

**Understanding Patterns of Pleasure Craft Tourism in the Canadian Arctic and
Implications for Safety Management**

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Abstract

This study establishes an understanding of pleasure craft tourism patterns in the Canadian Arctic from 1990-2013 with a focus on the implications for safety. Two specific objectives were fulfilled: 1. to develop an understanding of the pleasure craft vessel traffic and pleasure craft travel patterns, and 2. to develop an understanding of incidents, close-calls, and safety issues.

Pleasure craft tourism in the Canadian Arctic is a relatively new industry, although it is now the fastest growing marine sector. There is a lack of information on these small vessels compared to larger expedition cruise ships that have been the focus of research and management concerns. The increase in pleasure craft traffic in the region should raise concern about traffic patterns and safety of these tourists because they are traveling in a region with limited infrastructure, services, and search and rescue. Other issues that need examination are behaviour, monitoring, and control of pleasure craft vessels, indicating the need for insight into vessel numbers, spatial patterns, and vessel preparedness.

A literature review was conducted to identify the current state of pleasure craft tourism in the Canadian Arctic. This included identifying patterns of vessel traffic, defining pleasure craft and the management context, as well as the management context of Antarctica and the European Arctic. The literature review concludes with the knowledge gaps related to pleasure craft tourism that drive this study.

This research takes a quantitative approach to understanding pleasure craft vessels in the Canadian Arctic. This study uses two main sources of data: the Pleasure Craft Dataset, developed specifically for use in this project; and, a database of Internet web logs (Blog File) gathered for this research. The Pleasure Craft Dataset is comprised of information on pleasure crafts extracted from the NORDREG database (for the purposes of this research called the NORDREG pleasure craft data), a publicly available database collected by the Canadian Coast Guard, and data on additional vessels found through a literature review and Internet searches. The first phase of this study involved the analysis of the Pleasure Craft Dataset to explore spatial and temporal patterns. The second phase of this study used content analysis on blogs with material focusing on the experiences of pleasure craft travelers in the Canadian Arctic.

The results show an increase in pleasure craft tourism in the Canadian Arctic, and a concentration of vessels and vessels days spent in the Northwest Passage while demonstrating that not all vessels are reporting to NORDREG. Further, vessels days are now greater on a per vessel basis than in the past. The results also indicate an increasing number in pleasure craft travelers overall and the advent of larger pleasure craft vessels to the region. Blog analysis was able to provide insight into pleasure craft travelers and their vessels, including aspects such as: sites visited, behaviour of travelers, and interactions with the environment. The increase in vessel numbers, larger pleasure craft vessels in the region, and the spatial extension of vessel presence presents issues for

management in the Canadian Arctic regarding growing pressure on infrastructure, services, and search and rescue.

There is a need for further research on pleasure craft tourism in Arctic Canada. Additional research should contribute to this sector of marine tourism by focusing on understanding management implications related to safety, insurance, behaviour controls and monitoring. There is also a need for research into pleasure craft tourism experiences, the views of community members on the sector, and the role of individuals who provide support to pleasure craft tourism formally and informally. There is also a need for policies and guidelines to aid pleasure craft travelers, and quite possibly a need for mandatory pleasure craft reporting to ensure appropriate monitoring and support.

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Table of Contents

ABSTRACT	i
ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	viii
LIST OF TABLES	xi
1.0 INTRODUCTION	1
1.1. NEED FOR PLEASURE CRAFT TOURISM RESEARCH.....	1
1.2. OBJECTIVES.....	4
2.0. LITERATURE AND CONTEXT	6
2.1. INTRODUCTION	6
2.2. PATTERNS OF VESSEL TRAFFIC IN THE CANADIAN ARCTIC	6
2.2.1. Tourism Vessels in Arctic Canada.....	6
2.2.2. Climate Change and Vessel Traffic in the Canadian Arctic	7
2.2.3. Motivation for Polar Yachting and Arctic Canada Yachting.....	10
2.3. DEFINING PLEASURE CRAFT TOURISM.....	12
2.4. MANAGEMENT CONTEXT	16
2.4.1. The Canadian Vessel Tracking System.....	16
2.4.2. Management Context: Framework and Issues	18
2.4.3. Broader Context: Arctic Marine Shipping Assessment and the RCC Pilotage Foundation.....	25
2.5. YACHT MANAGEMENT IN ANTARCTICA AND THE EUROPEAN ARCTIC.....	27
2.6. KNOWLEDGE GAPS	29
3.0. METHODOLOGY	31
3.1. INTRODUCTION	31
3.3. THE NORDREG DATA.....	32
3.3.1. Extracting the NORDREG Pleasure Craft Data.....	35
3.3.2. ArcGIS.....	36
3.4. BLOG FILE.....	42
3.4.1. Data Collection	44
3.4.2 Content Analysis.....	48
3.5. CONCLUSION	52
4.0 RESULTS	54
4.1. ANALYSIS OF PLEASURE CRAFT DATA.....	54
4.2. PLEASURE CRAFT DATASET.....	54
4.2.1. Number of Vessels in Arctic Canada	54
4.2.2. Number of Voyages.....	57
4.3. ANALYSIS OF THE NORDREG PLEASURE CRAFT DATA	57

4.3.1. Registration of Pleasure Craft Vessels	58
4.3.2. Pleasure Craft Vessel Patterns.....	59
4.3.3. Persons on Board.....	74
4.4. BLOG ANALYSIS	78
4.4.1. Description Analysis.....	78
4.4.2. Key Word Analysis	87
4.4.3 Sites Visited.....	96
4.4.4. Reports of Other Vessels	98
4.4.5. Video Analysis.....	101
4.5. CONCLUSION	102
5.0 DISCUSSION	105
5.1. UNDERSTANDING PLEASURE CRAFT TOURISM THROUGH VESSEL PATTERNS	105
5.2. UNDERSTANDING PLEASURE CRAFT TOURISM THROUGH VESSEL BLOGS.....	110
5.3 SUMMARY.....	112
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	114
7.0. REFERENCES	118
8.0 APPENDICES	132
Appendix 1: Pleasure Craft Definitions.....	132
Appendix 2: <i>Arctic Marine Shipping Assessment 2009 Report Summary: Safe Passage in polar waters by Stonehouse and Snyder (2010)</i>	140
Appendix 3: Code Sheet (Abridged).....	141
Appendix 4: List of Vessels that Entered the NORDREG Zone More Than Once from 1990-2013 (Pleasure Craft Dataset). (Sources: NORDREG pleasure craft data, Brigham & Ellis, 2004, Orams, 2011, Headland, 2014, and Internet Searches). ...	148
Appendix 5: Registration of Pleasure Crafts in NORDREG Zone (NORDREG pleasure craft data from 1990-2013).	150
Appendix 6: Categories and Key Words Related to Safety.	151
Appendix 7: Analysis of Videos Used in Blogs (<i>Teleport</i> and <i>The Arctic Joule</i>) including Number of Videos, Length, Themes, and Key Topics.....	152

List of Figures

Figure 2.1: Map of NORDREG Reporting Zone Boundary, derived using the Canadian Coast Guard NORDREG Zone (CCG, 2013).....	17
Figure 3.1: NORDREG Zone and Canadian Arctic Communities.....	37
Figure 3.2: Points clipped to NORDREG Zone.....	38
Figure 3.3: Shipping Safety Control Zones.....	39
Figure 3.4: Clipping problem demonstrated with dark circles.....	41
Figure 4.1: Annual Counts of Pleasure Crafts in the NORDREG Zone from 1990-2013 (Pleasure Craft Dataset) showing NORDREG records and additional vessels. (Data Sources: NORDREG pleasure craft data; Brigham & Ellis, 2004; Orams, 2011; Headland, 2014; and Internet Searches).....	56
Figure 4.2: Regional Origins of Pleasure Crafts in NORDREG Zone (Data Source: NORDREG pleasure craft data from 1990-2013).....	59
Figure 4.3: Number of pleasure craft vessels from 1990-2013 using natural break categories (Data Source: NORDREG pleasure craft data).....	61
Figure 4.4: Number of pleasure craft vessels from 1990-2010 using natural break categories (Data Source: NORDREG pleasure craft data).....	62
Figure 4.5: Number of pleasure craft vessels from 2011-2013 using natural break categories (Data Source: NORDREG pleasure craft data).....	63
Figure 4.6: Change over time in the number of pleasure craft vessels for the two time periods using natural break categories (Data Source: NORDREG pleasure craft data).....	64
Figure 4.7: Number of vessel days from 1990-2013 using natural break categories (Data Source: NORDREG pleasure craft data).....	67
Figure 4.8: Number of vessel days from 1990-2010 using natural break categories (Data Source: NORDREG pleasure craft data).....	69
Figure 4.9: Number of vessel days from 2011-2013 using natural break categories (Data Source: NORDREG pleasure craft data).....	70

- Figure 4.10: Change over time in the number of vessel days for the two time periods using natural break categories (Data Source: NORDREG pleasure craft data).....72
- Figure 4.11: Recorded Number of Passengers on Board (POB) in NORDREG Zone from 1990-2013 (Data Source: NORDREG pleasure craft data).....74
- Figure 4.12: Recorded Number of Pleasure Craft Vessels and Recorded Number of Vessels Reporting Passengers on Board (POB) in NORDREG Zone from 1990-2013 ((Data Source: NORDREG pleasure craft data).....75
- Figure 4.13: Recorded Number of Pleasure Craft Vessels and Recorded Number of Vessels Reporting Passengers on Board (POB) in NORDREG Zone from 2000-2013 ((Data Source: NORDREG pleasure craft data).....76

List of Tables

Table 2.1: Sample of incidents involving Pleasure Crafts and other small vessels in Arctic Canada (Adapted from Johnston et al., 2013).....	21
Table 3.1: Number of Vessels with Blogs/ Books per Year from 1990-2013.....	45
Table 3.2: List of Vessels with Blogs.....	46
Table 3.3: Characteristics of Total Blog Population (n=39) and of Sample Blog Population (n=12).....	47
Table 4.1: Annual Counts of Pleasure Crafts in the NORDREG Zone from 1990-2013 (Pleasure Craft Dataset). (Data Sources: NORDREG pleasure craft data, Brigham & Ellis, 2004, Orams, 2011, Headland, 2014, and Internet Searches).....	55
Table 4.2: Number of Pleasure Craft Vessels by Shipping Safety Control Zone and Change in Number of Pleasure Crafts from 1990-2010 to 2011-2013 (Data Source: NORDREG pleasure craft data).....	66
Table 4.3: Number of Vessels Days by Shipping Safety Control Zone and Change in Number of Vessel Days from 1990-2010 to 2011-2013 (Data Source: NORDREG pleasure craft data).....	73
Table 4.4: Highly Visited Sites from 1990-2013.....	73
Table 4.5: Number of Pleasure Craft Vessels (Reporting and Non-Reporting) and Number of Persons Reported. (Data Source: NORDREG pleasure craft data).....	77
Table 4.6: Number of Vessels that Mentioned Specific Descriptors.....	79
Table 4.7: Quote from Blog that Demonstrates Equipment on Board.....	80
Table 4.8: Quotes from Blogs that Demonstrate Adventure as Reason of Voyage.....	81
Table 4.9: Quote from Blog that Demonstrates Research as Reason of Voyage.....	82
Table 4.10: Quote from Blog that Demonstrates Collecting Data During The Voyage....	82
Table 4.11: Quotes from Blogs that Demonstrate Multiple Reasons for Voyage.....	83

Table 4.12: Quote from a Blog that Demonstrates Preparation of Voyage.....	83
Table 4.13: Quotes on Preparation from <i>Bagan</i> (Theobald, 2009) and <i>Northabout</i> (Northabout: The Irish Northwest Passage, n.d.).....	84-85
Table 4.14: Quotes from Blogs that Mention Peter Semotiuk.....	86
Table 4.15: Number of Vessels Reporting Key Words in Regards to Government.....	87
Table 4.16: Quotes from Blogs that Mention NORDREG.....	88
Table 4.17: Number of Vessels Reporting Key Words in Regards to Ice.....	88
Table 4.18: Quotes from Blogs that Mention Ice.....	89
Table 4.19: Number of Vessels Reporting Key Words in Regards to Climate.....	89
Table 4.20: Quotes from Blogs that Mention Key Words in Regards to Climate.....	90
Table 4.21: Number of Vessels Reporting Key Words in Regards to Communications..	90
Table 4.22: Quotes from Blogs that Mention Key Words in Regards to Communications.....	91
Table 4.23: Number of Vessels Reporting Key Words in Regards to Reports/Charts....	92
Table 4.24: Quote from Blog that Mention Charts.....	92
Table 4.25: Quotes from Blogs that Mention Inaccurate Charts.....	93
Table 4.26: Number of Vessels Reporting Key Words in Regards to Issues.....	94
Table 4.27: Quotes from Blogs that Mention the Key Word “Stuck.”.....	95
Table 4.28: Quotes from Blogs that Mention the Key Word “Danger.”.....	96
Table 4.29: Number of Vessels that Mention Specific Sites.....	97
Table 4.30: Quote from Vessel Blogs that Mention Other Vessels.....	98-99
Table 4.31: Quotes from Blogs that Mention “Incidents and Close-Calls.”.....	100-101

1.0 Introduction

1.1. Need for Pleasure Craft Tourism Research

There has been a considerable amount of research on climate change in the Arctic in the past two decades demonstrating changes in climate conditions that are opening waterways for longer periods (ACIA, 2004; AMSA, 2009; Ford et al., 2010; Parsons et al., 2011; Rice, 2013; National Aeronautics and Space Administration, 2013). Climate change is causing a drastic decrease in summer ice cover in the Canadian Arctic (ACIA, 2004; Environment Canada, 2013). Since 1980, the Canadian Arctic has lost about 40% of its sea ice cover and most scientists believe that the Canadian Arctic could be entirely ice-free by the middle of the century, if not sooner (Goldenberg, 2013).

As this region continues to change, it increases the opportunities for human activity and, accordingly, has transformed tourism and visitation to Polar Regions (Ebinger & Zambetakis, 2009; Dawson et al., 2007; Johnston, 2006; Johnston, 2011; ACIA, 2004). The increased accessibility of Arctic waters has led to increased tourism ship traffic to Arctic Canada (Johnston et al., 2013; Pizzolato et al., 2013; Dawson et al., 2014). Tourism in the Canadian Arctic provides tourists with many opportunities while traveling including visiting significant sites of earlier historical exploration, the viewing of wildlife, and the experience of Inuit culture (Loverseed, 2008; Stewart et al., 2010). These tourism opportunities make the Canadian Arctic an attractive destination to tourists as climate change draws worldwide attention to the region (Lemelin, et al., 2010; Lajeunesse et al., 2011; Lemelin et al., 2013).

Small vessel tourism in pleasure crafts is the fastest growing marine shipping sector in the Canadian Arctic as of the 2012 season (Johnston et al., 2014). Johnston et al. (2013) point out that much less is known about how increased access in the Canadian Arctic waters has affected the smaller vessels and yacht traffic compared to the larger expedition cruise ships. Research on cruise ship travel in the Canadian Arctic demonstrates the growing level of cruise traffic in the region and, in particular, through the Northwest Passage (Stewart et al., 2010; Stonehouse & Snyder, 2010; Orams, 2010; Stewart et al., 2013; Dawson et al., 2014). Yet there is concern about the implications of the growing numbers of small tourism vessels.

One of the objectives of a scoping study by Johnston et al. (2013) was to report on the state of pleasure craft tourism in Arctic Canada. Results concluded that there is currently a limited amount of information available on this vessel sector in an accessible format for the Canadian Arctic, and that there are also management concerns about safety, security and sovereignty due to a widespread lack of knowledge. One source of information is the Northern Canada Vessel Traffic Services Zone (NORDREG). "Little specific information is known about pleasure craft vessels beyond the NORDREG numbers and very little is known about passengers and their behaviour in the Arctic" (Johnston et al., 2013 p.1). Limited data and knowledge on the pleasure craft sector in regards to vessel numbers, spatial patterns and vessel preparedness provides the backdrop for this research as the increase in traffic poses concerns for the safety of pleasure craft tourists (Johnston et al., 2013). For example, a group of seven Americans filming a reality TV show "Dangerous Waters" radioed for assistance from the

Canadian Coast Guard because they were unable to manage the Arctic conditions in 2013. As reported in the *National Post*, the regional manager of communications for Fisheries and Oceans Canada said “the group had encountered ice, high winds, and cool temperatures and felt they were not safe and were at risk if they did not request rescue/evacuation assistance...” (Hopper, 2013). Also in 2013, the rowing crew of *The Arctic Joule*, decided to end their journey early when sea ice and wind conditions made their trip to difficult to complete (CBC News, 2013).

Incidents such as these highlight the potential for problems related to safety and security, but there is limited knowledge about this growing tourism sector (Johnston et al., 2013). Pleasure craft vessels are not required to report to NORDREG (the Canadian Coast Guard, 2013b) in Arctic Canada, although most vessels appear to be reporting. Further, these vessels travel in a region with limited search and rescue capacity and other government support, and are able to land at numerous sites despite limited infrastructure and services. This raises a number of issues in relation to behaviour, monitoring, and control of pleasure crafts for government and communities because there is an insufficient management framework for these vessels in Arctic Canada at present (Johnston et al., 2013).

This thesis seeks to identify trends and patterns for pleasure craft vessel traffic in the Canadian Arctic and further seeks to understand the safety implications of pleasure craft tourism given the need to manage the effects of the increase in vessel traffic, particularly those effects related to incidents and tourist safety. This thesis will investigate aspects of the pleasure craft sector in the Canadian Arctic through two

approaches: examining available data on vessel traffic and analyzing web postings of pleasure craft travelers who have ventured into the increasingly accessible Canadian Arctic waters.

1.2. Objectives

This proposed research project includes the following research objectives:

1. Develop an understanding of pleasure craft vessel traffic and pleasure craft travel patterns; and,
2. Develop an understanding of incidents, close-calls, and safety issues.

This study is aimed at gathering knowledge related to pleasure craft tourists in the Canadian Arctic in order to develop an understanding of spatial patterns, tourist activities during travel, and in the time surrounding travel such as preparation, and incidents or difficulties. It is also aimed at providing information that will be useful in order to effectively manage the potential of safety hazards for future travel to Arctic Canada.

To meet the objectives of this research, this study was undertaken in two phases. The first phase involved the comprehensive analysis of the Pleasure Craft Dataset, comprised of a subset of information extracted from NORDREG data (NORDREG pleasure craft data) and information on additional vessels found through a literature review and Internet searches. This amalgamation was created in order to develop an understanding of pleasure craft vessel traffic and patterns from information currently available on this sector of marine tourism. The second phase of this study involved a

content analysis of pleasure craft tourism blogs for voyages in the Canadian Arctic from 1990-2013. This phase of the study was undertaken in order to develop an understanding of incidents, close calls, and safety issues occurring during Canadian Arctic pleasure craft travel.

The next chapter provides an overview and discussion of the relevant literature that informs this research, including patterns of vessel traffic in the Canadian Arctic, defining pleasure craft and the management context, as well as the management context of Antarctica and the European Arctic and concluding with the knowledge gaps that drive this study. Chapter Three begins with the description of the research aims and then follows the associated phases of data collection and analysis for the Pleasure Craft Dataset, with a large focus on the NORDREG data, and the development of the Blog File. Chapter Four presents an analysis of the results found through this research and Chapter Five presents a discussion of the implications for safety management in the Canadian Arctic. The thesis concludes in a presentation of the importance of this research and suggestions for future research.

2.0. Literature and Context

2.1. Introduction

Little is currently known about pleasure craft vessel traffic and pleasure craft travel patterns in Arctic Canada, particularly in relation to safety issues, incidents, close calls, and traveler preparation. This literature review examines what we do know about patterns of vessel traffic in the Canadian Arctic, tourism vessels, climate change and vessel traffic, and motivation for polar yachting. It also provides a definition of pleasure craft in relation to other tourism vessels. The management context of pleasure craft tourism is described, with a focus on federal regulation and search and rescue, and relevant international management is outlined. The literature review concludes with a discussion of yacht management in Antarctica and the European Arctic and the knowledge gaps related to pleasure craft tourism in the Canadian Arctic.

2.2. Patterns of Vessel Traffic in the Canadian Arctic

2.2.1. *Tourism Vessels in Arctic Canada*

The circumpolar north has fascinated explorers and researchers for centuries. In the 1850s Arctic marine tourism via commercial steamship was initiated in Norway and by the 1880s Arctic marine tourism was a flourishing industry in a few particular sites. Arctic destinations included Norway's fjords and North Cape, transits to Spitsbergen, Alaska's Glacier Bay and the gold rush sites as far north as Homer, riverboat cruises in the Canadian Yukon, and cruises to Greenland, Baffin Bay, and Iceland (Snyder, 2008). The expeditions that received the most attention were those of the early visitors to the

Polar Regions, the European explorers and adventurers, whose journeys were supported by private donors and public fundraising campaigns (Orams, 2010).

The Canadian Arctic initially was a focus for European exploration and, in 1906, Roald Amundsen became the first to sail through the Northwest Passage (Cross, 2009). Though the passage has been traversed many times by icebreakers and small working ships over the last 25 years (Dueck, 2012), it is only recently that tourism vessels have had a large presence. The area's remoteness and a lack of marine facilities and support continue to make this a difficult journey for smaller vessels (Dueck, 2012).

According to Snyder & Stonehouse (2007), the most significant change for yachts cruising in the Canadian Arctic is the opening up of the Northwest Passage between the North Atlantic and the North Pacific. The decline of the annual ice cover is making it easier to sail through the Arctic for an increased portion of the year (ACIA, 2004; Leitzell, 2011). The window of opportunity, when there is enough open water to sail in the passage, is only a few weeks long; even then the ice is a constant danger and ships may be forced to wait for ice to melt in crucial parts of the passage (Dueck, 2012).

2.2.2. Climate Change and Vessel Traffic in the Canadian Arctic

Although climate change is occurring worldwide, it is the Arctic that is facing the most obvious effects of change as temperatures are increasing at twice the global average in the Arctic (ACIA, 2004; IPCC, 2007; Mathiesen, 2013). Abundant natural resources and climate change issues increasingly focus national interest on an Arctic region in which retreating ice coverage with ice-free summer seasons is becoming more

prominent (ACIA, 2004; Parsons et al., 2011). “This decline is expected to accelerate, with the near total loss of sea ice in summer projected for late this century” (ACIA, 2004, p. 19), although some scientists have suggested that the decline may be even quicker than expected. The Canadian Arctic will experience a nearly ice free summer season starting as early as 2050 (see Brigham & Ellis, 2004). The overall trend of declining sea ice is expected to continue, although differences in sea ice extent annually highlight the variability in sea ice extent from one year to the next (Rice, 2013; National Aeronautics and Space Administration, 2013).

The retreat of annual ice cover increases the mobility of ships in Arctic waters as milder sea ice conditions create new opportunities for shipping, as well as providing shorter shipping routes from the Atlantic to the Pacific (ACIA, 2004; Parsons et al., 2011; Stewart et al., 2013). The reduction of sea ice cover thus far has improved shipping access and is expected to be beneficial for further expansion (Pizzolato et al., 2013). The widespread decline of sea ice has attracted attention to the Arctic with respect to the possibilities of an extended and less hazardous summer season and an increase in overall ship traffic (IPCC, 2004). As the changing sea ice regimes increase the opportunities for shipping (ACIA, 2004; Parsons et al., 2011), they also improve access for marine tourism within Arctic Canada (Stewart et al., 2012; Stewart et al., 2013; Johnston et al., 2013; Johnston et al., 2014; Rottem, 2013).

The obvious increase in marine tourism of small and medium sized cruise ships is due to the decrease in ice cover and the availability of icebreakers for commercial tourism travel in the Canadian Arctic (Dawson et al., 2007). Further, the Canadian Ice

Service listed the southern routes of the Northwest Passage navigable in 2007 (Canadian Ice Service, 2009), creating an influx of travel through the Passage (Orams, 2010; Maher 2010 & 2012; Dawson et al., 2011; Arctic Shipping Summary, 2012; Johnston et al., 2013; Stewart et al., 2013). Pizzolato et al. (2013) explain that there is an increase in pleasure craft vessels through the Canadian Arctic in 2007, which coincides with a record low September ice minimum.

In 2010, the NWP experienced the highest number of cruise ships in the area's history, representing a 57% increase from 2006 (Stewart & Dawson, 2011). But less ice and more vessels does not mean that there are easier ice conditions for marine operations (ACIA, 2004; Johnston, 2006; Dawson et al., 2007; Stewart et al., 2007). There is variability in summer sea ice extent each year due to ongoing climate change and weather patterns as can be seen with the 2013 summer sea ice extent (Rice, 2013). The unpredictable weather, continuous moving ice hazards, changes in cold air and water temperatures and incomplete charting, make routes less dependable than in the past (AMSA, 2009; Arctic Shipping Summary, 2012) and compromise the ability for safe travel throughout the Canadian Arctic, making search and rescue operations in the Arctic more hazardous and complex (Dawson et al., 2014; Johnston et al., 2012; Rottem, 2014; Stewart et al., 2013). "Inadequate charting of Arctic waters" is seen by Canadian ice experts as "the biggest issue in the Arctic," with only 10% of the Arctic waters charted to "modern-day standards" (George, 2010; Davidson, 2012). This may be particularly troubling for cruise ship operations as these vessels tend to stay out of the better travelled shipping lanes (George, 2010; see also Dawson et al., 2014).

2.2.3. Motivation for Polar Yachting and Arctic Canada Yachting

Expanding transportation technology, increases in disposable income and discretionary time, and personal motivations to visit new and challenging areas have demonstrated that all parts of the globe, including the Polar Regions, are not beyond tourist access. According to Snyder & Stonehouse (2007) travel to the Polar Regions has evolved from a few curious people to “an enormous market comprised of individuals seeking personal challenges and involvement with nature,” history and culture, and adventure (p. 17).

Marine tourism is the largest growing sector of polar tourism. “It appeals to millions of passengers aboard cruise and expedition ships, to the smaller numbers in chartered ships seeking wildlife viewing and sport, and to individual adventure mariners in vessels ranging in size from motor yachts to kayaks” (Stonehouse & Snyder, 2010 p. 101). An increasing number of commercial charter yachts and privately owned vessels are venturing to the Arctic and this trend will continue as there is also an increase in recognition that cruising in this Polar Region is now possible (Orams, 2010).

The main attractions of polar tourism are the differences between polar environments and those of the inhabited, everyday world, coupled with the relative ease with which they can now be reached. Differences of scenery, wildlife, culture and history all play their part in attracting tourists in tens of thousands annually to the Antarctic, and hundreds of thousands to the Arctic. (Snyder & Stonehouse, 2007 pp.40)

Tourism in the Arctic appeals to a diverse clientele that can be identified in five different market segments: the mass market, the sport fishing and hunting market, the nature market, the adventure tourism market, and the culture and heritage tourism

market (Stonehouse & Snyder, 2010). The following quote demonstrates that motivations to tour the Arctic can vary and contribute to more than one market segment: adventure and culture/heritage.

Hundreds of men died or simply vanished trying, existing charts were nineteenth century at best, and there was no guarantee one would make it to the other side alive. If polar bears didn't get you, the ice could... I told them that win, lose, or sink, I wanted to try to add to my list of awards for my filmwork- which included an Emmy in 1982 for my documentary on the America's Cup- and make a documentary about the Passage, with my journey as the centerpiece. (Theobald & Kreda, 2012 pp. 3)

The culture and heritage tourism market is a sector for tourists who want to visit historic places and see culture that differs from their own. These travelers want to experience the lives and traditions that demonstrate aboriginal ways of life in the Arctic and learn about other historical topics that interest them (Stonehouse & Snyder, 2010). Bruce Parry explains his motivation in his book *Arctic*: "I travel with the last of the Inuit hunters, to understand more about their culture and traditions, which many believe to be disappearing as quickly as the sea ice around them" (Parry & Lewis-Jones, 2011 p. 8). The nature tourism market attracts wildlife enthusiasts, photographers, and birders who visit the Polar Regions because of the "unique opportunity to witness diverse species of wildlife in their natural habitats" (Snyder, 2007 p. 62).

The desire for challenge and personal accomplishment characterizes the motivations of the adventure tourism market. Jesse Osborn, sailor for *Empiricus*, shared his thoughts about why the Northwest Passage has become an increasing draw to sailors: "somehow we modern 'Explorers of the North' have married ourselves to this concept that the passage itself (is) a Right of Passage" (George, 2013). This relates to a

“prestige value” for many travelers who want to do things that others have not (Orams, 2010). There are many motivations that characterize the adventure tourism market including testing one’s physical and mental stamina (Snyder & Stonehouse, 2007) as a number of visitors undertake voyages to explore, discover, and embark on extreme activities (Orams, 2010). For example:

The expedition yacht *Tara* deliberately spent the northern winter of 2007/2008 trapped in the Arctic ice pack to undertake an Arctic drift across the top of the world reminiscent of the voyage of the *Fram* over 100 years ago. (Orams, 2010 pp. 19-20)

Some polar adventurers have been motivated to replicate the exploration routes by means of alternative transport modes (Snyder & Stonehouse, 2007). “I’m on a journey around the Arctic Circle to discover what the modern world heralds for the Far North. Over one bright Arctic summer, I embark on a seventh-month journey, by boat and bush-plane, truck and skidoo, reindeer and dog-sled” said Bruce Parry (Parry & Lewis-Jones, 2011 p. 8). For the adventurer, personal skills and experience, suitable equipment, knowledge of environmental conditions, sufficient preparation and identification of emergency support services play vital roles in the pleasurable and safe achievement goals when traveling in the Canadian Arctic (Snyder & Stonehouse, 2007). According to Lamers et al. (2007), extreme adventure tourists in pleasure crafts are becoming more prevalent as tourism in the Arctic expands.

2.3. Defining Pleasure Craft Tourism

According to Orams (2010), small vessel based tourism on motor yachts and sailboats can be divided into two main types: yachts that operate as commercial tours

with fee-paying passengers and those that are private expeditions or cruises aboard privately owned vessels. The main focus of this research is on Pleasure Craft Tourism, the private expeditions.

The *Canada Shipping Act, 2001* defines a pleasure craft as a “vessel that is used for pleasure and does not carry passengers, and includes a vessel of a prescribed class” where prescribed refers to regulations made by the Governor in Council (Minister of Justice, 2015p. 3). A pleasure craft is different than a cruise ship. A cruise ship is “a ship that is used exclusively for the carriage of passengers that offers overnight accommodations,” while a pleasure craft is a “vessel, boat or craft that is used exclusively for pleasure and does not carry passengers or goods for hire, reward, remuneration or any object of profit” (Canadian Coast Guard, 2013a).

Definitions, extensions and interpretations appear in Canadian legislation and in international sources. A “Canadian pleasure craft,” outlined by the *Collision Requirements* in the *Canada Shipping Act, 2001*, means a pleasure craft that is licensed to Canada and is “principally maintained and operated in Canada and not registered in or licensed or otherwise legally documented by another state” (Minister of Justice, 2008 p. 1). Various examples of a pleasure craft (described in Transport Canada, 2011a; Transport Canada, 2015; Canadian Coast Guard, 2013) are:

- Privately owned vessels used for recreational purposes;
- A privately owned vessel used to entertain guests;

- Rented vessels used for recreational purposes where friends and invited and contribute money for expenses;
- Vessel used to transport persons or goods as a favour;
- Vessel used as an essential means of transportation;
- Vessel provided with a rented cottage;
- Vessel occasionally chartered or rented out by owner to third parties for recreational purposes. Rental does not include crew;
- A rental vessel operated by the individual renting the vessel (no crew), including the period when an 'orientation skipper' is on board;
- Kayak, canoe, or personal watercraft (e.g., jet ski) lesson.

All types of vessels, including human powered vessels (e.g. canoes, kayaks), can be considered pleasure crafts depending on the conditions under which they are used. If a vessel is used for "pleasure, recreation or daily living," it is a pleasure craft (Transport Canada, 2015). A vessel used for anything other than pleasure, recreation or daily living is considered a non-pleasure vessel, and is often referred to as a commercial vessel.

In the context of regulation for the Canadian Arctic, it is not the length of pleasure craft vessels that is important, but rather whether the vessel is commercial. A commercial vessel is "a vessel that is not a pleasure craft or used for commercial fishing" (Transport Canada, 2011a p. 4). The term commercial relates to vessels that are

primarily operating for profit, normally with paying passengers (Transport Canada, 2011b). A commercial vessel is also considered a non-pleasure craft:

Both 'commercial vessel' and 'non-pleasure vessels' are used in this guide to mean 'vessel other than a pleasure craft.' Vessels of all types, including human-powered vessels and vessels that are owned by any level of government and government entities like fire and police departments, are commercial vessels unless used only for pleasure. (Transport Canada, 2011a, "Introduction")

If the owner of a vessel rents or charters the vessel, without crew, to someone else who uses the vessel for pleasure, then it is defined as a pleasure craft; if the owner provides the master or operates the vessel, the vessel is classified as commercial (Transport Canada, 2011a). Some commercial vessels include: "workboats, tugboats, boom boats and other non-passenger vessels, and special purpose vessels/non-conventional vessels such as white water rafting, air cushion vehicles, amphibious and sail training vessels" (Transport Canada, 2011b). Regulatory definitions pertaining to small vessels can be found in Appendix 1.

The Canadian Coast Guard defines vessels in its tracking database so that it may track vessel traffic by category. This research classifies the following categories used in the NORDREG database as pleasure craft: Pleasure Craft, Sail/Row Boats, Row Boat, Adventurer, Pleasure Crafts, and Home Made Boats. In the database canoes and kayaks are not mentioned, suggesting that their travel is not tracked in NORDREG, though this is not completely clear.

2. 4. Management Context

2.4.1. *The Canadian Vessel Tracking System*

The Canadian vessel tracking system was created in the *Canada Shipping Act* for ships operating in Canadian Arctic Waters north of 60°N, as well as in Hudson Bay, James Bay, Kigmallit Bay and Ungava Bay (Canadian Coast Guard, 2013) (Figure 2.1). The objectives of this system – called NORDREG - are the enhancement of safety and movement of traffic, the strengthening of Canadian sovereignty in Arctic waters, and the prevention of pollution of Arctic waters (Knight, 2010).

Mandatory vessel reporting under NORDREG began in July 2010, making reporting compulsory instead of voluntary for large vessels (Canadian Coast Guard, 2013). Compliance is mandatory for all vessels with a gross tonnage of 300 or more, and for vessels involved in towing or pushing operations with a combined gross tonnage of 500 or more (Canadian Coast Guard, 2013). Mandatory reporting also applies to all vessels of any size that carry, tow or push cargos of pollutants or dangerous goods (Canadian Coast Guard, 2013). NORDREG is directed at larger ships as these pose the “greatest risk to the marine environment” (Standing Senate Committee on Fisheries and Oceans (SSCFO), 2009 p. 41). Reporting requirements for vessels operating in the NORDREG zone include: a Sailing Plan (required prior to entering the zone); Position Reports (required upon entry and then daily thereafter); a Final Report (required upon berthing or departure); and Deviation Reports (required whenever a vessel deviates from its Sailing Plan) (Knight, 2010).

Reporting to NORDREG provides access to a number of services including: ice information, routing, icebreaker assistance, and search and rescue response (Knight, 2010; Johnston et al., 2013). Even before mandatory reporting, the Canadian Coast Guard and Transport Canada estimated that 98% of vessels that participated in NORDREG did so voluntarily because of the services listed above (Rompkey & Cochrane, 2008). Following the change in regulation, it is likely that most small vessels are reporting for these reasons, as well (Johnston et al., 2013).

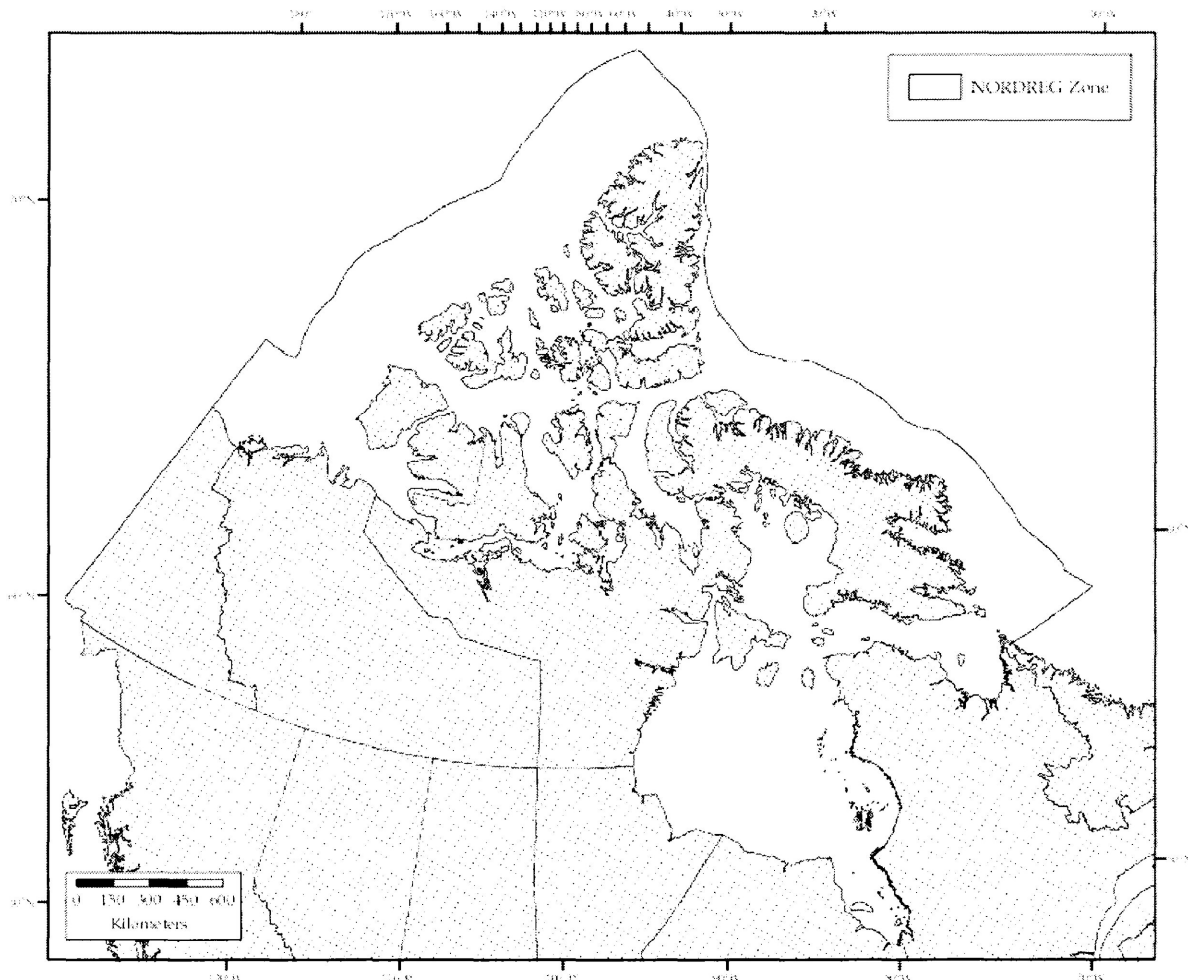


Figure 2.1: Map of NORDREG Zone Boundary, derived using the Canadian Coast Guard NORDREG zone (CCG, 2013).

Pizzolato et al. (2013) analyzed data obtained via the NORDREG system for the years 1990 to 2011, finding that vessel traffic has increased and the season length has expanded. According to Johnston et al. (2014), the pleasure craft sector is the fastest growing sector in comparison to other vessel categories in Canadian Arctic and the long-term trend indicates that there will be a continuing increase in pleasure craft activity. Johnston et al. (2013) examined pleasure craft increases for 1990 to 2012 using the NORDREG data, noting 20 vessels in this category were recorded in the system in 2011, an increase from 12 the year before, suggesting that 2011 may be viewed as a watershed year in the development of the sector.

2.4.2. Management Context: Framework and Issues

Given that pleasure craft vessels are not required to report to NORDREG or provide an itinerary to authorities, it is possible that the rate of growth for these vessels in the Canadian Arctic is higher than seen in the data (Pizzolato et al., 2013). For the entire Arctic region, “There are no summative data regarding the number of yachts cruising the Arctic Circle region, but there is little doubt that it is substantial and would number on the thousands each year” (Orams, 2010 p. 15). Johnston et al. (2013) recommended that research be undertaken to ascertain the actual numbers of pleasure craft and the behaviour of pleasure craft tourists given the increasing numbers and gaps in the management framework. Snyder (2008) emphasizes the need for authorities to address the challenges related to safe passage and resource management in the Canadian Arctic given the increasing tourism. Adventure tourists aboard private motor

yachts, sea kayaks and sailboats might not be familiar with the features and conditions they are likely to encounter in the Canadian Arctic, placing themselves at risk and becoming candidates for search and rescue operations (Stonehouse & Snyder, 2010).

Few studies have examined the sector of pleasure craft tourism and how it should be managed. Yet, there is concern among managers about deficiencies in the management system (Johnston et al., 2013) and from Arctic community residents, such as this individual who expressed a concern about lack of forewarning of visits "...we get a lot of the small crew like sail boats; we had ten of them last year so I'm expecting some to show up within the next month, unannounced as usual..." (quoted in Stewart et al, 2013, p. 154). Community members and government officials alike may be unaware of voyages being made in and around their communities (Stewart et al., 2013; Johnston et al., 2013). According to Snyder (2008) the numbers of tourists who are already traveling Arctic waters now exceeds the emergency response capabilities of local communities, especially those within Canada, as there is limited search and rescue (SAR) infrastructure accompanied with high costs of SAR.

Through interviews with key stakeholders, Johnston et al. (2013) identified the main concerns about the pleasure craft sector as visitor safety, the preparation of visitors and vessels, sovereignty, behaviour control, regulations, monitoring and enforcement. Stakeholders interviewed consisted of those involved in managing and supporting the pleasure craft sector (federal and territorial government agencies and those involved in tourism marketing and provision) in Arctic Canada. These management stakeholders provided concerns about visitor safety such as tourists

traveling without notification of route plans, incomplete tracking of vessels, insufficient vessel traffic for quick response rates, and incidents that may not be reported (Johnston et al., 2013).

Johnston et al. (2013) provide a list of incidents involving pleasure craft that describes the concerns about pleasure craft preparation: vessels not suited for navigation in Arctic waters; a lack of knowledge about the Arctic environment and limitations of services for marine travel; incomplete understanding of regulations and jurisdictions; lack of awareness of acceptable behaviour in communities and environments; and, a lack of Arctic experience and ice navigation. Table 2.1 outlines a number of recent incidents involving small vessels and provides details on the nature of the incident and the issues related to the incident. These incidents emphasize the concern described by (Stonehouse & Snyder, 2010 p. 118): “Independent marine travel in regions with unreliable telecommunication services may create dangerous situations to which Arctic governments can respond only with difficulty.” Search and rescue agencies rarely know the location or schedules of adventure tourists, and have no knowledge of the skills they may possess. Given that these adventurers view the Arctic as newly accessible due to climate change, this small but potentially risk-taking market segment will probably continue to grow (Stonehouse & Snyder, 2010).

Table 2.1: Sample of incidents involving Pleasure Crafts and other small vessels in Arctic Canada (Source: Adapted from Johnston et al., 2013).

Year	Vessel Name	Incident	Concerns
2012	<i>Fortrus</i>	Investigation of Crew and Passengers	<ul style="list-style-type: none"> • Passenger Behaviour (Safety) • Liquor and Firework Violations • Interactions with Wildlife
2009	<i>Silent Sound</i>	Immigration Rules and Regulations	<ul style="list-style-type: none"> • Breaking the law (Security) • No Immigration Clearance (Sovereignty)
2007	<i>Berserk II</i>	Immigration Rules and Regulations	<ul style="list-style-type: none"> • Hid two crew members (Sovereignty) • Passenger Behaviour (Safety)
2006	small motorboat	Immigration Rules and Regulations	<ul style="list-style-type: none"> • Re-entry into Canada (Sovereignty)
2005	<i>Jotun Arctic</i>	Trapped in Ice	<ul style="list-style-type: none"> • Canadian Coast Guard Rescue (Safety)
2005	<i>Idlewild</i>	Trapped on top Ice Flow	<ul style="list-style-type: none"> • Canadian Coast Guard Rescue (Safety)

The “combination of the environmental conditions and scarce emergency infrastructure is a serious threat” to the lives of tourists aboard ships that travel through these waters who may not be acquainted with the environmental features and hostile conditions they encounter while in the Canadian Arctic (Snyder, 2008 p. 21).

Further, navigation aids need updating, including marine charts and ice information (Brigham & Ellis, 2004). Direct communication is the principal means for alerting Search and Rescue and so it is essential to have equipment on board marine vessels that is compatible with SAR systems (Government of Canada, 2013). For example, the marine mobile radio and the emergency position indicating radio beacon

(EPIRB) as well as the other various forms of alerting equipment (Government of Canada, 2013) are all compatible with the Search and Rescue systems. Response to alerts may come from a variety of areas of the marine community as the type of responses could range from “a dedicated SAR resource to a private vessel operating a close distance to the vessel in distress” (Government of Canada, 2013 p. 11). It is the “degree of urgency, the type of emergency, the availability of resources, and the location” that are all key elements that help in determining the type of response in a given situation (Government of Canada, 2013 p. 11).

In assessing the state of the Search and Rescue system in Canada, The Office of the Auditor General (2013, p. 2) noted that “significant improvements are needed if they are to continue to adequately respond and provide the necessary personnel, equipment, and information systems to deliver SAR activities effectively.” Snyder (2008) notes that the Arctic’s cold air and water temperatures require quick and efficient rescue of capsized vessels and tourists aboard lifeboats and rafts. These dangerous conditions exist in a region that has very scarce emergency response resources and where long distances result in lengthy response times. In an interview with *Nunatsiaq Online*, Jean-Pierre Lehnert, head of Marine Communications and Traffic Services office in Iqaluit said that the Coast Guard does not hear much from pleasure craft vessels until they are stuck in ice (Varga, 2013). “When they call us to say they need help, the icebreaker could be sitting 800 miles away,” said Lehnert (Varga, 2013).

The Department of National Defense (DND) and Fisheries and Oceans Canada (DFO) operate three Joint Rescue Centres (JRCCs) and two Maritime Rescue Sub-

Centres (MRSCs) that provide search and rescue operations 24 hours a day, 365 days of the year in support of the marine activity in Canadian waters (Government of Canada, 2013). Operating under the Department of Fisheries and Oceans, the Canadian Coast Guard (CCG) is the “main presence” in Arctic Canada as it provides “marine safety and environmental protection services as well as essential at-sea support to other federal government departments and agencies (SSCFO, 2009 p. viii), although “Canada’s presence in the Arctic needs to be enhanced in terms of ships, personnel, administration offices, surveillance, shipping regulations, search and rescue, and oil spill remediation” (SSCFO, 2009 p. viii). In order to do so, the *Report of the Standing Senate Committee on Fisheries and Oceans* suggests that more funding be put into the CCG. The CCG ships break ice, escort other ships, re-supply communities, provide navigational aids, chart and survey waterways, and provide opportunities to fisheries and environmental researchers as they protect Canada’s sovereignty in the North.

The CCG also provides an enormous amount of support in marine safety in the Arctic alongside the Department of National Defense with the overall coordination of Search and Rescue (SAR). The Minister of National Defense is responsible for Canada’s SAR Program, but the CCG is responsible for the marine component (SSCFO, 2009). The CCG also delivers Marine Communications and Traffic Services, including “radio operations, to help ensure the safety of people at sea and the protection of the environment through effective traffic management and efficient movement of shipping” (Rompkey & Cochrane, 2008 p. 1). The Canadian Coast Guard also “help to ensure the safe voyages of vessels by reducing the risks of grounding and collision,” by placing

and maintaining over 1,500 visual and aural aids to navigation and provide monthly Notices to Mariners (Rompkey & Cochrane, 2008 p. 1). On average, there are 11 marine SAR incidents per year in Canada's northern seaways, typically involving pleasure crafts or local community vessels that the CCG tends to (Rompkey & Cochrane, 2008).

The Marine Transportation Security Act requires a submission of a pre-arrival information report 96 hours before entering Canadian waters to "non-SOLAS (International Convention for the Safety of Life at Sea) vessels over 100 gross tons or carrying more than 12 passengers, and SOLAS (Safety of Life at Sea) vessels over 500 gross tons" (SSCFO, 2009 p. 40). This Act exempts vessels such as pleasure crafts, fishing vessels, and government vessels from reporting. According to the *Canadian Shipping Act, 2001*, persons on vessels that intend to pass through Canadian waters and who do not seek to enter Canada are not required to report to the Canada Border Services Agency under the Customs Act (SSCFO, 2009).

The *Canadian Shipping Act, 2011* states that the Minister of Transport may designate persons as 'pleasure craft safety inspectors' or 'enforcement officers' who have the ability to inspect a pleasure craft (pp. 123). These inspectors and officers have the ability to stop or board a pleasure craft at any time; "direct any person to put into operation or cease operating any machinery or equipment on the craft" (p. 124); instruct that the craft not be moved until the inspection is complete; direct persons to move the craft to a safe place or direct that it not be operated if the officer/instructor has grounds to believe that the vessel does not meet requirements or regulations, exposes any person to serious danger, and/or if they have reason to believe that the operator does not meet

requirements of the regulations (Minister of Justice, 2012). “An enforcement officer who has reasonable grounds to believe that an offense has been committed or is about to be committed...” under the *Canada Shipping Act, 2001*, “...by a pleasure craft or any person on board a vessel may stop and board the craft or vessel and take any reasonable action to ensure public safety or protect the public interest” (Minister of Justice, 2012 p. 108).

As this sector of marine travel in the Arctic continues to grow, so do the concerns about sovereignty and security: a lack of domain awareness; incomplete reporting to authorities; no mandatory regulating authority; limited means of reinforcing sovereignty on water; and minimal government of Canada presence (Johnston et al., 2013). A major concern in regard to monitoring traffic relates to the fact that AIS (Automatic Identification System) technology is not currently required on small vessels. Unless a vessel voluntarily reported to NORDREG or if it was detected in Canada’s waters (by another vessel or the Canadian Coast Guard), the whereabouts of the vessels would be unknown.

2.4.3. Broader Context: Arctic Marine Shipping Assessment and the RCC Pilotage Foundation

The Arctic Council (2009) outlined management actions required to improve the safe passage of ships in polar waters in a report entitled *Arctic Marine Shipping Assessment 2009 Report* (AMSA Report). The decision to conduct the AMSA followed the release of two Arctic Council reports: *The Arctic Climate Impact Assessment* (ACIA) and the *Arctic Marine Strategic Plan* (AMSP). The ACIA outlined the impacts of climate change in the Arctic and one of the key findings was that “reduced sea ice is very likely

to increase marine transport and access to resources” (Arctic Council, 2009 p. 2). The second report, the Arctic Marine Strategic Plan (AMSP), presented goals for protecting the Arctic marine environment. The AMSP called for the “future application of an ecosystems approach to the Arctic Ocean and for a comprehensive assessment of Arctic Marine Shipping” (Arctic Council, 2009 p. 2). The Arctic Marine Shipping Assessment’s “central focus is on ships: their uses of the Arctic Ocean, their potential impacts on humans and the Arctic marine environment and their marine infrastructure requirements” (Arctic Council, 2009 p. 2). Increasing the safety of polar cruise transits and responding to emergencies is based on two principles: preventing harm and improving incident response capabilities. A summary of specific actions needed to accomplish those principles written by Stonehouse and Snyder (2010) can be found in Appendix 2. Similar to the AMSA, safety is the driving factor behind the RCC Pilotage Foundation.

The RCC Pilotage Foundation (RCCPF) is a voluntary run organization led by “yachtsmen to provide pilotage and passage planning information for cruising areas around the world” (RCC Pilotage Foundation, n.d.). The Foundation “collects and researches written, photographic and chart information relating to small boat pilotage, navigation and operation, climate and weather conditions, including information from remote areas of the world where other sources of information are scarce or non-existent” (RCC Pilotage Foundation, n.d.). The foundation then publishes this information for the public in the form of books and downloads; e-books, website passage planning guides, and other media (RCC Pilotage Foundation, n.d.). Russell,

following consultations with yachtsmen who have experience in Arctic waters, wrote a publication entitled *Arctic and Northern Waters*, which “seeks to consider the implications for yachts heading north into the Arctic oceans from the Pacific and the Atlantic”(2011, “Forward”). This publication contains detailed information about sailing in the Arctic including: planning for an Arctic voyage, approaching and leaving the Arctic, the Northwest Passage, the Northeast Passage, and the Aleutian Islands. “*Arctic and Northern Waters* is an invaluable planning guide for adventurous yachtsmen and women” (RCC Pilotage Foundation, n.d.).

“Maps, marine charts and tide tables can be supplied and it is hoped that adventurers will responsibly seek these essential aids to navigation. Emergency communication instructions in the form of emergency radio frequencies, protocols, directional beacons and Standard Operating Procedures for search and rescue (if available) can also be provided. Again, it is essential for adventurers to avail themselves of these in order to safely and pleurably pursue their activities.” (Snyder & Stonehouse, 2007 pp. 64-65)

2.5. Yacht Management in Antarctica and the European Arctic

According to Johnston et al. (2013), it is important to examine the approaches to yacht tourism management in the Antarctic as well as regions in the Circumpolar North for potential regulatory development in Canada, especially “guidelines for tourists including contingency plans, SAR, insurance and liability, environmental impact, permitting/authorization” (p. 15). Incidents involving pleasure crafts in Antarctica have led to policies for yacht tourism management in that region (Johnston et al., 2013). Though all vessels present environment risks, private yachts are of more concern than commercial vessels for environmental impacts because some yachts enter Antarctic waters without appropriate knowledge of the rules of best practice and enter without

permits (Krakau & Herata, 2013). Krakau & Herata (2013) noted the risks that pleasure craft sailors take on themselves, they also present to potential rescue teams if the sailors are 'inadequately prepared' for their travels. Through national permitting, providing information for prospective tourists and the regulations of technical yachting have been a greater focus following the sinking of a pleasure craft in 2010/11, *Berserk* (Johnston et al., 2013). Existing in conjunction with national permitting and regulations in Antarctica is the work of a tourism industry association, the International Association of Antarctica Tour Operators (IAATO), formed in 1991 as a member organization to advocate, promote, and practice safe and environmentally responsible private sector travel to Antarctica (Landau & Splettstoesser, 2007). Currently, more than 100 companies and organizations from 19 countries are members of IAATO (IAATO, 2013).

Together we have established extensive procedures and guidelines that ensure appropriate, safe and environmentally sound private-sector travel to the Antarctic: regulations and restrictions on numbers of people ashore; staff-to-passenger ratios; site-specific and activity guidelines; wildlife watching; pre- and post-visit activity reporting; passenger, crew and staff briefings; previous Antarctic experience for tour staff; contingency and emergency medical evacuation plans; and more. (IAATO, 2013)

The Emergency Contingency Plan implemented by IAATO is constantly updated to improve emergency response capabilities. For nearly two decades, IAATO's guidelines for the protection of visitors, environmental, and heritage resources have been in effect. "Marine tourism operations and the management of tourists when ashore, Arctic governments, communities and tour operators would most probably benefit from their application to Arctic tourism" (Stonehouse & Snyder, 2010 p. 115).

In the European Arctic, the Association of Arctic Expedition Cruise Operators (AECO), founded in 2003, is an international association for expedition cruise operators (AECO, 2013). Although the main focus is on cruise tourism “AECO is dedicated to managing responsible, environmentally friendly and safe tourism in the Arctic and strive to set the highest possible operating standards” (AECO, 2013). At present, AECO offers information, guidelines, and voluntary member policies for operating cruise ships (Johnston et al., 2013; Dawson et al., 2014) in Svalbard, Jan Mayen and Greenland, but the association is in the process of expanding to the rest of the Arctic (AECO, 2013). The guidelines for visitors to the Arctic, produced by AECO, encompass sections on the environment, safety, and cultural and social interaction. The section on safety is the only section in which AECO specifically talks about ‘tender boats/small boat excursions’ (AECO, 2013). Johnston et al. (2013) found differences of opinion in whether the AECO guidelines should be used in Arctic Canada. AECO has now expanded its operational remit to the Canadian Arctic (AECO, 2014). As a result, these guidelines for visits now cover AECO-member operators in Canada (AECO, 2014).

2.6. Knowledge Gaps

Much of the information about Arctic marine tourism in Canada comes from the research on expedition cruise tourism, but this work has also revealed the need to examine management strategies for pleasure crafts due to environmental, cultural, government and community concerns, some of which have been discussed above (Stewart et al., 2012; Johnston et al., 2013; Stonehouse & Snyder, 2010). A number of

knowledge gaps were presented through the scoping study on examining strategies for managing Arctic yacht tourism. Some of the key knowledge gaps outlined by Johnston et al. (2013) include: tourist motivations, previous experience, behaviour, safety, security and preparedness, and sovereignty. In particular, little is known about vessel numbers, spatial patterns and trends and little is known about the actual experiences of pleasure craft travelers in relation to safety and preparation. These are the particular gaps that are addressed in this research.

The proposed research will seek to develop an understanding of the number of pleasure crafts that have traveled through the Canadian Arctic, site specific destinations, the preparation procedures of travelers and their vessels, the examination of incidents, and information on experiences of travelers relating to the implications for safety and their behaviour while traveling in Arctic Canada. In addition to helping development our understanding of pleasure craft travel as a marine tourism sector, this research has important implications for future safety management and regulation of the sector. As the pleasure craft sector continues to grow, a need to explore this sector becomes more urgent, as considerable research is needed to fill these gaps in knowledge.

3.0. Methodology

3.1. Introduction

This chapter provides a description of the methods used for this research project and demonstrates how the research objectives guided this study. This study takes a quantitative approach to understanding pleasure craft vessels in the Canadian Arctic. The overall aim of the project is to gain insight into pleasure craft tourism and to explore the implications for safety management. The data gathered offer a picture of current and recent patterns in pleasure craft tourism in order to provide information for safety management approaches in the future.

This study uses two main sources of data: the Pleasure Craft Dataset, developed specifically for use in this project; and, a database of Internet web logs (Blog File) gathered for this research. The Pleasure Craft Dataset is comprised of information on pleasure craft vessels extracted from the NORDREG database (for the purposes of this research called the NORDREG pleasure craft data), a publicly available database collected by the Canadian Coast Guard, and data on additional vessels found through a literature review and Internet searches. The first phase of this study involved the analysis of the Pleasure Craft Dataset, with a large focus on the NORDREG data. The second phase of this study involved an inventory and content analysis of existing blogs with material focusing on the experiences of pleasure craft travelers in the Canadian Arctic.

3.2. Research Aims

The overall aim of the project is to gain insight into this sector of pleasure craft tourism and to explore the implications for safety management. There is a need to establish a reliable picture of the number of vessels that traverse through Arctic Canada, the safety preparedness of travelers, the nature of incidents and close calls in Canadian waters and the sites visited in the Canadian Arctic. This project gains insight into the sector of pleasure craft tourism and explores the implications of the pleasure craft tourism for safety management. The data used provide a picture of various aspects pleasure craft tourism and will be useful in providing information that may be useful in safety management approaches in the future.

This research project is based on the following research objectives:

1. Develop a picture of pleasure craft vessel traffic and pleasure craft travel patterns; and,
2. Develop a picture of incidents, close-calls, and safety issues.

3.3. The NORDREG Data

Two main sources of data have been identified as being useful in fulfilling the aims: NORDREG pleasure craft data and a database of Internet web logs. The NORDREG data include considerable information on vessels that have reported their entry into the NORDREG Zone and their daily positions. The NORDREG data form the core of the Pleasure Craft Dataset, a larger set of data that adds information for vessels present in the region that did not report to NORDREG. With these data as a starting

place, this research undertakes analysis of the patterns of vessels that have traveled through Arctic Canada starting in 1990. The second source of data is a blog database that is the result of a systematic Internet search conducted by the researcher. The resulting files include independent blogs (not commissioned, paid for, or written on behalf of a commercial entity) (see Carson, 2008) from Arctic travelers. The blogs will be used to supplement the Pleasure Craft Dataset in building a picture of pleasure craft vessel traffic and patterns as well as provide information about preparation and safety.

The full NORDREG database includes all vessels that have mandatory obligations to report as well as vessels that have chosen to report voluntarily. This information is collected and collated by the Canadian Coast Guard and made publicly available. Data records for vessels include nationality, type of vessel (e.g. pleasure craft, passenger ship), dates, daily position data recorded at 1600 Coordinated Universal Time (UTC) (latitude and longitude coordinates), as well as general locations and any remarks that were made about the vessel's journey (e.g. entering and leaving the NORDREG Zone, any assistance requested). In order to examine pleasure craft activity, available data including all vessel records in categories classified as pleasure craft were extracted from NORDREG and this information is referred to as the NORDREG pleasure craft data. The NORDREG pleasure craft data provides considerable information that can be analyzed to access patterns of pleasure craft activity in responding to the two objectives above.

Although NORDREG is a central source of data for this research project, there are limitations. NORDREG is not complete in relation to pleasure craft vessels because

these vessels are not required to report to NORDREG or to provide their itinerary to authorities. This is because reporting is not mandatory for vessels under 300 gross tonnes, although mariners are encouraged to participate in this voluntary system and most do choose to report (Canadian Coast Guard, 2013b). Further, this research relies on vessel classification as identified by NORDREG, but practices of classification may have changed over time without being apparent.

In order to verify the completeness of pleasure craft reporting to NORDREG and inclusion in the database, searches were conducted for vessels that traveled in the Canadian Arctic but were not recorded in the dataset from 1990 to 2013. Twenty-seven pleasure craft vessels not recorded in NORDREG were found through other sources to have entered the Canadian Arctic during this time period. These vessels were found through relevant literature (Brigham & Ellis, 2004; Orams, 2011; Headland, 2014) and Internet searches. The list of vessel transits of the Northwest Passage compiled by Brigham & Ellis (2004) and Headland (2014) include data sources from: Thomas Pullen and Charles Swithinbank (published in *Polar Record*, 1991), Lawson Brigham (USCG), Brian McDonald (CCG), and Patrick Toomey (CCG). Brigham & Ellis (2004) also used personal observations from *Kapitan Khlebnikov* and *Kapitan Dranitsyn* (as cited by Brigham & Ellis, 2004). Headland's (2014) sources also included: Peter Capelotti (USCG), David Cowper (Fort Ross visits), David Fletcher, Chris Havern (USCG), John MacFarlane, Peter Semotiuk, Tony Soper, and Victor Wejer as well as personal observations, publications, and advice from persons involved and various internet sites (as cited by Headland, 2014). Verification that these vessels entered the NORDREG

Zone came from the route details provided in the sources as well as additional information that outlined whether vessels had carried passengers. If a vessel was listed as carrying passengers, the vessel was not included as a pleasure craft. Further, vessels found in the additional sources were cross-checked with the term “Adventurer” in NORDREG pleasure craft data. This was done to ensure that all vessels found (e.g. schooner, sloop, junk-rig yacht, motor yacht) were not duplicated in the data. Though extremely valuable in adding vessels to the Pleasure Craft Dataset, the vessel transit sources are not sufficiently consistent in detail provided, nor consistent with detail from NORDREG records, limiting their use in analysis. The 27 vessels are included in the Pleasure Craft Dataset, but the majority of analysis will use the information extracted from the NORDREG data on pleasure craft vessels.

3.3.1. Extracting the NORDREG Pleasure Craft Data

NORDREG data from 1990 to 2013 were reviewed and all data for pleasure crafts were extracted and placed into a data file that for the purpose of this research was called the NORDREG pleasure craft data (which does not include the additional 27 vessels found). The data in the NORDREG pleasure craft data were ‘cleaned’ by removing any records that were not relevant or reliable. The creation of the data file started with the search for “Pleasure Craft,” “Sail/Row Boats,” “Row Boat,” “Adventurer,” “Pleasure Crafts,” and “Home Made Boats” within the given data. All data in this file were then examined to determine whether vessels were in fact in the NORDREG Zone. The NORDREG Zone consists of:

The shipping safety control zones prescribed by the Shipping Safety Control Zones Order, the waters of Ungava Bay, Hudson Bay and Kugmallit Bay that are not in a shipping safety control zone, the waters of James Bay, the waters of the Koksoak Rover from Ungava Bay to Kuujjuaq, the waters of Feuilles Bay from Ungava Bay to Tasiujaq, the waters of Chesterfield Inlet that are not within a shipping safety control zone, and the waters of Baker Lake, and the waters of the Moose River from James Bay to Moosonee. (Canadian Coast Guard, 2013 "NORDREG")

Latitude and longitude coordinates were used to establish vessel locations in the NORDREG Zone. In order to analyze locations, coordinate data were transferred into comparable values. For this research, decimal degrees were used to express the coordinates as this approach is used commonly in geographic information systems (GIS). GIS refers to computer-based databases that are "used to store, analyze, integrate in layers and display data of a geographical nature, in the sense that they are connected to discrete locations on the Earth's surface" (Tremblay, 2005 p. 163). The conversion from degrees, minutes, seconds to decimal degrees used the formula: $[\text{degrees} + (\text{minutes}/60) + (\text{seconds}/3600)]$. This allowed for processing of the data through ArcGIS software. This process resulted in the creation of the NORDREG pleasure craft data based on the NORDREG data and assumed to be accurate, as provided by the Canadian Coast Guard. The data were imported into ArcGIS software for further analysis.

3.3.2. *ArcGIS*

ArcGIS software is used in this research as a tool to convey a large amount of information in a spatial format. Maps were created through ArcGIS to demonstrate the patterns of pleasure craft activity such as variability in the number of pleasure craft

vessels and the number of vessel days spent in the Canadian Arctic. The maps produced through ArcGIS displayed throughout this research do not include the southern region of Hudson Bay in the NORDREG Zone. This was done because no data were present in this part of the zone.

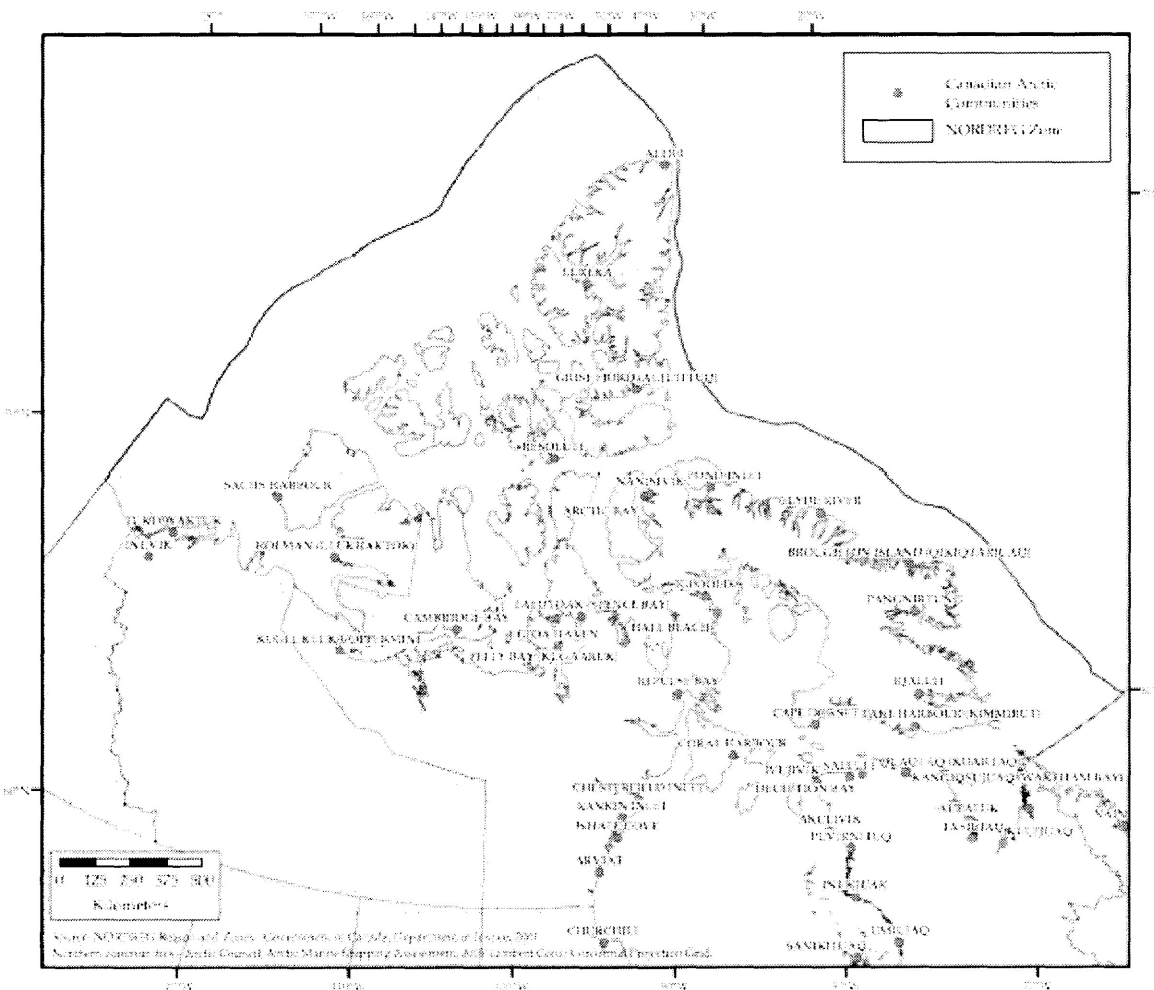


Figure 3.1: NORDREG Zone and Canadian Arctic Communities.

A base map of Canada was uploaded onto ArcGIS. From there a shapefile of the NORDREG Zone produced by the Department of Justice (2001) was added as a layer to the map alongside community names in the zone (Figure 3.1). The coordinates from the NORDREG pleasure craft data file were then uploaded to the software. Once all the points were added as a layer, pleasure craft vessels that were displayed outside the

NORDREG Zone were clipped and removed from the subset and from the map. Vessels that were eliminated included those that appeared in Greenland, Iceland, parts of the United States and in bodies of water just outside the zone. Vessels that did appear within the NORDREG zone were then kept for further analysis. This created a new layer of points that only fell within the NORDREG Zone (Figure 3.2).

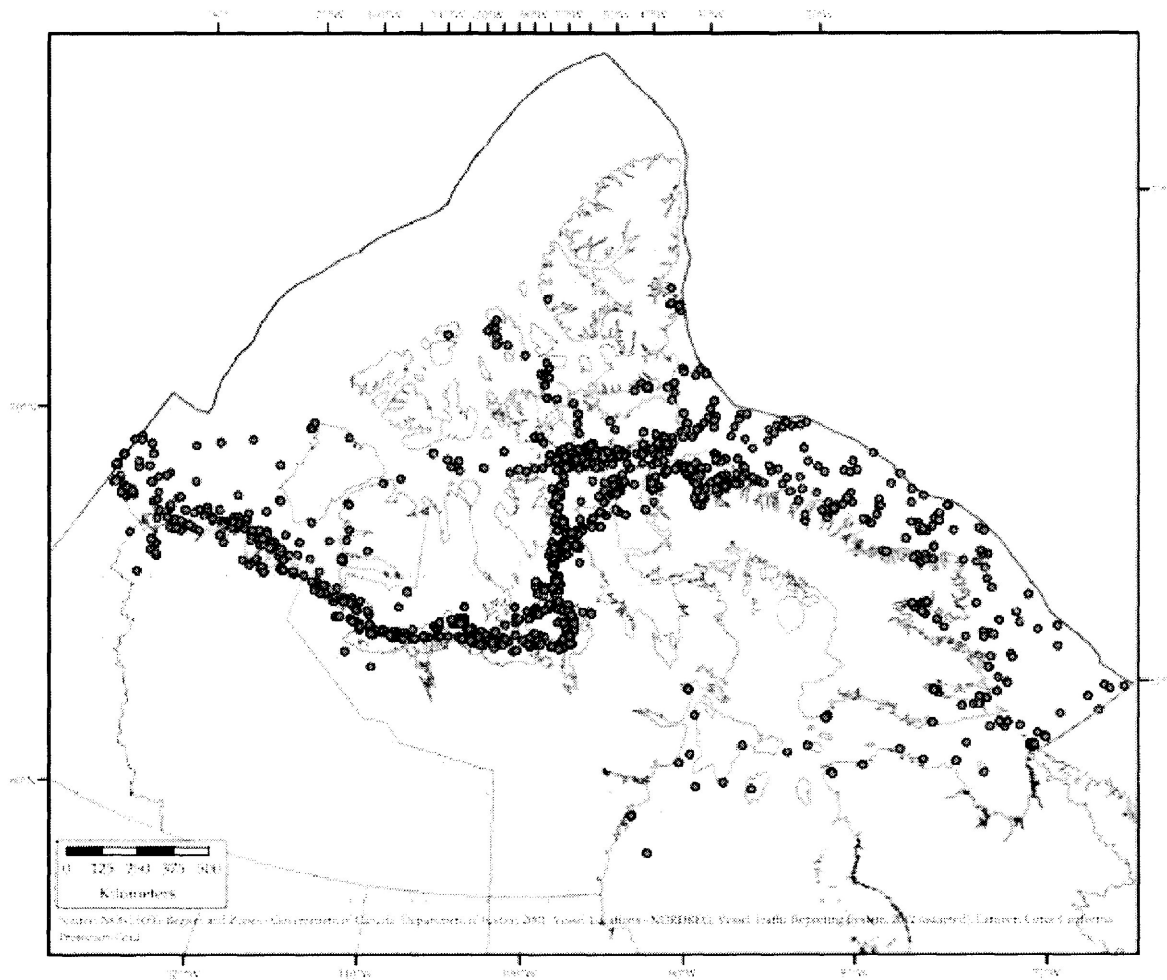


Figure 3.2: Points clipped to NORDREG Zone.

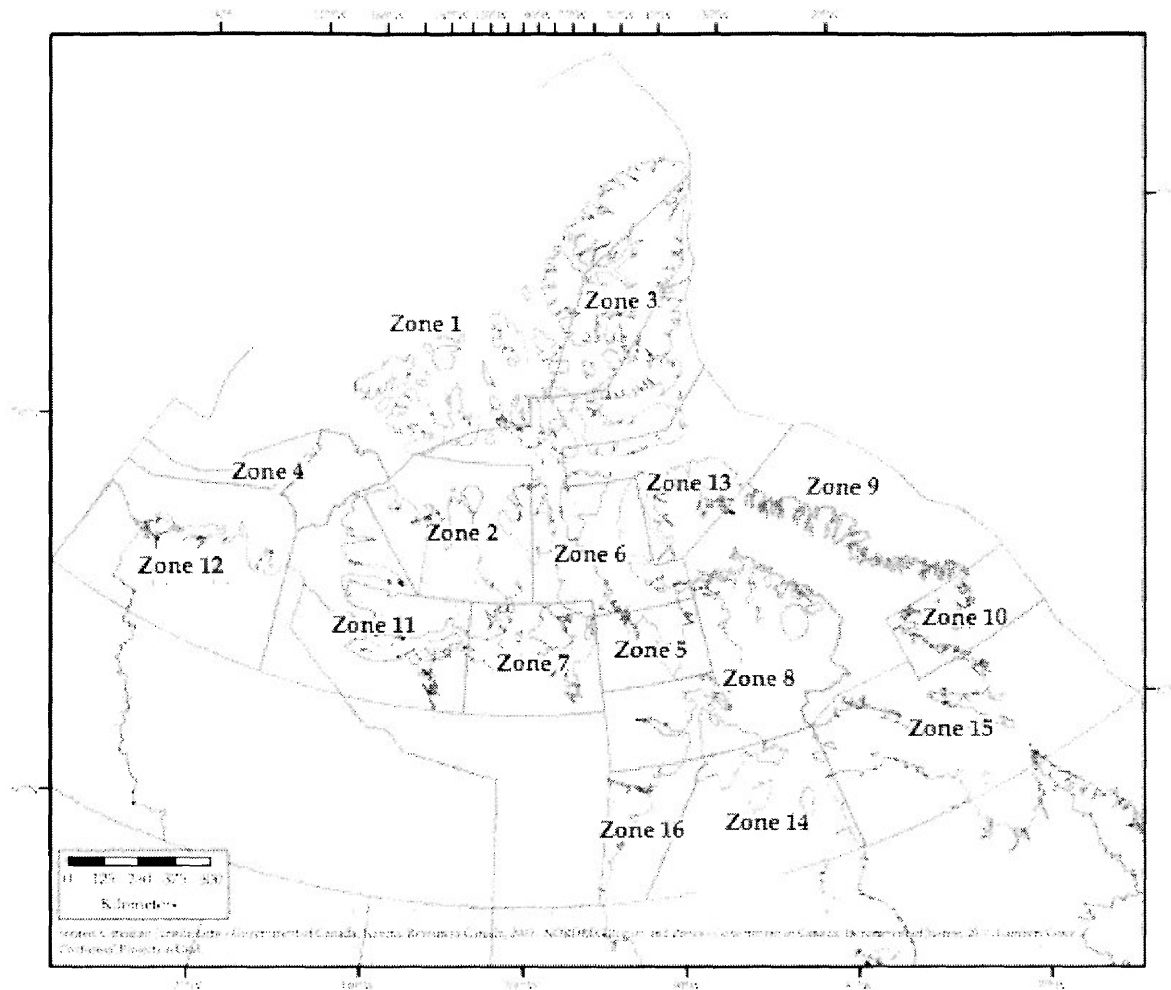


Figure 3.3: Shipping Safety Control Zones.

Navigation through The Zone/Date System is governed by the *Arctic Shipping Pollution Prevention Regulations* (Canadian Coast Guard, 2013c). In the Zone/Date System the Arctic waters are divided into sixteen Shipping Safety Control Zones. Zone 1 has the most severe ice conditions and Zone 16 the least. “In response to the fact that the Zone/ Date System doesn’t fluctuate with ice conditions, Transport Canada introduced the Arctic Ice Regime Shipping System to allow ships to navigate in the Arctic when the ice conditions permit” (Canadian Coast Guard, 2013c). Polygons produced by the Government of Canada and outlined in the *Shipping Safety Control Zones Order* were used to add a sub-regional layer to the map (Figure 3.3). Each point

that appears on Figure 3.2 reflects the coordinates given by NORDREG for each vessel. The total number of points extracted amounted to 2392 individual data points. A second computation was conducted of all the points within the NORDREG Zone to verify numbers; this calculation did not yield the same results and resulted in 2369 points. In order to determine where the discrepancy between the two sets of numbers was, summary statistics on the ArcGIS software was used to count the number of points within each zone. After looking closely at each zone, the result of the inconsistency of numbers was due to a 'clipping problem' where the boundary alignment of the Shipping Safety Control Zones did not directly overlap with the NORDREG Zone. This created a number of points that fell into the sliver areas created from the products of Department of Justice (2001) (for example, Figure 3.4). As a result, 23 points did not have a zone. Each of the 23 points were edited (i.e. moved within adjacent boundary) as the distance in the sliver areas is generally less than 5m outside each zone. One point was added to Zone 1, twenty-one points were added to Zone 9 (off the coast of Baffin Island), and one point was added to Zone 16. All the points were then intersected with the Shipping Safety Control Zones in order to determine the number of points within each zone. The number of vessels and the number of vessel days were then totaled for each zone. The data were then split into the temporal periods, pre-2010 (1990-2010) and post-2010 (2011-2013). These periods were split into two groups based on the need to establish a baseline of vessels for temporal comparison. A rough mid-point in vessel numbers was identified and then the final break was selected to reflect similar groupings in annual years.

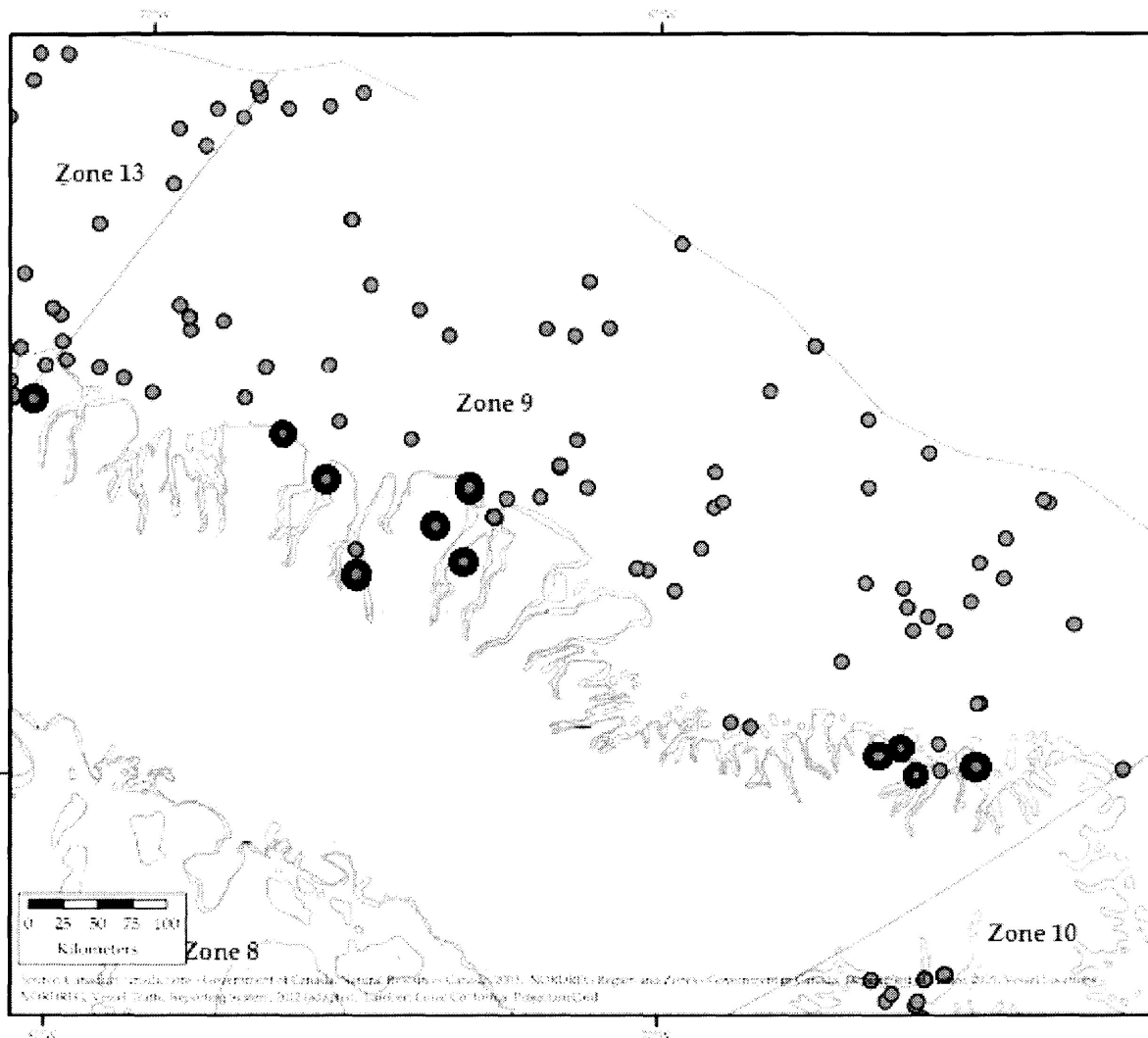


Figure 3.4: Clipping problem demonstrated with dark circles.

Although not entirely even, the first period will act as the baseline and the second will be used to demonstrate changes. Again, the number of vessels and the number of vessel days were totaled for each time period by zone.

Map creation was the next step in analyzing the NORDREG Pleasure Craft data. A Lambert Conic Conformal projection grid was used for all of the maps as well as a standard scale. Each map was then constructed using layers to demonstrate specific information. The information being presented focuses on the number of vessels and the number of vessel days that are present in each Shipping Safety Zone from 1990 through

2013. The classification method that was used for all the maps is the natural breaks (Jenks) classification. Natural break classes are based on natural groupings within the data. "Class breaks are identified that best group similar values and that maximize the differences between classes. The features are divided into classes whose boundaries are set where there are relatively big differences in the data values" (esri, 2012).

All of the maps presented are intended to allow the reader to assess differences quickly and to observe the current situation within Arctic Canada in regards to patterns of pleasure craft tourism. The NORDREG pleasure craft data, in conjunction with the maps provides a basic picture of the current state of pleasure craft activity in the Canadian Arctic, and is enhanced by the information available in the larger Pleasure Craft Dataset, but these do not provide enough information to respond to the aims of this research. Thus, the use of blogs, in the Blog File, supplements the information available through analysis of the NORDREG data and the Pleasure Craft Dataset.

3.4. Blog File

This research uses blogs to gain insight into pleasure craft travelers and their vessels, including aspects such as sites visited, behaviour of passengers, and interactions with the environment. In this research, blogs are used to analyze patterns of pleasure craft vessels and their activities in regards to safety management. "The growth and popularity of travel blogs on the Internet influenced tourism researchers to see the online narratives as valuable sources of information for destination marketing" (Banyai, 2012 p. 421).

Blogs are seen as valuable resources in tourism research because of many characteristics which include: web pages becoming an increasingly popular form of communication on the World Wide Web); commentary and personal thoughts are available; postings are frequently updated; displayed in reverse chronological order; and, blogs often use an interactive format that allows for readers to post comments (Herring et al., 2004; Schmallegger & Carson, 2007; Schmallegger & Carson, 2008; Fielding et al., 2008; Wakeford & Cohen, 2008; Poynter, 2010; Kozinets, 2010). Blogs are an important source of data as they are publicly available through the Internet and hold information about visitors' personal logs on their travels. Most blogs contain textual information, although audio and video content is becoming more common (Schmallegger & Carson, 2008). Photography and publishing are an important activity for polar yacht cruisers as "many establish their own websites and blogs and encourage friends, family, and others to follow their expeditions" (Orams, 2010 p. 19).

In tourism, travel blogs are made up of one or more individual entries where the main themes are "general descriptions of destinations, such as climate, cuisine, transport, attractions, or region-specific stereotypes" (Bosangit et al., 2012 p. 209). According to Pan et al. (2007), travel blogs cover every aspect of a visitor's trip; "from the overall experience of traveling, the anticipation, planning, packing, departure, driving, flying, and delays en route were all reflected in the travel blogs" (p. 42). According to Wang et al. (2014), data collection from tourists' blogs provide many advantages. They describe blogs as "reliable and trustworthy because their authors are tourists who describe their personal experiences" and because "the freedom of

expression on the blog websites enables tourists to provide more honest, richer data about their perception of the factors that affect their satisfaction” (Wang et al., 2014 p. 124). The disadvantage of using blogs for research is the bias that comes from the authors’ interpretation of events being recorded. The blog samples in this study are not representative of the population of pleasure craft travelers in the Canadian Arctic, but rather a representation of each traveler’s trip in Arctic Canada.

3.4.1. Data Collection

In order to present a picture of pleasure craft tourism in the Canadian Arctic, blogs were systematically gathered through Internet searches. Initially, names of vessels were taken from the NORDREG pleasure craft data from 1990 to 2013 and the names found through Internet searches for additional vessels. These names were then searched through Internet browsers to find any blogs related to the travel to Arctic Canada. The second approach to obtain information for the Blog File was the use of the snowball technique using the original blogs as the source. Website links within blogs were used to locate further information on other pleasure craft travelers and their vessels. All blogs that contained information on routes and statements suggesting they were in the NORDREG Zone were added to the Blog File. All blogs found through these searches including those in languages other than English, were recorded. This resulted in the Blog File containing 60 records (Table 3.1).

Table 3.1: Number of Vessels with Blogs/Books per Year from 1990-2013.

Year	Number of Blogs/Books
2001	1
2002	3
2003	1
2004	4
2005	2
2006	3
2007	6
2008	3
2009	5
2010	4
2011	6
2012	8
2013	14
Total	60

Blogs that were not in English were eliminated from the Blog File because translating the blogs using Internet translators could have resulted in the misinterpretation of information being presented. It was not feasible financially to use a translation service. This resulted in a blog database of 39 blogs (Table 3.2).

Table 3.2: List of Vessels with Blogs (blog database).

Vessels with Blogs	Vessels with Blogs Cont'd
<i>Northabout</i>	<i>Pangaea</i>
<i>Le Vagabond</i>	<i>St. Brandon</i>
<i>Norwegian Blue</i>	<i>Teleport</i>
<i>Jotun Arctic</i>	<i>Belzebub II</i>
<i>Fine Tolerance</i>	<i>Arctic Tern I</i>
<i>Idlewild</i>	<i>Dodo's Delight</i>
<i>Austral Express</i>	<i>Jonathan III</i>
<i>Luck Dragon</i>	<i>Scorpius</i>
<i>Berri Milla 2</i>	<i>Tokimata</i>
<i>Geraldine</i>	<i>Arctic Tern UK</i>
<i>Bagan</i>	<i>Arktika</i>
<i>Baloum Gwen</i>	<i>Bernard Explorer</i>
<i>Fiona</i>	<i>Dax</i>
<i>Fleur Australe</i>	<i>Empiricus</i>
<i>Ocean Watch</i>	<i>Fairmont's Passion</i>
<i>Young Larry</i>	<i>Libellule</i>
<i>*Captain Lemuel R Brigman II</i>	<i>The Arctic Joule</i>
<i>*Northern Passage</i>	<i>Traversay III</i>
<i>Eshamy</i>	<i>*Glory of the Sea</i>
<i>Issuma</i>	Total: 39 Blogs

*Blogs found through Internet searches and not in NORDREG pleasure craft data.

As there is a possibility for websites to be removed or become unavailable to the public, the blogs and their entries were saved as electronic PDF documents and printed to hard copy. Blog content was also downloaded into word document files. Each file contained blog entries, with titles, dates, and vessel names that were used as a reference.

The database is a major source of information, but it does have limitations. The database is not comprehensive of all the experiences of pleasure craft tourists who have been to Arctic Canada for the time period being explored (1990-2013) because not all travelers write about their experiences and post them online. The blog database may not

be a complete dataset of all the pleasure craft blogs; it represents the ones available at the point in time that blogs were being collected. Due to the extent of material and time constraints all 39 blogs could not be analyzed in depth. For example, a number of blogs contained entries over a two year time period recording copious amounts of information from the planning stages through the Arctic travel to voyages after being in the Canadian Arctic. In order to manage the demands of analysis a sample was taken. To define the sample, a chart was created highlighting the important features of each blog related to this research, such as vessel name, year, number of persons on board, type of vessel, length of the voyage, length of blog (months), and motivation for the trip. Ten key characteristics of the blog population were used to construct a table so that a representative sample could be taken of the 39 blogs (Table 3.3). This resulted in a sample of 12 blogs that were analyzed in depth (Blog Sample).

Table 3.3: Characteristics of Total Blog Population (n=39) and of Sample Blog Population (n=12).

	1990-2010	1990-2010	2011-2013	2011-2013
	Total	Sample	Total	Sample
Year of Voyage	18	6	22	7*
Multiple Voyages	4	2	5	2
Not in NORDREG	2	0	1	1
Type of Vessel: Sailboat	12	4	9	4
Research Mentioned	6	2	6	2
Adventure Mentioned	5	2	13	4
1-5 Persons on Board	11	4	13	4
6+ Persons on Board	4	2	6	2
Blog Length: 1-24 months	11	4	10	4
Blog Length: 24+ months	6	2	11	3

* One blog contained various Years of Voyage so represents both time periods (1990-2010 and 2011-2013).

3.4.2 Content Analysis

Pan et al. (2007) used various methods to gain insight into the meaning of travel blogs and their relationship to a specific tourist destination using written content, photos and videos. This study confirmed that blogs could be a useful tool in monitoring a destination in order to provide feedback, unlike that of a survey measurement.

“Travel blogs qualitatively cover every aspect of a visitor’s trip. From the overall experience of traveling, the anticipation, planning, packing, departure, driving, flying, and delays en route were all reflected in the travel blogs” (Pan et al., 2007 p. 38).

Content analysis was the primary tool used for analyzing the Blog Sample. Because content analysis is an unobtrusive method of analysis, it does not change the behaviour of participants in any way (Bryman & Teevan, 2005; Babbie & Benaquisto, 2002) and it is also efficient in terms of time and money because there is no requirement for numerous research staff or specific equipment (Babbie & Benaquisto, 2002; Hookway, 2008). Content analysis is a flexible method that can be applied to a wide variety of unstructured information, and it can be used to look at certain social groups that are difficult to access (Bryman & Teevan, 2005). The format of blogs is what makes content analysis suitable for this research.

Visual representations of a person’s trip, photos and videos, are a type of data on blogs that display more information than what is already known (McKinnon, 2011).

Content analysis is also used to analyze visual content or images, including personal photos and maps. Rose (2007) illustrates that the content analysis of images is typically used in relation to media images found in newspapers and magazines and it mostly

focuses on the image itself, although it is important to contextualize the image by examining headlines, text, and captions (Bock et al., 2011).

In this research, maps (visual representations of spatial data) are also analyzed as they have been constructed with the express purpose of showing travel routes. “Only those roads and landmarks that are ‘on the map’ are deemed relevant for getting to the destination” (Ball & Smith, 2011 p. 400) and these are important because the intended outcome of this part of the research is to provide information that will contribute to the identification of vessel numbers, daily positions, and specific sites visited. All materials presented on the blogs will be under review, including: design, links, photos, videos, and content regarding the trip (preparation, type of vessel, etc.). According to Hindmarsh (2008), videos capture a version of events that are unlike images and maps. Videos “provide opportunities to record various aspects of social practices in real time: talk, bodily contact, material environment, tool use, etc., which give destiny to the data record” (Hindmarsh, 2008 p. 344).

According to Bryman & Teevan (2005), documents should be assessed on three levels: authenticity, credibility, and representativeness. Authenticity is defined as a document that is what it declares to be. In respect to this research, authenticity of a blog refers to the fact that the individual writing the blog has completed a trip to the Canadian Arctic. Credibility is that there are no grounds for thinking that the contents of the document have been distorted in any way. For this research, the credibility of a blog applies to the information being presented by the traveler. As a researcher, the confidence in the nature of the material being presented is key. Though the blogs may

not include all relevant information on all aspects of an individual's trip, credibility is likely because most blogs can be seen as "representative of the 'real' thought and feelings of consumers" and are often referred to as personal online diaries, blog content therefore has the ability to provide valuable insights into particular sectors of travel (Carson, 2008 p. 112). Lastly, representativeness means that the documents examined are representative of the whole population being studied. Twelve blogs were used in this research as a representative sample of the population (Table 3.3).

After the assessment of the blogs, the next step in content analysis is the coding of documents. Ruhanen et al. (2013) used qualitative content analysis of Australia's national tourism strategic planning documents to identify the key strategic issues in Australian tourism. The documents were coded manually by reading and coding each emergent issue into key themes; coding was then crosschecked in order to verify the findings. Manual coding has been used in many studies (eg. Dimitrova & Neznanski, 2006; Pfeil et al., 2006; Young & Foot, 2005) and will also be used in this research. A coding form, similar to that of Banwart (2002), was constructed in order to collect all relevant information from the blogs. The code sheet used in Banwart's (2002) research maintained categories from prior research but new categories were also added and "certain categories were refined to identify the presence/absence of variables in addition to the overall dominant presence" (Banwart, 2002 p. 119). The code sheet used in this study recorded for 799 attributes in 30 categories (Appendix 3). The categories described the written content, video content, audio content, and image content as well as information such as name of blog and length of blog.

Written content categories included vessel description, description of crew, reasons for voyage/trip, preparation, route details, sites visited, and key words as well as names of other vessels mentioned. Video and audio content categories were coded for length, themes, and major topics. Lastly, image content was coded for maps, main themes, captions and titles, and topics within the images. Written content categories relevant to the format of the website were differentiated in the code sheet by specified sections of the website. For example, the “home page” section included categories inquiring about language, menus, and photos present, as well as external and internal links.

Content analysis was used to investigate the text to determine whether certain words and concepts are present within the given texts. Specific indicators were defined and searched for as they reflected the two main objectives of this research. Each blog was coded manually, allowing data and key issues to present themselves to the researcher. A trial blog was used in order to allow additional attributes to emerge from the data. New variables were added to the code sheet and coded in order to provide a holistic representation of travelers’ voyages to the Canadian Arctic. This research combines various methods to form a structured systematic analysis approach using frequencies. To provide a sense of the categories quotes are used as examples. In research, it is important to provide validity in the methodology. In order to gain accurate insight on numbers of pleasure crafts, incidents and close calls, preparation details, routes traveled, sites visited, and activities pleasure craft travelers participated in, the content analysis of blogs will provide as much of a holistic presentation of the

current state of pleasure craft tourism in addition to the NORDREG data and the Pleasure Craft Dataset.

3.5. Conclusion

This study uses two main sources of data: the Pleasure Craft Dataset and a database of Internet web logs (Blog File). The Pleasure Craft Dataset is comprised of information on pleasure crafts extracted from the NORDREG database (NORDREG pleasure craft data) and on additional vessels found through a literature review and Internet searches. The first phase of this study involved the analysis of the Pleasure Craft Dataset, with a large focus on examining the NORDREG pleasure craft data that contain vessel names, position data, registration, as well as other information pertaining to pleasure crafts. The NORDREG pleasure craft data were then used to construct a variety of maps using GIS software. This allowed for a large amount of information to be presented in a spatial format. The second phase of this study involved a content analysis of a representative sample of blogs (Blog Sample) in the Blog File with material focusing on the experiences of pleasure craft travelers who have voyaged to the Canadian Arctic. In this research, content analysis was used to explore visual and textual information. Visual information on images and videos was very basic. Analyzing both video and audio is significant for this research as documentation on blogs, although mostly text-based, includes both these elements. The data gathered through these sources will provide a representation of the current state of pleasure craft

tourism. All the pieces of information gathered will be useful in providing information and input for government safety management approaches in the future.

4.0 Results

4.1. Analysis of Pleasure Craft Data

This section will present the results of the analysis of the Pleasure Craft Dataset. It begins with examination of vessel numbers as annual totals from 1990 to 2013, based on both NORDREG pleasure craft data and the additional vessels found. It then examines multiple voyages of individual vessels. The section then analyzes the more detailed information available in the NORDREG pleasure craft data.

4.2. Pleasure Craft Dataset

4.2.1. Number of Vessels in Arctic Canada

The total number of vessels in the Pleasure Craft Dataset is 191 vessels entering the Canadian Arctic from 1990-2013 on an annual count basis. The NORDREG pleasure craft data include records for 164 of these vessels (reported as entering the NORDREG Zone). An additional 27 vessels were found to have entered the Canadian Arctic that were not recorded in the NORDREG data (Table 4.1). Figure 4.1 demonstrates the addition of these 27 vessels to the annual counts of vessels present in the NORDREG pleasure craft data: this is total number of vessels in the Pleasure Craft Dataset.

Table 4.1: Annual Counts of Pleasure Crafts in the NORDREG Zone from 1990-2013 (Pleasure Craft Dataset). (Data Sources: NORDREG pleasure craft data, Brigham & Ellis, 2004, Orams, 2011, Headland, 2014, and Internet Searches).

Year	NORDREG Vessel Count	Additional Vessels Found	Total Vessels/Year
1990	2		2
1991	2		2
1992	1		1
1993	3		3
1994	5		5
1995	3		3
1996	1		1
1997	0		0
1998	0		0
1999	2	1	3
2000	2	1	3
2001	6		6
2002	2	1	3
2003	7	2	9
2004	6		6
2005	9	1	10
2006	3	3	6
2007	7	2	9
2008	7		7
2009	12	1	13
2010	11	3	14
2011	20	5	25
2012	26		26
2013	27	7	34
Total	164	27	191*

*Total number of vessels in the **Pleasure Craft Dataset**.

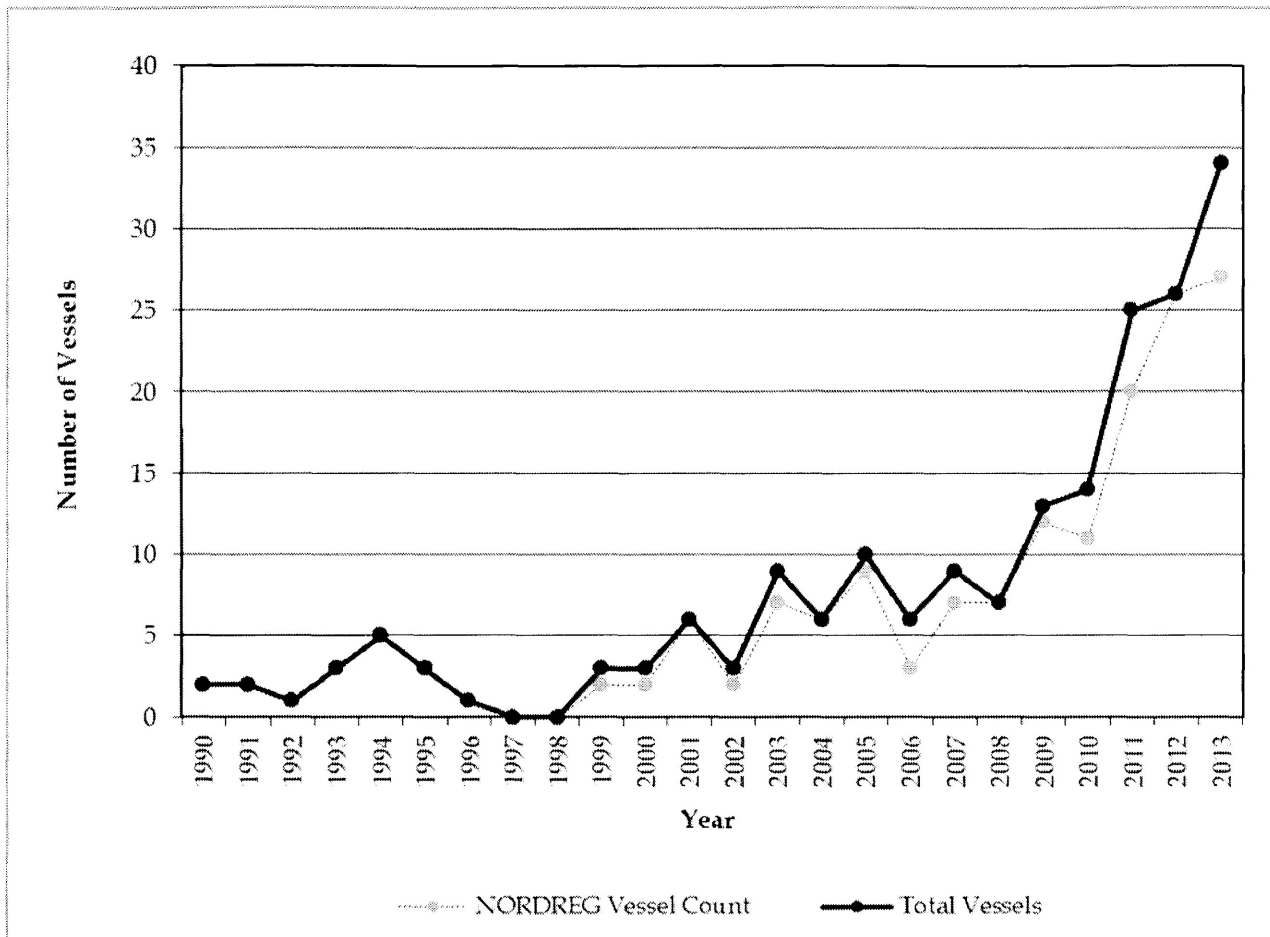


Figure 4.1: Annual Counts of Pleasure Crafts in the NORDREG Zone from 1990-2013 (Pleasure Craft Dataset) showing NORDREG records and additional vessels. (Data Sources: NORDREG pleasure craft data; Brigham & Ellis, 2004; Orams, 2011; Headland, 2014; and Internet Searches).

The year 2011 appears to be a watershed year and before this point, 106 vessels entered the Canadian Arctic according to the Pleasure Craft Dataset and 85 vessels entered between 2011 and 2013. Ninety-one vessels were recorded as entering the NORDREG Zone from 1990 to the end of 2010. From 2011 to 2013, three seasons, the number of vessels is 73. The year 2011 is notable as it shows a near doubling from the year before: 11 vessels were recorded in 2010 and 20 vessels were recorded in 2011 in the NORDREG pleasure craft data. In the Pleasure Craft Dataset, there were 14 vessels recorded in 2010 and 25 recorded in 2011. Though vessel numbers show a gradual

increase to 2010, the natural break in the data is quite evident between 2010 and 2011 when volumes surge to a new level. This natural break will be used to demonstrate patterns in the data as needed.

4.2.2. Number of Voyages

Analysis of the Pleasure Craft Dataset provides information on multiple voyages (Appendix 4). Of the 191 vessels in the dataset, 23 were found to have made multiple voyages to the Canadian Arctic over multiple years. Figure 4.2 demonstrates the number of vessels with multiple voyages to Arctic Canada from 1990-2013. Thirteen vessels entered the Canadian Arctic twice, while 7 vessels spent three years in the NORDREG Zone, 2 vessels with 4 visits, and 1 vessel had 6 visits over this time period. Based on the recorded dates and positions of vessels, some trips occur in sequential years, while others occur over several years (without the vessel leaving the zone) either purposely or because the tourists are left with no choice as the vessels are beset in ice. A vessel that over-winters is counted in the next season as well. About half the vessels in the zone with multiple visits completed all their visits in the pre-2010 period (56%), while 28% completed all their visits from 2011-2013.

4.3. Analysis of the NORDREG Pleasure Craft Data

The full NORDREG database includes all vessels that have mandatory obligations to report as well as vessels that have chosen to report voluntarily. Data records for vessels include national registration, type of vessel (e.g. pleasure craft, passenger ship), dates, daily position data recorded at 1600 Coordinated Universal

Time (UTC) (latitude and longitude coordinates), persons on board, as well as general locations and any remarks that were made about the vessel's journey (e.g. entering and leaving the NORDREG Zone, any assistance requested). The NORDREG pleasure craft data contain all information from NORDREG about recorded pleasure crafts entering the NORDREG Zone and is used to analyze patterns of pleasure craft activity. These data comprise 164 vessels.

4.3.1. Registration of Pleasure Craft Vessels

Vessels from all over the world travel to Arctic Canada. The regional origins of pleasure crafts in the NORDREG Zone are shown in Figure 4.2. European registered vessels have the largest concentration of recorded vessels with 51% of the total number of vessels. North America has 38% and Oceanic countries have 9% of the total number of vessels registered. Only 2% of the 164 vessels recorded by NORDREG did not provide vessel registration information.

Further information on registration for pleasure craft recorded in the NORDREG pleasure craft data is available in Appendix 5. Canadian registration has the largest number of vessels with 27 vessels (20%) of the total number of registered vessels. The United Kingdom, United States of America, and France follow with 24 vessels, 23 vessels, and 18 vessels respectively.

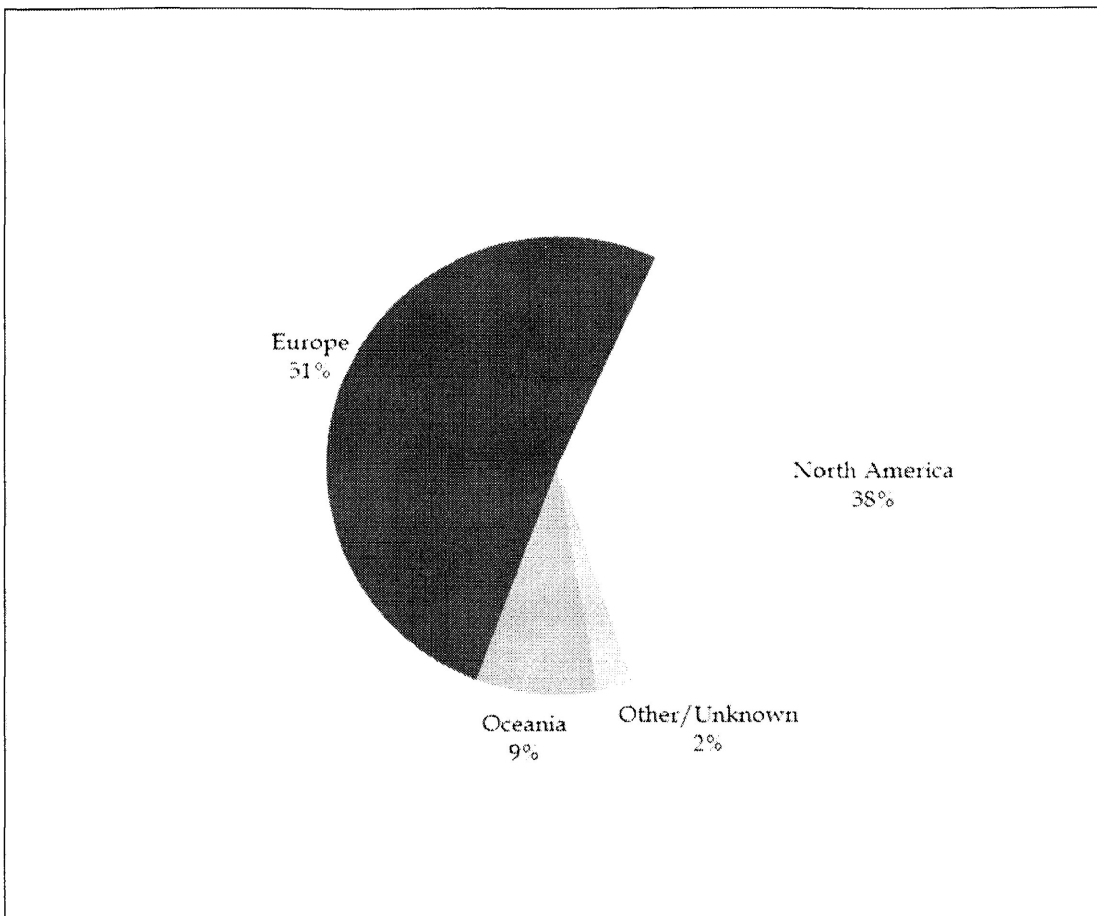


Figure 4.2: Regional Origins of Pleasure Crafts in NORDREG Zone (Data Source: NORDREG pleasure craft data from 1990-2013).

4.3.2. *Pleasure Craft Vessel Patterns*

Maps were created using NORDREG pleasure craft data. Maps were produced in order to display the patterns of pleasure craft activity such as variability in the number of pleasure craft vessels and the number of vessel days spent in the Canadian Arctic. When generating these maps, the natural breaks (Jenks) classification method was used. Natural break classes are based on natural groupings within the data. "Class breaks are identified that best group similar values and that maximize the differences between classes. The features are divided into classes whose boundaries are set where there are relatively big differences in the data values" (esri, 2012). Each Zone shown in the maps

provided represent a Zone outlined in the *Shipping Safety Control Zones Order*, produced by the Canadian Government. These Zones were used in order to provide a sub-regional layer to the map in distinguishing areas of concentration of in the number of pleasure craft vessels and the number of days vessels spent in each Zone.

In order to illustrate the numbers and locations of vessels present in the NORDREG Zone, vessel names and daily position data were used to display concentrations throughout the Canadian Arctic (Figure 4.3). The largest concentration of vessels coincides with the route of the Northwest Passage. Zones 12, 11, 7, 6, and 13 have the largest recorded number in vessels from 1990-2013. It is important to note that there are several zones that had little or no visitation throughout the 23 year time period being studied: Zones 3, 5, 8, 14, and 16.

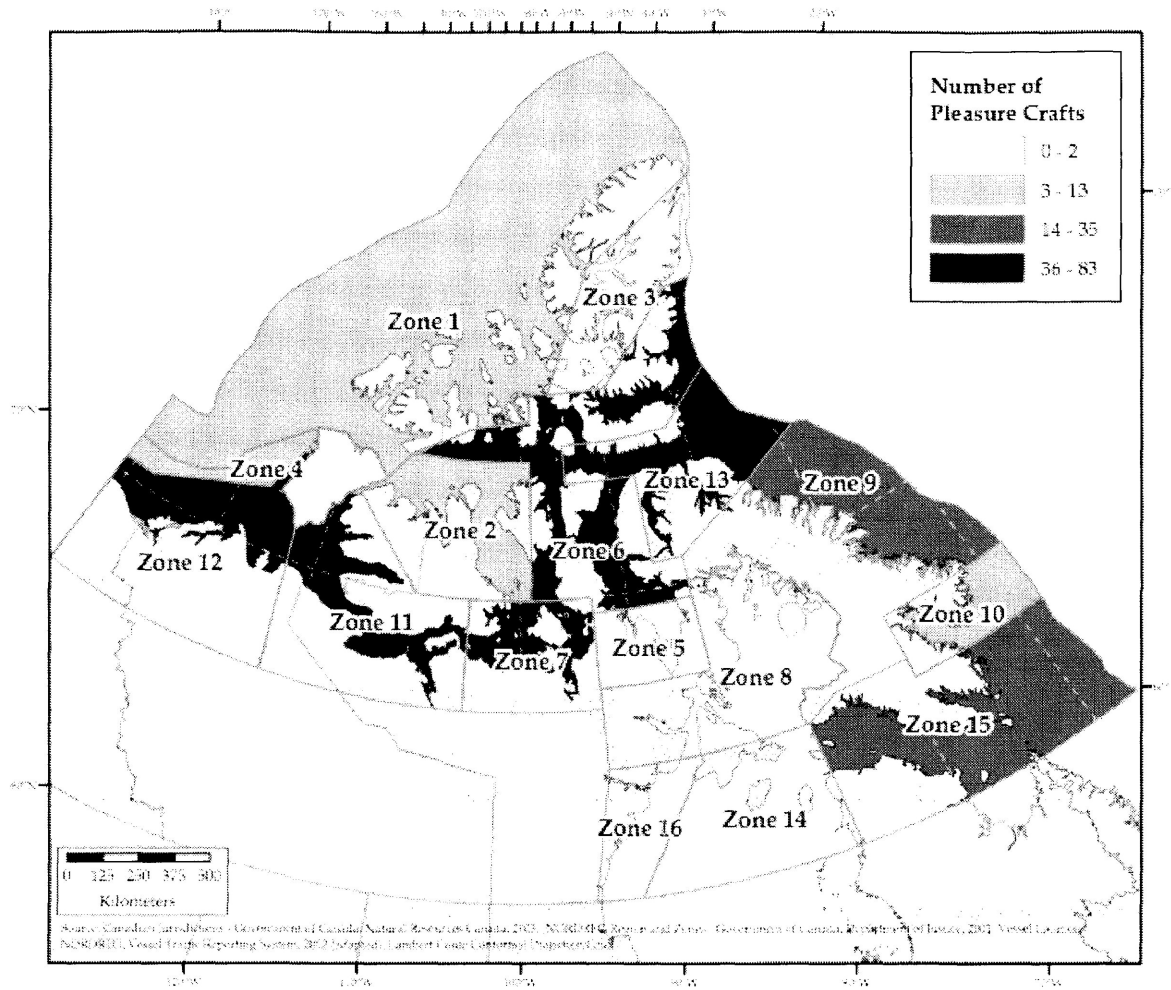


Figure 4.3: Number of pleasure craft vessels from 1990-2013 using natural break categories (Data Source: NORDREG pleasure craft data).

The concentration of pleasure craft vessels present from 1990-2010 is shown in Figure 4.4 and is similar to the concentration in number of vessels shown in Figure 4.5 (2011-2013): the majority of pleasure craft vessels are present through the NWP. A noticeable difference between the two figures is the amount of white space on Figure 4.4, the indicator of the areas with the lowest visitation. This is due to the limited number in vessels visiting the Hudson's Bay region as well as the far northwestern part of Arctic Canada.

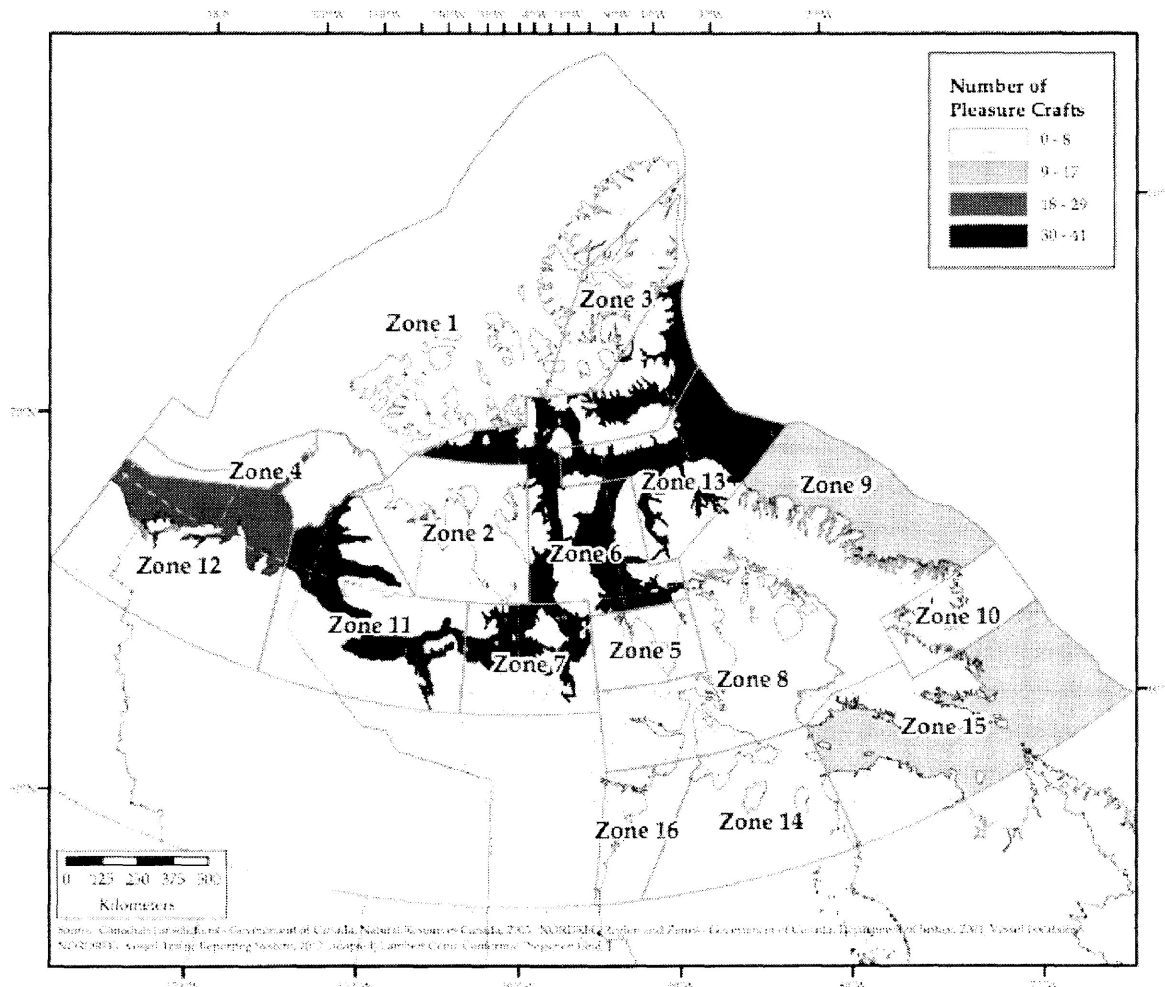


Figure 4.4: Number of pleasure craft vessels from 1990-2010 using natural break categories (Data Source: NORDREG pleasure craft data).

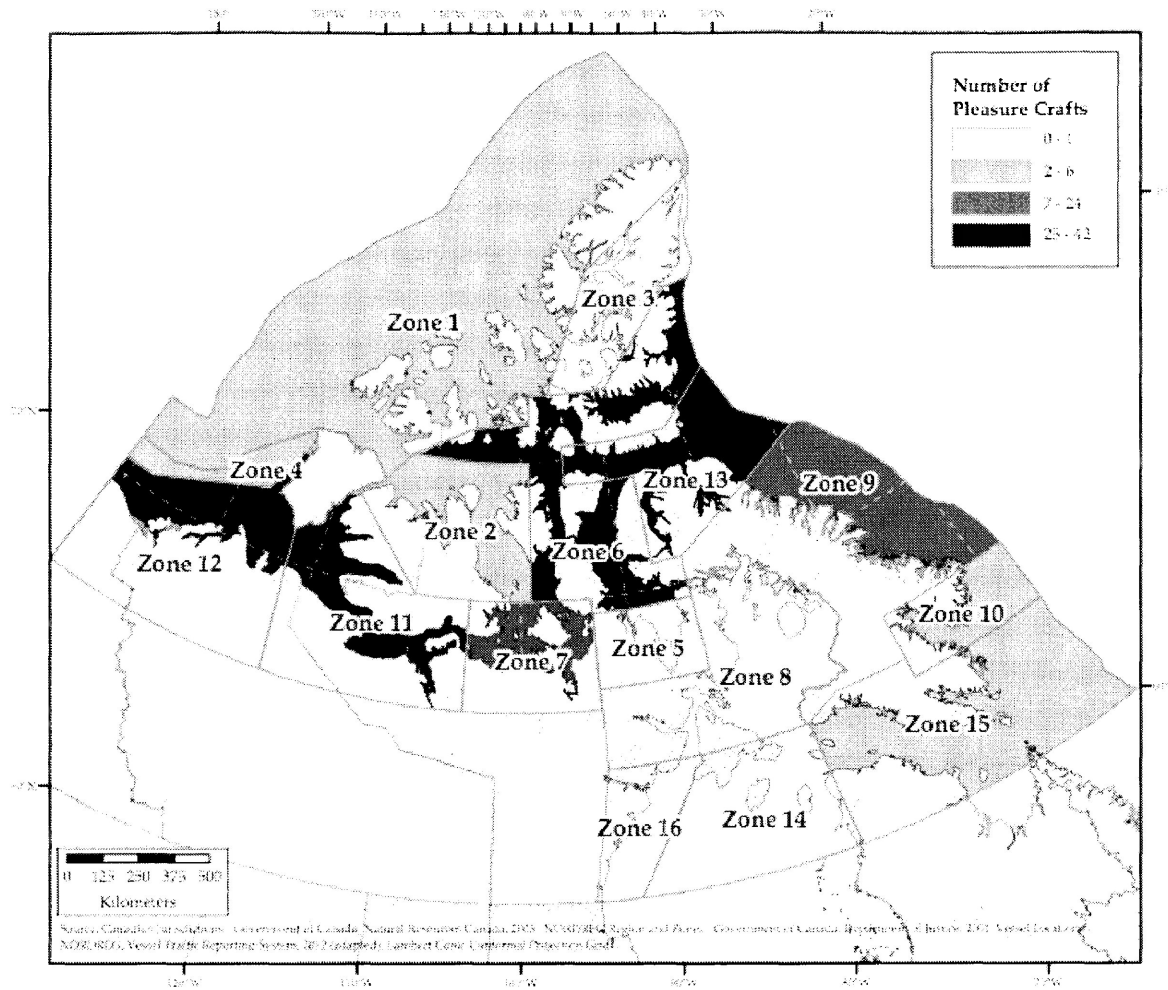


Figure 4.5: Number of pleasure craft vessels from 2011-2013 using natural break categories (Data Source: NORDREG pleasure craft data).

Figure 4.6 demonstrates the change in the number of vessels from 1990-2010 and 2011-2013. The areas with little to no change are Zones 2, 3, 4, 5, 8, 11, 13, and 14. The areas with a decline in the number of vessels presented post 2010 are Zones 7 and 15. Zone 7 had the greatest decline with 15 fewer vessels and Zone 15 with 11 fewer vessels. The greatest increase in the number of vessels is Zone 12 with 11 additional vessels appearing post 2010.

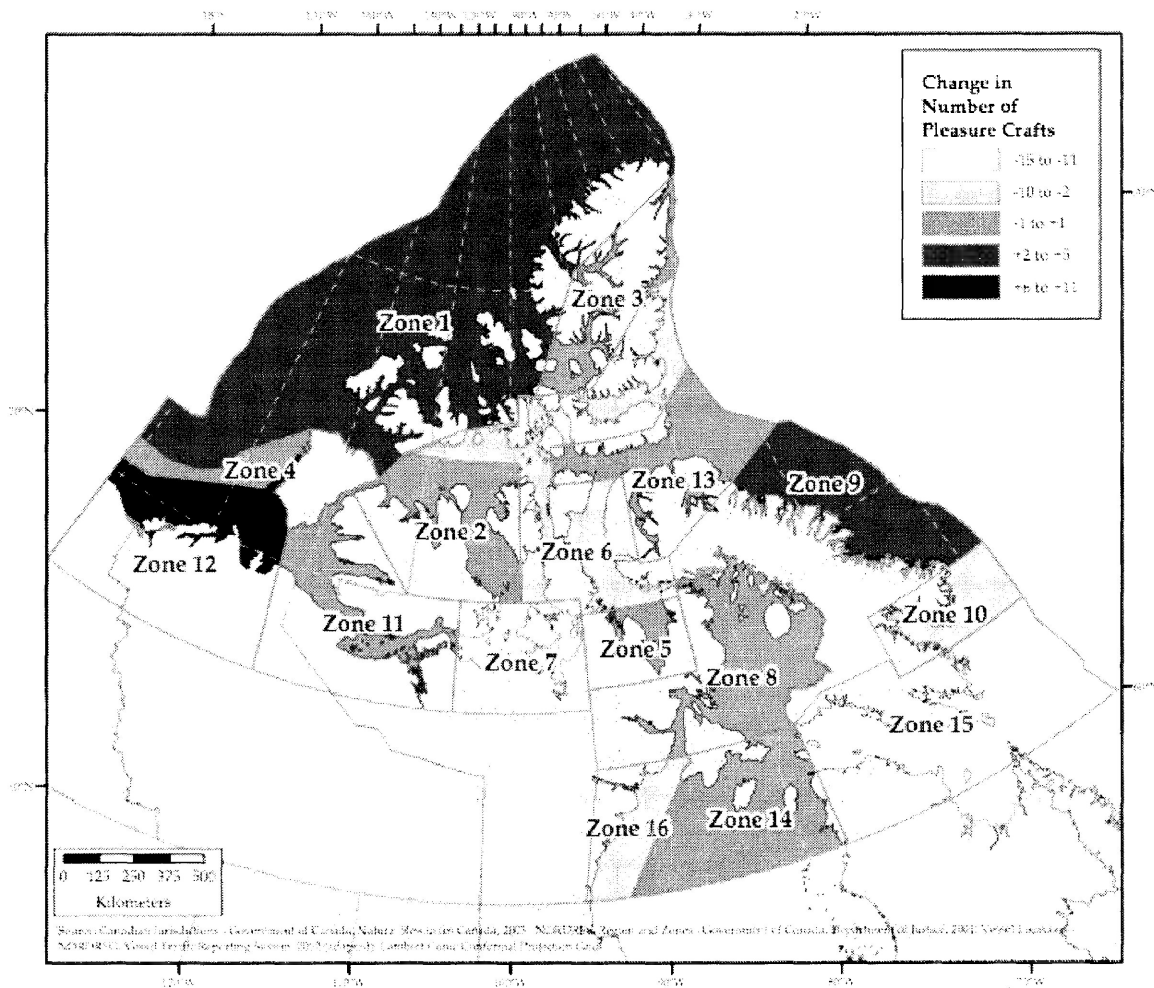


Figure 4.6: Change over time in the number of pleasure craft vessels for the two time periods using natural break categories (Data Source: NORDREG pleasure craft data).

Table 4.2 provides the numeric comparisons for the numbers of pleasure craft vessels by zone for the two time periods. The highest concentration in the number of vessels in one zone is 83 vessels, which occurs in Zone 13, the eastern opening to the Northwest Passage (Baffin Bay). This zone has the highest concentration in vessels for both time periods and the change over time is almost non-existent. In contrast, Zone 7 has the greatest change time with a decline of 15 vessels between the two time periods. Zone 15, the southern Baffin, also shows a large decline over the two time periods. The largest increase in the number of vessels over the two time periods occurs in Zone 12. This shows that more vessels are accessing the western section of the Northwest Passage and fewer vessels are visiting the Southern Baffin area. For the first time period the average number of zones accessed was 2.6; for the second time period it was 3.0.

Table 4.2: Number of Pleasure Craft Vessels by Shipping Safety Control Zone and Change in Number of Pleasure Crafts from 1990-2010 to 2011-2013 (Data Source: NORDREG pleasure craft data).

Zone Number	Number of Pleasure Crafts	Number of Pleasure Crafts 1990-2010 n= 234	Number of Pleasure Crafts 2011-2013 n= 220	Change in Number of Pleasure Crafts (1990-2010 to 2011-2013)
1	5	1	4	3
2	6	3	3	0
3	0	0	0	0
4	7	3	4	1
5	1	1	0	-1
6	70	37	33	-4
7	63	39	24	-15
8	2	1	1	0
9	35	15	20	5
10	13	8	5	-3
11	73	36	37	1
12	69	29	40	11
13	83	41	42	1
14	2	1	1	0
15	23	17	6	-11
16	2	2	0	-2

The NORDREG Pleasure Craft data contain records for each vessel including dates, daily position data (latitude and longitude coordinates), as well as general locations. The dates and daily position data were used to determine the number of days a vessel spends in a particular location in the Arctic. A vessel day is defined as a vessel being recorded as in the NORDREG Zone. Each day is a record and counts as a vessel day.

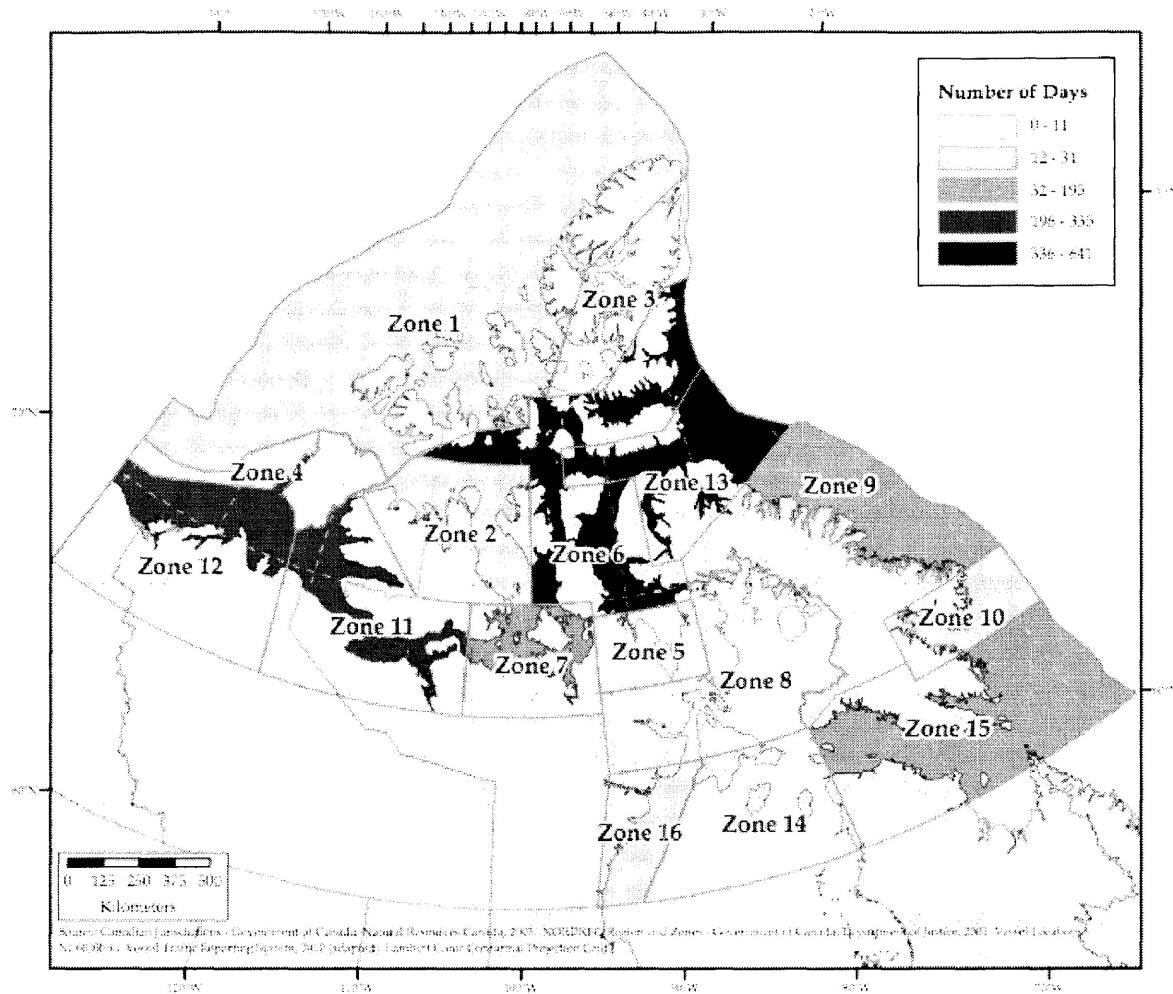


Figure 4.7: Number of vessel days from 1990-2013 using natural break categories (Data Source: NORDREG pleasure craft data).

Figure 4.7 demonstrates the total number of days spent in the zones in Arctic Canada from 1990-2013 and shows a concentration through Zones 12, 11, 6 and 13. Zones 6 and 13 have the highest concentration in the number of days for the entire time period, with a range of 590-641 days. This indicates that vessels are spending more days in this part of the Arctic rather than other parts. This representation reinforces the vessel data that also showed a concentration in the Northwest Passage. Similarly, relatively few days are spent in Zones 8 and 14, coincident with the vessel data.

Figure 4.8 shows the concentration in the number of vessel days in the most eastern and the most western parts of the NWP. The largest concentration of days occurs in Zones 6 and 13, the eastern side of the Northwest Passage. The second largest concentration in the number of vessel days is concentrated in Zones 11 and 12 at the western side of the NWP. Zones 1-5, 8, 14, and 16 have the lowest concentration of vessel days in Arctic Canada, indicating that vessels are not spending their time in these areas. The number of vessel days spent in Arctic Canada for 2011-2013 is dispersed over the NORDREG Zone. The majority of vessel days are concentrated in Zones 6 and 13 on the eastern end of the Northwest Passage, shown in Figure 4.9. The second largest concentration of days spent in northern Canada is in Zones 12 and 11, located at the western opening of the Northwest Passage.

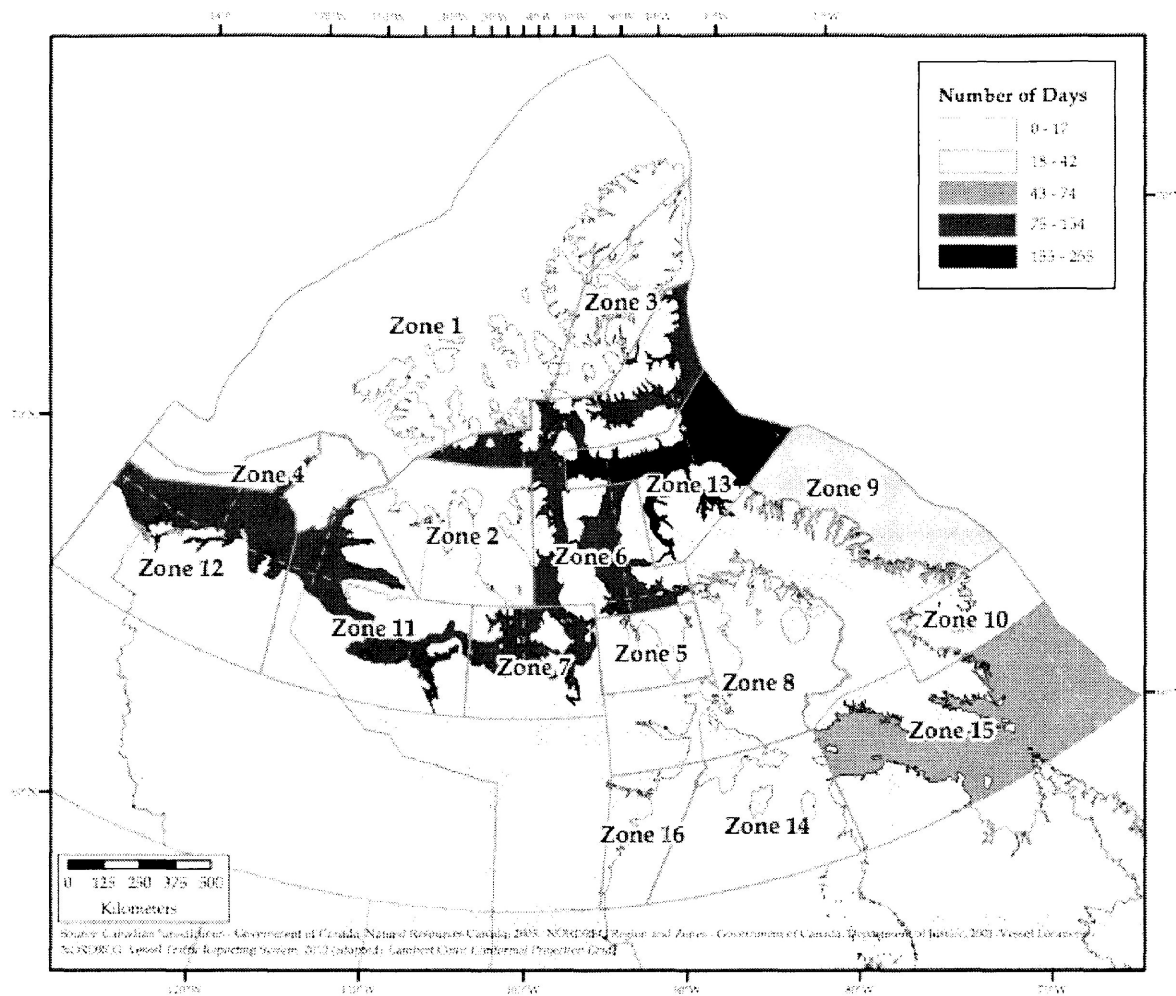


Figure 4.8: Number of vessel days from 1990-2010 using natural break categories (Data Source: NORDREG pleasure craft data).

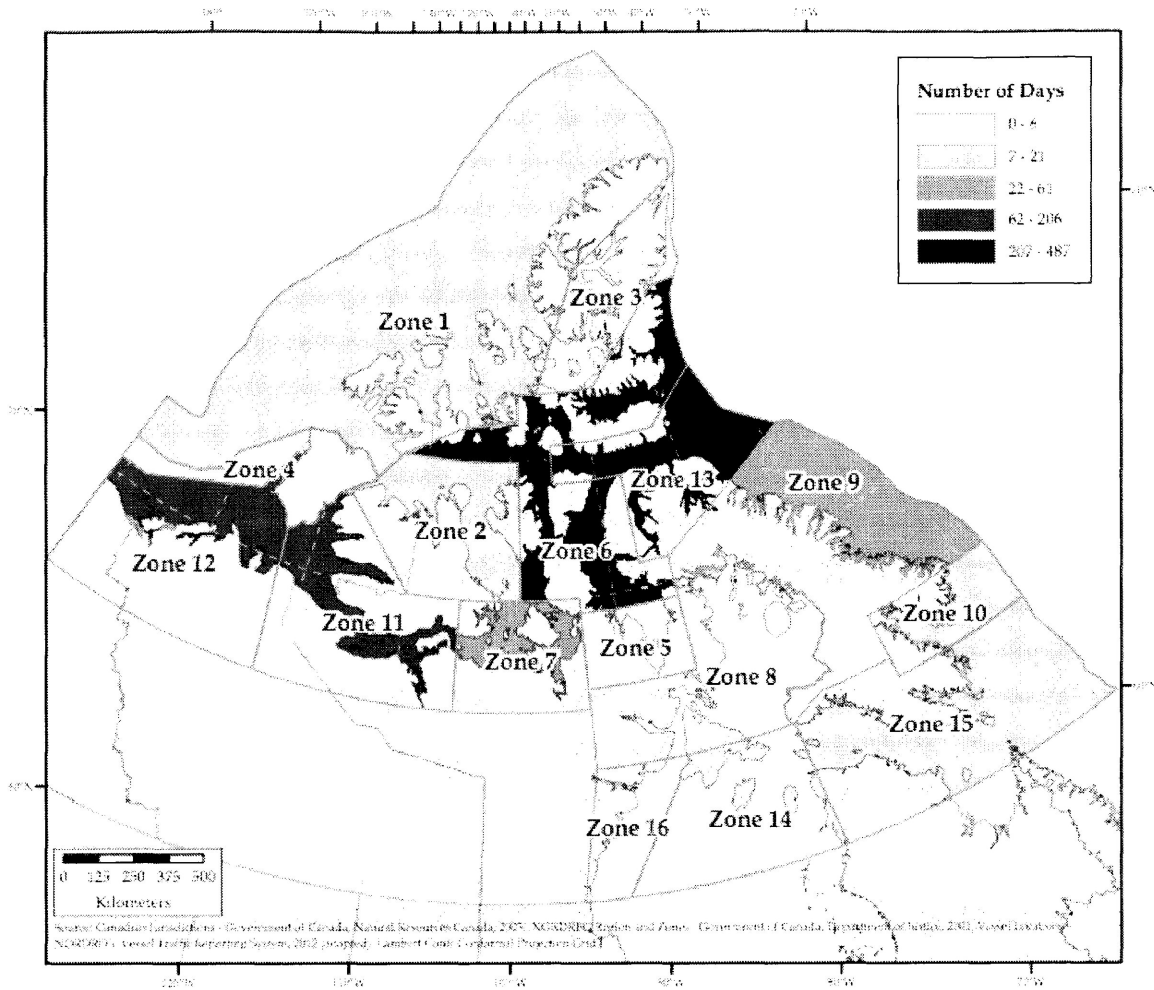


Figure 4.9: Number of vessel days from 2011-2013 using natural break categories (Data Source: NORDREG pleasure craft data).

Figure 4.10 displays the change in the number of vessel days over the two time periods (1990-2010 and 2011-2013). The zones with the greatest decline in the number of vessel days are Zones 7 and 15. The greatest change that is shown in this map occurs with an increase in the number of vessel days. This is shown in Zone 6 with an increase of 333 days for the 2011-2013 period. Table 4.3 shows the concentration in the number of pleasure craft vessel days for each zone per time period. Similar to the high concentration in the number of pleasure craft vessels, Zone 13 has the highest number in vessel days spent in the Arctic. The greatest change in the number of vessel days spent in the Canadian Arctic occurs in Zone 6, with a difference in 333 days from 2011-2013 to 1990-2010. The average number of vessel days per vessel in the NORDREG Zone from 1990-2010 was 10.86; for the second time period (2011-2013) the average number of vessel days is 19.23. It is important to note that not all vessels report all their daily positions and that once a vessel is winterized vessel positions are no longer recorded in the NORDREG data. Despite the limitations in these data, the doubling in the average number of vessel days spent from 1990-2010 to 2011-2013 is a major finding of this research.

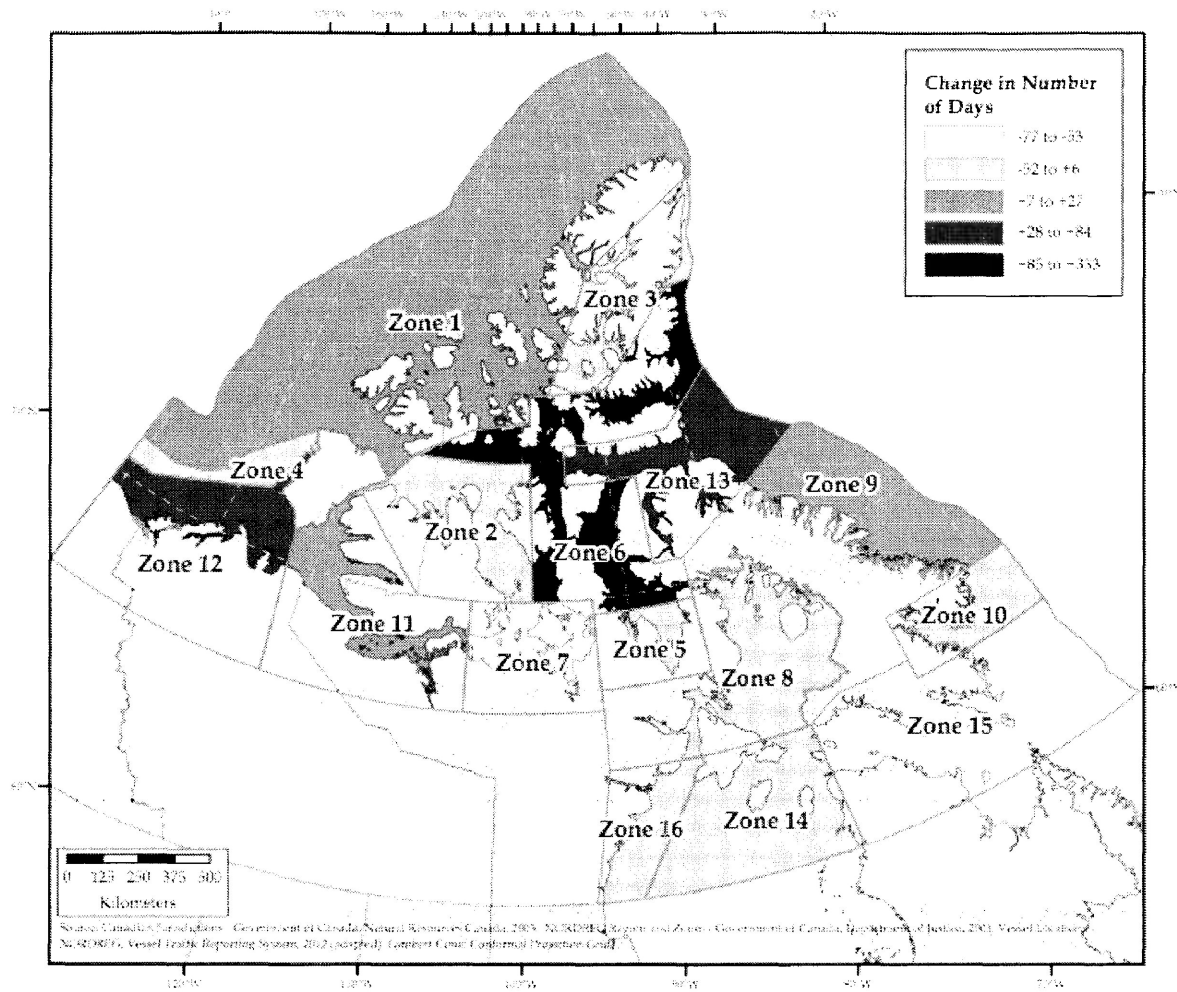


Figure 4.10: Change over time in the number of vessel days for the two time periods using natural break categories (Data Source: NORDREG pleasure craft data).

Table 4.3: Number of Vessels Days by Shipping Safety Control Zone and Change in Number of Vessel Days from 1990-2010 to 2011-2013 (Data Source: NORDREG pleasure craft data).

Zone Number	Number of Vessel Days	Number of Vessel Days 1990-2010 n= 988	Number of Vessel Days 2011-2013 n= 1404	Change in Number of Days (1990-2010 to 2011-2013)
1	22	1	21	20
2	14	4	10	6
3	0	0	0	0
4	11	5	6	1
5	2	2	0	-2
6	641	154	487	333
7	195	136	59	-77
8	4	3	1	-2
9	103	42	61	19
10	31	17	14	-3
11	335	154	181	27
12	328	122	206	84
13	590	255	335	80
14	7	5	2	-3
15	95	74	21	-53
16	14	14	0	-14

Table 4.4 demonstrates the highly visited sites from 1990-2013 using the daily position data available through the NORDREG Pleasure Craft data.

Table 4.4: Highly Visited Sites from 1990-2013.

<u>Site Location</u>	<u>Number of Recorded Vessels</u>
Cambridge Bay	76
Tuktoyaktuk	43
Gjoa Haven	40
Pond Inlet	40
Resolute Bay	27
Fort Ross	25
Halfway Island	23
Beechey Island	21
Herschel Island	19
Peel Sound	17
Prince Regent Inlet	17

*Vessel positions were recorded at 4pm daily.

4.3.3. Persons on Board

Analysis of the NORDREG pleasure craft data shows that the number of persons on board (POB) pleasure craft vessels in the Canadian Arctic from 1990-2013 is recorded as 1,097 individuals, though not all vessels records include this information. From 1990-2010 there were 628 people recorded aboard vessels, and over the 2011-2013 period there were 469 people recorded. Figure 4.11 demonstrates the low numbers of recorded persons up to 2009 and a peak in that time period in 2010. Though the numbers fall in 2011, the two subsequent years show very large numbers in comparison. It is important to note that the presence of a large pleasure craft affects the data. For example, in 2010, 2012, and 2013 a vessel with over 50 people aboard was present.

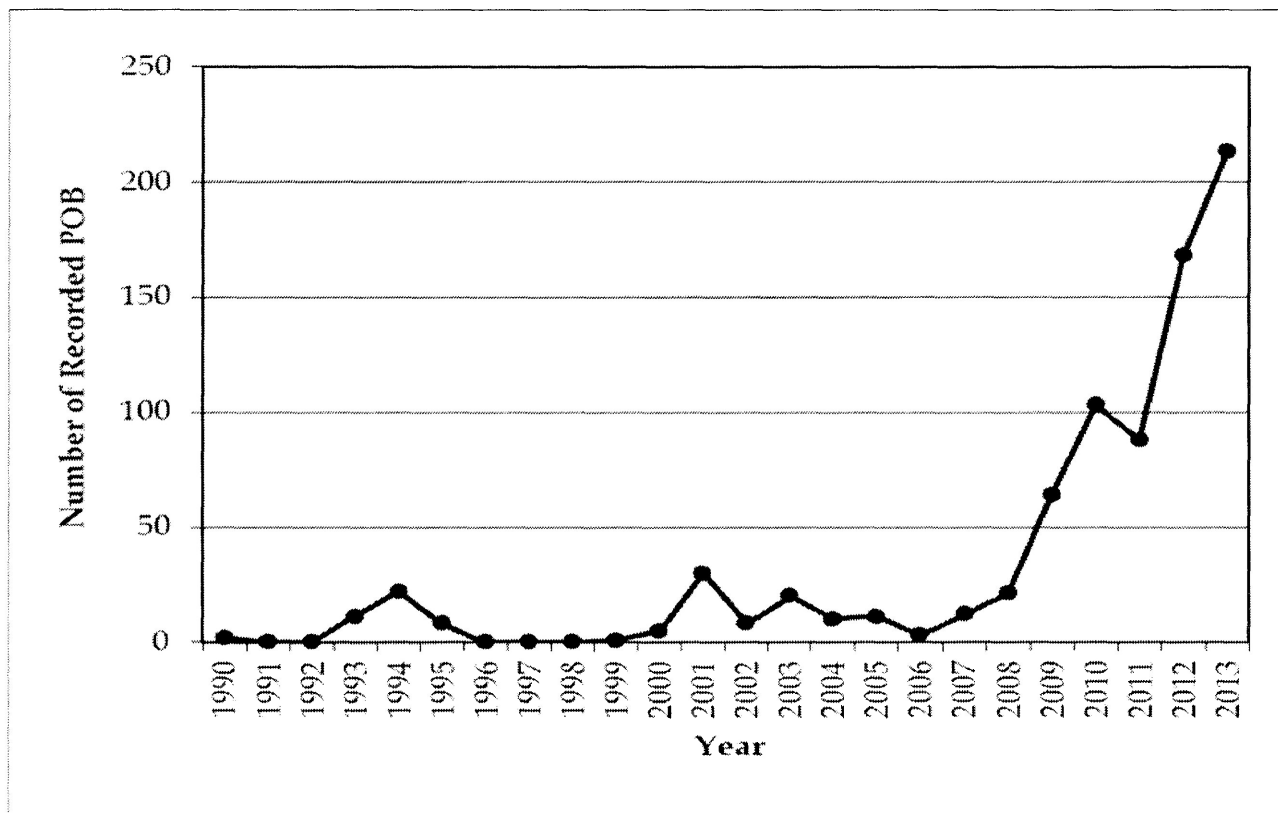


Figure 4.11: Recorded Number of Passengers on Board (POB) in NORDREG Zone from 1990-2013 (Data Source: NORDREG pleasure craft data).

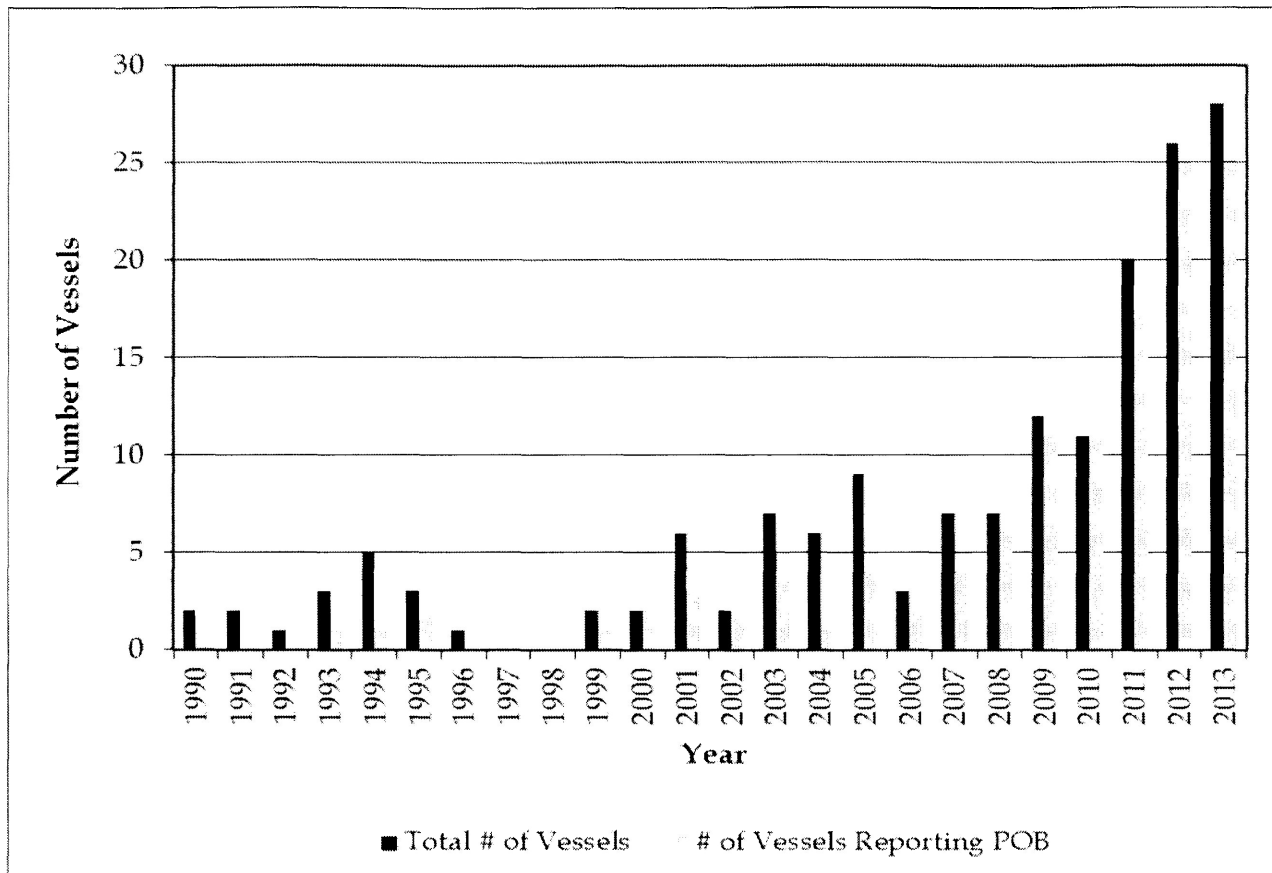


Figure 4.12: Recorded Number of Pleasure Craft Vessels and Recorded Number of Vessels Reporting Passengers on Board (POB) in NORDREG Zone from 1990-2013 (Data Source: NORDREG pleasure craft data).

From 1990-2013, 75% of pleasure crafts in NORDREG pleasure craft data provide the number of persons on board the vessel. Figure 4.12 shows the number of pleasure craft vessels annually and the number of vessels reporting the persons on board.

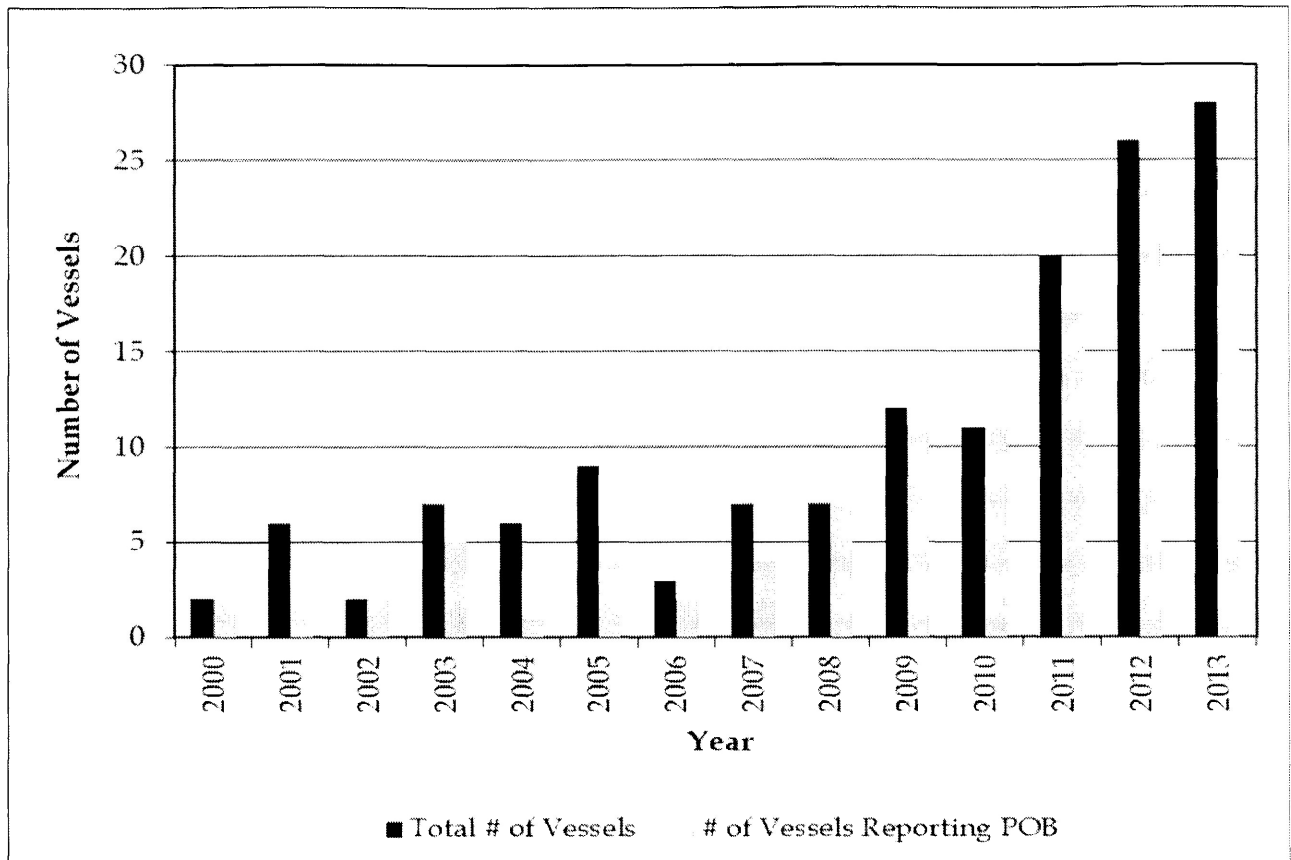


Figure 4.13: Recorded Number of Pleasure Craft Vessels and Recorded Number of Vessels Reporting Passengers on Board (POB) in NORDREG Zone from 2000-2013 (Data Source: NORDREG pleasure craft data).

Figure 4.13 focuses on the years 2000-2013, the time period when there is more consistent reporting of persons on board. This graph illustrates the number of vessels that have reported to NORDREG and the number that provided the number of persons on board. Not all vessels provide all information to authorities, even when reporting to NORDREG.

Table 4.5 displays the recorded number of pleasure craft vessels, the number of pleasure craft vessels that have and have not reported POB, the number of persons reported, the average number of persons per year from 2000 to 2013, and the adjusted number of persons. The adjusted number of persons is based on creating an average for the vessels reporting in a particular year and using that average to extrapolate for those not reporting. The adjusted numbers are on approximation of numbers based on the average for those reporting. The total number of persons on board is extrapolated as 928 for the time period 2000-2013 inclusive.

Table 4.5: Number of Pleasure Craft Vessels (Reporting and Non-Reporting) and Number of Persons Reported. (Data Source: NORDREG pleasure craft data).

Year	Total Number of Vessels	Number of Reporting Vessels	Number of Vessels NOT Reporting	Number of Persons Reported	Average Number of Persons	Adjusted Number of Persons
2000	2	2	0	5	2.5	5.0
2001	6	3	3	30	10.0	60.0
2002	2	2	0	8	4.0	8.0
2003	7	5	2	20	4.0	28.0
2004	6	1	5	10	10.0	60.0
2005	9	4	5	11	2.8	24.8
2006	3	2	1	3	1.5	4.5
2007	7	4	3	12	3.0	21.0
2008	7	7	0	21	3.0	21.0
2009	12	11	1	64	5.8	69.8
2010	11	11	0	103	9.4	103.0
2011	20	17	3	88	5.2	103.5
2012	26	25	1	168	6.7	174.7
2013	28	25	3	213	8.5	238.6
Total	146	119	27	756	6.4	927.5

4.4 Blog Analysis

This research uses blogs to gain insight into pleasure craft travelers and their vessels, including aspects such as sites visited, behaviour of passengers, and interactions with the environment. Blogs are used to analyze patterns of pleasure craft vessels and their activities in regards to safety management. The following sections are results from the content analysis of a sample of 12 blogs (Blog Sample), from the Blog File, that are used to gain insight into pleasure craft tourism in the Canadian Arctic. Each of the quotes provided in this section is directly taken from blogs indicating that all quotes are representative of the information found through the blogs.

4.4.1. Description Analysis

Specific descriptors were used in order to gain knowledge on type of vessels used, crew, reason for travel, preparation of voyage, and routes. Table 4.6 illustrates the number of blogs containing mentions of these specific descriptors on the websites. Fifty-eight percent of blogs described equipment on board the vessel; this included Satellites, Radar, and Forward Looking Sonar (FLS).

Table 4.6: Number of Vessels that Mentioned Specific Descriptors.

		Number of Vessels
Vessel Description:	Built by Owner	3
	Country of Origin	3
	Equipment on Board	7
	Layout	6
	Modifications/Alterations	7
	Sailboat	4
	Statistics	4
Description of Crew:	Experience	7
	Number of Crew	8
	Origin	3
Reason for Voyage/Trip:	Adventure	4
	Film	2
	History	2
	Other	2
	Research	3
Preparation:	Contact Person(s)	2
	Equipment	6
	Food/Water	4
	Research on Routes	4
	Research on Weather	4
	Safety Precautions	5
	Sponsors	2
Route:	Goals	5
	Itinerary	3
	Map	6
	Specific Stops (Anchorage)	2
	Vessel Tracking	3

Table 4.7 provides an example of one blog entry that describes the equipment one vessel had on board.

Table 4.7: Quote from Blog that Demonstrates Equipment on Board.

Vessel Name	Quote from Blog
<i>Bagan</i> (2009)	“Managed to secure at price something which could very well be the most important piece of equipment for the trip; FLS - Forward Looking Sonar. With this mounted under the waterline we’ll be able to look ahead out to 200’ and down to 100. Radar doesn’t always pick up icebergs and this should help for not only seeing them but uncharted shoals as well.” (Theobald, 2009)

Half of the blogs also described the layout of the boat, while just over half expressed the modifications and alterations the travelers performed on their vessels. The experience of a vessel’s crew is also of great importance when sailing into the Polar Regions because of the variety of conditions presented by the Canadian Arctic. Seven of 12 vessel blogs reported the experience of their crew although some authors that reported experience also made comments on their blog that contradicts that statement. The authors of the vessel, *Le Vagabond*, had this to say: “as for training our knowledge in navigation, not much needed usually thanks to GPS and electronic charts, *Vagabond* crossed several times the 180° longitude meridian, route set by the drifting ice in Anadyr Gulf” (Association Nord-Est & Brossier, 2001-2011). This poses a great concern for safety as this section will later describe.

The reason for a voyage is also of great importance. The motivation of a person for travel often determines the type of activities and the level of preparedness he or she has for their voyage. Four of the 12 blogs analyzed stated that the reason for traveling to the Canadian Arctic was adventure. Table 4.8 provides a quote from the blog authors of

the vessel *Teleport* and *The Arctic Joule* in relation to their reason for travel to the Canadian Arctic, adventure.

Table 4.8: Quotes from Blogs that Demonstrate Adventure as Reason of Voyage.

Vessel Name	Quote from Blog
<i>Teleport</i> (2010)	"To get through in one season (even for larger, faster yachts) is a race, and considering as we're up there for the experience, and both being photographers we want to be able to have the time to stop, explore and take photos etc rather than having to go-go-go all the time. This'll make for a much more exciting adventure and experience on all levels!" (Bray & Taunton, 2007)
<i>The Arctic Joule</i> (2013)	"The reality is actually quite different, yes there is obviously an element of adventure but for all four of us, there is an enormous amount of meticulous planning that has to be done to just get to the start line." (Mainstream Last First, 2013)

Blogs for three of the twelve vessels indicated the voyage was related to doing Arctic research. One of these bloggers, for the vessel *Glory of the Sea*, clearly outlined the objectives for research (Table 4.9). Vessels such as like *The Arctic Joule* were linked with agencies to collect data (Table 4.10).

Table 4.9: Quote from Blog that Demonstrates Research as Reason of Voyage.

Vessel Name	Quote from Blog
<i>Glory of the Sea</i> (2013)	"1. Increase the awareness of Norse interactions with North America over the past 1,000 years. 2. Travel via sailboat and search using advanced research technology for evidence of Norse presence in predetermined locations. 3. Support and energize increased research into the Norse exploration, settlements and trading in areas west of Greenland. 4. Educate and inform citizens of the Nordic countries on the history of Nordic exploration." (Fara Heim, 2015)

Table 4.10: Quote from Blog that Demonstrates Collecting Data During The Voyage.

Vessel Name	Quote from Blog
<i>The Arctic Joule</i> (2013)	"We're teamed up with the Vancouver Aquarium and the Department of Fisheries and Oceans and they have tasked us with collecting ocean data along our route so that ocean scientists might get a better picture of what's happening to the waters of the North West Passage. We use a special device called a CTD that measures a host of different ocean characteristics including conductivity, temperature and depth as the acronym indicates....The Department of Fisheries and Oceans has very little CTD information across the passage making our data collection a very valuable endeavour. Understanding what's happening in the arctic ocean will help better understand what climate change is actually doing up here." (Mainstream Last First, 2013)

Although there are five different categories regarding the reason for an individual's trip to the Arctic, blogs describe multiple categories. This can be due to multiple blog authors posting entries on the blog or because there are several facets to the motivation. Every crewmember may have various reasons for voyaging into the

Canadian Arctic. Some blogs appear to be written by one author, and some by two authors, while for others it is hard to tell how many authors contributed to the blog entries. An example of multiple motivations comes from a blog writer aboard *The Arctic Joule* whose reason for the Canadian Arctic voyage is research and adventure (Table 4.11).

Table. 4.11: Quotes from Blogs that Demonstrate Multiple Reasons for Voyage.

Vessel Name	Quote from Blog
<i>The Arctic Joule</i> (2013)	"I decided to undertake this expedition because by doing it myself and my teammates can make a strong statement in the battle against climate change. Doing it is very important to me. It's far easier for me to explain this to my girls, that I acted on my passions, than to lament to them that I didn't act on my passions because of them... What we're trying to do this summer has never been done before. We are hoping to row, without sail or motor in approximately 75 days, through the maze of islands and ice sheets of the Canadian archipelago that once represented a closed door for mariners attempting to navigate a sea route over the Americas in a single season. The Northwest Passage was anything but a passage in those days and presented a seemingly impassable route across the top of the world." (Mainstream Last First, 2013)

The blog author for the vessel *The Arctic Joule* recognizes the fact that preparation for travel into the Arctic is not an easy task as there are many elements of uncertainty when it comes to sailing in the Canada's Polar Region (Table 4.12).

Table 4.12: Quote from a Blog that Demonstrates Preparation of Voyage.

Vessel Name	Quote from Blog
<i>The Arctic Joule</i> (2013)	"So the scene is set for what will be one of the most difficult things I have ever done in my life. It's not necessarily the physical challenge that makes this so difficult but more the cloud of uncertainty that Mother Nature will cast over us on this expedition. We can prepare and train all we like but ultimately she will decide if we make it across the North West Passage or not." (Mainstream Last First, 2013)

This is why safety precautions and research on routes and ice is imperative. It is interesting to note that only 4 blogs discussed topics related to researching routes and ice on their blogs and only 5 blogs mentioned safety precautions. Table 4.13 outlines various quotes from the blogs of vessels *Bagan* and *Northabout* that describe some of the preparations they took in getting to the Arctic.

Table 4.13: Quotes on Preparation from *Bagan* (Theobald, 2009) and *Northabout* (Northabout: The Irish Northwest Passage, n.d.).

	<i>Bagan</i>	<i>Northabout</i>
Research on Routes	<p>“Tentative route made with possible stops for fuel and ice blocks.”</p> <p>“Spent 14 days on Russian Icebreaker “traveling the very waters that <i>Bagan</i> will be transiting this coming summer.”</p>	<p>“This project brings together a wealth of sailing and expedition 84 organizational experience. People who have achieved success in wild and remote corners of the world including Antarctica, Everest’s North Ridge, sailing in north polar ice and to Greenland by <i>Galway Hooker</i>. The core of the team is formed from members of the <i>South Aris</i> expedition.”</p>
Research on Ice/Ice Charts	<p>“Ice chart from The Canadian Ice Service. We download these charts once a day and try to get a picture of the speed and direction of the ice melt.”</p> <p>“Over the past year I’ve been in touch with Peter Semotiuk regarding ice and planning and one of the very first things I did was arrange to meet up with him.”</p> <p>“To have finally been face to face with the man who supplied us with information and cheered us on during those two days was a meeting I’ll never forget.”</p>	<p>All charts and Pilot Books covering Canadian waters had been to hand since Christmas, largely courtesy of Tony and Coryn Gooch. We had first met in Ushuaia, Tierra Del Fuego and subsequently in home waters (Ours, theirs are Victoria, B.C.).”</p>

Table 4.13 Continued: Quotes on Preparation from *Bagan* (Theobald, 2009) and *Northabout* (Northabout: The Irish Northwest Passage, n.d.).

	Bagan (2009)	Northabout (Progress Reports)
Contact Person for Health Emergencies	"...we got to talking about the trip to The Passage and by the end of that day I was emailing him asking him if he'd consider being our doctor on call. He very graciously accepted the invitation, spent many, many hours assembling our ship's medical kit and gave Dominique a very detailed, one day course on just about any emergency which could pop up. It was a always comfort knowing that Phil was literally a phone call away, a call that I'm very happy to say we never had to make."	"Mike is a medical doctor and will look after the crews health needs in the preparation and on the expedition."

In regards to preparation, an individual's name was mentioned multiple times in numerous blogs: Peter Semotiuk runs a daily radio schedule for yachts transiting the Northwest Passage. He sailed through the passage in 1988 and has been helping others do the same on voluntary basis for more than 20 years since. "He is a real hero to many who have attempted the passage, whether or not they finally succeeded in getting through, acting as a primary point of contact and information" (Russell, 2011 p. 6). Table 4.14 lists quotes regarding the input and assistance of Peter Semotiuk found during the blog analysis.

Table 4.14: Quotes from Blogs that Mention Peter Semotiuk.

Vessel Name	Quote from Blog
<i>Idlewild</i> (2005)	<p>“At 18:30 every evening starting Aug 10 Peter Semotiuk of Cambridge Bay is hosting a sailor’s radio network on 6224 kHz. He is very generously providing weather and ice reports as well as giving us the opportunity to hear the reports of the other 6 boats trying to travel the Northwest Passage this year.” (Idlewild Expedition, n.d.)</p>
<i>Bagan</i> (2009)	<p>“Every few days, via email, we’re in touch with Peter Semotiuk in Cambridge Bay seeking his wise council on all things ice related. For years now, Peter has been the “voice” who the majority of the boats trying to do this trip turn to, to plan their routes and timing and has built a wonderful and well deserved reputation for himself.” (Theobald, 2009)</p> <p>“Over the past year I’ve been in touch with Peter Semotiuk regarding ice and planning and one of the very first things I did was arrange to meet up with him... To have finally been face to face with the man who supplied us with information and cheered us on during those two days was a meeting I’ll never forget.” (Theobald, 2009)</p>
<i>Teleport</i> (2010)	<p>“Studying the ice charts again, and chatting by email with Peter Semotiuk (an expert on NWP sailing), we have decided to change our route, and instead of going to Resolute and then down Peel Sound (The 'usual' passage, if you can say such a thing), we are instead going to try heading down into Prince Regent Inlet instead...” (Bray & Taunton, 2007)</p>
<i>Young Larry</i> (2010)	<p>“Our plan was to wait a bit for the latest ice reports to show Navy Board Inlet more definitely clearing. We also got a helpful email from Peter Semotiuk (who is the acknowledged expert on NW Passage ice conditions) saying that it wasn't yet definite that we could make it through and on balance possibly to wait a little.” (Dermot’s NW Passage voyage on board Young Larry, 2010)</p> <p>“This evening we were incredibly privileged to have on board both Peter Semotiuk and another great character called Brent (I didn't catch his surname). Peter had given us impeccable ice and weather advice on our way down. He has been in contact with & helped almost every small boat that had been through or attempted the NW Passage in recent years and his knowledge is absolutely unrivalled.” (Dermot’s NW Passage voyage on board Young Larry, 2010)</p>

4.4.2. Key Word Analysis

A variety of key words were mentioned in blog entries that are important in helping develop the picture of incidents, close-calls, and safety issues of pleasure craft vessels in the Canadian Arctic (Appendix 6). Forty-one key words were grouped into 6 different categories. Each category represents an element that plays a role in regards to safety of vessels, especially small pleasure craft vessels, when traveling through the Canadian Arctic. The 41 words came from the original code sheet list based on the literature review and from key words that emerged from the data. This section illustrates the number of blogs that use these key words in describing their journey to Canada's Polar Region.

The number of vessels that mentioned key words relating to government are outlined in table 4.15. The word mentioned the most in this category was "Canadian Coast Guard." Fifty per cent of blog authors mentioned the CCG on their websites and all mentions on blogs had something positive to say: coming to the aid of vessels, checking on vessels, updating vessels on ice conditions, and inviting crews on their ships for dinners and showers.

Table 4.15: Number of Vessels Reporting Key Words in Regards to Government.

Government	Number of Vessels
Canadian Coast Guard	6
Canadian Ice Service	5
Coast Guard	2
Icebreakers	5
NORDREG	2
Police	5
RCMP	5
Search and Rescue	2

Interesting to note, only two vessel blogs mentioned NORDREG: *Tokimata* and *Young Larry* (Table 4.16).

Table 4.16: Quotes from Blogs that Mention NORDREG.

Vessel Name	Quote from Blog
<i>Tokimata</i> (2012)	"After some radio calls to the Coastguard it transpired that despite our advanced e-mails to NORDREG (the agency monitoring boat traffic in the NW Passage) no-one knew we were coming and therefore there was no customs or immigration in Tuk." (Garden, 2012-2013)
<i>Young Larry</i> (2010)	"Young Larry was on a lookout list that they receive at their daily morning briefing from the Canadian coordinating body, NORDREG. Nice to know that people are looking out for you. We do also update NORDREG with our passage plans so they would know if we are overdue." (Dermot's NW Passage voyage on board Young Larry, 2010)

Table 4.17: Number of Vessels Reporting Key Words in Regards to Ice.

Ice	Number of Vessels
Break through Ice	2
Ice Flow/Pack	6
Ice/Sea-Ice	11
Iceberg	9

Ice was mentioned in 11 of the 12 blogs (Table 4.17). The majority of vessel blogs described the surprise of the travelers about the fast movement of the ice in the Arctic. A shift in the direction of wind meant a subsequent shift in ice movement, making or breaking a vessel's chance of getting through. This was of great importance to the travelers because there were many incidents of vessels being caught in the middle of ice fields after strong winds. This is significant to this research in regards to safety and preparedness of vessels in an Arctic region where rescue is very distant. Table 4.18 displays a quote from the blog authors of *Teleport* that describe the scene of unpredictable ice in the Canadian Arctic.

Table 4.18: Quotes from Blogs that Mention Ice.

Vessel Name	Quote from Blog
<i>Teleport</i> (2010)	"I blinked groggily out the window and saw to my shock a bergy-bit no less than 20 meters from us! I exploded out of bed and into the cockpit, and the scene that surrounded us literally made me gape in horror. We were surrounded by bergy bits and growlers, hundreds of them, in the middle of a thick belt of ice, some rather large bits only meters from us as we bobbed around, slowly sailing in circles around them actually as the tiller had somehow slipped from where I'd cleated it." (Bray & Taunton, 2007)

Table 4.19: Number of Vessels Reporting Key Words in Regards to Climate.

Climate	Number of Vessels
Fog	11
Storm	3
Temperature	8
Weather	10
Winds	11

The climate is an enormous factor in voyaging through the Canadian Arctic. The two main key words, in regards to climate that almost 11 of 12 blogs noted are "fog" and "wind" (Table 4.19). This is mentioned numerous times because of the importance fog and winds have in the visibility and safe passage of pleasure craft vessels. Table 4.20 demonstrates the difficulties faced by two vessels related to fog and winds during their voyage. Reduced visibility in fog can make big differences in the navigability of sea ice because detecting leads through the ice is an entirely visual process.

Table 4.20: Quotes from Blogs that Mention Key Words in Regards to Climate.

Vessel Name	Quote from Blog
<i>The Arctic Joule</i> (2013)	"It's Frank and my shift and we head out into a drizzly morning shrouded in arctic fog. Our visibility is a mere 50 meters and we travel solely by the aid of GPS and compass. It's an eerie sensation moving forward, seeing nothing in a milky blankness until the contorted form of a decaying chunk of ice glides past, a weary foot soldier returning home from some far off battle." (Mainstream Last First, 2013)
<i>Teleport</i> (2010)	"Devastated to be missing such a photogenic moment, we quickly put our heads together and fussed over the lens for perhaps half of one second, and it was then that the deadly sirens suddenly struck - causing the wind to suddenly swing just enough crash-jibe our sails (an embarrassing first for this season) and send us sailing directly towards the wall of ice in front of us. *expletive* !!! Frozen in shock for another half-second, I then jumped on the tiller and pulled it back across with all my might, swerving us back on a course parallel and then safely out and away from the ice cliff just in time. That'll teach us! Still, they were great photos!" (Bray & Taunton, 2007)

Table 4.21: Number of Vessels Reporting Key Words in Regards to Communications.

Communications	Number of Vessels
Communication	2
GPS/Radar	10
Radio	7

Table 4.21 shows the number of blogs that mention navigational equipment in their blogs. "GPS" and "Radar" were mentioned by 83% of vessels. Radar is considered highly desirable for Arctic waters and GPS systems have improved polar navigation significantly according to Russell (2011).

Although these two means of navigation are highly regarded, there are still some major difficulties that are outlined in Table 4.22.

Table 4.22: Quotes from Blogs that Mention Key Words in Regards to Communications.

Vessel Name	Quote from Blog
<i>Jonathan III</i> (2012)	"Radar and C-map give different positions. Where am I? In a grey world we can only see the brown breakers forcefully running on the shallows. Also right ahead where it should be 6 m deep. Full reverse when the forward looking sounder goes down to 2,5 m. The swells break against the stern. According to C-map we should now hit the bottom but there is the spit, the depth increases so full to port now. Radar and chart-plotter are still arguing, so much for electronic navigation..." (Odysseus Creative MultiMedia, n.d.)
<i>Teleport</i> (2010)	<p>"The electronic charts on our GPS chart plotter were way off - rocketing from one green barrel to the next, I watched anxiously as our supposed track on the screen cut right over shoals and even directly through the middle of small islands." (Bray & Taunton, 2007)</p> <p>"We swapped to the other side of the island for better shelter (interestingly our GPS chart plotter showing that we a) anchored in the middle of the island, and b) had to sail an extra couple of miles as the island was in fact about a mile longer than shown - not the world's most accurate charts around here, despite them being this year's electronic issue)." (Bray & Taunton, 2007)</p>

Table 4.23: Number of Vessels Reporting Key Words in Regards to Reports/Charts.

Reports	Number of Vessels
Ice Charts/Reports	10
Weather Charts/Reports	7

In addition to GPS and Radar aboard vessels, it is also important that pleasure craft vessels are equipped with all relevant charts and other publications necessary for their voyage. Table 4.23 displays the number of vessels that mention “Ice” and “Weather Charts”. The majority of vessels do discuss Ice Charts in their blogs. The blog author of the vessel *Tokimata* notes difficulty with the Canadian charts in Table 4.24.

Table 4.24: Quote from Blog that Mention Charts.

Vessel Name	Quote from Blog
<i>Tokimata</i> (2012)	“ Although we have the detailed Canadian paper charts for this area, and electronic charts on our chart plotter, the area up the west side of King William Island is completely uncharted - just a big white space on the chart. So we had to keep a constant eye on the depth sounder, but it remained deep quite close into shore and we could anchor in 4m of water only 200 metres from the beach.” (Garden, 2012-2013)

Every winter the large-scale movement of ice re-shapes the seabed. The assumption is sometimes made that natural features, such as rocks, have all been charted and do not generally move although this is inaccurate. Inaccurate charts can be very dangerous for pleasure craft vessels in the Canadian Arctic.

The vessels *Tokimata*, *Young Larry*, and *Jonathan III* mentioned this issue of inaccurate charts in Table 4.25.

Table 4.25: Quotes from Blogs that Mention Inaccurate Charts.

Vessel Name	Quote from Blog
<i>Tokimata</i> (2012)	"The charts are not too accurate in this area - most of the surveys are years old, and at places close to the barrier islands our chart plotter showed us sailing over the top of the islands. But fortunately the sea bottom seems to be quite regular and it is easy to follow a depth contour along the shore when close in to the islands - sometimes we were down to 3 metres of water - 1 metre under the keel." (Garden, 2012-2013)
<i>Young Larry</i> (2010)	"Today's ice charts don't suggest an imminent clearing but the wind did blow from the East over night which should have helped. One problem with the ice charts is that they are inevitably a little out of date by the time we get them." (Dermot's NW Passage voyage on board Young Larry, 2010)
<i>Jonathan III</i> (2012)	"I am at the mast to shake out the last reef when a hard pounding sound vibrates through the boat. At first I have no idea what I did wrong, looking up the mast I hear shouting from the cockpit: "2 meter on the depth-sounder". I turn on the engine full throttle, Mirek turns the wheel all the way over and Eirik is already pumping up the centreboard. We tack and feel immensely relieved when the bottom disappears from sight again. Pfff.... Another good reason for a centreboard boat, you are not immediately stuck on a rock in the middle of nowhere. The rock is charted at 20 m depth. Charts in the Arctic ..." (Odysseus Creative MultiMedia, n.d.)

The number of blogs that record incidents, close-calls and safety issues is outlined in Table 4.26. The key word “Stuck” and “Danger(ous)” were mentioned the most in the blogs analyzed. The majority of blog writers that mention the word “stuck” refer to ice.

Table 4.26: Number of Vessels Blogs that Mention Key Words in Regards to Issues.

Issues	Number of Vessels
Caution	3
Close Encounters (Calls)	3
Concern	4
Damage	5
Danger(ous)	7
Detour	4
Difficulty	3
Incident	4
Issue(s)	3
Problem	4
Repairs	3
Risk(y)	4
Safety	3
Security	2
Stuck	6
Trapped	2
Trouble	2
Warning	2

Quotes from *Le Vagabond* and *Young Larry* can be found in Table 4.27 that describes the dangers of getting stuck in ice.

Table 4.27: Quotes from Blogs that Mention the Key Word "Stuck."

Vessel Name	Quote from Blog
<i>Le Vagabond</i> (2003, 2011, 2012, 2013)	"5 milles away from King Point, where Amundsen's Gjoa spent her third wintering, a strong North wind suddenly packed the ice. Stuck again. Compression was high, so much so that Vagabond was pushed up, thanks to her hull's shape...Our position was not very comfortable, and during 2 days, we tried to get used to live in a 15° tilted environment. This time the pack ice was silent, no breathing, no moving, everything stuck with the powerful ice pressure." (Association Nord-Est & Brossier, 2001-2011)
<i>Young Larry</i> (2010)	"I was off watch and trying to sleep in my berth in the fo'scle (for the non- nautical amongst you, that is the front pointy end) when I was disturbed by the always unpleasant sound of ice scrunching on the hull together with the engine going forward and astern. When I got up on deck it was clear we were well and truly stuck." (Dermot's NW Passage voyage on board Young Larry, 2010)

In the Canadian Arctic, it is important to plan for emergencies, as there are many potential incidents that can occur. The word "danger" was mentioned by 58% of blogs. This is important to note because the vessels that did mention the word used it in a way where they tried to eliminate the potential for possible hazards.

Table 4.28 shows quotes that illustrate the way some blog authors use the word “danger” in relation to safety precautions for traveling in the Canadian Arctic.

Table 4.28: Quotes from Blogs that Mention the Key Word “Danger.”

Vessel Name	Quote from Blog
<i>Teleport</i> (2010)	“Unfortunately, even if she's water-tight, we can't really leave today anyway, because the first 50 miles out from St. Anthony here is filled with icebergs (and their associated, smaller but more dangerous 'growler' chunks bobbing around them), and we wish to do this section in broad daylight to help us see and avoid them - requiring us to leave at first light and maximise our daylight time to get through the worst of it before the harrowing night-sailing with torches through (less crowded) berg-territory commences.” (Bray & Taunton, 2007)
<i>The Arctic Joule</i> (2013)	<p>“We hope they stay in the case for the duration but polar bears are a real danger on our journey and we need to be prepared. In addition to a separate flare gun as our first defense, we’ll have bear bangers in the chamber as the first round, a rubber bullet as second and a series of slugs as lethal force if all else fails.” (Mainstream Last First, 2013)</p> <p>“The planned crossings have not been possible because of the ice coverage and the danger of ending up in a soup of massive icebergs. To avoid this we have had to stay much closer to the shore and skirt around the bays like one would in a smaller craft. The difficulty with this is that the ocean rowing boat is much more susceptible to wind. So the danger is that we are blown away form the shore out to the ice that lurks off shore. This is absolutely not an option as the boat would be destroyed and we would be in serious danger.” (Mainstream Last First, 2013)</p>

4.4.3 Sites Visited

It is important to note the sites that are visited by pleasure craft vessels within the Canadian Arctic. This allows for a deeper insight into where vessels are going and what they might be doing at these sites. Looking at sites visited is important when developing a picture of pleasure craft tourism in the Canadian Arctic for governments

as well as communities. Blog authors mentioned a total of 90 sites, including some outside the NORDREG Zone. Of the sites within the NORDREG Zone visited by pleasure crafts, Table 4.29 demonstrates the top 14 reported sites and the number of vessels that mention each site.

The number one site, mentioned in 11 blogs, is Cambridge Bay followed by Tuktoyaktuk in 10. Cambridge Bay is located on the South coast of Victoria Island and is the largest community in the Kitikmeot. Lancaster Sound was mentioned by 9 blogs, while 8 blogs mentioned Coronation Gulf, Hershel Island, and Pond Inlet with 66% of blog authors who said they passed or stopped in these sites. The top sites mentioned in Table 4.29 coincide with the zones of concentration for number of vessels and number of vessel days spent in the Arctic from 1990-2013.

Table 4.29: Number of Vessels that Mention Specific Sites.

Top Sites Mentioned	Number of Vessels that Mentioned Specific Sites
Cambridge Bay	11
Tuktoyaktuk	10
Lancaster Sound	9
Bering Strait	8
Coronation Gulf	8
Hershel Island	8
Pond Inlet	8
Amundsen Gulf	7
Beaufort Sea	7
Bellot Strait	7
Bylot Island	7
Gjoa Haven	7
Baffin Island	6
Cape Perry	6
Dolphin and Union Strait	6

The sites mentioned are important to note because of the insight they provide.

This information can be useful in the development of future ports and harbours for pleasure crafts in relation to boosting tourism in the Canadian Arctic. This information provides another layer in developing a picture of pleasure craft vessel traffic and travel patterns in the Canadian Arctic because of the correlation with the number of pleasure craft vessels present in various zones throughout the Canadian Arctic.

4.4.4. Reports of Other Vessels

The excitement of seeing and hearing another vessel over the radio was mentioned in most blogs (Table 4.30) and some blogs outline incidents that occurred with other vessels.

Table 4.30: Quote from Vessel Blogs that Mention Other Vessels.

Vessel Name	Quote from Blog
<i>Bagan</i> (2009)	"Yesterday while doing my anchor watch, the VHF radio squawked to life with "Bagan, Bagan... Ocean Watch". I all but jumped out of my socks. Total disbelief that I'd heard what I heard. Sheepishly I answered the call (it wasn't a practical joke by someone tucked away in the engine room) and in short order found that "Ocean Watch" the sloop that's doing the "Around The America's" project was sailing by outside the bay, not a mile away." (Theobald, 2009)
<i>Baloumn Gwen</i> (2008)	"We meet our friends Hans, Tobias & Cameron from the sailboat Silent Sound (see who they are in my previous breaking news + pictures)...I was really pleased...these guys are great, interesting & passionned by the adventure to attempt the Northwest Passage as we do...We did a small morning hike with Hans & Tobias...exchanging too past days wildlife souvenirs (muskoxen, polar bears...), how the sea conditions where, and other life experiences...the pick-nick was relaxing with some nice Arctic flowers sceneries...took some good shots." ("Arctic Calling," 2009)

Table 4.30 Continued: Quote from Vessel Blogs that Mention Other Vessels.

Vessel Name	Quote from Blog
<i>Teleport</i> (2010)	"To our surprise, there was also two other yachts anchored in the bay, a lovely Danish couple aboard the 42 ft yacht 'SOL', and a New Zealand family aboard 42ft 'Tokimata', both heading the opposite way to us through the passage, from west to east. The most ever yachts ever in Tuk at the one time I bet! We had a good chat, got a group shot, swapped some pilot guides / info books (we gave them our Greenland info that we no longer need, and they gave us some Alaskan ones they no longer needed), and then once they'd filled up the diesel jerrycans they set off, making the most of the westerly winds out there at the moment." (Bray & Taunton, 2007)
<i>Le Vagabond</i> (2003, 2011, 2012, 2013)	"We have been sharing the adventure for 2 weeks with the incredible English trio of Norwegian Blue, and it was great to celebrate together our success last night, riding at anchor in front of a glacier of Bylot Island." (Association Nord-Est & Brossier, 2001-2011)

The blogs analyzed in this research also recorded incidents that have occurred with other vessels in Canada's Polar Region (Table 4.31).

Table 4.31: Quotes from Blogs that Mention "Incidents and Close-Calls."

Vessel Name	Quote from Blog
<i>Bagan</i> (2009)	"We received an email from a boat 60 miles north of us. She was so solidly packed in and was being driven to shore. She had to call the Canadian Coast Guard to send an ice breaker to free them up." (Theobald, 2009)
<i>The Arctic Joule</i> (2013)	"On Friday September 6th the Canadian Coast Guard rescued a group of American adventurers who were travelling the Northwest Passage on jet ski as part of the reality television show Dangerous Waters. We met these guys a number of weeks back as they blew past us on the Amundsen Gulf. We were fighting a strong southerly wind at the time that was intent on pushing us offshore when a number of small lights appeared on the horizon. It was in the early hours of the morning and only an arctic twilight illuminated our way. The lights bore down on us fast and before long we were surrounded by a pod of growling jet skis and their support boat. A cameraman was filming everything. We chatted with the group, wished them luck and watched them disappear into the night." (Mainstream Last First, 2013)
<i>Tokimata</i> (2012)	"Soon came another crew filming "Dangerous Waters" for the Discovery channel of 6 young men trying to go around the world on jet skis. These guys went across the Bering strait a few days before, had landed at Russia in fog, their cameras on their handlebars only to be confronted by a tank on shore, guns trained on them by surly soldiers and an angry army colonel who unknowingly picked up their small camera and stared down at it, big fur hat and handlebar mustache no doubt giving them great TV, then they were arrested and put in jail in spite of having visas pre-arranged." (Garden, 2012-2013)

Table 4.31 Continued: Quotes from Blogs that Mention “Incidents and Close-Calls”.

Vessel Name	Quote from Blog
Teleport (2010)	<p>“We awoke one morning to urgent Russian voices, and peeping blearily through our window, we saw what appeared to be a makeshift castaway's raft, tying up to the wharf beside us. It was made of what looked like bamboo poles, lashed with string and duct-tape, two diesel engines mounted on the back, with a small tent underneath a precarious A-frame structure in the middle. On top of this hung a shabby sail and a ... a radar dome. With absolutely no idea what to make of it, I hurried out to help take the lines of these poor shipwreck survivors. It turned out, amazingly, that these guys were actually in the process of circumnavigating the arctic in stages onboard this crazy raft, and had already successfully navigated the Northeast passage above Russia several years ago, had now just about done the Northwest passage, and were just a few weeks away from continuing on to Alaska and ultimately back to Russia. Just awesome. And we thought we were doing it tough aboard our little boat! These guys don't even have a heater!” (Bray & Taunton, 2007)</p>

These are useful to note because not all incidents and close-calls are reported to authorities. This information provides a new perspective on safety for smaller vessels in Arctic Canada. One blogger even recorded breaking the law: “The complete lack of (legal) alcohol in the community didn't detract from the day at all but now we're back on boat, we're breaking the law by quaffing a glass of wine before bedtime (Dermot's NW Passage voyage on board Young Larry, 2010).

4.4.5. Video Analysis

Two of the 12 blogs analyzed for this research included videos and these two blogs contained a total of 37 videos (Appendix 6). Each video varied in length. The blogs for the vessel *Teleport* had the majority of videos above 5 minutes whereas the blog for the other vessel, *The Arctic Joule*, had the majority of videos less than 1 minute

in length. This is important to note as the videos longer than 5 minutes hold more detail about the vessel's voyage. Major themes that were searched for that included: preparation, reports of difficulties, risk management, safety, and sovereignty as these themes are significant in developing a picture of incidents, close calls, and safety issues. As a whole, the blog *Teleport* had more detail in the videos about the voyage into the Canadian Arctic. The strongest theme in the videos captured the essence of preparation as the pair of travelers demonstrated the purchase of their vessel, its complete renovating (to prepare for the Arctic waters and temperatures), the process of testing the boat and repairing it. The most frequent topic in these videos was the vessel: rebuilding and repairs. The second largest theme for *Teleport* was safety. This included making ensuring proper equipment was on board (e.g. GPS/Radar systems; ice and weather charts), sufficient fuel, food, and water to last the voyage, as well as sufficient clothing for Arctic temperatures. Given that so few travelers used videos on their blog as a tool for describing experience, this component does not tell us much about pleasure craft tourists as a whole.

4.5. Conclusion

This section presented the results from the analysis of the Pleasure Craft Dataset, the NORDREG pleasure craft data, and the Blog Sample. This resulted in a representation of incidents, close-calls, and safety issues within the Canadian Arctic.

The total number in pleasure crafts entering the Canadian Arctic from 1990-2013 is 191 vessels (Pleasure Craft Dataset) demonstrating that not all vessels are reporting to

NORDREG. Between 1990 and 2010, 106 vessels entered the Canadian Arctic and 85 vessels entered between 2011 and 2013 according to the Pleasure Craft Dataset. This large increase in the number of pleasure crafts can be attributed to the reduction of sea-ice, the opening of the Northwest Passage, and the desire to experience Arctic adventure.

Of the 191 vessels in the dataset 23 were found to have made multiple voyages to the Canadian Arctic over multiple years. Based on the recorded dates and positions of vessels, some trips occur in sequential years, while others occur over several years (without the vessel leaving the zone) either purposely or because the tourists are left with no choice as the vessels are beset in ice.

Maps were produced in order to demonstrate the patterns of pleasure craft activity such as variability in the number of pleasure craft vessels and the number of vessel days spent in the Canadian Arctic. The number of vessel days nearly doubled between 1990-2010 and 2011-2013. The concentration of pleasure craft vessels within the Canadian Arctic from 1990 to 2013 coincides directly with the route of the Northwest Passage. When comparing the number of pleasure craft vessels for the two time periods, 1990-2013 and 2011-2013, it is clear that more vessels are traveling into the western zones of the Northwest Passage. The concentration of the number of vessels days shown in Arctic Canada from 1990-2013 demonstrates a concentration in the number of days a vessel spends in a particular location. The high concentration in the number of vessels days coincides with the high number in vessels on the western side of the Northwest Passage.

Analysis of the NORDREG pleasure craft data shows that the number of persons on board pleasure craft vessels in the Canadian Arctic from 1990 to 2013 is recorded as 1,097 individuals. From 1990 to 2010 there were 628 people recorded aboard vessels, and over the 2011 to 2013 period there were 469 people recorded. This increase in the number of persons on board can be attributed to the increasing number in vessels and size of pleasure craft vessel to Arctic Canada. The total number of adjusted persons on board vessels from 2000-2013 is calculated as 928.

Blog analysis in this research was able gain insight into pleasure craft travelers and their vessels, including aspects such as: sites visited, behaviour of travelers, and interactions with the environment. The blogs provided detailed information regarding preparation, motivation, safety precautions, incidents, close-calls and safety issues in regards to traveling Arctic Canada.

These results provide insight into the sector of pleasure craft tourism and the implications of this form of tourism for safety management. These results will be useful in providing information that may be valuable for management approaches in the future.

5.0 Discussion

This chapter discusses the results of the analysis. The first section will comment on the conclusions that can be made in relation to spatial and temporal vessel patterns and other aspects of vessel traffic. The second section focuses on the knowledge gained through the blog analysis. Both these sections include implications of pleasure craft tourism in the Canadian Arctic in regards to safety management.

5.1. Understanding Pleasure Craft Tourism through Vessel Patterns

The results from the Pleasure Craft Dataset show the growth of pleasure craft travel in the Canadian Arctic from 1990-2013, confirming the research of Orams (2010), Johnston et al. (2013), Pizzolato et al. (2013) and Johnston et al. (2014) regarding the dramatic increase in pleasure craft travel. This research found even greater numbers than reported previously, finding an additional 27 vessels that entered the NORDREG Zone. Clearly, a large number of vessels did report to NORDREG, but 15% of vessels over the time period studied did not report. This research reinforces the findings of Johnston et al. (2013) that NORDREG is the most comprehensive database available in tracking pleasure crafts in the Canadian Arctic, but is not complete.

This basic finding of increasing numbers reinforces the changing nature of Arctic tourism that is presenting opportunities for tourism and potential economic development for communities and also posing concerns for safety in the Arctic, given the limited marine infrastructure, limited Search and Rescue capabilities, limited

information about behaviour in the sector, and the incomplete tracking of vessels through NORDREG (see Johnston et al., 2013; Dawson et al., 2014).

The two periods examined represent a rough mid-point and natural break in the number of pleasure crafts present in Arctic Canada. The 2011 pleasure craft year of travel is a significant year because of a large increase in the number of vessels from 2010. Although there is a gradual increase in the number of vessels from 1990-2010, the number of pleasure craft vessels surges from 2011-2013, perhaps indicating a lag between the 2007 minimum ice extent (see Pizzolato et al., 2013) and the uptake of the tourism opportunity provided by increased accessibility that could reflect planning and preparation. These results also suggest the trend of high numbers will continue at this growing rate, a finding that supports the prediction of Pizzolato et al. (2013) and confirms the research of Johnston et al. (2013 and 2014) who noted the large increases to 2012. The dramatic increase in pleasure crafts creates many management concerns, as there is no mandatory regulating body to track the increase in vessels per year throughout the Arctic. It also suggests that managers need to ensure they do not rely exclusively on NORDREG records in order to make decisions for the sector.

There is also an increase in the recorded number of multiple voyages. A large number of vessels were recorded to have entered the Arctic twice, some with four visits, and one vessel was recorded as traveling in the Canadian Arctic over a 6-year period. Some of these vessels may have over-wintered while others may have been stuck ice. This research did not seek to understand the reasons for a vessel over-wintering in the Canadian Arctic or the reasons for multiple trips, but this pattern indicates the need to

understand multiple trips better to ensure they are truly pleasure craft trips and not commercial ventures, a concern identified by Johnston et al. (2013) as reflecting the need to have greater federal government oversight of vessel travel purpose.

Despite the fact that the NORDREG data do not cover all vessels, they do include important details about many of the reporting vessels that help provide a picture of vessels patterns. Through vessel registration information, analysis shows the broad origins of pleasure craft visitation to the Canadian Arctic. It also identifies the strength of the European pleasure craft market for Arctic Canada and the importance of North America. This reinforces concerns in the realm of sovereignty, and further supports the findings of Johnston et al. (2013) in which managers indicated their concerns about the domain awareness of incoming marine visitors. In order to address concerns about a lack domain awareness, efforts need to be undertaken to communicate messages to potential pleasure craft tourists about the region, particularly safety issues for travelers and the existence of legislation and regulation of relevance for pleasure craft tourists.

Analysis also showed vessel patterns and reinforced the importance of the Northwest Passage for pleasure craft tourism, accompanied with little or no visiting in other zones of the Canadian Arctic. This pattern of concentration in ship traffic through the Northwest Passage confirms the following research: Stonehouse & Snyder (2010), Stewart et al. (2010), Orams (2010), Maher (2010), Dawson et al. (2011), and Stewart et al. (2013). The change in the concentration of vessel numbers shows limited change from 1990-2010 to 2011-2013, with the exception of two zones. The two changes might suggest less reliance on the southern route of the Northwest Passage in the second time

period and a greater access to the western side of the passage in that time period. This is also reflected in the increase in the average number of zones accessed to 3.0 in the second time period. This trend of spatial extension may continue alongside advantageous ice conditions generally occurring through climate change. Vessels may be traveling increasingly long distances away from the supporting infrastructure and services available in communities and through the Canadian Coast Guard.

Vessel days are also concentrated in the Northwest Passage and the average number of vessel days has nearly doubled between the two time periods. This dramatic increase is important as it relates to the increase in the number of vessels: both are expected to keep increasing, indicating that greater numbers of vessels will be present and those vessels will be spending longer periods in the NORDREG Zone.

This poses concerns for the safety of vessels and travelers in the Arctic given the limited infrastructure and services for safety, including SAR, but also some opportunities. The growth in the number of vessel days could mean that vessels are spending more time in or near communities, creating benefits and concerns for tourism management. Indeed, the information provided by the 4pm position data suggests that communities are sites of concentration.

Analysis of the NORDREG Pleasure Craft Subset for the number of persons on board vessels shows that reporting this information is sporadic and not reliable until about 2000, nonetheless numbers rise in accordance with the rise in vessel numbers. An additional concern is the presence of a large motor yacht in 2010, 2012, and 2013, with over 50 persons aboard each time. The likelihood of larger vessels becoming more

common in the Canadian Arctic raises new concerns regarding safety of larger numbers of people on individual vessels that may need assistance.

These aspects of pleasure craft patterns are important for management in the Canadian Arctic:

- Increasing vessel numbers;
- Concentration in Northwest Passage;
- Spatial extension to north and west;
- Increasing vessel days overall;
- Increasing vessel days per vessel;
- Increasing spatial extension;
- Multiple voyages;
- Increasing numbers of travelers overall; and,
- The advent of large pleasure craft.

These patterns reinforce the concerns voiced by managers about the capacity of infrastructure and services and the potential for economic development and extension of marine tourism in the Canadian Arctic (see Johnston et al., 2013). If pleasure craft travel in the Arctic continues to expand, it will be essential for managers to develop new marine infrastructure and updating current infrastructure in order to support safe travel and the ability to respond adequately to marine incidents (see Arctic Council, 2009). The *Arctic Marine Shipping Assessment 2009 Report*, outlined two strategies that would aid in the development of marine ports and waterway management: “designate potential places of refuge in the Arctic and develop guidelines for their use,” and

“establish policies and systems to control ship movements” which include route planning, use of Automatic Identification Systems (AIS) on all Arctic ships, and vessel tracking systems (Arctic Council, 2009 p. 176). This research provides support for the AMSA strategies by identifying patterns and trends in pleasure craft traffic that are indicative of the potential for future problems should management not be pro-active.

5.2. Understanding Pleasure Craft Tourism through Vessel Blogs

Insight into pleasure craft travelers and their vessels, including aspects such as preparation, motivation, safety, sites visited, behaviour of passengers, and interactions with the environment was gained through the use of pleasure craft vessel blogs.

Preparation was a theme in the blogs, in particular, in relation to modification and alterations to vessels and equipment, reflecting the concerns noted by Russell (2011) regarding the need for yachts sailing in ice to be appropriately equipped and built or modified to withstand severe impact. There are guidelines available (IMO Guidelines for Ships Operating in the Arctic Ice-Covered Waters) that address specific construction, fire safety, lifesaving, navigational, operational and crew training, although these guidelines are voluntary.

The experience of a vessel’s crew was also mentioned frequently, a theme of importance for vessels in the Polar Regions because of the variety of conditions presented. The experience of the crew members was not necessarily in sailing in the Polar Regions, but in sailing in general. Johnston et al. (2013) outline the concerns of stakeholders in regards to the “lack of Arctic experience and ice navigation

competence,” a theme also discussed by the Arctic Council (2009) in relation to the value of training for ice navigation and emergency response in polar environments. The blog results provide more information on the level of preparedness of pleasure craft vessel voyagers such as seeking additional knowledge, obtaining first-hand information on conditions, implementing safety precautions, and route research.

Blog findings on motivation link in with the work of Snyder & Stonehouse (2007), Snyder (2007), Orams (2010) and Stonehouse & Snyder (2010), as well as Lamers et al. (2007) who point out that extreme adventure tourists in pleasure crafts are becoming more prevalent as tourism in the Arctic expands. It is not clear whether linking vessel travel to research is being used to support a primary interest in adventure.

Key word analysis shows an emphasis in blogs on ice and ice-related terms; climate/weather; technology; and charting. These topics were sometimes discussed quite substantially and often in regard to incidents or near-misses. One major issue was the inaccuracy of charts which contributed to confusion about location or problems in navigating. As Russell (2011) has noted, in the Arctic, the value of an ice chart depends on the understanding, accuracy, and detail of the surveys on which it was based, but concerns exist about whether charts in Canadian Arctic waters are surveyed appropriately. The references to charts in the blogs reinforce the concerns noted by managers about inadequate charting and the potential for navigation and safety problems (Johnston et al., 2013).

The analysis of incidents and close calls provides some information into the thoughts and concerns of travelers regarding the level of caution used when in the Canadian Arctic. Blogs also recorded the incidents that occurred with other vessels in the Canadian Arctic. These are useful to note because not all incidents and close-calls are reported to authorities, reflecting a key finding in Johnston et al. (2013). This information provides a new perspective on safety for smaller vessels in Arctic Canada.

Information about sites and routes confirms the analysis of the NORDREG data that shows the concentration in the Northwest Passage and communities and the particular mentions of Cambridge Bay, Tuktoyaktuk and Lancaster Sound. It provides another layer of understanding of where vessels are going and communities they visit while in Canada. This information can be useful in the development of future port facilities and safe harbours for pleasure crafts in relation to boosting tourism in the Canadian Arctic, and in the development of future infrastructure related to safety.

5.3 Summary

This chapter has provided a discussion on a wide range of issues that have the potential to affect future decisions concerning policies and guidelines surrounding the pleasure craft tourism industry in the Canadian Arctic. These conclusions emerged from the data satisfying the two main objectives that were proposed at the beginning of this study. The two main objectives of this study were to 1. develop an understanding of pleasure craft vessel traffic and pleasure craft travel patterns, and 2. develop an understanding of incidents, close-calls, and safety issues.

In the Canadian Arctic there is an increasing trend of pleasure craft vessel activity that is expected to continue through the Northwest Passage. As the expansion in the number of vessels persists, it is likely that the number of vessel days spent in the Arctic will increase along with the number of persons on board these vessels. This poses concerns for safety in the Arctic because of the limited marine infrastructure, limited Search and Rescue capabilities, limited information about behaviour in the sector, and the incomplete tracking of vessels through NORDREG.

Blogs analyzed in this research illustrate one of the same concerns identified by key stakeholders involved in managing and supporting the pleasure craft sector in the Canadian Arctic, described in Johnston et al. (2013). This concern is related to safety and particular concerns about the limited search and rescue infrastructure in the Canadian Arctic. Blogs provide key insight into pleasure craft travelers and their vessels, including aspects such as preparation, motivation, safety, sites visited, behaviour of passengers, and interactions with the environment along with incidents and close-calls that are not reported.

6.0 Conclusions and Recommendations

The main purpose of this study was to gain an understanding of the safety implications of pleasure craft tourism in the Canadian Arctic given the need to manage the effects of the increase in vessel traffic, particularly those effects related to incidents and tourist safety. In addition to this general goal, two specific objectives were proposed. The first objective was to develop an understanding of pleasure craft vessel traffic and pleasure craft travel patterns. The second objective was to develop an understanding of incidents, close-calls, and safety issues. This thesis investigated aspects of the pleasure craft sector in the Canadian Arctic through two approaches: examining available data on vessel traffic (Pleasure Craft Dataset) and analyzing web postings (Blog Sample) of pleasure craft travelers.

In order to develop an understanding of spatial patterns, tourist activities during travel, and in the time surrounding travel such as preparation, and incidents or difficulties, this research was aimed at gathering knowledge related to pleasure craft tourists in the Canadian Arctic. Research was needed to begin filling gaps in knowledge about the sector, including basic information about travel patterns. This research is also aimed at providing information that will be useful in order to effectively manage the potential of safety hazards for future travel to Arctic Canada.

To meet the objectives of this research, this study was undertaken in two phases. The first phase involved the comprehensive analysis of the Pleasure Craft Dataset and the second phase of this study involved the content analysis of a sample of pleasure craft tourism blogs in the Blog File for voyages in the Canadian Arctic from 1990-2013.

The Pleasure Craft Dataset created through this research includes all pleasure craft vessels that reported to NORDREG as well as additional vessels found through the literature review and Internet sources. This approach not only confirmed NORDREG numbers, but also added to the number of vessels that appeared in the Canadian Arctic from 1990-2013.

As a result, the Pleasure Craft Dataset comprises 191 vessels that were present in the Canadian Arctic during the period from 1990-2013. For the period 2011-2013, the number of pleasure crafts drastically increases, indicating a trend of growth that is expected to continue. The vessel traffic pattern of pleasure crafts in the Canadian Arctic is concentrated through the Northwest Passage. There is a large presence of vessels and a large number of days that are being spent within the zones of the NWP although vessels are likely to expand spatially beyond the concentration of zones in the Northwest Passage. As more vessels are present in Canada's Polar Region the total number of persons on board vessels is likely to grow substantially, especially with the increase in larger vessels in the Arctic.

The gaps in knowledge of the expansion in the pleasure craft sector in regards to vessel traveler's preparation, motivation and experiences are analyzed through the Blog Sample. These blogs studied were able to provide a layer of information that adds to the research in the pleasure craft tourism sector. The blogs were able to provide additional information on the level of preparedness and experience of pleasure craft vessel voyagers, outline some of the needs of these travelers, report on incidents, and provide more information on sites and routes taken while in the Canadian Arctic.

Pleasure craft tourism in the Canadian Arctic is experiencing steady growth and the pattern is expected to continue. Though pleasure craft tourism in the Canadian Arctic is a small sector, the fact that it is expanding at an accelerated rate and posing issues in the realms of safety demands more attention. This thesis contributes to the literature on pleasure craft tourism in the Canadian Arctic in regards to numbers, passenger numbers, visitation regions, motivation, behaviour, and the safety and preparedness of crew, and incidents and close-calls. This information developed through this research suggests the possibility of a drastic change in Arctic tourism, the need for the development of safety management, and the need for federal government oversight.

Pleasure craft tourism provides a variety of opportunities for communities, especially in relation to economic development. Through planning and preparedness, some Arctic communities may have the ability to become specific destinations for these voyagers by developing new infrastructure, safe harbours, vessel services, and search and rescue services. Presently, there is limited information on these pleasure craft travelers and further research needs to be conducted. Further research should be conducted to examine the actual routes vessels have taken when in the Canadian Arctic to provide more insight into spatial patterns. Additional research to correlate vessel patterns with sea-ice conditions will also add another layer in understanding pleasure craft tourism in the Canadian Arctic and its implications for safety management.

It would be beneficial in further research to continue looking at blogs to supplement the information found in the NORDREG data. Additional research should

contribute to this sector of marine tourism by focusing on understanding implications for safety, insurance, behaviour controls and monitoring. There is also a need for research into pleasure craft tourism experiences, and the views of community members, and individuals who support pleasure craft tourism formally and informally. Research should examine this role and managers should consult with these individuals in order to improve understanding of pleasure craft travel in Arctic Canada and mitigate concerns of management stakeholders. There is also a need for policies and guidelines to aid pleasure craft travelers, and quite possibly a need for mandatory pleasure craft reporting to ensure appropriate monitoring and support.

7.0. References

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8.0 Appendices

Appendix 1: Pleasure Craft Definitions

Key Words	Source	Definition	Link	Additional Information
Pleasure Craft	<p><i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26 Published by the Minister of Justice</p>	<p>“Means a vessel that is used for pleasure and does not carry passengers, and includes a vessel of a prescribed class.” pp. 3</p>	<p>http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf</p>	
Pleasure Craft	<p><i>Ship Safety Bulletin: Interim Small Passenger Vessel Compliance Program No. 04/2001</i> Published by Transport Canada</p>	<p>“Means a vessel used by an individual for pleasure and not for a commercial purpose.” pp. 4</p>	<p>http://publications.gc.ca/collections/collection_2011/tc/T12-11-4-2001-eng.pdf</p>	<p>“The ship must be used exclusively for pleasure to determine if the persons on board are guests. If a ship is chartered by an employer to transport workers to or from a work site, the employees are considered passengers because the ship is not being used exclusively for pleasure and the employees are not part of the crew complement of that particular ship.”</p>

Pleasure Vessel	<p><i>Ship Safety Bulletin Bulletin No.: 14/2000 2000-10-20</i> Published by Transport Canada</p>	<p>“Is a vessel used by individuals for their pleasure, recreational or sporting use and not for any commercial purpose by them such as carrying passenger(s).”</p>	<p>http://www.tc.gc.ca/eng/marinesafety/bulletins-2000-14-eng.htm</p>	<p>“Any vessel which is not a pleasure vessel is by definition a non-pleasure vessel and comes under Transport Canada and no vessel carrying a passenger is a pleasure vessel.”</p> <p>“Examples of pleasure vessels (not permitted to carry passengers): 1. Rented vessels used for recreational purposes: a. Yacht; b. Sailboat; c. Personal Watercraft (PWCs); etc. 2. Boating education/training schools 3. Situational examples.”</p>
Passenger	<p><i>Ship Safety Passenger Ship Operations and Damaged Stability Standards (Convention Ships)</i> Published by Canadian Coast Guard, Ship Safety Branch 1990</p>	<p>“Means any person carried on a ship, but does not include (a) a person carries on a Safety Convention ship who is (i) the masters or a member of the crew or a person employed or engaged in any capacity on board the ship on the business of that ship, or (ii) under one year of age, (b) a person carried on any ship in pursuance of the obligation laid upon the</p>	<p>http://www.tc.gc.ca/publications/en/tp10405/pdf/hr/tp10405E.pdf</p>	

		<p>master to carry shipwrecked, distressed or other persons or by reason of any circumstances that neither the master nor the owner nor the charterer, if any, could have prevented or forestalled” pp. 4</p>	
<p>Passenger</p>	<p><i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26 Published by the Minister of Justice</p> <p><i>Ship Safety Bulletin: Interim Small Passenger Vessel Compliance Program No. 04/2001</i> Published by Transport Canada</p>	<p>“Means a person carried on a ship by the owner or operator, other than (a) a person carried on Safety Convention ship who is (i) the master, a member of the crew or a person employed or engaged in any capacity on board the ship on the business of that ship, or (ii) under one year or age, (b) a person carried on a ship that is not a Safety Convention ship who is (i) the master, a member of the crew or a person employed or engaged in any capacity on board the ship on the business of that ship, or (ii) a guest on board the ship, if the ship is used exclusively for pleasure</p>	<p>http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf</p> <p>http://publications.gc.ca/collections/collecion_2011/tc/T12-11-4-2001-eng.pdf</p> <p>“Change in the definition of the term ‘passenger’: on October 31st, 1998, a new definition of the term ‘passenger’ in the Canadian Shipping Act became law. Many vessels operating as Charter Vessels are now classified as Passenger Vessels under the new definition.” pp. 1</p>

		<p>and the guest is carried on it without remuneration or any object of profit, (c) a person carried on a ship in pursuance of the obligation on the master to carry shipwrecked, distressed or other persons or by reason of any circumstances that neither the master nor the owner could have prevented, or (d) special purpose personnel” pp.2 pp. 4</p>		
<p>Passenger</p>	<p><i>Ship Safety Bulletin</i> <i>Bulletin No.:</i> 14/2000 2000-10-20 Published by Transport Canada</p>	<p>“A ‘Passenger’ is any person other than: 1. The master, a member of the crew or a person employed or engaged in any capacity on board the ship on the business of that ship; 2. A person under one year of age carried on a Safety Convention (foreign going) vessel; 3. A guest on board the ship, if the ship is used exclusively for pleasure, and the guest is carried without</p>	<p>http://www.tc.gc.ca/eng/marinesafety/bulletins-2000-14-eng.htm</p>	<p>“A fare does not have to be paid for a person to be a passenger.”</p> <p>“Vessels that are rented with a Skipper/Guide without a bona fide charter party in place may well be considered to be a passenger operations.”</p>

		<p>remuneration; 4. A person carried on a ship by reason of circumstance that neither the master nor the owner could have prevented, such as obligation to carry shipwrecked; or 5. Persons designated as special purpose personnel.”</p>		
<p>Passenger Ship</p>	<p><i>Ship Safety Passenger Ship Operations and Damaged Stability Standards (Convention Ships)</i> Published by Canadian Coast Guard, Ship Safety Branch 1990</p>	<p>“Means a Safety Convention ship carrying more than 12 passengers” pp. 4</p>	<p>http://www.tc.gc.ca/publications/en/tp10405/pdf/hr/tp10405E.pdf</p>	<p>“For the purposes of these Standards, passenger ships are classified as follows: (a) Class I, consisting of steamships certified to carry more than 12 passengers on international voyages that are not short international voyages; (b) Class II, consisting of steamships certified to carry more than 12 passengers on short international voyages.” pp. 5</p>
<p>Passenger Ship</p>	<p><i>Ship Safety Bulletin: Interim Small Passenger Vessel Compliance Program No. 04/2001</i> Published by Transport Canada</p>	<p>“Means a ship carrying passengers” pp. 4</p>	<p>http://publications.gc.ca/collections/collecion_2011/tc/T12-11-4-2001-eng.pdf</p>	
<p>Passenger</p>	<p><i>Canadian</i></p>	<p>“Means a vessel that</p>	<p>https://www.tc.gc.ca</p>	

Vessel	Supplement to the Solas Convention TP 15211 E (2012) Published by Transport Canada	carries more than 12 passengers."	ca/eng/marinesafety/tp-menu-515-4288.htm	
Safety Convention Vessel	Canada Shipping Act, 2001. S.C. 2001, c.26 Published by the Minister of Justice	"Means a vessel in respect of which the International Convention for the Safety of Life at Sea, listed in Schedule 1, applies." pp. 3	http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf	
Safety Convention	Ship Safety Passenger Ship Operations and Damaged Stability Standards (Convention Ships) Published by Canadian Coast Guard, Ship Safety Branch 1990	"Means the International Convention for the Safety of Life at Sea, 1974, signed at London on November 1, 1974 and the Protocol of 1978 relating thereto, signed at London on February 17, 1978 and any amendments, whenever made to the Annex to that convention other than Chapter I of the Annex" pp. 5	http://www.tc.gc.ca/publications/en/tp10405/pdf/hr/tp10405E.pdf	
SOLAS	Canadian Supplement to the Solas Convention TP 15211 E (2012) Published by Transport Canada	"Means the International Convention for the Safety of Life at Sea, 1974, and the Protocol of 1988 relating to the Convention. (SOLAS)."	https://www.tc.gc.ca/eng/marinesafety/tp-menu-515-4288.htm	

Bare-Boat Charter	<i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26 Published by the Minister of Justice	“Means a vessel charter agreement under which the charterer has complete possession and control of the vessel, including the right to appoint its master and crew.” Pp. 1	http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf	
Canadian Vessel	<i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26 Published by the Minister of Justice	“ Means a vessel that is registered or listed under Part 2 (Registration, Listing and Recording) or that is exempted under the regulations from the registration requirements in subsection 46(1).” Pp. 2	http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf	
Foreign Vessel	<i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26 Published by the Minister of Justice	“Means a vessel that is not a Canadian vessel or a pleasure craft.” Pp. 2	http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf	
Government Vessel	<i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26 Published by the Minister of Justice	“Means a vessel that is owned by and is in the service of Her Majesty in the right of Canada or a province or that is in the exclusive possession of Her Majesty in that right.” Pp. 2	http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf	
Vessel	<i>Canada Shipping Act, 2001.</i> S.C. 2001, c.26	“Means a boat, ship or craft designed, used or capable of being used	http://laws-lois.justice.gc.ca/PDF/C-10.15.pdf	

	Published by the Minister of Justice	solely or partly for navigation in. on, through or immediately above water, without regard to method or lack or propulsion, and includes such a vessel that is under construction. It does not include a floating object or a prescribed class." Pp. 3		
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Appendix 2: Arctic Marine Shipping Assessment 2009 Report Summary: Safe Passage in polar waters by Stonehouse and Snyder (2010).

Information for safe passage	Principle: Action to Prevent Harm	Principle: Actions to improve incident response capabilities
<ul style="list-style-type: none"> • Ice Condition Information: Expand Coverage • Weather Information: Expand Coverage and Timely Notifications • Update Hydrographic Charts • Navigational Aids • LRIT Long Range Identification and Tracking • Coordinate Cruise Ship Transits & Scheduling for Mutual Aid • Collaboration of International Information Organizations (e.g. Maritime, Hydrographic, Meteorological, and Maritime Satellite Organizations) 	Expand infrastructure capacity	<ul style="list-style-type: none"> • Places of Refuge • Expand and Develop Ports • Search and Rescue Resource Investments • Medical Evacuation & Care Resources • Shoreside Evacuation Shelters and Provisions • Environmental Incident Response Equipment and Personnel • Salvage Resources • Waste Disposal Facilities • Law Enforcement Resources
Guidelines for vessel operations	<ul style="list-style-type: none"> • IMO Guidelines for Ships Operating in Arctic Ice-covered Waters • Improve Passenger Ship Safety in Arctic Waters • Multilateral Arctic Search and Rescue (SAR) Instrument • Unified Governance: UN Convention on Law of the Sea 	Human resource training <ul style="list-style-type: none"> • Mariners • Ice Navigators • Emergency Service Providers • Lifeboat Drills and Prepare Tourists for Extreme Conditions • Environmental Managers and Monitors

Appendix 3: Code Sheet (Abridged)

Blog

Identification:

Name of

Website:

Vessel Name:

Web Address:

Home Page:

Language:

	Yes	Comments
English		
Other		
Translate Option		

Photos:

	Yes	#	Comments
Animals (Environment)			
Crew			
Landscape			
Map(s)			
Vessel			

Video**Analysis:****Videos:**

	Yes	#	Comments
Number of Videos			

Length:

	Yes	#	Comments
Under 1 min			
1-2min			
2-5min			
5+ min			

Themes:

	Yes	#	Comments
Preparation			
Reports of Difficulties			
Risk Management			
Safety			
Sovereignty			

**Topics in
Video:**

	Yes	#	Comments
Animals			
Books/ Films			
Climate Change			
Coast Guard			
Crew			
Environment (Surroundings)			
Equipment on Board			
History			
Incident			
Interview			
Issue			
Landscape			
Northwest Passage			
Other Vessels			
Police			
Preparation			
Route			
Sea-ice/Ice			
Security			
Sponsors			
Stuck			
Trapped			

Trials			
Trouble			
Update			
Vessel/Boat			
Voyage			
Weather			

**Blog
Analysis:**

Age of Blog (months):	
First Blog Date:	
Last Blog Date:	
Last Accessed Date:	
Number of Posts:	

	Yes	No
Comments on Posts:		

Links
(Comment Section)

Yes	#	Comments	
Books			
Contact Info			
Government			
Links no longer available			
Magazine Article			
Newspaper Article			
Other Blogs			
Other Vessels			
Photos			
Research			
Videos			
Website			

Links in Blog Posts:

	Yes	#	Comments
Books			
Contact Info			
Facebook			
Government			
Ice			
Interviews			

Links no longer available			
Magazine Article			
Newspaper Article			
Other Blogs			
Other Vessels			
Photos			
Radio Interview			
Research			
Sponsors			
Videos			
Weather			
Website			

**Vessel
Description:**

	Yes	#	Comments
Additional Equipment			
Built by Owner			
Country of Origin			
Equipment on Board			
Layout			
Modifications/ Alterations			
Row Boat			
Sailboat			
Specific Requirements			
Statistics			
Yacht			

**Description
of Crew:**

	Yes	#	Comments
Experience			
Number of Crew			
Origin			

**Reason for
Voyage/Trip:**

Yes	#	Comments
Adventure		
Film		
History		
Issues		
Other		
Research		

Preparation:

	Yes	#	Comments
Clothing			
Contact Person(s)			
Equipment			
Food/Water			
Research on Routes			
Research on Weather			
Safety Precautions			
Secondary Plans			
Sponsors			

Route:

	Yes	#	Comments
Dates			
Goals			
Itinerary			
Map			
Specific Stops (Anchorage)			
Timeline			
Vessel Tracking			

***Sites Visited:**

*This section of the code sheet lists 254 different sites. Not all sites were mentioned in blogs.

***Vessels Mentioned:**

*This section of the code sheet lists 67 different vessel names. Not all vessel names were mentioned in blogs.

Key Words:

Adventure(rs)	Glacier	Research
Air Service	Global Warming	Risk(y)
Animals (wildlife)	GPS/Radar	Route
Assistance	Grounded	Safety
Break through Ice	History	Satellite
Canadian Coast Guard	Ice Charts/Reports	Search and Rescue
Canadian Ice Breaker	Ice Flow/Pack	Security
Canadian Ice Service	Ice/Sea-Ice	Shelter
Caution	Iceberg	Sickness
Challenging	Icebreakers	Site-Seeing
Climate Change	Incident	Sovereignty/Ownership
Climbing	Inspection	Sponsors
Close Encounters (Calls)	Isolation	Storm
Coast Guard	Issue(s)	Stranded
Communication	Journey	Stuck
Community	Landscape (Descriptions)	Supplies (Food, Fuel)
Concern	Law	Surrounded
Confusion	Mapping	Temperature
Customs Officers	Medicine	Terrifying
Damage	Melting/Thawing Ice	Tourism
Danger(ous)	Mishap	Transportation
Deadly	NORDREG	Trapped
Delay(s)	Northwest Passage	Trouble
Detour	Opportunity	US Coast Guard
Difficulty	Park Rangers	Vessel
Equipment	Police	Voyage
Expedition	Preparation	Warning
Explorer(s)	Problem	Weapons
Fear	Radio	Weather
Finance Cost	RCMP	Weather Charts/Reports
Fog	Repairs	Winds
Food		

Appendix 4: List of Vessels that Entered the NORDREG Zone More Than Once from 1990-2013 (Pleasure Craft Dataset). (Sources: NORDREG pleasure craft data, Brigham & Ellis, 2004, Orams, 2011, Headland, 2014, and Internet Searches).

Vessel Name	Years Vessel Appeared in NORDREG Zone	Total Number of Voyages
<i>Anna</i>	2010 2011 2013	3
<i>Arcadia</i>	*2007 *2011	2
<i>Arctic Mariner</i>	2009 2010	2
<i>Arctic Tern 1</i>	2012 2013	2
<i>Arctic Wanderer</i>	2005 2006 2007 2008	4
<i>Baloum Gwen</i>	2008 2009	2
<i>Balthazar</i>	2012 2013	2
<i>Belvedere</i>	1999 2000	2
<i>Cloud Nine</i>	1994 2005 2007	3
<i>Dagmar Aaen</i>	1993 2003 2004	3
<i>Dodo's Delight</i>	2012 2013	2
<i>Glory of the Sea</i>	2009 2013	2
<i>Jotun Arctic</i>	*2003 2004 2005	3
<i>Le Nuage</i>	2001 2002	2

Appendix 4 Continued: List of Vessels that Entered the NORDREG Zone More Than Once from 1990-2013 (Pleasure Craft Dataset). (Sources: NORDREG pleasure craft data, Brigham & Ellis, 2004, Orams, 2011, Headland, 2014, and Internet Searches).

Vessel Name	Years Vessel Appeared in NORDREG Zone	Total Number of Voyages
<i>Minke 1</i>	2003 2004 2005 2006	4
<i>Ocean Search</i>	*1999 *2003	2
<i>Octopus</i>	2010 2012 2013	3
<i>Polar Bound</i>	2003 2004 2009 *2011 2012 2013	6
<i>Roger Henry</i>	1994 1995	2
<i>Roxane</i>	*2011 *2012	2
<i>Teleport</i>	2011 2012	2
<i>The Adele</i>	*2005 *2006 *2007	3
<i>Vagabond</i>	2011 2012 2013	3

*Additional vessels with a multiple number of trips

Appendix 5: Registration of Pleasure Crafts in NORDREG Zone (NORDREG Pleasure Craft Subset from 1990-2013).

Country	Number	(%)
Australia	6	4.38
Austria	1	0.73
Belgium	4	2.92
Canada	27	19.71
Cayman Islands	11	8.03
Croatia	1	0.73
Denmark	3	2.19
Finland	3	2.19
France	18	13.14
Germany	7	5.11
Greece	1	0.73
Ireland	1	0.73
Italy	1	0.73
Marshall Islands	3	2.19
Netherlands	3	2.19
New Zealand	5	3.65
Norway	3	2.19
Poland	2	1.46
Russia	3	2.19
Spain	1	0.73
South Africa	1	0.73
Sweden	7	5.11
Switzerland	1	0.73
Turks Island	1	0.73
United Kingdom	24	17.52
U.S.A.	23	16.79
Unknown	3	2.19
TOTAL	164	100%

Appendix 6: Categories and Key Words Related to Safety.

Government	Ice	Navigational Equipment	Climate	Reports and Charting	Issues
Canadian Coast Guard	Break through Ice	Communication	Fog	Ice Charts/Reports	Assistance
Canadian Ice Service	Ice Flow/Pack	GPS/Radar	Storm	Weather Charts/Reports	Close Encounters/ Calls
Coast Guard	Ice/Sea-Ice	Radio	Temperature		Caution
Icebreakers	Iceberg		Weather		Concern
NORDREG			Winds		Damage
Police					Danger(ous)
RCMP					Detour
Search and Rescue					Difficulty
					Issue(s)
					Problem
					Repairs
					Risk(y)
					Safety
					Security
					Trapped
					Safety
					Security
					Trouble
					Warning

Appendix 7: Analysis of Videos Used in Blogs (*Teleport* and *The Arctic Joule*) including Number of Videos, Length, Themes, and Key Topics.

Vessel:	Teleport	The Arctic Joule	
Videos:	Number of Videos	22	15
Length:	Under 1 min		8
	1-2min	1	5
	2-5min	5	1
	5+ min	16	1
Themes:	Preparation	30	5
	Reports of Difficulties	1	2
	Risk Management	4	
	Safety	16	2
	Sovereignty	2	
Topics in Video:	Adventure	3	
	Animals	34	
	Books/Films	1	
	Challenge	9	
	Climate Change		2
	Clothing	3	
	Coast Guard	2	
	Crew		7
	Customs/Immigration	2	
	Danger	1	
	Environment (Surroundings)		
	Equipment on Board	52	3
	Fuel	12	
	Food/Water	18	
	GPS/Radio	9	
	History	3	2
	Ice Charts	16	
	Incident		
	Interview	1	
	Issue		
	Landscape		
	Northwest Passage		1
	Other Vessels	3	

Police	1	
Preparation	4	
Route		
Sea-ice/Ice	39	
Security		
Sponsors		2
Stuck		
Trapped		
Trials		6
Trouble		
Update		
Vessel/ Boat	7	6
Vessel/ Boat Re-Build	30	
Vessel/ Boat Repairs	62	
Voyage		
Weather	22	