THE HUMAN DIMENSIONS OF NEWFOUNDLAND AND LABRADOR'S MURRE HUNT: A SOCIAL-ECOLOGICAL STUDY

by © Claire N. Brenton

a thesis submitted to the School of Graduate Studies in partial fulfillment

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Abstract:

A human dimensions approach to wildlife management was used to solicit murre hunter and stakeholder perspectives, attitudes, and recommendations for current Common Murre (*Uria aalge*) and Thick-billed Murre (*Uria lomvia*) harvest management practices in the Canadian province of Newfoundland and Labrador (NL). NL is the only jurisdiction that administers a legal, non-Indigenous murre hunt in North America. The overarching goals of this study were formulated to help inform potential changes for upcoming murre hunting seasons. A qualitative approach was utilized by conducting one-on-one interviews designed to collect hunter and stakeholder input on current murre harvest regulations and practices, provincial murre population status, alternative management strategies, the social and cultural significance of the murre hunt, the perceived extent and impact of illegal harvesting, and hunters' participation in the CWS National Harvest Survey. Results indicated that over-harvesting, lack of enforcement, illegal activity, limited access to population data, species harassment, and lack of community engagement were frequently reported hunter concerns. Interview analyses conclude that hunter input provides valuable local knowledge for resource managers to inform future harvest seasons. However, it also indicated a strong desire for more mechanisms for harvester feedback and input to secure the delivery of apt environmental policies.

Keywords: Murre, murre harvester, hunter perceptions, harvest regulations, human dimensions, Newfoundland and Labrador, wildlife management, conservation.

General Summary:

Seventeen one-on-one in-person and online (telephone and video conference) interviews were conducted with murre harvesters and stakeholders across the island of Newfoundland. Interviewees were asked 10 questions focused on murre hunting practices and perspectives. Most hunters reported that murre hunting was a group or social undertaking. Several interviewees (5/17) reported that they did not participate in the most recent season (2023 – 2024). Key regulatory concerns expressed by hunters included over-harvesting due to hunter mobility and liberal possession limits, a perceived lack of enforcement, illegal selling and buying of murres, limited access to population data by hunters, species harassment, and a lack of community engagement. Summarized recommendations from hunters included introducing a tag system, introducing a seasonal limit, adjusting season dates, splitting the license, increasing enforcement, and establishing a robust hunter education program.

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Abbreviations

CWS – Canadian Wildlife Service

ECCC – Environment and Climate Change Canada

GC-REB – Grenfell Campus Research Ethics Board

HQS – Harvest Questionnaire Survey

ICEHR – Interdisciplinary Committee on Ethics in Human Research

IUCN – International Union for Conservation of Nature

LEK – Local Ecological Knowledge

LISA – Labrador Inuit Settlement Area

MGBHP – Migratory Game Birds Hunting Permit

MBCA – Migratory Birds Convention Act

NHS – National Harvest Survey

NL – Newfoundland and Labrador

SCMP – Seabird Colony Monitoring Program

SCS – Species Composition Survey

Chapter 1.0: Project Introduction

1.1: General Introduction

Human dimensions of natural resource management studies provide an analysis of how human experiences affect wildlife, their management systems, and the policies designed to protect them (Castillo-Huitrón et al., 2023). Seeking to understand the complex social connections of human-wildlife interactions, these may be examined and influenced for the development of sound conservation strategies (Castillo-Huitrón et al., 2023).

Murres, generally referred to by Newfoundlanders and Labradorians as "turrs", are a migratory seabird in the auk (*Alcidae*) family. Murres can be found in coastal areas off the Canadian province of Newfoundland and Labrador as well as in the Canadian Arctic (Cornell University, 2022). There are two species harvested in the province, the Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*) (Environment and Climate Change Canada, 2022). Common Murre colonies are present around provincial coasts year-round while Thick-billed Murres migrate north, present provincially during the fall and winter only (Environment and Climate Change Canada, 2022).

The federal government manages murre harvesting in Canada. The Canadian Wildlife Service (CWS), a branch of Environment and Climate Change Canada (ECCC), issues mandatory Migratory Game Bird Hunting Permits (MGBHP) and enforces regulations. Further, the CWS issues Youth MGBHPs (free of charge) as well as a Canadian Wildlife Habitat Conservation (CWHC) stamp on which the permit must appear (Environment and Climate Change Canada, 2022). Regulations include harvest season dates, a daily harvest limit, a possession limit, and designated hunting zones (Figure 1.1; Environment and Climate Change Canada, 2022). Newfoundland and Labrador's murre harvest season runs from late-fall until

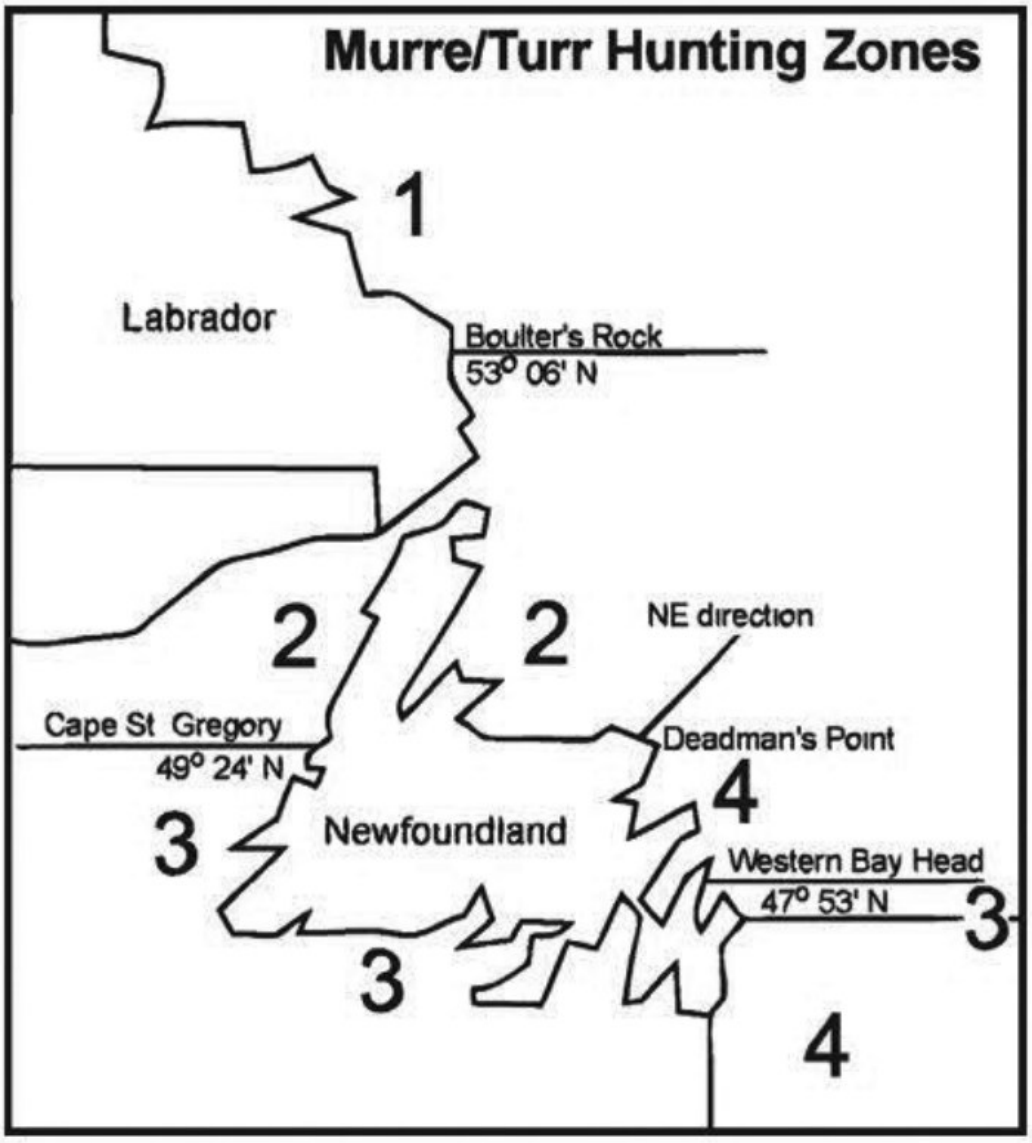

Figure 1.1: Murre hunting zones as per the federal government's 2024 - 2025 migratory game bird regulations (Environment and Climate Change Canada, 2024).

early-spring (season open dates vary per Zone, from early September to late November, while most seasons close March 10; Environment and Climate Change Canada, 2022). Newfoundland and Labrador's murre harvest is the only legal, non-Indigenous migratory seabird hunt in Canada (Government of Newfoundland and Labrador, 2011).

The Migratory Bird Convention Act (MBCA) to protect migratory birds was enacted after Canada signed the international Migratory Bird Treaty in 1916 (Government of Canada, 1994). The MBCA made it illegal to hunt murres in North America. When Newfoundland and Labrador joined Confederation in 1949, the MBCA extended to the province, an area which historically relied on hunting murres for subsistence (Montevecchi et al., 2007). Shortly thereafter, a legal exception was made for residents of Newfoundland and Labrador, and they were permitted to harvest murres unregulated and without a license into the 1990's (Stoodley, 2021). Consequently, unsustainable numbers of murres were killed annually (Stoodley, 2021; Gaston et al., 2000; Elliot, 1991). To address this, the Canadian government updated the MBCA to include more harvest regulations and a licensing system (Government of Canada, 1994).

Several phenomena have been shown to potentially threaten provincial murre colonies. These include starvation-induced die-offs, highly pathogenic avian influenza (HPAI; McPhail et al., 2025; Prosser et al., 2022), melting sea ice (Gaston et al., 2010), legal and illegal hunting, chronic oil pollution (Frederiksen et al., 2019), and incidental catch (Kadin et al., 2019; Regular et al., 2013). These events have triggered concerns over the sustainability of the annual harvest, as academic and government representatives have requested the evaluation of the use of tags and seasonal limits on the number of harvested birds. It's been shown that formal regulatory assessments are confounded by limited harvest data and population estimates (Cox et al., 2023). The murre hunt plays a significant role in Newfoundland and Labrador's history, culture, and legislation. The role that human dimensions play in its management is significant and is carefully considered in this study.

1.2: Project Objectives

In a broad sense, the objectives of this study were formulated to help inform potential changes for upcoming migratory game bird hunting seasons by exploring stakeholder perspectives regarding potential management strategies, illegal harvest levels, and future hunter consultation efforts. Stakeholders were identified as members of local bird hunters' associations, local wildlife officers, and academics conducting bird research within the study area. Specifically, the objectives of this project were to solicit perceptions and recommendations from murre hunters and other affected stakeholders on current murre harvest regulations and practices (e.g., current environmental and hunting conditions), provincial murre population status (e.g., current threats and distribution), possible alternative management strategies (e.g., phasing-out the use of lead ammunition, a harvest-tag system, and reducing season dates or bag limits), the perceived extent of illegal harvesting, and the cultural and social significance of murre hunting. These objectives were used to analyze current murre harvest management practices as they relate to future hunting seasons.

Further, this study explored hunters' participation in the CWS National Harvest Survey (which includes the Hunter Questionnaire Survey and Species Composition Survey), and examined ways to increase participation (e.g., by implementing a regulatory approach or offering incentives). The specific research question of this project was: How can CWS effectively adjust current management practices to consider murre hunter concerns and recommendations while mitigating ongoing murre population threats? The purpose of this research is to provide the CWS with a recommended management framework to support sustainable murre harvesting operations moving forward in NL.

Henceforth, in the interest of consistency, the term “murre” will be used to describe any discussion of Common Murres and Thick-billed Murres respectively, as well in place of the term “turr” which is more colloquially used by residents. Finally, the terms “harvest(er)” and “hunt(er) are used interchangeably throughout. This is because the terms “harvest(er)” and “hunt(er)” are both used to refer to migratory game bird management by governing bodies (e.g., the CWS), in academic literature, and in official federal legislation (e.g., the Migratory Birds Regulations).

1.3: Methods

1.3.1: Data Collection

The research objectives of this study were pursued using a qualitative methodology[1]. [1]This methodology was applied because qualitative approaches, like interviews, provide the researcher with the opportunity to fully explain the topics in question and ensure participants are offering contributions in line with the focal areas. Such approaches also result in a deeper understanding of research participants’ opinions, behaviors, and experiences. To describe results, the terms "most" and "many" were used when a majority of participants fell into a "theme" as identified through data analysis. This occurred when the researcher interpreted and summarized the data and was able to identify topics and statements presented by participants that merged around specific topics and opinions (Maguire and Delahunt, 2017). A theme was identified as

[1]The proposal for this research was reviewed and approved by the Grenfell Campus Research Ethics Board (GC-REB) and found to comply with Memorial University's ethics policy (GC-REB file number: 20240695).

being a pattern in the data that addressed the study foci, was important to the research questions, or was relevant to the project objectives (Braun and Clarke, 2006). Thematic analyses were then used to establish the subject of each manuscript chapter. Qualitative approaches are particularly well-suited when exploring contentious issues such as instances of illegal harvest and changes to harvest regulations for culturally important species (Chase et al., 2016; Dandy et al., 2012; Drury et al., 2011; Deruiter, 2002). Refer to Appendix D for a tabular summary of participants' responses and rationales to each interview question.

Pre-conditions for participant eligibility included residents of Newfoundland and Labrador that hunted murres either annually or intermittently within the last 10 years, and other affected stakeholder groups. Affected stakeholder groups include members of provincial hunters' associations and groups (e.g., the "TURR HUNTERS" Facebook group), provincial or federal wildlife officers, and members of relevant academic groups (e.g., biologists conducting research on marine birds within the project area).

The study was designed to gather a variety of perspectives of participants from different geographic regions on the island of Newfoundland. Participant criteria were established through consideration of the policy implications of this study. Residents that would be subject to any potential regulatory changes were used as the inclusion standard. It is important to note that, as per the Labrador Inuit Land Claims Agreement, Labrador Inuit living within the Labrador Inuit Settlement Area (LISA), "have the exclusive right to harvest wildlife and plants in Labrador Inuit Lands" (Nunatsiavut Government, 2023, par. 4). Therefore, although Nunatsiavut Beneficiaries were not excluded from this study, they were not intentionally included.

To recruit participants, an initial advertisement on February 8, 2024, was created and shared to Facebook through the private “TURR HUNTERS" Facebook group. The initial post, written by the author, read:

> Hi folks, I’m a graduate student in the Environmental Policy program at Grenfell Campus in Corner Brook. As part of the data collection process for my master’s thesis, I’m conducting human dimensions research on the turr harvest. Since there’s been some public concern over issues like avian influenza, we’re interested in hearing from harvesters on any thoughts or recommendations they may have on current practices and regulations. The goal of this project is to understand how to best address harvester needs for future harvest seasons. I’ll be conducting individual interviews on an ongoing basis and there will be group sessions in different locations across the province.

Further, on the same day, this post was shared to the private “East Coast NFLD Delta Waterfowl” Facebook group. Once initial participant recruitment had begun, additional separate posts were created and shared on Facebook through relevant stakeholder groups. Groups which shared advertisements for this project included Qalipu First Nations Environment and Natural Resources Facebook page and the ACAP Humber Arm Facebook page. Each social media advertisement statement was created and written by the author. Finally, snowball sampling (the most used sampling procedure in qualitative research wherein the researcher obtains new participants through previous or initial project recruits; Noy, 2008) was used to engage additional participants throughout the duration of the data collection process. It has been shown that snowball sampling is an effective data collection method for qualitative research (Parker and Scott, 2019; Naderifar et al., 2017).

The data collection procedures for this project employed one-on-one remote and in-person interviews. Seventeen (N = 17) semi-structured interviews were conducted between the months of February and August 2024. Ten online, 3 telephone, and 4 in-person interviews were conducted. The geographic scope of this project was the island of Newfoundland. See Figure 1.2 for an illustration of geographical distribution of participants.

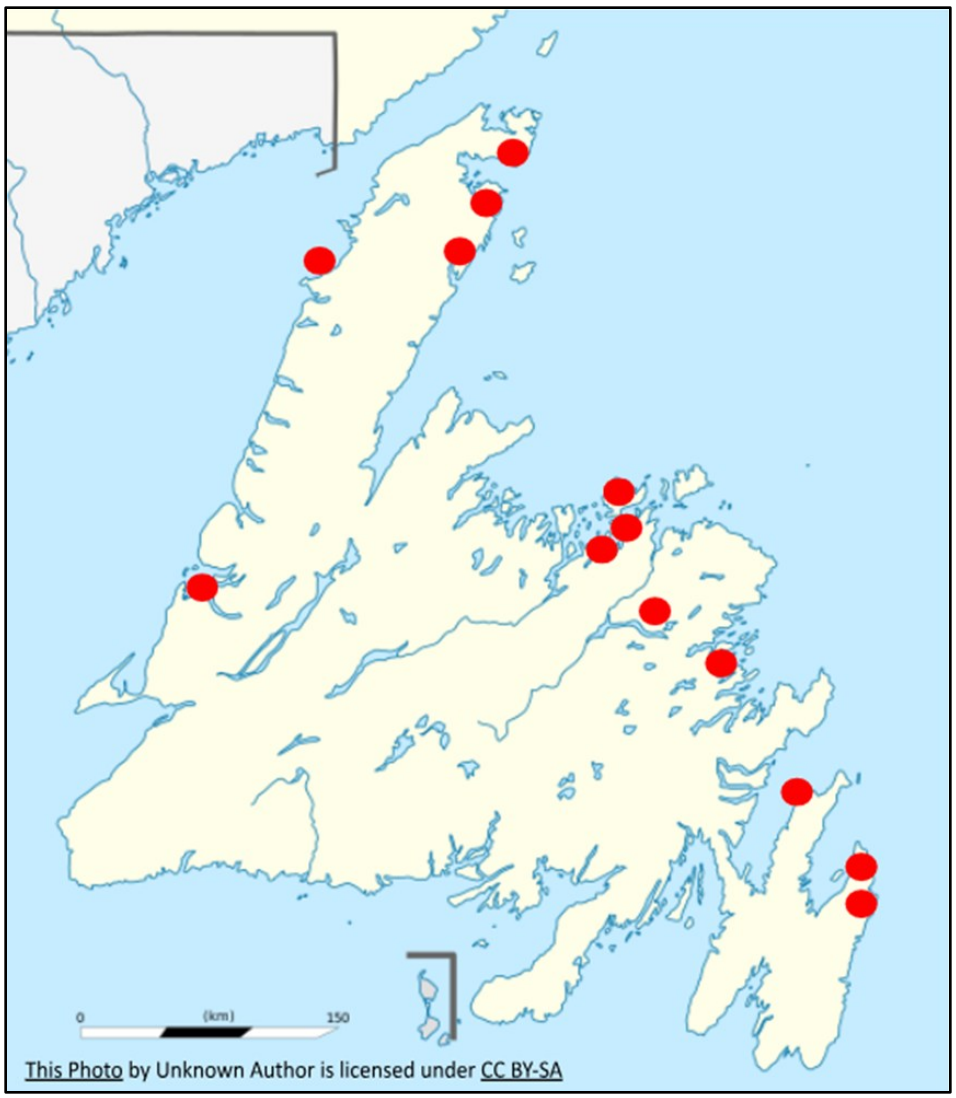

Figure 1.2: Geographical distribution of participants* (map licensed under creative commons, n.d., and graphic created by author). *Each red dot represents a community of residence for a participant but does not necessarily represent a single participant. Further, the location of residence sometimes did not match the location of hunting, or participants hunted in multiple areas (see Chapter 2.0 for a more detailed description of participant hunting activities).

To improve participant-researcher rapport, in-person interviews and online interviews (where both video-audio functions were utilized so the participants could see the researcher) were prioritized. If attendees were unable to participate in-person (e.g., due to accessibility or scheduling conflicts) a remote data collection approach was arranged. Remote data collection was conducted using Zoom communications or Microsoft Teams software, and in cases where

participants did not have access to video conferencing software, telephone interviews were conducted where the researcher would telephone the participant using their personal cell phone.

Informed consent forms were signed virtually or in writing before data collection. Refer to Appendix A for the informed consent form. Each interview followed a semi-structured approach. Interviews included ten (10) open ended multi-part discussion questions (see Appendix B). All participants were asked identical questions in the same sequence.

Colour photographs of provincial murre species and plumages, and other related seabirds (razorbills, guillemots, puffins) were included as supplementary material during the interviews. Photos were provided to help as prompts to stimulate discussion and to aid in the researcher's understanding of the research topic content. Detailed maps including hunting zones were also included to aid participants in their descriptions of harvest locations, experiences, and context. A paper or digital summary of the Migratory Game Bird Regulations was also included to clarify any regulatory details or any questions of the legality of certain activities. As well, a copy of the interview questions was shown to the participants during the meeting so that the interview was more accessible (so that they might have a copy to read in case the verbal delivery of the question by the researcher was misunderstood or hard to hear).

Interview questions were designed to solicit participant perceptions and recommendations on current harvest regulations, alternative harvest strategies, the use of lead ammunition, the perceived extent of illegal harvesting, the cultural and social significance of harvesting, any perceived threats to provincial murres, and participant knowledge of murre distribution and hotspots (areas of high murre abundance or risk). See Appendix B for a complete copy of the interview questions. The duration of the interviews was flexible, averaging 60 minutes each.

Some general participant information was recorded during data collection, including, general area of residency (e.g., town names and/or jurisdiction), general areas where they harvest or have harvested murres (e.g., bay names and/or hunting zones), harvest frequency (e.g., number of years spent harvesting, how many times they went out during a harvest season, if they harvest alone or in groups, and, if they were not alone, who was in their party), and whether they have completed the optional CWS National Harvest Survey. During this process, the maps were useful for helping identify geographical regions.

Tokens of thanks were provided to each participant after their interview. The tokens of thanks consisted of baseball caps and toques with an "NL Murre Survey" logo, designed by Ryan Johnstone of CWS, and a murre management brochure provided by the provincial government's Wildlife Division. One baseball cap and one toque, along with two (2) brochures, were either physically given or shipped via Canada Post to each participant. Those who participated virtually and opted to receive a token of thanks provided their shipping address to the researcher to have the items sent. Once the tokens were shipped and received by the participant, the participant's shipping information was destroyed. See Appendix E for photographs of project tokens.

1.3.2: Data Analysis

Discussions from interviews were audio-recorded, transcribed, and analyzed using a range of standard and non-standard software. To audio record in-person meetings, a free voice recording application, "Voice Memos", on the researcher's personal phone was downloaded and used. To audio record online meetings, video conferencing software with audio-video capture capabilities was used (either Zoom communications or Microsoft Teams) and stored on the researcher's password-protected laptop. To audio record telephone interviews, a free telephone recorder application, "Call Recorder", on the researcher's personal phone was used. Audio

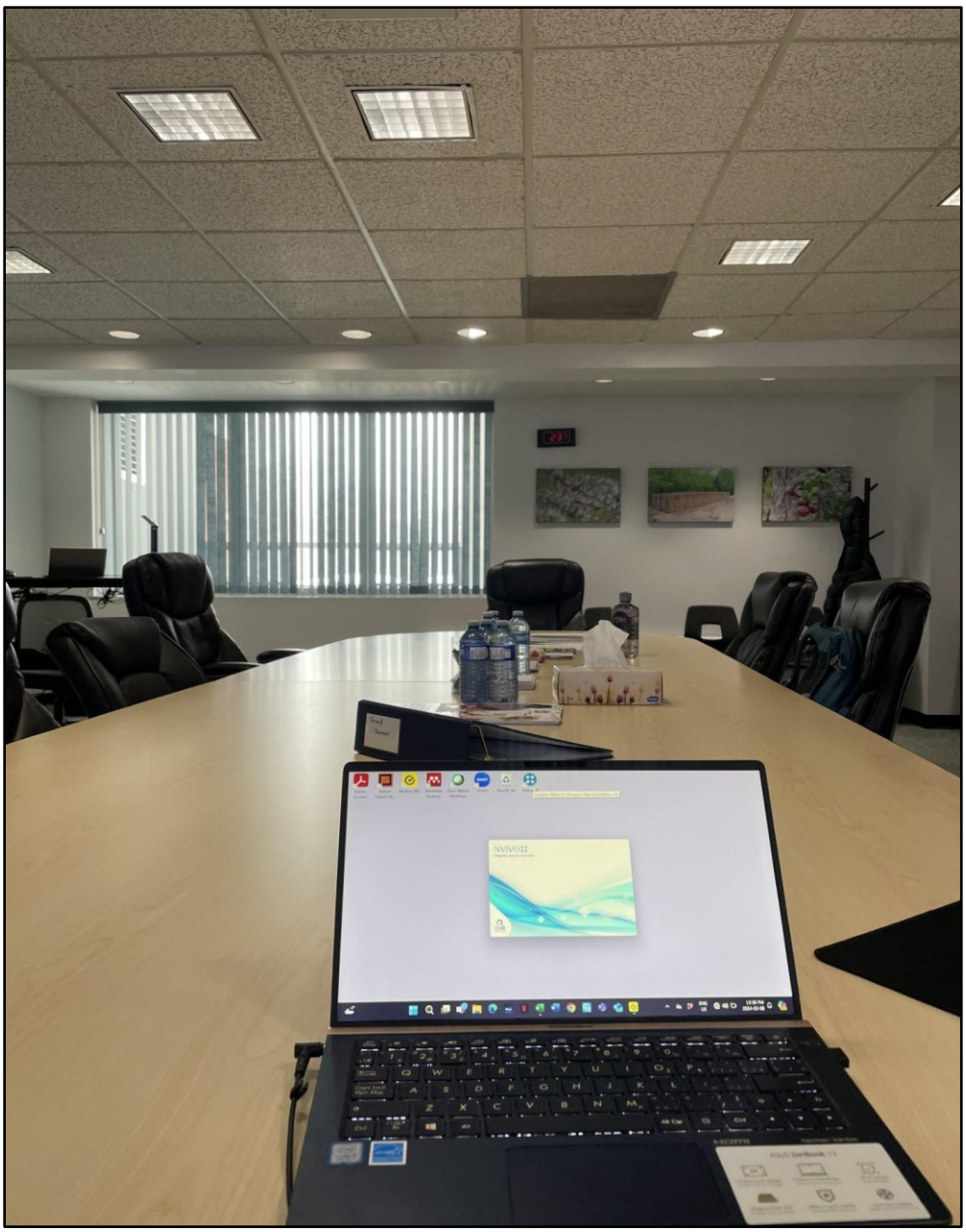

Figure 1.3: Setting up to interview participants in Lewisporte, NL (Photo taken by the author, 2024).

recordings helped the researcher identify different terminology and dialects, as well as giving the researcher playback capabilities to accurately represent the information provided by each participant. In some instances, participants did not consent to having their interview audio recorded. In that case, the researcher conducted the interview as normal but made typed notes

from each response as a substitute to an interview recording. The interview notes were organized on a Microsoft Word file and uploaded to NVivo for data analysis in place of an interview transcript.

To transcribe interviews, a range of software was used depending on the applications used to audio record the meeting. Both the “Voice Memos” and “Call Recorder” applications had built-in transcription capacity. In instances where interviews were recorded using these applications, transcripts were created using the relevant software. For all other audio recordings, “Clipto”, a free online transcription software was used. Every interview transcript was reviewed against the original audio recording and edits were made by the researcher accordingly. To analyze each transcript, NVivo Windows project files (".nvp") were created and stored on the researcher’s password-protected computer. Microsoft Word files of transcripts were uploaded to NVivo and when each file had been created for each interview, general themes and outcomes were analyzed with regards to the project objectives. From there, they were used to analyze participants' perceptions of the study objectives and to formulate a concise summary of the research findings.

Data analysis involved describing each participant’s perceptions of and support (or opposition) for different aspects of the murre harvest management framework for NL (e.g., current regulations, introducing alternative management strategies, and the use of lead ammunition), and exploring any other related information provided (e.g., specific recommendations for CWS, any information they may have on murre population status or harvesting practices in their region, and whether they have participated in the National Harvest Survey). This same software was used for text analysis, playback, and importing notes.

Additionally, short written notes and conversation points were typed into a Microsoft Word file and summarized. After each meeting, major points were summarized and reviewed by the participants if they chose.

1.3.3: Study Design

The study presented in this thesis is built upon a qualitative research approach and it is important to note that another graduate student acted as a co-investigator and contributed to the overarching project by employing a separate project with a quantitative methodology. The co-investigator was not present for the data collection carried out for this aspect of the study (interviews) and conducted their own data collection methods. The co-investigator did not have access to any raw data from this portion of the study, and each manuscript was written independently. The general results, discussion, and the recommended framework were designed to complement each other but are not contained in the same document. Each thesis was prepared separately and provided as a final set of recommendations for CWS. The results from this portion of the study did not influence the results from the quantitative portion of the study. Each thesis was made accessible to the project participants if they chose.

It is important to note, that, it was not the goal of the study to present results that are statistically representative of the population in question. Rather, as is often the goal when using qualitative approaches, interviews were conducted with the goal of representing a range of viewpoints pertaining to the study foci. The intention of the method's procedures was to interview a variety of volunteer participants with a uniform set of structured interview questions. Therefore, it is important to note that saturation of perspectives was achieved as the researcher recorded fewer additional new data and stabilized theme repetition as more interviews were conducted (Guest et al., 2006). The number of participants for this project was therefore able to

provide the researcher with an adequate degree of detail and breadth of perspectives to allow for the identification of robust themes which coincided clearly with project objectives. There were no quantitative data analysis methods used in this study.

1.4: Literature Review

This review aims to synthesize and discuss the historical, cultural, and biological status of murres as they relate to Newfoundlanders and Labradorians. This is coupled with commentary on how stakeholder input may lend a hand to addressing issues related to natural resource management. An online search of literature through MUN's library database and Google Scholar was performed to identify peer reviewed scientific articles and legislative materials (federal and provincial) using relevant keywords. Keywords used to yield applicable documents included, but were not limited to, "murre", "murre AND harvest", "murre AND hunt", "turr", "turr AND hunt", "Newfoundland and Labrador AND murre", "murre AND regulations", and "murre AND history". Next, an online search of grey literature through MUN's library database, archives, and Google using similar keywords was performed. Searches yielded regional newspaper articles (from 1900 to 2024), unpublished manuscripts, websites, and books which provided social and cultural context as well as supplementary and background information. The number of relevant works generated through the literature searches was 41.

1.4.1: Introduction

Hunted in boats along coastal Newfoundland and Labrador, Thick-billed and Common Murres are migratory seabirds that winter around nearshore and offshore North Atlantic and Arctic regions (Cornell University, 2022). They can be found from the Davis Strait (by Greenland and Canada's Nunavut) to the Grand Banks and the Gulf of St. Lawrence (Cornell University, 2022; McFarlane Tranquilla et al., 2014; McFarlane Tranquilla et al., 2013). Thick-

billed Murres appear to have greater wintering ranges while Common Murres generally have less, with little overlap between species' colonies (McFarlane-Tranquilla et al., 2014; McFarlane-Tranquilla et al., 2013). Both murre species are also present in fewer numbers along Canadian Pacific coasts, like in British Columbia (Birds Canada, 2024). However, there is no legal harvest administered for non-Indigenous residents in this region (Environment and Climate Change Canada, 2024). Like other auks, murres only come to land to breed in the spring and summer (Nettleship, 2015). Both species are distinguished by their dark brown or black feathers and white undersides (Nettleship, 2015).

Indigenous people and settlers hunted murres (and other seabirds) in and around Newfoundland and Labrador for centuries (Montevecchi et al., 2007). In 1994, the Canadian government implemented fixed regulations to safeguard murres in NL (Stoodley, 2021). Newfoundland and Labrador's murre harvest is the only legal, non-Indigenous migratory seabird hunt in Canada (Environment and Climate Change Canada, 2024). The uniqueness of the annual hunt is one of many factors that sets Newfoundland and Labrador apart from the rest of Canada (Montevecchi et al., 2007). Understanding the influence of perceptions, beliefs, and values of those with ties to the annual murre harvest may help to preserve this important tradition for Newfoundlanders and Labradorians.

1.4.2: Historical and Cultural Context

Prior to Newfoundland's Confederation with Canada, murres were an important winter resource for residents of rural Newfoundland and Labrador, generating food and income for folks living in outport communities (Montevecchi et al., 2007). Other historical uses for murre meat included feed for sled dogs and as bait for fishing (Elliot, 1991). Evidence suggests that the preservation of winter murre meat was also a common practice for harvesters to increase food

security (Elliot, 1991). Archaeological evidence of pre-contact Indigenous peoples living in Newfoundland and Labrador dates back as far as 9,000 years ago in Labrador and 5,000 years in Newfoundland (Pastore, 1997; Tuck, 1975). In Port aux Choix, murre skeletal remains (and other native bird species) have been found in 4,000-year-old Maritime Archaic burials, denoting their significance to early Indigenous groups (Montevecchi and Tuck, 1987). Another such cemetery from around this era containing remains from the extinct Great Auk was found in northern Labrador (Montevecchi and Tuck, 1987).

It appears the Dorsets (from around 2,500 years ago) hunted murres for their own traditional and sustenance needs (Montevecchi and Tuck, 1987). During the summer, the Beothuk inhabited Cape Freels and took seabird eggs from nearby islands, like Funk Island, suggesting murre hunting was customary (Montevecchi and Tuck, 1987; Carnigan, 1975). Thick-billed Murre remains have been identified in the only known Viking habitation from around 1,000 years ago on the north coast of Newfoundland (Montevecchi and Tuck, 1987). Prehistoric use of murres by numerous peoples throughout time highlights their significance to Newfoundland.

More recent inhabitants, pre-contact Mi'kmaq, hunted murres and harvested murre eggs during the spring, summer, and fall (Heritage Newfoundland and Labrador, 2009). Further, historical accounts of European settlers arriving in Newfoundland and Labrador (permanently around the 1600's but also seasonally for a couple centuries earlier) relied on harvesting colonial seabirds as food for the journey across the Atlantic and for enduring the long winters once they arrived (Montevecchi and Tuck, 1987). Cartography from about 1520 depicts the first "Y-dos-Aves", meaning "Island of Birds", probably referring to what is now Funk Island (Harisse, 1900). Thereafter, the island became a center for European seabird exploitation for centuries

until modern conservation measures helped return it to a productive nesting site (Montevecchi and Tuck, 1987; Government of Newfoundland and Labrador, n.d.). Taking murres became one part of subsistence foodways in Newfoundland and Labrador leading up to Confederation (Montevecchi and Tuck, 1987).

To protect migratory birds, the Migratory Bird Convention Act (MBCA) was enacted after Canada signed the international Migratory Bird Treaty in 1916 (Government of Canada, 1994). The Act made it illegal to harvest murres in North America. When Newfoundland and Labrador voted to join confederation in 1949, the MBCA and federal regulations automatically extended to the province (Montevecchi et al., 2007). Shortly thereafter, a legal exception was made to defend the historical hunt, and residents were permitted to harvest murres unregulated and without a license (Stoodley, 2021).

In 1949, murre hunting had no regulations aside from a designated 5-month season which ran from November to March (Gaston et al., 2000; Elliot, 1991). In 1966, it became mandatory for non-Indigenous residents to purchase (in addition to provincial hunting licenses) a federal Migratory Game Bird Hunting Permit (Sen, 1976). Due to the nature of the hunt and the lack of bag limits, the number of murres being taken annually went generally unrestrained until June of 1994, when the MBCA was significantly updated to introduce stricter murre hunting regulations (these included penalties and greater enforcement protocols; Gaston et al., 2000; Elliot, 1991). Subsequently, the number of murres harvested each year was dramatically reduced to almost half by the mid-1990's (Gaston et al., 2000; Elliot, 1991).

The introduction of motorized boats and improved gun and boat design gave rise to a community of modern sport hunters (Montevecchi et al., 2007). New technology and sport hunting culture seemed to be placing additional impacts on murre populations due to increased

hunter mobility and success (Montevecchi et al., 2007). Consequently, recent efforts to further refine modern management frameworks and to account for illegal harvesting and sport hunting have been stimulated (Montevecchi et al., 2007). In the past, designing surveys for obtaining accurate population estimates of harvested seabirds (including murres) may have been unreliable (Cooch et al., 1978; Sen, 1976). However, recent updates to survey analyses have improved population models (Smith et al., 2022). This may provide policymakers with more robust harvest management tools in the future (Smith et al., 2022).

1.4.3: Biological Status

According to Birds Canada's recent publication, "The State of Canada's Birds" (2024), the best available biological data for Common and Thick-billed Murres suggests that their Atlantic population has remained relatively stable since 1970 (Birds Canada, 2024). This means that the number of murres has not changed significantly since this time and that the average population level remained within Canadian conservation goals (Birds Canada, 2024). However, it is important to note that the most up-to-date population studies (like those from the Seabird Colony Monitoring Program) are from 2009 for Common Murres and 2012 for Thick-billed Murres (Birds Canada, 2024). As per these data, there are 1.8 million breeding Common Murres in Canada and 3.3 million breeding Thick-billed Murres in Canada (Birds Canada, 2024). This is a combined 5.1 million murres, the majority of which are available for hunting annually (McFarlane Tranquilla et al., 2013; McFarlane Tranquilla et al., 2014). A moderate step back in time places cumulative estimates at the same number; around 5 million (Elliot, 1991). Although earlier precise murre population estimates exist, there is an overt need for more recent data to guide future management decisions.

Global and national species designations by the International Union for Conservation of Nature (IUCN) and Wild Species reports place both Common and Thick-billed Murres as Least Concern (IUCN, 2024) and Secure (Wild Species, 2022). These are relatively good assessments which help support stable population hypotheses. Concise, new biological data are required to continue to make accurate projections to safeguard murre conservation.

Keeping one finger on the pulse of pervasive murre threats is essential to maintaining population health, which can in turn, help support an ongoing murre harvest (Mclean et al., 2020; Lieske et al., 2019; Gaston et al., 2010; Gaston et al., 2000). Some contemporary studies have identified serious anthropogenic and environmental threats to murre colonies, both in their wintering and summering grounds. Threats identified include illegal harvesting and selling, oil pollution, changes in shifting sea ice, changes in sea levels, marine traffic, and fisheries bycatch (Lieske et al., 2020; Mclean et al., 2020; Frederiksen et al., 2019; Kadin et al., 2019; Lieske et al., 2019; Gaston et al., 2010). Other seabirds in NL, like Razorbills (*Alca torda*) and Dovekies (*Alle alle*), are physically similar to murres. This makes them vulnerable to accidental take during the murre harvest season (Lavers et al., 2009). Presently, it is illegal for non-Indigenous residents to harvest Razorbills or Dovekies (Environment and Climate Change Canada, 2024).

It has been shown that seabirds (including murres) and their breeding colonies are important contributors to marine nutrient cycling (Pena-Lastra et al., 2022; Fenstad et al., 2017). Even in small amounts, lead exposure can cause significant harm to wildlife and people that consume game meat that may have a pellet in it or has had one pass through it (Environment and Climate Change Canada, 2018). Further, the production and deposition of lead pellets has been identified as an environmental concern by Environment and Climate Change Canada (2018). If seabirds are ingesting lead (like from that used in ammunition), while their own exposure is of

concern, they are also capable of depositing it in marine ecosystems at regional and even global levels (Pena-Lastra et al., 2022). Not only does this increase the risk of exposure for other wildlife, but for hunters that interact with and eat seabirds (Pena-Lastra et al., 2022). Although historical evidence suggests the amount of lead (and other toxic elements) in harvested murres are below Health Canada's levels of concern, researchers emphasize the importance of consistent and regular monitoring (Bond et al., 2015). It may be necessary to increase research which addresses lead contamination concerns to help residents and policymakers decide whether to continue the use of lead in ammunition for murre hunting.

According to returned harvest surveys, about 40 to 80 tonnes of lead are used annually for hunting in Canada (Environment and Climate Change Canada, 2018). Today, lead shot is banned for hunting waterfowl in Canada and the United States except for when hunting murres exclusively (Environment and Climate Change Canada, 2024). Further, the Migratory Birds Regulations stipulate that sea duck hunters cannot carry lead ammunition even if they were licensed and passing through areas where they could also hunt murres with lead shot (Environment and Climate Change Canada, 2018). So, although only those hunting murres exclusively are allowed to carry lead shot, it is crucial to understand the extent of lead contamination in game birds as well as how it may be impacting seabird colonies.

1.4.4: Stakeholder Input to Bridge Management Gaps

Creating balanced social-ecological frameworks relies on public support (Kelly et al., 2018). Human dimensions and stakeholder perceptions have been shown to work in conjunction with western science to develop sound resource management strategies (Kendal and Ford, 2017). Local Ecological Knowledge (LEK) is regional, ecological information typically transcending generations, garnered through traditions, experiences, and observations (Berkes et al., 2000;

Huntington, 2000). By engaging stakeholders, LEK can complement and bolster conventional scientific research by providing resource managers with original information accrued only through hands-on, lived experience (Berkstrom et al., 2019; Gilchrist et al. 2005). Furthermore, appropriate application of LEK has shown to build rapport between communities and resource managers (Freiwald et al., 2018).

Numerous studies affirm the importance of earnestly incorporating LEK in wildlife management decisions. Berkes et al. (2000) analyzed LEK in natural resource management practices.

> Monitoring the status of the resource is a common practice among many groups of traditional users and is often accompanied with the monitoring of change in ecosystems. The proximity of users to the resource confers an ability to observe day-to-day changes, either by the whole community or by selected individuals, such as community stewards and elders. (p. 1254).

Another study by Gilchrist et al. (2005) further asserts the value of LEK, stating,

> There has been growing international recognition that traditional and local ecological knowledge… can be useful sources of information to complement "western scientific approaches" to resource management. Because it is typically derived from people who have lived, hunted, and trapped wildlife, its role in wildlife management is analogous to "expert opinion" used in population modeling. (p. 1)

It is obvious that successful delivery of natural resource management decisions depends on rigorous social science. Meaningful local engagement helps realize sustainable policies and its use may prove substantial (Djosetro and Behagel 2020; Schlüter et al. 2020). These points emphasize the importance of feedback from resident murre hunters and affected stakeholders to

help address relevant harvest issues. Incorporating TEK from those closest to the heart of the subject matter may help realize the project goals.

1.4.5: Conclusion

For millennia, communities and individuals living in Newfoundland and Labrador relied on harvesting murres as a means of feeding their families according to traditional cultural foodways techniques. To address the unrestricted harvest that took place in the previous centuries, the Canadian government implemented fixed regulations in the 90's (Stoodley, 2021; Elliot, 1991). While data suggest that the numbers of both Common and Thick-billed Murres are stable, since that time researchers emphasize consistent, up-to-date population monitoring as the key to maintaining murre stability (Birds Canada, 2024). The annual murre hunt is one distinct activity that sets Newfoundland and Labrador apart from the rest of Canada (Montevecchi et al., 2007). It is key to emphasize that murre is a shared resource among other northern nations and Newfoundland and Labrador is the only one to administer a legal hunt. Therefore, understanding and integrating hunter input is key to preserving this tradition.

Chapter 2.0: Perceived Regulatory Challenges and Opportunities for Murre Hunting in Newfoundland and Labrador

2.1: Introduction

To protect migratory birds, the Migratory Bird Convention Act (MBCA) was enacted in 1917 to implement the international Migratory Bird Treaty with the United States (Government of Canada, 1994). The Act made it illegal to harvest murres in North America. So, when Newfoundland and Labrador joined Canada in 1949, the MBCA automatically extended to the province (Montevecchi et al., 2007). Public reaction was mostly negative, and petitions were signed to request reprieve (Montevecchi and Tuck, 1987; The Western Star, 1951; The Western Star, 1950; Tuck, 1949). Consequently, Canada and the US made a legal exception to the MBCA to defend the historical hunt, and residents were permitted to continue harvesting murres for food in Newfoundland and Labrador (Stoodley, 2021; Montevecchi and Tuck, 1987; The Western Star, 1951; The Western Star, 1950; Tuck, 1949). However, this distinction made it an offense to sell, buy, or barter murres (Environment and Climate Change Canada, 2022).

After 1949, murre hunting had no regulations aside from a designated 5-month season from November to March (Gaston et al., 2000; Elliot, 1991). In 1966, it became mandatory for non-Indigenous residents to purchase (in addition to provincial hunting licenses) a federal Migratory Game Bird Hunting Permit (Sen, 1976). Due to the nature of the hunt and the lack of bag limits, the number of murres being taken annually went generally unrestrained until 1993, when the government implemented their first set of deliberate harvest regulations (Gaston et al., 2000; Elliot, 1991). These regulations included harvest season dates (which vary by hunting zone), a daily bag limit of 20 birds, a possession limit of 40 birds, and designated hunting zones (Environment and Climate Change Canada, 2022).

Today, the Canadian Wildlife Service (CWS) manages murre harvesting in NL. The CWS, a branch of Environment and Climate Change Canada (ECCC), issues mandatory Migratory Game Bird Hunting Permits (MGBHP) and enforces Migratory Birds Hunting Regulations (Environment and Climate Change Canada, 2022). Hunters are required to hold a MGBHP, a Canadian Wildlife Habitat Stamp, and must be a resident of the province (Environment and Climate Change Canada, 2022). There are currently no limits on the number of trips a hunter can make per season. Further, provisions exist for enforcement and ammunition. Federal game officers enforce the regulations and hunters are not permitted to use lead ammunition for hunting waterfowl but can use it for hunting murres (Environment and Climate Change Canada, 2022). ECCC is committed to monitoring and ensuring the sustainability of the murre harvest by reviewing and updating the Migratory Birds Regulations on a biennial basis (Environment and Climate Change Canada, 2024).

2.2: Project Objectives

In a broad sense, the objectives of this study were formulated to help inform potential changes to upcoming migratory game bird hunting regulations by exploring stakeholder perspectives regarding potential management strategies, illegal harvest levels, and future harvester consultation efforts. More specifically, the objectives of this project were to solicit perceptions and recommendations from murre harvesters and other affected stakeholders on current murre harvest regulations and practices (e.g., current environmental and hunting conditions), possible alternative management strategies (e.g., phasing-out the use of lead ammunition, a harvest-tag system, and reducing season dates or bag limits), and the perceived extent of illegal harvesting. These objectives were used to analyze current murre harvest management practices as it relates to future harvest seasons.

Further, this study explored harvesters' participation in the CWS National Harvest Survey (which includes the Hunter Questionnaire Survey and Species Composition Survey), and examined ways to increase participation (e.g., by implementing a regulatory approach or offering incentives). The specific research question of this project was: How can CWS effectively adjust current management practices to consider murre hunter concerns and recommendations while mitigating ongoing murre population threats? The purpose of this research is to provide the ECCC with a recommended management framework to support sustainable murre harvesting operations moving forward in NL. Henceforth, in the interest of consistency, the term "murre" will be used to describe any discussion of Common Murres and Thick-billed Murres, as well in place of the term "turr" which is more colloquially used by residents. Finally, the terms "harvest(er)" and "hunt(er) are used interchangeably throughout. This is because the terms "harvest(er)" and "hunt(er)" are both used to refer to migratory game bird management by governing bodies (e.g., the CWS), in academic literature, and in official federal legislation (e.g., the Migratory Birds Regulations).

2.3: Methods

2.3.1: Data Collection

Refer to Chapter 1.0: Project Introduction for an in-depth description of the methods procedures. The research objectives of this study were pursued using a qualitative methodology. This methodology was applied because qualitative approaches, like interviews, provide the researcher the opportunity to fully explain the topics in question and ensure participants are offering contributions in line with the focus areas. Such approaches also result in a deeper understanding of research participants' opinions, behaviors, and experiences. To describe results, the terms "most" and "many" were used when a majority of participants fell into a "theme" as

identified through data analysis. This occurred when the researcher interpreted and summarized the data and was able to identify topics and statements presented by participants that merged around specific topics and opinions (Maguire and Delahunt, 2017). A theme was identified as being a pattern in the data that addressed the study foci, was important to the research questions, or was interesting and relevant (Braun and Clarke, 2006). Thematic analyses were then used to establish the subject of each manuscript chapter. Qualitative approaches are particularly well-suited when exploring contentious issues such as instances of illegal harvest and changes to harvest regulations for culturally important species (Chase et al., 2016; Dandy et al., 2012; Drury et al., 2011; Deruiter, 2002). Refer to Appendix D for a tabular summary of participants' responses and rationales to each interview question.

2.3.2: Data Analysis

Data analysis involved describing each participant's perceptions of and support (or opposition) for different aspects of the provincial murre harvest management framework (e.g., current regulations, introducing alternative management strategies, and the use of lead ammunition), and exploring any other related information provided (e.g., specific recommendations for CWS, any information they may have on murre population status or harvesting practices in their region, and whether they have participated in the National Harvest Survey). This same software was used for text analysis, playback, and importing notes. Additionally, short written notes and conversation points were typed on a Microsoft Word file or and summarized. After each meeting, major points were summarized and reviewed by the participants if they chose.

This chapter's themes and outcomes were grouped based on themes from responses given by participants to interview questions. Responses were then categorized into the following

domains: general hunter practices, hunter opinions and concerns for the current harvest regulations, hunter participation in harvest surveys, perceived illegal activity and regulatory challenges, and hunter recommendations and perceived opportunities for future hunting seasons and alternative strategies. A discussion and analysis of each domain are presented below.

2.3.3: Study Design

It is important to note, that, it was not the goal of the study to present results that are statistically representative of the population in question. Rather, as is often the goal when using qualitative approaches, interviews were conducted with the goal of representing a range of viewpoints pertaining to the study foci. The intention of the method's procedures was to interview a variety of volunteer participants with a uniform set of structured interview questions. Therefore, it is important to note that saturation of perspectives was achieved as the researcher recorded fewer additional new data and stabilized theme repetition as more interviews were conducted (Guest et al., 2006). The number of participants for this project was therefore able to provide the researcher with an adequate degree of detail and breadth of perspectives to allow for the identification of robust themes which coincided clearly with project objectives. There were no quantitative data analysis methods used in this study.

2.4: Results

2.4.1: General Hunter Practices

General participant information and hunting demographics were collected during the interview process (see Appendix B for the interview questions). As part of the interview, participants were asked if they had been murre hunting in the study area within the last 10 years. Sixteen of the 17 participants stated that they had harvested murres in Newfoundland and Labrador a minimum of 1 time in the last 10 years. The participant that had not, stated that,

although they had not been murre hunting in this decade, they had been out frequently before this time. They elaborated by sharing that they had been on the water every day and grew up around the bay, “in the inner bay so turrs [murres] weren’t always there” (Participant 9, 2024).

Participants were asked about their hunting party; if they harvested alone or in a group, and, if in a group, to describe their relationship to the other people in their party. Some participants hunted both alone and, in a group, and 12 described themselves as hunters that always harvested with at least one other person. Participants described the number of other people in their group as ranging from 1 other person to up to 3 other persons in a boat at one time. When asked about who they hunted with, responses ranged from family members (father, father-in-law, nephew, son, first cousin, and a fiancé), to friends (close friends, colleagues, and a neighbour), and some shared that they were joined by others with no previous murre hunting experience (“first-timers” [Participant 1, 2024]). One participant iterated that they always take their retrieving dogs with them. “Generally, I’ve been solo which is somewhat uncommon” stated another hunter (Participant 8, 2024). “But when I have been with friends, it’s been no more than six other persons. Not all at the same time, but a total of six other persons that have been in the boat when I’ve hunted murres” (Participant 8, 2024).

When asked about hunting frequency (number of hunting trips made per season on average), answers ranged from 1 to 20 trips per season. Five (5/17) participants cited that the number of trips made per season typically depend on weather, with better weather conditions allowing for more trips. One participant put it succinctly, by answering, “I was out enough to get my forty” (Participant 2, 2024). Participants were asked if they had harvested murres during the most recent season (fall 2023 to spring 2024). Five (5/17) stated that they did not participate in the most recent season. The remaining participants that had, responded as having made 1 to 20

Table 1: General hunting areas of participants indexed alphabetically according to bay names, community names, or general areas.

General hunting areas
Baccalieu Island
Bay de Verde
Bay of Exploits
Bonavista Bay
(south of) Cape John
Conception Bay
Conche
the east coast (of Newfoundland)
Exploits Island
Green Bay
Herring Neck
L'Anse-au-Loop
Labrador straits (on the Labrador side)
the northeast coast of NL
the northwest coast of NL
Notre Dame Bay
Placentia Bay
Plum Point
Pointe Riche
Port aux Choix
Red Bay
the south coast (of Newfoundland)
the southwest coast (of Newfoundland)
Twillingate

trips throughout the 2023 to 2024 season. Finally, general hunting areas were recorded during the interviews. Two participants stated that they have harvested in every area (hunting zone) over their lifetime. Refer to Table 1.1 for an index of participants' hunting locations.

2.4.2: Hunter Opinions on Harvest Regulations

Participants were asked to discuss their general opinions on the current murre hunting regulations and to describe their support or opposition to specific regulations (e.g., daily bag limits, possession limits, season dates). Overall, hunter support for the current hunting regulations varied. Key concerns raised by study participants included over-harvesting due to hunter mobility and modernized hunting equipment (e.g., ability to tow boats to multiple bays and cellphones), over-harvesting due to liberal possession limits, lack of enforcement, illegal activity (e.g., selling and buying of murres), perceived absence of biological studies (e.g., limited access to murre data to justify season quotas), species harassment/abuse (e.g., perceived stress reaction by birds to boat engines means murres congregating less in common inshore areas and hunters have had to increase harvest range/travel further out the bay), and a lack of community engagement and opportunities for feedback by CWS (e.g., leading to a perceived deficit in rapport). A few participants indicated the opposite, stating a desire to maintain the regulations as-is or for more liberal possession limits (e.g., increasing daily possession limits). Most frequently reported concerns perceived by participants included lack of patrolling enforcement officers (e.g., to help prevent illegal harvesting) and timing of season dates (e.g., dates not coinciding with the movement of sea ice in and out of bays, with when adult murres are migrating resulting in a perceived higher number of juvenile murres being taken, or with permissible weather conditions in certain areas). Examples of participant statements are assembled below.

Perceptions of harvest regulations overall:

I think in general the regulations are decent, I guess. The bag and possession limit is [are] not too bad, although I think it's liberal. I have serious concerns about the lack of science. And of course, I understand it's a hard species to track and monitor and whatnot, particularly the thick-billed [murre] because they're more northern so it's harder to get the data. But how much damage are we doing with the harvest? I do have serious concerns about that (Participant 1, 2024).

I disagree – I don't want to agree with the large number of birds that people is allowed to take. I've seen over the years, you know, the waste [of] birds that got killed. Some never got cleaned, so many ended up in the dump and I really think that they're over-harvesting the birds (Participant 11, 2024).

In general, I agree with the intent, and specifically, with the language of the current regulations on harvesting murres for Newfoundland and Labrador… whilst a daily bag limit of 20 birds may be necessary for some people who have a single opportunity to hunt murres and a desire or a need for, you know, up to 20 birds in a day and mightn't have other opportunities to hunt murres… but whether or not 20 birds is sufficient, I argued at the outset, essentially when these regulations were being brought in, that I thought the bag limit should have been 12 birds. The daily bag at that time, right? (Participant 8, 2024).

Perspectives on the cost of hunting:

It ends up being expensive. Me and [name removed] was just discussing; it works out to be, like, $10 a turr [murre] by the time you gets gas to get down, gas to go away, food, and to get back home (Participant 16, 2024).

Perspectives on the lack of data:

But I was thinking about the regulations here because I looked up some of the information that the Government of Canada had on murres after we had the avian flu and they didn't seem too concerned. But one of the things that was, I can't say [was] disappointing, but that the number of turrs [murres] that were harvested ranged from 60 to 120,000 per year. So, really, they don't know (Participant 10, 2024).

So, with those extra pressures, the historical hunting, avian influenza, and such a sensitive species, why can't we pick up a phone and say, 'How's the population?' There's none! Whereas, if you want to talk about a mallard duck, I swear to God, they could tell you right down to, you know, the decimal point how many thousands there are in any region at any time. Turrs? Nobody knows (Participant 1).

Support for bag limits:

That's another thing with the quotas, I mean, you wouldn't want the quota to be any less because it's only a small bird. I mean, to have a meal with a family you gotta have cooked four or five

birds if you're going to have a, you know, if you've got four or five people eating turrs [murres] you're going to need a turr [murre]each, basically, for an adult (Participant 16, 2024).

I feel the bag limits is good in our area; 20 a day, 40 in your possession. I feel strongly that the population in our area can withstand that now, you know (Participant 4, 2024).

My biggest thing is helping out other people. It's nice to be able to - the older generation that can't get out anymore - it's nice to be able to get them a few birds without feeling like you're a criminal. I realize they got to have some kind of control over it and all that but it's - there's a lot of people that's not able to get a few birds yourself, whether it's their age or not… it's like if you had a moose or something like that, it's not a big deal, no one really cares if [you] gives anyone moose or anything like that. It should be much the same thing to me, personally (Participant 2, 2024).

Species-specific concerns:

I know some of the guys that do the surveys, and I heard one of them once, the pilot was talking about how they fly right from the eastern seaboard up through Labrador, right, primarily for sea ducks, again. They're flying low-level and they're just getting these counts and one of them made the comment, "Every time I get to Newfoundland, I can tell I'm in Newfoundland because as soon as the birds hear the sound of an engine they go to fly". It doesn't happen elsewhere… So, even if it's not a targeted species, if boats are continually going in around those areas and just driving them to the wing, particularly in the wintertime, you know, it's putting a stress on them. (Participant 1, 2024).

Participants were asked to discuss their opinion on lead ammunition and its use for hunting murres. Eleven (11/17) participants stated that they did not agree with the regulation change that prohibited hunters from carrying lead ammunition except for when hunting murres exclusively. Those that did not agree described the success rate to be higher when using lead ammunition versus other non-toxic ammunitions (steel was the most common example). Additionally, most participants perceived a higher number of crippled murres when using steel ammunition (or other non-toxic metals). Additional worries included how expensive using non-toxic ammunition was and how hunter education programs should be put in place to help ensure effective ammunition use. However, others discussed concerns for potential lead poisoning to themselves and to wildlife. Examples of participant comments are assembled below.

Opposition to limiting the use of lead ammunition:

Terrible regulation. I'm a sea duck hunter as well and it's just, it's pretty pathetic… And for me to pick up, like, to get my ducks and then go try to pick up a few turrs [murres] or something like that, steel shot is outrageously expensive. So, it's not even feasible to be using it. And it's not as good either… I'm worried that they're going to start bringing [it] in for turrs [murres] as well, and that would be terrible (Participant 2, 2024).

I think that was a terrible decision to make that regulation change... Generally steel shot – and I can tell you from experience – shooting a turr [murre] with lead versus shooting a turr [murre] with steel shot, it's night and day difference. Lead shot is goodnight to the turr [murre]. Steel shot it's just a wounded bird, it's gull food, it's eagle food (Participant 1, 2024).

The big problem that you're going to see is, you're seeing it now with sea ducks too, is non-toxic shot, if you wants a quality non-toxic shot that's going to perform as well as lead you're looking at 80 or 90 dollars a box for shells. People aren't doing it… lead shot is king when it comes to hunting turrs [murres]. It's economical, it performs well, the cripple rate stays low with it. (Participant 3, 2024).

Lead poisoning concerns:

Yeah, I think I agree with it mostly, like uh, the only thing I don't really like is you're allowed to hunt with lead shot, and, like, I've heard so many bad things about, like, lead poisoning and [it] seeping through the meat and stuff. So, like, the first time I went, I used lead shot, but I recently bought a bunch of steel shot, so I think I'll just use that next time, because I don't really agree with lead [shot]... So, you can't hunt turrs [murres] and ducks at the same time. I guess the way to get away from it is all steel shot, then it's way more expensive for especially turr [murre] hunting because it's not often you hit a turr [murre], like, first shot… Like, almost every time you eat a turr [murre] you're biting into a lead shot. So, like, it's in the meat and we're ingesting it too (Partcipant 7, 2024).

Perceived impacts of using alternatives to lead ammunition:

Most times I gotta go out, at least in the straits, like eight kilometers from where I'm at offshore before I gets any turrs [murres]. So, to me, like, and if you shoot 'em with lead most times you're going to get a bird, very few will you lose. So, your time out there is, you're not as long out there so you're saving on expenses. And if you look at climate change, if we're talking about, you know, carbon emissions then if you're not out there as long you're not burning as much gas either… Steel, to me, you're gonna end up with a lot of injured birds, it's going to take you longer to get your quota. It cost me $10 dollars a turr [murre] now, it's gonna probably bump me up to $12 and you got more carbon emissions (Participant 10, 2024).

It's tricky to think about so many parts; financial feasibility, gun safety. I've got both kinds of ammunition, and if I go to hunt ducks I gotta take steel, if I go to hunt murres I gotta take lead. And it's a financial equation that you've got (Participant 15, 2024).

Perspectives on hunter education to elucidate the matter of poor ammunition use:

In summary, lead shot and ammunition, well, I think it's not bad, not a bad thing for the Government of Canada to prohibit the use of lead shot because of its effects on the environment and on migratory birds. But personally, I think in regards to its use for sea ducks and for murres, that is moot. Whilst acknowledging that a far bigger issue, well documented, is that, you know, people can, they should be better shots than they are. They should be better at hitting a bird and basically bringing it into the boat or the blind or whatever. Bringing it home to eat (Participant 8, 2024).

2.4.3: Hunter Participation in Harvest Surveys

Participants were asked if they had participated in the CWS' National Harvest Survey (which comprises both the Hunter Questionnaire Survey and the Species Composition Survey). Eleven (11/17) participants responded as having submitted the National Harvest Survey (NHS) at least once, and one (1/17) participant responded as having completed the Species Composition Survey (SCS) but not the Hunter Questionnaire Survey (HQS). Further, participants were asked to describe recommendations for increasing participation in the NHS. Summarized recommendations from participants included increasing community engagement and individual contact with license-holders (e.g., introducing a telephone or in-person survey component), incentivizing the survey (e.g., with prizes like a patch or a box of shotgun shells), and moving the survey primarily online. Key concerns raised by study participants included falsifying survey responses (e.g., if taking the surveys became mandatory) and introducing biases into survey results. Many emphasized the need for a survey that produces reliable figures to avoid over-harvesting. Examples of participant comments are assembled below.

Hunter intentions for opting out of the NHS:

I have in the past but not normally, no. I'm bad, even the moose one they'll just send the moose one two or three times and yeah, I'm bad for that stuff. I've sent back, like, even the salmon one; like, I've sent back the salmon one to survey, you know, "how many times you salmon fished, dot, dot, dot". I have done 'em but I'm not good at it (Participant 16, 2024).

I used to participate in the survey for a number of years and I participated in the one that, where you submit samples of your wings, and so on and so forth. I did that over a number of years and then it did become a bit of a nuisance to me, it became a bit of a extra part of work when you're cleaning up ducks, and so on and so forth. You got a big mess there and you got to get it all done

in a certain amount of time. And trying to salvage the wings and package them up correctly, and so on and so forth, over time I just discontinued that practice (Participant 11, 2024).

I should be ashamed to say it but most times I gotta get [a] notification. I do send in a participation report to fisheries when I gets it for myself and my two daughters because we fish together. My moose survey I sends that back, normally I get a notice because you know, I mean, I've only killed one moose in the last six years, so you get your license, and you throw it in the corner and you just forgets about it (Participant 10, 2024).

Recommendations to increase survey participation:

But the way to actually engage an audience, a hunting audience here in Newfoundland, I can't speak for other places really, is to actually go to them. You don't need someone to hold every participant's hand to get them to fill out a survey, no, but what you do have to do, or what can help, I've seen it help, is you can actually, by interacting directly with hunters, by explaining what is learned and what is sought in these surveys, you can increase your participation (Participant 8, 2024).

Support for incentivising the NHS:

When you participate, you know, everyone likes something for free or something like that, so maybe that would be an incentive. That would probably be the only thing I could think of offhand that would, you know, draw more people to participate, because, you know, people just say, "ah, I'm not going to fool around with that", you know that's too much, too much effort sometimes but it really isn't. Or some people don't like change sometimes and people just don't want to do extra things that they don't have to do (Participant 4, 2024).

…and similar to, like, the moose hunting return they send you a little patch in the mail if you're successful getting your moose, and I think something as simple as that, like a patch sent out to people who went turr [murre] hunting. People go crazy for it, like, they'll be online trying to trade and buy 'em. So, yeah using an incentive is like just a simple thing (Participant 7, 2024).

Some of the salmon ones I believe they had some stuff where they gave away some trips to a fishing lodge or a salmon rod-reel combination, something of those nature. So, I guess it's, for some people, it's just an added thing, "oh yeah doesn't hurt, I'll fill it out and I'll send it in". How accurate it's going to be, I don't know. (Participant 14, 2024).

You know, a lot of people don't want to participate [in] stuff because they think there's nothing into it for them. They don't understand that, you know, while you're participating in it, you are still getting something out of it because that's what's keeping the hunt going… So, I mean, if you offer up your information, it could be just something as simple as, it's like a couple of boxes of shells would be enough to get people to send in, you know, something pertaining to hunting (Participant 3, 2024).

2.4.4: Perceived Illegal Activity and Regulatory Challenges

Participants were asked about observed levels of illegal harvesting and selling of murres in their area. Most (13/17) participants stated that the illegal harvest and selling of murres was a problem in their area. Problem areas identified by participants included Placentia Bay and Notre Dame Bay. The most frequently reported concern was a lack of enforcement (observed lack of patrolling officers to problem areas). Some participants asserted that many hunters are entirely unaware that selling birds is illegal. Another added that in 2023 they noticed there were only 6 enforcement officers for the whole province. Examples of participant comments are assembled below.

Perceptions on illegal activity:

Because again, it's getting back to the hunters that are going out now, are going out much more frequently. They're getting, you know, forty, fifty, sixty birds a trip every single trip; they're doing it multiple times a week all season long (Participant 1, 2024).

And part of that concern - there are always amongst the hunting communities – people who love to hunt. And they tend to hunt at every opportunity that they have and if it means that they have to give birds away or sell birds, they'll do so. And not all people are like that… and if there's a market for murres or anything else, right, which is forbidden in, you know, for migratory birds, then, but a market for anything basically means that there's a likelihood that people are going to break the law and take more birds than they need. (Participant 8, 2024).

Perspectives on lack of enforcement:

I don't think, now I know a lot of people who hunt turrs [murres] a lot more than I do, and I don't think to my knowledge, I've ever been stopped by a wildlife officer while hunting turrs [murres]. Very seldom, while hunting moose, very seldom, maybe I've been stopped three times, maybe four times in the last fifty years, maybe. So yeah, enforcement is a big issue in all of those areas. (Participant 15, 2024).

A lot of people obviously are doing it [illegally harvesting]. I can't say if it's causing issues with the population in our area. Obviously, if you're killing more turrs [murres] then there's more population dying. People know if they're doing it, they shouldn't be doing it. Just more enforcement would be a big thing that obviously comes into factor (Participant 4, 2024).

I've heard of people like selling them and like they're obviously getting too many. And I've heard of people still shooting Dovekies and like having those because they say they're like the best

seabird you can eat. Yeah, so people are still at that… I don't think I've ever heard of anyone being checked for turr [murre] hunting, like from the province. I guess CWS, like, do check it, but I know a few friends that are wildlife officers with CWS and there's only three of them on the Avalon or something, it's really low numbers. And my fiancée, she works with DFO as an enforcement officer, so they've even enforced it a few times because they came across violations… as soon as one person gets checked the word of mouth goes around and people get really nervous. That's an easy way to cut down on it. (Participant 7, 2024).

Perceptions of the impact of social media:

…there are particular areas around the island, I think, that require a lot more enforcement than other areas. Just given, like, Placentia Bay for example, like, just given the, like, the number of hunters that are on the Avalon. Placentia Bay is the main bay of focus for turrs [murres] and you know with social media and everything now, like once the turrs [murres] hits down there it's, you know, people start posting pictures and everything, everybody knows, and you'll see like you know there'll be dozens of boats out in the bay. Generally, there's, you know, you rarely hear of anybody being stopped by you know fish and game or anything like that for a check, you know, bag limits what else you got, you know (Participant 3, 2024).

The same participant recalled a story they saw on the local news station:

Not in my area because there's not enough of them. Like, me and dad made two trips out this year; on the northern peninsula we got thirteen. But down in other areas like, well, it's a known fact in Placentia Bay that it's been over-harvested for years. I don't know if you can remember a number of years back there, there was a news story up on NTV there. Someone had 2,500 murres and they were dumped in the dump up there… But here, like I said, it's just, the Northern Peninsula is not a huge area, like all you get, like transient birds that are just passing through…Where they actually stick around, I think, you know, due to the lack of enforcement and stuff - what appears to be a lack of enforcement - because, I've been turr [murre] hunting since I was, you know, 16 or 17 years old, and I'm 33 now, I've never seen a wildlife officer on the turr [murre] hunt (Participant 3, 2024).

Arguments as to why illegal activity isn't an issue:

I'm more of a, if the population is not hurting there's nothing wrong with it. I just let it be. Once that becomes an issue, by all means do what you got to do but it's, I see no, I see no problem with the population, so, it can't be that bad (Participant 2).

2.4.5: Harvest Recommendations

A number of participants were keen to express recommended changes for murre harvest regulations. Further, participants were asked to discuss their support or opposition for potential alternative management strategies. When asked if they would discuss their opinion on the

potential introduction of a harvest-tag system, support was varied. While some participants were quick to endorse it, others were against it. Examples of participant comments are assembled below.

Recommendations for harvest season dates:

What's the point of having a season open when there are no turrs [murres] migrating to that area? Maybe the seasons, in some cases, I think they're longer than they should be. I'm not saying they are, just thinking from observing some of the opening and closing dates, and then again of course in the wintertime, you're competing pretty much every day with possible good or bad weather (Participant 15, 2024).

I think it should open later in the year, generally, for the most part. A lot of the birds that you gets early in the year, especially up here on the Northern Peninsula… is immature birds or smaller birds. They still got, you know, a lot of pin feathers. So just cleaning them in general, you're getting, like, a poor-quality immature bird is mostly what you're getting. And for the most part, yes, you can distinguish juveniles. But, like, you know if it's a quick hunt or anything like that, you're not getting the quality of birds that you would like. And I think that would lead more people to probably take more than they want. (Participant 3, 2024).

A tailored bag limit approach:

Maybe the only thing I can think of, and this is not to sound unfair or anything, but if they think that they have a problem with certain areas, with populations, [to] have different bag limits for those areas. But other than that, I don't think anything up our way should be touched (Participant 2, 2024).

Some participants recommended changes for the licensing approach to murre hunting. A murre "add-on" suggestion:

I mean, the province split the ptarmigan system to just to see how many people were hunting ptarmigan. I don't agree with splitting the license per se, but I think if you had a migratory bird license and we had an add-on for turrs [murres] that was a ten dollar per year fee, you know, an additional fee for turrs [murres] with a tag system with it to pay for the tags, and that way you would know exactly how many people are hunting turrs [murres]. (Participant 10, 2024).

A mixed-bag licensing approach suggestion:

One thing I just did think about, a lot of people, like, I don't know if you're familiar with, like, black guillemots – pigeons we calls 'em – you know, that's something that should have been considered as a mixed bag with turrs [murres] to help alleviate some of the, like, the pressure on turrs [murres] instead of specifically targeting turrs [murres]... They're more plentiful around

and turrs [murres] you'll see, you know, 100 pigeons where you'll see 20 turrs [murres]... So, but it is something that should have been considered as a mixed bag. Like, with turrs [murres] you can either, you know, you can have, you know, 20 turrs [murres] or, like, 10 of which can be black guillemots or 10 you know common murres or thick-billed murres, you know. Just consider like a mixed bag like they got done for the sea ducks, you know. Sea ducks don't just target eiders you know, you're allowed like eider ducks, long-tailed ducks, you know as a, as a mix, right. So, something, you know, could have been in consideration because they certainly do seem a lot more plentiful, the black guillemots do than and common murres (Participant 3, 2024).

Support for a harvest-tag system:

What I would like to see, one thing I would suggest for all seabird species actually… would be a tagging system. So, you have a seasonal possession limit because they're so slow reproducing right? Like, turrs [murres] only have on average one egg per year… the longer lived the species generally the lower reproduction, so the more susceptible they are to harvest, right. So, harvest can have a bigger impact as opposed to, like, a mallard duck which can rebound relatively quickly. So, to me we need a seasonal possession. If you have - now what that number would be, of course, you'd have to look at your science – but, like, if you say it's 40 turrs [murres] for the season, I'd be more comfortable with that because I think then we're going to have a chance at protecting our birds (Participant 1, 2024).

Opposition to a harvest-tag system:

*Well, I have problems with tags, okay, and I don't think they're necessary… In order to do that, there's two things you need. One is to know, well, how many birds can you allow all the hunters who may want to hunt to get? What is that number? Is it a hundred thousand? Is it two hundred thousand? Is it half a million? Is it twenty thousand? Who knows! But you absolutely need to know that number. And we know there's no certainty in all of these things. They're all derived from estimates but when you're printing off a bunch of tags you're gonna need to know how many of those tags you're going to produce. And you actually have to allow for the maximum number, right. And then you have to figure out some way that, you know, all these hunters who buy licenses can get these tags, and someone's going to pay for them, which they don't have to pay for them now. And on top of that, say it's a hundred thousand, you've got a hundred thousand plastic tags every – excuse my vulgarity – every f*cking year that are going to end up in the dump. They're going to end up somewhere. More plastic!* (Participant 8, 2024).

I don't like the tag system for the fact of the recreational cod fishery. Back, I'm not sure how many years, probably 15 years ago, maybe even 20 years ago, when they came with the tag system and [it] used to go through the gill in the mouth. And the first thing you'd do is cut the head off and you'd throw it overboard. And they found that all the tags were washed up on the beach including the coastline. And a lot of the time when you're cleaning your murres, you know, you're putting it all in a bag or you're putting it in fish pans and you're discarding it, either in the trash or you're throwing it over into the water, kind of thing. And I only feel like that's going to put more plastic into the ocean and eventually end up on the coastlines. If you go with plastic tags. (Participant 4, 2024).

I think it'd be a lot of kickback because I find, like, fishermen in general don't like regulations. I remember they had it for codfish, but they got rid of it. I've heard a bunch of people getting caught, like, opening up the tags and using them again or not clipping them (Participant 7, 2024).

2.5: Discussion

This chapter was designed to provide a qualitative understanding of hunter perceptions of regulatory challenges and opportunities for murre hunting in NL. This chapter's themes and outcomes were identified based on responses given by participants to each interview question. In general, interview analyses from this chapter demonstrate that hunter input will help resource managers to inform future harvest seasons. However, the results indicate there is a strong desire for more mechanisms for hunter feedback and input to secure hunter buy-in and hunter-informed harvest regulations. Further, this chapter demonstrated that there is a serious lack of enforcement by wildlife officers for bag and possession limits and a desire to increase enforcement efforts for these regulations and to specific problem areas.

It appears that murre harvesting is a social undertaking often involving loved ones and family members. This is supported by the number of hunters that responded as always hunting in a group with at least one other person, with hunting party composition ranging significantly, reinforcing the notion that murre hunting is culturally and traditionally ingrained in the fabric of Newfoundland and Labrador, as argued by current and early literature (Montevecchi et al., 2007; Gaston et al., 2000; Elliot, 1991; Montevecchi and Tuck, 1987; The Western Star, 1951; The Western Star, 1950; Tuck, 1949; Turner, n.d.).

Further, a review of hunter interviews also indicates that many hunters are travelling to hunt in multiple areas and that most harvest murres recreationally. This emphasizes the importance of understanding how modern equipment, technology, and increased sport hunting

may be changing the murre hunting landscape in NL. These results call on resource managers to consider reforming modern management frameworks to account for these changes.

Some participants perceived a decline in the number of licensed hunters and asserted that fewer young adults were engaging in the annual hunt. This is in accordance with findings from other qualitative studies which describe gradual reductions in hunting populations because of aging and rural depopulation (Lovelock et al., 2021; Ryan and Shaw, 2011). It appears that recruiting new hunters usually takes place in the family, when parents train their children (and other family members) to engage in traditional hunting activities (Ryan and Shaw, 2011). It is evident that Newfoundland and Labrador's murre hunt involves not only the harvester themselves, but their families and communities, and that these should be considered together for future management frameworks.

Hunters generally supported current harvest regulations. However, when asked to discuss certain regulations they agreed or disagreed with, many were keen to express specific concerns. Further, another important finding identified by this study is a strong desire for up-to-date biological data as evidence for hunters to justify harvest concerns. Many hunters asserted that their beliefs are contingent on and cooperate with evidence backed by science. Conservation approaches examine regulated hunting and resource conservation together, with North American administrative systems (one such is formally referred to as the North American Model of Wildlife Conservation; NAM) typically operating under both (Servheen, 2023; Mahoney and Jackson, 2013). Regulated hunting can contribute to wildlife conservation by controlling and restoring populations and contributing to overall ecosystem health (Mahoney and Jackson, 2013). However, few studies have evaluated hunters' perspectives and attitudes towards wildlife conservation (Ghasemi and Kyle, 2022).

Understanding hunter value orientations as they relate to resource conservation and their regulatory measures is obviously essential. Public participation in environmental policy is gradually increasing, however many studies have identified barriers to its integration like insufficient means of engagement, government reluctance to adhere to community concerns, and the potential misalignment of local understanding with real social-ecological changes (Benham, 2017). Further, some studies describe a historical propensity for conventional science to favour expert, technical advice over TEK (Benham, 2017). This highlights the importance of integrating hunter feedback to safeguard Newfoundland and Labrador's murres while effectively addressing harvester needs.

Some hunters believe that their right to harvest murres should also extend to other seabird species (e.g., Dovekies). Additionally, many participants were multi-species hunters and drew on alternative harvesting observations to bolster their experiences (e.g., many cited the former recreational cod tagging system to justify their opposition to the introduction of murre harvest-tags). This indicates that local knowledge is typically not limited to a single species alone, but confounded by experiences built from different, learned experiences throughout the hunter's life (Danielsen et al., 2009; Degnbol, 2005). This underscores the importance of legitimizing and promoting comprehensive engagement for ecosystems management.

In sum, a review of hunter interviews prescribes hunter support, retention, nuance, and recommendations as integral to the creation of sound conservation strategies. Human dimensions of natural resource management studies provide an analysis of how human experiences affect wildlife, their management systems, and the policies designed to protect them (Castillo-Huitrón et al., 2023). Understanding complex social-ecological interactions is essential to developing responsible wildlife management practices (Castillo-Huitrón et al., 2023). Conservation concerns

have triggered up-to-date examinations of the sustainability of NL's annual murre hunt, as academic and government representatives have requested the evaluation of the human dimensions of Newfoundland and Labrador's murre hunt. It is evident that it plays a significant cultural, historical, and legislative role in the province. The capacity of human dimensions in its management is significant and was carefully considered in this study.

2.6: Conclusion and Summarized Recommendations

Overall, results from this chapter indicate the key regulatory recommendation for the CWS from hunters was to increase enforcement, particularly to identified problem areas. Other recommendations included introducing a tag system, introducing a seasonal limit, adjusting season dates (e.g., shifting season dates to account for murre migration to certain areas), splitting the license or introducing a license add-on, increasing enforcement (particularly to problem areas), and establishing a robust hunter education program (e.g., to ensure proper gun and ammunition use). One participant wrapped it up nicely, stating a viewpoint shared by others, "We need to limit seasonal take. That, and we need more enforcement and more science. That's to me the three keystones of it" (Participant 1, 2024).

This chapter gets to the heart of many regulatory considerations for resource managers. This study presents a major opportunity to build lasting, meaningful relationships with murre harvesters and affected stakeholders. In conclusion, this study demonstrated the importance of public consultation, like through one-on-one interviews, and how they may improve harmony and trust among harvesters and resource managers. This can, in turn, increase harvester willingness to collaborate at the conservation level and ensure the successful incorporation of honest participant feedback and input for future policy delivery.

Chapter 3.0: Cultural and Environmental Conditions for Murre Hunting in Newfoundland and Labrador: Hunter Perceptions and Opinions

3.1 Introduction

Human dimensions of natural resource management studies provide an analysis of how human experiences affect wildlife, their management systems, and the policies designed to protect them (Castillo-Huitrón et al., 2023). They seek to understand the complex social connections of human-wildlife interactions, and how these may be influenced for the development of sound conservation strategies (Castillo-Huitrón et al., 2023).

It is widely accepted that seabirds and their breeding colonies are important contributors to marine environments and can act to signal the status of ecosystem health (Pena-Lastra et al., 2022; Fenstad et al., 2017; Mallory et al., 2010; Piatt et al., 2007). This emphasizes the importance of establishing consistent monitoring programs to ensure, not only the status of seabird populations, but global environmental conditions. Increasingly, scientists and resource managers are relying on a balance of conventional scientific data and Local Ecological Knowledge (LEK) to satisfy this need (Berkstrom et al., 2019; Niraj et al., 2012). LEK is regional, ecological information typically transcending generations, garnered through traditions, experiences, and observations (Berkes et al., 2000; Huntington, 2000). Careful consideration of LEK is essential to exploring nuance, the "why" (personal reasons and lifestyle choices that lead to someone's specific opposition to or support for a policy decision), and contentious resource management topics (Chase et al., 2016; Dandy et al., 2012; Drury et al., 2011; Deruiter, 2002).

Public participation in environmental policies is on the rise (Berkstrom et al., 2019). Incorporation of LEK is increasingly recognized as a reliable and practical source for resource managers to inform conservation strategies (Berkstrom et al., 2019; Niraj et al., 2012).

Ecosystems are complicated with many direct and indirect interactions; therefore, it makes sense to engage communities and individuals closest to these dynamic systems (Peloquin and Berkes, 2009). Evidence has confirmed that successful hunters operating within a certain ecosystem adapt their harvest techniques to allow for ecosystem-specific variations (Peloquin and Berkes, 2009).

Human dimensions and stakeholder perceptions have been shown to work in conjunction with western science to develop sound resource management strategies (Kendal and Ford, 2017). By engaging stakeholders, LEK can complement and bolster conventional scientific research by providing resource managers with original information acquired through hands-on, lived experience (Berkstrom et al., 2019; Gilchrist et al. 2005). Moreover, appropriate application of local knowledge can build rapport between communities and resource managers, which is necessary for public buy-in and participation (Freiwald et al., 2018; Kelly et al., 2018). All this to say, preserving the murre hunt is important for social cohesion and enhancing community identity in Newfoundland and Labrador. Based on its socio-cultural influence, harvesters and affected stakeholders can provide valuable information that will, in turn, help support a sustainable murre harvest (Mclean et al., 2020; Lieske et al., 2019; Gaston et al., 2010; Gaston et al., 2000).

3.2: Project Objectives

In a broad sense, the objectives of this study were formulated to help inform potential changes for upcoming migratory game bird hunting seasons by exploring stakeholder perspectives regarding potential management strategies, future harvester consultation efforts, and to help inform potential provincial murre-related heritage conservation programs. Specifically, the objectives of the project were to solicit perceptions and recommendations from murre hunters

and other affected stakeholders on the cultural and social significance of murre harvesting, provincial murre population status (e.g., current threats and distribution), and perceived environmental changes to hunting areas (e.g., observed changes to sea ice and weather patterns). These objectives were used to analyze current murre harvest management practices as it relates to future hunting seasons.

The specific research question of this project was: How can CWS effectively adjust current management practices to consider murre hunter concerns and recommendations while mitigating ongoing murre population threats? The purpose of this research is to provide CWS with a recommended management framework to support sustainable murre hunting operations moving forward in NL. Henceforth, in the interest of consistency, the term “murre” will be used to describe any discussion of Common Murres and Thick-billed Murres, as well in place of the term “turr” which is used more colloquially by residents.

3.3: Methods

3.3.1: Data Collection

Refer to Chapter 1.0: Project Introduction for an in-depth description of the methods procedures. The research objectives of this study were pursued using a qualitative methodology. This methodology was applied because qualitative approaches, like interviews, provide the researcher the opportunity to fully explain the topics in question and ensure participants are offering contributions in line with the focus areas. Such approaches also result in a deeper understanding of research participants’ opinions, behaviors, and experiences. To describe results, the terms "most" and "many" were used when a majority of participants fell into a "theme" as identified through data analysis. This occurred when the researcher interpreted and summarized the data and was able to identify topics and statements presented by participants that merged

around specific topics and opinions (Maguire and Delahunt, 2017). A theme was identified as being a pattern in the data that addressed the study foci, was important to the research questions, or was interesting and relevant (Braun and Clarke, 2006). Thematic analyses were then used to establish the subject of each manuscript chapter. Qualitative approaches are particularly well-suited when exploring contentious issues such as instances of illegal harvest and changes to harvest regulations for culturally important species (Chase et al., 2016; Dandy et al., 2012; Drury et al., 2011; Deruiter, 2002). Refer to Appendix D for a tabular summary of participants' responses and rationales to each interview question.

3.3.2: Data Analysis

This chapter's themes and outcomes were grouped based on themes from responses given by participants to interview questions. Responses were then categorized into the following domains: harvester perceptions of impacts to murres, perceived environmental conditions on hunting grounds, perceived changes to sea ice and weather patterns on hunting grounds, and hunter motivations for murre harvesting. A discussion and analysis of each domain are presented below.

3.3.3: Study Design

It is important to note, that, it was not the goal of the study to present results that are statistically representative of the population in question. Rather, as is often the goal when using qualitative approaches, interviews were conducted with the goal of representing a range of viewpoints pertaining to the study foci. The intention of the method's procedures was to interview a variety of volunteer participants with a uniform set of structured interview questions. Therefore, it is important to note that saturation of perspectives was achieved as the researcher recorded fewer additional new data and stabilized theme repetition as more interviews were

conducted (Guest et al., 2006). The number of participants for this project was therefore able to provide the researcher with an adequate degree of detail and breadth of perspectives to allow for the identification of robust themes which coincided clearly with project objectives. There were no quantitative data analysis methods used in this study.

3.4: Results

3.4.1: Hunter Perceptions of Impacts to Murres

Interviewees were asked whether they have recently encountered any sick or dying murres and whether they've recently encountered any murres with oil on them. Further, participants were asked their opinion on whether they perceived these threats (avian influenza and oil spills) to have a negative impact on murres in Newfoundland and Labrador. Finally, participants were asked to describe any other threats they perceived were affecting murres in NL. Many participants stated that they didn't participate in recent harvest seasons (discussions ranged from 2021 through 2024 harvest seasons) due to concerns with contracting avian influenza. While most participants stated that they had recently seen at least one sick bird in the last two years, most did not believe that this indicated an outstanding threat to murres in NL waters. However, a small number of participants communicated the opposite, but stated a need for accessible biological data to justify their concerns. Examples of participant comments are assembled below.

Participant accounts of impacts to murres from avian influenza and oil spills:

Now, two years ago, last year, my buddy got a seining boat, and he said there were a lot of sick birds. He said they were steaming off, steaming on up through, and they wouldn't even get out of the way. They've just, they was just there and basically running them over! But now, like, this year seemed like, jeez, seemed like they were healthy birds this year. Healthy, nice, plump, with a lot of fat and no issues whatsoever this year (Participant 17).

Last year [2022] when they had the bird, the avian bird flu was on the go, last year, right? So, we were seeing dead birds on the beaches, they were on land walking around the roads, they were in a long ways. You know, obviously there was, you know, whether that was the avian bird

flu or something else really put the, the turrs [murres], you know, it made them sick, you know, it was something really definitely happening to them (Participant 4, 2024).

I don't think I saw any turrs sick, fortunately. But yeah, that summer before last, right, there was a bunch of gannets here, bull birds, a lot of those, really concerning obviously, but no, fortunately. Even with all the sea ducks, I haven't seen any, knock on wood. I have seen a couple with oil, mostly from up Herring Neck, but nothing recently. The other threats other than development, no. Oil's still one of the big ones and with avian influenza, that's obviously not gone (Participant 1).

[Have you encountered any murres with oil on them?] *Not since they've recovered the oil out of the shipwreck that was down around the Baccalieu Islands. So, that was an issue in our past, but the federal government did step in and they did recover oil out of the boat. So, nothing within the last, I'd say, what, four years since they've done it, maybe* (Participant 4, 2024).

But in all the birds we've seen when I was out this fall, I gotta say the only one that I, I seen sick that I, I could tell that it was sick was one (Participant 16).

I seen probably two or three that I could tell was sick, because we just, you know, we steam right alongside them with my boat [and] you could have reached out and picked them up in your hand if you wanted to. Like, they didn't make any attempts to dive, but it wasn't a large number. This year was probably the healthiest birds that I've ever seen since I've been hunting. I mean it probably did have something to do with that flu that you know, the survival of the fittest more or less (Participant 3, 2024).

Perceptions as to whether avian influenza posed a threat to murres:

So, I've kind of thought about this question. And when all this was happening, you know, there was obviously signs that there were, the birds were sick, right? Not all of them, but, you know, there was birds being sick. And that, you know, that discouraged a lot of hunters from participating in the hunt last year. And with so many people not participating into it, I kind of feel like maybe the numbers equaled out in regards to what died off from sickness that would have died off from hunting maybe. So, I don't think, with regards to what we've seen this year in the, in the turr hunt, I, I feel it was still a strong population in our area (Participant 4, 2024).

It was no different this year than it was five years ago for the numbers, what I could see, you know what I mean. Like you go, you go out and uh, I mean you might see five over here. When you're after them you might see another five or another ten or you know. So, for what I've seen this year, didn't seem no different for population – the numbers – than what it was in the past, nope (Participant 16, 2024).

But I don't know if it's like a significant impact, but I'd say it would be. I've seen videos on Facebook, like when avian influenza first came out, and someone was out in a boat, and there was just like a ton of them all in a group swimming erratically and stuff. So, I would say it is having an impact, but I'm not sure the extent (Participant 7, 2024).

Reasons for hunters' hesitation to participate in recent hunting seasons due to concerns with contact with avian influenza from sick murres:

I didn't go out last year. Just it was just too much and, one, I go with my cousin all the time and just the talk of bird flu and seeing birds sick around, like, gulls and you know, people just didn't, didn't go out. We didn't go out. I went out this fall, we killed 40 birds and I seen one sick one (Participant 16).

I did participate in it last year. Not a lot, but I went out and got a few just for myself. And just, just to see, like, if, if there was any difference into it. Like, what I shot was all turrs [murres] flying. I didn't shoot any birds that were in the water… because I know when they did get sick, they stuck to the water and they got lazy and their heads got lazy. And then they eventually passed away. Well, if I was shooting anything, I shot birds that were flying, that were, you know, I could physically see the birds going 60 kilometers an hour or how fast they're going, you know, that's a strong bird in my mind. So, I didn't feel like they would be sick from, if I was shooting at them and if they were flying (Participant 4, 2024).

Perceptions of other potential threats to murres:

Now, I've just seen that they're proposing for offshore wind turbines and stuff in, like, in our coastal bays and stuff, so I would presume that's going to probably put an impact if that proposal's ever going to go through. They're going to have to do some environmental assessments for sure (Participant 7, 2024).

I've seen that one sick bird this year, but, like, I've seen sick birds in the past. I mean, you can tell, I mean, they're usually pretty lively up diving and as soon as you get close enough for a shot they'll dive. But I've seen birds in the past where, like, you can tell they're sick and skinny. Like any animal, I guess I mean, there's disease or you know and get sick or whatever. But other than that no I don't know (Participant 16, 2024).

Perceptions on the lack of biological data to justify population concerns:

So, I think another issue, in my opinion, is that we need to get more data on the birds that are out there. But hopefully, even if, if something like that is proposed, maybe it'll be a gateway or something. Something to get more studies done out in the bay, and on the migration patterns, and, you know, just the numbers of populations. I feel like a lot of that information should be made way more accessible, like, to folks. Like, if you try to look for studies or anything, it's very hard to find it on the internet unless you know exactly where you gotta go (Participant 13, 2024).

3.4.2: Perceived Environmental Changes to Hunting Areas

Participants were asked to describe the current climate conditions for harvesting murres in their area and to discuss whether they've noticed any environmental changes (prompts given included changes to sea ice or weather patterns) in their hunting grounds. Most participants stated that they have noticed a gradual change in weather conditions compared to past years. Most frequently reported changes included less sea ice and more frequent high wind levels

leading to difficulties hunting. Some participants perceived lower levels of sea ice to be beneficial because it potentially gives murres a longer season to remain in provincial bays, allowing harvesters to take more birds before they migrate with the ice. Examples of participant comments are assembled below.

Perceptions on changes to weather patterns and sea ice:

That's the other thing, it seems like we get more wind these years than we have. That's why I'm saying it's very hard to get out to hunt turrs [murres] now. You got a very limited window when they're there and when they're there then if you get the wind, you know. So, we are getting more wind there's no doubt about it, right. As for sea ice, like this year in particular there's not as much sea ice around. I think that would be a positive because it will give the birds more room to spread out. Maybe they won't go, as many of them won't go south. And if they're forced out, like I said, in Placentia Bay, that's the biggest, that's where they're being impacted right there (Participant 11, 2024).

There's no sea ice and the turrs [murres] now in our area, you have to get prevailing winds which, I mean, onshore winds or we don't see many turrs [murres]. They'll go on, come up from the north and keep well outside… but climate change is real and is making a difference to the birds (Participant 12, 2024).

Some years are better than others and that relies on a lot of, a lot of weather conditions. In our bay, kind of, we need a lot of northerly wind in order for to drive the turrs [murres] from, you know, the offshore into our bay. If we got southerly wind for, you know, the average migration of the turr [murre] coming down through is usually the end of October to mid-November in our area. If you're having southerly offshore winds for that duration, then you know the turrs [murres] are going to be further off. And people kind of contradict of that, well, "The turrs are all gone, where are they gone to?". It's just the climate, you know, this year there's winds and they're not coming in. The turrs [murres] are still there, they're just further out in the water, you know, they find bait out there… They're not going to be far off. Like, I worked on Hibernia, that's 350 kilometers offshore, and I've seen beds of thousands out there on the Grand Bank. If you're not seeing any turrs [murres] in around the coast, you know, "Where are they to?" kind of thing, those birds aren't afraid to go offshore long ways (Participant 4, 2024).

The weather, for the weather part of it, we're having a lot more wind, or it seems like. One time you get wind here, especially if you get southeast [wind] or something, you get a, it would seem like it would blow hard but it would be short-lived and go out. And now it seems like it's lasting a day or two days. So, it seems like the weather systems are sticking around a bit longer, which reduces the amount of time that you're able to actually get on the water and get on the water when the birds are near. Like I told you, they pass through here not like they're congregating here and staying here for long periods… Sea ice; we've noticed, not as much of it, but I don't really know how the sea ice would impact turrs here in October because we don't see no ice in October, obviously. (Participant 14, 2024).

There's definitely not as much ice. We're on the coast where we see it, so it's hit or miss. Some years you get some, some years you don't. Seems like it's more years that you don't. But with regards to the turrs, they've been dealing with sea ice for their whole life. So, I don't think it really affects them. If anything, it keeps them up north for longer (Participant 2).

Ice is getting much, much later it seems, and it's almost like the seasons have shifted too - right? Our falls and winters are more mild, but the springs are kind of hanging on, and it's like everything is three weeks later than normal, at best. Like this year, I see the same thing, the ice has only gotten down to St. Anthony so far. Whereas this time of year it should be at least down to Fogo… And I don't know how it's affecting the migration, so it comes back to what I was saying earlier: we need more science on this because it very, very obviously is affecting it. How? I can't say, but yeah, they're not migrating the same there's no doubt. And where's the bait? (Participant 1, 2024).

Like years with little ice? I don't know, we haven't heard talk of –in the last couple years – we haven't heard talk of that after birds coming in land and stuff. So, is the sea ice affecting 'em? I guess so but is it because of, you know, you talk about climate change and all this, you know, this and that, like, I don't, I don't know. I haven't noticed any pattern changes. And like I said, maybe someone that's at it more or seen more birds, maybe they can recognize change. But for me only going once a year in the same location, I haven't seen any changes (Participant 16, 2024).

So, the amount of ice I've seen changed is unbelievable. I spend a lot of time in the Arctic and stuff, and definitely the pack ice in the Arctic what generally comes, what we ends up getting on the Northeast coast and in the straits there's becoming less and less and less every year… I mean like 15 years ago the straits would have been full of ice probably by the end of January, right. So, I do think that is definitely having an effect. But then why does sea ice not show up later? You know. The falls have been much windier than they were before. So, that's kind of alleviating the pressure on the other side where you could get out because the ice isn't there now it's too windy for a lot of times to get out. (Participant 3, 2024).

3.4.3: "Why Do You Hunt Murres?"

As part of the interview, participants were asked to describe their reasons for harvesting murres. Reasons given include enjoying it as a recreational activity, sharing a meal of murres with loved ones (many stated that their families enjoyed a meal of murres for Christmas), continuing a traditional hunt (e.g., because their parents taught them and their parents taught them, etc.), to socialize, and as a means to feed their families. One participant expressed that the culture of sharing is pronounced in Newfoundland and Labrador (Participant 9, 2024). Examples of participant comments are assembled below.

Participant motivations for hunting murres:

So, you know, I don't look at the cost per bird obviously, because I love it. I grew up turr [murre] hunting. It's just part of my, you know, part of my diet slash culture to go out turr [murre] hunting. Even when I was young, even when I was small, I used to do it with my father and stuff and my grandfather. I can remember my grandmother used to always complain because my pop used to come home, just could be Christmas, he'd go turr [murre] hunting and come home and slap the birds in the middle of the floor, you know, like back in the day. So, it is in our culture to go turr [murre] hunting, right (Participant 16, 2924).

I'm just going off my experience, you know, my experiences because I mean even myself, like, I love turrs [murres], my mother loved turrs [murres]. Because we grew up in St. Anthony. Here in Port aux Choix as well, they didn't really, it wasn't part of their tradition to turr [murre] hunt. I grew up eating turrs [murres], they didn't. So, when I had turrs [murres], me, my mother, [and] my sister, you know what I mean, like we'll have it as a family thing. But my in-laws, they hate turrs [murres] because they didn't grow up eating it. So yeah, so it's like one of those things now, is just people do it for recreation, like I do it because I love it. I love going in boat, I love shooting, I love duck hunting and goose hunting and turr [murre] hunting. To me, turr [murre] hunting is one of the funnest sports and hunts there is. And I enjoy them, like, I probably wouldn't be at it so much if I didn't, if me and my family didn't enjoy it. Like you always hear people, "Oh my, I can taste the turr gravy now". You know the way it is now with Facebook and social media, like, I can go out and when we come back, we'll line up our 40 turrs [murres] and take a picture or whatever, and comments is like, "Oh my god I'd love to have some of them, I can taste the gravy now" (Participant 16, 2024).

I love them. I like them to eat, love them to eat, I think they're a beautiful food. Aside from the bit of lead which is, is not an insignificant effect in them… I like the activity; I love being in boat. I like it in boat in winter and summer. The killing now is not such a big deal, you know, it used to be that was a big deal, right, the actual shooting of the bird. I mean, it's nice to do things that you can do confidently, you feel good about that. I like the social part of it sometimes but often it's not I'll go by myself. But there's still very much a social part of it. (Participant 8, 2024).

I hunt turrs [murres] because I love to eat them and I don't do it for sport… Some people goes out and kills eight or ten or fifteen turrs [murres] and they don't want them anyway. And, you know, I've known to be sitting around, I've seen them sitting around in different places but I don't hunt turrs [murres] for sport, I only hunt them for a treat, you know (Participant 12, 2024).

It's mostly strictly just to eat because it's providing a food source and it's cheap; we don't go to the grocery store and buy [a] chicken every Sunday. It's also just keeping our traditions alive here in Newfoundland. I think that's a big reason why I first wanted to try it, to keep traditions going (Participant 7, 2024).

And well, they're a delicacy for both me and the wife. I don't want them every day, don't get me wrong. So, you know, like if I got turrs [murres], we'll probably have them, like, once a month. And my mother, she's still alive and she likes turrs [murres]. That's a lot of the reason why, like I don't, I might go off duck hunting for a day or something, but I mean if I gets to duck, I don't like the taste of a duck. It's a different taste than a turr [murre]. It's just because of what they're eating, like a murre or turr is a fish eater and a duck is a bottom feeder. So, they're feeding on mussels and clams, whatever. You've seen everything in them and there's a different taste to the meat. I just can't, I just can't eat it. So, if I don't want it to eat, I'm not going to kill it (Participant 10, 2024).

You know my father is, you know, a nice bit old, he's 74 years old. So, I've seen it from, you know, hunting with a much older generation, I mean my uncle still hunts and he's 80 (Participant 3, 2024).

Because I love them! And the gravy is amazing! Dad took me out, you know. I used to hunt with dad many, many years ago and we loved it. We ate it because it was a, I guess, especially for them - the older generation - they hunted it as a source of meat or protein, whatever, for to help get through the winter… it's a traditional food that they were raised on and they look forward to that time of year to have those four or five meals, whatever it might be, of turrs or bottle it up to have it through the winter, whatever the case is. I'm kind of, I like the meat and gravy-type food. So for me I love the taste of them. With my buddy, we've been hunting a long time together. I enjoy the day or two days that we get on the water each year and it's not much, but it's, you know, if I go to Conche for two days we get two days on the water it's usually two good days that we just we don't care if we get turrs [murres] or not but if we get a few it just makes the trip even better. So, it's, I guess, it's [to] carry on traditions that dad shared to me (Participant 14, 2024).

Discussion on colloquialisms for murres to emphasize and conclude the personal and historical relationship to murres by Newfoundlanders:

It's funny too, when I started, when I was going to university, I learned, like, seabird names, and then when I went out hunting, there's, like, we got a different name for every single bird. It's funny. Like, razor bills they call them 'tinkers', and yeah, the bull birds, turrs, yeah it's funny. And then like a common murre they'll call a 'turr', and then a thick-billed murre they'll call it an 'old turr'. That's because apparently they're like tougher meat so they think that they're old (Participant 7, 2024).

3.5 Discussion

This chapter was designed to provide a qualitative understanding of the social and cultural significance of murre hunting in NL. This chapter's themes and outcomes were identified based on responses given by participants to each interview question. In general, interview analyses from this chapter demonstrate that harvesters' motivations for participating in murre hunting are culturally charged, relating to their personal and provincial identity, and as a means of maintaining a tradition and upholding their rights. Additionally, the results indicate that harvesters and stakeholders can continue to preserve the murre harvest by providing valuable, original environmental interpretations which may aid in monitoring ongoing murre population threats and overall ecosystem health.

Interview analyses indicate that, while most hunters observed a number of sick murres in recent harvest seasons, most do not attribute avian influenza and oil spills to be causing observable declines in the number of murres in NL. Although a number of participants were keen to express their concerns and indicated a desire to conserve murres so that future generations can participate in the annual harvest, they emphasized that up-to-date and publicly available biological data were needed to justify this notion. Accurately identifying and characterizing trends in a harvested species can help answer a broad range of management and conservation questions. Biological monitoring programs can provide an understanding of issues like population declines, the prevalence of other invasive species, a population's relative recovery, the impacts of climate change, anthropogenic pressures, and the direction of sustainable use (Bauder et al., 2022; Allen et al., 2018; Adams et al., 2013; Gauthier et al., 2013; Wakamiya and Roy 2009; Crowl et al., 2008; Dulvy et al., 2008; Ewen and Armstrong 2007; Maxwell and Jennings 2005; Fewster et al., 2000). So, making data from monitoring programs more accessible may equip and inform hunters so that they can form sound hunting habits and, as a consequence, contribute to sustainable harvest practices while being aware of current murre population trends.

Since a recent, comprehensive database of murre demographics and population data do not already exist (Birds Canada, 2024), this supports the notion that hunter observations are a practical and convenient tool for understanding current provincial murre population status, while also emphasizing the need for more up-to-date biological monitoring programs. Further, the results from this study suggest that hunter observations may also serve as a means for monitoring murres, as biological data collection has sometimes shown to be financially and logistically challenging (Bauder et al., 2022). It is also important to consider here that after more than a couple years, it appears LEK accuracy may begin to decline due to a person's ability to recall

specific details (Ryan et al., 2006). So, it is key to emphasize the importance of biological surveys, but to reflect on how these may be strengthened by appropriate utilization of recent hunter LEK, like through murre observations.

In the same vein, literature has shown that hunters are a valuable workforce for citizen science (DeCesare et al., 2022). Interview analyses from this study provide evidence for this; soliciting hunters for species observations can help resource managers understand trends in their target population and to keep on top of pervasive threats and major declines. Whether hunters observe noticeable changes to murres may be a useful index to gauge the relative health of provincial murres.

Results also indicate hunter success (whether they get any birds) depends on weather and environmental conditions. Most hunters reported observing a decline in the amount of sea ice that reached their bays, and that the amount of wind (with less wind being the desirable weather condition for hunting murres) is increasing each year. Changes to sea ice and weather patterns because of climate change have been identified as serious (anthropogenic and environmental) threats to murres (Lieske et al., 2020; Mclean et al., 2020; Frederiksen et al., 2019; Kadin et al., 2019; Lieske et al., 2019; Gaston et al., 2010). Precise murre population estimates supported by hunter knowledge reveal an overt need for public input to guide future management decisions to address these threats to murres, and consequently, to their harvest.

Another finding from this portion of the study is that murre harvesting is a social operation that involves family members and their communities at-large. When asked to discuss why they harvested murres, most participants mentioned that they and their family enjoy eating them and use them as a means for carrying-on the murre harvesting tradition. This reinforces the notion that murre harvesting is culturally ingrained in the fabric of Newfoundland and Labrador,

as argued by other studies (Montevecchi et al., 2007; Gaston et al., 2000; Elliot, 1991; Montevecchi and Tuck, 1987; The Western Star, 1951; The Western Star, 1950; Tuck, 1949; Turner, n.d.). Some studies also describe gradual reductions in hunting populations as a result of aging and rural depopulation (Lovelock et al., 2021; Ryan and Shaw, 2011).

It appears that recruiting new hunters usually takes place in the family, when parents train their children (and other family members) to engage in traditional harvest activities (Ryan and Shaw, 2011). It is evident that Newfoundland and Labrador's murre hunt involves not only the harvester themselves, but their families and communities, and that these should be considered together for future management frameworks. In all, interview analyses show murre harvesting has deep roots in NL and emphasis should be placed on creating and promoting programs that work to preserve and maintain murre harvesting for the benefit of future generations and cultural safeguarding.

3.6: Conclusion and Summarized Recommendations

Overall, summarized recommendations from this chapter include introducing more mechanisms for harvester input and community contact and establishing a murre harvest heritage conservation program to promote community values and preserve traditional practices. It is also recommended that harvester perceptions and opinions on impacts to murres and environmental changes in their hunting grounds be incorporated alongside conventional biological research programs, to ensure the delivery of well-informed conservation strategies for murres. Another gap to address might be why most hunters observed a number of sick murres in recent harvest seasons, and to understand the extent and prevalence of avian influenza or other threats in provincial murres. It is obvious that hunter engagement can complement and bolster conventional scientific research by providing resource managers with original information

accrued only through hands-on, lived experience. In the context of this study, appropriate application of hunter LEK may also help to build rapport between provincial communities and federal resource managers administering future murre harvest seasons (Berkstrom et al., 2019; Freiwald et al., 2018; Kelly et al., 2018; Gilchrist et al. 2005).

4.0: Research Opportunities and General Conclusion

The project objectives formulated for this study focused on helping inform potential changes for upcoming migratory game bird hunting seasons by exploring harvester and stakeholder perspectives regarding potential management strategies, illegal harvest levels, and future harvester consultation efforts. Specifically, the objectives of this project were to solicit perceptions and recommendations from murre harvesters and other affected stakeholders on current murre harvest regulations and practices (e.g., current environmental and hunting conditions), possible alternative management strategies (e.g., phasing-out the use of lead ammunition, a harvest-tag system, and reducing season dates or bag limits), the perceived extent of illegal harvesting, and the cultural and social significance of harvesting. These objectives were used to analyze current murre harvest management practices as it relates to future harvest seasons. Further, this study explored harvesters' participation in the NHS and examined ways to increase participation in this CWS data collection effort.

According to participant interviews, recommendations for future harvest seasons from hunters include introducing a seasonal limit, adjusting season dates, splitting the license or introducing a license add-on (e.g., introducing a separate license for murres which can be purchased at the time the hunter purchases their CWS MGBHP), introducing a mixed-species license (e.g., extending the MGBHP to allow for other seabirds like Dovekies), increasing enforcement, establishing a robust hunter education program, increasing means for harvester

input and community contact, and establishing a murre harvest heritage conservation program to promote community values and preserve traditional practices.

Future work emerging from the project results include to design programs and policies aimed at initiating and maintaining a thorough and sustainable level of public engagement in Newfoundland and Labrador in the long-term. This paper calls for careful reflection on the proffered recommendations and to adapt and consolidate existing murre management frameworks accordingly. Another area of potential future work involves making biological data pertaining to provincial murres more accessible and straightforward for residents. Further opportunities for future research include biological studies to investigate the impacts of lead poisoning on murres and murre hunters and to examine ways to increase (whether through research or expenditures or both) enforcement and the presence of wildlife officers pan-provincially. A final area of potential work is to conduct up-to-date biological studies that assess the extent and impacts of avian influenza specifically on murres. This topic has emerged as important to participants, with most stating that they still encounter sick birds during their trips in the bays for hunting.

Key takeaways from this study as they relate to the project objectives are that Newfoundland and Labrador's murre harvest is entrenched in a rich history that has defined a way of life for many residents, and that their lived experiences can provide the CWS with meaningful, diverse knowledge to help formulate future management plans. This study has shown that consideration and incorporation of harvester perspectives and recommendations can contribute to robust conservation policies, and to that end, will help preserve a tradition that many Newfoundlanders and Labradorians hold dear. The social, cultural, biological, political, and historical dimensions are only a few of the layers to murre harvesting in Newfoundland and

Labrador explored in this study. It urges Canada not to forget this province and its unique hunt, but to consider every dimension carefully, and to move forward with the rest of Canada.

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Appendix A: Informed Consent Form

Informed Consent Form: Interview

Title: *Human Dimensions of Newfoundland and Labrador's Murre Hunt (Interview Portion)*

Researcher: *Claire Brenton (she/her)*

Environmental Policy Institute, Grenfell Campus, MUN

Email: cnbrenton@mun.ca

You are invited to take part in a research project entitled, *"Human Dimensions of Newfoundland and Labrador's Murre Harvest (Interview Portion)."*

This form is part of the process of informed consent. It should give you a basic idea of what the research is about and what your participation will involve. It also describes your right to withdraw from the study at any time. To decide whether you wish to participate in this research study, you should understand enough about its risks and benefits to be able to make an informed decision. This is the informed consent process. Take time to read this carefully and to understand the information given to you. Please contact the researcher, *Claire Brenton*, if you have any questions about the study or for more information not included here before you consent.

It is entirely up to you to decide whether to take part in this research. If you choose not to take part in this research or if you decide to withdraw from the research once it has started, there will be no negative consequences for you, now or in the future.

Introduction

I am a graduate student in the Master of Arts in Environmental Policy program at Grenfell Campus, Memorial University of Newfoundland and Labrador, in Corner Brook, NL. The funding agency for this project is the Canadian Wildlife Service (CWS), a division of Environment and Climate Change Canada (ECCC). As part of my master's thesis, I am conducting research under the supervision of Dr. Stephen Decker.

Human dimensions of natural resource management studies provide an analysis on how human experiences affect wildlife, their management systems, and the policies designed to protect them. Murres are a migratory seabird in the auk (*Alcidae*) family. Murres can be found in coastal areas off Newfoundland and Labrador. There are two species harvested in the province, the Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*). Common Murre colonies are present around provincial coasts year-round, while Thick-billed Murres migrate north, present only during the fall and winter.

The federal government has jurisdiction over murre harvesting in Canada. The Canadian Wildlife Service (CWS), a division of Environment and Climate Change Canada (ECCC), issues mandatory Migratory Game Bird Hunting Permits (MGBHP) and enforces regulations (harvest season dates, a daily harvest limit, a possession limit, and designated hunting zones). Newfoundland and Labrador's murre harvest season runs from late-fall until early-spring. It is the only legal, non-Indigenous migratory seabird hunt in North America.

To protect migratory birds, the *Migratory Bird Convention Act* (MBCA) was enacted when Canada signed the international Migratory Bird Treaty in 1917. The Act made it illegal to harvest murres in North America. When Newfoundland and Labrador joined Confederation in 1949, the MBCA extended to the province; an area which historically relied on harvesting murres for subsistence. At that time, a legal exception was made for residents of Newfoundland and Labrador and the murre harvest continued mostly unregulated into the 1990's, with large numbers of murres taken annually. In 1994, the MBCA was updated to include more rigorous regulations. In 2023, several impacts threaten provincial murre colonies and call into question harvesting practices. These threats include starvation-induced die-offs, the highly pathogenic avian influenza (HPAI), melting sea ice, illegal harvesting, and incidental catch. Due to these, the CWS must make significant considerations for future migratory gamebird hunting regulations in Newfoundland and Labrador. Despite concerns, the 2022-2023 gamebird hunting season remained open.

This study will help the researchers understand harvester needs for future harvest seasons. Currently, no regulation changes are anticipated. It is evident that the murre harvest plays a significant role in Newfoundland and Labrador's history, culture, and legislation. Collaboration with harvesters and stakeholders is paramount for making future management decisions.

Purpose of study: This project will examine the human dimensions of Newfoundland and Labrador's murre harvest. The objectives of this project are to solicit perceptions and recommendations from murre harvesters and other affected stakeholders on: Current murre harvest regulations and practices, provincial murre population status (i.e., current threats and distribution), and potential alternative management strategies. These objectives will be used to

analyze current murre harvest management practices as it relates to murre conservation. The research question of this project is, how can CWS effectively adjust current management practices to consider murre harvester concerns and recommendations while mitigating ongoing murre population threats? The purpose of this research is to provide the federal government's CWS with a recommended management framework to support sustainable murre harvesting operations moving forward in the province of Newfoundland and Labrador.

What you will do in this study: People that meet the study pre-conditions will be invited to participate in a confidential semi-structured interview. The study pre-conditions include residents that have harvested murres in the province of Newfoundland and Labrador in the last 10 years with a valid Canadian Wildlife Service Migratory Game Bird Hunting Permit (CWS-MGBHP), members of provincial Indigenous organizations that have harvested murres on their traditional lands within the last ten 10 years, and any affected stakeholders. Stakeholders will represent residents that are involved in the provincial murre harvesting sector (i.e., employees or members of hunters' associations) at the time of the study or within the last 10 years.

You will be asked a variety of open-ended discussion questions. You will be provided with colored photographs of provincial murre species and their plumages, and other related seabirds (e.g., razorbills) as supplementary material during the interview. Detailed maps including hunting zones can also be included. In-person data collection is preferred. If you are unable to participate in-person, then every effort will be made to accommodate for online data collection. Online data collection will be conducted using Microsoft Teams software, and if you are unable to use Microsoft Teams then alternative software (e.g., Zoom Communications) can certainly be considered.

Some general participant information will be collected, including, your general area of residency (i.e., town names and/or jurisdiction), general areas which you harvest or have harvested murres (i.e., bay names and/or hunting zones), your harvest frequency (i.e., number of years spent harvesting and consistency), and whether you have completed the optional Canadian Wildlife Service (CWS) hunter survey. At the end of the interview, major points will be summarized and reviewed by you, if you choose. Transcripts will be made accessible for you and drafts will be sent for optional revisions to ensure that the study information is accurate and representative. Multiple meetings per person can be held to review and add information.

Length of time: The time commitment required for participation is about sixty (60) minutes. This is the length of time expected to complete an interview. Please note, though, that scheduling will be somewhat flexible, and timing can be adjusted based on the participants' interest and discussion.

Withdrawal from the study: Your participation in this interview is voluntary and you can choose to stop participating at any time. If you choose not to answer a question, we can skip that question. If you choose to stop participating, it will not affect your relationship with the researcher, or any other individual involved with this project. In the event you withdraw, all information associated with your participation will be destroyed wherever possible. You can stop and/or end your involvement in this study by communicating with the researcher or any member of the research team in-person or online. They may ask for the reason for termination, but you do not have to indicate why if that makes you uncomfortable. You may choose to withdraw at any point, however, once the manuscript is published, you will no longer be able to withdraw, and it will be impossible to remove your contributions.

Possible benefits: Benefits that might accrue directly or indirectly to you from your involvement in this study are as follows:

- Understand how the provincial murre harvest relates to responsible seabird conservation.
- Understand how the provincial murre harvest relates to murre harvesters and murre harvesting regulations.
- Understand current and past provincial murre biology and population dynamics, understand the evolution of murre harvest regulations in Newfoundland and Labrador and Canada, and;
- Opportunity to contribute to shaping the future management of the species.

Benefits to the scientific/scholarly community or society that might accrue directly or indirectly from your involvement in this study are as follows:

- Understand how the provincial murre harvest practices affect murre populations and seabird conservation in North America, and;
- Clarify future actions of provincial murre harvest regulations in Newfoundland and Labrador.

Possible risks: Participants may be asked to disclose sensitive information like personal opinions and attitudes about the provincial murre harvest, and if they or someone they know have participated in any illegal activities related to the provincial murre harvest. The risks will be managed by maintaining a rigid standard of anonymity throughout every interview, and at no point will the participants' personal information be shared publicly or without their knowledge.

Confidentiality vs. Anonymity: There is a difference between confidentiality and anonymity: Confidentiality is ensuring that identities of participants are accessible only to those authorized to have access. Anonymity is a result of not disclosing participant's identifying characteristics (such as name or description of physical appearance).

Confidentiality and Storage of Data: All interviews will be anonymous and confidential. Interview transcripts and recordings will be stored on password-protected computers and/or in locked office filing cabinets and accessible only to the researcher and their supervisor (Dr. Stephen Decker). Data will be kept for a minimum of five (5) years, as per Memorial University policy on Integrity in Scholarly Research.

Anonymity: Every reasonable effort will be made to assure your anonymity during data collection and analysis, and you will not be identified in any reports and publications without your explicit permission.

Recording of Data: Discussions from interviews will be audio recorded, transcribed, and analyzed using a portable laptop, Microsoft Word, and NVivo software. Audio recordings will help researchers identify different terminology and dialects. An NVivo Windows project file (".nvp") will be created and stored on a password-protected computer. General themes and outcomes will be analyzed with regards to project objectives. This same software will be used for text analysis, playback, and importing notes. Additionally, short written notes and conversation points will be typed on a Word file and summarized in accordance with the interviewee.

Reporting of Results: With the co-investigator (Hayley Myers), it is the goal to each produce two, personally written, stand-alone, complimentary manuscripts. The co-investigator will not be present for any data collection procedures. The co-investigator will not have access to your raw data from this portion of the study, and each manuscript will be written independently. The general results, discussion, and the recommended framework are designed to fit together, but will not be contained on the same document; each will be prepared separately and will be provided as a final set of recommendations for CWS. The results from this portion of the study

will not influence the results from the co-investigator's portion of the study. Each of these will be made accessible to participants if they so choose.

Sharing of Results with Participants: A plain language executive summary will be made available to participating people and communities. Brief summaries will also be provided to the general public via community radio/social media outlets.

Questions: You are welcome to ask questions at any time during your participation in this research. If you would like more information about this study, please contact: *Claire Brenton at: cnbrenton@mun.ca or (709) 638-2807.*

The proposal for this research has been reviewed by the Grenfell Campus-Research Ethics Board and found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the Chairperson of the GC-REB through the Grenfell Research Office (GCREB@grenfell.mun.ca) or by calling (709) 639-2399.

Consent: Your signature on this form means that:

- You have read the information about the research.
- You have been able to ask questions about this study.
- You are satisfied with the answers to all your questions.
- You understand what the study is about and what you will be doing.
- You understand that you are free to withdraw from the study at any time, without having to give a reason, and that doing so will not affect you now or in the future.
- You understand that any data collected from you up to the point of your withdrawal will be destroyed.

If you sign this form, you do not give up your legal rights and do not release the researchers from their professional responsibilities.

I have read what this study is about and understood the risks and benefits. I have had adequate time to think about this and had the opportunity to ask questions and my questions have been answered.

☐ I agree to participate in the research project, understanding the risks and contributions of my participation, that my participation is voluntary, and that I may end my participation at any time.

☐ I agree to be audio-recorded during the interview/focus group, OR

☐ I do not agree to be audio-recorded during the interview/focus group.

A copy of this Informed Consent Form has been given to me for my records.

_____ _____

Signature of participant Date

Researcher's Signature: I have explained this study to the best of my ability. I invited questions and gave answers. I believe that the participant fully understands what is involved in being in the study, any potential risks of the study and that he or she has freely chosen to be in the study.

_____ _____

Signature of Principal Investigator Date

Appendix B: Interview Questions

Interview Questions: Murre Management Project

Claire Brenton (Principal Investigator)

1. Have you harvested murres in Newfoundland and Labrador within the last ten (10) years?
   a) If yes, were you alone or with a group?
   b) If in a group, who was in your party? (i.e., family, friends, etc.)
   c) On average, how often do you go out per season?
   d) If you went last year, how often did you go?
   e) Where do you or have you harvested murres?

2. What is your opinion on the current murre harvest regulations?
   a) Are there some parts of the harvest regulations that you agree or disagree with? Why?

3. Are you willing to support alternative or non-conventional harvest management strategies?
   a) These could include changes to bag limits, season dates, season limits, tags etc., what are your thoughts on these?

4. A recent regulation change prevents sea duck hunters from carrying lead ammunition, even if they were licenced and passing through areas where murres could be hunted with lead shot. What are your thoughts on this regulation change? *Sea duck hunters must carry a non-toxic shot exclusively.
   a) What are your thoughts on the use of lead ammunition in general for hunting?

5. The Canadian Wildlife Service uses the National Harvest Survey (which comprises the Hunter Questionnaire Survey and the Species Composition Survey) to gather information from hunters. Have you participated in this survey?
   a) Do you have any ideas about what changes could be made to increase participation in this survey?
   b) Some jurisdictions have a regulatory approach to it (i.e., taking the survey becomes mandatory), would you support this?
   c) Would you consider survey participation in the form of draws with incentives?

6. Do you have any suggestions for scaling back the total harvest of murres? (i.e., reducing bag limits or season dates).

7. Do you think the illegal harvest and selling of murres is a problem in your area?

a) Which regulations do you think are not followed most often?
b) What would you recommend for reducing these illegal activities?

8. Have you seen or encountered any sick or dying murres within the last 2 years?
   a) Have you seen or encountered any murres with oil on them?
   b) In your experience, do you think these are affecting murre populations?
   c) In your experience, are there any other threats affecting murre populations?

9. What do you think about the current environmental conditions for hunting murres in the province?
   a) Have you noticed any changes in sea ice?

10. Finally, why do you harvest murres? (open discussion).

Appendix C: Project Description

Human Dimensions of Murre Management: Interview Portion

Hello, my name is Claire Brenton. I am a graduate student in the Master of Arts in Environmental Policy (MAEP) program at Grenfell Campus, Memorial University of Newfoundland and Labrador, in Corner Brook, NL. As part of my master's thesis, I am conducting research under the supervision of Dr. Stephen Decker. This study is titled, "The Human Dimensions of Newfoundland and Labrador's Murre Harvest (Interview Portion)". Human dimensions of natural resource management studies provide an analysis of how human experiences affect wildlife, their management systems, and the policies designed to protect them. Murres are a migratory seabird in the auk (*Alcidae*) family. Murres can be found in coastal areas off the Canadian province of Newfoundland and Labrador. There are two species harvested in the province, the Common Murre (*Uria aalge*) and the Thick-billed Murre (*Uria lomvia*). The federal government has jurisdiction over murre harvesting in Canada. The Canadian Wildlife Service (CWS), part of Environment and Climate Change Canada (ECCC), issues mandatory Migratory Game Bird Hunting Permits (MGBHP) and enforces regulations. Newfoundland and Labrador's murre harvest is the only legal migratory seabird hunt in North America. In 2024, several impacts threaten provincial murre colonies and call into question harvesting practices. Some imminent threats include starvation-induced die-offs, highly pathogenic avian influenza (HPAI), melting sea ice, illegal harvesting, oil spills, and incidental by-catch.

The objectives of this project are to solicit perceptions and recommendations from murre harvesters and other affected stakeholders on current murre harvest regulations and practices,

i.e., current environmental and hunting conditions; provincial murre population status, i.e., current threats and distribution; alternative management strategies, i.e., the use of non-toxic ammunition, a harvest-tag system, and reducing season dates or bag limits, and the extent of illegal harvesting. Further, this study will explore harvester's participation in CWS' National Harvest Survey and examine ways to increase participation. The public has requested the evaluation of the use of tags and seasonal limits on the number of harvested birds. The outcomes of this research will provide a better understanding of current murre harvest management practices as it relates to future harvest seasons. Currently, no changes are anticipated. The purpose of this research is to identify a recommended management framework to support sustainable murre harvesting in the province of Newfoundland and Labrador.

I am inviting you to participate in this study by means of an independent interview. The timeframe for this interview is approximately one hour. It is entirely up to you to decide whether to take part in this research. If you choose not to take part in this research or if you decide to withdraw from the research once it has started, there will be no negative consequences for you, now or in the future. If you know of anyone else who may be interested in participating in this study, please give them a copy of this information. If you are interested in participating or have any questions about the project, please reach out to me at cnbrenton@mun.ca. The proposal for this research has been reviewed by the Interdisciplinary Committee on Ethics in Human Research and found to be in compliance with Memorial University's ethics policy.

Thank you very much.

Appendix D: Tabular Summary of Project Results

Table 2: Summary of project results indexed by theme and number (n).

Theme	**Number (n)**
Harvested murres in NL within the last ten (10) years (Y/N)	
Yes	n = 16
No	n = 1
Hunting style (alone or with others)	
In a group	n = 12
Alone	n = 4
Both	n = 1
Hunting party composition	
Family and/or friends	n = 15
Other	n = 2
General harvest frequency (number of trips per season on average)	
1 - 2 times	n = 6
Between 3 - 10 times	n = 6
Between 11 - 20 times	n = 1
No consistent number: It varies greatly (e.g., depends on weather conditions or the number of available birds)	n = 4

Harvest frequency for 2023 - 2024 season	
None	n = 5
1 - 2 times	n = 4
Between 3 - 10 times	n = 7
Between 11 - 20 times	n = 1
Hunter opinions on harvest regulations	
Supports current harvest regulations and does not desire any changes to regulations	n = 12
Opposes current harvest regulations and desires more severe regulations	n = 3
Opposes current harvest regulations and desires more lenient regulations	n = 2
The use of lead ammunition for harvesting murres (agree/disagree with regulation change that only allows hunters to use lead shot for hunting murres exclusively)	
General support for the use of lead shot for hunting murres	n = 11
General opposition for the use of lead shot for hunting murres	n = 6
Hunter participation in harvest surveys	
Submitted the NHS (HQS and SCS together) at least one time	n = 11

Submitted a portion of the NHS (HQS or SCS separately and omission of the other portion)	n = 1
Has not participated in the NHS	n = 5
General support for introducing a regulatory approach (e.g., taking the NHS becomes mandatory)	n = 8
General support for incentivizing the NHS (e.g., draws with prizes)	n = 17
Observed illegal activity (e.g., buying or selling birds, poaching, or exceeding bag/season limits and other regulations)	
Believes illegal activity occurs and is a concern in their area	n = 13
Does not believe illegal activity is a problem in their area	n = 4
Willing to support increased enforcement to mitigate illegal activities	n = 13
Willingness to support alternative management strategies	
Support for introducing a harvest-tag system	n = 9
Does not support introducing a harvest-tag system	n = 8
Willing to support changes to current regulations (e.g., season dates, bag/season limits)	n = 13
Hunter perceptions of recent impacts to murres	
Has recently seen/encountered oiled murres	n = 1

Has recently seen/encountered sick murres	n = 11
Believes these are impacting murres	n = 2
Hesitated to hunt murres recently due to concerns with avian influenza	n = 2
Hunter perceptions of changes to hunting areas	
Perceives changes in levels of sea ice	n = 10
Perceives changes in wind patterns/frequency	n = 9
Believes this is impacting murres	n = 1

Appendix E: Project Tokens of Thanks

Figure A: Project tokens of thanks (toques and ball caps). Logo by Ryan Johnstone of ECCC.

Figure B: Project tokens (murre brochures). Brochures were provided by the Government of Newfoundland and Labrador's Wildlife Division.