Following Stones: Navigating the Landscape in Northern Labrador

by

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ABSTRACT

The landscape in northern Labrador is dotted with inuksuit (human-made rock stacks used for navigation, commemoration, hunting, and more) signifying a connection between people and the land. My theoretical framework considers the traditional knowledge, or way of knowing, respecting, and using resources from the environment, of Inuit in Labrador to understand ways of memorializing the landscape and place. Through an aerial survey via drone, this project involves collecting photogrammetric data to reconstruct 3D and digital elevation models of different features and sites. This project serves as an examination of the application of data that drones can collect in summer and winter settings. Geographic information systems (QGIS and ArcGIS) aid in examining the relation of inuksuit to topography and other features. This project looks at the relationship between humans and their surroundings, movement across vast spaces, methods of navigation, and connection to land to argue for the importance of protecting cultural landscapes.

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Chapter 1: INTRODUCTION

1.1 Project Overview and Objectives

This thesis explores the notion of a landscape through a study of inuksuit in northern Labrador. Inuksuit, the plural form of inuksuk[1], are human-made stacks of rocks used for various purposes such as hunting blinds, ceremonial features, memorials, and navigational landmarks (Hallendy 2000; Kaplan 1983; Whitridge 2004). These stone-stacks represent a long history of modifying and using the landscape. By drawing on previous research on inuksuit, traditional knowledge, and field surveys, this research considers navigation and transportation methods in northern Labrador, as well as the dual nature of landscapes and icescapes with the transitions between winter and summer. The field research portion of this thesis employs the use of drones to collect photogrammetric imagery followed by a discussion of the effectiveness of drones and photogrammetry[2] in archaeological research and, specifically their use in northern Labrador.

The definition for inuksuit refers to more than two formations, while *inuksuuk* is used when there are exactly two (Agvituk Digital Archive Project 2019; Hallendy 2009). Inuksuit are found along the coast of northern Labrador; their enduring presence is a reminder of those who were there before you. Inuksuit, which in other areas are referred to as cairns, are found throughout the world and are used for numerous purposes (Hallendy 2009; Hunt et al. 2016). In India, stone figures offer a space for prayer, and

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[1] Also spelled 'inukshuk' in some parts of Labrador and the Arctic.
[2] This method is described more in Chapter 3. Photogrammetry is the process of stitching together overlapping images to create 3D models and high-resolution orthophoto mosaics.

stacks of stones are used similarly to inuksuit for navigation in the southwest United States (Hallendy 2009). In southeast Alaska, cairns are found in alpine areas above tree line and are used for marking great flood lines to denote safe areas to retreat from floods, and they embody the significance of cultural landscapes (Hunt et al. 2016). Geographically, the inuksuit in northern Labrador are found in a similar environment to alpine areas on landscapes with little to no trees, except these landscapes are often found at (or near) sea level. While this research focuses on inuksuit and landscapes along the coast, inuksuit occur further inland in Labrador as well (Larkham and Brake 2011).

There is a striking resemblance between telephone towers and inuksuit. In the communities visited as part of this research, tall skinny telephone towers can be seen from a distance. Inuksuit in northern Labrador are likewise known to be used to communicate with travelers following behind (Larkham and Brake 2011). While the telephone towers literally facilitate communication, they also mark the location of settlements along the coast of Labrador. They come into view before buildings and tower above the horizon while signaling to travelers that they are close to home, or to another town.

This landscape-oriented research project adopts a view of cultural landscapes that considers Indigenous perspectives. Cultural landscapes, or *vernacular landscapes*, view the landscape holistically to encompass both natural and cultural aspects (Buggey and Mitchell 2008). Viewing artifacts on a cultural landscape and listening to oral traditions are direct ways of comprehending these meanings of landscape within the discipline of archaeology. Many recent theoretical studies on landscapes by geographers and anthropologists consider the views of landscapes by non-Western cultures (Andrews and Zoe 1997; Aporta 2004; Boyle 2008; Buggey & Mitchell 2008; Dimitriadis 2009; Hartley et al. 2019; Riesenweber 2008; Roy et al. 2015; Stewart et al. 2004; Whitridge 2004; Zedeño et al. 1997). The next step from theorizing these views is to put them into legislation to further protect traditional uses of the land.

With my research findings I explore past uses of the landscape. While many archaeological studies focus on a specific *site* location, or time-period, this research is a non-site study that focuses on the distribution of features in relation to the environment throughout any given time period (Anschuetz et al. 2001). It is my goal to demonstrate that cultural landscapes are as important and warrant the same protection as individual 'sites' such as dwellings, burials, or rock art by showing the way that they are used, how they influence us, and their significance to people in the present. I argue that landscapes including trail networks and viewsheds need to be preserved just as much as specific cultural sites such as ruins or rock art. For instance, the areas traveled in a journey made to a location with rock art may be as important culturally as the locality of rock art itself.

This thesis research also examines the use of unmanned aerial vehicles (UAVs), or drones, in archaeology. I chose drone photogrammetry and in-person field surveys to record cultural landscapes for many reasons. Drones present significant advantages over satellite imagery or aerial imagery captured by larger aircraft. By using drones, I eliminate a third party, saving me the cost of compensating a pilot (Jeong et al. 2016) and I maintain control over my own data-collection. From a data standpoint, the highest resolution satellite imagery only goes to about half a meter and does not offer adequate resolution to discern an inuksuk from a boulder on the landscape (Landinfo Worldwide Mapping LLC 2018).

The coast of northern Labrador presents an ideal landscape for remote sensing by drone imagery. The use of LiDAR is not necessary since there are very few trees or overgrowth obscuring sites. This allowed me to use drone photogrammetry to create digital elevation models that detail the ground's surface. The speed of data collection via drone also allows archaeologists to map large sites quickly and in a detailed manner for visible features.

From a cultural landscape perspective, it was incredibly important for me to be able to experience the landscape, including its viewsheds, smells, wildlife, and weather, in person. Within the timespan of a master's degree, it was difficult to include both a summer and winter field season to see the seasonal variations of the landscape. In Labrador, the ocean makes a transformation from seascape to icescape, drastically altering modes of hunting, transportation, and habitation. So, to include seasonal data, winter imagery was collected by Eldred Allen of Inuk-owned Bird's Eye Inc. The collection of imagery, field observations, and literature are used throughout this thesis to provide an examination of the practicality and methodology of using drones for archaeological research, and to look at the ways Inuit experience the landscape, icescape, and seascape in the past and the present.

The main objectives of this thesis are to examine several facets of cultural landscapes as well as methodology used to study landscapes. Through a literature review drawing on Inuit perspectives and my own archaeological field observations, inuksuit are used to gather information on landscape and icescape experiences. These experiences span site use from hunting and camping to transient observations during travel and navigation. Finally, information gathered on cultural landscapes initiates a discussion on future landscapes protections and conservation.

1.2 Social Relevance

Today there is concern that the symbol of an inuksuk has been misused and adopted for commercial purposes (Hallendy 2000; Larkham and Brake 2011). The inuksuk shape has been used as a symbol for Canada as a whole and was used as the logo for the 2010 Winter Olympics in Vancouver (Larkham and Brake 2011). The human-shaped inuksuk with arms has been mass-produced in factories outside of Canada and sold for profits imitating Inuit art (Fionda 2019). Furthermore, the traditional meaning and use of an inuksuk is being lost while those still using them fear that a randomly built inuksuk may send misleading information (Larkham and Brake 2011). This is not only the case in the Canadian Arctic, but also in public lands and recreation areas where cairns are used for trail marking. Randomly built inuksuit (or cairns) may misguide a traveler off the trail.

My research examines how people have modified landscapes and how that reflects on their experience of the land. My aim is to gain a better understanding of cultural landscapes through studying seemingly small rock features to argue for the importance of protecting and conserving landscapes. In this discussion I look at how archaeological landscapes impact life today in a fast-paced and globalized world.

Methodologically, this thesis illustrates the effectiveness and capabilities of drones in archaeological research in northern Labrador for landscape-based studies.

Prior to beginning my master's research, I was inspired to learn more about the process of protecting public lands due to the new political environment. Living in Colorado, I was familiar with and had spent time in cultural landscapes of Utah that had their protections revoked. In the United States, Section 106 of the National Historic Preservation Act protects historic, archaeological, and cultural sites to a certain extent by preventing development until the sites can be surveyed by an archaeologist (United States of America 2016). With the encroachment of development on cultural landscapes in the United States, I was curious as to how archaeology could be used to protect these areas further (Andrews and Zoe 1997; Boyle 2008; Buggey and Mitchell 2008; Gwich'in Steering Committee 2020; Patagonia 2019; Riesenweber 2008). This approach intrigued me, so I began to dig into academic research and legal studies to see if approaches like this have been done in the United States and Canada. With resource exploration relevant in Labrador, this research may ultimately contribute to the protection of cultural landscapes for Inuit practices and lifestyles.

Another topic of relevance that I researched is a technological application to archaeology. With drones being a relatively new tool, or at least newly accessible tool, for archaeological research, it felt important to dedicate a part of this study to analyzing the practicality of drone imagery, and the usefulness of the data that results from drone surveying. Since many of these sites were originally accessed in winter (Hallendy 2000, Whitridge 2016), it was important to view the landscape in a winter setting. To include winter seasons in landscape archaeology, this research includes 3D imagery that I had a contractor collect during the winter. This research examines the winter abilities of drone operation and logistics for archaeology. Surveying sites in the winter also helped determine whether inuksuit may be more visible in the winter against a snow-covered landscape, or less visible due to being covered by snow.

1.3 Summary of Proceeding Chapters

The following chapters detail the process of my research, the theories behind it, and finally the results and findings. Chapter 2 details the cultural history of Labrador beginning with the migration of people from Siberia to the arrival of Europeans and their subsequent settling in Newfoundland and Labrador in association with fishing industries, trading, and religious missions. This chapter continues by introducing the environment of Labrador and reviewing previous research that has been conducted on each area included in this research. For this research, the focus areas, or non-sites, are based on the time and logistical ability to survey during fieldwork. Many goals were often to map or survey an entire small island, however in some cases the research is limited to a small area that could be or is considered a 'site' in archaeological reports. Chapter 3 looks at the methodology that I used throughout this research. This includes logistical plans for fieldwork and literature review, procedures for drone licensing, flying, and 3D modeling, mapping techniques, and a discussion on options for dating methodology of inuksuit and other stone features. Chapter 4 discusses the theoretical viewpoints of this research which greatly influenced the research plans and methodology. Finally, Chapter 5 and 6 discuss the results and findings of this research. Chapter 5 is focused on fieldwork results of each location visited, while Chapter 6 is organized by major themes from the findings. Chapter 7 includes concluding statements as well as future directions.

Chapter 2: BACKGROUND

2.1 Previous Research

People from different cultures have visited Labrador for a few hundred years and, most notably, since the 18th century. Surveys and research in Inuit Nunangat[3] and the circumpolar north have ranged from Inuktitut[4] linguistics to climate and geology studies to decades-long anthropological projects focusing on inuksuit (Hallendy 2000; Krupnik et al. 2010). Archaeological studies in Labrador began in the late 1920s when William Duncan Strong undertook work around Nain and Hopedale, and then in the 1930s when Junius Bird worked in the Hopedale region (Bird 1945; Hood 2008). Both studies conducted excavations of Inuit sod houses. Since then, the field of archaeology has evolved, and the presence of archaeologists in Labrador has grown with numerous studies occurring simultaneously from several different institutions. Currently, Nain is a hub for many different archaeologists and other scientists in the summer.

This thesis builds specifically on previous studies that look at the purpose and use of inuksuit by Inuit, including publications by Aqiag Kappianaq and Nutaraq (2001), Larkham and Brake (2011), and Hallendy (2000). This research also examines methodology for using drones in landscape-based studies by testing its effectiveness and practicality in archaeological surveys. This research will contribute to studies in archaeology that have employed drones for accessing remote areas and creating detailed maps of sites using photogrammetry (Hamilton and Stephenson 2016; Jeong et al. 2016).

[3] Refers to Inuit homeland in Canada.

[4] The Labrador spelling is *Inuttitut* which will be used throughout this thesis when specifically referencing the dialect from Labrador.

Finally, this research also looks at previous literature on archaeological studies being used to protect cultural landscapes and assist in Indigenous land claims.

2.2 Northern Labrador

2.2.1 Culture History of Labrador

Archaeological and genetic evidence indicate that two distinct cultures populated the arctic of modern-day Alaska, Canada, and Greenland (Fitzhugh 1980; Kaplan 1983; Raghavan et al. 2014; Stopp 2002). Archaeologists have defined these cultures and have assigned different cultural names for each group; these terms have been evolving for many decades, and some have become outdated. With regards to Labrador, at least three migrations of people populated the coast, including the two major waves populating the arctic from the northwest, and others coming in from the south. The Strait of Belle Isle's bountiful marine life drew people from the culture referred to as Maritime Archaic who then populated the coastline of Newfoundland and Labrador (Fitzhugh 1980; Stopp 2002; Tuck 1971). This migration likely occurs around the same time that an interior group of people moved into Quebec and Labrador becoming the ancestors of today's Innu population (Stopp 2002). Northern Labrador, between Okak and Nain, was inhabited by Maritime Archaic between 6500-3800 BP, and southern Labrador was inhabited as early as 8500 BP (Fitzhugh 1980; Tuck and McGhee 1975; Stopp 2002). Ramah chert, Mugford chert, ground slate, and quartzite tools, as well as stone caribou drives, and boulder-mound burials mark the Maritime Archaic tradition in the archaeological record (Fitzhugh 1980; Hood 2008). The Maritime Archaic people specialized their subsistence strategies to be well equipped for coastal environments, hunting sea mammals, and gathering other resources that can be found near coasts (Stopp 2002).

From the north, the first group of people arrived around 4500 years ago having migrated from Siberia following the coast across Alaska and northern Canada to Labrador and Greenland, and while this was one ‘wave’ of people, archaeologists break the population into several traditions based on material cultures (Fitzhugh 2017; Hood 2008; Raghavan et al. 2014). This group, commonly referred to in the past as ‘Paleo-Eskimo’ are known by archaeologists in Labrador as the ‘Arctic Small Tool tradition’, or more generally as the ‘Pre-Inuit’, ‘Pre-Dorset’, or ‘Paleo-Inuit’ (Raghavan et al. 2014). A variety of material culture defines this tradition in the archaeological record including: tent camps, a diet comprised of caribou and seal, and stone tools including chert microblades, burins, and harpoon technology that can be traced back to Siberia (Hood 2008; Raghavan et al. 2014). There are numerous Pre-Dorset sites throughout Labrador from this initial wave of migration; however, their use of inuksuit is unknown (Fitzhugh 2017).

The Pre-Dorset culture evolves into Dorset culture in eastern Canada and Greenland around 2750 BP with the adoption of a diet and lifestyle focused on marine mammals (Fitzhugh 1980; Kaplan 1983; Raghavan et al. 2014). Inuit identify this culture as *Tuniit* to refer to their ancestor’s predecessors who taught them about the environment (Fitzhugh 2017; Stewart et al. 2004), or as those “who came and prepared the land” (Hallendy 2000: 22). The *Tuniit* are said to be more broad-shouldered than present-day Inuit and easily scared (Agiaq Kappianaq and Nutaraq 2001). The Dorset tradition includes many cultural adaptions, including less permanent winter housing and more temporary snow structures on land or sea ice (Fitzhugh 1980).

The Dorset culture disappears in the eastern arctic around 600-400 years ago with ancestral Inuit[5] moving in quickly from the Bering Strait via Baffin Island (Friesen 2013; Raghavan et al. 2014; Whitridge 2012, 2016). This transition is difficult to date because Inuit sometimes reused Dorset settlement locations (Hood 2008). Inuit first appear in North America around 950 BP in Alaska around the Bering Strait and migrate within decades[6] to northwest Canada and Greenland (Friesen 2013; Rankin 2009). The placement of Inuit settlements and camps likely put them in contact with Dorset populations (Fitzhugh 1980). Faunal evidence indicates that Inuit pursued bowhead whale populations initially (Arendt 2013; Fitzhugh 1980, 1981; Raghavan et al. 2014). Around 600 BP, the environment entered a period of variable sea ice conditions during the Little Ice Age coinciding with social and resource procurement changes (Fitzhugh 1980, 2017; Hood 2008; Woollett 2007).

Early Inuit established settlements in northern Labrador along Saglek Bay around 500 BP (1450 CE) (Rankin 2009). Inuit cultural adaptation to the environment shows up on the landscape today, and in the archaeological record through groups of large semi-subterranean sod houses, tent rings, *umiaks*[7], *Kajaks*, dog sleds, above-ground burials,

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[5] Many past researchers have split Inuit into two cultures, with the earlier being 'Thule' and transitioning to Inuit around the Little Ice Age (Fitzhugh 2017; Raghavan et al. 2014; Rankin 2009). This term is outdated, and throughout this thesis I will be using 'Inuit' to refer to this culture in its entirety.

[6] This rapid migration is apparent through radiocarbon dates of settlements, and pottery found on Ellesmere Island with a chemical signature indicating an Alaskan origin (Friesen 2013).

[7] A larger boat for transportation and hunting large sea mammals, unlike the *Kajak* which is smaller and more known for speed (Brake 2019; Friesen 2013; Hood 2008; Larkham and Brake 2011; Weyer 1932).

and stone structures including caches, fox traps, caribou fences, and inuksuit (Fitzhugh 1980; Hood 2008; Kaplan 1983). Inuit took advantage of the sea and terrestrial resources by making seasonal structures in locations that had access to open water for seal hunting and ice for ice fishing, as well as near the mainland for seasonal caribou hunts (Stopp 2002).

It is well agreed upon that Thule and Inuit are identical, with Inuit merely referring to the more recent time period (Rankin 2009; Whitridge 2016). Changes in material culture within the Inuit cultural tradition are subtle adaptations through time to various social and environmental changes (Rankin 2009). In the past, archaeologists referred to this material culture as Thule and as Inuit once Europeans arrive, however, it is well accepted that the term Thule has no place in contemporary arctic archaeology (Whitridge 2016). Furthermore, the extension of what in the past is referenced as Thule culture into Inuit culture, along with the problems that arise with assigning date ranges to inuksuit, makes dividing Thule and Inuit into separate phases nonsensical for this research. To further illustrate the uselessness of this term, even with a so-called ‘transformation’ from Thule to Inuit in Labrador, the timeline is so short that the only benefit to separating these phases would be to identify the very first inuksuit that Inuit erected.

2.2.2 Europeans in Labrador

The first reported instance of Europeans visiting Labrador is an unconfirmed visit by the Norsemen around 1003 CE (Arendt 2011; Bird 1945). The Norse were in Newfoundland around that time, at L’Anse aux Meadows on the northern part of the island (Arendt 2011; Kaplan 1983) and sagas refer to meetings with the native inhabitants, who they termed *Skraeling* (Enterline 2002). By the 16th century, Europeans, including the Dutch and French, began making regular trips to the coastline for cod-fishing and to trade with Inuit groups in Labrador and references to their interactions with Inuit can be found in documentation dating back to 1588 (Arendt 2011; Kaplan 1983; Rankin et al. 2012). The Basque were the first Europeans to establish regular seasonal whaling settlements in southern Labrador in 1547 (Arendt 2011). The whaling industry at that time was profitable, however, after over-hunting and climate change, there was a decline in economic productivity (Arendt 2011; Woollett 2003). In addition to resource-oriented enterprises, European groups, including the English had made several attempts to find the Northwest Passage to Asia in the 1500s by exploring the west Atlantic (Arendt 2011).

New Englanders conducted trade along the coast of Newfoundland in the 1600s and moved their operations to southern Labrador in the 18th century after the Treaty of Paris in 1763 (Arendt 2011). These European groups all had hostile interactions with Inuit for a variety of reasons: ethnocentric views, impeding on Inuit hunting grounds and impacting the balance of the ecosystem, and involving themselves in unfriendly relations between Inuit and Innu (Arendt 2011; Kaplan 1983). This period is marked by violence and hostility, which led the French and English to use administrative laws to protect Indigenous groups of Newfoundland and Labrador to protect their own economic interests (Arendt 2011; Rankin et al. 2012). By 1765 hostile relations between the British and Inuit led the governor, Sir Hugh Palliser, to create a formal policy that banned year-round settlement in Labrador, and to prohibit attacks on Inuit (Kaplan 1983; Rankin et al. 2012). Before this treaty, the Moravian Brethren had attempted to establish a mission in Labrador after having success in bringing Christianity to Greenland (Bird 1945; Kaplan 1983). This first attempt in 1752 was unsuccessful and left six crew members dead from an attack by Inuit (Kaplan 1983). With a mutual understanding, in 1769 the British Crown gave the Moravian Brethren access to land in Labrador to conduct trade and preach while allowing English fishing activities to continue in the south by enticing Inuit to the Moravian in the north (Cabak and Loring 2000; Kaplan 1983; Rankin et al. 2012). The Moravian Brethren established three different missions in Labrador during the 18th century: Nain in 1771, Okak in 1776, and Hopedale in 1782 (Arendt 2011; Cabak and Loring 2000; Kaplan 1983; Richling 1979). These locations came with challenges: a year-round mission in Nain soon taught the Moravians that Inuit did not settle in one location year-round. After finding success, the Moravians expanded during the 19th- and 20th-centuries throughout Labrador (Richling 1979).

The Moravians, among other Europeans, had a continual effect on Inuit involving changes to their subsistence methods, architecture, and social structure (Arendt 2011; Cabak and Loring 2000; Jordan 1978; Kaplan 1983; Richling 1979; Rankin 2015; Woollett 2003). “While the Mission’s ultimate goal was the salvation of Eskimo souls, and their immediate concern was to stop further violence between Eskimos and Europeans, the Mission’s primary relationship with the Labrador people was an economic one” (Kaplan 1983: 171). These economic impacts were an unexpected result of the

Mission's goal to carry out their religious plans without impacting Inuit lifestyle (Kaplan 1983).

In summary, Labrador's coast has been regularly visited by various European groups for the last 500 years, with a notable impact on the local economy in the 18^{th}-century due to the establishment of the Moravian Brethren and more strictly regulated trade and European settlement operations (Arendt 2011, 2013; Kaplan 1983; Rankin 2015; Woollett 2003). The Hudson's Bay Company was active in northern Canada from 1668 onward but did not have a huge impact in northern Labrador until the 19^{th}-century (Arendt 2011) when they competed with the Moravian Mission by providing an outlet for trade without pressuring Inuit to become Christian (Brice-Bennett 1981; Jurakic 2007). From an archaeological and historical standpoint, the presence of the Moravians in Labrador has had a unique impact on Inuit cultural history. The Moravians (and the Hudson Bay Company) were keen on documenting events, populations, and their perspectives on Inuit culture in diaries and photos (Memorial University of Newfoundland – Digital Archives 2020). While these documents are presumably biased, they provide a useful perspective into Inuit life at the time. This cultural history of Labrador illustrates a dynamic landscape of interacting parties that were competing for resources and sharing the landscape. Traces and artifacts of other groups' presence on the landscape may influence the next traveler's experience (Rankin and Squires 2006).

2.3 Geography, Geology and Ecology of Study Area

The landscape of Labrador is rugged, diverse, and shaped by many powerful geologic forces. The focus of this research is on the northern coastline and surrounding islands – an area that is bare of trees and has very little topsoil. Many of the areas surveyed are comprised of bedrock. Various scrubby plants and lichens grow where there is soil, creating tiny ecosystems. The long history of Inuit in Labrador, and their tie to the coastline, is evident in today's Nunatsiavut Government jurisdiction, as seen in Figure 1 below. The coast is important to Inuit as it is where they have lived for the duration of their occupation in Labrador (Arendt 2013: 303), where they have conducted trade with other groups, and where many spots exist for specific types of hunting and trapping (Brice-Bennett 1977). The land and sea around the Okak Islands and Hopedale are home to, or migration routes for, caribou, arctic char, harp seal, ringed seal, harbor seal, bearded seal, beluga, bowhead whale, walrus, and polar bear (Kaplan 1983). Eider ducks, geese, and other seabirds also inhabit this coastline. Inuit hunt for a variety of animals, many of which are seasonal, including seals, whales, and different birds. A specialized skill set has been long in the making to read shorelines and beaches for optimal boat landing spots and "plays a significant role as a framework of spatial orientation, as it does in other cultures where people's livelihoods are tied to the sea" (Krupnik et al. 2010: 171). Travel and navigational methods for Inuit, which will be discussed throughout this thesis, are tied to and shaped by the coast and these environments.

Figure 1: Map of Nunatsiavut. Note – the northern portion of this area is also managed by Parks Canada – the Torngat Mountains National Park.

2.4 Site Context

For a map of every survey location, see Figure 2. The following section includes a description of each location with a background of previous archaeological research on the area.

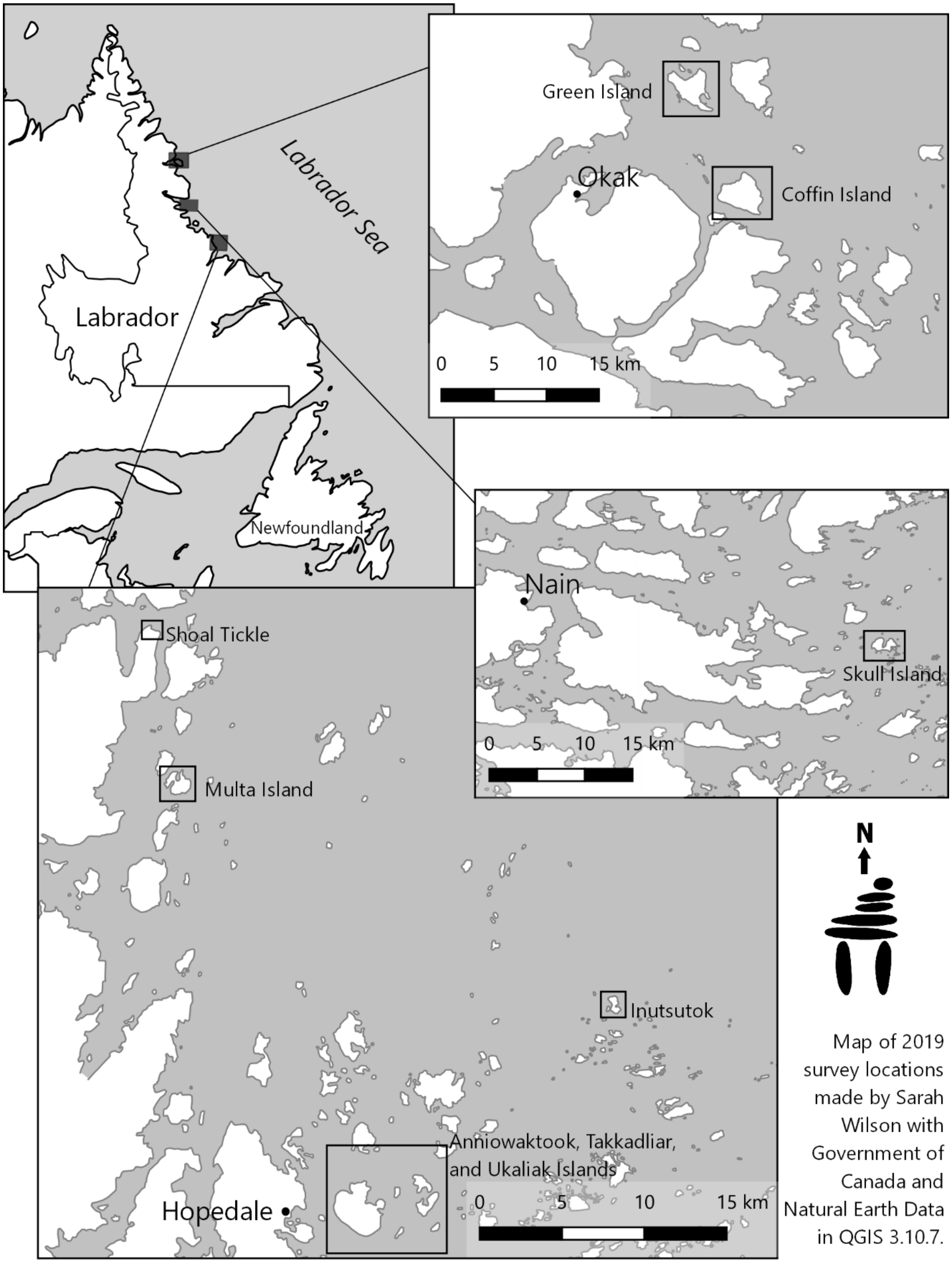

Figure 2: Map of 2019 survey locations.

2.4.1 Coffin Island

During fieldwork, we spent one day at Coffin Island recording inuksuit at Coffin Island 1 (HjCk-07). Coffin Island, or *Ukusiksalik* (Brice-Bennett 1977), is northeast of the Okak Islands near the mouth of the tickle. Several archaeologists have visited Coffin Island with four resulting archaeological site records: two areas with ‘pinnacles,’ or inuksuit, a tent ring in the valley between these stone features, and a soapstone quarry (Curtis 2007; Fitzhugh 1981; Kaplan 1983). There are census-like records showing that up to six families lived at *Ukusiksalik* during the winters of 1783, 1802, and 1803 and one family during the springs of 1792 and 1798 (Brice-Bennett 1977:64, 68). The focus of my survey during fieldwork on Coffin Island was on Coffin Island 1 – we would have surveyed more, including the opposite ridge with previously recorded pinnacles if time and weather permitted. Coffin Island 1 consists of over 60 standing stones called ‘pinnacles’ or referred to here as inuksuit. These inuksuit are unique in their form – they are human-made single standing pillars of rock, some as tall as 1.2m. They are supported by cracks in the bedrock, leaning on ledges, or a base of smaller, rounded rocks.

Although visited by several archaeologists, none have come to a conclusive interpretation of what purpose the inuksuit on Coffin Island serve. Kaplan (1983) argues that some have been purposely kicked over, while Fitzhugh (2017) suggests that they are not aligned astronomically and that they have lost their original context. Fitzhugh also postulates that these inuksuit are not associated with “pre-Dorset, Dorset, Labrador Inuit, or European cultures” (2017: 156) based on a lack of finding oral history related to them. My research at Coffin Island was to document the pinnacles further and to create a 3D model of these features. The model can be used to show communities in Labrador what the site looks like in an attempt for a more in-person experience than standard photographs and to encourage discussion on the pinnacles' potential meaning.

2.4.2 Green Island

Green Island is another location where archaeologists have previously recorded inuksuit in the form of pinnacles. The Inuttitut name for Green Island is *Ighlokhsoaktalik,* and the settlement, *Nuasorknak,* is located on the island (Brice-Bennett 1977). Archaeologists have identified several settlements along the coastline of Green Island, along with smaller features like burials and inuksuit scattered across the island (Cloutier-Gelinas and Merkuratsuk 2009; Kaplan 1985). Green Island is a roughly triangle-shaped island with large coves and harbors. The island has few trees, and the topography is hilly with nice sloping beaches for a boat landing. Green Island has a historical site and seems to be regularly visited by archaeologists in Labrador (Cloutier-Gelinas and Merkuratsuk 2009). My survey on Green Island adds more detail to the information on inuksuit and takes a more focused look at their placement on the landscape.

2.4.3 Multa Island and Shoal Tickle

Multa Island and Shoal Tickle are less than an hour's speedboat ride from Hopedale. Both locations were popular cod-trapping areas for fishing industries, and Multa Island was also an Inuit hunting area for bottlenose dolphins (Brice-Bennett 1977). Multa Island has several sod houses, stone structures, tent rings, burials, and inuksuit (Fitzhugh 1985; Kaplan 1985). Shoal Tickle is near an area where caribou were hunted and a popular place for seasonal seal hunting and fox traps (Brice-Bennett 1977). These locations are discussed in Larkham and Brake (2011) and were easy to access from Hopedale, where I was based for a portion of my fieldwork. Multa Island and Shoal Tickle are about 35km north via boat from the town of Hopedale. Shoal Tickle is a point on the mainland northeast of Multa Island and is referenced as 'Shore' Tickle in Larkham and Brake (2011: 29) and is recorded as having an inuksuk marking a seal hunting spot.

2.4.4 Inutsutok

Archaeologists have not previously visited Inutsutok, so my fieldwork drew on hearsay from locals in Hopedale. Inutsutok translates to "the place where there are inuksuit" (Nicholas Flowers, personal communication, 2019). This island is referred to as Pillar Island on Government of Canada maps (Brice-Bennett 1977; Hamilton 1996; Surveys and Mapping Branch, Department of Mines and Technical Surveys 1965), an accurate translation describing its features. Hamilton (1996) records Pillar Island as having landmarks for fishing schooners coming from the east. Inutsutok is the spelling locals in Hopedale used which I will use throughout this thesis. Other variations include: *Inuksutoguluk*, *Inuksutogaluk*, and *Inuksuktut* (Brice-Bennett 1977; Hamilton 1996). The coastal waters of Inutsutok and surrounding islands are visited by seals and whales at different times of the year, making them prime seasonal hunting and camping locations (Brice-Bennett 1977). Interviews and literature on Inutsutok warned us of a nearby haunted island where if you fell asleep on this island, you would not wake up (Brice-Bennett 1977; Agvituk Digital Archive Project 2019). My surveys on Inutsutok add these features to the provincial archaeological record.

2.4.5 Winter Inuksuk Sites

On March 26th – 30th, winter fieldwork was undertaken by Deirdre Elliott and Eldred Allen. Elliott was conducting research under her PhD at Memorial University, and Allen was contracted through a J.R. Smallwood Foundation grant to collect winter, and photogrammetric imagery, of inuksuit around Hopedale. Trevor Broomfield assisted as a SkiDoo (snow-machine) driver.

The area around Hopedale is the location of "some of the earliest scientific archaeological work directed towards Inuit history in Labrador" (Rankin 2009:6) by William Duncan Strong in the late 1920's. Strong's research began with excavations of sod houses, and later Junius Bird entered the scene around Hopedale with excavations of 45 sod houses on Anniowaktook Island in the 1930's (Arendt 2013; Bird 1945). Bird's research resulted in many artifacts being collected, along with site reports, maps, and artifact drawings (Bird 1945). Since then, several archaeologists have studied Anniowaktook Island to look at Inuit-European trade along the coast of Labrador (Arendt 2013).

Anniowaktook Island is the location of a winter sod house site (GiCa-02) with nearby inuksuit. Some of the nearby inuksuit were found on hills surrounding the site, and on a nearby islet. While the winter sod house site is referred to by Borden number GiCa-02, the site records do not include all of the surrounding inuksuit. GiCa-02 consists of four semi-subterranean sod houses, a tent ring, a burial, caches, and an inuksuk (Elliott and Wilson 2019). On the northeastern point of the island there are two large inuksuit with caches between them.

Hopedale is the location of the archaeological site of Avertok, or Agvituk and since 1782 has been the location of one of Labrador's Moravian Missions (Arendt 2013; Cabak and Loring 2000; Kaplan 1983; Kudelik and Pitt 2019; Richling 1979). This is the location of a large Inuit whaling site that was integral to the Inuit-European trading economy and is presently being researched by the Agvituk Archaeology Project in an effort to combine community engagement with a digital archive of artifacts that have ended up in museums around the world (Agvituk Digital Archive Project). Today, much of the site is beneath more recent residential buildings (Kaplan 1983).

Takkadliar Island is a small island west of Anniowaktook Island. The site located on it, GiCa-01, has no winter habitation features, but consists of about fifteen tent rings, a blind, a burial, a cache (dismantled), and inuksuk along several beach terraces (Fitzhugh 1977). This site was chosen as a safe option for winter survey for its familiarity to Elliott who visited the site in 2018 and its proximity to Hopedale. In researching sites to visit for the winter survey, the focus was on known inuksuit, specifically near a known winter site, or within reasonable proximity to be visited by SkiDoo from Hopedale.

Ukaliak Island, or Ellen Island, sometimes spelled *Okaliak*, is about 6 km southeast of Hopedale. The site was identified based on Larkham and Brake's (2011) report where interviewees reported a glass jar associated with an inuksuk that travelers could use to communicate with the community of Hopedale in poor travelling conditions. If an individual tried to reach Hopedale but had to turn around at this point due to weather, they could leave a message in the glass jar (Larkham and Brake 2011).

Residents from Hopedale would visit this inuksuk to see if people had attempted to visit but could not, and why (Larkham and Brake 2011).

Chapter 3: METHODS

3.1 Fieldwork

The primary[8] fieldwork for this research was divided into two segments during July-August 2019. Stephen Hull of the Provincial Archaeology Office (PAO) assisted me in finding past Site Record Forms held at the PAO to identify sites with notes on variations of the term 'inuksuk'. This included searching for terms relating to cairns[9], pillars, caches, pinnacles, and spelling variations on the Inuttitut words for inuksuk and inuksuit. My fieldwork began around the Okak Islands in Northern Labrador with a crew of eight people including myself, Dr. Peter Whitridge, Dr. Veronique Forbes, fellow MA candidate Ivan Carlson, boat driver and bear guard Alfred Winters, and field assistants Stephen Denniston and James Williamson. Memorial University crew members left St. John's on July 8th for Nain. For the majority of the field season, we were based out of Nutak at a small cabin from July 13th-21st. Walking surveys to map inuksuit and rock features took place on July 12th at Skull Island, July 15th on Coffin Island, and July 16th at Green Island. I assisted Dr. Whitridge in additional surveys to map sod houses at Kivalekh on Okak Island on July 14th, 17th, and 19th while Carlson conducted a paleoecological-archaeoentomology survey and excavations for his own MA research. In the field, additional inuksuit features were noted in travel between the base camp at Nutak and field locations, however time limitations and boat constrictions prevented us from conducting extra surveys. In one case, pinnacles were spotted near a gradual beach

[8] Additional fieldwork carried out by Eldred Allen of Bird's Eye Inc. occurred around Hopedale in March 2019, discussed later.
[9] This was often misspelled: 'carin'.

on the northern Okak Island while leaving Kivalekh for the last time. After passing notes on about these features to Jamie Brake, archaeologist for the Nunatsiavut Government, he and Michelle Davies were able to survey the area on a trip they conducted to the Okak Islands later in the summer.

The second segment of summer fieldwork began on July 25th as I sailed to Hopedale on the *Kamutik*. Having arrived early after leaving Nain before originally intended, I had time to explore and acclimate to the community. In Hopedale, I was hosted by the late-Elder, Andrea Flowers. On July 29th, I joined Dr. Laura Kelvin and hired local Hopedale student-researchers who were conducting interview-based community archaeology research with the Agvituk Archaeology Project. Dr. Kelvin, and students Denver Edmunds, Mackenzie Frieda, and Claire Iglolioirte, as well as Kevin Gully and myself conducted walking surveys in the Hopedale area to survey the landscape and map inuksuit at Multa Island, Shoal Tickle, and the Hopedale mainland on July 31st, as well as on Inutsutok[10] on August 8th. For most of the time in Hopedale, fog and poor weather conditions prevented safe travel to islands near Hopedale. Prior to fieldwork, I had compiled locations from Site Record Forms to identify potential survey areas and had intended to resurvey locations that were documented in the previous winter. This summer fieldwork was preceded by a winter survey conducted by Deirdre Elliott of Memorial University and Eldred Allen of Bird's Eye Inc.

With a grant awarded through the J.R. Smallwood Foundation, Inuk-owned and operated Bird's Eye Inc. was hired to conduct a winter aerial survey of inuksuit features

[10] This is recorded on some maps as one of the Pillar Islands.

near known winter sites around Hopedale. This research overlapped with PhD research being conducted by Deirdre Elliot, so some expenses such as SkiDoo travel were shared. For this fieldwork, 14 different sites were identified as potential survey locations from previous Site Record Forms. In the time available Allen was able to visit seven inuksuit and collect aerial photogrammetric imagery of six. Given harsh winter conditions and the time available, this was a very successful outcome. Allen also captured images of the landscape to provide me with more context given that I was not able to join Allen and Elliott in the field.

3.2 Literature Review

Literature reviews, including documents on previous interviews were conducted before and after fieldwork. Having grown up in Alaska I have noticed many cultural and environmental similarities between Alaska and Labrador, however there are many differences that I needed to become familiar with. Larkham and Brake (2011) conducted interviews for traditional knowledge specific to inuksuit in Labrador and while the raw interview transcripts are not available, their report was useful in planning fieldwork around Hopedale. While Larkham and Brake (2011) provide some data on specific locations of inuksuit, the literature reviews primarily influence the theoretical and interpretive aspects of this research.

A significant amount of research was dedicated to studying the potential of using lichenometry to date inuksuit during fieldwork. Lichenometry, which associates the size of present lichen to an age, first appeared as a potential dating method for dating the exposure of rocks in 1950 (Beschel 1950; Osborn et al. 2015; Rosenwinkel et al. 2015).

Since then, it can be argued that there has not been much improvement in the field, and that the method is quite unreliable (Osborn et al. 2015; Rosenwinkel et al. 2015). Since this method was developed, biologists and archaeologists have applied lichenometry to glacial and anthropogenic rock features to associate dates of up to 10,000 years before present (Andre 1986; Benedict 1999; Bettinger and Oglesby 1985; McCune et al. 2017; Osborn et al. 2015). A large multidisciplinary study of cairns in southeast Alaska specifically applies lichenometry to date stone rock stacks while comparing that method to radiocarbon dates (Hartley et al. 2019; Hunt et al. 2016; McCune et al. 2017). The results showed a wide range of variation between lichenometry and radiocarbon dating, with the latter being a destructive method to find organics buried beneath the cairns (McCune et al. 2017).

Lichenometry, or 'lichenometric dating,' uses the largest lichen diameter measurement to estimate the duration of exposure of a rock surface (Osborn et al. 2015; Rosenwinkel et al. 2015). There are lichens that can grow for 1,500 years; however, these are very rare – most lichens provide a time scale of up to 200 years (Osborn et al. 2015; Rosenwinkel et al. 2015). The method has been in use for over 60 years, though there is no strong evidence that it works; there are many disagreements and debates on the process of lichenometry, and the lichen growth itself is dependent on several different environmental factors such as climate, elevation, moisture, and temperature (Beschel 1950; Osborn et al. 2015; Rosenwinkel et al. 2015). Furthermore, lichenometry requires region-specific growth curve calibration rates (Andre 1986; McCune et al. 2017; Osborn et al. 2015). This requires comparing lichen measurements to surfaces of a known age

(Benedict 2009; McCune et al. 2017). Known ages could come from surfaces like grave markers or buildings. This does not provoke confidence for ages beyond the age of the calibration surface leading to speculation when a researcher says they have a dated a surface to 10,000 years BP using lichenometry. To its benefit, lichenometry is a feasible method as it only requires a knowledge of different lichen species, and a pair of calipers.

For the purpose of this research, lichenometry does not present many strong qualities. If lichenometry could be more fine-tuned and more reliant, given the correct lichen species in Labrador, it could be a useful tool for dating rock features on the landscape. However, even with more reliability in the method, lichenometry presents contextual issues. Lichenometry seems more applicable to glacial and melting events where it is reasonable to assume that the rock was bare at the time of exposure, whereas it is wrong to assume rocks making up inuksuit were bare at the time of construction. Rock feature exposure dating methods may improve opening other avenues of research, however, in the meantime traditional knowledge, spatial analysis, and other forms of information can provide more reliable information on rock structures in cultural landscapes. Through thorough research, the prospect of using lichenometry in this research project was curtailed.

3.3 Unmanned Aerial Vehicle Photogrammetry

Unmanned aerial vehicles, or drones, represent a useful tool for collecting aerial documentation of what archaeologists have recorded on the ground. In some cases, drones could be used to collect imagery of an area that has not been surveyed, and then the imagery can be studied later for identifying potential[11] features on the surface. In May 2019 I returned to Colorado to take the initial U.S. Federal Aviation Administration (FAA) drone pilot exam to obtain a Remote Pilot Certificate from the FAA. This certificate was a requirement to obtain a Special Flight Operations Certificate through Transport Canada as a foreign resident. In July and August 2019, I flew a Mavic 2 Pro with built-in Hasselblad camera. The drone collects high resolution photos with a 35mm lens for an effective pixel count of 20 million (DJI 2018). I used the DH Basic app to fly photogrammetric flight plans, and the DJI Go 4.0 app for other imagery-collecting flights. The DH Basic app allows control over the amount of overlap (which is required in photogrammetric imagery), as well as altitude and flight pattern. The DH Basic app also allows the user to survey buildings, fly circles or ellipses, and collect video in addition to different grid variations for photogrammetric imagery. Allen of Bird's Eye Inc. used a DJI Mavic Pro Platinum drone and the DJI Go 4 flight app to manually conduct a spiral flight to collect overlapping images of single inuksuit.

Photogrammetry is a process where overlapping images are stitched together to create a 3D model (Hamilton and Stephenson 2016; Haukaas 2014; Mesas-Carrascosa et al. 2016). This can be used for small objects, including artifacts, or larger landscapes as demonstrated here. Overlapping images can be processed in programs like MapsMadeEasy, Agisoft Metashape, and ArcGIS to create 3D models. 3D models can be manipulated within these programs, but for easier access landscape models should be

[11] Features should be reassessed on the ground, as some features may appear different in person. This is discussed further in Chapter 6.

further processed into different file types. These models can be exported into high resolution digital elevation models (DEMs), KML files to import into Google Earth, orthophoto mosaics, and more (Hamilton and Stephenson 2016). I used Agisoft Metashape to create 3D models and exports of TIF digital elevation models to use in a GIS, as well as orthophoto mosaics. The resulting DEM looks very similar to what LiDAR[12] could collect, however where LiDAR can eliminate vegetation, aerial photogrammetry cannot (Hamilton and Stephenson 2016). On the other hand, UAV photogrammetry is much more cost-effective by eliminating a third party (Agüera-Vega et al. 2017; Ai et al. 2015; Jeong et al. 2016). The landscape along the coast in northern Labrador, having very few plants larger than a shrub, is an excellent candidate for photogrammetry.

To collect photogrammetry imagery, I used the DH Basic app to create flight plans. I started all the flights at the highest point of elevation in the survey area to ensure that the drone would not fly into anything since it flies at a set height above ground level. For Coffin Island, two different flights were conducted to map two nearby clusters of features. For the larger area, I set the overlap to 70% while flying at 11m above ground, at a speed of 1.5m/s while shooting continuously (not stopping). This resulted in 421 images. The second, smaller area was documented using 80% overlap at an altitude of 10m using the same speed and camera setting as the previous flight. This smaller area resulted in 125 images. The final photogrammetric flight was on Green Island and the settings consisted of a 70% overlap in coverage, at an altitude of 25m. The higher altitude

[12] Light Detection and Ranging

is symptomatic of a larger area being covered, as well as a greater change in elevation of the surface being mapped. The flight on Green Island collected 348 images and required a battery change part way through the flight. The temperature at Green Island on this day was lower than at Coffin Island and is likely a factor in the shorter battery life. For a battery change, the drone is returned to home[13], turned off to change the battery pack, and then upon take off, automatically returns to where it left off in the flight plan. Fortunately, the sky was overcast during this survey where a battery change was required. This is fortunate because "variations in illuminations, [or] the appearance or disappearance of shadows" (Mesas-Carrascosa et al. 2016: 2) throughout a series of flights can cause problems in the photogrammetric algorithms used to create 3D models and DEMs.

3.4 3D Modeling and Digital Elevation Models: Agisoft Metashape

Photogrammetric imagery can be developed into 3D models using various computer software programs. In September 2019 I began processing the photogrammetric images collected by unmanned aerial vehicles in the program Agisoft Metashape version 1.5.0 (64-bit) on a PC running Windows 10. In Agisoft Metashape, first a dense point cloud is generated after uploading and aligning the photos. The photos from the DJI drones embed coordinates into the photo files, so their locations are automatically imported into Agisoft Metashape. The dense point cloud is three dimensional and can be maneuvered and manipulated in Agisoft Metashape. I processed the dense point clouds

[13] In UAV terminology, home is wherever the drone last took off.

using “High” quality and “Aggressive” depth filtering. For a small model of about 100 photos, the dense point cloud processing can take 10 hours or more. After the dense point cloud is processed, Agisoft Metashape can interpolate the data into digital elevation models, and orthophoto mosaics. These two file types can be exported into georeferenced TIF files which can be overlaid into maps using a geographic information system. For the orthophoto mosaics I used a “Geographic” projection and “Mosaic” blending mode, building off the DEM. While the digital elevation model can be colorized for further analysis, an orthophoto mosaic stitches many aerial photos together to appear as one large, high resolution image. These types of files can also be exported into Google Earth, which functions as a more accessible platform for viewing 3D models.

3.5 Geographic Information Systems

Mapping and data analysis were conducted in Quantum GIS (QGIS), an open-source geographic information system. QGIS serves as a useful tool for creating visual representations of the data including GPS points, digital elevation models, and orthophoto mosaics. QGIS also offers itself as a platform for applying theories such as least cost path which will be elaborated on in the following section, and for comparing winter and summer imagery. QGIS has a layout application which made formatting maps for this thesis publication simple and self-contained. Base topographic data was downloaded from Natural Resources Canada’s (2017, 2018a, 2018b) Geogratis data extractor. This data included several layers not necessary for this research (e.g. airstrips in Quebec), but is customizable in any geographic information system.

Chapter 4: THEORY

My theoretical approaches guided my research by helping me view the landscape as an embodiment of culture and memory. Broadly, this chapter looks at landscape theory, memory, and the Least Cost Path tool within a geographic information system to form my theoretical approach. While archaeology generally focuses on information you can draw from artifacts, landscape studies do not always have access to this type of information. Instead, landscape archaeology deals with how the qualities of a landscape such as topography, geographic features, and land cover (or ice cover) can influence movement and settlement, and how in turn, people influence the landscape with built spaces and monuments (Hu 2012; Johnson 2012; Llobera 2001; Tilley 1994). In the winter months, the landscape in Labrador is transformed as the ocean becomes solid, effectively extending the 'land' and connecting islands to the mainland. Because of this dual nature, the ice cover is as important in my research as the bedrock landscape seen in the summer. My research also involves a comprehensive review of information, including oral histories, on *Inuit Qaujimajatuqangit* (IQ, or traditional knowledge) in recent research (Karetak et al. 2017; Tester and Irniq 2008; Wenzel 2004), to understand how Inuit inhabited the land. This approach, along with the use of modern geographic information system's tools, are the foundation of the interpretive methods for my research.

4.1 Landscape Theory

Sentient Landscapes

Landscape archaeology encompasses a vast number of theories and beliefs, many of which are specific to certain cultures or geographies. A general definition of landscape archaeology is "the study of cultural and environmental variables influencing the way humans interacted with their landscape" (Hu 2012: 1). Landscape archaeologists may look at settlement patterns, resource procurement patterns, physical roads and trails, sentient glaciers, or the many layers of symbolic meanings and temporalities of landscapes (Anschuetz et al. 2001; Aporta 2009; Cruikshank 2007; Ingold 2000; Tilley 1994; Whitridge 2004). Many authors have drawn attention to the variety of meanings of 'landscape', so I have synthesized my own definitions and terms here to articulate the language I use throughout this thesis (Anschuetz et al. 2001; Hu 2012; Ingold 2000; Whitridge 2004). The four main terms I use to refer to the land are: environment, landscape, place, and space. Influenced by Ingold's (2000) *The Temporality of the Landscape*, I see the environment as the physical, biological, presence of the world. The environment refers to ecosystems, geology, weather, and topography unaltered by humans – the base from which landscape is formed. The landscape is what we experience on a large scale; things we can see but not touch, but also where people travel through, destinations, and where we experience space and place. Place and space are contained within landscapes. Place is "a qualitative…experientially grounded mode of inhabiting or dwelling in the world that invests particular locations with personal and collective significance" (Whitridge 2004: 214). Place is a specific locale within a landscape that has embodied memory and meaning to a culture. Spaces are deliberately constructed for social reasons out of the environment and are closely related to what many archaeologists consider a ‘site’ (Heidegger 1977; Hu 2012; Whitridge 2004). A space on the landscape includes settlements – anything from a small campsite to a group of houses or structures for several families. This research puts focus on non-sites instead of specific sites, or even artifacts. Therefore, most of my theoretical background and inspiration stems from the terms of ‘landscape’ and ‘place’.

In Labrador, the concept of trails is not a fixed line that people follow[14]. Unlike smooth gravel paths that you find in city, provincial, or national parks, trails in Labrador and the circumpolar north change with each season. This is especially true for routes along sea ice where every summer the physical trail melts away. This non-static idea around trails relates to memoryscapes, which “are not static entities; on the contrary, the concept expressed both the permanence of memory through time and the dynamics of people’s relationship with their environments. Memoryscapes are not transmitted from generation to generation as a mere corpus of geographical knowledge” (Aporta 2004:15). This idea of memoryscapes emphasizes how two individuals from the same culture have different experiences and memories from the same significant place and that cultural landscapes cannot be generalized to fit an entire culture. While there are static and more permanent qualities of landscapes, for example an inuksuk, there are qualities of landscapes such as experiences that are not necessarily passed on through time.

These definitions help me to focus my research on the experiences people and groups have on landscapes, and how these experiences developed a place that is now marked by an inuksuk as a physical location known through a collective memory. The

[14] Some trails, such as occasional caribou trails, do erode the landscape making visible marks.

inuksuk is prone to being dismantled or altered, but its semi-permanence is a reminder of those who passed through the area before. These theories of landscape and place are important in my data interpretation for human-made inuksuit that are not specific to navigation, such as caribou blinds, campsite or harvesting locale markers, ceremonial gathering markers, or memorials (Hallendy 2000; Whitridge 2004). I employ different theories for discussing navigational inuksuit, touched on later in section 4.3.

4.2 Memory

Memory, through traditional knowledge and place names, plays a large role in the interpretation of the inuksuit in Labrador. Several people who have worked with cultures in the arctic convey the importance of *Inuit Qaujimajatuqangit* and collective memory in survival and ways of living (Cruikshank 2007; Whitridge 2004). I do not think it is possible to understand the meaning or relevance of a landscape without knowing what previous people shared with later generations. *Inuit Qaujimajatuqangit* describes the science used by arctic and sub-arctic cultures; it is their way of knowing, respecting, and using resources from the environment (Cruikshank 2007; Tester and Irniq 2008; Wenzel 2004; Whitridge 2004).

Place names are a significant part of traditional knowledge and are typically visually descriptive of geographic features to help guide navigation and place identification, and provide a sense of space (Andrews and Zoe 1997; Aporta 2003; Collignon 2006; Cruikshank 2012; Hallendy 2000; Hamilton 1996; Keith 2004; Krupnik et al. 2010; Stewart et al. 2004; Whitridge 2004). This use of place names can be a form of mapping for Inuit, and apart from quick sketches of maps in sand or snow, you will only find these maps in memory (Whitridge 2004). The importance of places can be seen in the way that they are named equating places to sentient beings. "People and places share the significant quality of *being named*" (Whitridge 2004: 221). The Tlingit in present-day Alaska and British Columbia see the landscape as sentient and having reactions to human activities such as cooking with grease near glaciers (Cruikshank 2007). More universally, in other nomadic and subsistence cultures, landscapes are a canvas for culture in the form of monuments and built spaces (Fitzhugh 2017; Llobera 2001; Stewart et al. 2004; Tilley 1994). With the sentience of landscapes in mind, place names provide a window into past thoughts about different places on the landscape. From a non-navigational perspective, place names "tell the story of the land and of its people, a story that emphasizes space rather than time" (Collignon 2006: 199) when passed down through oral history.

Memory is also relevant to interpreting the inuksuit in Labrador that are not specific to navigation; those inuksuit in some way embody the memory of an event and may not have a strictly physical purpose that can be inferred by the surrounding landscape. Detailed traditional knowledge for specific locations is required to fully understand these complex inuksuit. While hunting, a hunter may spend a significant amount of time waiting. "Some [inuksuit] were built for a purpose, while others were made to pass the time. [It is] at the waiting places where you can sometimes find an *inuksuapik*…the most beautiful kind of inuksuk. It is built with the greatest care" (Hallendy 2000: 27). While it may be impossible to distinguish an *inuksuapik* from another type of inuksuk, traditional knowledge may be able to help find answers. A lack of traditional knowledge could be an indicator of age, where through time things may be slowly forgotten (Stewart et al. 2004). If traditional knowledge of inuksuit is forgotten, many cultural landscapes could be lost or not remembered, impacting the way that we continue to use the land.

While the physicality of the coastline is important to Inuit culture as mentioned earlier in section 2.3, the ability to travel to various locations for hunting or trips is as well. Understanding traditional Inuit knowledge without "the context of mobility is limiting, as travel was an integral part of Inuit life before their establishment in permanent settlements[15]. Inuit identities and environmental knowledge were historically connected not only to specific places (like a camp or the floe edge) but also, and significantly, to life on the move" (Krupnik et al. 2010: 163). Movement and travel were required for hunting, establishing seasonal camps, and trading. It is difficult as an archaeologist to try to comprehend a landscape or place, without considering the length of time spent there. The amount of time spent in a place varies from whether it is a camp or part of a trail.

Traditional modes of transportation for Inuit in the past varied by season as they do today. During my fieldwork it became apparent that summer travel is primarily by speedboat to other islands or parts of the mainland along the coastline. In the winter, the sea freezes and people can travel by Skidoo. Climate change has made winter travel conditions riskier and more dangerous. Traditionally, summer travel could be done by a

[15] Inuit moved into year-round permanent settlements after the influence of the Moravian Brethren who arrived in Labrador and set up several missions along the coast (Arendt 2013; Bird 1945; Brake 2019).

one-person *Kajak*[16], or a larger boat called an *umiak* that could fit several people, gear, and dogs (Brake 2019; Hood 2008; Larkham and Brake 2011; Weyer 1932). In the winter, sled dogs pulling a *Kamutik* (sled) across packed sea ice and land made long-distance travel faster and given the right conditions people would use a *Kajak* to travel into the open ocean (Brake and Nochasak 2019; Larkham and Brake 2011). Inuit across the arctic are known for their *Kajak* construction, and Labrador Inuit specifically are known for strong, balanced, and fast *Kajaks* that could be more than twenty feet long (Brake and Nochasak 2019). This innovation is evidence of Inuit thriving in these coastal environments.

Navigating the intricate coast of Labrador is a massive feat without the use of GPS or what many of us consider traditional maps. Before GPS, Inuit relied on memory in several ways for traveling. Instead of focusing on a single technique for transportation, "Inuit bring all their knowledge, experience, and senses to bear on every available environmental sign and circumstance" (MacDonald 1998: 161) from sea currents, wind and snow drifts, landmarks, stars, or even the behavior of animals including their sled dogs. Through collective memory passed down through generations, an individual knew certain landscapes and horizons from where they were (Andrews and Zoe 1997; Hallendy 2000; Whitridge 2004). Additionally, memory is vital to using oral directions given by someone who had been there before. Place names function as a mnemonic in cultures across the arctic (Andrews and Zoe 1997; Aporta 2003; Cruikshank 2007; Hallendy

[16] A capital "K" in Inuktitut has a different sound from a lower case "k" (Andersen et al. 2007). K, in some dialects is replaced with a "Q" and has a sound more similar to an "h" in English.

2000; Hamilton 1996; Krupnik et al. 2010; Whitridge 2004). "As a part of a knowledge system, traditional place names serve as memory 'hooks' on which to hang the cultural fabric of a narrative tradition" (Andrews and Zoe 1997: 172). Place names in Inuit culture usually include a description of the geography or an event that happened in that place (Hallendy 2000; Krupnik et al. 2010; Whitridge 2004).

> The centrality of place names to Inuit spatiality is reflected in their capacity to simultaneously archive a diverse array of cultural knowledge in a tangible, geographically anchored idiom, impart cultural and personal meanings to this same topography, and provide individuals with mnemonic devices for navigating an often trackless arctic landscape. Topography is made intelligible and mapped into memory through its articulation with a store of cultural knowledge. (Whitridge 2004: 220)

The unfortunate loss of place names, along with the increased use of GPS, has had a huge impact on today's Inuit in wayfinding methods (MacDonald 1998). However, in an increasingly digital world some organizations, such as Siku.org (SIKU 2020), are using apps and web platforms that incorporate traditional knowledge and allow users to communicate with each other and post photos pertaining to sea ice conditions.

Another relevant aspect of Inuit traditional knowledge is the use of the sky, and astronomical markers for navigation. It is suggested that some inuksuit are built to be aligned with astronomical markers such as the north star or various moon positions (Hallendy 2009). Hallendy (2000) had originally assumed the stars were unimportant to Inuit that he lived with because they were unfamiliar with the 'Big Dipper'. He later realized that what many Westerners recognize as the Big Dipper, is a caribou in Inuit culture. Traditionally, Inuit were not known to use constellations with this as an exception (MacDonald 1998). Instead, there is a "widespread Inuit view that all stars were once animate beings on Earth, possessed of single souls, which in transformation logically retained their individual identities" (MacDonald 1998: 14). There are problems with using the sky for navigation in the arctic as amount of daylight drastically changes from season to season. Some researchers doubt the use of the arctic sky as a navigational tool due to a lack of evidence (MacDonald 1998). However, this absence of evidence could be due to miscommunications and a deficit of Indigenous-led studies. Inuit in Nunavut compiled oral history into a review focused on traveling and living off the land where they document the north star's use as a method of navigation, knowing one's place, and time keeping (Agiaq Kappianaq and Nutaraq 2001). The north star's fixed location was especially important when traveling on sea ice as an icescape is more dynamic and less reliable than the landscape.

4.3 GIS: Least Cost Path

Geographic Information Systems, and Least Cost Path

A Geographic Information System (GIS) is a tool that has made many other theories testable in a reasonable amount of time. The computer-based application allows users to not only map data, but to analyze different aspects of the data, not limited to: slope, elevation, vegetation cover, and statistical information[17]. While a GIS does not appear to be a primary source of new theories, it does influence theory; it has been used to prove theories wrong, and to aid in providing counter-theories (Hu 2012). For

[17] Social and economic data can be mapped geographically and represented through a GIS.

example, late Bronze Age linear ditches in Wessex were theorized to be markers of territorial boundaries visible only from within each boundary (Hu 2012). However, visibility analysis showed that the ditches followed topography and landscape orientation and were visible from a variety of locations (Hu 2012; Llobera 1996).

Archaeologists began using GIS in their research in the 1990's for a variety of spatial analyses and predictive modelling to determine the location of sites (Hu 2012). John Bintliff (1977) published his view on the importance of walking time as opposed to map distances, and this was followed shortly by the first move towards a digitally calculated least-cost path in 1980 (Bintliff 1977; Herzog 2013). This history of a GIS makes it an important topic to discuss theoretically.

Within QGIS (Quantum GIS – an open source software), I utilize applications such as: comparative analyses and least-cost path to find geographical patterns between the various aspects of the landscape and inuksuit placement. The comparative analysis is useful to compare differences and similarities in patterns between the various locations surveyed along the coast of Labrador. In future studies, a comparative analysis could also prove useful in comparing identical winter and summer imagery. These analyses provide clues to the use of the inuksuit, for example, whether they are navigational or embody a different purpose or memory, and if they can support information from traditional knowledge. Using a GIS allowed me to compare the alignment of several inuksuit, or an inuksuk to another feature, or with celestial alignments (Anschuetz et al. 2001; Whitridge 2004). While it may be unlikely that the sky was used, this test of alignment is a quick way to rule it out. When looking at navigational routes, it is important to remember that not only the end points create ‘place’ as discussed above. The travel routes, or trails, are also experienced. “While movement was not perhaps always as intimately intertwined with life as observed among Inuit communities…the fact is moving through physical landscapes formed a vital experience across past communities” (Howey 2011: 2523). Incorporating a GIS analysis into my thesis aided in focusing on movement and mobility, while traditional knowledge provided more cultural insight into the landscape and icescapes.

Least Cost Path (LCP) and circuit theory are two different but closely related theoretical applications. Least Cost Path is more familiar to digital archaeologists, however, it is argued that it should be used in conjunction with circuit theory for a more comprehensive study of travel routes (Howey 2011). While LCP calculates one route based on specific ‘costs’, such as topography, wind, currents, and land cover, circuit theory produces several possible routes and ranks them by resistance, or cost (Herzog 2013; Howey 2011). Circuit theory is more applicable to first-time travel and migration patterns, while LCP assumes the traveler has a complete knowledge and view of the landscape. Circuit theory was influenced by electrical engineering and applies ‘random walk theory’. Random walk theory assumes “the fates of random walkers on circuits can be predicted by resistance, [and] conductance” (Howey 2011: 2524). Least-cost path and circuit theory are very technological methods which I pair with cultural and historical information. These tools also require the understanding that environments change with seasons and natural events. In Labrador, the biggest changes in environment will be from landscape to icescape where in an icescape, the sea becomes a solid travel route, and therefore ‘place’, by foot or sled.

These theories guided my research by accounting for the original purpose of the inuksuit, while also presenting my findings in a way that is attuned to the Western world using GIS as a tool for map making and analysis. The landscape, wherever you are, embodies many memories from the people that came before you. A comprehensive understanding of traditional knowledge in Labrador helps me analyze the spatial data I collected with drones and GPS. I believe it is important to try and comprehend these memories to understand why ‘non-sites’, or landscapes, are significant to modern cultures and in turn why they too warrant preservation in addition to localized cultural sites.

Chapter 5: RESULTS

5.1 Discussion by Location

The following section begins by looking at findings by location, generally grouped by island visited for fieldwork. A table of each feature recorded throughout fieldwork (except for burials) can be found in the appendices. Chapter 6 contains a discussion of the themes and findings by connecting the results to the broader research objectives and theory, an examination of the practicality of using a drone for archaeological research in Northern Labrador, and a few case studies of where cultural landscapes are (or are not) represented in legislation.

5.1.1 Coffin Island

Coffin Island, or *Ukusiksalik* (Brice-Bennett 1977), is located northeast of the Okak Islands at the mouth of the tickle (see Figure 3). This island has a few previously recorded sites, including two areas with inuksuit (Coffin Island 1 and 3; HjCk-07 and HjCk-14, respectively), a site consisting of a tent ring (Coffin Island 2; HjCk-13), and a soapstone quarry for resource extraction (HjCk-08) (see Figure 4) (Curtis 2007; Fitzhugh 1981; Kaplan 1983). The tent ring is located in the valley between the two ridges that have inuksuit. During my fieldwork, we spent a single day mapping and photographing inuksuit at Coffin Island 1 both by hand and aerially via drone. Unfortunately, due to time we were unable to survey more of the island or to visit Coffin Island 3 to document the other collection of inuksuit.

Coffin Island has few gradual beach areas along the northern and western shores, but we anchored near a rocky ledge between sites Coffin Island 1 and Coffin Island 3.

There are wide sweeping views of the mountain range to the west, and the hills on the island climb much higher than Green Island which is of similar size. There are a few small spruce trees along the hills, and the valley in between the two ridges was grassy and flat. In our day on Coffin Island, the weather varied from foggy to sunny.

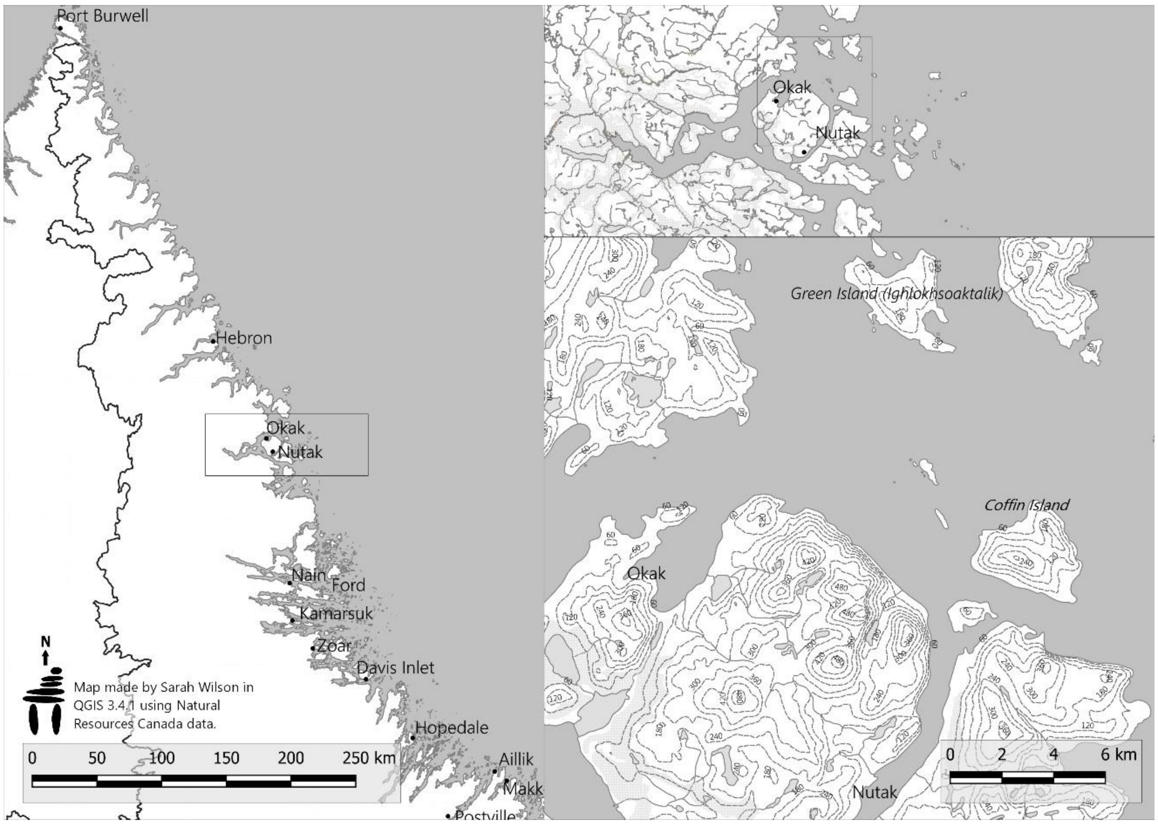

Figure 3: Map of Okak area.

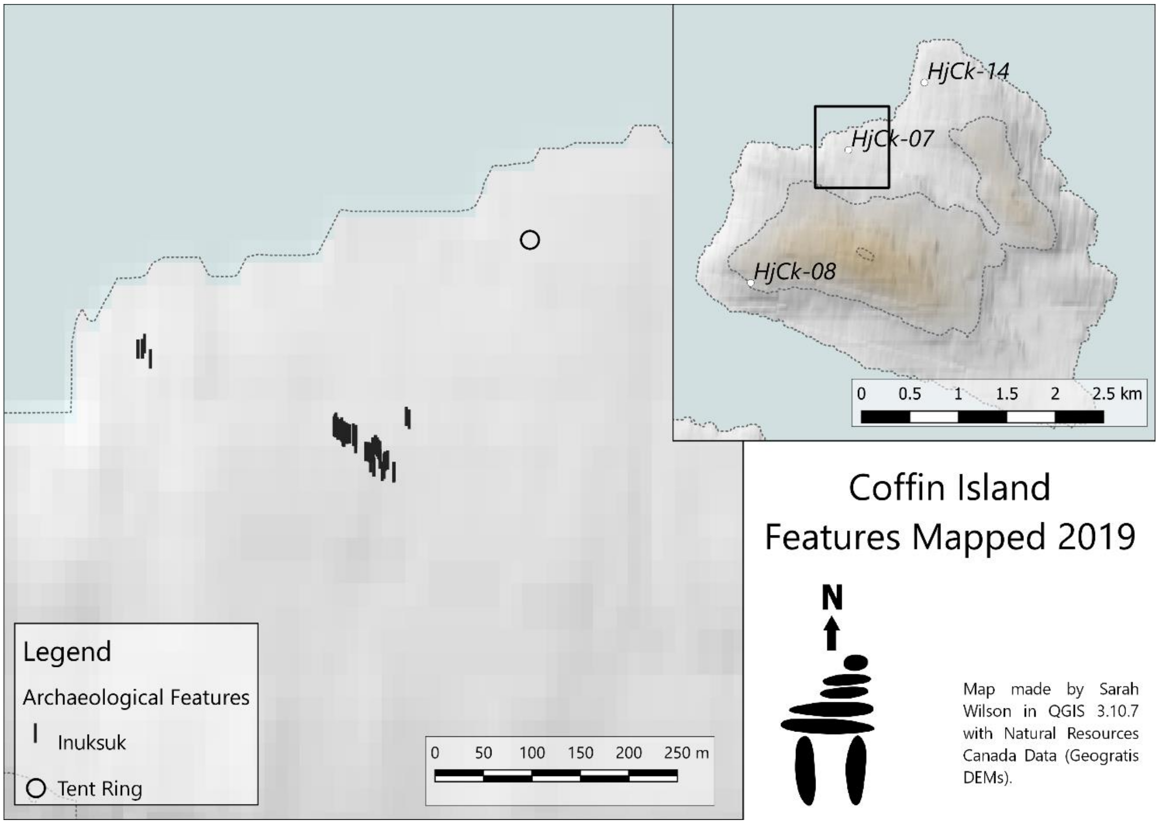

Figure 4: Map of archaeological features recorded on Coffin Island in 2019.

The inuksuit at Coffin Island 1 are broken up into groups: the central cluster of around 70 inuksuit, with a smaller cluster further down the ridge towards the shore. Standing at the tent ring when surveying for Coffin Island 1, the inuksuit were barely visible peeking through the fog to the southwest (see Figure 5). Trees were visible above the inuksuit which looked similar in appearance. The fog may have made the inuksuit easier to spot since it drastically faded the background. Given the way the inuksuit blend in with the ridge behind them, it seems unlikely that they were used to guide a person coming from the shore in the summer. In the winter, it is possible that they are visible and more striking against a snowy background, or that snow encases them hiding them from view. Additionally, in our approach from the northeast to the larger cluster, there were a few individual inuksuit on the slope approaching the ridge. From the lower inuksuit, two of the inuksuit are easily visible on the horizon looking east, as seen in Figure 6 below.

Each inuksuk is wedged into the cracks in the bedrock, propped up on other rocks, or leaning against a ledge. These inuksuit have drawn attention from local archaeologists for their unique form – primarily composed of a single-standing, tall, and skinny rock. These are referred to specifically as 'pinnacles' in other archaeological publications (Cloutier-Gelinas and Merkuratsuk 2009; Curtis 2007; Fitzhugh 2017; Kaplan 1983; Larkham and Brake 2011; Whitridge and Woollett 2009). Instead of categorizing these rock features separately from the rest of the inuksuit documented in Labrador, I include them in my research as inuksuit with a different form. The shape of an inuksuk may instead be reliant on the types of rocks available. To create this landscape, making several small inuksuit could have been preferred over a larger stack of several pinnacle shaped rocks. This is not to say that pinnacle shaped inuksuit are not deliberate, but that they are somewhat reliant on the rocks available.

Figure 5: View of Coffin Island 1 from valley below, photo courtesy the author.

Figure 6: Inuksuit visible from lower group of inuksuit at Coffin Island 1, photo courtesy Dr. Peter Whitridge.

There is a wide range of potential functions of these inuksuit. When showing photographs of the arrangement to locals in Nain and in Hopedale during community meetings, individuals were unfamiliar with the formations and could not identify their purpose. While not specific to Labrador, Inuit tend to place “features such as graves, monumental inuksuit, and waiting places” (Stewart et al. 2004: 205) in higher locations that are less sheltered and are more visible. Additionally, Hallendy (2000) describes some inuksuit in the Baffin Island area as “*inutsuliutuinnaqtuq*, which means inuksuit that are created to shorten the time that one waits” (67). On Baffin Island, there is a place called Tukilik where there are over 200 inuksuit where hunters waited during a caribou hunt (Fitzhugh 2017). While many inuksuit function for hunting purposes, either as decoys or as objects to hide behind (Buggey and Mitchell 2008; Fitzhugh 2017; Hallendy 2000, 2009; Larkham and Brake 2011; MacDonald 1998; Stewart et al. 2004; Whitridge 2004), inuksuit-building is also a way to pass the time (Agiaq Kappianaq and Nutaraq 2001). This activity is similar to how stone-stacking is controversially shared through social media as a way for an individual to spend their time outdoors doing something creative.

Another perspective that I was curious to consider was the association of inuksuit on Coffin Island to astronomical or celestial markers and alignments. There is little information in mainstream research about Inuit using astronomical markers for navigation or spirituality; however, there are a few mentions that are worth noting. As mentioned previously, Inuit see the Big Dipper or Drinking Gourd constellation as a caribou (Hallendy 2000). Stars in Inuit culture tend to represent individual beings while groups of stars depict inanimate objects (MacDonald 1998). With regards to inuksuit, it is suggested that some are built to be aligned with astronomical markers, including the pole star, or the midwinter moon (Hallendy 2009: 62).

With reference to Coffin Island 1, Fitzhugh (2017) argues that the inuksuit are not aligned astronomically. However, in a quick Google Earth analysis using data points collected from Coffin Island 1, the alignment of the large cluster of inuksuit is exceptionally close to matching the sunset of the summer solstice (see Figure 7). The inuksuit are propped up on ledges and in cracks meaning that the geology of the island is a significant factor in the situation of inuksuit. Additionally, this quick look at Google Earth does not provide the actual horizon, which somewhat alters the location of the sunset. In Google Earth, the horizon appears flat as if the view to the northwest was a seascape. Instead, the actual view has mountain ranges and islands, as seen in Figure 8. While there are no indications that Inuit observed or celebrated either solstice or equinox, MacDonald (1998) notes that "Inuit of Labrador, on the other hand, seemed particularly given to summer festivals, according to F.W. Peacock, a Moravian missionary, who cites early church records to support his claim" (130). These records briefly discuss activities that Inuit conducted in the evenings around July 7th, 1771 (MacDonald 1998). More typically, Inuit associate the passing of time and seasons with different biological factors like plants changing colors or animal life cycles (MacDonald 1998). The alignment of the Coffin Island 1 inuksuit is not necessarily related to the summer solstice, but it is interesting to note. I also tested the inuksuit with the alignment of sunsets on other dates, including the equinoxes and the winter solstice; however, none were close to lining up.

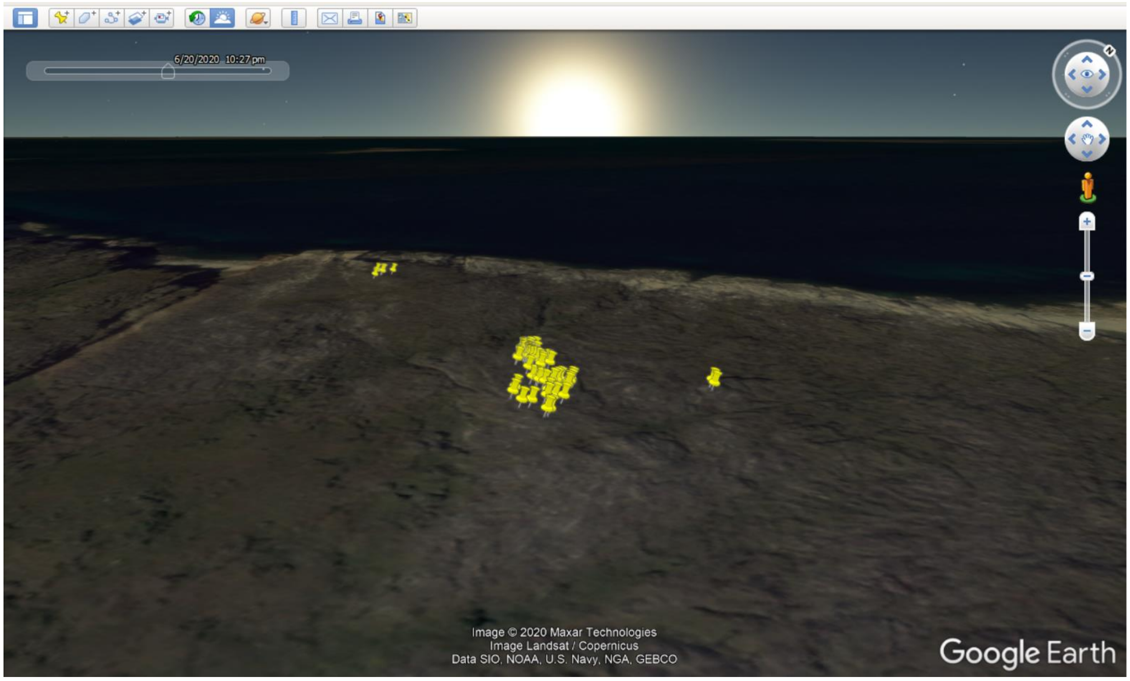

Figure 7: Screengrab of Coffin Island 1 inuksuit in Google Earth.

Figure 8: View of horizon from Coffin Island 1 looking northwest, photo courtesy Dr. Peter Whitridge.

At Coffin Island 1, I conducted two aerial photogrammetric surveys with the drone to document the inuksuit we had recorded by GPS point. Using Agisoft Metashape, I compiled these photos to create a 3D model, a digital elevation model, and an orthophoto mosaic. The two separate flights collected imagery of the two clusters with inuksuit; the first flight occurred before the smaller grouping was recorded in our survey. The 3D model shows a detailed representation of the landscape where many, but not all, inuksuit are clearly visible. Given their small size, this is an impressive result. My plans to use the drone for fieldwork was to document features that we could see on the landscape, rather than using it as a surveying method. The resulting DEMs, orthophoto mosaics, and models discourage the use of drones for surveying and documenting small features since not all inuksuit are visible in height representations and their color blends in with the bedrock.

Individual rocks and ledges are visible in the digital elevation model extrapolated from the photogrammetry imagery. The inuksuit in these DEMs are so small that they are hard to define. Another problem with this method is that the GPS points are much rougher than the DEM. The points collected by the Garmin GPS64s have an accuracy of about 3m, whereas the DEM has an extremely high resolution. In some applications, the GPS points could be redefined based on the DEM. In this case, the DEM provides a high-resolution representation of the overall landscape. The actual features are not the focus, but rather the general topography, slope, and texture of the place. The focus on slope and geographic features in the area provides a platform to study the placement of several inuksuit that have fallen or broken. As seen in Figure 9 there is no specific pattern between fallen, broken, or standing inuksuit at Coffin Island 1.

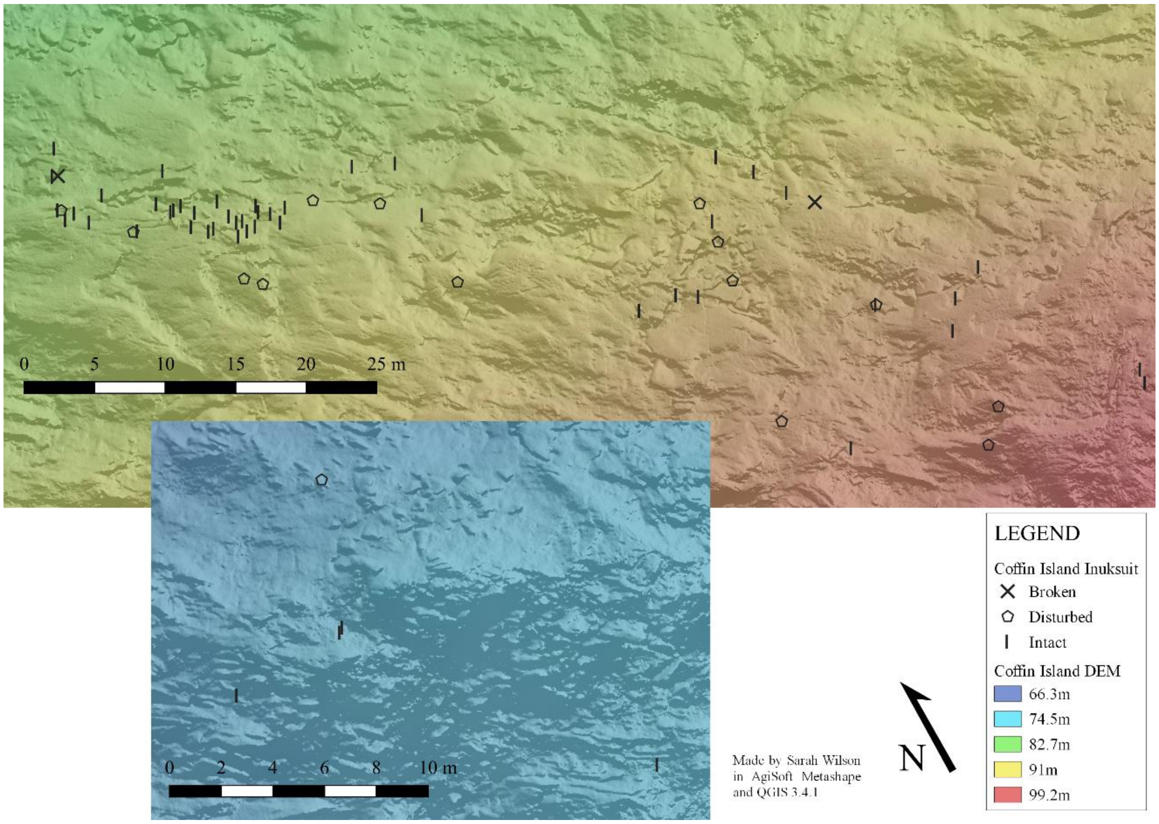

Figure 9: DEM of Coffin Island 1 showing inuksuit conditions. (Broken means that cracks in the rocks that could be refit were identified)

5.1.2 Green Island

Green Island, or *Ighlokhsoaktalik* (Brice-Bennett 1977), is located north of the Okak Islands (roughly northeast of the historic settlement of Okak). The small island has low gradual ridges and has little vegetation larger than a shrub. Many archaeologists have visited Green Island, and several sites and features have been documented here (see Figure 10). These sites include habitation sites along beach terraces, historic-modern campsites, sod houses, fox traps, caches, and burials (Cloutier-Gelinas and Merkuratsuk 2009; Kaplan 1983; Whitridge and Woollett 2009). Kaplan (1983) suggests that sites on Green Island, specifically Green Island 1 and Green Island 6, were occupied by 15th-17th century Inuit, and are strategically located on shores near harp seal and bowhead whale migrations routes. In my field survey, we made two transects across the island running northwest and southeast with the goal of surveying and documenting inuksuit, and to record ‘pinnacles’ that had been visited previously and mentioned by other archaeologists.

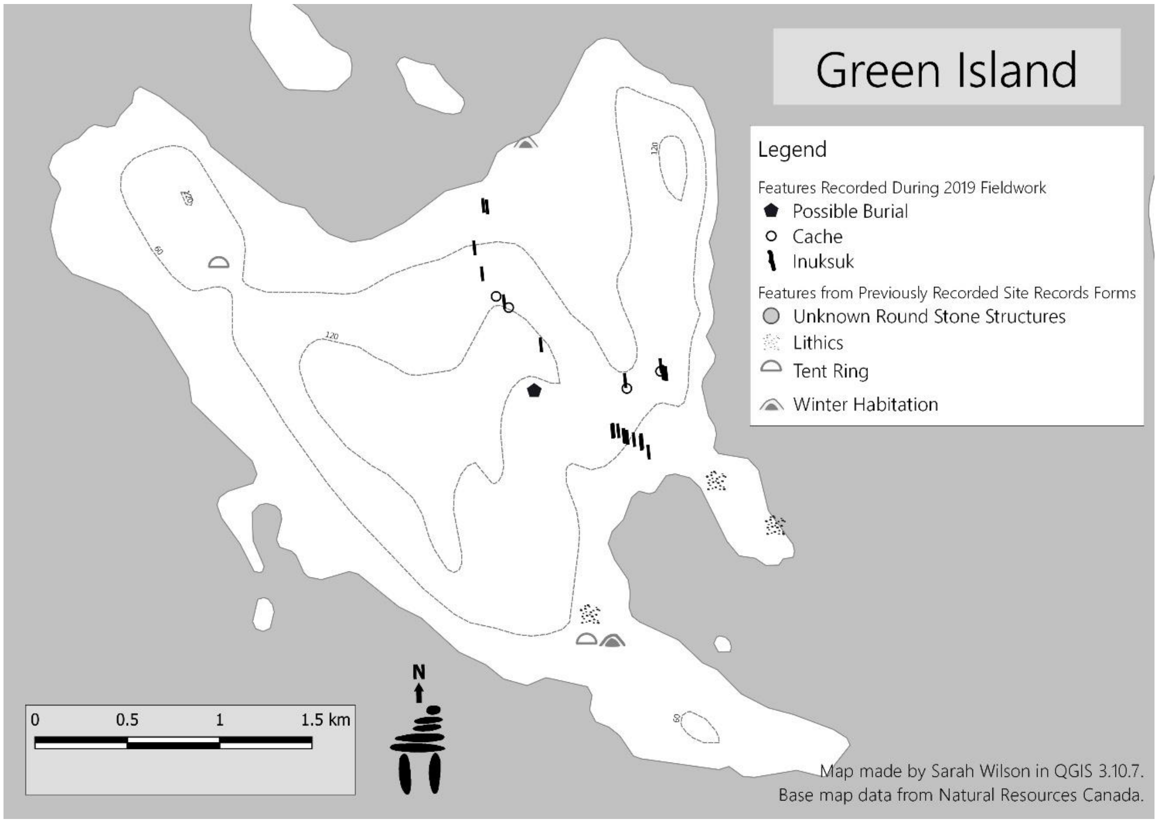

Figure 10: Green Island map of archaeological features.

The inuksuit we came across in our traverse were varied – many were difficult to spot from a distance or were associated with caches and potential burials. Most of these consisted of placed rocks, which were sometimes hard to discern from a glacial erratic. One reported use for placed rocks is a gun rest (Agiaq Kappianaq and Nutaraq 2001). Other inuksuit had more defined forms that were easier to distinguish as human-made. Before going into the field, I was aware of two inuksuit (pinnacles) paired together that were visited previously by archaeologists. Upon reaching the site, we documented several sets of these inuksuit following the slope to (or from) the shoreline. The terrain in this specific location was rugged; there were many cracks and jagged breaks in the bedrock that required careful foot placement, however, it was not overly dangerous to walk along. It would be interesting to see how snow impacts this landscape: whether drifts make the gaps in the bedrock even more dangerous or if they smooth out the surface. In addition to taking individual GPS points for each inuksuk (whether fallen or still standing), I conducted a drone survey to collect photogrammetric imagery. This imagery was stitched into the following digital elevation model and orthophoto mosaic (Figure 11).

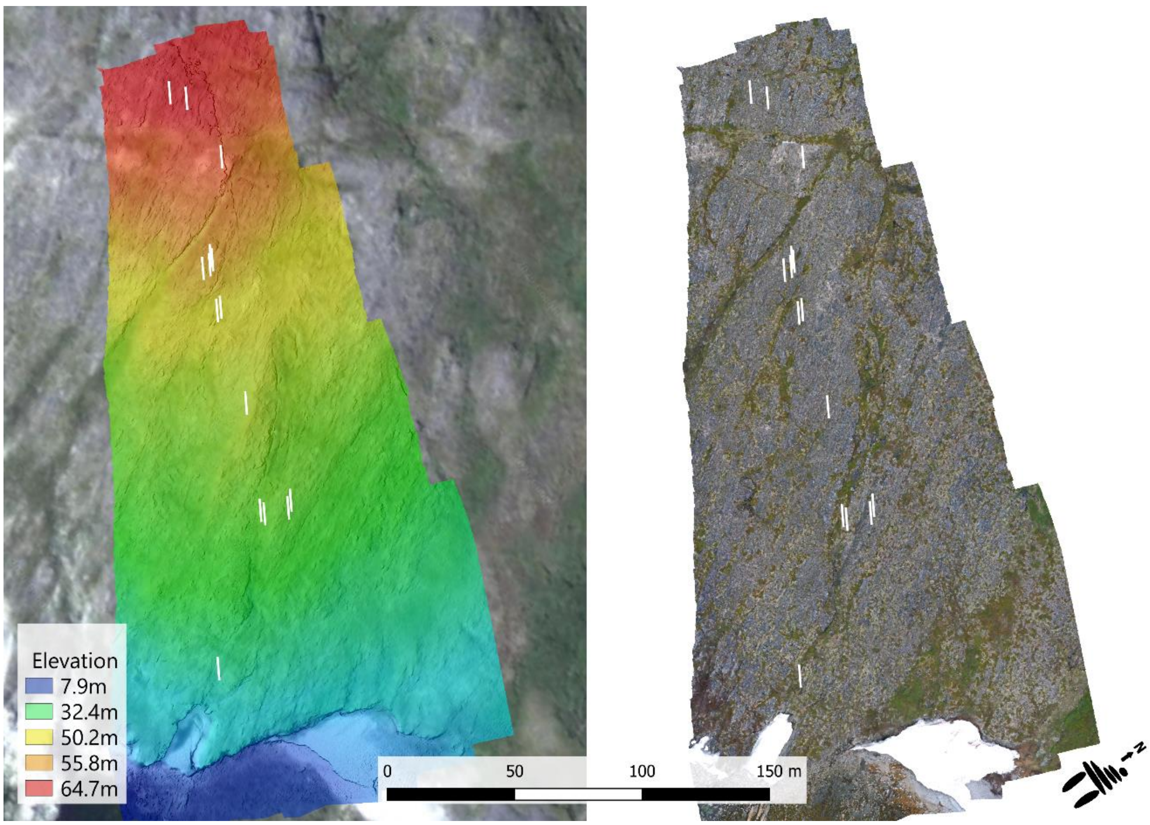

Figure 11: DEM with a hillshade and an orthophoto mosaic from drone imagery on Green Island.

In literature, inuksuit like these on the southeast shore of Green Island match descriptions of caribou hunting lines where “deer would pass between the lines of stones, and the hunters hidden behind them would lance them” (Larkham and Brake 2011:14), but in actuality, they do not seem large enough to use as blinds or decoys. In analyzing the placement of these inuksuit, they seem more consistent with descriptions of inuksuit that are used for navigation. Larkham and Brake (2011) record an individual from Labrador saying, “[t]here would be one rock stuck straight up and two on the sides holding the rock up. These would be found on each side of the road or trail, and if they were matching it meant that this was a safe road” (36). The inuksuit at Green Island were frequently set up in pairs, which seems significant to communicating something about the landscape. They vary in arrangements of pairs or singularly and based on the DEM, the pairs seem consistent with relatively smooth topography, while a solo inuksuk marks where there is a steep drop off or crack in the bedrock.

In QGIS, I compared the least cost path (LCP), with slope as the cost, to the alignment of the inuksuit and different features nearby on the island. I ran into problems with having only low-resolution digital elevation models of the entire island, and with the Least Cost Tool in QGIS using the ocean as a plane for walking. While this would be true in the winter when the sea is frozen, I was hoping to find the most cost-effective paths across the land. I ran two LCPs; each starting at the inuksuk closest to the shore on the island’s southeast cove and ending at different spots (see Figure 12). One ends at the presumptive burial to the northwest, and another at a cache along the ridge near the center of the island. The path to the burial immediately veered left and followed a small valley towards the feature, while the path to the cache went around the island on the water and up the other side. In the map below, the least cost path did not follow the inuksuit cluster in the route to the burial (dashed line); however, if following those inuksuit to the burial the route would be shorter and more direct. This an example where the LCP chose a longer and more gradual route over a more direct path since the cost determining the LCP was slope. With access to a program running circuit theory, the results would show other route options. Conversely, the LCP that wraps around the island and up the other side (dotted line) roughly follows the inuksuit and placed rocks that we mapped in our traverse.

The inuksuit near the southeast cove are coarsely in line with the burial despite not matching the LCP. The other inuksuit on the center ridge are also following a distinct line that traverses the island. It is important to note, however, that the features mapped in 2019 were along only two transects that we made while walking. While we looked for features in the distance as we were walking, this map (Figure 10) is a stark representation of where we walked from the north side of the island on one side of the valley, and back along the east side.

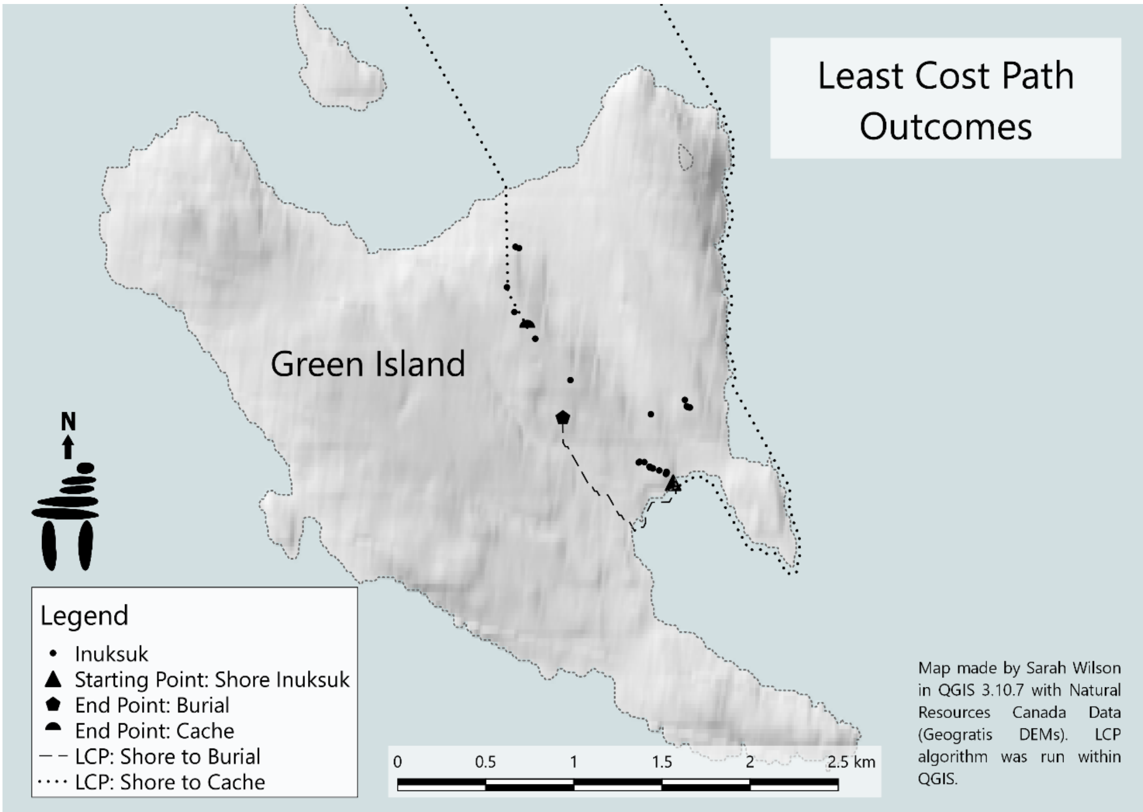

Figure 12: Least Cost Path results on Green Island.

5.1.3 Okak Islands

In transit, while leaving Kivalekh, our crew spotted features on a beach shore in a cove on the northeast side of the Okak Islands. Due to time and other factors, we were not able to survey this area. Upon returning to Nain, we informed the Nunatsiavut Government of the site since they planned fieldwork around the Okak Islands later that summer. In August 2019, Jamie Brake and Michelle Davies visited and recorded this site as HjCl-15 and HjCl-16 (Okak Island Northeast 1) under permit NG19.22. The cove has steep slopes on the northwestern shore, with a cobble beach and a more gradual slope towards the south. Above the beach is a grassy terrace that transitions into a rocky slope leading to a terrace of bedrock. From the water, you can see two inuksuit on the bedrock above the beach. Brake and Davies recorded an inuksuk consisting of a single standing white rock and an inuksuk consisting of several stacked rocks making a hive shape, a little less than one meter tall (see Figure 13). These two inuksuit are visible from two open caches recorded near the beach (see Figure 14). Further up the slope, there is a small 'pinnacle' style inuksuk covered in lichen. This inuksuk was not visible from the water. A tent ring is also located in this cove, however its relationship with these features is unknown.

Figure 13: Inuksuk on Okak Island, photo courtesy the Nunatsiavut Government.

Caches have several functions, and while they are stationary features, they allow Inuit to be mobile. Caches provide a method of storing items, including food which throughout Labrador and Quebec can include frozen, dried, and fermented or 'stinking' meat for long-term storage (Stopp 2002). A cache can also be used for more short-term food storage and can often be found along known travel routes to provide fuel for dog sled teams on long trips (Stopp 2002). Inuksuit can act in the way that a cache does as well by containing an item, as seen at the Ukaliak Island inuksuk near Hopedale that contains a glass jar for passing along messages (Larkham and Brake 2011). Inuksuit and caches have similar construction techniques and appearances. While they function differently, inuksuit can signal the location of a cache to a traveler. Some caches seen in Labrador are quite small, such as the cache at Okak Island Northeast 1, while others discussed below at Multa Island and Skull Island can be much larger.

Figure 14: Cache on Okak Island, photo courtesy the Nunatsiavut Government.

5.1.3 Multa Island

Multa Island is about 30km north of the community of Hopedale, or about a 40-minute speedboat ride. For a map of Multa Island and other sites in the area in relation to Hopedale, see Figure 15. Multa Island consists of a large main island and an adjacent island connected by a submerged ridge (see Figure 16). Like many other islands in the area, Multa Island is made up of primarily exposed bedrock with few trees and shrubs. Previous archaeologists have documented tent rings and sod houses on the island, including features that may be tied to Moravian Missions and the Hudson's Bay Company (Kaplan 1985). Today, Multa Island has remnants of a wooden structure and is visited for seasonal fishing by residents along the coast. Multa Island and the surrounding area was historically important for cod-trapping and bottlenose dolphin hunting (Brice-Bennett 1977).

In a brief walking survey of Multa Island, Denver Edmunds, Mackenzie Frieda, Kevin Gully, our boat driver/bear guard Zeke Lucy, and I documented ten inuksuit scattered across the island, a possible burial, and a large 2-3 meter round stone structure in a boulder field. Among the inuksuit, was a large hive-shaped inuksuk that had a substantial amount of crusty black lichen growth overlapping rocks and covering the cracks between them. Some of the smaller inuksuit we encountered seemed to be made of a very iron-rich rock and had a reddish appearance (see Figure 17). The reddish rocks lacked lichen growth, which might be due to their chemical composition, or more recent construction. Many of the inuksuit had fallen over or were dismantled.

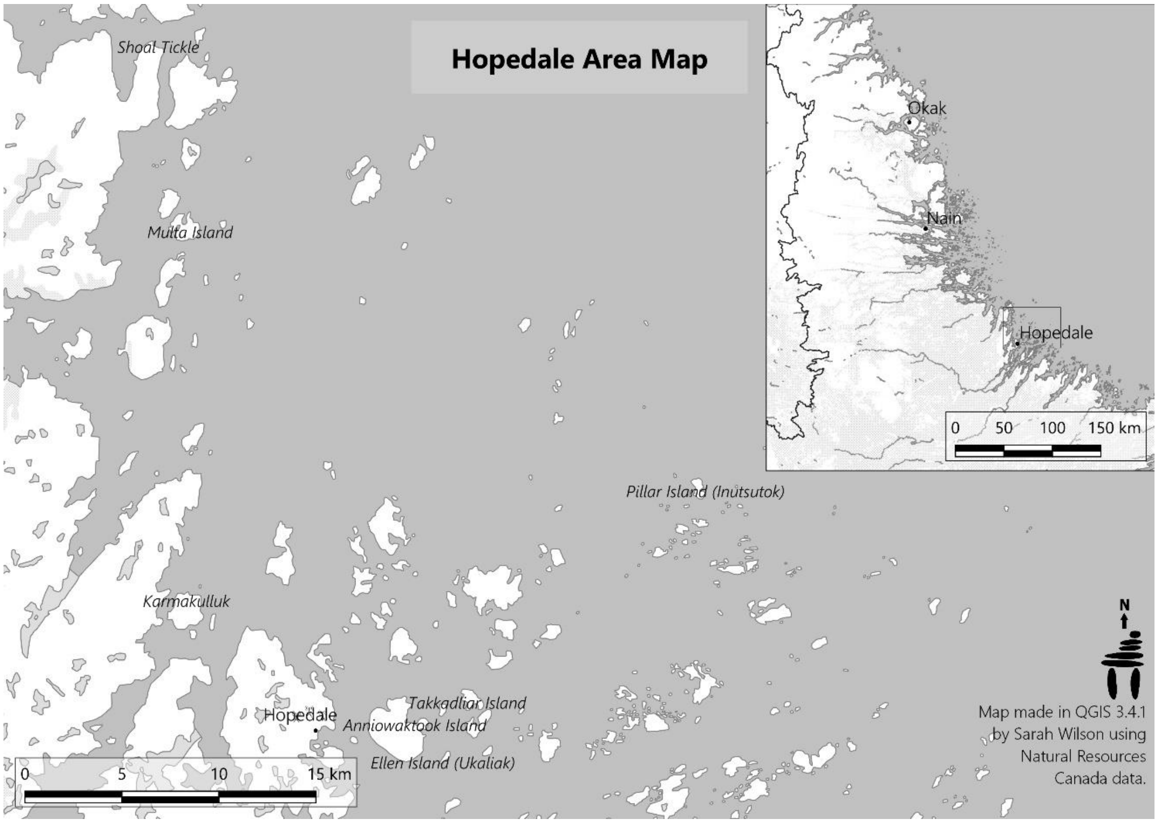

Figure 15: Map of Hopedale area.

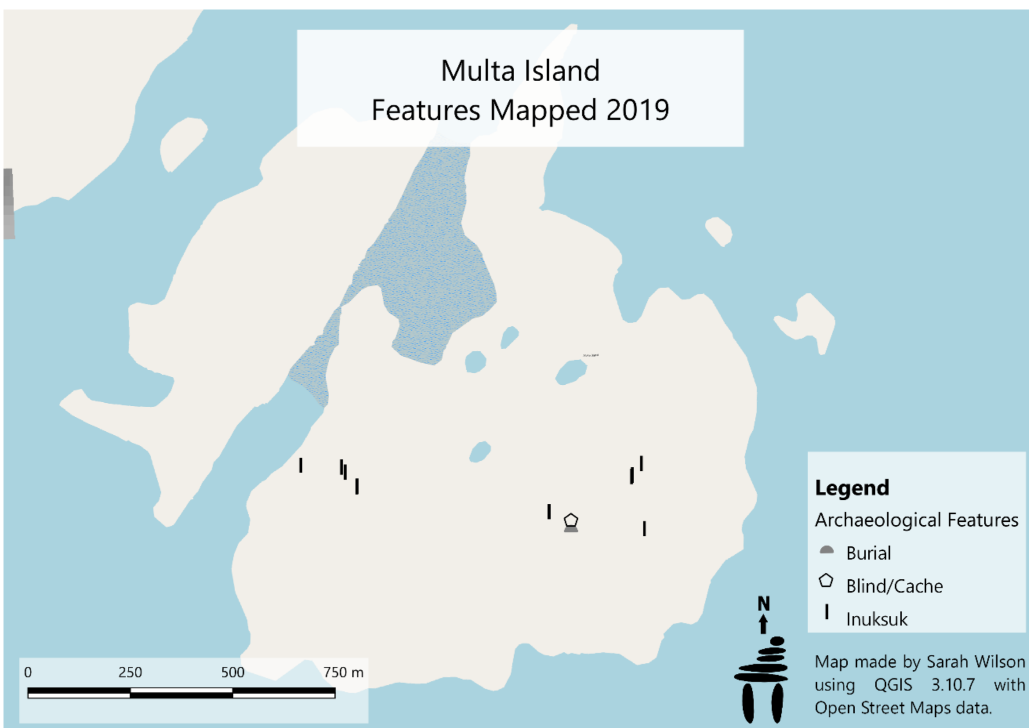

Figure 16: Map of archaeological features recorded in 2019 on Multa Island.

Figure 17: Iron-colored rocks on Multa Island - possible dismantled inuksuk or cache, photo courtesy the author.

The largest inuksuk on the island, which was visible from a great distance, is located near the top of one of the highest ridges. In our approach to it, there were smaller dismantled inuksuit along the ridge. The large hive-shape cairn[18] (see Figure 18) is much larger than inuksuit discussed in Larkham and Brake (2011) that are consistent with local oral tradition. Most inuksuit in the region's traditional knowledge are smaller, and with more detailed structures including windows outlining specific views, or arms functioning as arrows (Larkham and Brake 2011). The inuksuk does present possible applications for lichenometry because several of the rocks had lichen overlapping the cracks. This context is essential for lichenometry in archaeology. Instead of dating the length of exposure of

[18] In my field notes, I used the term cairn to refer specifically to hive-shaped mounds of rocks to distinguish them from pinnacles, or other style of inuksuit.

the rock used to construct the feature, the date would more closely represent the date of construction. Figure 19 shows lighter colored crusty black lichen overlapping cracks between two rocks in the inuksuk, contrasted with darker lichen on individual rocks.

The large round structure in the boulder field matches the description of a large cache. The structure's arrangement is similar to a hunting blind, however the location and distance from the water suggest otherwise. Stopp (2002) describes large bowl-like features on cobble beaches in various areas of Labrador and suggests that they are caches. While pre-Moravian Inuit were a very mobile culture, caching and storing food in strategic locations allowed them to travel; caching food and resources to prolong food supply and strategize hunting trips promoted mobility (Stopp 2002). It seems plausible that if hunting took place in this area on Multa Island, that a cache on the beach was a convenient location to process and store catches.

Figure 18: Denver Edmunds and Multa Island inuksuk photo courtesy the Agvituk Archaeology Project.


Figure 19: Lichen overlapping rocks on Multa Island inuksuk, photo courtesy the author.

Another inuksuk on Multa Island demonstrates how inuksuit interact with non-human environments. At the top of a hill, quickly spotted from a distance, a single standing tall white stone was perched on a few rocks surrounding its base. The unusual rock color was easy to spot and even easier to see because of the fertile soil supporting grass beneath it. This inuksuk (Figure 20) likely made a nice perch for a bird (or several birds) to consume a meal, leaving behind nutrients via scraps (Figure 21) and guano to support a small ecosystem. Inuksuit can also provide shelter to small animals like lemmings. This small ecosystem can encourage lichen and plant growth which can in turn make a feature appear older than it is (Hallendy 2000).

Figure 20: Image of inuksuk on Multa Island with Zeke Lucy and Kevin Gully in the background, photo courtesy the author.

Figure 21: Small bones near Multa Island inuksuk, photo courtesy Denver Edmunds/Agvituk Archaeology Project

5.1.4 Shoal Tickle

Shoal Tickle is located northwest of Multa Island, with the site itself on a small point protruding into the tickle. Larkham and Brake (2011:29) refer to this site as Shore Tickle and report that it consists of an inuksuk marking an excellent place to hunt seal. This area is on the mainland of Labrador, and its landscape has more trees than any other location visited. The shore is narrow before quickly turning into a steep slope. Without specific coordinates, this site was difficult to find. We started our survey by finding a safe spot to anchor the speed boat. The first features we documented were a burial and adjacent cache. The burial had no visible remains and had an immaculate rectangular interior construction. Our survey continued towards and along the beach, where we saw several tent rings and several caches in flat grassy areas. Some caches were built against large boulders so that the boulder formed one of the cache's walls. On the beach in the tidal zone, we spotted a large boulder with three small rocks stacked on top (Figure 22).

This inuksuit style is referenced in numerous ways by Hopedale elders (Larkham and Brake 2011). An inuksuk made of a few rocks could be used to mark where a seal was killed in the spring so that its location could be remembered until the hunter could travel to where it sank (Larkham and Brake 2011:30). While in open water it is inconceivable to go back to retrieve a sunken seal, on a shallow shore such as where this inuksuk is located, it seems possible that a sunken seal shot from the shore could be retrieved if the hunter was willing to walk into the water or fetch it via a dip net from a boat. In the spring and summer, seals are more likely to sink since they have less blubber (Taras 2007). Additionally, inuksuit can mark where camping sites or settlements are.

Another use of a simple stone-stacked inuksuk is to mark good hunting and fishing locations. This area seems frequently used, and it is possible that the inuksuk, although simple, served many purposes for different people. While it was difficult to spot in our approach by boat, someone more familiar with the area could find it easily.

Figure 22: Shoal Tickle Inuksuk, photo courtesy Mackenzie Frieda/Agvituk Archaeology Project.

On the return trip to Hopedale, we recorded two large pinnacle-like inuksuit on the mainland in a small cove about 5 kilometers northwest of Hopedale, across from Achvitoaksoak Island. Each inuksuk was made of a single standing rock and was about a meter high, possibly taller. The two were about four meters apart from each other and were spotted from the mainland, rather than the shore. We had little time to survey the area further, so it is possible that there are more features in the area that might point to what these inuksuit functioned as, whether they are place markers, navigational communicators, or memorials. In Figure 23 the second inuksuk is in the center of the photo, leaning slightly towards land.

Figure 23: Two inuksuit near mainland Hopedale, photo courtesy the author.

5.1.5 Inutsutok

Inutsutok, or *the place where there are inuksuit* is still visited by local Hopedalemiut for seasonal bird, seal, and whale hunting trips (Agvituk Digital Archive Project 2019; Brice-Bennett 1977; Nicholas Flowers, personal communication, 2019). This island is located directly east of Hopedale on the edge of the Atlantic Ocean and near several other small islands that are known locally as being haunted (Agvituk Digital Archive Project 2019; Brice Bennett 1977). Inutsutok is referred to as Pillar Island on current Government of Canada maps (Brice-Bennett 1977; Hamilton 1996; Surveys and

Mapping Branch, Department of Mines and Technical Surveys 1965). The small size and remoteness of the island, along with not having a name on maps that matched local use, made the island difficult to locate before arriving in Hopedale. The island itself is not visible on Google Maps, and maps that do have the island's geography are coarse, grainy, and inaccurate representations of the area (Google Maps n.d. [2019]). Aerial imagery provides the best representation; however, its resolution is still very coarse. It was not until my fieldwork began in Hopedale, and with the help of locals that I was able to confirm the location of Inutsutok to conduct archaeological surveys.

We focused our Inutsutok survey on collecting photos, GPS points, and notes on individual inuksuit and rock features. Six of us, including two boat drivers/bear guards, Shaun Gear and Phillip Abel, members of the Agvituk Archaeology Project, Dr. Laura Kelvin, Claire Igloliorte, and Mackenzie Frieda, and I, walked around the island following inuksuit that we could see from a distance. In a full day of surveying, we documented nineteen inuksuit scattered across the small island, along with a boat rack (see Figure 24), metal stove fragments, a jigger, a burial, and tent rings (see Figure 25). We were unable to survey the entire island before needing to return to Hopedale and not wanting to run into boat trouble late in the day. With a telephoto lens, I took photos of several inuksuit that we could see from a distance on the portion of the island that we could not reach. Also due to time constraints, I was unable to use the drone to collect photogrammetric imagery; however, I did conduct flights to collect imagery of specific features and to capture videos and images of this stunning landscape.

Figure 24: Drone photo of possible boat rack near tidal zone on Inutsutok, photo courtesy the author.

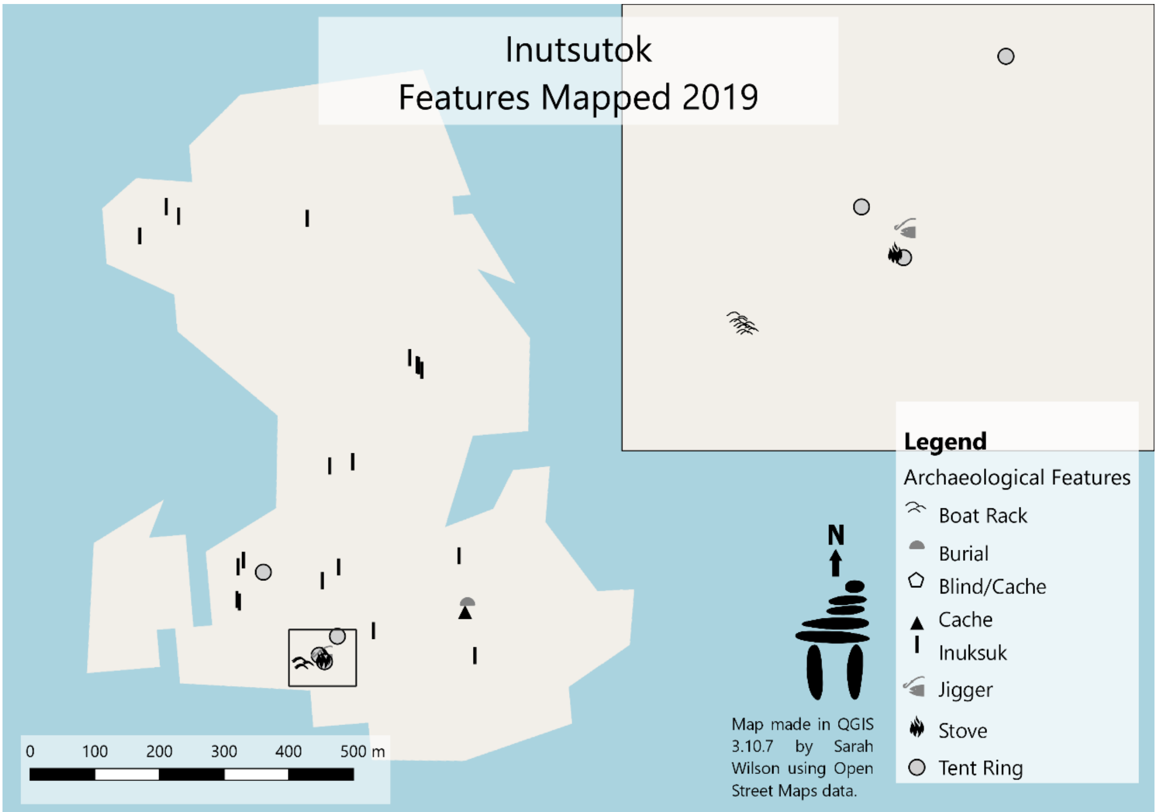

Figure 25: Map of archaeological features recorded on Inutsutok.

Inutsutok has a lot of exposed rock illustrating an active geologic past with dark dikes crisscrossing the lightly colored bedrock. There is very little vegetation due to a lack of topsoil which is largely a factor of the climate and environment of a small island without any protection to weather from the Atlantic Ocean to the east (Figure 26). Crusty black lichen covers most bare rocks that are not regularly hit by ocean waves. In our surveys, we noticed a few places where soil had been dug up by a polar bear, along with some of its scat. The features on Inutsutok are scattered across the island. The southern portion of the island had the most variety in features including inuksuit, the possible boat rack, tent rings, and a burial with a cache. This area was relatively easy to walk around and had a few low-lying gullies with small plants and grasses protected from the wind.

Figure 26: Drone photo of Inutsutok, looking east, with the three largest inuksuit visible on the left, photo courtesy the author.

The central and northern part of the island is hillier with steeper slopes. There was one area with a small valley and boulder field near the shore; however, in our short survey, we did not notice any features in this beach area. On the highest part of the island (near the center), three very large cairn-like inuksuit were visible while we traveled to the island. These inuksuit are over a meter tall, hive-shaped in appearance and very similar to the one found on Multa Island (Figure 27). Hamilton (1996) mentions Pillar Island [Inutsutok] as having landmarks for fishing schooners coming from the east. Given their large stature, and construction style, I presume that these inuksuit were built or at least used by commercial European fishers. The inuksuit had visible lichen shadows on the ground where the crusty black lichen that grows on the rocks in Labrador was not growing.


Figure 27: Large inuksuit on Inutsutok with lichen shadow, photo courtesy the author.

In areas where landscapes are shared, or in competition, between two or more groups of people, many consider the building of inuksuit and other rock features to be a way to claim space; especially when marking one's proximity to a burial (Hunt et al. 2016; Zedeno et al. 2014). The size and visibility of the three enormous inuksuit on Inutsutok could be a witness to this cross-cultural landscape since they are both visible to Europeans coming from the east, and to Inuit coming from the north, west, and south. Another small inuksuk contained a lemming skull, further illustrating the animal-inuksuk interaction observed on Multa Island. One inuksuk was perched high on the ridge overlooking the Atlantic ocean and had a shotgun shell inside, possibly indicating that the inuksuk was used as a gun rest. This inuksuk was about a foot high and had a stout, rounded construction.

5.1.6 Skull Island

From Nain, we took a day trip to Skull Island without knowledge of inuksuit, but with general locations of large circular stone structures that had the potential for using aerial imagery and photogrammetry (Fitzhugh 1981; Kaplan 1985). We visited Skull Island with no set plans but to test out and practice photogrammetry applications with the drone. Upon arriving, our boat driver/bear guard, Alfred Winters, my supervisor, Dr. Whitridge, as well as Ivan Carlson, James Williamson, and myself surveyed the area while looking for the large structures. Skull Island is about twice as large as Inutsutok; however, it has a similar setting with the open ocean to its east (see Figure 28). Skull Island has two main large hills that are separated by a small inlet. The vegetation, like the rest of the area, is low and comprised mostly of lichens and mosses. The island has an open low-lying flat area between the two hills.

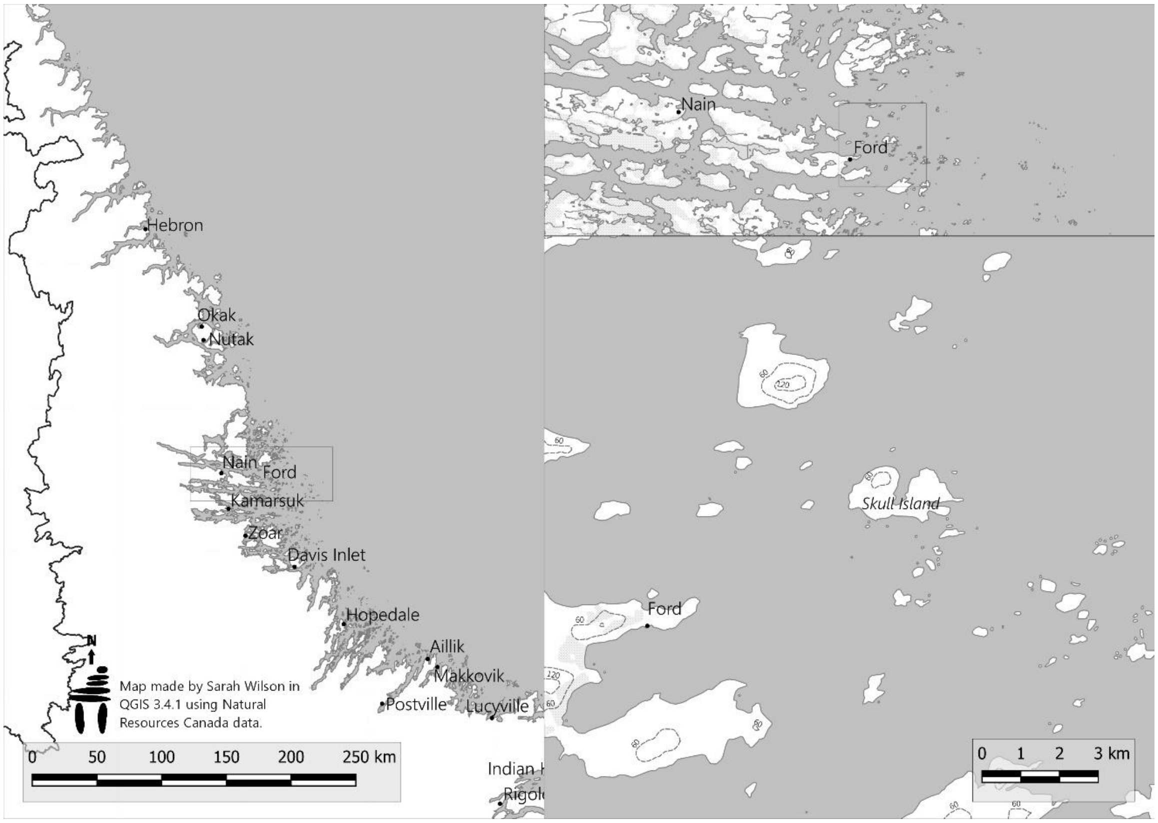

Figure 28: Map of Skull Island in relation to Nain.

On our way across the island, we saw several different types of features, including bird blinds, burials, inuksuit, and human remains. One inuksuk was placed at the ledge of a steep drop off in the bedrock, dropping at least a meter. Many sources indicate that inuksuit can communicate hazardous places (Buggey and Mitchell 2008; Fitzhugh 2017; Hallendy 2000, 2009; Larkham and Brake 2011). Other inuksuit, made of several small-stacked boulders, occurred on a ridge along the island. These were dismantled, and they appeared to have pinnacle-like rocks incorporated into their structure. Whether they were stacked vertically or horizontally to make a window is unclear. They appear to have been visible from the water (or sea ice) and have wide viewpoints from where they stand (Figure 29).

Figure 29: Fallen inuksuk on Skull Island, photo courtesy Dr. Peter Whitridge.

Once arriving at a boulder field, having known what to look for, the structures were somewhat easy to spot. Although the structures are easy to see when you are a few feet from them, they blend in well with a background of similarly colored rocks (see Figure 30). While walking around the area, we noticed three to four larger structures that could fit people inside and a few smaller structures that could have been storage units, similar to the presumptive cache on Multa Island. Having not flown a drone prior to arriving in Nain, I focused this survey on becoming comfortable with it so that I could work out any problems while in Nain before we headed north. I allowed the DH Basic app to fly controlled circular patterns around the largest stone structure (Figure 31) while collecting video, as well as an overlapping grid over the beach, and I practiced manually collecting photographs and video. The Mavic 2 Pro drone allows the pilot to fully control the flight speed and direction, but also the camera angle and manual photography settings. I wrapped up my drone practice with a photogrammetric flight over the boulder area from the larger structure towards the beach.

Figure 30: Smaller circular structure on Skull Island, photo courtesy the author.


Figure 31: Aerial photo of largest round structure on Skull Island, photo courtesy the author.

Photogrammetry in archaeology can serve many purposes, including documenting inaccessible sites, general mapping, interpretation of features through spatial analysis, and identification of features (Berquist et al. 2018; Hamilton and Stephenson 2016). The flights I conducted over sites with inuksuit fall more under the category of general mapping and interpretation of features. While the intent was to practice, the Skull Island stone structures and beach provide an excellent opportunity for using photogrammetry to identify features. Given the homogeneity between the rock structures, and the rocks surrounding them, some features are difficult to spot. Conversely, the structures are in a distinct circular pattern that, if colored differently, can be easily identified aerially.

With the imagery collected at Skull Island, I used AgiSoft Metashape to interpolate a 3D model, an orthophoto mosaic, and a digital elevation model. The same imagery is used for each file type. The 3D model can be spun around and explored, which could be useful in an interactive platform, but is less useful to my research than the following two results. The orthophoto mosaic is essentially a very large photograph, but with many photos stitched together, the resolution is extremely high at 96 dpi, or about 3780 pixels per meter. Additionally, the orthophoto mosaic (and the other results) are geo-referenced and can easily be imported into various mapping software. The orthophoto mosaic provides a spatial representation of the landscape and features while detailing different ground covers.

The digital elevation model is similar to an orthophoto mosaic, except instead of imagery, the rendered map represents relative elevation. A digital elevation model, when exported from AgiSoft Metashape, is a black and white, grainy looking TIFF file. Once exported, I opened the file in QGIS to add a hill shade, which gives the appearance of shadows. Within QGIS and other GIS software one can adjust the angle and direction of light; for this purpose, I chose angles that accentuated the most detail. Then I added a color scale to show the change in general elevation; this is most useful to show the slope since individual boulders were not tall enough to make a huge difference in elevation.

In Figure 32 below, the orthophoto mosaic and digital elevation model produce two very different types of images. Together they provide a detailed map of the site[19] with the orthophoto mosaic showing context – an above ground rocky outcrop with little vegetation, and the digital elevation model revealing small changes in elevation. The two are best used together because although the digital elevation model makes several boulder

[19] The full extent of the site was unknown so there might be additional features that are not included here.

structures appear, the orthophoto mosaic can help identify large features such as the large boulder slightly left of each image's center.

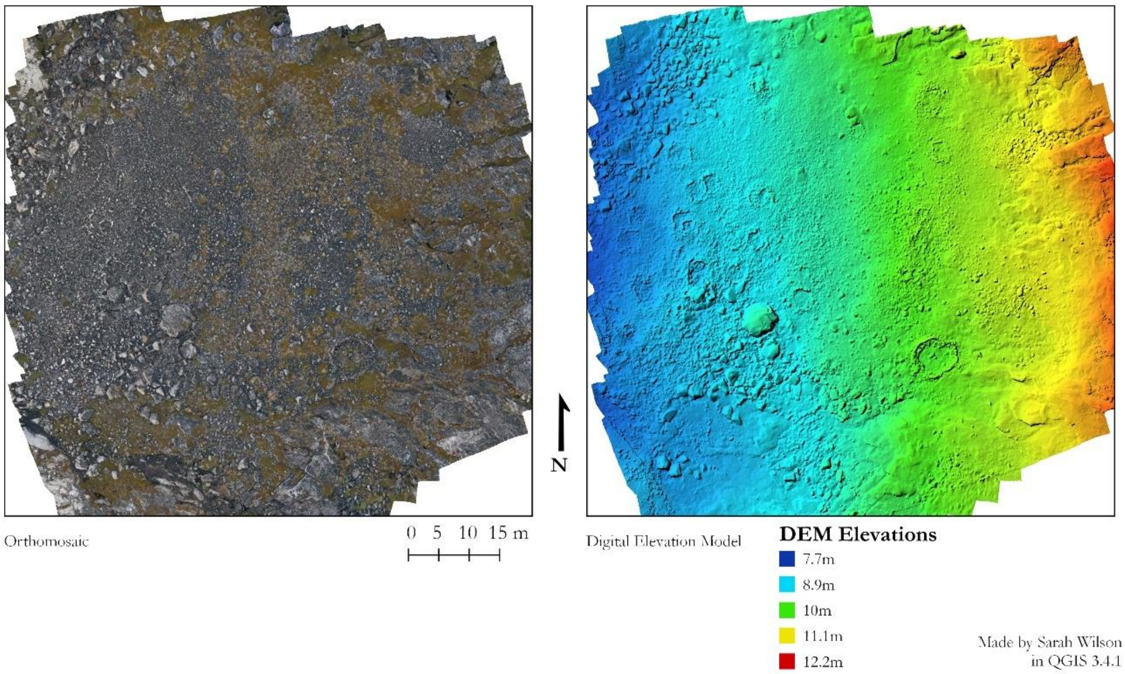

Figure 32: Comparison of orthophoto mosaic and digital elevation model of Skull Island 6 (HcCg-09).

Photogrammetry is very useful here to document several stone structures that may be hard for the human eye to see and in a short number of 'working' hours. It is important to note though, that the results took over a month to produce since I did not have the computing power or set up to produce the models in the field. In this case, now that the digital elevation model shows where structures are, it requires a subsequent field season to study further or record those features. This is less of a concern for archaeological field research that is not remote, does not take months of planning, or large amounts of funding to visit. These images could be interpolated in the field with a remote laptop setup, however, the size of these models took over ten hours to process which would require a significant amount of battery power. Photogrammetry is useful to studies within archaeology, and the price and ease of using drones makes it a cost-effective option for including in research. The practicality, or number of challenges with this method, will vary from project to project and from site to site.

Table 1: Summary of Summer Fieldwork Findings

Location	**Inuksuit recorded**	**Types of inuksuit**
Skull Island *We traversed a small portion of the island, primarily focusing on large circular rock formations near the beach.*	6	A few inuksuit comprised of several small boulders along ridge and a few that appear to be collapsed pinnacles. Some inuksuit were near other features, like a burial, or tent ring.
Coffin Island (Coffin Island 1) *We spent one full day documenting inuksuit at this site by GPS point and drone photogrammetry.*	71	Varying sizes of pinnacles; inuksuit comprised of tall single standing rocks wedged into cracks, propped on ledges, and some with small bases of smaller rocks. Most of the inuksuit recorded were in two main clusters.
Green Island *We made two transects across the island along ridges, and spent some time doing drone photogrammetry over a cluster of inuksuit near a beach.*	27	Several pinnacle-like inuksuit and many inuksuit with more of a hive structure built of many smaller rocks. It is possible that some were caches, but no contents remained. Some inuksuit were likely more recent for they were built on top of lichen on boulders.
Okak Islands (North) *In passing we saw a possible inuksuk, and later in the season Jamie Brake and Michelle Davies were able to record the site.*	3	Two pinnacles, one black and one white, and an inuksuk made of several flat stacked rocks. Also nearby were caches and a tent ring.
Mainland near Hopedale *Cove on mainland Hopedale across from Achvitoaksoak Island.*	2	Two large, prominent single-standing rocks. Each are a few meters apart.
Multa Island *Traversed around the island, focusing on higher elevations.*	10	Recorded a small white pinnacle, and a very large hive-shaped cairn. Both were visible from a distance and had a fair amount of lichen and/or grass growth on and around them. The remaining inuksuit recorded were smaller, built of small boulders. It is possible

Location	**Inuksuit recorded**	**Types of inuksuit**
		that some were caches – many were ‘dismantled’.
Shoal Tickle *A point on the mainland, more trees present than other sites. Area is known for seal hunting (Larkham and Brake 2011).*	1	One very small inuksuk on top of a large boulder near the beach that is mentioned in Larkham and Brake (2011). Most features that we recorded here were tent rings and large caches.
Inutsutok *Spent a full day recording features across most of the island. Place name translates to “the place where inuksuit are.”*	22	Many varying types of inuksuit with some small pinnacles, small stacked inuksuit, and large hive-shaped cairns along a ridge. There were several other features including a burial and cache, tent rings, metal artifacts, and a possible boat rack. One inuksuk may be a gun mount based on its location, and remnants of gun casings inside.

5.1.7 Winter

In March 2019, Memorial University of Newfoundland PhD student, Deirdre Elliott, and Eldred Allen of Bird’s Eye Inc. traveled to Hopedale to visit several sites in the winter. Inuit settlements and camps may vary in location each season based on wind, resource procurement opportunities, and comfort of the location (Stewart et al. 2004). Conducting winter surveys is difficult and reliant on the safety of travel over sea ice, along with finding a window of good weather, which can be challenging in Labrador in any season. Fourteen sites with inuksuit were identified that were within reasonable traveling distance from Hopedale and were associated with other features noted for winter seasonality, such as sod houses, in the Provincial Archaeology Office Site Record Forms. In three days, eight sites were visited, with the accompaniment of Trevor Broomfield as the bear guard and SkiDoo guide (see map in Figure 33). Allen was able to collect photo documentation of nine inuksuit including seven that involved drone flights. Strong winds prevented some of the inuksuit being documented with drone photogrammetry.

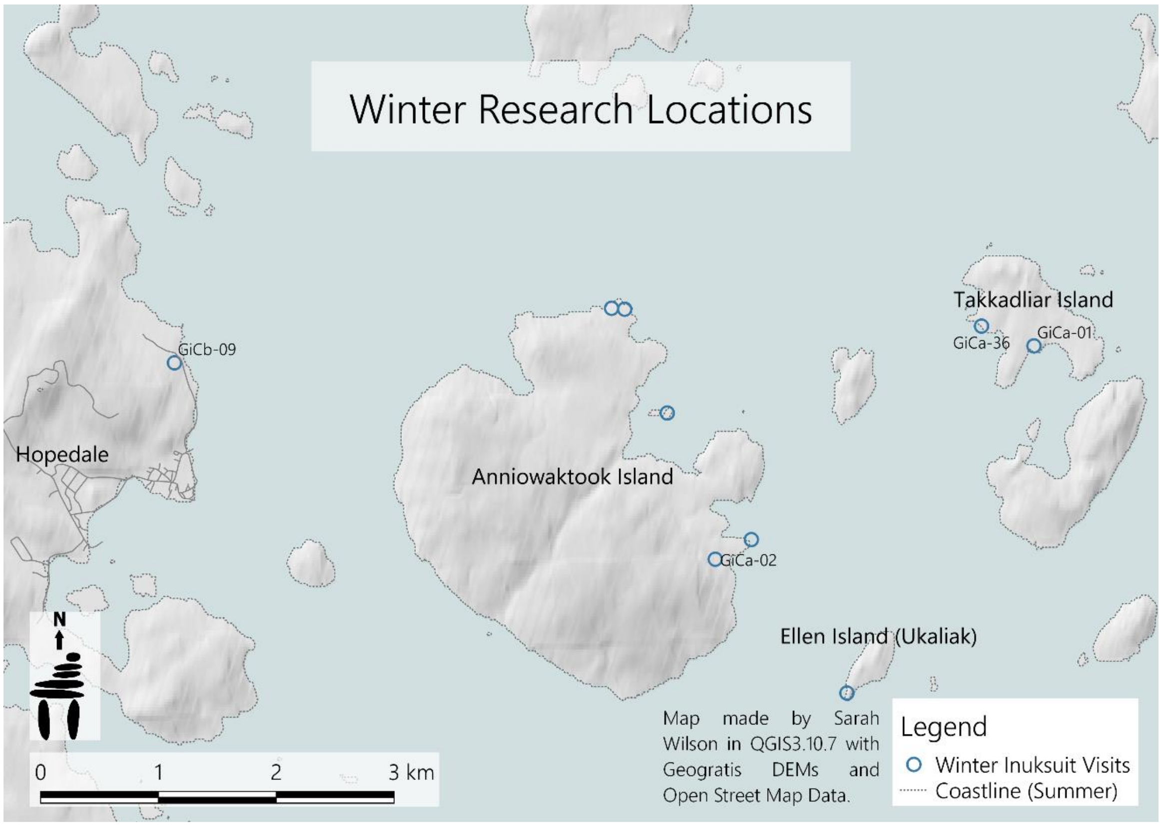

Figure 33: Map of sites visited in March 2019.

<u>Agvituk (Hopedale, GiCb-09)</u>

One inuksuk visited in March 2019 was within walking distance from Hopedale, located near the road that goes towards the landfill. Brake (2012) notes that this inuksuk has a window shaped opening that frames a view towards Anniowaktook Island towards the east. Nearby is a dismantled cache and possible caribou bone. The proximity to the town's rock quarry and dump suggests that this inuksuk could be recent. The inuksuk is up a hill from the shoreline and is surrounded by bedrock. When visited in the winter, many surrounding areas had windblown snow, but the inuksuk and immediate surrounding area was snow-free (see Figure 34).

Figure 34: Inuksuk near Hopedale dump, photo courtesy Eldred Allen.

Anniowaktook Island

Five inuksuit were visited on Anniowaktook Island, one of which is located on a small islet in a cove. The following is a description of these inuksuit, from north to south. On the most northeastern point there are two intact inuksuit on high points of land with caches in between (Figure 35). The inuksuit have a view of Hopedale to the west. Both inuksuit are visible from a distance when traveling on the sea, whether it is ice or water. Each of these inuksuit were recorded with drone photogrammetry and subsequently processed into 3D models (Figure 36).

Figure 35: Allen, Broomfield, and Elliott on Anniowaktook Island, two inuksuit at high points, photo courtesy Eldred Allen.

Figure 36: Image from a model of one of the most northern inuksuit on Anniowaktook Island.

On a small islet in the cove on the east side of Anniowaktook there are two small piles of cobbles that could be remnants of a single inuksuk or cache. The highest area of the small islet was bare of snow exposing dead grass and moss. To the southeast a peninsula protrudes and at the top of the hill there is a large inuksuk about 1m high. The inuksuk and surrounding area were bare of snow and appear the same in the summer or winter because of the windswept landscape. On a small point on the southeast side of the island is GiCa-02, the only previously recorded archaeological site visited on Anniowaktook Island, which consists of a large archaeological site with four sod houses, a tent ring, a burial, caches, and an inuksuk. Of these features, the only one visible was the inuksuk indicating its usefulness in the winter.

Takkadliar

Takkadliar Island is northeast of Anniowaktook Island, a small island sits between them. GiCa-36 is on the western side of Takkadliar Island in a small cove and consists of at least five tent rings, a grave, a cache, and a small inuksuk built of about five small cobbles. Only the inuksuk was visible on this trip, shadowed by small snowdrifts. Some snow sits on the inuksuk while black lichen surrounds it on the bedrock. GiCa-01 is on a cove on the southern side of the island and extends along the entire beach. In the summer at least fifteen tent rings are visible, along with a cache, grave, and hunting blind. In the winter, only a small inuksuk made of about three cobbles was visible near the shore, surrounded by snow and small patches of exposed bedrock. Hallendy (2000) notes that some inuksuit are built specifically against snowy backgrounds to mark ice fishing spots or safe routes across ice.

Ukaliak

Ukaliak Island, or Ellen Island, is to the southeast of Anniowaktook Island. The inuksuk here, discussed in Larkham and Brake (2011) as being used to pass messages via a glass jar, is located on the southern tip of the island. The small hive-shaped inuksuk is made of several rocks and is about a half meter tall. Its size makes it very prominent in the colorized digital elevation model (see Figure 37 below).

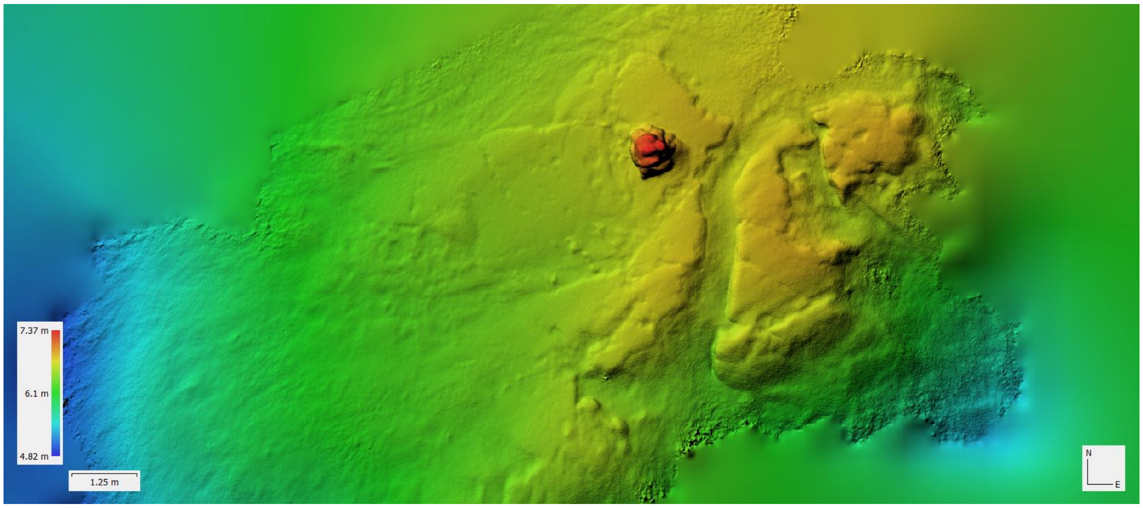

Figure 37: Digital elevation model of Ukaliak inuksuk.

Each inuksuk was visible on the winter landscape, as were other inuksuit in the surrounding areas that were not visited. In Fall 2019, I processed these models in Agisoft Metashape to create digital elevation models and orthophoto mosaics. Allen used a spiral flight pattern to collect overlapping images of the inuksuit. This method leaves the edges of the models very messy, however this is possible to clean up in Agisoft Metashape. The results are very detailed models and elevation representations of the inuksuit. In the Ukaliak Island digital elevation models it is possible to see footprints in the snow.

These winter sites are just a glimpse into Inuit culture in the winter. While numerous traditional terms and definitions for snow used by Inuit are well documented and discussed elsewhere (Krupnik et al. 2010), the many terms for sea ice and its features are overlooked. In a way, the impacts on sea ice due to climate change are greater than the impacts that many conceptualize when hearing ‘snow’. “When Inuit describe sea ice trails, they will describe particular ice features that travelers are going to find on the way”

(Krupnik et al. 2010: 171) along with more general place names for features on the coast and land. With climate change, the extent of sea ice could be the most obvious change, but the safety and thickness of ice is also a large factor in the ability of Inuit to travel and hunt in the winter. Thinning ice also has impacts on wildlife and therefore hunting, and is more greatly influenced by ocean dynamics, wind, and precipitation (Krupnik et al. 2010). In effect, the lack of sea ice is literally shrinking the region that Inuit can travel safely. The culture is transformed from traveling long distances by sea ice in the winter to remaining near shore and on land. While boats may become more useful in the winter, the effects of climate change on wildlife and biological cycles will have a heavy impact on traditional subsistence practices.

The locations of past winter sites provide an opportunity to compare ice safety and modes of mobility to the present. While extremely variable, the present-day sea ice during the time of this study had no polynyas, or open areas of water, for hunting sea mammals. The data presented here is just one of many directions for winter archaeological surveys. The research for these sites was focused on locating previously visited archaeological sites with winter features, such as sod houses, nearby indicating winter landscapes. Inuksuit were a primary focus to test the capability of drones to collect imagery to create 3D models. While the sites are located on separate islands, the transition of the ocean to ice conjoins them into a solid icescape.

Chapter 6: DISCUSSION

To best interpret the functions and uses of inuksuit in northern Labrador, a study like this is best facilitated by Inuit, either through ownership and management of research or with a study dedicated to Inuit participation (Stewart et al. 2004: 190). In the scope of this MA research, the interpretation was guided primarily by literature review including past interviews. I felt that it was important to revisit interviews that had already been conducted on the topic of inuksuit, allowing me to focus more on the drone and field methodology of this research. It is also important to note that the local field assistants, bear guards and boat drivers had an influence on the fieldwork and interpretation. For instance, on Skull Island, Alfred Winters pointed out a hunting blind that was best suited to hunting birds based on its location and the direction it was placed. I welcome Inuit-owned studies to use the imagery, models, and maps collected during this project to provide their own interpretations of the uses of inuksuit throughout northern Labrador.

6.1 Inuksuit

Throughout fieldwork, we recorded many forms and arrangements of inuksuit by photo, drone, and GPS point with a complete database of these on file with the Nunatsiavut Government and Provincial Archaeology Office[20]. The very large, stacked inuksuit, described as cairns for their large hive shape, were typically at high points of ridges and islands including those on Anniowaktook Island, Inutsutok, Multa Island,

[20] Tables including descriptions and photos of each feature are available for perusal as an appendix to this thesis.

Green Island, and Okak Islands. Other inuksuit draw attention by using contrasting colored rocks, such as white or even red, against the grey lichen-covered bedrock. Accentuating that further, some inuksuit have fertile soil developing around them from transported organic matter. Several small inuksuit appear to be marking specific places, such as the small stack of rocks at Shoal Tickle in a popular seal hunting location. Pinnacle-shaped inuksuit – those using long slender rocks – were recorded in all survey locations. While it is difficult to tell if leaning rocks are due to environmental factors, some inuksuit near viewpoints on Inutsutok appear to point a certain direction. The widely used symbol of an inuksuk, representing a human with arms that are often used for showing direction (Larkham and Brake 2011), was not present in any of the study areas.

The location and placement of inuksuit varied in addition to their forms. Many were near the coastline while others sit on ridges. Several records of traditional knowledge point to the use of inuksuit for navigational tools by marking safe or dangerous spots, specific locales, and routes (Hallendy 2000, 2009; Larkham and Brake 2011; MacDonald 1998; Whitridge 2004, 2016). For navigation, memory is a technique used to remember place names and viewsheds (Andrews and Zoe 1997; Aporta 2003; Cruikshank 2012; Hallendy 2000; Hamilton 1996; Krupnik et al. 2010; Stewart et al. 2004; Whitridge 2004). Besides memory, "wind direction, the set of snowdrifts, landmarks, vegetation, currents, clouds, and various astronomical bodies" (MacDonald 1998:161) act as methods of navigation and knowing one's place. These landmarks could be natural, or human-made like inuksuit. Many of these methods such as sea currents, wind, and snowdrifts require a very intricate knowledge of the environment which is made fluid by tides and weather processes (MacDonald 1998). Methods using the sun or astronomy will fluctuate throughout the seasons in areas where the sun is very limited in winter, or stars are not visible in the summer. The north star can not only aid navigation in the northern hemisphere but also give a signal to a traveler about the amount of time that has passed (Agiaq Kappianaq and Nutaraq 2001). These methods of navigation are part of an established, oral-based knowledge set of Inuit.

For inuksuit, the navigational function goes hand in hand with communication. An inuksuk can communicate to a traveler which direction a previous party went, or a dangerous geographic feature to avoid (Buggey and Mitchell 2008; Hallendy 2000, 2009; Larkham and Brake 2011). The winter portion of this research demonstrated the high visibility of inuksuit along ridges. Obtaining a visual of an inuksuk is key for navigational purposes, and the gradually sloping landscape along parts of the coast in Labrador is convenient for placing inuksuit on high ridges. In Baffin Island, inuksuit are placed in high places like this to help a traveler find their bearings (Hallendy 2009). Near Hopedale, the winter research highlights a few examples of inuksuit on these high ridges. While their general shape and construction style may be similar, the settings in which they are placed are unique when combined with the rest of their surroundings. Two inuksuit across a valley from each other, such as those on Anniowaktook Island, are discernible as a pair on the landscape compared to a single inuksuk (Figure 38). This pair of inuksuit offers a descriptive image that can be relayed to another person verbally.

Figure 38: Two inuksuit on Anniowaktook Island, photo courtesy Eldred Allen.

From a point of view of using cairns and posts as trail markers, the natural use of inuksuit can be assumed for navigation. Inuit uses for inuksuit are more complex and should not only be construed as navigational markers. Aside from acting as travel aids, inuksuit also represent memorials and can have spiritual or astronomical functions. Inuit burials in Labrador are generally above ground and built of stone (Fitzhugh 2017; Hood 2008; Kaplan 1983). In the case of a drowning, there are reports of an inuksuk functioning as a memorial in the Arctic (Fitzhugh 2017; Hallendy 2000; MacDonald 1998; Whitridge 2004). Hallendy mentions a story where many inuksuit were used to memorialize several individuals who had been lost to the ocean, so that the drowned souls would "be on dry land and not out on the wet sea" (2000: 77). Inuksuit can also have spiritual connections or meanings. A traditional story from Labrador describes the first inuksuk as a creation by a young man in love, to leave part of his soul near his beloved (Hallendy 2000: 60). From there, the custom of building inuksuit became a way to leave part of your spirit behind before going on a long journey (Hallendy 2000). In addition to memorializing a person, inuksuit can signify a sacred place, or the spirits of an animal (Hallendy 2000, 2009; Kaplan 1983).

Some studies relate specific forms of inuksuit to specific functions (Hallendy 2000; Larkham and Brake 2011). While this may be true, it appears that the form and function of inuksuit varies regionally from community to community, or family to family. The variations in inuksuit forms and functions are akin to the differences among the Inuit in terms of their dialect, traditions, tools, and natural resources. In Labrador, several archaeologists single out *pinnacles* as a different form of inuksuit, and in some cases, different from inuksuit and non-Inuit in tradition (Cloutier-Gelinas and Merkuratsuk 2009; Curtis 2007; Fitzhugh 2017; Kaplan 1983; Larkham and Brake 2011; Whitridge 2016). Descriptively, pinnacle is a useful term for describing these features, however, nothing leads me to believe that they are necessarily from a separate culture or tradition. In my brief field experience in northern Labrador, pinnacle-shaped inuksuit seemed common. Not only in the inuksuit recorded during this season, I saw several from a distance on islands and small islets that we passed while traveling by boat. While the large cluster and form of these pinnacles at Coffin Island is notable, there are several pairs or single standing inuksuit that point to their regular usage throughout the region. Larkham and Brake (2011) describe pinnacle-like inuksuit comprised of one rock propped up with smaller rocks on the sides to mark trails. These markers could be used in matching pairs to indicate if the trail is safe (Larkham and Brake 2011), which seems analogous to the arrangement found on Green Island.

Inuksuit, very similar to pinnacles in northern Labrador, are also present in south-central Newfoundland. In 2016, geologists recorded three tall, possibly a meter or higher, pinnacle-like inuksuit while on a geology survey (see Figure 39 and Figure 40). The landscape near Miawpukek, or Conne River, is rugged, and although looking relatively flat from the photos, the inuksuit are along a high ridge, offering a vast vantage point. Each inuksuk has a base of small supporting rocks, and a tall skinny rock propped up. The markers are about 15km from Branis Point, a site where a chert tip-fluted end blade that is presumed to be Dorset was collected (Penney 1980). The area was occupied by Dorset and later by Mi'kmaq who were likely drawn to salmon, eel, and caribou sources (Penney 1980, 1982; Penney and Nicol 1984). Locals have found many arrowheads as surface finds in the community of Conne River (Penney 1980). There is little archaeology research, as far as excavations by archaeologists, in the area which make interpreting these features use and possible age difficult.

Figure 39: Inuksuk in south-central Newfoundland, photo courtesy Brant Gaetz and Dr. Anne Westhues.

Figure 40: Two inuksuit (inuksuuk) in south central Newfoundland, photo courtesy Brant Gaetz and Dr. Anne Westhues.

The dating of inuksuit in Labrador is a complex subject, and while the traditional Inuit uses of inuksuit are the focus of this thesis, it is possible that some features are more recent, or made by Europeans. One documented example are the landmarks on Inutsutok (Pillar Island) for fishers coming from the east. Additionally, Europeans could be responsible for the recent dismantling of inuksuit. In the 19th century, whalers around Baffin Island mistook many inuksuit for caches and dismantled them looking for the contents (Hallendy 2009). It is conceivable that this also occurred in Labrador.

Attempts have been made to date cairns using lichenometry, as well as carbon dating, with varying results that give very general date associations (McCune et al. 2017). Until lichenometry can become more reliable, or new methods are invented, associating inuksuit to dates of nearby sites is a reasonable practice. Other researchers associate forgotten meanings, such as place names, or in this case inuksuit arrangements, with the passing of long periods of time (Stewart et al. 2004). With the nature of oral history being fluid, it is understandable that some meanings may slowly be forgotten, modified, or replaced over the years. For my research, the dates of specific features were not essential to studying how people experience landscape. While some inuksuit in Labrador may not be part of contemporary traditional knowledge, they are still part of the landscape Inuit continue to use. Cultural landscapes accumulate artifacts and different meanings through time, which is represented here.

With the example of pinnacle-like inuksuit in southern Newfoundland, it is possible that some inuksuit are enduring monuments and markers from Dorset occupations. Dorset were present on the coasts of both Labrador and Newfoundland

(Penney 1980) so it is not safe to assume that all inuksuit in Labrador are Inuit-made. Nonetheless, even if some inuksuit pre-date Inuit occupations, they are part of the Inuit cultural landscape and may have influenced their culture and experiences. Just as today, an individual walking on the same landscape will experience inuksuit that were built in the past which can influence their actions. Dorset inuksuit could have influenced the landscape for Inuit by providing windows into the past, where sometimes oral narratives are lost. They show that someone was there before and can sometimes give hints to what that person did there. Hints about the cultural landscape now include bullet casings or a jar of messages inside inuksuit, or bone scraps and guano left from birds. At Coffin Island, a large cluster of inuksuit could momentarily stop someone's travel as they meander around to inspect the site. By assuming inuksuit are meant for travel, they could influence an individual's experience by guiding them along a ridge, or towards a settlement or hunting location. Cultural landscapes are accumulative and this notion more intimately connects cultures to one another than seeing them as separate 'occupations' (Buggey and Mitchell 2008).

Modern inuksuit are obtaining new meanings and functions, while there is also a push to record traditional knowledge from elders to preserve heritage. During interviews by the Agvituk Archaeology Project, an interviewee mentioned that he had built inuksuit as a form of protest for the Voisey's Bay mine development in a joint demonstration organized with the Innu First Nation (Agvituk Digital Archive Project 2019; Schofield and Evans 1997; The Nation 1997). There is little literature documentation showing that inuksuit were used to claim space like this in Labrador; however, in areas where there is competition among different cultural groups, stone features can act in ways to assert territory (Hunt et al. 2016). For example, Inuit in Labrador may have clashed for land with the Innu in addition to Europeans.

An inuksuk has become a symbol of Canada as seen in the 2010 Winter Olympics hosted in Vancouver. The commercialization of inuksuit makes the symbol more well known, but also takes away from their tradition and ownership. One informant in Larkham and Brake "said that at one time inuksuit were used as navigational aids and had no monetary value, but that now they have come to symbolize Inuit…he felt that they are almost being taken over from a commercial aspect" (2011: 43). From a non-economic standpoint, there is a growing trend for hikers and outdoor recreationalists to stack stones, which has become a highly controversial topic. While those against stone stacking are concerned about its environmental impact (specifically, erosion), their primary concern seems to be experiencing 'wild' landscapes untouched by humans and painting stone stackers as narcissists (Ascension 2019; Barkham 2018; Haigney 2018). On the other hand, stone stacking can be a meditative activity and in some ways an art form that is just another way to experience a landscape. The part lacking in this discussion on stone stacking, are the traditional uses and meanings of cultural landscapes that recognize the humanness of the environment, and where it can be acceptable to stack stones as an art or meditative practice. Seeking 'wild' landscapes is erasure of Indigenous culture's land uses, and excessive stone stacking continues to distract from traditional and modern navigational uses of cairns.

6.2 Unmanned Aerial Vehicles in Labrador and Beyond

6.2.1 Photogrammetric Flight Plans and Apps

Without having precise locations of the sites visited to plan flights, my drone flight plans were reliant on apps that could be used in remote areas where cell service is unavailable. The timing of acquiring my remote pilot license and drone limited the time available for me to test various apps prior to fieldwork. For my surveys, I used the app *DH Basic* for an Android phone. *DH Basic* at the time was at no cost and allows the user to view satellite imagery when planning their flights. As it has become apparent in other parts of this research, satellite imagery of Labrador available on most platforms has a relatively low resolution. To use this in the field to plan flights, I walked through (or around) the area I wanted to map and marked points using my phone's GPS location. The app allows you to draw a polygon on the satellite imagery to plan your drone flight. It allows you to view the area's size, allowing you to estimate how long a flight might take. Once your area is outlined in the app, you can choose what type of pattern the drone will fly in – for instance: just the perimeter, a grid with the perimeter, or a spiral. The app will ask you where your drone is taking off, and subsequently where it will land when it finishes or runs low on battery. This app completed the tasks I needed, but not without difficulty or confusion. Many apps are only available on Apple products, while others are only available on Android. Having a variety of devices increases your options for programs to collect photogrammetric imagery via drone.

The photogrammetric imagery collected by Eldred Allen of Bird's Eye Inc. was captured flying manually in a spiral formation around individual inuksuit. The result is a high-quality representation of all sides of the inuksuk, however, the surrounding area quickly deteriorates. The oblique angle of the camera makes the background difficult to interpolate. In Agisoft Metashape, the models and subsequent DEM and orthophoto mosaic can be cleaned up where unmatched points are easily erased. While the imagery collected shows the background of the inuksuit, the models are focused on the inuksuit themselves. In these models it is possible to examine construction styles and forms. From a mapping perspective, the DEMs provide a representation of the immediate topography. The elevation, or height, of the inuksuit, could be extrapolated from these models, but the accuracy of these heights is debated (Daponte et al. 2017). Measurements pertaining to the actual size of an inuksuk, or other rock feature, should take place in the field.

For larger site and landscape applications, drones are very useful in providing detailed imagery and maps. As mentioned earlier, the drone resolution paired with the GPS precision created some inaccuracy in replotting points onto the products produced from photogrammetry at Coffin Island and Green Island. In practice, it is better to identify the features being mapped with markers such as contrasting colored flags or tape so that they could be easily recognized in an orthophoto mosaic. From there, latitude and longitude points can be identified from the drone imagery so that the points and imagery coordinate. Alternatively, use of a total station or another more precise method of mapping points adds time to the survey process, but could help mitigate the discrepancies between data.

The imagery collected at Skull Island provides an example of how detailed photogrammetry can provide both an accurate map of the area, and a 3D representation of archaeological features. It would be interesting to compare these results from Skull Island with an identical flight pattern but at different heights above the ground to see if the quality or elevation contrast changes. The orthophoto mosaics from Skull Island, Coffin Island, and Green Island are all useful base maps for additional archaeological mapping projects. Their resolution far exceeds aerial imagery that is commercially available. Besides being attractive for public applications, the quality of imagery could allow the maps to be used for geological or biological objectives.

6.2.2 Inuksuit Photogrammetry

The winter photogrammetric imagery portion of this research is an example of how photogrammetry can create detailed documents of features and artifacts. Photogrammetry can be applied not only using drones, but with handheld cameras to create 3D models of smaller objects. There are many ways in which this methodology can be applied in archaeological research. In a short amount of time, drone photogrammetry can create a detailed representation of features for the archaeological record. Individual rocks can be identified clearly, and they can provide reference for reconstruction if they are damaged. Chodoronek (2015) suggests that drone photogrammetry of cairns can allow destructive methods in archaeological research to take place. Destructive archaeological practices require a lot of consideration by Indigenous parties and the permitting agencies. On the other hand, being able to reconstruct a feature to its original form could allow studies of the building methods of rock features and contents of caches to take place. With respect to inuksuit, this could allow the opportunity for different dating methods besides lichenometry such as radiocarbon dating (McCune et al. 2016) or optically stimulated luminescence (Greilich and Wagner 2009). Reconstruction with the aid of detailed 3D models could also assist in reconstructing features that were damaged by natural hazards or vandalism.

This thesis provides the methodology to collect 3D digital imagery of cultural sites to record and preserve their settings without being destructive. To give a sense of experience, the imagery could be further used to create virtual reality to allow community members to view and move around cultural sites and landscapes via goggles. 3D models and digital technology are also arguably more engaging than research articles and written reports, offering an opportunity for Indigenous communities to become more involved with archaeological studies (Haukaas and Hodgetts 2016). While this may not be possible now with slow internet speeds in many parts of Labrador, it can become more accessible as new technologies become available to Indigenous communities. 3D models can be used on desktop or laptop platforms, but virtual reality can provide a more immersive experience. Finding ways to familiarize oneself with cultural landscapes can help provide context for oral traditions.

6.3 Landscape Protection and Policy

This discussion of landscape protection and policy is not directed at Newfoundland and Labrador alone, but is instead to take part in a larger discussion on cultural landscapes. When it comes to policy, the term *cultural landscape* is not well recognized in legislation, but geographers, anthropologists, and archaeologists alike discuss this holistic meaning that looks not only at the physical and biological presence, but the cultural qualities and even sentience of a landscape (Andrews and Zoe 1997;

Anschuetz et al. 2001; Boyle 2008; Buggey and Mitchell 2008; Cruikshank 2007; Ingold 2000; Riesenweber 2008; Simons and Pai 2008; Stewart et al. 2004; Tilley 1994; Whitridge 2004). Not only is the landscape comprised of topography, geology, and natural resources, it embodies cultural meaning and experience from different cultural perspectives. This understanding of landscape is sometimes referred to as a *vernacular landscape* (Buggey and Mitchell 2008). A vernacular landscape, or cultural landscape, is a way to see the landscape as a holistic accumulation of natural and cultural processes that have altered and used the landscape. It gains cultural meaning and physical artifacts from human activity through time. Another concept of landscape is an *associative landscape*. This is a very encompassing term that refers to a physical, visual, acoustic, olfactory, or spiritual association between a person or community and a landscape (Buggey and Mitchell 2008).

Organizations and protection agencies are beginning to recognize cultural landscapes as something in need of their own policy (Boyle 2008; Buggey and Mitchell 2008; Riesenweber 2008). However, the political environment in the United States is behind in positive action towards protecting Indigenous communities' and outdoor enthusiasts' associations with landscapes. While many activists are addressing this issue, policymakers are slow to react. Land management agencies are a critical factor in what policies are adopted, and Indigenous land claims are one way to return land management to Indigenous hands. The term "wilderness" is often used in policy, but it does not fully account for human agency. While policies in Canada and the United States protect historical and archaeological sites, including historic buildings, rock art, significant places, and even trails, there are fewer regulations towards protecting widescale cultural landscapes and viewsheds from development. A few gaps in these policies are highlighted here.

Bear's Ears and Grand Staircase, two United States National Monuments in the southwest, were shrunk by 85% and 50%, respectively, by President Trump in 2017 (Patagonia 2019). Seen as an illegal action, several different tribal, governmental, non-profit, and commercial groups have been working on legislation to prevent mining industries from damaging the integrity of the landscape and to expand the monuments to at least their original size (Patagonia 2019). These landscapes are full of heritage in the physical form of cliff dwellings, rock art, burials, and spiritual associations with geographic features.

In Alaska, the Arctic National Wildlife Refuge (ANWR) is an important ecological environment and is important culturally to the Gwich'in for continuing the tradition of living sustainably off the landscape (Gwich'in Steering Committee 2020; Patagonia 2020). Specifically, the unprotected 1.5 million-acre coastal plain referred to as *the sacred place where life began*, bordering the refuge, is vulnerable to mineral exploitation and harmful industries (Gwich'in Steering Committee 2020; Patagonia 2020). In this part of Alaska, supermarkets are not accessible and living off the land is a critical factor to the health of the community. Protecting the caribou's territory can directly protect the Gwich'in way of life.

Both the United States and Canada have examples where Tribal, Local, State/Provincial, and Federal organizations have been able to protect landscapes larger than a specific site. The Kazan River Fall Caribou Crossing in Nunavut, Canada is situated on Inuit-owned and managed land on the traditional landscape of the Harvaqtuurmiut (Buggey and Mitchell 2008; Stewart et al. 2004). This landscape is the breeding grounds and spring and autumn migration route for a herd of over 300,000 caribou (Buggey and Mitchell 2008; Stewart et al. 2004). The 1993 Nunavut Land Claims Agreement and Inuit Impact and Benefits Agreements have allowed Inuit to reclaim management over this landscape (Buggey and Mitchell 2008; Stewart et al. 2004). The Fall Caribou Crossing is officially protected by ensuring oral traditions and archaeological remains are preserved and respected, and that only low-impact activities take place in this area. This cultural landscape also has national recognition as a Historic Site and Monument (Government of Canada 2000). These lands are important environmentally to the caribou, and culturally to Inuit in the area.

In Alberta, Head Smashed in Buffalo Jump is now a popular tourist attraction. The area lies on the grassy plains where the Rocky Mountains abut the Great Plains in southern Alberta (UNESCO 2020). For at least 6,000 years, people herded bison over the natural topography to their death below a cliff where carcasses could then be prepared for food and materials. Today, the lands are in continued use for ranching, and the more immediate area of the site is protected by multiple agencies including the Crown, Province, and UNESCO. In the United States near the Mexican border in Arizona and New Mexico, the Malpai Borderlands has been used for ranching since the 1800s and was under threat by expanding housing development (Buggey and Mitchell 2008). Now, a group of over thirty ranching families and government agencies own and manage the land to continue this way of life and preserve the ecological diversity of the landscape.

These examples show how cultural landscapes, and not just specific locales, can be considered for protection. They show a greater understanding of the connectedness between people and place. Rather than focusing on the ‘naturalness’ or ‘wildness’ of the environment, these policies are shaped by the cultural traditions that took place there. These are also exceptional cases where extra steps and advocacy took place to ensure the landscapes were protected. More standard regulations and process exist and vary by region. In Newfoundland and Labrador, the Provincial archaeologist can declare a stop-work-order to prevent cultural material from being damaged according to the Historic Resources Act (Newfoundland and Labrador 2019). The Newfoundland and Labrador Historic Resources Act does not include the phrase “landscape,” but “site” is loosely defined including the term “area,” while “land” includes surfaces covered by water. Similarly, in the United States, the National Historic Preservation Act protects cultural resources on federal lands from being developed without first having an archaeologist or historian survey the site to identify historical or archaeological features. This ensures that some cultural sites are not damaged and can be conserved or recorded so that future generations can benefit from learning about America’s *entire* past (United States of America 2016).

Another avenue for signifying Indigenous ownership or rights to landscapes is to return geographies to their traditional place names. Place names represent a more intimate knowledge of the landscape and sense of place; and restoring these names can empower Indigenous people (Collignon 2006). In Alaska, the highest peak, Denali, was returned to its traditional name after a relatively short stint as Mt. McKinley. This action recognizes the longstanding tradition of Athabaskan land use in the area and removes the sense of recent 'discovery.'

While cultural landscapes accumulate meaning through time, people and industries should respect previous culture's spiritual associations with the same place. This will require a more dedicated approach in education that considers other views of what makes a landscape. Legislation and policies should explicitly represent Indigenous values and voices and redefine the meaning of "site" to include cultural landscapes and viewsheds.

Chapter 7: CONCLUSION

This thesis explored many aspects of inuksuit and landscape in northern Labrador, with a focus on Inuit uses of the land including mobility, navigation, memorialization, and resource procurement. Navigation, as well as transportation methods, vary drastically from winter to summer seasons with the freezing of the ocean into icescapes. The vast number of ways that Inuit are shown to use the land in the few locations researched here show that cultural landscapes warrant protection. Sites are connected to one another and protecting one area but not the other can have major consequences for modern subsistence and wildlife.

An inuksuk, what has become a symbol of Canada, may seem like a simple stack of stones, but can function in many ways to communicate significant places, direction, a person or event, or territory. Through time, an inuksuk can accumulate different meanings, and through time, inuksuit can be built for different reasons. Today, Labrador's coastal landscape is dotted with inuksuit that span a long range of time, signifying people's enduring experience.

In the past, an icescape was experienced at a relatively slow pace by foot or dog sled, compared to today's experience from SkiDoos. While dog sledding still requires attention, the slower pace of travel would allow the traveler a 360° view, while today's travel requires more focus on the path ahead (Aporta 2004). Today's travel is aided by GPS which can refocus attention to topographic markers that are visible on those devices. The loss of traditional knowledge by recent generations is a reminder to slow down and take note of our surroundings, family members, and traditions.

The technical portion of this thesis examines the use of drones in Labrador for archaeological survey and documentation. Drone photogrammetry is useful in archaeology for making high resolution digital elevation models of sites, and 3D models of features to record their appearance and construction style. Especially in areas where limited imagery is available, drones can be used to produce highly detailed, and beautiful, maps and aerial representations of the landscape. They are easily operated and have better fuel efficiency and a relatively low cost compared to LiDAR or satellite imagery, while providing a higher resolution than satellite imagery. 3D models can serve as detailed documentation of archaeological features for record keeping, as well as an interactive way for the public to experience archaeological sites remotely without physically removing artifacts from the landscape or using destructive excavation processes. Drones are not very useful to survey for new features unless those structures have strong topographic representations, such as those on Skull Island. Especially in Labrador, the ability to produce detailed imagery and return to the site to conduct traditional surveys of features highlighted by drone imagery is a logistical challenge. The digital elevation models of inuksuit at Coffin Island and Green Island show that small inuksuit with little width or height are difficult to recognize and are more easily surveyed in person with higher quality imagery of the features from a handheld camera.

7.1 Future Research

Photogrammetry and landscape focused studies open a wide range of possibilities for further research in Labrador. Researchers invested in landscape should conduct more winter fieldwork so that interpretations are not biased towards warmer seasons. A technique that has been employed in other studies, but not yet in Labrador, is using inuksuit to predict nearby site locations (Fisher and Farrelly 1997). The small collection of inuksuit presented here indicate areas where there may be more cultural resources and archaeological features. Another methodology study that could be useful is the study of how long it takes a lichen shadow to develop on the coast in Labrador. Many of the inuksuit, from Coffin Island to Inutsutok, left shadows where the bedrock beside them was bare of lichen, while black, crusty lichen covered other surfaces (see Figure 41). The technique could be a non-invasive way to estimate relatively how long inuksuit have been standing in those locations. An additional avenue towards studying the landscape in Labrador could focus on language to see how language may influence how cultural landscapes are experienced. Things we take for granted, like verbs and nouns, could be very different in Inuktitut and this study could help English speakers see other perspectives. This thesis touches on that aspect through Inuit use of place names as an expression of landscape, however, Inuktitut could have many more aspects related to experiencing landscape and the environment through its vocabulary and syntax.


Figure 41: A 'lichen shadow' at Coffin Island 1, photo courtesy the author.

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APPENDIX A: Coffin Island

Features Recorded July 15th, 2019[21]

Description	Photo
Catalog #: C1 Inuksuk (intact) – 75cm tall pinnacle in crack, visible on right. Light colored rock with some black lichen. Photo by James Williamson.	
Catalog #: C2 Inuksuk (intact) – 33cm tall pinnacle in crack. Light colored rock with some black lichen. Photo by James Williamson.	
Catalog #: C3 Inuksuk (intact) – 26cm tall pinnacle in crack. Light colored rock with some black lichen. Photo by James Williamson.	

[21] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: C4 Inuksuk (disturbed) – 43cm tall pinnacle in crack, fallen. Light colored rock with some black lichen. Photo by James Williamson.	
Catalog #: C5 Inuksuk (intact) – 32cm tall pinnacle in crack, leaning 45 degrees, on left of photo. Light colored rock with little amounts of black lichen.	
Catalog #: C6 Inuksuk (intact) – 33cm tall pinnacle in crack, leaning 45 degrees, on right of photo. Light colored rock with little amounts of black lichen. Photo by James Williamson.	
Catalog #: C7 Inuksuk (intact) – 48 cm tall pinnacle in crack, on right. Light colored rock with some black lichen.	
Catalog #: C8 Inuksuk (disturbed) – 76cm tall pinnacle in crack, leaning 80 degrees – almost fallen, on left. Light colored rock with some black lichen. Photo by James Williamson.	

Description	Photo
Catalog #: C9 Inuksuk (disturbed) – 48cm tall pinnacle in rock pile, base of pinnacles is bare of lichen, fallen. Photo by James Williamson.	
Catalog #: C10 Inuksuk (disturbed) – 50cm tall pinnacle in rock pile, fallen. Photo by James Williamson.	
Catalog #: C11 Inuksuk (intact) – 113cm tall pinnacle leaning, leaning 45 degrees. Photo by James Williamson.	

Description	Photo
Catalog #: C12 Inuksuk (disturbed) – 140cm tall pinnacle in rock pile, broken in two and fallen. Very little lichen. Photo by James Williamson.	
Catalog #: C13 Inuksuk (intact) – 58cm tall pinnacle leaning on ledge. Very little lichen. Photo by James Williamson.	
Catalog #: C14 Inuksuk (intact) – 32cm tall pinnacle in crack. Photo by James Williamson.	

Description	Photo
Catalog #: C15 Inuksuk (intact) – 62cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C16 Inuksuk (disturbed) – 80cm tall pinnacle in crack, fallen. Photo by James Williamson.	
Catalog #: C17 Inuksuk (disturbed) – 93cm tall pinnacle in rock pile leaning on ledge, fallen. Photo by James Williamson.	

Description	Photo
Catalog #: C18 Inuksuk (intact) – 35cm tall pinnacle, on left in photo. ——————————— Catalog #: C19 Inuksuk (intact) – 25cm tall pinnacle tall pinnacle, leaning 45 degrees, on right in photo. Photo by James Williamson.	
Catalog #: C20 Inuksuk (disturbed) – 55cm tall pinnacle leaning, broken in half. Lichen growth (about 2cm across) on surface that refits. Photos by Sarah Wilson.	 

Description	Photo
Catalog #: C21 Inuksuk (intact) – 60cm tall pinnacle in rock pile, leaning 45 degrees. Photo by James Williamson.	
Catalog #: C22 Inuksuk (intact) – 58cm tall pinnacle in rock pile. Photo by James Williamson.	
Catalog #: C23 Inuksuk (intact) – 86cm tall pinnacle leaning. Photo by James Williamson.	

Description	Photo
Catalog #: C24 Inuksuk (disturbed) – 100cm tall pinnacle in crack, fallen. Photo by James Williamson.	
Catalog #: C25 Inuksuk (disturbed) – 117cm tall pinnacle, fallen, but was likely leaning on ledge. Photos by James Williamson.	 

Description	Photo
Catalog #: C26 Inuksuk (intact) – 86cm tall pinnacle in crack and leaning. Photo by James Williamson.	
Catalog #: C27 Inuksuk (intact) – 78cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C28 Inuksuk (disturbed) – 57cm tall pinnacle in crack, fallen. Photo by James Williamson.	

Description	Photo
Catalog #: C29 Inuksuk (intact) – 128cm tall pinnacle, leaning 45 degrees. Photo by James Williamson.	
Catalog #: C30 Inuksuk (disturbed) – 38cm tall pinnacle in rock pile, fallen. Photo by James Williamson.	
Catalog #: C31 Inuksuk (intact) – 32cm tall pinnacle in crack. Photo by James Williamson.	

Description	Photo
Catalog #: C32 Inuksuk (intact) – 63cm tall pinnacle in crack, in center of photo. Photo by James Williamson.	
Catalog #: C33 Inuksuk (intact) – 50cm tall pinnacle in crack, in center of photo. Photo by James Williamson.	
Catalog #: C34 Inuksuk (intact) – 92cm tall pinnacle in crack and rock pile. Photo by James Williamson.	

Description	Photo
Catalog #: C35 Inuksuk (intact) – 62cm tall pinnacle in crack and rock pile, second from right in photo. Photo by James Williamson.	
Catalog #: C36 Inuksuk (intact) – 63cm tall pinnacle in crack and rock pile, in center of photo. Photo by James Williamson.	
Catalog #: C37 Inuksuk (disturbed) – 78cm tall pinnacle in rock pile, fallen. Photo by James Williamson.	

Description	Photo
Catalog #: C38 Inuksuk (intact) – 50cm tall pinnacle in crack, leaning 80 degrees almost fallen. Photo by James Williamson.	
Catalog #: C39 Inuksuk (disturbed) – 74cm tall pinnacle in crack and rock pile, fallen. Photo by James Williamson.	
Catalog #: C40 Inuksuk (disturbed) – 32cm tall pinnacle in crack, fallen, broken in half. Photo by James Williamson.	

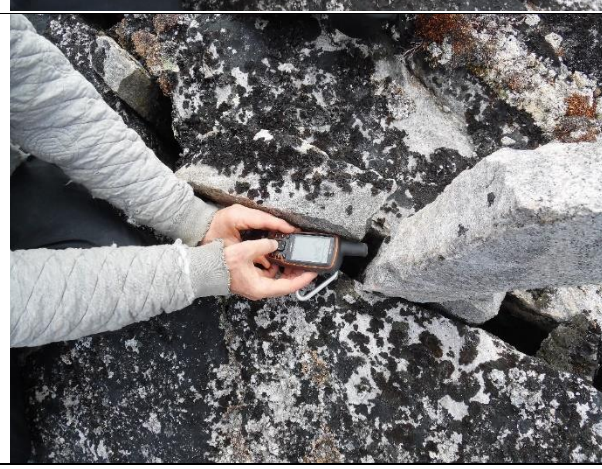
Description	Photo
Catalog #: C41 Inuksuk (intact) – 54cm tall pinnacle in crack and rock pile, leaning 45 degrees. Photo by James Williamson.	
Catalog #: C42 Inuksuk (intact) – 56cm tall pinnacle in crack, leaning 45 degrees. Photo by James Williamson.	
Catalog #: C43 Inuksuk (intact) – 21cm tall pinnacle in crack. Photo by James Williamson.	

Description	Photo
Catalog #: C44 Inuksuk (intact) – 32cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C45 Inuksuk (intact) – 57cm tall pinnacle. Photo by James Williamson.	
Catalog #: C46 Inuksuk (intact) – 70cm tall pinnacle in crack. Photo by James Williamson.	

Description	Photo
Catalog #: C47 Inuksuk (intact) – 91cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C48 Inuksuk (intact) – 96cm tall pinnacle leaning with rock pile. Photo by James Williamson.	
Catalog #: C49 Inuksuk (intact) – 79cm tall pinnacle leaning with rock pile. Photo by James Williamson.	

Description	Photo
Catalog #: C50 Inuksuk (intact) – 77cm tall pinnacle in crack with rock pile. Photo by James Williamson.	
Catalog #: C51 Inuksuk (intact) – 34cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C52 Inuksuk (disturbed) – 29cm tall pinnacle in crack, fallen. Photo by James Williamson.	

Description	Photo
Catalog #: C53 Inuksuk (intact) – 30cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C54 Inuksuk (intact) – 99cm tall pinnacle in rock pile. Photo by James Williamson.	
Catalog #: C55 Inuksuk (intact) – 74cm tall pinnacle in crack. Photo by James Williamson.	

Description	Photo
Catalog #: C56 Inuksuk (intact) – 58cm tall pinnacle in crack, leaning 80 degrees, almost fallen. Photo by James Williamson.	
Catalog #: C57 Inuksuk (intact) – 16cm tall pinnacle in crack, seen on right in photo.	
Catalog #: C58 Inuksuk (intact) – 8cm tall pinnacle in crack, possibly slid down further into the crack, seen on left. Photo by James Williamson.	
Catalog #: C59 Inuksuk (disturbed) – 36cm tall pinnacle in crack, fallen. Photo by James Williamson.	

Description	Photo
Catalog #: C60 Inuksuk (intact) – 44cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C61 Inuksuk (intact) – 15cm tall pinnacle in crack. Photo by James Williamson.	
Catalog #: C62 Inuksuk (intact) – 28cm tall pinnacle in crack. Photo by James Williamson.	

Description	Photo
Catalog #: C63 Inuksuk (disturbed) – 97cm tall pinnacle leaning, broken in half, fallen. Photo by James Williamson.	
Catalog #: C64 Inuksuk (intact) – 31cm tall plate-like inuksuk in crack, visible 'shadow' where lichen growth is impeded. Photo by Sarah Wilson.	
Catalog #: C65 Inuksuk (intact) – 27cm tall pinnacle. Photo by James Williamson.	

Description	Photo
Catalog #: C66 Inuksuk (intact) – 95cm tall pinnacle leaning on boulder. Photo by Dr. Peter Whitridge.	
Catalog #: C67 Inuksuk (intact) – 43cm tall pinnacle wedged in crack. Photo by Dr. Peter Whitridge.	

Description	Photo
Catalog #: C68 Inuksuk (intact) – 54cm tall pinnacle in crack and rockpile, pointing NW. Photo by Dr. Peter Whitridge.	
Catalog #: C69 Inuksuk (disturbed) – 111cm tall pinnacle in rock pile, fallen. Photo by Dr. Peter Whitridge.	

APPENDIX B: Green Island

Features Recorded July 16th, 2019[22]

Description	Photo
Catalog #: G1 Inuksuk (intact) – 74cm tall inuksuk made of 3 rocks, delicate base, evenly covered in lichen. Photo by James Williamson.	
Catalog #: G2 Inuksuk (intact) – 96cm tall pinnacle leaning 45 degrees, evenly covered in lichen. Photo by James Williamson.	
Catalog #: G3 Inuksuk (intact) – 5 white rocks on a large black boulder, lots of lichen. Photo by James Williamson.	

[22] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: G4 Inuksuk (intact) – small lichen covered rock on reddish boulder. Placed rock? Photo by James Williamson.	
Catalog #: G5 Cache (intact) – cache, small rocks on large boulder. Photo by James Williamson.	
Catalog #: G6 Inuksuk (intact) – 70cm tall white pinnacle, very little lichen. Photo by James Williamson.	

Description	Photo
Catalog #: G7 Cache (intact) – Possible cache, about 2m across. Photo by James Williamson.	
Catalog #: G8 Inuksuk (intact) – Small rock placed on large boulder, no lichen beneath placed rock. Photo by James Williamson.	
Catalog #: G9 Cache (intact) – Box shaped cached surrounded by small boulders, empty. Photo by James Williamson.	

Description	Photo
Catalog #: G10 Inuksuk (disturbed) – 85cm tall pinnacle in crack, fallen. Photo by James Williamson.	
Catalog #: G11 Inuksuk (intact) – 34cm tall plate like inuksuk with rock base. Photo by James Williamson.	

Description	Photo
Catalog #: G12 Inuksuk (disturbed) – 66cm pinnacle with rock based broken in two. Lichen growth on face of rock that refits. Photos by Sarah Wilson.	 
Catalog #: G13 Inuksuk (disturbed) – 81cm tall pinnacle with rock base, fallen. Photo by James Williamson.	

Description	Photo
Catalog #: G14 Inuksuk (intact) – 80cm tall pinnacle in crack with rock pile, little lichen on standing rock. Photo by James Williamson.	
Catalog #: G15 Inuksuk (intact) – 67cm tall pinnacle leaning, little lichen on standing rock. Photo by James Williamson.	
Catalog #: G16 Inuksuk (intact) – A few small placed rocks. Photo by James Williamson.	

Description	Photo
Catalog #: G17 Inuksuk (disturbed) – 78cm tall pinnacle with rock base, fallen. Photo by James Williamson.	
Catalog #: G18 Inuksuk (disturbed) – 40cm tall pinnacle with rock base, possibly larger stacked inuksuk, fallen. Photo by James Williamson.	
Catalog #: G19 Inuksuk (disturbed) – 48cm tall pinnacle, plate like rock but broken. Photo by James Williamson.	

Description	Photo
Catalog #: G20 Inuksuk (disturbed) – 68cm tall pinnacle or cluster of collapsed pinnacles (fallen). Photo by James Williamson.	
Catalog #: G21 Inuksuk (disturbed) – 72cm tall white pinnacle, fallen. Photo by James Williamson.	
Catalog #: G22 Cache (disturbed) – Box-like cache, collapsing in on itself, empty. Photo by James Williamson.	

Description	Photo
Catalog #: G23 Inuksuk (disturbed) – Cluster of collapsed pinnacles or larger stacked inuksuk. Photo by James Williamson.	
Catalog #: G24 Inuksuk (intact) – 77cm tall pinnacle, leaning on rock. Photo by James Williamson.	
Catalog #: G25 Cache (disturbed) – Box shaped cache. Photo by James Williamson.	

Description	Photo
Catalog #: G26 Inuksuk (intact) – 56cm tall pinnacle, in crack with rock supports. Photo by James Williamson.	
Catalog #: G27 Inuksuk (intact) – Large stacked inuksuk on boulder, hive shaped. Photo by James Williamson.	
Catalog #: G28 Inuksuk (intact) – Large stacked inuksuk - hive shaped. Photo by James Williamson.	

Description	Photo
Catalog #: G29 Inuksuk (intact) – Large stacked inuksuk - hive shaped. Photo by James Williamson.	
Catalog #: G30 Inuksuk (intact) – Very large stacked hive shaped inuksuk on square boulder. Photo by James Williamson.	
Catalog #: G31 Inuksuk (intact) – Large stacked inuksuk on summit, very little lichen. Photo by James Williamson.	

Description	Photo
Catalog #: G32 Inuksuk (disturbed) – Fallen pinnacle or cache, has lots of lichen. Photo by James Williamson.	

APPENDIX C: Okak Islands (Northern Island)

Features Recorded August 3rd, 2019[23]

Description	Photo
Catalog #: O1 Inuksuk (intact) – Stacked inuksuk about 1 m high, visible from the water, far from shore. Dark colored from lichen. Photo by Nunatsiavut Government (Michelle Davies and Jamie Brake).	
Catalog #: O2 Inuksuk (intact) – Small black pinnacle, not visible from the water, approximately 10m above stacked inuksuk listed above. Photo by Nunatsiavut Government (Michelle Davies and Jamie Brake).	

[23] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: O3 Inuksuk (intact) – Small white pinnacle about 25m below stacked inuksuk listed above, visible from water. Photo by Nunatsiavut Government (Michelle Davies and Jamie Brake).	
Catalog #: O4 Cache (intact) – Large cache near the beach at sea level. Photo by Nunatsiavut Government (Michelle Davies and Jamie Brake).	
Catalog #: O5 Cache (dismantled) – Small open cache near the beach at sea level. Photo by Nunatsiavut Government (Michelle Davies and Jamie Brake).	

Description	Photo
Catalog #: O6 Tent ring – located behind bedrock outcrop on a small plateau towards the left side of the small cove. Photo by Nunatsiavut Government (Michelle Davies and Jamie Brake).	

APPENDIX D: Skull Island

Features Recorded July 12th, 2019[24]

Description	Photo
Catalog #: S1 Inuksuk (dismantled) – Inuksuk on ridge on top of a dark dyke in the bedrock. Pile of rocks, covered in black and orange lichen, one rock could have been pinnacle. Photo by Sarah Wilson.	
Catalog #: S2 Inuksuk (dismantled) – slightly dismantled stacked inuksuk on ridge with views of the ocean on 3 sides. Thick areas of black lichen, some orange lichen. Small bones inside (lemming?), appears to be collapsed pinnacle and has long rocks. Photo by Sarah Wilson.	

[24] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: S3 Inuksuk (intact) – Small stacked, stout inuksuk near to a burial. White rocks and not a lot of lichen. Photo by Sarah Wilson.	
Catalog #: S4 Inuksuk (intact) – two stacked rocks in a rocky area, near possible tent ring. Photo by Sarah Wilson.	

Description	Photo
Catalog #: S5 Hunting blind (intact) – Alfred suggests it is for hunting sea birds based on its orientation. Photos by Sarah Wilson.	 
Catalog #: S6 Inuksuk (dismantled) – Fallen pinnacle near shoreline, possible burial between here and shore. Photo by Sarah Wilson.	

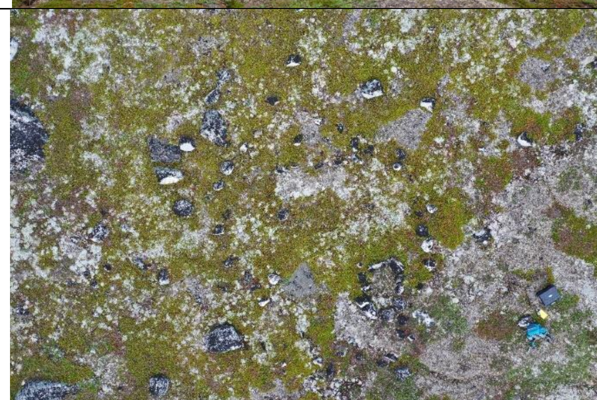
APPENDIX E: Inutsutok

Features Recorded August 8th, 2019[25]

Description	Photo
Catalog #: I1 Inuksuk (dismantled) – Cache or cairn, dismantled, has lichen and moss. Photo by Agvituk Archaeology Project.	
Catalog #: I2 Inuksuk (intact) – Placed rock that is surrounded by lichen (with small lichen shadow where the bedrock is bare of lichen), placed on a ledge. Photo by Agvituk Archaeology Project.	
Catalog #: I3 Inuksuk (dismantled) – Dismantled or leaning pinnacle with two round rocks for the base and a tall rock that is laying on the ground pointing west. Patches of lichen present. Photo by Agvituk Archaeology Project.	

[25] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: I4 Inuksuk (dismantled) – Dismantled cache or cairn. Photo by Agvituk Archaeology Project.	
Catalog #: I5 Inuksuk (intact) – Short round cairn with thick lichen. Photo by Agvituk Archaeology Project.	
Catalog #: I6 Inuksuk (dismantled) – Small dismantled cairn or cache, lemming skull present and lots of lichen. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: I7 Tent ring – Possible tent ring. On gradual slope near beach. Photo by Agvituk Archaeology Project.	
Catalog #: I8 Tent ring – Small ring of rocks inside larger ring of rocks, tent ring and hearth? On gradual slope near shore. Photo by Sarah Wilson.	
Catalog #: I9 Tent ring – near tent ring listed earlier and jigger. Photo by Sarah Wilson.	

Description	Photo
Catalog #: I10 Jigger – Rusty jigger on large boulder near tent ring. Photo by Agvituk Archaeology Project.	
Catalog #: I11 Metal part of stove? Close to shore near tent rings and boat rack. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: I12 Inuksuk cluster – one of four evenly spaced small piles of rocks near tidal zone. This one is made of about 4 rocks. Drone photo by Sarah Wilson, handheld by Agvituk Archaeology Project.	 
Catalog #: I13 Inuksuk cluster – two of four evenly spaced small piles of rocks near tidal zone: Made of about 10 rocks. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: I14 Inuksuk cluster – three of four evenly spaced small piles of rocks near tidal zone: Made of about 3-4 rocks. Photo by Agvituk Archaeology Project.	
Catalog #: I15 Inuksuk cluster – four of four evenly spaced small piles of rocks near tidal zone: Made of about 5 rocks. Photo by Agvituk Archaeology Project.	
Catalog #: I16 Inuksuk (disturbed) – Large rocks making up a partially dismantled cairn, lots of lichen present. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: I17 Inuksuk (disturbed) – Large rocks making up a cairn, orange and black lichen, fallen or pointing south. Photo by Agvituk Archaeology Project.	
Catalog #: I18 Cache (intact) – Small rectangular cache near burial (#I19), appears empty.	No photo.
Catalog #: I20 Inuksuk (intact) – Stout cairn with orange lichen, green casing inside from shot gun. Photos by Agvituk Archaeology Project.	

Description	Photo
Catalog #: I21 Inuksuk (disturbed) – Fallen cairn, made of large tall rocks with lots of lichen. Photo by Agvituk Archaeology Project.	
Catalog #: I22 Inuksuk (disturbed) – Large partially fallen cairn. Photo by Agvituk Archaeology Project.	
Catalog #: I23 Inuksuk (intact) – one of three large cairns in line with others on high point of island, lots of overlapping lichen and has lichen shadow. Photos by Agvituk Archaeology Project.	 

Description	Photo
Catalog #: I24 Inuksuk (intact) – two of three large cairns with overlapping lichen. Photo by Agvituk Archaeology Project.	
Catalog #: I25 Inuksuk (disturbed) – Pinnacle or possible rock fallen from larger nearby cairn. Photo by Agvituk Archaeology Project.	
Catalog #: I26 Inuksuk (intact) – three of three large cairns with lichen shadow. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: I27 Inuksuk (intact) – This cairn was seen from a distance – due to time we were unable to view it closer. Small cairn. Photo by Sarah Wilson.	
Catalog #: I28 Inuksuk (intact) – This cairn was seen from a distance – due to time we were unable to view it closer. Large stacked inuksuk near smaller pinnacle (lower left of center of photo). Photo by Sarah Wilson.	
Catalog #: I29 Inuksuk (intact) – This cairn was seen from a distance – due to time we were unable to view it closer. Placed rock seen on horizon in center of photo. Photo by Sarah Wilson.	
Catalog #: I30 Inuksuk (intact) – This cairn was seen from a distance – due to time we were unable to view it closer. White pinnacle in center of photo below black dyke. Photo by Sarah Wilson	

Description	Photo
Catalog #: I31 Tent ring – Piece of plastic in middle of a possible tent ring. Located near center of island. Photo by Sarah Wilson.	

APPENDIX F: Mainland Near Hopedale

Features Recorded July 31st, 2019[26]

Description	Photo
Catalog #: H1 Inuksuit - Two large pinnacles, around a meter tall, near the shore about 4m apart. One is visible in the center of the photo, with the second in the foreground on the right. Photo by Sarah Wilson.	

[26] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

APPENDIX G: Multa Island

Features Recorded July 31st, 2019[27]

Description	Photo
Catalog #: M1 Inuksuk (intact) – Small cairn with lots of lichen. Photo by Agvituk Archaeology Project.	
Catalog #: M2 Inuksuk (intact) – Iron colored pile of rocks, very little lichen if any at all. Photo by Agvituk Archaeology Project.	

[27] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: M3 Inuksuk (dismantled) – Small cluster of rocks, dismantled cairn with some lichen. Photo by Agvituk Archaeology Project.	
Catalog #: M4 Inuksuk (dismantled) – Iron colored pile of rocks. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: M5 Inuksuk (intact) – Small cluster of rocks in depression near another (previously listed) cluster of reddish rocks. Photo by Agvituk Archaeology Project.	
Catalog #: M6 Probably an eroded boulder, at least one meter in height. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: M7 Inuksuk (intact) – Single narrow slab propped up, whiteish, fertile ground underneath with lots of lichen, Possibly quartz in area, inuksuk is visible from a distance. Photo by Agvituk Archaeology Project.	
Catalog #: M9 Cache (dismantled) – Large 2-3m diameter round rock feature, possible cache or blind but distant from shore. In boulder field. (Burial nearby, #M8) Photo by Agvituk Archaeology Project.	
Catalog #: M10 Inuksuk (intact) – Small cairn or cache, lots of lichen, might have been pinnacle. Photo by Agvituk Archaeology Project.	

Description	Photo
Catalog #: M11 Inuksuk (intact) – Small cache or cairn in crack in bedrock. Photo by Agvituk Archaeology Project.	
Catalog #: M12 Inuksuk (intact) – Very large intact cairn, 1.5m high, 1m wide base, lots of lichen overlapping some rocks. Photo by Agvituk Archaeology Project.	
Catalog #: M13 Inuksuk (intact) – Cache or cairn covered in lichen, some moss. Photo by Agvituk Archaeology Project.	

APPENDIX H: Shoal Tickle

Features Recorded July 31st, 2019[28]

Description	Photo
Catalog #: ST2 Cache (intact) – Cache or cairn (probably a cache) near a grave (#ST1). Photo by Agvituk Archaeology Project.	
Catalog #: ST3 Tent ring – Partially buried tent ring in flat area near shore. Photos by Agvituk Archaeology Project.	 

[28] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: ST5 Tent rings – About three tent rings and visible caribou trail near shore in flat area before slope increases. Photos by Agvituk Archaeology Project.	  

Description	Photo
Catalog #: ST4 Cache (intact) – Large cache or somewhat hollow cairn, lichen present. Photo by Agvituk Archaeology Project.	
Catalog #: ST6 Cache (intact) – Cache under boulders with smaller boulders. Photo by Agvituk Archaeology Project.	
Catalog #: ST7 Inuksuk (intact) – three placed rocks on a large boulder in a tidal zone. Photo by Agvituk Archaeology Project.	
Catalog #: ST8 Tent ring – Possible tent ring with cache in boulder field. Photo by Agvituk Archaeology Project.	

APPENDIX I: Winter Sites

Features Recorded March 25th – 28th, 2019[29]

Description	Photo
Catalog #: A1 Inuksuit (intact) – Two inuksuit on opposite high points with caches between them on Anniowaktook Island. Photo by Eldred Allen.	
Catalog #: A2 Inuksuk (dismantled) – Two small piles of cobbles, maybe one fallen inuksuk on islet near Anniowaktook Island. Photo by Eldred Allen.	
Catalog #: A3 Inuksuk (intact) – Large inuksuk on Anniowaktook Island. Photo by Eldred Allen.	

[29] A complete table with coordinates and all associated photo numbers is on file with the Nunatsiavut Government.

Description	Photo
Catalog #: A4 Inuksuk (dismantled) – Small dismantled inuksuk on Anniowaktook Island (GiCa-02). Nearby are sod houses, a tent ring, a burial, and caches. Photo by Eldred Allen.	
Catalog #: U1 Inuksuk (intact) – Squat cairn built from several cobbles on Ukaliak Island. Photo by Eldred Allen.	
Catalog #: H4 Inuksuk (dismantled) – Collapsed inuksuk and dismantled cache near Hopedale dump (GiCb-09). Photo by Eldred Allen.	

Description	Photo
Catalog #: T1 Inuksuk (intact) –Small inuksuk made of cobbles on Takkadliar Island (GiCa-36). Nearby are several tent rings a grave, and cache. Photo by Eldred Allen	
Catalog #: T2 Inuksuk (intact) – Small inuksuk made of smooth cobbles on Takkadliar Island (GiCa-01). Nearby are several (15) tent rings, a cache, a grave, and a hunting blind. Photo by Eldred Allen.