SUCCESSFUL ENGAGEMENT BETWEEN IÑUPIAT AND SCIENTISTS IN UTQIAĠVIK, ALASKA: A SOCIOCULTURAL PERSPECTIVE

By

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Abstract

Climate change has become a global threat that the world is struggling to grasp. At the frontlines of these changes, the Arctic warms at an amplified rate. U.S. research funding agencies have taken unprecedented and aggressive measures to steer Arctic sciences to not only consider its impacts on Indigenous communities in the Arctic, but to work with those communities in producing research that benefits locals in the Arctic. Barriers have prevented positive engagement between scientists and Indigenous communities, including the irrelevancy of research to locals' daily lives and wide cultural and geographical gaps between research institutions and Indigenous entities. There are few models of successful and mutually-beneficial relations between Indigenous communities and scientists in the Arctic. This project focuses on the extremely unique and historic example of relations between local Iñupiat and Arctic scientists in Utqiaġvik, Alaska. This thesis provides both a detailed history of the relations between Iñupiat and scientists in Utqiaġvik, and a snapshot of how Indigenous science specialists and Arctic researchers in Utqiaġvik view cross-cultural knowledge exchange as they experience it in 2020. Three primary findings of this research include: first, that multiple forms of successful engagement exist between Iñupiat and academic scientists in Utqiaġvik, two of which include co-production of knowledge and contractual logistical service; second, relevancy of research is an extremely important precursor to successful engagement between scientists and communities; and third, both Iñupiat science specialists and Arctic researchers must possess unique sets of skills for long-term success in working together. This research has the potential to have broad implications for how Indigenous contributions are acknowledged, compensated for, measured, and valued in the face of increasing scientific research in the Arctic.

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Chapter One: Introduction

> The Arctic has warmed at more than twice the rate of the global mean since the 1990s, a phenomenon known as Arctic amplification of global warming. This warming is transforming Arctic ecosystems and presenting unique challenges for the regions Indigenous peoples who rely on the stability of the environment for cultural and economic well-being, as well as for subsistence foods taken from their local lands and waters. The impacts of a changing Arctic are not confined to those who live there. Through global sea level rise, the release of permafrost carbon, and its role in regulating global weather patterns, the Arctic is vitally connected to people worldwide.
>
> NOAA Arctic Report Card 2019

1.1 Justification

The Arctic is commonly described as being "at the frontlines of climate change" and has drawn national and international interest. Powerful countries and multinational corporations are drawn to newly opened sea routes and access to exploitative natural resources including minerals, oil, and gas. Worldwide media is attracted to sensational stories in the changing Arctic. And most importantly for the purposes of this thesis, scientists have been driven to record and monitor these dramatic changes and orient their research to make positive impacts on Arctic residents. The increased focus on the changing Arctic has led to funding opportunities for Arctic research. In 2016, the National Science Foundation (NSF) established 10 "big ideas" to prioritize research funding. Of the 10 big ideas, eight were selected for funding and each were awarded $30 million, (NSF 2018). One of the big ideas selected to receive funding is called Navigating the New Arctic (NNA). The first NNA request for proposals (RFP) in 2018 made an explicit

attempt to push Arctic research to work with Indigenous communities in the Arctic in forming research projects that draw on existing knowledge and that make positive impacts on locals residents. In the first paragraph of the NNA RFP, the NSF's priorities were clear: "Given the extensive Indigenous presence in the Arctic, and the broad local and other knowledge Indigenous people have regarding the changing Arctic, NSF encourages direct collaboration with Indigenous residents and local institutions and organizations at all project stages, as appropriate." The NNA solicitation called for two separate tracks of proposals, smaller planning grant-style proposals and larger 5-year proposals to be capped at three million dollars. The RFP provided details about engagement with communities and defined co-production of knowledge:

> Community collaborations and knowledge co-production with Arctic Indigenous communities are encouraged in both tracks, when appropriate. NSF identifies co-production of knowledge as: *research in which local and Indigenous people and organizations fully engage in the complete research process from development of questions, to the collection, use and stewardship of data, and interpretation and application of the results*. [NSF 2018, emphasis added]

The first NNA call for proposals drew the interest of researchers and institutions throughout the U.S., including scientists who had previously worked in the Arctic as well as many new to the field. The move for Arctic researchers to work closely with Arctic communities on a wide scale was unprecedented and it forced researchers to reflect on the relevancy of their own research to local communities in the Arctic. In many cases, Arctic scientists soliciting NNA funding were forced to think of how they could *make* their research relevant to Arctic communities. These scientists faced many issues during the formation of their NNA proposals: many fields of Arctic research are not directly relevant to locals' daily lives in the Arctic; many

scientists were unsure of how to approach communities; many were confused about the varying roles and responsibilities of different Alaska Native entities; many were unaware of the historical context of science in communities; and most simply didn't know where to begin in engaging with Indigenous communities in the Arctic. Following NSF priorities, numerous NNA proposals shooting for the "co-production of knowledge" were formed in the span of a few months and many Alaska Native entities in the Arctic were flooded with various inquiries about the relevancy of science to locals' lives and with requests to partner with a wide variety of research proposals led by scientists each taking their own shot at the "co-production of knowledge". The expected roles of Alaska Native entities in the proposals, and the allotted funding for their roles varied drastically from proposal to proposal. Research entities and project leads searched for examples of successful co-production of knowledge between Arctic scientists and Indigenous communities, however there are very few. One example that is internationally known as a model of successful engagement between an Arctic Indigenous community and Arctic researchers is the long and historic relationships between the Iñupiat and Arctic researchers in Utqiaġvik, Alaska. Throughout the history of Iñupiat-Science relations in Utqiaġvik, engagement between community members and scientists have taken many forms that have the potential to inform collaborative proposals.

This thesis focuses on this historic relationship between the Iñupiat of Utqiaġvik and Arctic scientists who utilize Utqiaġvik as a base for their research as a case example to explore what successful engagement between Arctic research and Indigenous communities can look like. This research will tell a history of Iñupiat and Arctic science relations in Utqiaġvik to provide a context for understanding a contemporary snap shot of Iñupiat and Arctic science relations in 2020.

1.2 Objectives

The Iñupiat village of Utqiaġvik, Alaska, the northernmost settlement in the United States, has been a logistical hub for conducting and supporting scientific research in the Arctic for over 100 years (Brewer and Schindler 2001, 9; Brower 1942; Murdoch 1892). The Iñupiat residents of Utqiaġvik have historically been heavily involved in Arctic research and for many decades have worked alongside researchers from national and international research institutions, universities, agencies, and other entities (Brewster 2001, 23).

This historic relationship between local Iñupiat and visiting scientists continues through several capacities in Utqiaġvik. UIC Science (UICS) is a local Iñupiat owned and operated Arctic research logistics provider. UICS is a team of local Iñupiat whalers and hunters who specialize in utilizing local, Traditional, and Indigenous knowledge to provide field support and logistical advice to Arctic research projects based in Utqiaġvik, Alaska. This situation is unique, in that Indigenous knowledge experts utilize their own collective knowledge systems to help Western knowledge experts produce knowledge, in this case Arctic research.

Given the recent push for more meaningful engagement between Arctic scientists and Arctic Indigenous communities, this project aims to provide a thorough historical context, which is a major component of cultural research in anthropology. Through examination of historical documents, including publications resulting from field research in Utqiaġvik, this study looks carefully into the history of Iñupiat and Arctic scientist's relations and knowledge exchange in Utqiaġvik from 1947-2020. In addition, the background chapter will investigate the semantic history and development of key concepts—Traditional knowledge, Indigenous knowledge,

Traditional Ecological Knowledge (TEK), and co-production of knowledge—that have the potential to clarify and/or confuse collaborative relationships.

In addition to reviewing historical documents, the researcher interviewed eight expert Indigenous knowledge holders who work in the field of Arctic research support in Utqiaġvik and eight academic scientists who base their research in Utqiaġvik, to document their perspectives on the intersection between different knowledge systems and cross-cultural engagement in Utqiaġvik as they experience it. Through thematic analysis of the interview transcripts, the researcher identified themes and reflexively analyzed and interpreted patterns in the data. Followed by reflexive analysis this thesis provides recommendations to foster reciprocal and collaborative relationships among academic scientists and knowledgeable Indigenous residents.

This thesis asks: do these two cohorts, the expert Indigenous knowledge holders and expert Western knowledge holders, differentiate between Indigenous knowledge and Western knowledge while they produce Arctic research in Utqiaġvik, Alaska? And if so, how do the two cohorts define, utilize and balance Indigenous and Western knowledge through the different phases of research? At what phases of research do the two sides work together? To help answer these inquires, this study focuses on the unique perspectives of both expert Indigenous knowledge holders who conduct and assist Arctic research based in Utqiaġvik and expert Western knowledge holders who conduct Arctic research based in Utqiaġvik. Expert Indigenous knowledge holders include Iñupiat science specialists who provide assistance and consultation to scientists in Utqiaġvik and expert Western knowledge holders include Arctic scientists who conduct field research in Utqiaġvik.

The findings of this research provides both Arctic researchers and Indigenous communities examples of successful engagement between Arctic scientists and Indigenous

communities and examples of different forms this engagement may take. This research has the potential to have broad implications for how Indigenous contributions are acknowledged, compensated for, measured, and valued in the face of increasing scientific research in the Arctic.

Chapter Two: Background

Arctic research based in Utqiaġvik has contributed to tens of thousands of publications. A complete comprehensive review of this data would take many years. The resources cited in this chapter represent a small fraction of available historical documents regarding the history of science in Utqiaġvik. The author in this project chose resources most applicable to the history of relations between scientists and Iñupiat. Elements of history are subjective in nature and this chapter is the author's interpretation of the history of Iñupiat and Science relations in Utqiaġvik as represented in the cited historical resources.

2.1 Early History of Iñupiat in Utqiaġvik and Piġniq

This section provides an early history of Iñupiat in Utqiaġvik to show the depth of their knowledge and history. The Iñupiat village of Utqiaġvik (formerly Barrow) has been one of the most strategic locations in the Arctic for thousands of years. Utqiaġvik is surrounded by the Chukchi Sea to the west, the Beaufort Sea to the east, the Arctic Ocean to the north, and the Arctic coastal plain to the south. Due to currents and deep water, leads open up near the shore during the winter and spring to allow access to a bounty of resources including marine mammals, birds, and fish. Both the spring and fall migration of the bowhead whales pass near Utqiaġvik. This fact alone makes Utqiaġvik one of the most strategically located pieces of Iñupiat real estate in all of Inuit Nunaat (Inuit homeland, from the Bering Sea to Greenland). In 1924, Arctic explorer Knud Rasmussen, following his successful expedition by dog sled from Greenland to Siberia declared that "Pt. Barrow has always been one of the main centers for the Eskimo whaling industry" (Rasmussen 1927, 305). The people of Utqiaġvik also utilize resources from the Arctic coastal plain by both travelling inland and maintaining extensive trade networks with inland Iñupiat.

Archaeological evidence tells a story of a very long and consistent occupation of the North Slope by the Iñupiat, stretching back thousands of years (BLM 2004; Dixon 1975; Smith, et. al., 2013). Virtually everywhere you look, both on the coast and inland along rivers and in the hills, you will find evidence of long occupation and local resource utilization. The Chukchi and Beaufort Sea coastlines are filled with old house pits and former village sites. There are many archaeological sites of great significance in Utqiaġvik that show at least 1,500 years of continuous occupation by the Iñupiat (Carter 1966; Ford 1959; Jensen 2009; Stanford 1976). One of the most significant archaeological sites in the entire Arctic, Piġniq (also referred to as the Birnirk Site) in between Utqiagivk (formally Barrow) and Nuvuk (Pt. Barrow), (Carter 1966, Ford 1959).

Piġniq is located on the outset of a narrow isthmus that connects the gravel spit of Nuvuk (Point Barrow) to the mainland. Piġniq is especially significant to this research project because it overlaps the Naval Arctic Research Laboratories (NARL) campus, where the science that is the focus of this study is centralized in Utqiaġvik. Piġniq runs adjacent to the eastern end of the NARL airstrip. The airstrip has been decommissioned for several decades and is utilized as a platform to butcher bowhead whales caught in the fall hunt. Piġniq is a traditional location for local Iñupiat to gather and hunt migrating ducks in large numbers during the late summer and fall. This resource is a significant part of the traditional Iñupiat diet. Sgt. John Murdoch, spent two years in Utqiaġvik from 1881 to 1883 and recorded his observations on the significance of Piġniq:

> About the end of July the return migration of ducks begins. At this season the flocks, which are generally smaller and more compact than in the spring, come from the east along the northern shore, and cross out to sea at the isthmus of Pernyû (Piġniq), where the

> natives assemble in large numbers to shoot them as well as to meet the Nunataṅmiun (inland Iñupiaq). All the people who have been scattered along the coast in small camps gradually collect at this season at Pernyû (Piġniq), and the returning eastern parties generally stop there two or three days; while, after they have brought their families back to the village, the men frequently walk up to Pernyû (Piġniq) for a day or two of duck shooting. The tents are pitched just in the bend of Elson Bay, north of them is a narrow place in the sand spit over which the ducks often pass. Here the natives dig shallow pits in the gravel, in which they post themselves with guns and bolas. A line of posts is set up along the bend of the beach from the tents almost to the outlet of Imêkpûniglu (Imikpuk Lake). [Murdoch 1892, 277]

As Murdoch noted above, people from Utqiaġvik would gather at Piġniq to meet with the inland Iñupiat, or Nunamiut, during the fall time. The purpose for these regional meetings was to allow for trade between people who collected various resources across the North Slope from the land and ocean. People traditionally came from both the east and west to meet at Utqiaġvik to trade. Burch notes the Messenger Feast was periodically held at Piġniq and in 1889 Herbert Aldrich, a Massachusetts news reporter travelling with a commercial whaling boat, recorded seeing a trade fair at Piġniq with 70 tents, (Burch 2005, 196). However, it was reported that in year 1900, nearly all the people attending the fair at Piġniq caught influenza and many died as a result, and the fair was never held at the location again (Spencer 1959, 210-211). The location of Piġniq as a site to gather and exchange knowledge and resources correlates with NARL as a location to exchange knowledge and resources.

The archaeological site at Piġniq includes a series of mounds with the remains of several houses built of whalebone dating back two thousand years. Some of the house mounds have been

excavated and others are fully intact. The initial archaeologist who excavated the site interpreted the local name of Piġniq as "Bir-nirk" (Ford 1959). Therefore, the site was named the "Birnirk Archaeological Site." The Birnirk Archaeological Site is listed as a National Historic Landmark (NHL) on the National Register of Historic Places. Originally nominated in 1962, the site was officially declared an NHL in 1966. The Birnirk Site is one of only four NHL's on the entire North Slope of Alaska, and one of only 49 NHLs in the entire State of Alaska. Arnold Brower, Sr. recalled the oral history of the mounds at Piġniq:

> They say there was a grandmother and grandson living together in one of those old sod houses at Piġniq [Birnirk, six miles north of Barrow]. All these whales were running out in the lead in springtime, so she took her grandson out there. They got a whale with no boat, no nothing. That old woman had fur pants that got a little belt around them. She took that belt off and tied it around the whale's mouth. She told her grandson that they were going to go home with the whale, but he was not to open his eyes until they reached their sod house up there. And then when they got there, she told her grandson to open up his eyes and there they were, right in front of their house. And just with that little belt she'd pulled the whole whale way up by her house! […] And they found all these whale bones when a man named Ford dug up all those old sod houses at Piġniq. We went duck hunting up there every spring, and we were camping up there when they were digging that part. And they had these whale bones, all in one piece over by where that story happened. The whale bones, vertebras, ribs, the head and everything were there. I don't know how they got it all there. [Brewster 2004, 128]

Throughout the 20th century, Piġniq remained a significant location for local Iñupiat hunters to hunt birds for a food resource during the late summer and fall. Late Iñupiat Elder and

Whaling Captain Arnold Brower, Sr. remembered that "Every day in late July and early August when the wind is not blowing, men, women, teenagers and boys shoot ducks at Piġniq. Huge flocks cross over the spit on their way south for the winter" (Brewster 2004, 26).

Access to the springtime eastern migration of bowhead whales along open leads that open close to shore is the primary reason why the location of Utqiaġvik is so strategic. Secondary to the bowhead hunt, the location also provides year-round access to bounties of the ocean including other marine mammals, sea birds and fish *and* access to bounties of the Arctic coastal plain including caribou, freshwater fish, waterfowl, plants, berries, wolves, wolverine, moose, and much more. In addition to its strategic location to utilize resources, the specific location of the present-day NARL campus has historically been a location to exchange knowledge and resources. Traditionally, local Iñupiat gathered at Piġniq each fall to trade resources and exchange, and beginning in 1947, scientists and local residents began utilizing the location to exchange knowledge and resources, mainly through paying locals to provide consultation and labor to conduct Arctic research.

2.2 Historic Relations between Iñupiat and Visitors in Utqiaġvik

Even before the establishment of the NARL campus, there was a history of relations between Iñupiat and Euromerican visitors in Utqiaġvik. The location has been utilized as a logistical hub by U.S. federal and other foreign entities for nearly two centuries. In 1848, the H.M.S. Plover was the first of over 20 expeditions to travel to northern Alaska to take part in the infamous search for Sir John Franklin and his crew by the British Royal Navy and U.S. Navy. From 1852 to 1854, the H.M.S. Plover spent over two years in Elson Lagoon, very close to Piġniq and the present-day NARL Campus. During the winters, the ship froze into the ice. The

crew hoped to develop friendly relations and to inquire with people in Utqiaġvik and across the North Slope with the hope of learning information about the missing Franklin expedition. The ship's commander, Captain Rochford Maguire provided the earliest detailed written accounts of the North Slope Iñupiat, (Maguire 1988). Maguire also played a pivotal role in influencing the future of governmental and scientific presence in Utqiaġvik. The Captain reported back to England and the United States that they had found a suitable place in which they could maintain friendly relations with the locals and a safe place to overwinter without being crushed by ice (Schneider, et. al., 1980, 30-31).

During the Plover's stay in Utqiaġvik, commercial whaling in the Arctic Ocean was beginning to impact the Iñupiat of the North Slope. In 1849, fifty commercial whaling ships passed through the Bering Straits into the Arctic Ocean and killed as many whales as their ships could hold, averaging more than 1,300 barrels of oil per vessel and large amounts of baleen (at the time referred to as whalebone). More and more ships began to travel to the Arctic every year, and by 1852, 200 ships were hunting whales and walrus in the Arctic Ocean (Bockstoce and Burns 1993, 567). By 1866 the population of whales in the Arctic Ocean was in steep decline due to the commercial industry. The whalers pushed their ships further north near dangerous ice packs and began killing more gray whales and walrus to offset the low bowhead whale harvests. These commercial fleets had detrimental impacts on Iñupiat subsistence harvests of marine resources.

As a result of their aggressive whaling practices, during the 1870s, fifty-seven whaling ships were lost in the ice, including 31 near Point Belcher in 1871, and 12 near Point Barrow in 1876 (Bockstoce 1977; Bockstoce 1986; Bockstoce and Burns 1993, 570). Onshore whaling stations were set up on at Point Barrow in 1884 to catch bowhead whales that were traveling

along open sea-ice leads during their spring migration when ships could not access them. The land-based stations were successful, and by 1895 there were up to 20 stations operating between Saint Lawrence Island in the Bering Sea to Point Barrow in the Arctic Ocean (Bockstoce and Burns 1993, 571). The land-based whaling stations drew in Iñupiat for trade and employment (Burch 1998, 108). The advent of steam-powered boats allowed commercial whalers to travel into the eastern Beaufort Sea to exploit the summer feeding grounds of the bowhead whales. During the summer of 1897, many of the steam-powered whaling ships became stranded in the ice near Point Barrow while in route to the eastern Beaufort. Forty-four ships were abandoned and roughly 1,200 whalers fled to the shoreline between Point Barrow and Wainwright in need of clothes, food and housing. The Iñupiat took care of the whalers and reportedly gathered over 12,000 pounds of caribou meat, 8,600 pounds of fish, and 2,500 pounds of waterfowl to feed the stranded whalers (Schneider, et. al., 1980, 86).

Upon word of the 1897 whaling disaster, the U.S. Federal Government sent Lieutenant Jarvis to drive a herd of domesticated reindeer from the Seward Peninsula to Utqiaġvik to provide food and clothing to the stranded whalers (Jackson 1898). As mentioned above, the whalers had already been taken care of by the local Iñupiat. The reindeer herd arrived and resulted in the establishment of several reindeer herding stations in the Barrow-Atqasuk area with 11 head herdsmen listed in Barrow in 1903 (Schneider, et. al., 1980, 33). Reindeer herding as a practice and public institution contributed further to the formation of working relations between local Iñupiat and non-Native government officials in Utqiaġvik.

The original Barrow herd that was established in 1898 consisted of 125 deer and was managed by Presbyterian mission teachers and missionaries as agents of the U.S. Government. A hundred of the deer were owned by the U.S. Government, while 25 of the deer were owned by

Ojello, a local Inuk in Utqiaġvik (Jackson 1898), and by 1900 the mission owned 185 and Ojello owned 42 (Jackson 1901, 14). Other local Iñupiat begin to earn and own deer beginning in 1901 (Jackson 1902, 17), and by 1915 approximately 2,400 reindeer were owned by 107 separate Iñupiat owners in Utqiaġvik. By 1923, 209 Iñupiat owned 3,700 reindeer. All the deer tended to mix up, and with so many different earmarks, it was very confusing to keep track of fawns and unmarked deer. In 1925, the Alaska Reindeer Service encouraged the herders to give up private ownership and form a herding co-op/association. The *Farthest North Reindeer Company* was formed in Barrow. Locals referred to the herd as the 'Company Herd.' Among others, Al Hopson and Tom "Mickey" Gordon, Jr. were effective managers of the Company Herd. During corralling, meat and hides were distributed to each association members' households. Charles Brower acquired five female reindeer in 1904 from the government-owned herd in Barrow with the understanding that his herd would be inherited by his oldest son. Charles's son, Thomas Brower, Sr. or Paniattaaq, eventually took charge of the herd from 1926 to 1947 and established a range east of Utqiaġvik, and the herd grew from a few hundred to over 6,000. However, by 1948 the herd fell to 1,250 deer and by 1951 the herd dispersed and mixed with caribou (Jackson1899; Jackson 1900; Jackson 1901; Jackson 1902).

In the late 1920s and 1930s, the population of wolves grew significantly in northern Alaska and began to focus on reindeer as a primary food source. Caribou populations also began to grow significantly in the area and drew reindeer away from their pastures and scattered herds into opposing ranges, and new herding practices introduced in 1925 decreased the protection and confinement of herds. As the caribou and wolf populations grew, the reindeer population shrank. Wolves killed and dispersed reindeer; caribou dispersed them and lured them on their travels, (Burch 2012, 14). Due to the lack of herdsman who personally owned deer after the creation of

reindeer herders' associations, as well as the loss of reindeer to caribou and wolves, reindeer herding in the Utqiaġvik area came to an end. By 1945, the last of the reindeer left the area west of Utqiaġvik (Bodfish 1991, 73), and in 1951 the last reindeer herd mixed with the Teshekpuk Lake caribou herd to the east of the Meade River (Brower 1982). Commercial whaling and reindeer herding were two enterprises that initiated employment and working relations between local Iñupiat and non- Iñupiat in Utqiaġvik. Although employment of locals in Arctic research took place during the second half of the 20th century, Utqiaġvik as a location to conduct Arctic research began very early.

The first long-term presence of academic scientists in Utqiaġvik came in 1881 during the First International Polar Year (IPY1). The U.S. Army Signal Corps selected Utqiaġvik as one if it's 15 polar locations to base field research and take scientific measurements during IPY1 from 1881 to 1883. The research station was located near the current location of the Top of the World Hotel in Utqiaġvik. The Signal Service Expedition attempted to document weather conditions, earth magnetism, tidal amplitude, auroral display, minerals, plants, invertebrates, fish, birds, mammals, ethnography and linguistics (Fitzhugh 1988, ix). Sgt. John Murdoch led the ethnographic and linguistic studies of the people of Utqiaġvik. Murdoch was supported by the Smithsonian Institution, who provided for Murdoch's salary and extra funds to buy items from the trading post to trade with locals for the Smithsonian's collection (Murdoch 1892). Smithsonian Institution had already been collecting clothing, tools, and other items from indigenous peoples in Alaska for several decades before IPY1. In 1850, four years after its founding, the institution's curator, Spencer Baird started what became referred to as "salvage ethnography," an aggressive mission that sent naturalists to the furthest stretches of North America to document the cultures and natural environments, and collect material culture from

Indigenous peoples before they would be “influenced” by the expansion of the United States and Canada (Crowell, et. al., 2010, 290; Fitzhugh and Crowell 1988, 90). Alaska became a target for Baird when the United States assumed control over the territory in a deal with Russia in 1867. The Smithsonian went on a “collecting binge” in Alaska that reached every corner of the state (Hurst-Thomas 2000, 54). The Smithsonian initiative had a heavy influence on guiding the conduct of government science across the northern regions of Alaska, (Fitzhugh and Crowell 1988, 96).

A significant portion of the scientific research based out of Utqiaġvik is built upon local Iñupiat knowledge and their willingness to share it with visiting scientists. Charles D. Brower arrived in Utqiaġvik in 1886 and started the Cape Smyth Whaling and Trading Company. C.D. Brower married an Iñupiat woman and fathered 14 children over the course of 61 years in Utqiaġvik, (Brower 1942). The Brower family played a pivotal role in bringing science into the local Iñupiat community. C.D. Brower had an enthusiasm for science and provided support to many visiting scientists in Utqiaġvik from 1884 to 1945. C.D. Brower trained his sons to professionally prepare specimens for scientific institutions (Bailey 1948, 40; Reed and Ronhovde 1971, 114), and by 1950 a majority of Arctic bird specimens, collections of bird eggs, and mammal study skins found in scientific institutions across the entire United States were prepared by the Brower family (Brewer and Schindler 2001, 9). In addition to collecting specimens, the Brower family obtained animals for zoos, acted as translators, and provided logistical help to scientists, travelers, and explorers including Vilhjamur Stefansson and Knud Rasmussen. During Rasmussen’s visit to Utqiaġvik in 1924, he recognized that the local Iñupiat were well-educated, had a strong sense of community, and that they seemed to have friendly relations with non-Iñupiat visitors:

> Our arrival aroused quite a sensation among the inhabitants, when it was known that we had come from so far east; all had sufficient book learning to form some idea of the distance involved. Consequently I was invited to give a lecture on Greenland and the other countries we had passed through, which I did at the local school house, on the following day… During my stay I gained a living impression of the contact between the native populations and the white man." [Rasmussen 1927, 30]

2.3 History of the Naval Arctic Research Laboratory (NARL) in Utqiaġvik

The U.S. federal government has had a long interest in the oil fields of Northern Alaska. Oil seeps were "discovered" by Alexander Malcom Smith in 1917 in Smith Bay east of Utqiaġvik; however, the local Iñupiat had always known of the seeps (Schindler 2001, 29), and traditionally utilized fuel-soaked blocks of sod as a heating source. During the 1920s the U.S. Navy began to retire its coal-powered fleet and converted to oil and gas-powered vessels. In 1923, U.S. President Warren D. Harding, through an act of Congress, created the 23.6 million-acre Naval Petroleum Reserve 4 (PET-4) to reserve potential oil and gas resources on the North Slope for the U.S. Navy (Reed and Ronhovde, 1971, 10). The act claimed that the North Slope was "free of private ownership interests"; however, PET-4 was located at the center of the ancestral North Slope Iñupiat homeland. In many cases, the Navy forced people to leave their homes, houses, and hunting camps during the early years of resource exploration in PET-4 (Gallagher 2001, 100). In 1946 PET-4 was described as "the largest block of land under public domain" (Stanford and Pierce 1946, 3). In a 1977 federal proposal to turn a major North Slope river tributary into a National Historic Landmark, the federal government clearly did not recognize the long occupation of the Iñupiat. The report found that the river system was

"untouched" despite people living along its shores, hundreds of campsites, and Iñupiat archaeological evidence virtually everywhere you looked. Furthermore, the 1977 report found that the newly occupied village of Atqasuk on the Meade River posed "a strong threat to the integrity of the area" (Racine 1979). Several decades later, in 2013, the U.S. Bureau of Land Management still claimed that the central North Slope "is one of the largest remaining wilderness areas in the United States" (BLM 2013, 451). Although the NPR-A is technically a wilderness area, the Iñupiat of the North Slope have lived on and utilized resources from the 23.6 million acres of land for thousands of years.

At the height of World War II, in 1944 the federal government initiated the PET-4 Oil Exploration Program to search for oil resources in the central North Slope. Utqiaġvik was chosen as the base for its operations. The U.S. Navy landed a series of barges four miles northeast of Utqiaġvik near what is traditionally known as Piġniq and began the construction of the oil exploration basecamp. The site was selected with the advice of the Brower family. Arnold Brower, Sr. remembered being recalled from his paratroop regiment to help confirm the location of the site (Jensen and Erickson, 2016, 13). The base camp included 100 WWII Quonset and Jamesway huts and an airstrip, which provided all living requirements and working space for up to 1,000 personnel to carry out the exploration program.

For over 30 years, NARL was one of the world's largest research facilities located in the Arctic. Today the NARL Campus consists of the local Ilisagvik College, the Department of Wildlife Management, the Barrow Arctic Research Center (BARC), the Atmospheric Radiation Measurement (ARM) offices, various local businesses, and a handful of residential houses. Historically, NARL had special influence on thousands of scientists who visited Utqiaġvik as "they were exposed to a new climate and a different culture, both of which required shifts in

perspectives and methods" (Brewster 2001, 25). Research at NARL utilized Iñupiat knowledge and observations, and as Brewster points out, "this incorporation took place at NARL long before it became fashionable amongst northern scientists, and before anyone ever heard of the phrase Traditional Ecological Knowledge" (Brewster 2001, 25). Furthermore, these contributions "show a breadth and wisdom of Native environmental knowledge and demonstrate how essential Native involvement is to scientific inquiry" (Brewster 2001, 25).

In 1946 the U.S. Navy created the Office of Naval Research (ONR) and charged it with two principal tasks: first, it needed to create and implement a robust naval research program; and second, it needed to orient this research in support of other missions of the Navy. In February of 1947, M.C. Shelesnyak of ONR visited Utqiaġvik to look into the feasibility of establishing an ONR research station in Utqiaġvik. Shelesnyak quickly returned to the east coast and entered into negotiations with Dr. Laurence Irving at Swarthmore College to establish and operate an Arctic research program in Utqiaġvik. By August of 1947, Dr. Irving and six other scientists travelled to Utqiaġvik and took over two surplus Quonset huts located at the naval oil exploration camp and established the Arctic Research Laboratory (ARL was later renamed NARL and will be referred to as NARL for the rest of this thesis to avoid confusion) (Reed and Ronhovde 1971, 37-39). From the beginning, NARL was operated as a national facility with resources open to all federally funded research projects. For several consecutive years, NARL grew in size and significance, and by 1951 the facility supported various research initiatives including sea ice research projects, the USGS as they conducted year-round permafrost studies, research by the U.S. Hydrographic Office, the U.S. Army Corps of Engineers, the Coast and Geodetic Survey, and the Public Health Service (ARCUS 1999, 6).

In 1953, the PET-4 Oil Exploration Program ended and in the following year the entire oil exploration camp was turned over to ONR. Growing tensions between the U.S. and the Soviet Union would prove to play a pivotal role in expanding the significance of NARL. In an effort to protect the continental U.S. from Soviet bombers that could potentially carry nuclear weapons, the U.S. Department of Defense contracted Western Electric (AT&T) to construct a system of radars called the Distant Early Warning (DEW) Line that would stretch across the North American Arctic from the Bering Strait to the Faroe Islands east of Greenland. The first of the eventual 63 DEW line sites was set up in Utqiaġvik, and cold-weather radar technology was developed based at NARL by the Massachusetts Institute of Technology (MIT). The DEW Line construction offered jobs across the Arctic for virtually all seeking employment as the project provided over 25,000 positions (Lackenbauer, et. al., 2005, 10). In support of building the DEW Line, the U.S. Air Force took over NARL in 1954 and contracted with the University of Alaska to operate the campus. In 1956 Max Brewer became director of NARL and entered into negotiations with the Air Force to retain a host/tenant agreement to continue to conduct research from the facility, and the Air Force agreed to furnish support for all research functions (Britton 2001, 67). A major emphasis on the research conducted at NARL in the 1950s and 1960s was on the physiology and ecology of Arctic animals (see Rausch 2001), and the Animal Research Facility (ARF) was developed with live animals including weasels, lemmings, seals, wolverines, wolves, caribou, ravens, and polar bears.

The development and utilization of aircraft to conduct scientific research greatly increased the importance of NARL to the Air Force and Navy. In 1958, during the International Geophysical Year (IGY), NARL acquired two light aircraft to conduct landings on sea ice. For several decades, NARL provided support to research across the Arctic Basin, especially to the

drifting ice field stations. By 1972, the air fleet at NARL operated and housed eight aircraft including five single engine aircraft, and two twin engine R4Ds that were fully dedicated to Arctic research (ARCUS 1999, 8).

In 1971 the National Science Foundation (NSF) was designated as the lead U.S. Federal agency for Arctic research and began funding large scale integrated studies. Field research for a series of complex Arctic research programs funded by NSF in the 1970s were largely based in Utqiaġvik. For instance, the Tundra Biome Program (TBP) (1970 to 1974) was a large integrated program that studied Arctic ecological, terrestrial, and freshwater systems (Brown 2001, 194-196). Most of the terrestrial and all of the aquatic research for this program was based at NARL. The NSF-funded Research on Arctic Tundra Environments (RATE) (1975 to 1977) was based in Utqiaġvik and built on the TBP studies, while the aquatic studies were located at Toolik Lake and the terrestrial studies were located at Atqasuk. Research led by the USGS to study the Arctic Coastal Plain looked into the physical and thermal aspects of permafrost, vegetation and soil characteristics, and innovative Arctic engineering ideas to utilize snow and ice for construction techniques. Another large research initiative in the 1970s was the Arctic Ice Dynamics Joint Experiment (AIDJEX) (1975 to 1977). This program was funded jointly by the NSF, the U.S. Navy, and NASA and included an array of sea ice drifting stations both manned and unmanned (instrumentation) that studied ice drift characteristics, physical properties, creation and deformation of sea ice, ocean currents, wind drivers, Coriolis force, and the gravitational pull on sea ice. The Outer Continental Shelf Environmental Assessment Program (OCSEAP) (1975 to 1982) was led by the BLM and based its operations out of NARL and included major studies of the Beaufort and Chukchi Seas.

In 1968, major oil reserves were discovered at Prudhoe Bay 200 miles southeast of Utqiaġvik. In order to access the oil and bring it to the southern markets, the industry faced massive environmental engineering hurdles. To make things more difficult for the oil companies, the federal government passed the National Environmental Protection Act in 1969, which required all major projects in the United States to conduct a detailed Environmental Impact Study (EIS) to assess all potential environmental impacts and to ensure that projects follow all state and federal laws. The industry utilized the NARL Library for its immense amount of Arctic research. The Arctic permafrost studies alone are believed to have saved the oil companies two years of delay and over $10 billion in research (Navy 1975).

2.4 Iñupiat and Science Relations at NARL

During the Navy's initial establishment of the PET-4 Oil Exploration Camp in 1944, the Navy hesitated to hire local residents because they were scared of the prevalence of tuberculosis (TB) in Utqiaġvik and they assumed that Natives were undependable workers, (Norton 2001, 2). After establishing a healthcare program that allowed for testing TB, the Navy changed its policy to allow the hiring of local Iñupiat as laborers, equipment operators, mechanics, carpenters, and as guides on surveys and mapping expeditions. The Navy's hiring of the local Iñupiat set the stage for long term cooperation between the science community at NARL and the local Iñupiat community in Utqiaġvik. Throughout the second half of the 20th century, NARL put intense international focus on the local Iñupiat. A longtime NARL scientist reflected, "it was like having a magnifying glass over the people—Ukpeaġvik people, history, culture, environments, whaling traditions—all things about Barrow, in short, were being magnified" (Norton 2001, 1).

The Office of Naval Research (ONR) scientists who founded NARL in 1947 immediately recognized that local Iñupiat in Utqiaġvik held an incredible wealth of knowledge and saw it as a resource to be tapped. In a memorandum dated October 1947, just two months after the establishment of NARL, the founding director, Dr. Laurence Irving, wrote to the ONR headquarters about the local Iñupiat, the knowledge they possessed, and their ability to pass on scientific knowledge to scientists. Irving continued,

> The sharp observation of our Eskimo assistants has been invaluable. Combined with their keen observation, their accurate memory, and their ability to report observations is literally making available to us, gradually, the careful results of their serious study of the region. [Reed and Ronhovde 1971, 44]

Irving also recognized that to adequately understand the Arctic environment, one must experience the Arctic, "scientific exploration of the Arctic cannot be initiated by experimental models in academic institutions. It requires direct observation of the life and conditions in the Arctic lands and seas by methods that go beyond the means of institutions of learning" (Irving 1973, 19). Another long-term NARL scientist, John F. Schindler, recorded that:

> Since the first summer of the Laboratory's operation (1947) we have enjoyed a unique relationship with the Natives of Barrow. For most of the lifetime of the laboratory, about 60 percent of our employees have been hired locally. The difficulties that someone from the "South 48" can have trying to accomplish the simplest chores in an arctic winter can only be appreciated fully by those who have learned the hard way. The people of Barrow have brought experience and knowledge to the Laboratory and the value of these to the research effort can never be fully measured. Many overland trips, ice projects, boat

projects, and ice stations owe their success to the presence and gentle suggestions of the local people. [Shindler 1973, 219]

Granting that scientists immediately recognized how crucial the contributions of local the Iñupiat to their science, their public recognition of these contributions usually came long after the research was collected and data was published. In many cases this recognition came in retirement when scientists reflected on their careers. In 2001, after a lifetime of research at NARL that incorporated local Iñupiat knowledge, David Norton appreciated that the "comprehensive and holistic observational skills that Iñupiat colleagues traditionally call upon in surviving when on the sea ice, and travelling arctic rivers" was crucial to his research (2001). After decades of research at NARL another scientist felt thankful: "I now publicly express both my gratitude and the Laboratory's gratitude to the people of Barrow" (Schindler 1973, 219).

The recognition of local Iñupiat contributions to science at NARL during ONR's tenure was nearly absent from publications resulting from research in Utqiaġvik. A bibliography that attempted to capture all the publications of research based at NARL from 1947 to 1973 included a total of 2,426 publications. Of the over 4,000 contributing authors, only one local Iñupiaq contributor, Simon Paneak, was listed as a contributing author on three publications (Gunn 1973).

Although hundreds of local Iñupiat in Utqiaġvik provided significant contributions to Arctic research at NARL, it is worth focusing on one example of a local Iñupiat man who was instrumental to the success of Arctic research in Utqiaġvik and how his contributions were recognized. Peter Sovalik was the head animal caretaker at the Animal Research Facility (ARF) and made profound impacts on nearly all of wildlife research that took place at NARL in the 1950s and 1960s. Many scientists and research technicians at NARL would ask Peter to edit the

drafts of their research. As the researchers put it, “In effect, Pete trained a whole generation of young scientists, in how to observe and interpret nature, and how to survive in the Arctic” (Brewer and Schindler 2001, 9). Peter Sovalik was never listed as an author in any publications that he contributed to. In hindsight, former NARL scientists recalled that “the most definitive book on birds in the area (Bailey 1948) contains so many quotes from Pete that one wonders why he wasn’t the author of record” (Brewer and Schindler 1997, 9). Although Brewer and Schindler claimed that “it is not necessary to have passed formally through the halls of a University to become a naturalist, the keen and patient observer of nature, who can long remember what he has seen qualifies as a naturalist” (Brewer and Schindler 1997, 24). However, it seems that you must pass formally though the halls of a University to be recognized as an author in scientific publications in the case of NARL research before its closure in 1980. While reflecting on the impact of local Iñupiat on the science at NARL, and the recognition of these impacts, Karen Brewster recognized that:

> Many scientists owe their survival, the success of specific projects, and even their ultimate career success to their Iñupiat guides, who shared what they knew about the Arctic… Of the more than 1,500 scientists that passed through NARL from 1947 to 1980, only a few recognized fully the contributions of their Native teachers and co-teachers. During this period, scientists were not held to a standard for acknowledging local assistance. Some researchers failed to mention their Native assistants at all, prior to 1980. [Brewster 2001, 24]

2.5 The Land Claims Era: Statehood, ANCSA, and Local Control of NARL

Alaska became a state on January 3, 1959. The Alaska Statehood Act gave the State of Alaska (SOA) 25 years to select over 130 million acres, nearly one-third of the total landmass of Alaska. During and shortly after the formation of the SOA, Alaskan Natives were left out of federal and state negotiations on the development of resources across the state. The SOA began selecting the most profitable lands without regard to aboriginal title of Alaskan Natives. Tension mounted across Alaska as the SOA claimed that Alaska Native traditional lands were vacant and thus eligible for selection. After the oil fields in Prudhoe Bay were recognized as recoverable and claimed by the SOA, oil companies and the SOA began planning a pipeline that would cross disputed lands throughout Alaska. Suddenly, the SOA and the oil companies *had* to settle the long-standing issues of aboriginal title in Alaska. As a result, the Alaska Native Claims Settlement Act (ANCSA) was signed in 1971. Although the North Slope Iñupiat adamantly fought against the ANCSA agreement, all other Alaska Native regions voted for passage of the act. Through ANCSA, the Alaska Natives were allowed to select a total of 44 million acres, or 10 percent of Alaska's landmass, in addition to nearly $1 billion to split up amongst the communities across the state in exchange for, among other things, the extinguishment of aboriginal title over the other 90 percent of Alaska's land and the extinguishment of traditional subsistence rights (ANCSA 1971). The one billion dollars was to be split up amongst 12 regional corporations and 220 village corporations that were created by the act. For the North Slope, the regional corporation was called the Arctic Slope Regional Corporation (ASRC) and the village corporation in Utqiaġvik was named the Ukpeaġvik Iñupiat Corporation (UIC). UIC became the major land owner in Utqiaġvik and ASRC quickly became the largest private business in Alaska, and by 2015 annual earnings topped $2.5 billion in revenues (ASRC Official Website).

Following the passage of ANCSA, Iñupiat leaders on the North Slope devised a brilliant plan to utilize State of Alaska law to gain taxation and zoning power over the oil development on the North Slope. State law regarding boroughs was specifically written to give major taxation and zoning power to borough governments near the non-Native population centers such as Juneau, Fairbanks, Anchorage and Kodiak. The State of Alaska and the large oil companies developing the North Slope fought to stop the creation of a local borough government on the North Slope; however, a ruling by a federal judge allowed for the North Slope Iñupiat to create the North Slope Borough (NSB) in 1972. The creation of the NSB gave local Iñupiat equal power as the boroughs in southern Alaska to tax the infrastructure of the oil fields located in their respective boroughs. This created a tax base from which to build the infrastructure needed to provide services to people across the North Slope. The local infrastructure in Utqiaġvik quickly expanded, and the population grew to over 4,000 residents.

Due to lowered worldwide whale populations from commercial whaling, the International Whaling Commission (IWC) imposed a ban on subsistence hunting of bowhead whales in the Arctic in 1977. The ban was based on a NOAA whale census that claimed there were less than 1,000 bowhead whales in the Bering-Chukchi-Beaufort stock. In 1977, 111 whale strikes were reported in northern Alaska (DWM Official Website). Iñupiat whalers in Utqiaġvik knew the NOAA scientists grossly underestimated the bowhead population. During the bowhead moratorium on whaling, the formation of the NSB allowed locals in Utqiaġvik to build their own research program that hired scientists to lead a thorough bowhead whale census that incorporated local Indigenous knowledge. By 1981 the partnership between local Iñupiaq whalers and wildlife biologists (what became known as the Department of Wildlife Management or DWM) took over the bowhead census project and showed the population of bowhead whales was much higher

than 1,000. Consequently, the IWC whaling ban was lifted. The new, more accurate census proved to NOAA and the IWC that Iñupiat knowledge about bowhead whale populations was more reliable than their previous scientific census. The establishment of the DWM led to one of the most fruitful long-term collaborative relationships between scientists and indigenous peoples in the world.

On a local level in northern Alaska, the Iñupiat were well aware of the power to organize and fight against external threats to their subsistence rights. Even before the Iñupiat successfully organized to end the whaling ban of 1977, the North Slope Iñupiat had successfully organized against the U.S federal government in 1961 and changed international policy. In 1916, several countries, including the U.S., signed the Migratory Bird Conventions, which outlawed the hunting of ducks and geese from March 10 – September 1 each year. From 1916 to 1961, no attempt was made by authorities to enforce this law in Utqiaġvik. On May 31, 1961, under pressure to enforce the law due to illegal hunting near the Mexican border, federal game warden Harry Pinkham flew to Utqiaġvik stop the spring duck hunt. Pinkham was discussing the law with Johnny Nusunginya, who at the time was a State Legislature, when a flock of ducks happened to fly over. Mr. Nusunginya drew a shotgun and shot one down in front of the warden, after which he was arrested along with a few other hunters. Their guns and hunting equipment were seized. Two days later, the warden was invited to a community town hall meeting. Upon arriving to the meeting, the warden was met by 138 hunters from Utqiaġvik, each holding an eider duck in one hand and in the other hand a note with a written statement that said they killed waterfowl out of season. That night, 300 people in Utqiaġvik signed a petition to President John F. Kennedy to allow for the Iñupiat to legally hunt waterfowl during the spring, summer, and fall, (Gallagher 2001, 106). The international treaty was amended and the ban was lifted. This

example of Indigenous civil disobedience to stand up for their food security is famously known as the “Duck Inn”.

From 1975 to 1979 overall usage of NARL declined by 67 percent and ONR research at NARL decreased by 91 percent. The Navy shifted its focus in the Arctic to the Kola Peninsula in the northwest Soviet Union where they held the world’s largest Navy fleet (ARCUS 1999, 9; Kelly and Brower 2001, 260). In 1980, the NARL campus included 5,000 acres of land and 135 buildings, mostly Quonset huts, in addition to the 45,000 square foot main building (Building 360). The annual operating cost for the University of Alaska to operate NARL in 1980 totaled $11.5 million (Laursen, et. al., 2001, 252). The Navy sought ways to transfer the campus to a new owner and operator, though none were identified. In October 1980 the NARL campus was closed to ONR research, the University of Alaska contract was terminated, and the Laboratory was reduced to 46 buildings. The estimated demolition cost was $50 million, and the Navy put out a bid for contracts for the demolition job (Sheehan 2001).

UIC began inquiring about the possibility of transferring NARL to UIC ownership in 1978. The Navy and the BLM rejected the first official offer in 1983; however, in 1985 Senator Ted Stevens helped the two sides reach agreement, and an official Caretaker Agreement was signed. On June 14, 1989, after three years of negotiations largely associated with the liability of inheriting hidden environmental contamination problems, UIC and the Navy signed for the official transfer of NARL ownership from the Navy to UIC (Kelly and Brower 2001, 260-261). The North Slope Borough (NSB) has played a major role in utilizing the NARL campus since UIC gained ownership. The NSB Department of Wildlife Management (DWM) moved into a section of building 360 and converted the Animal Research Facility (ARF) into living quarters and a laboratory to conduct research and accommodate scientists visiting Utqiaġvik for wildlife

research. The NSB also started a post-secondary education center on the NARL campus (headquarter in Building 360) which is currently called the Ilisagvik College.

In 1992, UIC made an unprecedented move to attract more research to Utqiaġvik by creating the Charles Etok Edwardsen Barrow Environmental Observatory (BEO). The BEO is a 7,466-acre land reserve set aside for scientific research. During the 1990s the number of scientists located in Utqiaġvik began to grow and included the scientists at DWM, the NOAA Climate Monitoring and Diagnostics Laboratory (CMDL), Ilisagvik Science Professors, and the growing Department of Defense Atmospheric Radiation Monitoring (ARM) project. In addition, new funding opportunities in Arctic research drew outside research entities to Utqiaġvik. The responsibility of providing visiting scientists with logistical support became a burden to the DWM. Several locals and resident scientists of Utqiaġvik created the Barrow Arctic Science Consortium (BASC) in 1995 to alleviate this burden. BASC was a nonprofit organization that was tasked to manage the BEO and to provide logistical support to visiting scientists. In the late 1990s, BASC entered into a cooperative agreement with the NSF Office or Polar Programs to manage the BEO and provide support to NSF-funded projects located in Utqiaġvik. During the late 1990s and early 2000s, with NSF's support, BASC played a pivotal role in reestablishing the capacity to support Arctic research in Utqiaġvik. When comparing fieldwork in Utqiaġvik to doing fieldwork in communities in Canada and Greenland in the early 2000s, a team of scientists recalled, "Barrow is the simplest by far, thanks to the Barrow Arctic Science Consortium" (Huntington, et. al., 2010, 262).

In 1997, BASC president Richard Savik Glenn organized a gathering in Utqiaġvik to celebrate the NARL 50th anniversary. BASC organized a series of papers (BASC 1997; Norton, ed., 2001), which are referenced extensively in this thesis. In a letter to the attendees of the

celebration, most of whom were contributing articles that were to be published to commemorate the history, BASC president Savik wrote to the visitors:

> Dear Friends, Welcome to Barrow and the 50th anniversary celebration of the Naval Arctic Research Laboratory. You are helping us remember and document the great works of scientific research that have been accomplished with the help from Native Iñupiat Eskimo people of the North Slope. You are helping us remember the ways in which scientists and local residents have learned to cooperate and work together. You are helping us tell the world that UIC-NARL and the people of the North Slope still carry on this tradition of supporting science, and that we are all building upon the works of people that came before us. [BASC 1997]

In December of 1998, an NSF-funded workshop was held in California with Iñupiat residents of Utqiaġvik, former NARL scientists, and Arctic funding agencies to develop a set of recommendations for the subject matter of research in Utqiaġvik and recommendations for the development and maintenance of Arctic research support infrastructure. Recommendations included the following: Traditional knowledge needs to be used in the formation of research questions; Researchers need to explain to communities in other parts of the world the significance and usefulness of Arctic research; and Utqiaġvik needs a support staff to be available to provide relevant information to visiting scientists, to assist with permitting, local orientation, and safety training, to provide local labor support, and to act as local liaisons between scientists and the community (ARCUS 1999). The 1998 workshop report also emphasized that the expertise of the Iñupiat in Utqiaġvik is a crucial element of science in Utqiaġvik:

> The residents of Barrow have demonstrated a whole-hearted willingness to help scientific research and we are a reservoir of scientific and technical information. Local people work on research projects as investigators, technicians, guides, bear lookouts, drivers, and in other capacities. At public meetings and science lectures, elders and other residents share their knowledge and expertise with research teams. [ARCUS 1999, 34]

Three years after the meeting in California, another NSF-funded workshop was assembled in Utqiaġvik in April 2001 and was hosted by BASC. The workshop, called "Arctic Science in the Barrow Region: Recommendations for Future Facilities" brought together Iñupiat residents of Utqiaġvik, local politicians, Arctic scientists, and representatives of research funding agencies to look closely at the logistical infrastructure constraints in Utqiaġvik. The participants of the workshop unanimously recommended the expedited construction of a new Arctic research facility called the Barrow Arctic Research Center (BASC 2002, 32).

By 2002, the NSF OPP and NOAA organized a report titled "The Feasibility of a Barrow Arctic Research Center," in which they offered their suggestions to alleviate the issue of infrastructure constraints. Recommendations focused on upgrading existing NARL infrastructure and did not recommend building a large, new facility (NSF OPP 2002). BASC moved forward with an aggressive plan to build not only a large new facility called the BARC, but a whole new research campus with the help of Senator Ted Stevens. Apparently NSF had reservations about supporting the building of large research campus for multiple reasons. In a popular book on the history of NARL, investigative journalist Charles Wohlforth described the situation:

> It had become another front in the long war to stop Ted Stevens from funding his own science priorities rather than the priorities arising from the NSF's process. The NSF officials talked about the BASC building as if it were a crazy idea. "If you put this big

> thing up there, how the hell are you going to run it?" said Tom Pyle, head of Arctic Programs. "How much science is there that really needs it?" He preferred to put the money at Toolik Lake. [Wohlforth 2004, 224]

When interviewed by Wohlforth, former NARL scientist John Kelly further suggested that "if the money went to BASC, it wouldn't necessarily be good for Barrow, because ongoing support could disappear overnight without constant political vigilance" (Wohlforth 2004, 226). Shortly after Wohlforth's 2004 publication, the history of science support in Utqiaġvik took a few sharp twists and turns. Senator Ted Stevens pulled through for BASC and secured funding for the planning and first phase of building a new research campus located inland of and adjacent to the NARL campus. The building of the first phase of the new campus' construction was completed in 2007, with the introduction of the Barrow Arctic Research Center (BARC), a state of the art Arctic research facility with several large and small labs, conference rooms, offices, and walk in freezers. However, BASC encountered some issues and the cooperative agreement between BASC and the NSF quickly fell apart. BASC was dissolved and a subsidiary business of UIC, UIC Science (UICS), stepped in and filled the niche of providing logistics to scientists in Utqiaġvik and took on the responsibility of operating the new BARC building. However, the drama was not over. Following completion of the BARC, the federal government shifted funds away from building the rest of the planned campus to help fund the war in Iraq. Tragically, Senator Stevens died in an airplane crash in western Alaska in 2010 and the plan to complete the research campus came to a halt. Even though the rest of the planned campus was not built, the building of the BARC opened a new era of science support in Utqiaġvik. From 2010 to 2020, UICS gradually grew in size and capacity to provide logistical support to an increased number of researchers in Utqiaġvik. During the past five years, interest in Arctic research has grown

exponentially and UICS has been forced to continue to expand services to keep up with the growing demand for logistical assistance to researchers in Utqiaġvik.

2.6 Iñupiat and Science Relations in Utqiaġvik Today

Today, UIC Science consists of 15 staff members, 10 of whom are based at the BARC on the NARL Campus in Utqiaġvik. The team is made up of local whalers, hunters, and expert Arctic survivalists who utilize traditional and local knowledge to provide logistical assistance to a wide variety of U.S. and international Arctic research institutions. UICS provides:

- lodging, lab facilities, storage and staging space;
- science equipment and vehicle rentals;
- science equipment deployment, maintenance, and technical support;
- remote labs and ice camps, including set-up, host, and break down;
- ice guides, bear guards, technical support, and other labor;
- collaborative services, including: community meetings, field schools, school visits, dissemination of knowledge, local representation of research;
- cultural resource management including phase one surveys, project monitoring, salvage and recovery archaeology; and
- permitting, local orientation, and safety training.

(UIC Science official website accessed 1/20/2020)

During the BARC's initial years, UICS's primary clients included the National Science Foundation, who funded a variety of projects, and the U.S. Department of Energy, who funds the Atmospheric Radiation Measurement (ARM). As changes in climate systems have become more of a global threat, and with new funding opportunities similar to the NNA funding as detailed in

the introduction, UICS has grown to accommodate a larger number of projects each year. With the development of new housing facilities and an expanding young and energetic staff, UICS hosts 40 to 50 projects per year funded by national and international research institutions such as the NSF, ONR, DOE, NASA, BOEM, the Max Plank Institute for Ornithology, the Swedish Polar Research Secretariat, the Ocean University of China, and several privately funded research and media projects. UICS is well known as an Indigenous owned and operated Arctic research logistics provider located in the Arctic.

The NSB Department of Wildlife Management (DWM) is also located on the NARL campus and is world renowned for expertise in Arctic wildlife science and marine biology. The DWM is made up of a mixture of local Iñupiat and wildlife scientists who facilitate sustainable harvests and monitor populations of fish and wildlife resources through research, leadership, and advocacy from local to international levels (DWM Official Website). The research at DWM is driven by local Iñupiat whalers and scientists who live in Utqiaġvik. This partnership has allowed for deep cohesion that establishes collaborative equity among scientists and local Iñupiat creating a very unique mix of circumstances that has resulted one of the most widely known examples of cross-cultural collaborations in the Arctic. The DWM has produced hundreds of publications (DWM Official Website) as a result of several decades of co-produced studies in wildlife research, including the formation of the most robust bowhead whale research program in the world. Examples of collaborative DWM publications that incorporated and documented Traditional knowledge include “Observations on the Ice-Breaking and Ice Navigation Behavior of Migrating Bowhead Whales (Balaena mysticetus) near Point Barrow, Alaska, Spring 1985” (George, et. al., 1989); “Summer Records of Bowhead Whales in the Northeastern Chukchi Sea” (Moore 1992); “Trails to the Whale: Reflections of Change and Choice on an Iñupiat Icescape at

Barrow, Alaska" (Druckenmiller, et. al., 2013). The DWM is well known internationally as a gold standard example of co-production of research between Indigenous people and academic research in Arctic sciences and wildlife biology.

2.7 Researchers Role at UIC Science: Full Disclosure

The researcher in this project is an Iñupiat member of the UICS staff. The researcher self-identifies as a bearer of limited and localized Traditional and Indigenous knowledge who specializes in Iñupiat-Scientist relations in the Arctic. In order to conduct this study, the researcher was faced with the difficult task of shifting from the position of Iñupiaq science specialist to Arctic researcher studying Iñupiaq science specialists.

As a qualitative research project that looks into cross-cultural situations, this thesis can be considered ethnography. In theory, traditional ethnographical research assumes researchers and research subjects come from separate cultures. As Schensul and LeCompte put it, "good ethnography is a vehicle to understand other cultures," and good ethnography usually requires that a researcher possess two abilities: the ability to build relationships with others; and the ability to enjoy themselves in unfamiliar environments (2013, 1). In this case, the researcher, or ethnographer, already has established relationships with the research subjects, and the research environment is not unfamiliar. One of the main elements of Arctic research that draws scientists to the field is the element of discovery, both at the scientific level, for instance making discoveries about the changing environment, and also at the personal level to discover new entertaining, exciting and exotic phenomena.

The researcher in this project is an Iñupiat science specialist, closely tied to the Iñupiat community in Utqiaġvik, and is closely affiliated with the Arctic research community, which are

the two main cohorts subjected to this study. In fact, the researcher *is* a subject of this study. The life history of researchers in cultural studies are important to disclose to explain any potential biases. In the case of this research, the life history of the researcher provides deeper context to the research questions.

The researcher for this project, or the Principal Investigator (PI), was raised in several villages along the Bering Sea by an Iñupiaq mother who was raised in Utqiaġvik on the North Slope of Alaska and a Scandinavian father who was raised in Unalakleet, on the Bering Sea coast of Alaska. Subsistence and commercial fishing, hunting, boating, and outdoors were central to the PIs life as a child. With parents who instilled a sense of pride in his mixed heritage, and because he moved back and forth between villages with several cultural backgrounds, the PI's upbringing set the stage for a career in cross-cultural relations. After graduating High School in 2003, the PI worked for the Arctic Slope Regional Corporation (ASRC) from 2003 to 2013 while he started a family and earned a BA in Anthropology. In 2015 the PI began working for UICS and in 2016 took on the role of North Slope Science Liaison with UICS in Utqiaġvik, Alaska. The funding for this position was relatively new, and there were no parameters for the job, which meant there was opportunity to build. Since 2015, UICS has developed an outreach and engagement program and expanded its community liaison services.

Each member of the UICS team in Utqiaġvik are liaisons to the community through family ties and through communication with their whaling crews. However, as lead liaison, the PI specifically focuses on fostering positive relations between scientists and proper entities across the Arctic by actively communicating, sharing data, and providing resources for both Arctic researchers and local stakeholders in research. The PI founded and leads coordination of the BARC Science Fair each fall, which includes three days of family-friendly activities,

barbeques, and evening science presentations that are attended by hundreds of residents of Utqiaġvik (see section 2.8). Started in 2016, the Soup N' Science program is a biweekly seminar series wherein visiting researchers present their research and ideas to local entities and community members while enjoying homemade soup and other local cuisine. Sharing of food and time is very important in building relations and trust from an Indigenous perspective. The BARC B' Que program is a larger expanded version of the Soup N Science program, in which visiting scientists and community members meet at the BARC to share food, take part in family-friendly activities, and learn about Arctic research. The PI also coordinates dozens of classroom visits, webinars, and field schools each year across the North Slope and in coordination with the North Slope Borough School District, the Iḷisagvik College, and the Barrow Boys and Girls Club. Another responsibility is to foster good relations between North Slope educators and Arctic scientists.

The PI also offers a local and Indigenous perspective to different realms of Arctic researchers, funders of research, and policy makers. The PI is on the Arctic Research Consortium of the United States (ARCUS) board of directors. ARCUS oversees many programs that help promote coordination and collaboration between researchers and research entities across the United States. One program that ARCUS helps manage is the Study for Environmental Arctic Change (SEARCH), which was responsible for setting up and hosting the Arctic Futures Conference 2050 (AF2050) at the National Academy of Sciences in Washington D.C. in September 2019. AF2050 brought together hundreds of Arctic residents and leaders, Indigenous knowledge holders, Arctic scientists, and D.C. policy makers. The purpose of the conference was to gather the stakeholders in Arctic research to take time to find ideas to move Arctic research in a direction that is best for all stakeholders involved. The PI of this thesis took a role on a team

later referred to as the "Indigenous Peoples Working Group," which played a role in organizing the AF2050 conference in a manner that offered Indigenous folks an equitable seat at the table. The PI took part in a plenary panel discussion at the AF2050 conference called "Considerations for Emerging Research: Capacity and Scale," in which he and other panel members discussed how Arctic research can better meet the needs of Arctic communities and policy makers. The panel also included a program manager from NSF who spoke on the NNA proposal process that was introduced in Chapter One of this thesis. In addition, the PI attends dozens of conferences and meetings across the United States each year to argue for and promote proper engagement between Indigenous communities in the Arctic and the scientists who work in and near Arctic communities. Needless to say, the central theme of this thesis: what successful engagement between Indigenous people and scientists looks like; was on the PI's mind for nearly a decade before the writing of this thesis.

2.8 One Example of UICS-led Community Engagement in Utqiaġvik: The BARC Science Fair 2019

One example of UICS's role in community relations on the North Slope is the annual BARC Science Fair that takes place each fall. In 2016 there was a surge in interest by scientists in Utqiaġvik to engage with the local community. Instead of having each and every project conduct their own separate community meeting and activities, which contributes to meeting fatigue in Utqiaġvik, UICS set up a large, three-day event to bring together outreach and data dissemination efforts. The first BARC Science Fair was formed in 2016 and included daily family friendly activities, daily barbeques, and evening presentations and group discussions. The original purpose of the BARC Science Fair was to provide a positive space for Arctic researchers and Arctic residents to meet, eat with each other, spend time, and share ideas; and to inspire the

youth of the Arctic by providing fun and educational activities that are based in science and traditional knowledge. In addition, the event consolidated outreach and engagement efforts by multiple research institutions that would have otherwise required several community meetings and contributed to the "meeting fatigue" that Utqiaġvik experiences. The BARC Science Fair was one part of a larger effort by UICS to bring coordination and collaboration to science outreach and engagement efforts across Arctic Alaska. It is worth looking more closely at the details of the BARC Science Fair 2019 as an example of coordination and communication between scientists, regardless of affiliation.

The BARC Science Fair 2019 included three days of youth and family-friendly activities, BARCbeques, and evening community presentations and discussions. During the first day, the youth activities included "Iñupiat Knowledge about Plants" led by Jerica Aamodt and the Ilisagvik College Iñupiat Studies Department, "Eco-chains Activity" hosted by the North Slope Borough Office of Emergency Management, and "Birding with Audubon Alaska" hosted by Audubon Alaska. The youth activities on the second day included "Big Little World: Bugs, Plants, and Microscopes" hosted by the National Ecological Observatory Network, "Microplastics in the Arctic" hosted by the North Slope Borough Department of Wildlife Management, and the "BARC Scavenger Hunt" hosted by UICS. The youth activities on the third day included "AEROKATS: Kites, Cameras, and Remote Sensing" hosted by University of Alaska, Fairbanks, Alaska Arctic Observation and Knowledge Hub (AAOKH), "Our Role in the Carbon Cycle" hosted by the University of Texas El Paso (UTEP), and "How Permafrost Works" hosted by the University of Alaska, Fairbanks, Geophysical Institute.

Each day roughly 100 students attended the BARC Science Fair 2019. More than half of these students attended through a partnership between UICS, the Boys and Girls Club of

Utqiaġvik, and the North Slope Borough Mayor's Office. UICS provided food to the youth on day one, however the food items on day two and three were huge hits. On the second day, Cruz's Restaurant and Grill (located in Utqiaġvik) provided hundreds of funnel cakes to all youth, parents, volunteers, scientists, and staff members. On the third day, the youth thoroughly enjoyed s'mores provided by the University of Alaska, Fairbanks, AAOKH (Alaska Arctic Observation and Knowledge Hub).

During the evening activities the Youth Activity Room was hosted by several volunteers and offered children a fun and educational space while their parents listened to presentations. On the first night, Grand Valley State University, in association with the International Tundra Experiment (ITEX) hosted several youth stations. The second night included making slime and painting rocks with the 907 Slime Sisters (Kaia Erickson, Chanel Erickson, Alani Thomas and Aaġluaq Harcharek), and the third night included movie night and activities.

The BARC Science Fair 2019 provided a variety of food each night during the community barbeques. In all, the fair provided over 1,000 servings. The first night, the Arctic Slope Regional Corporation (ASRC) provided food that was grilled by UIC Science staff, on the second night the NSB Department of Wildlife Department provided and cooked a large BBQ, and on the third night UICS made tutuu (Caribou) soup, fresh king salmon and other sides. The tutuu was provided by UICS staff member Qaiyaan Wilbur Leavitt of Utqiaġvik and the fresh King Salmon was provided by Jeff and Donna Erickson of Unalakleet. UICS planned to grill food on the third night, however, several Elders asked to have something other than hamburgers and hotdogs for the final night, so tuttu (caribou) and king salmon was pulled out of the freezer.

The evening presentations included 15 discussions led by national and international research institutions. The first night included "Bird Friendly Community Programs with new

Partners" with Natalie Dawson and Max Goldman of Audubon Alaska, "Global Change Research Group in Utqiaġvik" with Terenzio Zenone of San Diego State University, "Snowy Owls and Lemmings in Utqiaġvik, 1992 to 2019" with Denver Holt of the Owl Research Institute, "NOAA Barrow Observatory Update" with Bryan Thomas of NOAA, and "Permafrost Spies in the Skies: Polar 6 Aircraft Permafrost Study" with Ingmar Nitze of the Alfred Wegner Institute in Germany. The second evening included "Herbivore Impacts on Carbon Cycling in Utqiaġvik" with Austin Roy of University of Texas, El Paso, "Behavioral Ecology of Red Phalaropes and Long-Billed Dowithcers" with Johannes Krietsh and Eunbi Kwon of the Max Planck Institute of Germany, "From Microbes to Mammals and Birds: NEON Utqiaġvik Update" with Chris Baird of Battelle Ecology, "2019 Bowhead Census" with Craig George of the North Slope Borough Department of Wildlife Management, and "USF&W Eider Research in Utqiaġvik" with Nathan Graff of the U.S. Fish and Wildlife Service. On the third and final evening, discussions consisted of "Long Term Ecological Research (LTER) in Utqiaġvik" with Vanessa Lougheed and Craig Tweedie of University of Texas El Paso, "Sea Ice Physics and Community-Based Science" with Roberta Tuurraq Glenn and Josh Jones of the University of Alaska, Fairbanks Alaska Arctic Observation and Knowledge Hub (AAOKH), "Iñupiat Science Support in Utqiaġvik 2019" with UICS Staff, "International Tundra Experiment (ITEX) Update" with Katelyn Betway and MacKenzie Lift of Grand Valley State University, and "Hot Times in Cold Places: Permafrost During Climate Change" with Santosh Panda of the University of Alaska, Fairbanks Geophysical Institute.

The BARC Science Fair has been a huge success. Hundreds of individuals, from both the local community and the science community come together to take part in mutually beneficial engagement. Seeds are planted: hundreds of students from Utqiaġvik get excited about science

and learn about realistic and fulfilling careers in research that takes place in their backyard. Dozens of Utqiaġvik community members and Elders take part and learn about the breadth of research that takes place in and near their home. Elders and other locals are very concerned about the drastic changes in our environment. Scientists share these concerns, and the discussions during the fair are a chance to recognize this common ground. Breaking the ice between Arctic researchers and residents can lead to endless opportunities for collaboration, sharing ideas, and even lifelong friendships (BARC Science Fair 2019 Recap, UIC Science, 2019).

2.9 Iñupiat in Ethnography and Cultural Studies

By focusing on how Indigenous knowledge is different from Western knowledge, one commits to the dichotomy between Indigenous knowledge and Western knowledge (Agrawal 1995, 2; Ludwig and Poliseli 2018). This dichotomy is deeply-rooted in Western scientific ontology and is supported in meta-theories such as progressivism and unilineal cultural evolution. These arguments place Indigenous cultures at a lower, more primitive stage of evolution than Western cultures and promote the assumption that Indigenous cultural traits and social patterns are at a constant loss and being replaced by Western culture. American anthropologists who wrote about the Indigenous people of northern Alaska based their interpretations of Iñupiat culture on preexisting ideas and beliefs, which Moore calls "pre-theoretical commitments" (2003, 445), that both framed the questions they asked and constructed their objects of inquiry (Moore and Sanders 2006, 9). Ethnocentric theories tend to be inherited implicitly and taken for granted by researchers as given truths. Progressive meta-theories promote history as a moral success story, "a tale of the furtherance of virtue" (Wolf 1982, 368). However, as Westermann points out, progress needs a starting point. While the "civilized"

cultures of the West represent one end of the spectrum, colonized people represent the other end. Thus, ethnographies, such as those written about the Iñupiat of northern Alaska, are meant to fill that conceptual space at the lower end of evolution (Westermann 2005, 255).

Unilineal evolution within American Anthropology was essentially overthrown by the work of Franz Boas at the beginning of the 20th century, and students of Anthropology embraced cultural relativism and the theory that cultures were distinct entities with their own histories. However, deeply-rooted models of static cultures remained much longer, all the way through the 20th century. The late Dr. Ernest Burch, Jr. was one of the most highly respected historical ethnographers in the history of American cultural studies of Arctic indigenous peoples. Burch was truly seen as a godfather of Iñupiat ethnography. The cover of a tribute publication after Burch's passing read, "The Iñupiaq Eskimo have experienced two tremulous centuries of change in Northwest Alaska. *As their chronicler*, Ernest S. Burch, Jr., documented precontact Native society and the Iñupiaq encounter with colonialism" (Hill, ed. 2013, emphasis added). Throughout his career, Burch worked very closely with and had a deep respect for Iñupiat Elders and communities. In 1988 Burch wrote that

> The Eskimo's ingenuity and resourcefulness in technological matters was recognized by even the most bigoted of the early European explorers and missionaries. What has taken much longer for Westerners to understand are the less tangible aspects of their traditional culture-the complexity of their family life, the wealth of their oral traditions, the beauty of their dances, the subtlety of their ideas, the breadth of their emotions. These reveal not the carefree, simple folk of Western lore, but an intelligent, complex, proud, and sometimes even arrogant people, a people who survived more than 4,000 winters in a land where few other groups could even last one. [Burch 1988, 123]

Burch truly dedicated his life to documenting Iñupiat culture. However, the foundation for nearly all of Burch's work is rooted in the essentialist notion of static cultures, and he wanted to convey an objective reality of static Iñupiat culture. Burch believed that traditional Iñupiaq culture represented hunter-gatherer societies, which was a representation of Western cultures in ancient times, before the agricultural revolution and industrialization (Burch 2005, 2). In order to learn about ancient forms of modern society, Burch sought to study traditional Iñupiaq culture. The problem was that he did not believe Iñupiat people born after 1848 in northern Alaska represented traditional Iñupiaq culture. In a 1988 publication titled *The Eskimos*, Burch explained that

> The "traditional period" is defined as the time when northwestern Alaska Eskimos were operating in terms of an essentially indigenous system of action… The contacts between these outsiders [European explorers] and Eskimos led to profound changes in the native way of live, and thus marked the end of the aboriginal period of northwestern Alaska. [Burch 1988, 9-10]

Burch attempted to learn more about Iñupiat culture before 1848 by using historical records, and since there were no Iñupiat alive in the mid-20th century who had experienced life before 1848, Burch devised methodology that he stuck to his entire career. The method he used in nearly all of his work was referred to as "ethnographic reconstruction" and involved "upstreaming data," which meant the he interviewed people about historical information that they might have learned from their parents and grandparents. When referring to the Elders and Iñupiat knowledge holders he interviewed in the 1960s and 1970s, Burch described them as "individuals who personally never experienced the life about which they told me but who learned about it from people who had" (Burch 1998, 18). Believing that Iñupiat people living in the late

20th century did not represent "traditional" Iñupiat culture, Burch spoke of Iñupiaq people in a past tense: "To Eskimos the universe *possessed* a fundamental unity…" (p. 89); "The Eskimos *believed* that everything was embodied with a soul…" (p. 89); "Eskimos *were* very attentive," (p. 92); "Every Eskimo *had* some sort of ability to deal directly with the spirit world…" (p. 101); "Eskimos *thought* it *was* important to be happy" (Burch 1988, 109, emphasis added).

Notions of a static "traditional" Iñupiat culture that was being replaced by Western culture are clearly evident across the board in 20th century ethnographies on the Iñupiat of the North Slope. Published in 1969 a prominent ethnography on the Iñupiat people claimed that "It is obvious that the native economy will die within the passing of the present adult generation" (Nelson 1969, 387). Another publication insisted that after contact with Westerners, the life of the Iñupiat has been "nothing less than a battle against extinction," and that "they feel purposeless" (Oswalt 1979, 273-302). In an ethnography about the North Slope Iñupiat, ethnographer Norman Chance assumed that, "for the Iñupiat, one can say that Western 'progress' represented in part an erosion of their history… they no longer have a sense of who they are" (Chance 1990, 212).

Due to postmodern critiques and an epistemological shift, the field of anthropology went through a reflexive period in which cultural anthropologists became extremely conscious of ethnocentrism, personal biases, and the impact of their research on Indigenous peoples. The perspectives of Foucault (1973, 1982) and Bourdieu (1977) set the stage for postmodern anthropological theory. Other influential critiques of positivism included Edward Said's argument that the concept of "oriental" was a construction of Western cultures (Said 1978). Fanon asserted that the idea of "colonized people" was brought into existence by the "settlers" and the two share an antagonistic interdependency (1961). These arguments left many

anthropologists feeling that there was "no firm ground from which students of human life could gaze objectively at their subject matter" (Erickson and Murphy 2008, 189). In a 1999 essay about the postmodern "anthropological enlightenment" of the 1990s, (also referred to as the 'interpretive turn'), Marshall Sahlins confronted the assumed implication that Iñupiat and other Eskimos were in an earlier stage of evolution, despondent, and losing their culture. Sahlins states that before the epistemological shift of the 1990s, anthropologists truly thought all hunter and gatherer cultures were suffering constant cultural loss; however, he explained that "Eskimo's are still there, and still Eskimo. Anthropological enlightenment begins with how wrong we were about that" (Sahlins 1999, vii). Following this reflexive phase, anthropological studies in northern Alaska tended to focus on the reproduction of Iñupiat culture, rather than the loss of Iñupiat culture (Simon 1998, 199). 21st century cultural anthropology as a discipline certainly does not support cultural evolutionary theory; however, underlying notions of cultural evolution remain influential in modern culture and media.

It is important to explore the anthropological view for this project because anthropological studies, largely through ethnographical inquiry, are viewed as Western sciences' mechanism to interpret Indigenous culture (Hammersly 2017). More importantly, Western natural sciences, in the face of climate change, are becoming more aware of their impact on Indigenous communities and as emphasized in the introduction of this thesis, are making a push to conduct science that is more actionable, or immediately beneficial to the general public (Beeton et. al., 2018, Decrappeo, et. al., 2018, Lorenzo-Alonso, et. al., 2018, NSF 2018).This shift in natural sciences is similar to the changes the U.S. social sciences faced as represented in the example above about the Anthropological enlightenment. Natural sciences are following a similar pattern as they move through a reflexive phase and look closely at how their sciences can

incorporate knowledge outside of the realms of their own scientific knowledge, through interdisciplinary, transdisciplinary, convergent, and co-produced research (NSF 2018; NSF 2020). In this case, natural sciences can learn from the history of social sciences and hopefully become enlightened as well.

2.10 Development of Traditional and Indigenous Knowledge as Concepts

Several aspects of the knowledge of Indigenous peoples have been characterized in academic literature by terms such as *Traditional knowledge, Traditional Ecological Knowledge (TEK), Indigenous Knowledge, local knowledge, ethnoecology, customary law, folk taxonomy* and *knowledge of the land*. Indigenous interpretations of natural phenomena can correspond poorly with Western intellectual interpretations of natural phenomena. Within Western research, the acceptable norms of intellectual development have been rigidly institutionalized in which university degrees, journal publications, and conference presentations are the milestones which mark a narrow path to knowledge. Constrained by these inflexible norms, "environmental scientists reject traditional ecological knowledge of Native hunters as anecdotal, non-quantitative and amethodological" (Nakashima 1990, 23). Western scientists are usually aware there is a wealth of underlying empirical knowledge in local interpretations of natural phenomena; however, in most cases they lack the conceptual tools to incorporate Indigenous knowledge. The scientific method also makes it difficult to compartmentalize and categorize holistic Indigenous and local perspectives into research methods and data collection, a constraint which leads many non-Indigenous Arctic scientists to dismiss Indigenous expertise (Eicken 2010, 361).

During the 1960s and 1970s several events, including national and international civil rights movements, set the stage for discussions within Western sciences about how to incorporate

Traditional Ecological Knowledge (TEK) and other forms of Indigenous Knowledge into their science. The creation of the U.S. Environmental Protection Agency (EPA) was formed as a result of the conservation movement. The conservation movement is thought to have originally began on the North Slope of Alaska when a group of Iñupiat from Tikigaq (Point Hope) fought against stopped the U.S. Atomic Energy Commission from testing nuclear bombs near their village (O'Neill 2007). As mentioned previously in this chapter, the Iñupiat of the North Slope were well aware of the power of organizing as a group.

The Civil Rights movement, including the American Indian Movement (AIM) contributed to a large pan-Indigenous community within international politics. Before the large-scale pressure to recognize Indigenous perspectives later in the decade, a group of ecologists gathered in 1980 and took action to avoid using the term "traditional" when referring to ecological knowledge of non-Western cultures in their research: "In our view, 'traditional' denoted the 19th-century attitudes of simple, savage, and static. We wanted a term that represented the dynamic contributions of any community to problem-solving, based on their own perceptions and conceptions, and the ways they identified, categorized, and classified phenomena important to them… we came up with the term 'indigenous' " (Berkes 1995, 5).

However, that same year (1980) the term "TEK" became more commonly used in ecological studies after its recognition and utilization received international attention as a top priority within the *World Conservation Strategy* created by the International Union for the Conservation of Nature and Natural Resources (IUCN), the United Nations Environment Programme (UNEP) and the World Wildlife Fund (WWF) (IUCN, et. al. 1980), as well as in *Our Common Future*, created by the World Commission on Environment and Development (WCED) (WCED 1987). After receiving international attention, the United Nations (UN) system through

UNESCO (United Nations Educational, Scientific, and Cultural Organization), positioned itself as a "super national advocate" for TEK and provided a central platform for discussions of Indigenous rights and knowledge in relation to science and research (Warren, et. al. 1995, xv, Mauro and Hardison 2000).

According to Berkes (1999) three main factors in the development of TEK included the following: the presence of a dedicated core group of schools producing not only academic material but also feeding information to international policy circles; parallel development in other interdisciplinary and policy-relevant fields (such as environmental ethics, common property research, and environmental history); and public dissatisfaction with the outcomes of modernist analysis in fields such as resource conservation and management. Although ecological scientists and conservation groups recognized the need to incorporate Indigenous knowledge to understand ecologically sound practices that contribute to sustainable resources, there was rising political pressure for other fields of science to recognize the rights of aboriginal peoples. This fueled a growing environmental movement that searched for alternative approaches to Western sciences and technology (Johnson 1992, 5). After several forms of Indigenous Knowledge became concepts, and fields of study, and following its burst of international attention in the 1980s and 1990s, one of the largest issues facing the Indigenous peoples across the world was the misconception of what Indigenous Knowledge really meant. A semantical debate ensued as to what Indigenous knowledge, Traditional knowledge, and local knowledge meant, and how these terms relate to each other. According to Heckler, the definitions of these terms changed over time: "Gone are the days when TEK could be considered 'ancestral' or 'timeless' or as simple systems of classification. Today, it is conceived of as emerging from ecopolitical

discourse, practical engagement with the landscape, and social relationships all at the same time" (2009, 3).

It is important to recognize the perspectives of Indigenous scholars as represented in the literature in regards to the portrayal of Indigenous peoples' knowledge in Western academic sciences. In 2000, Anishnabe Scholar Deborah McGregor recognized fundamental flaws in the use of TEK: "TEK as it is generally presented, consists of the knowledge non-Aboriginal researchers think Aboriginal people possess, rather than the knowledge itself. This is especially problematic because researches, having obtained some TEK, think they understand when they do not" (p.452-453). McGregor prefers to use the term Indigenous knowledge, with the acceptance that this knowledge is a living and continuously evolving entity, just as all human cultures are (McGregor 2000, 450). Villegas, et. al., recognize that Indigenous knowledge is not static, but temporal and is inextricably linked to the relationships in which it is situated, (2008, 2). Battiste further argued that Indigenous knowledge is an expression of changing relationships:

> Indigenous knowledge…is the expression of the vibrant relationships between the people, their ecosystems, and the other living beings and spirits that share their land. These multilayered relationships are the basis for maintaining social, economic, and diplomatic relationships-through sharing-with other peoples. [Battiste 2000, 42]

Also in 2000, Battiste and Hendersen recognized that Indigenous people had not established a universal definition for Indigenous knowledge, and that need for a universal definition is a Eurocentric strategy to appropriate knowledge that benefits colonial motives. Further, "using their artificial tools of classification, the colonizers attempt to Europeanize all knowledge and heritage" (p.36) and that these attempts had raised serious concern amongst Indigenous peoples (p.37).

Choctaw scholar Dr. Dawn Hill Adams provides a particularly useful framework to view different forms of Indigenous knowledge in which she organizes Indigenous knowledge into three categories. The first form of Indigenous knowledge can refer to a body of information, or *what* people know. The second form of Indigenous knowledge can refer to a process of learning things, or *how* people know. And the third form of Indigenous knowledge as described by Dr. Adams can refer to the source of the information itself (Tapestry Institute Official Website). Clearly defined distinctions between different types of Indigenous knowledge from an Indigenous perspective can be very useful and important to non-Indigenous scientists attempting to incorporate Indigenous knowledge into their work.

The history of incorporating Indigenous knowledge into federal land management in Utqiaġvik is also unique. As detailed earlier in this chapter, the U.S. government created a 23.6 million-acre Naval Petroleum Reserve 4 (PET-4) surrounding Utqiaġvik to reserve potential oil and gas resources for the U.S. Navy (Reed and Ronhovde, 1971, 10). In 1980, PET-4 was renamed the National Petroleum Reserve – Alaska (NPR-A) and transferred from the Navy to the Department of Interior, Bureau of Land Management (BLM). This started a new era of engagement between the local Iñupiat in Utqiaġvik and federal land managers. BLM even attempted to identify Traditional Ecological Knowledge (TEK) and incorporate it into land management plans.

During the late 1990s and early 2000s, the programmatic incorporation of TEK into resource management amongst Federal agencies became a top priority nation-wide: “A combination of public pressure, internal consul, political realities, and genuine scientific inquisitiveness has worked to create a growing interest in TEK research on the part of many resource management agencies, providing fertile ground for this work” (Sepez 2005, 2). These

agencies were also mandated to consider Indigenous rights. In 1994 a Presidential Memorandum reaffirmed the Federal Government's role to establish and maintain government-to-government relationships with Tribes. In 2000, Executive Order 13175 set forth guidelines for all Federal agencies to do the following: first, establish regular and meaningful consultation with Tribes; second, strengthen U.S. government-to-government relationships with Tribes; and third, reduce the imposition of unfunded mandates on Tribes. Finally, in 2012 the Departments of Agriculture, Interior, Defense, and Energy signed a Memorandum of Agreement (MOA) to make incorporation of TEK a priority in resource management (USDAFS 2015, 3).

According to Stacie McIntosh, a longtime official at the BLM Arctic Field Office, all NPR-A resource management plans for lands surround Utqiaġvik in the 1990s and early 2000s included attempts to incorporate TEK (2005, 38). McIntosh recognized the importance of distinguishing "local" and "user" knowledge from what she described as "traditional" knowledge and further argued: "fundamentally, it matters because the more local knowledge or user knowledge becomes attributed as traditional knowledge, the less legitimate traditional knowledge becomes in the realm of land managers… and this is especially true when the knowledge conflicts with Western scientific conclusions" (McIntosh 2005, 40). However, the BLM has distanced itself from the task of differentiating local, user, and Traditional knowledge during its scoping processes, and the latest draft of Environmental Impact Analysis for the NPR-A makes no effort to distinguish Iñupiat knowledge from other forms of public comments, and there is no mention of TEK or other forms of Indigenous knowledge in the nearly 2000 pages of EIS and supporting documents (BLM 2014).

Chapter Three: Methods

The research for this project took place during the years 2019 and 2020 in Utqiaġvik, Anchorage, and Fairbanks, Alaska. The archival research took place throughout 2019 and 2020 and the research involving human subjects too place from December 2019 to February 2020. The objectives of this research project are: first, to provide a thorough historical context, which is a major component of cultural research in anthropology. Through examination of historical documents including publications resulting from field research in Utqiaġvik, this study will look carefully into the history of Iñupiat and Arctic scientist's relations and knowledge exchange in Utqiaġvik. In addition, the background chapter investigates the development of the concepts of Traditional knowledge, Indigenous knowledge, Traditional Ecological Knowledge (TEK), and co-production of knowledge; as well as the sematic history of how these concepts and terms relate to each other.

Second, the researcher interviewed eight expert Indigenous knowledge holders who work in the field of Arctic research support in Utqiaġvik and eight academic scientists who base their research out of Utqiaġvik, to document their perspectives on the intersection between different knowledge systems and cross-cultural engagement in Utqiaġvik as they experience it. And third, through thematic analysis the researcher identified themes and analyzed and interpreted patterns in the data. Following the thematic analysis, the author provided reflexive analysis and recommendations.

Rooted in sociocultural theory, this study provides a deep contextual history of the interactions between local Iñupiat and Western Scientists in Utqiaġvik (Chapter 2). This background research included a review of library and archival resources at the Consortium Library and ARLIS Collection at the University of Alaska, Anchorage and the Elmer E.

Rasmussen Library at University of Alaska, Fairbanks. Iñupiat-Science relations in Utqiaġvik is extremely unique. And what makes it unique? The *history*. This unique history in Utqiaġvik is an important tool to provide guidance from past examples and lessons learned that scientists today can utilize when searching for help in engaging with Indigenous communities in the Arctic. However, historical data is limited, and in order to better understand the current situation in Utqiaġvik, one must both understand the history and learn from those directly involved in the current Iñupiat-Science relations in Utqiaġvik. The data for this project included both historical data and data derived from 16 semi-structured interviews with expert informants in Utqiaġvik, Anchorage, and Fairbanks.

3.1 Research Setting

The qualitative research for this project focuses on the perspectives of people that work in the field of Arctic Research in Utqiaġvik, Alaska. Nearly all of the Arctic research in Utqiaġvik is centralized on the NARL campus. As noted in Chapter Two, the Barrow Arctic Research Center (BARC) is a research facility located on the NARL campus and includes workspace, offices, conference rooms, labs, freezers, and storage space for scientists. Dozens of aging buildings on the NARL campus also provide labs, storage, and staging area for scientists. The Ukpeaġvik Iñupiat Corporation (UIC) owns NARL and the BARC, and the BEO, a 7,400 acre tract of land near the NARL campus that is set aside from development and utilized for long-term atmospheric monitoring and terrestrial research projects. UIC has also constructed new housing facilities on the NARL campus for scientists. UICS is a subsidiary company owned by UIC that operates the BARC, the BEO, and other science housing and facilities located at NARL. Hundreds of visitors travel to Utqiaġvik each year and utilize the services UICS

provides. Roughly half of the visitors include academic researchers that are funded by various agencies, such as NSF, NOAA, BOEM, NASA, and others. The other half of the visitors are primarily associated with the Department of Defense that include initiatives to build capacity in the Arctic including training, exercises, testing of field equipment, and more.

The typical process in which research is conducted in Utqiaġvik follows a set of streamlined steps facilitated by UICS in coordination with prospective scientists. First, in one way or another, scientists contact UICS and lets them know they are interested in working in Utqiaġvik, and introduces UICS to their proposed research. UICS then introduces the interested scientist to UICS's specific services and capabilities that can serve their project, and sends the scientists a document called the Logistics Request Form (LRF). The LRF requires the scientists to explain clearly the services they are hoping to receive from UICS, and it defines the role of UICS in the given research project. Second, UICS uses the LRF to create a budget forecast and a budget justification. During this process UICS works closely with the scientists to make sure both UICS and the scientists are clear about each other's' roles and responsibilities. Once the details are agreed upon, both sides move forward with conducting the fieldwork. Most research projects include some sort of locally sourced labor, typically as bear guards, ice guides, or for assistance in permitting and orientation.

One of the largest issues with conducting Arctic research is the inaccessibility to and unreliability of logistical resources in the Arctic. Reliable housing, transportation, and local support are just a few of the logistics that can be difficult to secure. This makes it difficult for scientists who are forced to plan their field research activities many months and sometimes years in advance. UICS is unique in that it provides scientists with a sense of security that they will be

here for the long haul, allowing scientists to plan long term research projects around these available resources.

In most cases, the longer scientists conduct research in Utqiaġvik, the more they establish their own housing, vehicles, equipment, and workspace, which naturally limits the role of UICS in their research. In the case of wildlife biology, especially fields associated with marine species, many scientists lean on the NSB Department of Wildlife Management (DWM) to help guide their research. As noted in Chapter Two, the DWM has office space, labs, staging area, vehicles, limited housing, and a large staff with a long history in Utqiaġvik. DWM also rents labs, offices, and walk-in freezers in the BARC from UIC. The DWM has a larger staff and longer history than UICS. The two organizations work in close communication and many scientists who reach out to DWM for logistical assistance are forwarded to UICS. Likewise, UICS makes sure to forward marine and wildlife scientists who reach out to UICS to the DWM for their expertise and advice.

3.2 Two-Group Structure

As detailed in the background chapter, the relations between Iñupiat and scientists in Utqiaġvik goes back many decades, and Utqiaġvik is commonly referred to as an example of an Indigenous community that has long term positive relations with Arctic scientists. These historic relations tend to be viewed as binary in nature, typically on the one side you have the local Iñupiat who possess local, Traditional, and Indigenous knowledge, and on the other side you have the academic or Western scientists, who possess Western knowledge. Following this framework, this research project chose to interview these two cohorts, the Iñupiat science specialists and the Arctic scientists as two separate and equal cohorts.

The two cohorts were called Group A and Group B. Group A consisted of eight Iñupiat science specialists in Utqiaġvik, Alaska. Group A included two subgroups: Subgroup A-1 and Subgroup A-2. Subgroup A-1 included four subject matter experts that have worked in the field of Arctic research support in Utqiaġvik for at least three of the past five years, with less than 20 years' experience in the field. Subgroup A-2 included four subject matter experts that have worked in the field of Arctic research support in Utqiaġvik for 20 years or more. Subgroup A-2 was asked additional questions regarding the history of Arctic research in Utqiaġvik. The subgroups are meant to bring a range of age cohorts to the data and references to excerpts in the results will not identify the subgroup the references belong to.

Group B consisted of eight Arctic scientists who conduct field research based in Utqiaġvik. Group B included two subgroups: Subgroup B-1 and Subgroup B-2. Subgroup B-1 included four subject matter experts that have worked in the field of Arctic research in Utqiaġvik for at least three of the past five years, with less than 20 years' experience in the field and included one Arctic wildlife biologist, one Arctic oceanographer/marine scientist, one Arctic permafrost/terrestrial scientist, and one Arctic sea ice scientist. The quoted references in this publication do not disclose the researchers' field of study. Subgroup B-2 included four subject matter experts that have conducted 20 or more field seasons of Arctic research based out of Utqiaġvik and included one Arctic wildlife biologist, one Arctic oceanographer/marine scientist, one Arctic permafrost/terrestrial scientist, and one Arctic sea ice scientist. Subgroup B-2 was asked additional questions regarding the history of Arctic research in Utqiaġvik. The quoted references in this publication do not disclose the interviewees' field of study.

3.3 Purposive Sampling

A purposive sampling method was utilized to select informants for this study form two finite groups of individuals. The first group included local Iñupiat in Utqiaġvik, Alaska that are known for utilizing Traditional, Indigenous, and local knowledge to help Arctic researchers and scientists. In general, most people on the North Slope of Alaska know who the local Iñupiat science specialists are in each community, and for the most part this cohort of individuals are proud of their ability to utilize local, Indigenous, and traditional knowledge to support Arctic research. The second group of individuals included Arctic researchers from various research institutions in the U.S. who conduct research in Utqiaġvik and who utilize local Iñupiat support. The sampling method is considered purposive because the researcher sought out informants for the purpose that they provide information on their specific expertise (Bernard 2018, 147). Data collected during interviews is considered cultural data, which required the perspectives of expert informants. The study utilized semi-structured interviews in which the researcher created, with suggestions from the researchers' academic advisor and the research institution's Institutional Review Board.

Iñupiat are an example of the pan-Indigenous community, and Iñupiat knowledge represents Traditional, Indigenous and local knowledge. The parameters of this study will not allow for a non-probability sample of pan-Indigenous peoples, due to the fact that the pan-Indigenous community is spread across most of the world. However, as Bernard explains, when a non-probability sampling method is not available, researchers must select "informed informants" and thoroughly document the researcher's biases (Bernard 2018, 145). The research in this study is limited to the perspectives of the Iñupiat science support community in Utqiaġvik and the perspectives of U.S. Arctic researchers conducting fieldwork in Utqiaġvik, Alaska.

The Ukpeaġvik Iñupiat Corporation (UIC) Head of Barrow Operations and UICS General Manager Nagruk Harcharek gave permission for this research to be conducted with UICS employees. The UAA Institutional Review Board (IRB) approved the project as fully satisfying the U.S. Department of Health and Human Services requirements for the protection of human subjects (45 CFR 46 as amended/revised).

3.4 The Procedure

As detailed above, a set of standards was developed to choose individuals to interview. The PI went about soliciting interest and identifying Arctic scientists and Iñupiat science specialists to interview simply by asking people that he knew who qualified as subject matter experts according the standards that were detailed in the previous subsection. Interviews were held whenever and where ever it felt most appropriate in each situation. Interviews were held in restaurants, during breaks at science conferences, in living rooms, in offices, and in science labs. Although it was the full intent of the researcher to hold all interviews in person, three interviews were held over the phone.

Rather than focusing on specific questions, the subject matter of the interviews were open ended and followed key threads on how the informants describe knowledge, knowledge acquisition, knowledge systems other than their own, the knowledge systems in which Arctic research is based, and how knowledge is shared between Iñupiat and Arctic scientists in Utqiaġvik. Throughout the course of the interviews, an interview guide was loosely followed and was utilized only when necessary. The researcher used his cross-cultural communication expertise to word the questions so that they were more understandable to the locals. The interview guide assisted in terms of keeping the conversations somewhere near the subject matter

of this research, however, the nature of the exploratory interviews allowed the conversations to follow the direction that the interviewees took it. Thus, the data does not necessarily correlate directly with the subject matter in the interview guides.

The interview guide was similar in all 16 interviews, and followed three main phases. The first phase asked subject matter experts to define and describe their own collective knowledge systems. During this phase of the interview, the researcher inquired about where subject matter experts acquired the collective knowledge that they utilize in their careers, early memories of growing up, and how knowledge was shared in different phases of their lives including at home and at work. The second phase of the interview guide asked the subject matter experts to try and explain knowledge systems other than their own and how cross-cultural knowledge exchange applies to their work. During this phase of the interviews the researcher asked interviewees to define knowledge systems that they distinguished earlier in the interviews. In many cases Iñupiat science specialists were asked to further define Western knowledge and the Arctic scientists were asked to elaborate on Indigenous and Traditional knowledge. The final phase of the interview guide asked subject matter experts to share their thoughts on how different knowledge systems inform Arctic research in their own experiences.

Previous to the interview the researcher introduced each interviewee to the project background, the purpose for the research, and carefully went over the consent form. After this process, interviews were conducted and recorded with a small digital recording device. Following the interviews, the researcher transcribed the complete interviews and returned a transcribed copy of the interviews either by hand or through email to the interviewees. The interviewee was asked if they had wanted to omit any data that they shared. The interviewees also had the chance to edit or elaborate on elements of their interview. Per the IRB plan, the

researcher maintained the confidentiality of all interviewees throughout the entire research process. No interviewees wanted to elaborate on or omit any data, and nearly all insisted that it was okay to utilize their name in the research. However, as noted before, the IRB process prohibited this.

The eight interviews with Arctic scientists averaged 37 minutes long with an average of 4,075 words per interview, averaging 110 words per minute. The eight interviews with the Iñupiaq science specialists averaged 27 minutes long with an average of 2,644 words per interview, and an average of 98 words per minute. The typed transcripts included a total of 53,755 words.

3.5 Thematic analysis: An Exploratory Approach

This research is qualitative research and will utilize a thematic analysis approach to identify themes and analyze and interpret patterns in the data. According to Denzin and Lincoln:

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible. These practices transform the world. They turn the world into a set of representations … qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them. [2005, 3]

The researcher took an exploratory approach to thematically analyze the qualitative data by reading the interview transcripts several times, each time recognizing new elements. Excerpts were pulled out and categories of common themes were identified by the researcher. It was important to focus on the data derived from interviews and to avoid seeking out themes that

correlated with hypotheses in which the research questions are rooted in. Reflexivity on the researcher's behalf played a role in how the interviewees were conducted. As the interviewing process went on, the interviewer found better methods to inquire about certain subject matter.

This project took an exploratory approach in several forms: the loose structure of the interviews are content-driven, rather than hypothesis-driven; themes were derived from the data, rather than from hypotheses; and a purposive sampling method was utilized to select subject matter specialists, rather than a random sampling method. This study utilizes historical records and transcribed interviews that are in the form of text data, which is the most common form of data utilized in qualitative research, (Guest, et. al., 2014, 7). The results chapter will be presented with numerous excerpts from the data to illustrate themes directly from the sources.

Chapter Four: Results

The results chapter is arranged in three sections. Section one (4.1) presents a set of themes that were identified through careful thematic analysis of the data that was provided by Iñupiat science specialists in Utqiaġvik. The second section (4.2) presents themes identified in the data provided by Arctic scientists who base their research in Utqiaġvik. The third section (4.3) presents themes that cross-cut, or correlated between the two different cohorts: the Iñupiat science specialists and Arctic scientists. All the themes in this chapter derive directly from the data and were identified and arranged by the author of this thesis.

4.1 Qualitative Themes: Iñupiaq Science Specialist's Perspectives in Utqiaġvik, Alaska

Section 4.1 includes four themes identified in the data that was provided by Iñupiaq science specialists. These qualitative themes were identified by the author of this research through close analysis of the transcribed interviews with Iñupiaq science specialists. The themes include: Theme one, the knowledge that Iñupiaq science specialists utilize to support Arctic research in Utqiaġvik is rooted in their personal experience spending their entire lives whaling, hunting, fishing, travelling, and surviving on the lands and waters near Utqiaġvik; Theme two, that common characteristics of successful Iñupiaq science specialists include having patience with and a willingness to help visiting scientists, having a drive to share knowledge with scientists about the environment they live in, and most have fond memories of growing up around scientists; Theme three, that working as a bear guard and/or ice guide is both a very dangerous job and an opportunity to build trust and share knowledge; and theme four, that Arctic research is variable in that some research is more relevant to Indigenous communities and some

scientists are better at engaging with locals in the Arctic. Under each of the following themes, there are sets excerpts presented individually and in groups. Each group of excerpts represents a group of multiple perspectives. For an example, a group of five consecutive excerpts will represent five separate perspectives.

4.1.1 Theme One: The knowledge that Iñupiaq science specialists utilize to support Arctic research in Utqiaġvik is rooted in their personal experience

The collective knowledge of Iñupiaq science specialists is rooted in personal experience in addition to knowledge passed down from family and community members. Iñupiaq science specialists almost always cited *uncles* as being the primary family members who taught them traditional ways to navigate, hunt, fish, and survive. Not every person raised in the Arctic gets to learn all the skills necessary to hunt, fish, and survive on the lands, waterways, and oceans, regardless if they are Iñupiaq or not. When asked where they gained the knowledge that they use on a daily basis to assist Arctic scientists, the Iñupiaq science specialists' responded that:

Excerpts:

> I never did a lot of education in the books and schools. I did a lot of my learning was hands on and getting out here and playing around. That's where I learned to do all the stuff, just digging holes in the snow and playing out, being a little kid and watching my uncles and my aunts do all their stuff… The Iñupiaq way of life is how I got my Indigenous Knowledge, it's that Iñupiaq way of life. The way I learned to live like the Iñupiaq, you know. Fishing the land, all that stuff. And to me, that's the way I learned Indigenous Knowledge, is being around the people. [Iñupiat science specialist]

…just growing up here in the North Slope, it's playing out up here. Just growing up with people hunting all my life, the knowledge I know, there is not a time of year where I am not hunting something. So growing up in the Iñupiaq way of life here, there's not a time of the year I'm not hunting something. So, growing up with other people teaching me. A little bit of school, but the knowledge I learned here on the North Slope is by other people just hunting all my life. [Iñupiat science specialist]

So the knowledge base that I have, I think, is a traditional mindset, it's a traditional knowledge that was passed down to me through family. It was very family-oriented, growing up with my uncles, my mom and my dad. Traditional lifestyles. From whaling to seal hunting, walrus hunting, caribou hunting. You know, starting with hunting is obviously going to have. I got my first rifle when I was 12, and that's all through family. It's a big family effort to keep our traditional lifestyles going, so that was very family based. [Iñupiat science specialist]

I learned from my grandparents and all my uncles, all the knowledge that I know. You know, just growing up doing everything with them. Learning as I get older… It was mostly, like out of town, going out camping, going out whaling. [Iñupiat science specialist]

I guess it would start from being a little boy and going out with my uncles and my Elders that brought me out hunting. Mainly my one uncle, my dad's younger brother, and would always bring me out where ever he went. And every time he went caribou hunting, or

geese hunting, or fishing, I was always the one that went with him… And so he would bring me out and teach me all about the stuff out there, the land and which creeks and places you can cross, and how to get to one point or the other. And just over the years, going out over and over again and having that knowledge just instilled in you over the years. And when you become a young teenager, being able to go out by yourself and find your own way and be confident that even if you breakdown or anything like that that you will be okay and you'll know how to survive out there. So I guess I acquired it mainly from my uncles. And also my friends, too. I got friends in my age group that are way more knowledgeable than I am, and even today they still teach me stuff, you know. [Iñupiat science specialist]

So, started out at a young age, earliest memories, being out at camp, fishing, hunting, and always looking forward to that. And the way I was brought up and taught was based on all of that… You know, growing up at camp, fishing was kind of how I got the knowledge base. All hands on, not a lot of talking. Mostly kind of watch and learn and do it yourself and make mistakes until you figure it out. Kind if how I was brought up, being out at camp I was real young, and then you get nine, 10 years old and you start whaling, and then that's more of the same, just in a different more professional setting, I want to say. Out at camp and on the river, there's more swimming, and screwing around and being kids. Out whaling there is a lot less of that. Way more serious, still really quite, a lot of watching, not a lot of verbal teaching, some stories and things… There's no screwing around while whaling. You screw around and you get sent home, you know, that kind of deal. That was kind of more the Iñupiaq upbringing, and with my parents

being mixed, my dad and my mom as well, emphasized the importance of getting a good education in school and things, so I had that side too. But they're two different knowledge systems, they're two ways to learn I think just from what they're trying to teach you. [Iñupiat science specialist]

The fact that local people who spend their entire lives in the Arctic make better local guides for scientists is obvious to most. However, when you look more closely, roughly half of children who are raised in rural Arctic Alaska have the opportunities to grow up with extensive experience outdoors hunting, fishing, and travelling on the land. There are many non-Indigenous people living in Utqiaġvik who do not practice subsistence lifestyles. There are many Iñupiat children as well that might not have the opportunities to learn about local Indigenous knowledge with their parents or families for a handful of potential reasons. This also may seem obvious to some people, however it is very important to recognize that the development of local, Traditional and/or Indigenous knowledge requires a lifetime of experience.

Excerpts:

It's the Indigenous people, I was born and raised here. That's 36 years of being around this place minus two or three years. And they're studying it in a book and stuff, but if they're not here, it's completely different. [Iñupiat science specialist]

The knowledge base that we carry is based off of real life factors that we experience when we're out there. And our knowledge is gained from those experiences. And what we were taught was, you know, you always have to do what your gut feels. [Iñupiat science specialist]

4.1.2 Theme two: Common Characteristics of Successful Iñupiaq science specialists

Throughout the interviews with Iñupiaq science specialists, many discussions led to distinguishing several common characteristics that they have that allow them to do their job in assisting scientists. The first theme, as distinguished above, is that Iñupiat science specialists need to have grown up acquiring local Indigenous knowledge. This is the common denominator amongst all who work in the field of science support in Utqiaġvik, and this characteristic is required. There are a set of secondary characteristics that are not necessarily required for the job, but having these characteristics make being Iñupiat science specialists much easier. These characteristics include: patience and willingness to help visitors; the enjoyment of learning from scientists about the Arctic environment; and growing up with memories of being around scientists as children.

4.1.2.1 Patience and willingness to help visitors

As noted above, the number one common denominator amongst Iñupiat science specialists is to possess local Indigenous knowledge that is acquired throughout one's life, and only half of people raised in Utqiaġvik are raised in that manner. Out of the people who have local Indigenous knowledge, there are very few that are willing to work with non-local people, especially non-local scientists with agendas and who are heavily indoctrinated and who are not keen to listening to people who are much younger and who have no classroom training in the scientists' particular fields of research. Iñupiaq science specialists usually have a high level of patience when working with these types of people. The combination of patience and willingness to work with outsiders is relatively rare in rural Alaska. The Iñupiaq science specialists generally

let scientists operate in the field without disruption, however, if they think of potentially more efficient ways to do things, they offer their ideas for solutions.

Excerpts:

> Most of the time I let them try first, to try to do it their way. And then I'll see them, they'll be taking a while. I'll ask them if they want me to try it and show them how I would do it. And then when I show them, they're like, oh wow that's a lot faster [laughter]. [Iñupiat science specialist]

> All I look at, is if I'm watching them do something, is that if there is a better way to do it, or an easier way to help them, I'll give them my knowledge on how we do it here to make it easier to them. [Iñupiat science specialist]

> …you find the best way, and you move forward with that. Like if you can minus six or seven steps that are completely pointless, then let's step over them. Because there's no reason to do that. It's just a waste of time, money and people don't have time and money to waste like that. It's if you can do it than do it. [Iñupiat science specialist]

> They (Iñupiaq science specialists) understand how it is to teach, because they've been taught. But if you don't have that knowledge, you're not going to be able pass that down or persuade someone who might think that they know more about your land then you do. They might just want to take charge and do things their own way. But when you're out there and you show them, like I know there was a couple times when I went out with scientists, and they would start packing the sled, and I would say that it is not going to

travel, not to where we're trying to go. And they would be like, oh you know, I've packed a sled before. And I'm like yeah but have you packed a sled in the Arctic? And so after three or four times of it falling apart and their gear going all over the place then they finally ask for help, you know. And once you give them that kind help then they are like, okay, we better listen to this guy. Show them how to web it right and make sure it's tight. [Iñupiat science specialist]

4.1.2.2 Many enjoy learning from scientists

As portrayed in the background chapter and repeated throughout this thesis, Utqiaġvik has a very long and extensive history of working with scientists. Iñupiaq science specialists have a tendency to enjoy learning from academic scientists, which in the bigger picture is part of this long history of sharing knowledge. This characteristic speaks to the nature of Iñupiat people in their ability to soak in any knowledge that helps in better understanding the Arctic environment. Excerpts:

> But I love taking care of all them. And to me, that's where I've learned a lot of my school. I may not have gone to school like them, their whole lifetime to learn these pieces and bits of knowledge, but I take back a lot of what they're studying, you know. Like I'm not one to just bear guard, scan the area for bears all the time. I want to know what they're doing, why they're doing it, what's it doing. It helps a lot, and I can help a lot of people too. [Iñupiat science specialist]

> I feel like I know more because I can see it through both perspectives. When we are out hunting and we notice things, it's not just the one, we're not just looking at it from the one

perspective anymore…to me my eyes are bigger now, because I feel like I can see it from both perspectives. It's not just one. [Iñupiat science specialist]

And we're learning a lot more, from scientists that tell us forecasts and what we can do better with ice forecasts and ice conditions. Those are, you know we're getting to that point where we can use scientists in looking at images, ice images and currents. And use them to our gain. For an example if someone had drifted out on the ice, we could probably find out where that ice is by using imagery. I think we used that a few years ago, a crew got drifted out in high winds. And the radar image showed that big piece of ice that came off from here to NARL and just went up to gravel pit and stayed there, even though the winds were like 50 to 60 miles an hour. Then the wind shifted and the current took the ice almost to right back from where it came. So that certainly helped us out. [Iñupiat science specialist]

And also, you learn that the Iñupiaq people have a lot of respect for the scientists that do this research and share knowledge towards them that they may not have known about. Like for me with the owls. I didn't know as much as I knew after going to that one presentation that that one scientist that had been researching owls for over 20 years dropped some knowledge on everybody [laughter] and that was freakin' awesome man. Walked away like, holy moly, I didn't know that about owls. [Iñupiat science specialist]

4.1.2.3 Growing up around scientists

Also correlating with Utqiagivk's long history of Iñupiat-Science relations, several Iñupiaq science specialists had positive memories of growing up with scientists. Many remember

seeing people that they look up to in their families work with scientists. These fond memories play a factor in how Iñupiat science specialists have patience with new scientists.

Excerpts:

> I think when I first realized it when I went out with my dad and the scientists at Wildlife [NSB Department of Wildlife Management] and they were going out there doing the whale census. And the Iñupiaq's, my dad and all those guys they had the knowledge of going out there on the ice, but at the same time those guys were showing them things that they had already knew, but like recording whale songs and just how much life is underneath the ocean. Yeah, they already knew it but I think to have it in audio and brought to a different format was pretty awesome for everybody. And you could tell that there was a different understanding of how they understood it and how we understood it, and that's where I first seen the difference. Because they had dropped the microphones down underneath the ice, you know. And the sounds that you could hear in the speakers was just, it was crazy. And everybody wanted to put the headsets on, because nobody had really, you know, besides putting your ear to a paddle or faintly hearing it, but not like that, you know. So I think that was a real big thing for everybody when they first heard that audio. [Iñupiat science specialist]

> … [as a kid] we had (science) groups that would come out with our whaling crews, and they had different questions and how processes worked. But they would come out and they would study ice conditions and things like that. [Iñupiat science specialist]

…we've seen scientists come to our homeland since we were kids, you know what I mean? [Iñupiat science specialist]

4.1.3 Theme Three: Working as a bear guard and/or an ice guide is both a very dangerous job and an opportunity to build trust and share knowledge

It is always dangerous when travelling on sea ice, over the land, or on the water in the Arctic. With more variable and unpredictable weather and climate patterns, things are becoming more dangerous. It is a very large task for local bear guards and ice guides to take on the responsibility of keeping visiting scientists safe when venturing into the field in the Arctic. Many times these dangers are not as apparent to people who don't live in the Arctic environment. As mentioned above, some scientists come to the Arctic with a rigid research plan, and they attempt to strictly stick to those plans. However, Iñupiat science specialists know the dangers that they face in the environment and this awareness allows them to stay focused on safety while the scientists focus on their research.

Excerpts:

And for us, going out on the land and whaling for all those years, you know, it wasn't for research, it was for survival. You fucked up, you died. You know what I mean? [Iñupiat science specialist]

It's a challenge for most that come out here thinking the ice is a safe place to be. Or thinking it's a good place to conduct research. In reality it's risking your life every day. And it's not as safe as it used to be…Even with the last 10 years, ice conditions were completely different. They're not safe, they're not consistent, and they're not predictable. So that, I think that's setting challenges even from a bear guards perspective, or ice guide.

That's a fun position to be in but it's not something I would take very lightly. Because then you have different lives on your hands at that point. So it's a challenge. Things have changed. And I think using Traditional Knowledge is a good safeguard for those that are coming in. [Iñupiat science specialist]

…with respect to the positions that are expected to be outside and interacting, and trying to keep people safe out on the ice and things like that, that's why we have those requirements. You have to be someone who has done that before. You have to be somebody who goes whaling, you have to be somebody who goes out onto the tundra and can survive. [Iñupiat science specialist]

I think that's the key thing, finding the local people who have knowledge about where they want to go. And they have to understand the dangers of going to different places, you know. You have to have a lot of experience. It's mainly keeping the scientists safe and keeping yourself safe. Those are the things that build trust. And then you teach younger folks (scientists) about the conditions that we have and they catch on very quickly, you know that's their main goal. It's to bring the scientists to where they need to go, then bring them back safely, and how to recognize the oncoming dangers of the current shifts, or the wind shifts. Sometimes scientists don't really care about those hidden changes that makes your mind, it's a whole different thing if you have scientists going to do their work and if you have a local guy that really knows what can change really quickly. [Iñupiat science specialist]

In terms of field support, on paper scientists hire local Iñupiaq science specialists primarily as bear guards, because either their funding agency or their North Slope Borough permits require that they have bear guards. Some bear guards enjoy taking part in the actual scientific field work, and some distance themselves from the scientists. Many scientists infer with bear guards about local and Traditional knowledge:

Excerpts:

> Well I always ask them, because I am supposed to just be bear guarding, if they need help or anything like that. I've been on projects were I've actually did a lot of the work because the other two people there were busy doing other things. So I would help the scientists drill holes, use the auger, drill ice cores and stuff like that. But mainly bear guarding. But I always tell them, you know, if they need help then just let me know. [Iñupiat science specialist]

> The bear guard is the title, but the duty and the responsibility is greater…anybody can bear guard just as well as we can, but what we bring to that table that sets us apart is that piece, it's the whole hunter, whaler, Iñupiaq piece. So in order for us to achieve that mission of imparting some of that knowledge to the outside world, or Western science, it has to be more than just a bear guard. Or else we're not enhancing projects, or else we're not any better than anybody else. And that is why, with respect to the positions that are expected to be outside and interacting, and trying to keep people safe out on the ice and things like that, that's why we have those requirements. You have to be someone who has done that before. You have to be somebody who goes whaling, you have to be somebody

who goes out onto the tundra and can survive. Because we want to be able to pass that knowledge on any opportunity we get, and people want it. [Iñupiat science specialist]

…some of them will poke my brain, ask me about it [local and Traditional knowledge]. Because they know I'm born and raised here in Barrow. [Iñupiat science specialist]

4.1.4 Theme Four: Arctic Research is variable: some research is more relevant to Indigenous communities and some scientists are better at engaging with locals

All of the Iñupiaq science specialists spoke about relevancy of Arctic research to communities. Immediate responses almost always referred to local bowhead whale (wildlife) research as an example of a field of research that is locally relevant and that has had a long and successful history of co-production of knowledge in Utqiaġvik:

Excerpts:

Bowhead whale research, that's going to be pretty popular amongst people. [Iñupiat science specialist]

…those guys, they really have a good tight close-knit relationship with the whalers around here, they're always going out to the whales, measuring, taking samples. They have a lot of knowledge about the land... And I think those older (local) scientists have way more of a connection to the Iñupiaq people than the ones that come up. I think the ones that come up, a lot of them have good intentions and try. But I have also heard of scientists come up here and really not enjoy being up here, you know. [Iñupiat science specialist]

> I think a lot of us remember that we had a moratorium on whaling in the 70s … And there was a lot of Elders that knew there was a lot more whales than a couple of new government scientists came up here and visually looked for whales and they only counted what they can see. I think it came about to 600. That's a lot to see by yourself, but not knowing that our knowledge as Iñupiat people and the whalers that always knew that whales would travel under the ice and way out there beyond where we can't see where they're communicating together by talking to each other and showing where a good breathing hole may be. And after that we fought for our right to hunt animals. And by the time it was like 1980 to 84 we had a really good scientists that wanted learn more about our culture and our Traditional knowledge and went to go ask some Elders and whalers how they can work better with each other and learn from each other. And we certainly learned from scientists and I think they learned a whole lot more from Elders and whalers and local people that depended on animals. And after that they've used underwater hydrophones, an array of moorings, and aerial surveys, and ice-based counts … the total population number of like 17,000, there's 600 new babies being born a year. So that's a lot, but we knew that there was a lot of whales out there. [Iñupiat science specialist]

Local wildlife research centralized at the NSB Department of Wildlife Management (DWM) impacts all Iñupiat-Science relations in Utqiaġvik in one way or another. Whether it be Iñupiat science specialists who grew up watching their Whaling Captains, fathers, uncles, and aunties working with scientists, or new scientists who look to wildlife research as an example of successful engagement with locals, the work of the DWM has very deeply rooted impacts on all research that takes place in Utqiaġvik, regardless the field of science.

Iñupiat science specialists know that scientists are humans, too, and that some scientists are better than others at engaging with the locals in Arctic communities. Some of the characteristics mentioned in the following excerpts in regards to long term successful engagement with locals correlates with answers given by Arctic scientists in the second half of the results chapter. These correlations are recognized as cross-cutting themes at the end of the chapter.

Excerpts:

> And just like anything else, certain people are really receptive to it and others they kind of don't want anything to do with it, right. They've got their mind set to what they want to do and that's what they're going to do, and that's okay too. But to me there's benefit to seeing the world through the different lenses, right. [Iñupiat science specialist]

> It’s just a different approach to understand what is going on around them, the only way you can do that is asking the experts. And that's the people that have been there. But I don't know, those are my thoughts, anyways. It definitely doesn't happen enough. But as you guys know, there is a few researchers that are better at it than others. [Iñupiat science specialist]

> There's some [scientists] that don't [inquire for advice]. And then most of them are willing to see the way that I do it. And there are always a few scientists that have to do it their way. [Iñupiat science specialist]

Especially people that haven't been here before. They're way more receptive to letting you lead and them following, just getting them to the point that they need to go to. And if they have any questions, you just got to be will more than willing to help them out, or whatever… So you just got to have a good attitude and make sure they feel comfortable around you. [Iñupiat science specialist]

We've had some really good returning scientists to come up here and study their work, and really get involved with our communities. And people like Dr.'s Craig George and Robert Suydam, they've lived up here and learned you know, all the things that we go through year to year and they know what to look for and how to do science in the right way, you know. And it really strengthens their relationship with hunters and community members. I think it's just something that everyone has learned and seen. And everybody knows them and knows their names from all the whaling communities. It's really hard to find somebody that could make their own name about plants, and maybe that's the hardest thing [to do in the communities]. But if you look at maybe the ice people like Dr. Sterum and a lot of people know him too, because he went up and worked with local hunters and not just here in Barrow in all the other villages. And maybe Dr. Norton reached out to community members about things. It's communicating with the communities, going back to the communities and showing what he found, you know the dinosaurs that he [Dr. Norton] found and those kinds of things. Everybody is maybe intrigued of that. And when you look at young scientists that came up here and, Dr. Druckenmiller, he came up here when he was young and start mapping out trails, and he got the attention of whalers' on the ice, with his instruments showing how thick the ice was from the beach to where

the whalers were by the lead. And that caught a lot of whaler's attention and we've learned a lot from that and equally Hajo Eicken really did some really good work with collecting snowflakes on top of the younger ice. They had a really good team and hired local people. I was able to work with him and when I was a lot younger and didn't know what they were doing, and learned that they were getting a lot of useful information. [Iñupiat science specialist]

You know, like, some of the researchers that have been coming here for many years, they've got tight bonds with a lot of these guys that just been in the community for a long time, you know. They're happy to see each other, they eat with each other. It's become a tight bond. Not just the working or educating knowledge relationship, you know. [Iñupiat science specialist]

Western Science has a ridged set of methods, rules and restrictions. Indoctrination of these methods can clash with the flexibility of local and Traditional ways of finding creative and practical solutions with limited resources. As mentioned previously in this chapter, most Iñupiat science specialists have patience and a willingness to gently offer their ideas and perspectives. The following excerpts show that Iñupiat science specialists are fully aware of this situation:
Excerpts:

The Western Knowledge is, like you see it in the tenure program where people have to do it this way because so-and-so did it this way before them. They have to do it that way. Even if it's not the right way. [Iñupiat science specialist]

My experience there's certain ones, I think the ones that are really open minded and even if they don't have an understanding right, if they come up here thinking it's just a place to do Arctic research. When they get up here, if you can expose them to the benefits of it. And they're open minded, they're more willing to come back. But they have to be able to listen, that's a big one. Like how we grew up learning was listening. And a lot of times when people get to that level of education, with certain individuals, there is a block. They don't necessarily need to listen anymore and those are the ones that aren't going to be as successful, because they think they have all the answers. Even though they are up here trying to find answers, their way of getting it is the only way to get it. [Iñupiat science specialist]

I think Iñupiaq, how we were raised, you work smarter, not harder. So I think the Western way is a lot of over thinking, and not just keeping it stupid simple, you know. Just really trying to overthink, like packing a sled. It's not that hard, you know. But if you try to make it harder than it has to be than it's going to be hard. [Iñupiat science specialist]

4.2 Qualitative Themes: Arctic Scientist's Perspectives on Research Based in Utqiaġvik, Alaska

Section 4.2 includes four themes identified in the data that was provided by Arctic scientists. The qualitative themes were identified by the author of this research through close analysis of the transcribed interviews with the Arctic scientists. Any field of science working in the Arctic can be considered Arctic research. Given the indefinite number of scientific fields

represented in Arctic research, perspectives vary drastically across Arctic research. The themes include: Theme one, which details what successful engagement between scientists and communities in the Arctic looks like; Theme two, that relevancy of research to Artic communities plays a critical role in how scientists engage with communities; Theme three, which distinguishes similarities and differences between Indigenous knowledge systems and Western knowledge systems, and how the two systems work together; and Theme four, which details the roles of Iñupiat in Arctic research from the perspective of the scientists in Utqiaġvik and thoughts looking towards the future.

Under each of the following themes, there are excerpts presented individually and in groups. Each group of excerpts represents a group of multiple perspectives. For an example, a group of five consecutive excerpts will represent five separate perspectives.

4.2.1 Theme One: What is successful engagement between scientists and communities in the Arctic?

The first qualitative theme that Arctic scientists went to great lengths explaining, was what successful engagement between Arctic researchers and Arctic communities is, and what it is not. Definitions of successful engagement varies drastically from field to field, from institution to institution, from project to project, and from individual to individual. This variable nature speaks to the fact that there is not cookie-cutter formula in regards to successful engagement between Arctic residents and communities. Each scientists' situation is unique.

Excerpts:

> … if we do our jobs right, the scientists, we both learn to try to understand the different ways of knowing, but we also communicate our methods and our results effectively so that it's not always the science community coming into a community and initiating the

science that way. The science actually starts to be initiated from the community. So it can be a case of a community, or a group of communities trying to identify and being able to recognize what kinds of research they need. Kind of coming at it that way so that you get the right scientist, the right personality, the right combination to meet community needs. [Arctic Scientist]

And it's more talking to the locals, which include people who live here a long time who are non-Native Alaskans, and also people who have grown up here who have family here for generations. And then also a mix of researchers that come into town, so we exchange ideas and work together sometimes. And all of those have contributed to my better understanding of Arctic systems, of science, and how to work here as well. It's an ongoing process. [Arctic Scientist]

I spent a lot of time out on the ice with [our local guide], talking about the different features and how it formed and how it contributed land fast ice stability, or destabilizing features. And so it was really a cross relationship between a hardcore science community and Iñupiat knowledge. [Arctic Scientist]

The “co-production of knowledge’ is a popular phrase within Arctic natural and physical sciences in describing relations between Indigenous communities and Arctic researchers. Many scientists had mixed feelings about the word “co-production,” and there was no consensus of what the term means. Some scientists were more familiar than others, and each scientist related

co-production of knowledge to their own careers and experiences. Fields of sciences that were more relevant to communities were more aware of the process of co-production of knowledge:
Excerpts:

> So for me that co-production is definitely a back-and-forth conversation that you need to have. It's not quite as effective when it's one side controlling the conversation without listening to the other side. [Arctic Scientist]

> I think it (co-production) is one of those things people like to hear it, and write it. But I'm not sure if people really know what it means. Or if they're using it in a way that say, you would, or a local would. Because I don't know if it should be considered production, if they're just informing each other, working together to have a more complete understanding. So production, I think is a little misleading. But the gist of it is a good idea. [Arctic Scientist]

> "I probably first heard that term, the buzzword, co-production of knowledge in the last year, maybe year and a half. Has that word been around longer? I'm just curious." –Arctic Scientist

One thing that was clear was that scientists understand that proper engagement between Arctic scientists and Arctic residents always takes a lot of time familiarizing with communities. The scientists interviewed were fully aware that in order to familiarize themselves they need to develop relationships, friendships, and long term lines of communication.
Excerpts:

…so a year ahead of time before we even went into the water we talked to people up in Barrow and people were kind of interested in what we were planning on doing and by the time we showed up to do fieldwork, at least people knew that we were going to be there and what we were going to be doing. So I think that ultimately made life a little easier for us as far as being outside scientists coming into town. [Arctic Scientist]

You know, you're coming into these communities as a white guy, and average white guy, even though you might have all the right intentions or feelings, or experience, to some of the people you are not perceived that way. You've got to build up relationships and trust and have that friendliness and demonstrate compliable value systems in order to earn respect in the community, I think. And that obviously doesn't come in just showing up on the plane and picking up where we left off last year. [Arctic Scientist]

But I think a lot of these newly funded projects, that there is some naivety there, where it definitely takes time to develop trust and friendships that lead to co-production of knowledge, I think. Some of these one-off grants that people just show up for three years or five years and fulfilling what they need to fill in their grant obligations. So for me there is two ways to go about it, and one way is more meaningful and you actually gain a lot of information just by spending time, not really trying to do too much over a one to two week period. Actual co-production of knowledge happens over the course of a lifetime, I think. I know people don't have the time and/or the effort to put into that kind of stuff, but for me it's like yeah, the interactions that I've had with Iñupiaq people that started in Barrow, and then just materialized pretty much all over northern and

northwestern Alaska have all made my career what it is. I've learned a lot from their perspectives, kind of understood some of their concerns in terms of real life situations they deal with. [Arctic Scientist]

…those two sides don't necessarily interact unless there is a specific project that puts those two communities together. That's my impression. So you need to kind of live with someone, or have enough interactions so those things can merge. Open communication and opportunities for that to happen. [Arctic Scientist]

There is a reason why scientists stress so much on spending adequate time to successfully engage with Arctic communities: they face serious problems if they don't spend the time. Projects with minimal field time in Utqiaġvik, and without prior history and relations in the community can face a lot of issues, as one scientist pointed out:

… they tend to come in, and they're on a short timeframe, they need to walk away with certain products, or deliverables. And the only way that they know how to achieve that, by being trained in the traditional system is to put their head down and work their ass off. And they have probably never had career or professional success, ever in their lives, that they can point to just sitting around and having a cup of coffee and talking to people about how the winter was, or how was the hunting. How do you prepare that food, tell me about your cabin, tell me about your family, and just talking about everyday things, And being able to read into those conversations and extract information that is relevant to their science. So most researchers wouldn't even know what metrics to use or how to strike up a conversation like that. They wouldn't have the confidence. A lot of researchers are

absolutely intimidated by locals. A lot of researchers are scared shitless of the environment, it's really inhospitable so they cannot imagine anyone living there. So with that some of them just go into survival mode, they just shut down, and they forget how to interact or relax, or to laugh at themselves a little bit, and ask questions and stuff. [Arctic Scientist]

To make things more complicated, you need to be very careful when you time your visit to communities:

I guess try to spend the time in the communities as much time as you can at the right times of the year. So like really try to reach out and figure out what that calendar is like in the various communities and not try to impose yourself during these inopportune times when people are subsistence hunting or if there's an Elder that passes away and there is like a funeral going on in a particular time of the year, you know try to be cognizant of the community culture first and bring your science agenda second, essentially. [Arctic Scientist]

Arctic research projects are typically funded from 1 to 5 years in length, with minimal time "in the field," or in the case of this thesis, in Utqiaġvik. The short timeframe of research may not give a scientist enough time to develop relations in communities. In many cases, scientists who work in Utqiaġvik for long periods of time continually build on their research successively from project to project. Throughout this process, relationships are made that allow scientists to learn how they might orient following research to avoid local conflicts, and in some cases, to have positive impacts on local communities. Generational research that continually

builds on previous research projects also require that scientists secure consistent funding resources to sustain local partnerships.

Excerpts:

> You don't get to that point in the span of one research project, that's for sure. You'd have to take a generational look at research projects. One research project hands down knowledge to another research project, and then you build knowledge that way. And often, the important questions, the questions that everybody really wants to know, which are not necessarily these little tiny probing questions that I'm asking. Really, those sorts of questions can only be asked by looking at lots of research projects. [Arctic Scientist]

> Some projects that are longer termed have a better chance of that [good relations with communities]. But ones that only have a year or two years of funding to go through everything. I just don't see that being beneficial. I don't think that is enough time to really build relationships and help each other out effectively. And I'm sure there are some examples of shorter term that do build lasting relationships and results. But in my experience it seems like the longer you have, the better the outcome will be… That's kind of the way we've gone about it, from a starting from a starting point. We've had projects going on for 16 years and it's been under different names and different funding, but we've been able to maintain, at least very similar projects within the community that people know we're working on and looking forward to hearing from us about. [Arctic Scientist]

According to the scientists, in order to be a successful Arctic researcher in Utqiaġvik, you must be flexible, open minded, receptive, and patient when engaging with the local communities.

Many scientists do not have these characteristics, and it was clear that Arctic scientists who are successful are aware that they have these traits.

Excerpts:

> …the people I have gotten to know in the field, who work with Indigenous Knowledge, they have to be receptive. If you are not receptive, you don't do it very long. [Arctic Scientist]

> I've definitely sat through quite a few interviews where we had an agenda, and we had what we were looking for in terms of aspects of our project, and it was like a five or six hour conversation related to something totally different. But I still learned quite a bit and I still gained a lot of knowledge, even though it was not directly related to my project at the time. But I think down the road it actually helps, just having a better understanding of the cultural situations that a lot of these Native communities are in on the Slope and in northwestern Alaska. [Arctic Scientist]

> Well, the locals probably know more than we ever will because their livelihood depends on those things. The way things are, the changes in the environment, and subsistence activities. So I never discount their knowledge, or tell anyone that something is this way, if they disagree. Because that's their understanding of it, and it's a different mindset than a scientist would have. So then combining those two, you have to be very respectful. [Arctic Scientist]

Chopping (vegetables while cooking) or having different tasks to do, and suddenly conversation starts, and that's usually I think the most effective way. Like I think you end up learning without realizing that you are. And so, I think that's just how the human brain works. It's effortless, but you are always aware in it. You have an association of doing something pleasant, with the knowledge that you are getting. [Arctic Scientist]

…you can usually tell if somebody's a charlatan or if somebody knows their stuff, pretty quickly… So I kind of make an assessment of who's the expert, regardless of ethnicity. And I'm not too hung up on my own ego. [Arctic Scientist]

Who's got the most observational data, the biggest most robust data set? In general, with Arctic science, I think it really depends on the subject and I would say an astute Elder who has spent a lot of time on the land, who was paying attention, you know a bright person, et cetera, a successful hunter, they probably will have a better broad-based sense of what is happening over a long time period. And time depth matters. Then somebody comes up intermittently, maybe read some literature that is good, but you know, there's a lot of areas of knowledge that simply-you know a Western scientist whose intermittent sampling of a fairly narrow discipline, typically won't have a holistic knowledge for Arctic science. They may know the literature better, or what's going on in Norway or East Greenland, or some remote area. [Arctic Scientist]

I think the scientific community in general doesn't embrace new things as easily… I try to use all the information I have, be it scientific or not. Because it would just be dumb of me if I didn't. [Arctic Scientist]

It was clear that scientists are aware that some are better at engaging with the public than others. As humans each person communicates in a unique way.

Excerpts:

…we're all humans and sometimes it's just personalities. If you have a mismatched personality, as with anything, it's going to make collaboration more difficult. But I think sort of miscommunication and misunderstanding, sometimes it's just something as simple as terminology. [Arctic Scientist]

In a way, there are people who have skills that can interact with people better than some other people like me, for an example. I have a hard time, or it's somewhat more difficult for me to interact with some people, other than people I know really well. I don't know if that's shyness, or standoffishness or whatnot. But [my colleague] is one of those people who can go into a room of strangers and start talking and feel at home doing that. It's a little more difficult for me to do that, I'm a little shy or something. [Arctic Scientist]

…some scientists only care about their science, and that's much to the chagrin of other people working on their research or working with them. [Arctic Scientist]

> It's hard, but you can find people that think differently because of that upbringing. You know, by the time kids get to college, it's almost too late to develop that mindset if they haven't got it by then. As an educator in higher education, it's more like you are steering them to opportunity to develop that mindset that is already there. [Arctic Scientist]

> I think there is sort of a naive balance that I've seen in some of the non-Native researchers that come up and think that there is some sort of genetic knowledge in Native people. That, you know, [they say] I've talked to a hunter that said, A, B or C, you know, he's seen penguins down the coast. And because it was a Native hunter it has to be right. And I'll say, umm, oh, I don't, and who was it? Oh okay, I know. You know, kind of like in the science community, you know who you can trust, local observers is the same thing… There are certain people that are very, very reliable, and don't bullshit. And then there's the opposite. [Arctic Scientist]

A scientists' upbringing might have to do with how well they engage with communities. There was a reoccurring theme throughout all the interviews: nearly all scientists were raised in a mixed academic and hands-on learning environment and/or raised as extensive travelers:

Excerpts:

> I was also in the Boy Scouts. And that was not classroom kind of teaching. And I always thought that was a very formative part of my childhood, but I hadn't really thought about how it provided a non-classroom based way of learning that may have shaped my

thinking now. I've never made that connection before. But yeah, I had that academic side. [Arctic Scientist]

…a lot of my younger years growing up was spent outdoors, and doing a lot of activities in nature, whether it was fishing, hunting, hiking, expedition camping trips. So I think it really instilled in me more of a hands-on learning type of experience. But I always did very well in classes. [Arctic Scientist]

We lived in kind of a rural area, so in the summer time, when school was out, we picked berries, or fruit, for cash. I worked my first 40 hour week when I was eight years old… we just spent, we just spent a lot of time outside as kids, even in the winter, we played outside and built snow forts, slide down hills, all that kind of stuff. Go ice skating. [Arctic Scientist]

With my own upbringing, when it sort of came time to narrow down for college, it was pretty clear to me that whatever I did was going to have to be hands on and had to be outside and had to be something that wasn't just science, but had to include some kind of life adventure, or life experience all the time, you know? Whether it be travel, or working with different people, with different disciplines, and that sort of thing… I grew a healthy awareness of all the things that I didn't know, that indigenous communities did know about the landscapes they had managed for many thousands of years. And I also realized and got an appreciation for some of the differences between that perspective and say, what science would otherwise try and teach you. [Arctic Scientist]

> It's really hard for students who aren't brought up to think independently and critically to the extent possible that they approach everything in life with an open mind. It seems that everybody has got an opinion these days, or fixed perceptions of some things. [Arctic Scientist]

The scientists who are the most successful at engaging with the communities spend a lot of time and energy and are very passionate about their fieldwork in Utqiaġvik and enjoy their time "in the field". The following excerpts show this deep personal connection to Utqiaġvik:

Excerpts:

> I don't know, to me, working in the Arctic is, when I look back at all of my experience, the moments in your career where you realize, where you have an ah-ha moments, were working with Indigenous communities in one case, or sharing food with someone from an interesting culture, or appreciating ancient cultures, or figuring out how to solve problems in the environment using different approaches to doing research on your own, and making your own discoveries. And to me, working in the Arctic particularly in northern Alaska, it's really the only time where I sort of feel like all the things that have been most meaningful for me have all come together all at the same time, you know what I mean? [Arctic Scientist]

> I definitely have a personal connection particularly with Barrow, with Utqiaġvik. Just having worked there so long now, I've developed quite a few friendships early on when I

was up there. I think people in town just saw this young white kid in town, running around doing science and stuff, and I made friends with some of the families on the beach when they would have bonfires, and they would invite me back to their house for meals in the evening. Sometimes I would go to their camps and cabins and hangout with them for a weekend. And so for me it definitely became this friendship that I had with the community. And I have found a lot of value in learning by being a casual observer in terms of hanging out in their homes, being invited to their parties, and not really trying to be too domineering in the conversation. But just like developing friendships and being casual about the relationship. And so for me, I learned a ton that way that I think a lot of people don't get to experience necessarily if they try to parachute in to these communities and assume that their thoughts, or whatever they try to bring to the table are necessarily wanted there. [Arctic Scientist]

I came to Barrow for the first time. And it was primarily my interest and desire to really start focusing whatever my career path might be on fieldwork, essentially. Not at the time knowing what it might get me into, but just knowing that I like to work outdoors, and I like to learn about natural environments, and how those type if systems work by actually being in them. So I definitely said yeah to that opportunity. [Arctic Scientist]

A lot of focus has been related to long-term experiences. Students who spend a short time in Utqiaġvik can also have life-changing experiences, however, short-term students were not interviewed in this study. One scientist recalled that:

> I have had kids write to me five years later and say, you know what, I had no idea how that experience had changed my mind and challenged my thinking. And just today, such and such happened, and it took me straight back to where we were, and I just want you to know, I still think about those times, you know. So sometimes that realization of what you learn, it expands many cultures, it certainly expands me. That learning experience lasts for decades. [Arctic Scientist]

4.2.2 Theme Two: Relevancy of research to Arctic communities plays a critical role in how scientists engage with communities

A second qualitative theme throughout the interviews focused on the relevancy of Arctic research to Arctic communities. This came up extensively because the relevancy of research to local residents plays a crucial role in the success and failure of engagement between Arctic scientists and local residents in Utqiaġvik. Scientific fields that correlate more closely with locals' lives will have a better shot at successful relations. However, there is a lot of very important Arctic research that takes place that is not directly relevant to the everyday lives of Indigenous peoples in the Arctic. One major issue is how to relate irrelevant research to locals. Excerpts:

> If they have a particular niche in their field that is particularly applicable to community issues, then it seems to me like those types of PI's and researchers really excel in community settings, kind of with the outreach and co-production piece. [Arctic Scientist]

> …stuff that doesn't seem relevant on its face, like maybe microorganism research or ocean wave forces research, but there is a way to make it relevant. Where changes in the microbiome work its way up thought the web until it eventually effects the top, keystone

predators and keystone animals. And I think there's ways to make it more interesting and relevant to local people, and it's just taking the time, effort, and patience to do that. [Arctic Scientist]

I think we ask questions for different reasons. As scientists we ask questions sometimes because we think we know the answer, and the purpose we ask the question is to test if we know the answer. I've come across in a few cases where, because I haven't described my intentions, or why I am asking this question very well, it comes across as I am asking a very obvious question. Because they're [local people] are like, "We know the answer, if you are here to answer that question, we can tell you right now and you can go home." And I'm not really looking for the answer, I'm looking to make sure that the answer is exactly what I am expecting. There is not really a terminology difference, it's like explaining why I'm asking questions. And to get to that level of understanding, that takes years of working with people. You have to learn each other's personalities and then things can go a lot more quickly. [Arctic Scientist]

Scientists who develop relationships in Indigenous communities can become communicators for the greater science community. Relationships that include open lines of communication allow for information flow between Arctic community members and scientists who might not have ways to communicate with locals.

…first, listen to the community and just really listen to them, and make them the most important piece of this puzzle where they can express their concerns, even if it is not entirely related to your project, per se, it's a good way to build bridges with folks in the

> Native communities by taking the time to listen to what they are really concerned about even if you can't directly address that with your project, you might know of a different project where somebody you can recommend the expertise for somebody else to come in to help provide some of that information they might be looking for. So I would say, listen to their needs first, and then hopefully your desires and what you are trying to study will crop up in those needs. And if not, you can always provide them with connections with other researchers that might be doing more applicable work for their community. And I would say also as a researcher not to get too discouraged if your field is not exactly important to what a particular community or person's needs are in a community." [Arctic Scientist]

The previous excerpt suggests listening to Indigenous communities before beginning the formation of research questions. This is extremely important, but listening Indigenous communities does not equate to "listening sessions". With the wide cultural and geographical gaps between scientists and Iñupiat, real listening always requires time, and the building of trust and relationships to open the lines of communication.

Relevancy of science to the public is a problem that is not exclusive to the Arctic. This is an issue that scientists have to deal with in regards to relating their sciences to the general public throughout the United States. Scientists who travel from institutions across the U.S. face relating their science not only to locals in the Arctic, but also to the public in their respective home communities.

> Even outside the Arctic, you go to any major metropolitan area or any rural area in the world and say to the community, you know what, these theoretical physicist that we pay

millions of dollars in research money to every year that just sit in the room and run math on how the universe was made and if dark matter really exists and all this sort of stuff. It's just as difficult as explaining things like that to any community in the world. As to coming into the Arctic and saying that understanding the movement of carbon from the landscape to the atmosphere is super, super important and some of the most urgent things that science needs to address these days. And the local community saying, what? Why would you even be doing that? Our village is almost being washed away. Why would you be researching that when we can't get other things that are really relevant to us, addressed? And nobody is wrong here, nobody is doing the wrong thing or asking the wrong questions. It's just, it's a matter of balance and understanding where different peoples' perspectives all come together. I know myself, I run into people in the grocery store and complete strangers will ask me, what are you guys doing? And I try to explain. And you know when you are explaining to them that this is probably the most irrelevant thing that this person can ever imagine me being in town for months of a time actually doing. But how do you explain to them why it's important, and why this is happening maybe rather than something else that's more relevant to their day-to-day wellbeing. And I think that those same challenges exist anywhere in the world, where you try to explain any type of science to anyone from the general public. [Arctic Scientist]

One very clear theme was the tendency for scientists to refer to two examples of fields of science that have a lot of correlation to locals' lives, and that have had a very successful and long histories in Utqiaġvik of producing Arctic research that equally utilizes local and Traditional

knowledge with Western academic sciences. These examples include wildlife biology and sea ice sciences.

> Barrow has a long history of having scientists on their door step. And from what I understand, that has largely been a positive thing for the folks in Barrow. And it sets Barrow apart from most places in the Arctic as far as I know. And I think there is a lot of researchers that come through Barrow and learn to respect Indigenous Knowledge and I think there are a lot of folks in Barrow who see the benefits of science. [Arctic Scientist]

Excerpts regarding sea ice research in Utqiaġvik:

> …from my perspective, sea ice in general, information from local people about sea ice, its extent, its thickness, its characteristics, like breakouts, and all that kind of stuff, that has really informed research for say like Andy Mahoney and Hajo Eicken. I think that has been very helpful for them. [Arctic Scientist]

> And that is obviously the most difficult terrain to cross, that's where there is nobody on earth that could possibly come close to competing with kids who got brought up on the ice, you know. And just reading it, and knowing what to do, et cetera, et cetera. I think that the increase in sea ice research, in particular, has been kind of a resurgence of support locally. [Arctic Scientist]

> I took part in the sea ice field school, and we had Joe, and a couple other folks, maybe Billy Adams, out on the ice with all the students talking about their view of the icescape. And then also had a sit-down with some Elders who talked about the importance of

Iñupiat knowledge for local's lifestyle, and how it could contribute to, and learn from science also. So it's pretty unique and beneficial class and relationship. [Arctic Scientist]

I didn't get taught in the classroom to think about other ways of knowing. But I started learning about sea ice in both ways simultaneously. So to me I have not known another way of learning about sea ice, except for through a combination of classroom stuff, I would have my own Western research-based methods for learning, but I would be doing that while I was going out on the ice with experts and Elders, and so I learned that way. So I wasn't formally trained in it, and I'm still learning. But they both for me, my education about sea ice started in both directions at the same time. And I think that has been very important to me. [Arctic Scientist]

…in the late 90s and early 2000s, this deep appreciation for how Traditional knowledge is so incredibly valuable for figuring out change over time, and there's parallels in the names that we give things. If you take the time to sit down and form relationships and have a laugh at each other. And again I think the sea ice community, because of that close relationship, that new approach, I think arguably were really some of the pioneers in making some of those tighter linkages. And also the different groups working with marine mammals and that sort of things were. So to me, the transition that went beyond valuing traditional knowledge for access to the land or the sea. [Arctic Scientist]

Excerpts regarding wildlife biology in Utqiaġvik:

> One of the examples that is often brought up is the role that science played in shaping policy on subsistence whaling. And it is sort of sad to say, and this is based on facts, that at that time Indigenous Knowledge was not held, at anywhere near high enough regard that national policy decisions would have been based on folks in the community saying, "Hey guys, there's plenty of whales." There was concerted scientific effort led by the Wildlife Department [North Slope Borough] that did these standardized censuses, and established that. So ultimately it was the involvement of Western science that got the decision, when the community knew was the right thing all along. [Arctic Scientist]

> So the '80s was a real period of awakening, it's like wow. And then it got more comfortable talking with some of the senior captains and they got more comfortable talking. And then that was a really, those were kind of the renaissance years in a lot of ways because it was the interaction was spinning up, we were both learning. The hunters were learning from us and we were learning from them, and it was kind of this magic period, a lot of good chemistry. Wasn't perfect. [Arctic Scientist]

4.2.3 Theme Three: similarities and differences between Indigenous knowledge and Western academic knowledge, and how the two systems work together

A third major qualitative theme throughout the interviews with Arctic scientists included the identification of similarities and differences between Indigenous knowledge and Western academic knowledge. The discussions about scientific knowledge and the knowledge of local Iñupiat were centered on the notion of a binary framework. This deeply-rooted binary structure impacted both the researcher's questions and the scientists' answers. Scientists spoke of the distinction between the two sides throughout the interviews.

Excerpts:

> Indigenous Knowledge is more a practical solution, whereas the Western Science is more of a methodology. [Arctic Scientist]

> …in my mind they should recognize each other. And also with the realization that they are different and have different expectations and different uses, really. And one is not better than the other, necessarily. But if I'm out hunting up there than I would like a really knowledgeable Iñupiaq with me, other than some hardcore sea ice physicist that doesn't know what is going on. You know what I mean. [Arctic Scientist]

> So it's kind of two different data streams to some extent, but arrive in the same place. So in wildlife biology, I think there is a fair amount of overlap, because they're both tend to be observational sciences. So the more effort you have, typically the better your data, if you're, you know sampling properly, or consistently I should say. So if you have for instance one person (scientist) looking off the coast here for when the whales arrive, going out every two or three days, as oppose to a couple hundred people (locals) going out and going around the clock. In that case, you're both sampling, but the group with the higher effort are going to have a more robust answer, more robust data, leading to a more firm conclusion. So it depends, I guess you know of course that's an example where you would be, you know it's pretty clear that just observation effort is unequal between the groups. But if it's offshore and you're talking about acoustic data, then that's something entirely different. More information from tagged whales in regions out off the coast. So I guess that those data are more robust if you want to know presence or absence of whales

50 miles offshore in spring. Yeah, maybe occasionally some local guys have gone out there, either by accident because they drifted off, or maybe an airplane flight for something. But what I'm trying to say is that the more robust dataset, regardless of how it's collected, is probably closest to what is happening, the truth, so to speak. [Arctic Scientist]

I think the similarities are, if you see something that doesn't agree with your understanding that triggers something. That's odd, you take a look at it more closely and try to understand it. And both those, you have an understanding in how you think the system works. You use that understanding to sort of set your expectations and when something doesn't match your expectations, you are sometimes like, ha, that's weird. You know, when the environment is changing rapidly, these weird moments come up more often… I think the part that is based on observations are where most of the similarities are between the two ways of knowing. [Arctic Scientist]

I would just say there are definitely different perspectives in how people can look at the same problem. In that sense, it opened my world to appreciate that my worldview and my way of doing things is not the only one and it's not better. [Arctic Scientist]

Many scientists recognized that there are much more "ways of knowing" than just the two sides as represented in the dichotomy between Traditional/Indigenous and Western/academic as represented in the previous excerpts.

Excerpts:

I don't really see that many dissimilarities [between knowledge systems]. Like maybe the language people are using is different. So scientists like to talk in quantities that are maybe not very [inaudible], but ultimately what we want to know might be exactly identical things… I guess that I would not even say that there is not just two knowledge systems, I know there is many more knowledge systems than just these two. I know that you are focusing this on just these two, and a particular region, but the differences between the two attitudes, I really think it benefits everyone if both sides can inform each other, and pass information from one another and if there are pathways open for that to be possible. [Arctic Scientist]

So like working with [interdisciplinary science colleagues] in a way, that's like co-production of knowledge, too. Because one comes from a different background that I come from, and we're both asking questions of each other to figure out how something works. And so in a way, it's like asking people in Barrow, it's like what do you notice? How do you see things? In a way it's very similar to asking [my team member] who comes from a different science background that I do, how she sees things. So you have all these different perspectives, I think people who are interested in doing science, or are interested about the world in which we live, you try to find out different perspectives and you talk to different people. I guess maybe why it might seem more two sided is because we're from different places, kind of your traditional academic scientists and your real world scientists, which are your fisherman, your whales, the people that live the life, basically. We're still looking at the same things, but our experiences give us different perspectives. And I think we both want to understand the world in which we live. So if

we can share information, I think that's what we do. I think the people that are effective, and really want to learn, make the effort to learn from people who have a different background. [Arctic Scientist]

Scientists expressed the need to be flexible when incorporating Traditional knowledge into their data. Context is extremely important when incorporating local observations into scientific data.

I have a very specific way of using the cardinal directions. When I mean north, I mean the direction relative to the axis in which the earth rotates. I just found that there is a little bit more looseness in regards to what north means. It sort of, sometimes it can mean offshore, and really offshore is like northeast. And depending on the context of which north is used, I have to be flexible in how I translate that into my research. [Arctic Scientist]

Many scientists spoke about the importance of Traditional and local knowledge to their personal careers.

Excerpts:

…we try to get out during these times of the year when these satellites are coming over and we can measure various characteristics of snow conditions and lake ice conditions from space. So for our research it's a pretty important part of the year to get out, and its nice knowing I can do that pretty safely in the last two decades, no major catastrophes, knock on wood. But all because of all the training I received from the Iñupiaq people in Barrow. [Arctic Scientist]

I remember people telling us about convergent zones where these two water masses would come together in the Barrow Canyon area. And as I recall, when we started out, we started looking for this in our measurements. And sure enough we were able to describe those differences. So people were aware there were different water masses up there and they have a rough idea of where they were. And throughout measurements we would see this kind of phenomenon and try to understand what causes year-to-year differences in that. [Arctic Scientist]

If I think about, I think there is some very specific lessons I learned that taught me about the science, but it also kept me safe on the ice. And that was very early on, talking to folks like Kenny Toovak, about paying attention to your foot prints on the ice and if there was any water in them, or of you can see if you disturbed the surface of the ice at all. I guess some really subtle things like that that you can probably figure out yourself walking around on the ice, but you are not going to get taught that in a classroom, you need to be out in the field working with it. And for me, the fact that this came from an Iñupiaq Elder telling me it just burnt it into my brain, versus if somebody told me in the classroom, I would have maybe forgotten that and maybe fallen though the ice at some point. [Arctic Scientist]

I definitely came here with the understanding that these people live here and they look at this every single day of their lives. Whereas I experience this world only through data and equations and the knowledge I acquire from reading papers and reading about it, not

> living with it every day. So there is defiantly an inherent knowledge and experience that comes from living it, rather than just looking at the statistics and the data. [Arctic Scientist]

Some scientists even learn local, Traditional, and Indigenous knowledge and utilize this knowledge to become guides and safe keepers of new scientists to the field:

> And I learned more in that two and a half week trip on the tundra that I had in first three or four years working in the community. So it was really just getting out with our guide and bear guard. And it didn't seem like he was excited about the science we were doing, he didn't quite understand it at first, he thought we were a little bit nuts, actually. But over the course of our interactions with us telling him about what we were trying to do and why it was important. He started sharing with us stories about how he'd seen certain events happening on the tundra, and passing on his knowledge about travelling the tundra during ground blizzard conditions, or whiteout conditions, if your GPS dies, what you should do in terms of looking for indicators of which way you are going and stuff like that. Then I really started to build up confidence that this work was kind of cool that we were doing, and that he found that it was cool in the end, but also we could get out on the tundra instead of just sticking around in town. And so after the course of the next three or four years, I travelled a little bit further and further each time, and also with bear guards and with guides, and I got to the point where they kind of turned it over to me to be the guy that would guide these science trips. Anyway, for me that felt like a major accomplishment, having travelled the tundra with these guys, gaining knowledge about how to do things safely out there, how to navigate, how to survive when you are out on

these trips, but also starting to look for some of the things they see in their daily lives when they are out subsistence hunting and fishing. [Arctic Scientist]

There is a current push for more integration of local, Traditional, and Indigenous knowledge into Western academic sciences in the Arctic, as indicated in chapters one and two. Several scientists spoke about this trend:

Excerpts:

I see that more and more people, and also funding organizations, and all that are pushing for integration and not separation of the two. And giving it equal, trying to make those merge. Which is very difficult to do and I think it's still in its infancy. [Arctic Scientist]

Well I've been around long enough where I've seen, kind of where visiting researchers, there wasn't a level playing field. I think that's changed a lot. I think it's changed a lot, I don't think it used to be very equitable. And there was a fair amount of variance in some of the scientists…so I saw it go from very little [engagement], and a lot of suspicion about local knowledge, or not a lot of weight placed on it, to swinging, in some cases, too far the other way. And I think, as I see it, an expert is an expert, and whoever has the most and best observational data, that dataset should be the ones that's used to make the best conclusion about whatever it is that you are talking about. [Arctic Scientist]

It has become more mainstream to the point where I recently gave a talk with some students. I was explaining the importance of knowledge co-production. And I didn't even know what knowledge co-production was when I was a student. And these students for

whom I was giving a talk already had some insightful questions formed about the process of it. They must have been exposed to it before and they knew about it. And I'd say that's sort of within the confine of 20 years, I think it went from I didn't know anything. There was a very few of my peers as students really knew about this way of doing research, and now it's mainstream enough that there are really students that know the buzz words and understand the concept at hand here. [Arctic Scientist]

…there's this huge influx of all these new folks coming to the Arctic to do research for the first time, too. Like, you have to train them about the culture, and then also like this mentality of convergence research and co-production of knowledge really guiding the science, so it's two new things that are very difficult things to deal with. [Arctic Scientist]

…we visited Barrow [20 years ago] more than a year ahead of putting any instruments in the water, basically. So we got some feedback and we asked people, gee, where should we look? What kinds of things should we look for? Any interesting things that you notice when you are out there that we might notice? That kind of stuff. So I think interaction with people in the community was probably unusual for the time. Now days when you do proposals, to do oceanographic work up in the area, it's kind of explicitly required that you contact people ahead of time, local people. [Arctic Scientist]

Something that has come up in the past 10 years is what's called stakeholders in the research and the area. And I consider the Iñupiat as some of the biggest stakeholders in the area, and so in my perspective, it's more focused on making sure that they participate

in research itself, but also guiding the research. And I see that becoming more and more a part of other projects in other schools. So that's become an important part, and a lot of people don't know how to address that, it seems like. [Arctic Scientist]

4.2.4 Theme Four: The role of the Iñupiat in Arctic research in Utqiaġvik today and looking towards the future:

Bear guards are still an important role as most scientists who are based out of Utqiaġvik are required to have bear guards for their safety. Some bear guards take a more significant role in the field research, others not as much. Regardless, the interaction between scientists and local bear guards provides for an opportunity for the sharing of knowledge and the building of trust and friendships.

Excerpts:

> I got to go out as a grad student on my own on the ice quite a lot, and so the only other person who would be with me would be somebody from the Native community serving, kind of to keep me safe in a way. But they pass on knowledge that way as well. So that was where the opportunity was. And I could have disengaged and I could have not taken an interest in it, but it was fascinating to me. [Arctic Scientist]

> I think there is a huge amount of co-production of knowledge that occurs particularly when you get out and if it's kind of these one-on-one (between scientist and bear guard), or one-on-three field teams out on the land or on the ice. But I think that is where you see co-production of knowledge taking place. Where you can come back to your office after a productive field trip, and then you sit down and summarize what you did and think about your results and you learn a new perspective on how to think about the science you

are trying to do by interacting with people that live there all the time and get out and travel the land. [Arctic Scientist]

For a bear guard, mostly, is they're attentive. Because sometimes we get, like I get so focused on what I'm doing that it's good to have someone who is there watching out for a dangerous situation, right? But also some of them I've worked with through the years are engaged with what's going on, or what we're doing, and share their knowledge. And others are there to just do the job, which is fine also… After working with them for a while, they've been happy to talk about what they've learned who they've learned it from, and discuss with them how did this knowledge come about. There's one that I haven't really figured out, yet. And I've asked Billy Adams about it, and Qunniq. I was doing a CTE cast with Billy, and the warmest water was at the bottom. And he was like, the Elders always said that the water is normally warmer at the bottom. I said, how did they figure that out? [Laughter] And he was like, I don't know. That was pretty interesting. [Arctic Scientist]

A very important point was made by a veteran scientist about an issue that some scientists' have in perceiving bear guards negatively due to cultural differences:

…when researchers show up, and the guy that they get as a bear guard looks really young, may not be wearing some of the same shoes, or North Face clothing that the researcher things is super important for being in the elements, and has got blood or grease on them from hunting or fixing a machine, and has different ways of answering questions or interacting socially. And some people would interpret that as local guards being

> uneducated or unaware, or ill equipped, or immature, or you can use all sorts of descriptions, right? But I think if you've got an open mind, and you're used to communicating with all different types of people, you realize that looks and perceptions are not everything. You've got to give everyone a chance. And that's a really big thing. And so I think a lot of researchers don't gain what I would gain because they automatically become closed minded just based on appearances. [Arctic Scientist]

The former Barrow Arctic Science Consortium (BASC) played an important role in the late 1990s and early 2000s in building science and local Iñupiaq relations and setting the stage for good relations today:

> Glenn Sheehan, who was the head of BASC at the time, I think he was a real advocate for scientists communicating and interacting with the communities. And we owe him a great debt of gratitude for basically, he drove us around. He said, you should talk to this person, you should talk to this person, and you should talk to this person. We went to the fire station, we went to the Mayor's Office, we went to I forget what shop it is, the heavy equipment shop, whatever that's called. There was the place where the, the community center, where it has a little gym inside the community center. It's down there going towards the airport from Stuaqpak, you take the roads across the ponds there and over there, and I forget the community centers name. Anyway, we met people there and all over town, Glenn took us around, and he knew people in the community. He said, you need to talk to this person, you need to talk to this person, so he would take us around and we talked to all these people. So that was a good introduction to us, as outsiders. [Arctic Scientist]

Several scientists spoke about the current relationship between local Iñupiat and Scientists in Utqiaġvik, and the value of having local logistical service and science infrastructure: Excerpts:

> But in terms of the logistics perspective, UIC Science particularly, but the logistics providers in general are kind of like the way into the community, in a sense. The role you guys fill really, for people coming in to Barrow, or Utqiaġvik for the first time, it's a little bit shocking, I guess, if you are coming from Florida, for instance, as a researcher, or Arizona or New York City. And the comfort level that you guys set up out there at UIC Science, at the Nest and at the BARC, it's just like the facilities are there that really promote new comers being successful. And that level of interaction that goes on with the staff, I find pretty encouraging, and then when people do venture into town, it makes them be a little more respectful to their situation where they actually are doing their research. It make a nice connection that I think would not really be possible then say if a researcher tried to come to Barrow, go to the Top of the World Hotel, stay there, bring all their field gear and try to do some of their science based out of the middle of town. The connection you guys create is really, really valuable, for sure." [Arctic Scientist]

> …with the change in the logistics organizations, particularly with UIC Science over the last few years, a lot of these mechanisms are now falling into place to making opportunities that we haven't sort of seen I think for almost 20 years and they've come back to life, you know? But even more so, I see some of those opportunities, some of those mandates being driven by local communities. And I think that is an incredibly

powerful thing, it's such a positive step. And it's such an important step in the right direction. [Arctic Scientist]

…a lot of people their field experience with sea ice comes from a boat, and you are surrounded by other scientists. And that's really valuable, but I do see that I've got opportunities that they didn't, because they didn't work out of the community. [Arctic Scientist]

And finally, scientists are thinking towards the future:

Excerpts:

So ideally, we can get to a world where science and Indigenous knowledge isn't such a dichotomy when making decisions, they are each given their appropriate level of weight based on—because some questions are better answered by science, and some questions are better answered by people that have a lifetime of experience in a community. If we can learn when to use each one, or what the correct blend is, like making a recipe for each particular question. I think we can reach a much better stage. [Arctic Scientist]

Because I feel it's important to know how we arrived at our conclusion, but maybe we don't need to draw such hard lines between where the knowledge comes from. [Arctic Scientist]

We're all the same, we're just coming at it from different perspectives, and if we can share I think we all benefit. [Arctic Scientist]

> And ultimately it just comes down to good people willing to share and I think have a laugh at themselves, and appreciate the challenges and not just stick with weird perceptions, but really believe in people doing the best that they can with what they've got to work with. [Arctic Scientist]

> …there is certainly some people that are doing an exceptional job with what they have at their fingertips including time, resources and energy that they have to work with. But with all the different barriers in place, it's such a huge challenge to even think about how you would attain perfection. [Arctic Scientist]

4.3 Cross-Cutting Themes between Iñupiat and Scientists on Arctic Research in Utqiaġvik

There were several themes that cross-cut the data from both cohorts of interviewees. Through careful examination of the data, several of these cross-cutting themes were identified by the author and are listed below:

4.3.1 Cross-cutting theme one

Relevancy of research to locals' lives varies from project to project, and it plays a huge role in the success or failure of relations between Arctic communities and Arctic scientists. Both Iñupiaq science specialists and Arctic scientists were very aware that clear relevancy of research to locals' lives is required for the co-production of knowledge. Relevancy of research to locals' lives is not required to hire locals for logistical support.

4.3.2 Cross-cutting theme two

The general formula for long-term successful engagement with communities requires: Funding (several funding cycles), Time (and patience), and Flexibility (in the orientation of their research questions). There are many barriers to achieving these crucial aspects. Barriers include local irrelevancy to research, temporality of funding, short field seasons, and busy schedules when scientists are not in the field (teaching, families, and maintaining funding), lack of trust and relationships, and more.

4.3.3 Cross-cutting theme three

The role of the Iñupiaq science specialists is much more than what it says on paper as laborers, support technicians, guides, and bear guards. Their lifelong accumulation of Traditional, Indigenous and local knowledge is the key component that elevates the service they provide. This is a key component of being a bear guard or ice guide in Utqiaġvik that scientists have come to expect and it is largely taken for granted and it is not reflected on the job description of the bear guard or ice guide.

4.3.4 Cross-cutting theme four

There is no consensus on key terminology when referring to different knowledge systems and the exchange of knowledge between local Iñupiaq and scientists in Utqiaġvik. Each person had different ideas on what co-production of knowledge means, or how Traditional, Indigenous and Local knowledge differs and relates to each other.

Chapter Five: Conclusions

5.1 Reflexive Analysis and Discussion

This thesis was a chance for me to reflect on my role as an Iñupiat science specialist and as liaison to dozens of scientists who work in the Arctic. I've gained deeper appreciation for both the Iñupiat science specialists and Arctic scientists that I've interviewed. Many of the interviewees consisted of friends, family, co-workers, and clients in both of the cohorts interviewed. For the Iñupiat science specialists, I was able to better recognize the unique characteristics that it requires for them to be successful in their careers. It is amazing how many "little things" Iñupiat science specialists provide to Arctic research in Utqiaġvik. When you add it all up, there is no doubt local Iñupiat knowledge plays an integral role in most Arctic research based in Utqiaġvik. And for the Arctic researchers, this project gave me the chance to slow down and see how tough it can be for them to maintain success in their respective careers. Scientists who work in Utqiaġvik are not in it to get rich. They are very passionate about their work and go to great lengths to be respectful of locals.

Funding opportunities for scientists to orient their research to help communities adapt to climate change is relatively new, as detailed in the introduction chapter. These funding opportunities are changing the demographic landscape of Arctic research. The extra $30 million spent each year by the NSF in Arctic science is drawing the interests of many researchers with little to no history of working in the Arctic. This new initiative may seem like a burden on Arctic communities, as they are asked to respond to numerous requests and inquiries from scientists. However, in the big picture, our communities in the Arctic are in a much better position to work with scientists and to utilize science to benefit our people. The aggressive step in which NSF took in steering their research to provide benefits to communities is a good thing for the

Indigenous people in Alaska, and can be a good thing for all parties involved, as long as it is gone about the right way.

5.1.1 No consensus in terminology

Amongst Arctic researchers and the Iñupiat science specialists in Utqiaġvik, there is no consistent understanding of the differences between Indigenous knowledge, Traditional knowledge, local knowledge and Western knowledge. There are two great examples of "co-production of knowledge" in Utqiaġvik, including the fields of wildlife biology and sea ice research, both of which are directly relevant to lives of the local Iñupiat. Nearly all interviewees referred to these two examples of co-production of knowledge. When asked about differences between knowledge systems, the Arctic scientists had a lot more to say than the Iñupiaq science specialists. The Iñupiat science specialists are not forced to think about how their own collective knowledge systems are divided between Indigenous and Western knowledge, and they don't seem to worry about these distinctions at all. Simply discussing these terms can be confusing to both Arctic researchers and local Indigenous people in the Arctic, which makes it especially hard for the two cohorts to co-produce knowledge in a short amount of time and at sudden notice. A lot of progress is held up in just trying to hash out semantics. A workshop was held by the Alaska Eskimo Whaling Commission in February 2020 in which the PI attended. The workshop brought together marine scientists, funders of marine science, Iñupiat whaling captains, and local leaders. One of the topics of discussion included: what does co-production of knowledge mean to the Iñupiat and Yupik whalers in north and west Alaska? After several scientists and locals gave their opinions as to what co-production of knowledge means to them, an Elder who is an Indigenous knowledge expert and whaling captain and who is very well-known as an expert consultant in decades of sea ice research in Utqiaġvik, Joe Mellow Leavitt gave his opinion of

the concept of co-production of knowledge, "co-production of knowledge is too confusing, can we just call it *sharing*?"

There are a lot of individuals and organizations that are trying to bring clarity to the issue by defining what co-production of knowledge means. The confusion surrounding the terminology associated with the subject matter of this thesis forced me to spend significant time describing questions and inquiries to several interviewees. When an interviewer looks to utilize open-ended exploratory inquiries, it is important that the interviewee have an idea of the general subject matter in which the interviewer is hoping to cover. However, one must be careful that the interviews don't become hypothesis-driven by over explaining questions to the interviewees. Being that there was so much confusion surrounding the terminology, in some cases the subject matter specialists were unsure about what they *thought* I was expecting them to talk about.

5.1.2 Check your bags at the front door? Not here

The words that people use matter. A common characteristic amongst Iñupiat leaders and Elders is the ability to listen carefully and choose words wisely. Most do not speak for the sake of speaking. Silence is okay and it doesn't always need to be filled with verbal communication. Scientists know that words matter as well, and they are more careful with the words they put on paper. The words *co-production of knowledge, Indigenous Knowledge,* and *Traditional Knowledge*, each carry heavy baggage. Many non-Indigenous scientists use these terms without fully understanding their deep and complex histories and they don't understand what these terms mean to the specific Indigenous peoples they are working with. Most scientists simply don't have the time, capacity, or willingness to unpack all of baggage that comes with using these terms. The co-production of knowledge is *much* more complicated than one would expect. Formalizing this process in any project takes an extreme amount of time and energy.

Nevertheless, the time and energy required is worth every second and every penny, and the results of co-produced knowledge can generate deep and enriched results, and positive tangible impacts on people. Fully understanding these concepts is a crucial precursor to mutually beneficial co-production of knowledge. Yet there are other variables that are required for this process to work including: research needs to be relevant to locals' lives; open lines of communication are required through, mostly through the development of relationships and trust; and projects must provide equitable resources to Indigenous partners.

5.1.3 Iñupiat Knowledge as a *Process*

One of the largest reasons why it was so hard for Iñupiat science specialists to describe the knowledge they utilize on a daily basis, is because most of the advice they offer scientists in the field is knowledge that can't be written down. Rather, the knowledge they offer is *how* they go about doing things. It is the process in which they operate in the Arctic. For an example, having patience, remaining calm, being observant, and making sure they dress appropriately are some of the intangible processual things that Iñupiat learn how to do from their life experiences. When Iñupiat science specialists utilize these methods in the field, it can have huge impacts on the success or failure of the Artic research they are supporting. Local Iñupiat knowledge as a process correlates with previous descriptions of Indigenous knowledge in the background chapter (Tapestry Institute Official Website).

5.1.4 Indigenous Knowledge as a *Network*

Just like science, Indigenous knowledge is based on observations. In Utqiaġvik, an individual's Indigenous knowledge derives from a network of observations. Hundreds of people travel on the land and ocean and make observations in which they share with each other. This knowledge sharing network is the basis of Indigenous knowledge in Utqiaġvik. During a post

interview discussion, an Arctic scientist that worked in Utqiaġvik for several decades indicated that it took several years of working with local Iñupiat science specialists before he/she realized that they had "entered into a knowledge sharing network, and people were sharing with me, and expecting me to share back. They were very nice about it." And that "the more time you spend in Utqiaġvik, the more you understand this dynamic."

5.1.5 Relevancy of research is very important in developing positive engagement between scientists and communities

There are fields of Arctic research that are very relevant to locals' lives in the Arctic, and some fields of research are not. This is not exclusive to the Arctic, as sciences in general can have an issue relating their science to the general public in the U.S. However, Arctic researchers are forced to think about how their sciences are directly relevant to communities due to new funding requirements. Iñupiaq science specialists are not as concerned about the relevancy of Arctic research to their own personal lives, but all were aware of how variable the relevancy of research to their lives can vary from project to project. This is something all Arctic researchers that were interviewed think about a lot, as it relates to their own field of research. One reason is because they need to try and orient their research to be relevant, primarily because of new funding requirements, but also because many local folks in Utqiaġvik ask scientists what they are up to. Making these connections can be a struggle for scientists who have research that is less relevant to locals' lives in the Arctic, research that is still important to overall scientific understanding of the Arctic.

It is important to recognize that there are many forms of engagement between Arctic researches and Indigenous communities in the Arctic. In fact, each research project should approach community engagement in its own unique way that best fits their research and the community's needs. There is no cookie-cutter formula on how this should work. There are

examples of positive engagement, like the co-production of knowledge between Iñupiat whalers and scientists in Utqiaġvik in the fields of wildlife biology and sea ice research, or other partnerships that focus on the logistical side of research, like those between UICS and Arctic researchers working in Utqiaġvik. Both of these types of community engagement are necessary in Utqiaġvik and as shown in the results, if executed correctly can be mutually beneficial to both Indigenous communities and Arctic scientists.

5.1.6 Temporality of funding and need for generational research

A clear theme throughout all of the interviews was that proper engagement with communities takes time and patience. Most scientists have good intentions, want to do what is right, and many go to great lengths to do so. However, the temporality of Arctic research funding is an issue for building and sustaining relations in the Arctic, and requires scientists to take a generational approach to research. That is, they have to consecutively line up a series of research projects that successively builds on each other. This cycle becomes reciprocal in nature and over time scientists build and sustain relations with local communities. Through these relations, locals share concerns which are then worked into future projects, and so on. Fieldwork becomes a major part of the lives of the scientist who are able to figure out the complex nature of long-term generational Arctic research. This project showed that this generational process is extremely complicated to maintain in which only a few scientists are able to figure out. If funding agencies are serious about building and maintaining relations with Arctic Indigenous communities in the Arctic, it will be important to support more generational research.

5.1.7 More than bear guards

I always knew that our local bear guards and ice guides were special in the way they utilize Indigenous knowledge on a daily basis to help scientists. However, I never looked

carefully at how special the set of characteristics one must have to provide the service that Arctic researchers have come to expect in Utqiaġvik. First, the job requires that the individual is raised with extensive time out on the land and seascape around Utqiaġvik under the guidance of family teaching them. Not all children raised in the Arctic get to experience this. In a conversation between the PI and several Iñupiaq science specialists, it was agreed upon that roughly half of children in Utqiaġvik are raised with this knowledge. The requirement for Iñupiat science specialists to have deep Indigenous knowledge is widely known amongst both Iñupiat and scientists in Utqiaġvik. Not all people who are raised with Iñupiat knowledge in Utqiaġvik make good Iñupiat science specialists. Other qualities that foster successful careers amongst Iñupiat science specialists include having patience, having a willingness to work with non-Indigenous peoples, and having a drive to learn scientific knowledge about the Arctic environment. Iñupiat science specialists also typically grew up watching family members that they look up to working with scientists. This unique set of characteristics can be taken for granted by both Iñupiaq science specialists and Arctic scientists.

5.1.8 The situation in Utqiaġvik is extremely unique

This was an obvious fact to all interviewees, however it can't be emphasized enough how unique the situation in Utqiaġvik is as reflected in the history in chapter two. As a researcher, I was born and raised in the Bering Straits region, and I spend a lot of time in that neck of the woods because of family across the region. Utqiaġvik is very unique. The socioeconomic differences are very clear. There is more region-wide autonomy in the North Slope region, with eight villages that are strongly united as North Slope Iñupiat. In contrast, the Bering Straits region, has a wide variety of different groups of villages that have very unique cultural backgrounds living in close proximity to each other. The long history of relations between

scientists and Iñupiat people in Utqiaġvik is also very unique in the Arctic, as detailed in the background chapter. This thesis has shown that a deep connection between scientists and Iñupiat in Utqiaġvik exists in 2020 and is rooted in a history of knowledge sharing.

The history of Arctic research in Utqiaġvik is so extensive that I had to be careful in both my historic data collection and in my qualitative data collection (interviews). During the review of historic resources, the amount of literature and publications associated with research in Utqiaġvik ranged in the tens of thousands, so I had to pick primary resources to focus on. I recognize that some elements of history are subjective, and that I did not capture all perspectives in the background chapters. I will look forward to learning more about the history and recognize that I may have misinterpreted certain elements of history. In my interviews, I avoided delving too deeply into the history, because several subject matter experts that I spoke to have such deep history that they can talk on the subject for several days. I would absolutely love to hear it all and someday I hope I can, however for the purposes of this project I could not transcribe all of that data.

The fact that relations between locals and scientists in Utqiaġvik is extremely unique is a great thing for the Iñupiat of Utqiaġvik, however it is not a good thing for the big picture of engagement between scientists and Indigenous communities in the Arctic. There should be more places like Utqiaġvik in northern Alaska, as there are dozens of amazing and thriving communities with locals who would be interested in working with and for scientists and there are multiple entities in each village that have the potential to provide similar services that UICS provides. The scientists want more local help in other regions, there is funding that calls for it, but what's holding it up? Wide cultural, geographical, and communication gaps. These gaps are compounded by lack of capacity on both sides of the table. The funding for Indigenous

communities and researchers to work together is so new that most Alaska Natives and scientists don't know how to work together. UICS was fortunate that we got a running start on this situation because of the unique history in Utqiaġvik that put us in the position we are today. Decades of hard work by the leaders of UIC has put us in the position we are in today.

The North Slope is also unique in that the local Iñupiat have a long history of organizing as a group to fight injustices forced upon them by external forces. As previously noted in this thesis, the North Slope Iñupiat led the Duck-Inn protest that changed international policy on hunting migratory birds; the Iñupiat of Tikigaq came together to stop Project Chariot; the North Slope Iñupiat were at the frontlines of the land claims movement and led the fight against the State and Federal takeover of the Indigenous lands of Alaska; and the North Slope Borough created their own research entity to produce accurate science to lift the IWC whaling ban of 1977. In 2013, Karen Brewster, a researcher at the University of Alaska, Fairbanks interviewed Charles Etok Edwardsen, Jr., who was one of the main catalysts in nearly all of the examples of civil disobedience listed above. When Brewster asked Etok why the Navy treated the local Iñupiat in Utqiaġvik with respect, Etok answered "It's not like any other place, okay? Barrow is very unique, because the Eskimos, they know their rights, and know how to assert them. *They were not subservient to the white man*." (Edwardsen 2013, emphasis added).

5.1.9 Cohorts within cohorts

This project divided interviewees into two cohort groups, Iñupiat science specialists and Arctic scientists. However, within these two groups, there seemed to be tendency that was unique in each group associated with age cohorts. There seemed to be much more long-term scientists available who spent 20+ years working in Utqiaġvik, and these scientist were happy to talk about their experiences in Utqiaġvik at great lengths. As shown in the results, the fieldwork

becomes an important part of many Arctic scientists' lives. Younger scientists were much more reluctant to share their feelings about the subject matter of this thesis because a lot of them had not formed final opinions and several were careful not to say things that might upset their advisors, senior scientists, and maybe even the researcher asking the questions. Within the Iñupiaq science specialists, on the other hand, an opposite trend occurred. The older cohorts who spent 20 or more years working with scientists were very reluctant to be interviewed. I believe this is due to them being interviewed over and over, again and again, by scientists for several decades, and they simply don't enjoy being interviewed any longer. However, the younger cohorts of Iñupiaq science specialists were happy to share their experiences about working with scientists. They did not go to great lengths in these explanations, yet they seemed to enjoy the conversations.

5.1.10 Revealed Biases

Going into this project, I knew I was going to bring many biases to the table. Throughout the research these biases became clearer. By focusing on scientists who conduct fieldwork out of Utqiaġvik, I limited the input to Arctic scientists who spend unusually high amounts of energy and time on their field work. That is, they spend a lot of time in Utqiaġvik. And naturally, as the results chapter detailed, with more time these scientists develop local relationships, local knowledge, and in some cases Indigenous knowledge. As an Iñupiat science specialist, who works in Utqiaġvik, I get to know these scientists better, which led to me asking them to be interviewed. I believe this bias in the sample actually strengthens this research because it gives other scientists reading this thesis examples to learn from and insight that could have taken them years to acquire.

The largest and most obvious bias in this project is the assumption that knowledge exchange and engagement between scientists and Iñupiat in Utqiaġvik is binary in nature, or that it consists of two sides. The whole structure of this project as represented in the methods and results chapters are designed around the concept of two opposing knowledge systems, the Indigenous side and the Western academic side. In reality, the situation is much more complicated than two sides. I ran into this realization over and over. For an example, on the Indigenous side, you have dozens of entities in Utqiaġvik who all have very different roles and responsibilities. On the academic science side, each field of science, each research entity, and each research project have different objectives and obligations. When you look at the big picture of science relations in Utqiaġvik it is a very large web of relations between hundreds of individuals that represent local entities and dozens of research projects. This web is much more complicated than a binary system. The binary viewpoint has provided a framework from which to view the system, however we must all keep in mind this deeply rooted pre-theoretical commitment.

5.1.11 Role Play

During this project, I had to shift from my role as Iñupiaq science specialist to Arctic scientist who studies Iñupiat science specialists. This was a very strange experience, especially during the interview process with other Iñupiat science specialists. In each instance, I felt awkward explaining the reason why I wanted to interview them. By asking them to be interviewed, I was asking them to play a role, as an interviewee. The initial response was usually a smile or a laugh, because of the awkwardness of one of "our own" attempting to play the role of scientist. In several instances we had to talk for a while about the project I was working on. Iñupiat science specialists work with many different types of environmental science projects on a

daily basis and rarely work with social scientists. However most are used to being interviewed by media outlets in regards to science associated with global warming. I had to thoroughly explain my research project without putting words into their mouths and I ran the risk of developing hypothesis-driven data. The interviews with Arctic scientists did not seem awkward at all, and it seems that most had a lot to say about the subject matter of this research. The interviews with Arctic scientists lasted on average 37 minutes whereas interviews with Iñupiat science specialists averaged 27 minutes.

5.1.12 Anonymity

The University of Alaska, Anchorage has a very strict process when social scientists are planning research that involves human subjects. The UAA Internal Review Board (IRB) is very careful to avoid any potential harm that might result from their students' research projects, and rightfully so as there have been cases in which research has resulted in harming research subjects in the past. In the case of this research project, the IRB made sure the PI of this project was extremely careful to keep the identities of interviewees confidential in order to protect them from potentially harming their employability, being that they will be asked to describe how they feel about working with their employers (scientists). So the PI went to great lengths to protect the identities of the subject matter specialists, including removing directly identifiable information, avoiding asking questions that led to disclosing identifiable information, restricting access to interviews and transcripts to the PI only, restricting any other publications of the data collected from interviews other than this thesis, and developing a plan to destroy the interviews and transcripts three years after the publication of the thesis. Nearly all interviewees, both Iñupiaq science specialists and Arctic scientists insisted that I could use identify their names in association with the information they provided, however, I reminded them of my methods to

keep their identities confidential both before and after the interviews. Several interviewees were surprised of the high level of restrictions.

5.2 Recommendations

5.2.1 Recommendation One: If you can't find a way to standardize the terminology, stop using it

There is a strong need for standardization of terminology when referring to co-production of knowledge, Indigenous knowledge, Traditional knowledge, and TEK. Each scientists and each Iñupiaq science specialist had different ideas of what each term meant and how they related to each other. This is alarming, especially because many of the 16 subject matter experts had extensive backgrounds in cross-cultural engagement in Utqiaġvik. In order to use the term "co-production" scientists and researchers need to co-produce a definition that they can agree on, so that they have a mutual understanding of the term, which will result in realistic expectations of each other. The standardization of terminology should occur before requiring scientists to co-produce knowledge with Indigenous communities in the Arctic on a wide scale.

5.2.2 Recommendation Two: Recognize there are many models of successful engagement between scientists and communities in the Arctic

This research has shown that there are multiple ways for scientists to successfully engage with Indigenous communities in the Arctic. Co-production of knowledge is one way to engage, and takes a lot of time, effort, and resources. Contractual logistical services is another form of engagement. Both are very beneficial to both researchers and local communities. Indigenous peoples and organizations can help in the production of research, they just need the proper

resources to do so. Co-production of knowledge and logistical assistance can go hand-in-hand in many cases.

5.2.3 Recommendation Three: There is a need for a history of United States federally funded Arctic research

Arctic research in general needs to keep better track of its history. Funders of Arctic research in the U.S. should keep track of how and why they fund Arctic research. There are many lessons that we all can learn and benefit from the past. In terms of working with communities in the Arctic, there have been many examples of successful and unsuccessful past initiatives, and the history of these initiatives is very hard to track down. Specific projects that have and haven't worked usually produce publications regarding their data and the technical process in which they went about their research, as opposed to the real time issues they faced and lessons they may have learned.

5.2.4 Recommendation Four: Systematically establish Indigenous community needs to inform the science

The research community and Indigenous communities need to come together to figure out where Arctic research can correlate with community needs. This responsibility cannot be dumped solely on Principal Investigators of research projects. Communities are also forced to teach scientists the simple "101's" about their communities. It takes a lot of energy for communities to have to educate and orient researchers that approach them with various inquires. Indigenous communities are going to have to learn more about science if they want to give informed answers as to how science can help them. The responsibility to inform the communities about science should be shared by the funders who are creating this requirement, the scientists who are soliciting the funding, and the communities that stand to be benefitted. Once the

communities are better informed about what science can provide, the communities can offer realistic suggestions for research that can benefit them. Establishing community needs to inform science will take time, relationship building, and open lines of communication to close the geographical and cultural gaps that exist between Indigenous peoples and scientists in the Arctic.

5.2.5 Final thought

This thesis is a reminder that we are all human regardless of ethnicity, background, career, or where we live. We all communicate in different ways, some of us are extroverts and some are introverts, some of us are more comfortable in silence, and for some silence makes them uncomfortable. We all have weaknesses and strengths. If we are able see though cultural and individual differences and communication issues, we can work together to help each other in understanding and dealing with changes we are facing today on a global scale.

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