Empires on Ice:

Science, Nature, and the Making of the Arctic

By

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Introduction

Is the Arctic out of Time?

He did not appear to have come back from the future, but his words betrayed his looks. With a rust-colored flannel shirt, a Bolo tie, and a PowerPoint slideshow, Mark Serreze addressed the audience at the Inuit Studies Conference in October, 2012. The director of the National Snow and Ice Data Center revealed what science could see unfolding at the top of the world.[1]

The far north is warming faster than any other place on earth. Serreze and his team had both documented this trend and forecasted its impacts. They had recorded a forty percent reduction of sea ice cover in the Arctic Ocean between 1980 and 2012, an area equivalent to the states east of the Mississippi. Dark water absorbs more light and heat than white ice. Thus, once the edge of the ice pack is gone, the ocean will heat faster and claim more ice. This accelerated positive feedback loop is called "Arctic amplification." Climate change is magnified in the far north in other ways. Coastal erosion is worsening because wave action used to be buffered by shore ice. Moreover, as water warmed by hotter air temperatures washes ashore, it melts the shoreline. The town of Shishmaref, Alaska is crumbling into the sea and others around the circumpolar region will soon follow suit. There are signs of thawing in the Arctic's frozen subsoil, also known as permafrost. Roads and runways are slumping and cracking as lenses of solid ice beneath them give way to water and silt. Because the planet's permafrost contains two

1 Mark Serrezze, "The Arctic as the Messenger of Global Climate Change," Presentation to the Inuit Studies Conference, Washington, D.C., October 26, 2012.

times as much carbon as the atmosphere, scientists like Serreze are paying close attention to it. If that carbon is released, the sea ice will vanish even faster. Global temperature and pressure gradients will tilt in unknown directions, with drastic consequences for weather patterns, agriculture, and livelihoods everywhere.[2]

Stories about the Arctic like the one Mark Serreze delivered pervade scientific and popular media today. For every keynote speech at a conference, there is an article in *National Geographic* or *The New York Times.*[3] For every image of a polar bear stranded on an ice floe (on a Coke can; in an IMAX theater), there is a warning about glaciers the size of Manhattan calving off the face of Greenland.[4] For every new historical low in sea ice cover, there is another gesture to the "timelessness" of the frozen north that makes this rapid change all the more striking.[5] Scientists, journalists, and environmental activists point to the northern rim as the "canary in the coal mine" for global warming, using the region to assess climate change's speed, impacts, and the complex ecological relationships it will transform.[6] Like a fragile bird forecasting a grave danger for miners, the distant region is a bellwether for the rest of the world: this is what global

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2 Ibid.

3 National Geographic, "Arctic—News Watch," http://newswatch.nationalgeographic.com/tag/arctic/, (accessed March 28, 2013).

4 "Coke Raises More Than $2 Million to Save Polar Bears," The Coca-Cola Company, http://www.coca-colacompany.com/our-company/coke-raises-over-2-million-to-save-polar-bears (accessed March 28, 2013).; David DeWitt, "Hopscotching From One Block of Ice to the Next: 'To the Arctic,' an Imax Polar Bear Documentary," *The New York Times*, April 19, 2012.; Duane Dudek, "'Chasing Ice' pursues chilling evidence of climate change," T*he Milwaukee Journal Sentinel*, December 20, 2012, http://www.jsonline.com/entertainment/movies/chasing-ice-pursues-chilling-evidence-of-climate-change-5j7v692-184339691.html, (accessed March 28, 2013).

5 Justin Gillis, "Ending Its Summer Melt, Arctic Sea Ice Sets a New Low That Leads to Warnings," *The New York Times*, September 19, 2012, http://www.nytimes.com/2012/09/20/science/earth/arctic-sea-ice-stops-melting-but-new-record-low-is-set.html, (accessed March 28, 2013).; Ian Frazier, "In the Beautiful, Threatened North," *The New York Review of Books*, http://www.nybooks.com/articles/archives/2013/mar/07/beautiful-threatened-north/?pagination=false, (accessed March 28, 2013). Frazier begins his article, "Frozen places, like deserts, offer timelessness."

6 References to the Arctic as a "canary in a coal mine" are ubiquitous. See Natural Resources Defense Council, "Global Warming Puts the Arctic on Thin Ice," November 22, 2005, http://www.nrdc.org/globalwarming/qthinice.asp, (accessed March 28, 2013). The site explains "Why are global warming specialists watching the Arctic so closely? The Arctic is global warming's canary in the coal mine. It's a highly sensitive region, and it's being profoundly affected by the changing climate. Most scientists view what's happening now in the Arctic as a harbinger of things to come."

warming looks like. Indeed, Serezze's presentation was entitled "The Arctic as a Messenger of Global Climate Change." The message rings with eeriness because it comes from a far off and eternal place, one that somehow already knows the challenges tomorrow brings.

Climate scientists are not alone in treating the Arctic like an ageless crystal ball. As the ice retreats, other prognosticators say, it will reveal a lynchpin in global economies, a battleground in a Third World War, and a refuge for southerners escaping floods and famines elsewhere. Take, as examples, the work of independent journalists Gwynne Dyer, Bob Reiss, and McKenzie Funk, policy analyst and risk-assessment expert Charles Emmerson, geographer Laurence C. Smith, and research biologist Alun Anderson. Blending evaluations of current conditions with war-game scenario planning, these authors sensationalize the collision of global warming and global investment at the top of the world in order to suggest a variety of futures for the Arctic and the planet. They have foreseen vulnerabilities in Arctic landscapes, strains on international relations, and booms in global mineral and energy markets to declare an unprecedented situation playing out in the circumpolar region.[7] These are not figments of imaginations run wild. In the summer of 2012, Shell Oil sent two rigs around the horn of Alaska to drill wells in the Arctic waters of the Beaufort Sea.[8] Meanwhile, US and Canadian officials are investing in ice-cutting vessels and contemplating new harbors for the Arctic to take advantage of northern sea routes, prepare for another, colder war, or both.[9] For all of these observers and

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7 Gwynne Dyer, *Climate Wars: The Fight for Survival as the World Overheats* (Oneworld, 2011).; Bob Reiss, *The Eskimo and the Oil Man: The Battle at the Top of the World for America's Future* (Business Plus, 2012).; McKenzie Funk, "Cold Rush: The Coming Fight for the Melting North," *Harper's Magazine*, (September 2007), 45-55.; Charles Emmerson, *The Future History of the Arctic* (Public Affairs, 2010).; Laurence C. Smith, *The New North: The World in 2050* (Profile Books, 2011).; Alun Anderson, *After the Ice: Life, Death, and Geopolitics in the New Arctic* (HarperCollins, 2009).

8 Henry Fountain, "Breakaway Oil Rig, Filled with Fuel, Runs Aground," *The New York Times*, January 1, 2013.

9 Michael Byers, "You can't replace real icebreakers," *The Globe and Mail*, March 27, 2012; Paul Arthur Berkman, "Preventing an Arctic Cold War," *The New York Times*, March 13, 2013

decision-makers, the Arctic has become, and will continue to become, a "New North."[10]

Suspend judgment about the likelihood of any one of these projections and consider this phrase. Like the larger arguments in which it is enrolled, the "New North" packs its rhetorical punch not simply by compiling the facts of contemporary Arctic matters, but by arranging them in relation to the historical record. For its full effect, the New North requires an Old North that is a remote and unchanging place, one that has been shielded from civilization up until this very moment. Because scientists frame the Arctic as outside of modernity, they can examine its so-called simple and pristine environment as a baseline for climate-induced impacts.[11] Because environmentalists believe the Arctic to be an ancient realm, disconnected from industrial society—but still disturbed by it—the icon of the polar bear is not only shocking, but tragic.[12] Because bureaucrats, policy analysts, and journalists portray the Arctic as experiencing globalization for the first time, they can label the arrival of oil companies and military forces as harbingers of a new, unsettling era.[13] The tales of the New North, then, are much more than they seem. Beyond calls for environmental protection, or prophecies of geopolitical conflict and economic opportunity, they are historical narratives. They tell of the coming of history and, in doing so, imply that the Arctic has not yet known history.

These presumptions about the past are fundamental to modern symbols, ideas, and stories about the Arctic. Yet these presumptions are rarely contested. Regardless of how the far north

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10 References to a "New North" have snowballed across scientific and popular media in the last 10 years. A.L. Parlow, "Shell and beyond: Toward an Arctic Standard in the new North," *Alaska Dispatch,* July 29, 2012; "The New North," *Nature,* Vol. 478 (October 13, 2011), 172-174.

11 National Oceanic and Atmospheric Association, "Arctic settles into new phase—warmer, greener, and less ice," December 1, 2011, http://www.noaanews.noaa.gov/stories2011/20111201_arcticreportcard.html, (accessed March 28, 2013). From the article, "In 2006, NOAA's Climate Program Office introduced the State of the Arctic Report which established a baseline of conditions at the beginning of the 21st century."

12 Brian Murphy, "Prepare now to save polar bears, say researchers," University of Alberta, February 4, 2013, http://www.news.ualberta.ca/newsarticles/2013/february/preparenowtosavepolarbears, (accessed March 28, 2013).

13 Heather Exner-Pirot, "Myth of Fresh Cold War in Arctic Won't Die," *Alaska Dispatch,* March 17, 2013, http://www.alaskadispatch.com/article/20130317/myth-fresh-cold-war-arctic-wont-die, (accessed March 28, 2013).

changes in the future, one can reasonably ask, *is the Arctic out of time?*

In the pages that follow, I provide a straightforward response to this question: no. Arriving at that answer, however, involves an historical narrative more complex than the New North.

To Represent and Intervene: Arctic Science as Arctic Empire

This dissertation situates modern concerns about climate change in the Arctic within a history of environmental transformation, economic expansion, and political intervention there. I will demonstrate that the seemingly unprecedented situation playing out across the top of the world today is better understood as the most recent iteration in a series of attempts to understand, protect, and exploit the region. Doing so requires that we first identify science as a form of power over nature.

Much like the situation today, scientists and their ideas of nature mediated encounters with Arctic life throughout the twentieth century. Scientific theories, concepts, and research practices accompanied efforts to cajole, control, consume, conserve, civilize, and capitalize upon the place. It may feel odd to link the pursuit of truths about the natural world with colonialism, especially in such a remote and mostly unpopulated zone. But reflect for a moment on the most popular episode in Arctic history, the search for the North Pole. As historians of exploration have deftly shown, American, Danish, and Norwegian explorers scoured the Arctic Ocean over the turn of the twentieth century not simply to seek out adventure, but to find the worlds' remaining unclaimed lands. They returned south as national heroes because they expanded the geographical extent of their home country's territorial possessions and refined geographical knowledge about the shape of the earth. Redrawing maps to display their discoveries, they sprinkled the names of

sponsors on bays, islands, straits, and narrows. In these material ways, explorers projected the networks of Euro-American authority over the Arctic.[14]

Going further, cultural historians have eyed Polar explorers' stories and specimens as mechanisms for crafting social power. Beginning a trend that continues today, itinerants followed-up Arctic travel with lecture tours, presentations at geographical societies, and a series of magazine articles, newspaper columns, and travelogues. With their words, they painted the Arctic as frozen, inhospitable, and remote. At times, they portrayed Inuit communities as backward for relying on Stone Age technologies for survival and primitive because they appeared to know neither religion nor law. In other instances, Inuit were strong, even superhuman, for subsisting in an environment without trees, warmth, or readily accessible game.[15] To prove their points, explorers displayed photographs, articles of clothing, colored lantern slides, and—in rare cases—live Inuit.

Historians have analyzed these depictions of the Arctic as a necessary backdrop for larger dramas playing out at the time. Explorers' narratives were products of metropolitan societies concerned with the effects of over-civilization, a general softness emerging from the urban existence that had replaced life on the farm over the end of the nineteenth century. They were also efforts to extend imperial influence to the last corners of the planet. Like their maps, explorers' tales about an Arctic *terra incognita* and savage Inuit cultures helped southerners claim the north. Those who produced and consumed scientific publications, specimens, and stories measured the Arctic against the norms of the Euro-American experience, reifying that

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14 The literature on Polar exploration is immense. For a good primer on connections between geographical knowledge and imperial power in the search for the North Pole, see Neil Smith's discussion of the American Geographical Society. Neil Smith, *American Empire: Roosevelt's Geographer and the Prelude to Globalization,* (Berkeley: University of California Press, 2003), 83-112.

15 On issues of representation of Alaskan Eskimos see Ann Fienup-Riordan, *Freeze Frame: Alaska Eskimos in the Movies,* (Seattle: University of Washington Press, 2003).

experience as superior. An exotic place, one uninfluenced by machines and morality was not an objective observation, but a view through imperial eyes.[16]

The ways historians have unpacked Polar exploration helps illustrate this dissertation's conceptual framework. That is, representations are entangled with interventions. A map of the North Pole in 1909 was not an exact reproduction of the physical environment of coastlines and ocean currents. Rather, it was a document born from particular field experiences in the Arctic and global interest in taking the influence of the nation beyond the continent. Science was made possible because of political and economic expansion. In turn, scientific ideas and publications rendered that expansion more possible. Philosopher Ian Hacking put it this way, "Science is said to have two aims: theory and experiment. Theories try to say how the world is. Experiment and subsequent technology change the world. We represent and we intervene. We represent in order to intervene, and we intervene in light of our representations."[17] Perhaps readers already understand this relationship intuitively, given the everyday nature of the saying "Knowledge is power." Because representations and interventions, science and empire are intertwined, they must be studied together.

Polar exploration is but one example of the pursuit of knowledge converging with imperial ambition. Because it has been studied so exhaustively and because ideas of nature changed over time in step with forms of colonial power, this dissertation treats the search for the North Pole only glancingly. Rather, I develop a broader history of representing and intervening in

16 The best source for understanding the relations between science and culture in Polar exploration in the United States is Michael F. Robinson, *The Coldest Crucible: Arctic Exploration and American Culture*, (Chicago: University of Chicago Press), 2006.. See also Lisa Bloom, *Gender on Ice: American Ideologies of Polar Expeditions*, (Minneapolis: University of Minnesota Press, 1993) (especially page 2); and Beau Riffenbaugh, *The Myth of the Explorer: The Press, Sensationalism, and Geographical Discovery*, (New York: Belhaven Press, 1993). Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation*, (New York: Routledge, 1992).

17 Ian Hacking, *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*, (Cambridge: Cambridge University Press, 1983), 130-1.

the Arctic. I begin in 1867, as the United States and Canada acquired Arctic territories from the Russian and British empires. This moment marked both the rise of North American empire and the rise of professional science in North America. I end in 1959, as federal governments from the US and Canada transferred democratic powers to the Northwest Territories and the Alaskan territory (making it the 49th state). These gestures "officially" ended the region's colonial period. But they also kept imperial power alive, as devolution did not involve territorial control of science or natural resources. Instead, the so-called end of colonialism witnessed the emergence of an academic-military-industrial complex in the Arctic centered on oil extraction and emergent partnerships between Inuit leaders and scientists, who grew concerned about the oil industry's impacts on northern life. Far from straightforward or inevitable, the colonization of the Arctic between 1867 and 1959 involved surprising transformations in imagining and intervening in the far north.

To track these changes, I organize this dissertation according to particular ways of thinking about Arctic nature and their corresponding imperial forms. Each chapter takes up a prevailing scientific idea about the Arctic that was tied to both specific research practices and specific approaches to political and economic expansion. While an overview of chapters is presented at the end of this introduction, a rough sketch here explicates this organizational strategy. Prior to the 1860s, the North American Arctic was a dangerous place, largely because Russian and British endeavors to capitalize upon the region were met with failure and sometimes death. The search for a Northwest Passage resulted in the creation of new knowledge about Arctic plants and Inuit peoples, but no viable route to Asian markets. Similarly, British and Russian fur traders could not conquer the fringe of the continent where Inuit guarded valuable fox furs. This episode serves as a foil for the remainder of the dissertation, as the representation

of a threatening Arctic was largely displaced in the twentieth century.

In the period of US and Canadian colonial rule, the prevailing scientific idea of the Arctic was not a dangerous region, but an endangered one. This representation took its earliest expression over the turn of the twentieth century as traveling naturalists and anthropologists documented the near extinction of big-game species and Inuit races. In this instance, and many others, scientific concern about Arctic life materialized from the best of intentions, but it occasioned political and economic interventions in lands that did not belong to scientists. Expeditions were sent to salvage human and natural communities before an encroaching whaling industry destroyed them forever. There was no doubt the arrival of whalers decimated caribou populations and unleashed disease throughout Inuit settlements. But scientists did not simply record these processes. They assumed authority over them. Expeditionary fieldwork allowed governments to enumerate the region's natural resources and amass large collections of artifacts, specimens, and data points. In the 1910s and 1920s, museum-based scientists and federal bureaucrats enrolled these materials in the development of sweeping theories of Arctic geology, culture, and biology. Both the materials and the theories supported the creation of political structures and legislation to enclose Arctic resources, either as national parks, game sanctuaries, or mineral reserves.

The notion of an Arctic at risk morphed over the twentieth century, as we will see in great detail in this dissertation. By the interwar period, the far north was considered “wild”: its human communities were uncivilized and had yoked their livelihoods to unpredictable fluctuations in fur-bearing populations and global markets. This conception of the Arctic was produced alongside attempts to stabilize and tame the region through the introduction of reindeer husbandry economies. With the onset of the Second World War, the far north became endangered

in a wholly different manner. The region's proximity to the Soviet Union and the difficulties in performing combat missions on the tundra helped remake the Arctic as a vulnerable, yet strategic zone in geopolitical matters. Again, this representation was tied to interventions in which US and Canadian military agencies and corporations sought to establish radar stations, administrative centers, research laboratories, and ready supplies of oil to fuel a Cold War theater.

Taken together, these episodes constitute a history of Arctic science and empire. As with climate science, these earlier dramas involved distinct framings of the Arctic and the assertion of new forms of authority, both of which can be linked to efforts by outsiders to steward the region's cultural and natural resources. Representations and interventions are entwined, and this facet of the far north's history lurks in discussions about the circumpolar world today. Modern conceptions of the Arctic pit the place as a fragile wilderness only now experiencing the effects of the industrialized world. With no aims to do so, those who promulgate such notions create a wicked paradox in which the region's colonial history is both concealed and perpetuated.

The Arctic and the North: National Traditions, Transnational Science

This dissertation draws upon and contributes to several historical literatures. Most obviously, it adds to a small but growing body of work that addresses the history of the Arctic regions. An academic field long dominated by anthropologists, archaeologists, and those interested in exploration, Arctic history is becoming a subject for study by environmental historians and historians of science.[18] Michael Bravo and Sverker Sörlin's 2002 collection, *Narrating the Arctic: A Cultural History of Nordic Scientific Practices*, initiated and exemplifies

18 Igor Krupnik, "From Boas to Burch: One Hundred Years of 'Eskimology,' 1880-1980," Presentation, Inuit Studies Conference, Washington, D.C, October 25, 2012. I presented at this conference. On more than one occasion, I was asked about my interests in the Arctic. When I explained that I am a historian, some attendees seemed confused. One responded, "What are you doing here?"

the surge in scholarship on the far north in the last decade. As this collection demonstrates, the Arctic is a dynamic, transnational, connected, and contested space where natures, identities, histories, and politics constantly intersect.[19] Yet while we know pieces of the Arctic's story, a larger narrative has yet to emerge. Much of the scholarship on the far north has focused on the Scandinavian and Greenlandic Arctics. We have not received a full treatment of the Russian or North American Arctics.[20] This dissertation contributes one analysis of the North American Arctic to help build a more circumpolar picture.

This is not to say that historians in and of North America have neglected the northern rim of the continent. Working in isolation of one another, American and Canadian historians have developed sophisticated literatures on "the North." These bodies of scholarship sometimes incorporate Arctic peoples, landscapes, and episodes, but not always. In the United States, "northern studies" typically refers to Alaska and casts the state's history as a corollary to the American West.[21] In many ways, this arrangement is fitting. Alaska became an overseas colony for the United States after the first wave of western expansion. Seattle and San Francisco were key ports for transportation to the territory as well as sources of capital and labor for its development. Interest in natural resources like salmon, coal, and gold connected the social and physical infrastructure Pacific Northwest with the booming resource districts along the Inside

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19 Michael Bravo and Sverker Sörlin, eds, *Narrating the Arctic: A Cultural History of Nordic Scientific Practices,* (Canton, MA: Science History Publications, 2002).; Similar collections have been assembled in the past five years. Sverker Sörlin, *Science, Geopolitics, and Culture in the Polar Region,* (Ashgate; accepted, in press for publication August 2013); *Northscapes: History, Technology, and the Making of Northern Environments*, eds. Dolly Jörgensen & Sverker Sörlin (Vancouver: University of British Columbia Press; accepted, in press for publication 2013). *The Polar Journal* was also created in 2011 as a space for scholarship on the Arctic from historical and social scientific perspectives.

20 There is promising work on the Soviet North coming to publication soon. Andy Bruno, "Making Nature Modern: Economic Transformation and the Environment in the Soviet North," (Ph.D. Diss., University of Illinois at Urbana-Champaign, August 2011). Pey-Yi Chu, "Mapping Permafrost Country: Visualizations of Frozen Earth in Russian History," Presentation, "Frost, Ice, and Snow: Cold Climate in Russian History" held at the German Historical Institute in Moscow, February 2012.

21 Roxanne Willis, *Alaska's Place in the West: From Last Frontier to the Last Great Wilderness,* (University Press of Kansas, 2011). Robert Bruce Campbell, *In Darkest Alaska: Travels and Empire Along the Inside Passage,* (University of Pennsylvania Press, 2007).

Passage and within the Alaskan interior. Exploitation of the land in southern Alaska resulted in the displacement of native communities, just as it did throughout much of the American West.[22] In other words, the North opened just as the West came to a close and frontier history seemed to have a logical extension in southeast Alaska.

In regards to Alaska's Arctic regions, the associations with the West are not so clear. Salmon run in small numbers in many of the rivers draining Arctic territories. Large gold deposits, the type that supported towns like Nome and Fairbanks, do not exist above the Brooks Range.[23] Moreover, Inuit communities living along the Beaufort Sea coast were never pushed out of their homelands by incoming settlers, stampeders, pioneers, or tourists. Understanding Arctic Alaska thus requires an engagement with Alaska's western history but also an ability to understand the Arctic on its own terms.

Eastward, across the international boundary line, Canadian historians have also treated "the North" as a "second frontier" emerging after western expansion. However, scholars have been much more active in defining "the North" as separate from the west. Simple geographic and demographic conditions help explain why Canadian scholars view the north differently than American historians. A glance at a map of Canada reveals that forty percent of its land lies above 60° north latitude. But roughly ninety percent of the population lives within 300 miles of the US-Canada border. Almost everything in Canada is north.[24] As a physical region and a cultural construct, "the North" occupies a large spot in the Canadian identity.

Just as historians have identified "the West" as both a place and a process, so too have

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22 Claus-M. Naske and Herman E. Slotnick, *Alaska: A History,* (Norman, OK: University of Oklahoma Press, 2011).; Stephen Haycox, *Alaska: An American Colony,* (Seattle: University of Washington Press, 2006).; William Cronon, "Kennecott Journey: The Paths out of Town," in William Cronon, George Miles, Jay Gitlin (eds.), *Under an Open Sky: Rethinking America's Western Past,* (New York: Norton, 1992).

23 Peter Craig and Lewis Haldorson, "Pacific Salmon in the North American Arctic," *Arctic,* Vol. 39, No. 1 (March 1986): 2-7.

24 Duane McCartney, "Country Pasture/Forage Resource Profile," http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Canada/Canada.html, (accessed March 28, 2013).

Canadian historians deconstructed the "North" into a set of shifting meanings, relationships, and locations. Historian Janice Cavell and literary scholar Sherill Grace offer insights in this arena. There have been many Norths in the annals of Canadian history. These include an eighteenth century version aligning with the North-Western Territory, the hinterland of the Rupert's Land fur trade; a nineteenth century north that remained an icy barrens with only temporary visits by brave explorers, despite the incremental colonization of the Mackenzie River and Hudson's Bay regions by the Hudson's Bay Company; and several twentieth century Norths (High North, Far North) generated through various attempts at Arctic exploration, settlement, occupation, defense, and development. As with "the West," the North is best understood through a "politics of location." That is, the stories of the place tell us as much about the people who tell them—their social status and how they engage the north—as they do about the day to day complexities of the northern world.[25]

For much of the nineteenth and twentieth centuries, "the North" did not necessarily refer to the Arctic, or even a physical location, but a "region of the mind" associated with values of wilderness, masculinity, modernism, and nostalgia for a simpler past. The notion of "the North" as perpetually cold and inhospitable permeated concerns about the fate of the nation. Alaska was simultaneously "Seward's Ice Box" and the United State's great storehouse of resources as it grew a global empire.[26] Similarly, Canadian northern identities often wavered between two poles. On one side, there was a brash confidence in conquering the distant and foreboding North in order to finally take up the mantle of a world superpower. Here, the American and British experiences were often foils for the Dominion's possibilities. Canada was more northern than the

25 Sherrill E. Grace, *Canada and the Idea of North* (Montreal: McGill-Queen's University Press, 2001). See especially 266-267. Janice Cavell, "The Second Frontier: The North in English-Canadian Historical Writing," *The Canadian Historical Review,* 83, 3 (September, 2002): 364-389.

26 Peter A. Coates, *The Trans-Alaska Pipeline Controversy: Technology, Conservation, and the Frontier* (University of Alaska Press, 1993).

US or England and thus could carve a spot on the world's stage by fully owning its northern natural resources, its northern history, and its northernness. On the other side, there was a nagging self doubt that the North was barren, void of value, and non-arable. Given these constraints, Canada would be, like vegetation on the tundra, forever stunted because of its nature.[27]

It is useful to step back for a moment and view these two fields—histories of the Alaskan and Canadian North—side by side. They are both rooted in frontier traditions. But they approach the frontier in different ways, which reveal much about how nationalist stories and national boundaries reinforce one another. Alaskan history's meta-narrative concerns the power of corporate capitalism, the spirit of laissez-faire, and the exploitation of nature and labor by private enterprise.[28] In the popular mind, Alaska is a vast wilderness or a "last frontier." In the scholarly analysis, Alaska is a resource colony, one that US economic elites have controlled despite the interests of local residents or the abilities of the federal government and because of its natural bounty. On the Canadian side of the North, the meta-narrative is less about capital and more about the state.[29] Bureaucrats have extended power from Ottawa northward through the

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27 Grace, 167-177. Cavell, 364-374.

28 The best example of this metanarrative playing out is Stephen Haycox, *Frigid Embrace: Politics, Economics, and Environment in Alaska*, (Oregon State University Press, 2002). Haycox argues that Alaska's American history can be understood as the gradual shift from a place of natural wealth converted into materials of capitalist opportunity to a wilderness protected from economic development.

29 One can glean a good sense of these treatments of the state in Canadian northern history through the following sources, Arthur Ray, "Recent trends in Northern Historiography," *Essays on Canadian Writing* 59, (Fall, 1996). Ray concludes that historiography has moved from focus on explorers, traders, missionaries to government bureaucrats (whether conservative or liberal) and the impact government perspectives and projects have had on Inuit. See also Kerry Abel and Ken Coates, *Northern Visions: New Perspectives on the North in Canadian History*, (Toronto: University of Toronto Press, 2001).; Amanda Graham, "Reflections on Contemporary Northern Canadian History," *Essays on Canadian Writing* 59 (Fall, 1996).; K.S. Coates and W.R. Morrison, "Writing the North: A survey of Contemporary Canadian Writing on Northern Regions," *Essays on Canadian Writing* 59 (Fall, 1996). Finally, see Peter R. Mulvihill, Douglas C. Baker, and William R. Morrison, "A Conceptual Framework for Environmental History in Canada's North," *Environmental History* 6, No. 4 (Oct., 2001), 611-626. For intersections of power and discourses of sovereignty, see the work of Shelagh Grant, such as Shelagh D. Grant, "Northern Nationalists: Visions of 'A New North,' 1940-1950," in *For Purposes of Dominion: Essays in Honour of Morris Zaslow*, eds. Kenneth S. Coates and William R. Morrison (North York, ON: Captus Press, 1989), 47-70.

installation of northern police, the creation of an expansive and elaborate social services sector, and the legislation of conservation areas and hunting restrictions.[30] The state is such a pervasive concept in the Canadian North that actors not directly affiliated with the government are examined as state agents. Missionaries and the world's oldest corporation—the Hudson's Bay Company—are commonly understood as de facto governments because of their roles in molding native northerners into moral and economic citizen-subjects.[31]

These meta-narratives in northern history speak to even broader national tendencies in scholarly treatments of nature and power. As historian Paul Sutter has noted, US historians are much more likely to narrate environmental change (whether exploitation, protection, or restoration) as a function of capitalism. Non US scholars, on the other hand, concentrate the agency of environmental history in a broad and heterogeneous category of "the State." Sutter writes, "So much emphasis has been placed on seeing conservation and preservation as heroic limitations on capitalist resource exploitation—or, alternately, as policies that privilege resource efficiency or the recreational needs of the leisure class—that [US historians] have neglected to recognize that state conservation also arose as an effort to contend with marginal landscapes." In order to bring these forces together for the sake of richer, more textured histories, Sutter recommends seeking out transnational histories that focus on environmental control. When

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30 Kenneth Coates, *Canada's Colonies: A History of the Yukon and Northwest Territories*, (James Lorimer and Company, 1985). Coates believes it is fair to refer to Yukon and NWT as "colonies" because of the physical and psychological distance between the land and people and the forces of government that imposed order on the region from afar, see pages 9-10. Building on the work of historians of game management in the United States and South Asia, Canadian historians have replaced enlightened preservationists with pragmatic bureaucrats determined to regulate the hunting traditions of native northerners and make space—intellectually and materially—for future northern development There are many examples of this work. A good primer can be found between Tina Loo, *States of Nature: Conserving Canada's Wildlife in the Twentieth Century (*Vancouver: University of British Columbia Press), 2006 and John Sandlos, *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories*, (University of British Columbia Press), 2007. Frank Tester and Peter Kulcyhski: Frank Tester and Peter Kulchyski, *Tammarniit (Mistakes): Inuit Relocation in the Eastern Arctic, 1939-1963* (Vancouver: UBC Press, 1994) and Peter Kulchyski and Frank Tester, *Kiumajut (Talking Back): Game Management and Inuit Rights,1900-1970*, (Vancouver, UBC Press, 2007).

31 Morris Zaslow, *The Opening of the Canadian North, 1870-1914*, (Toronto: McClelland and Stewart, 1971).

scholars consider wilderness areas, vaccination programs, and erosion stabilization techniques as similar in kind, but different in degree, and allow their studies to transcend national borders, capitalism and the state no longer appear as categories that are antagonistic or mutually exclusive. Rather, they are two entities and processes that create and contest power over nature.[32] Such an approach is especially useful in the North American Arctic, a region divided by its political boundaries and their corresponding frontier traditions, but always the object of bureaucratic, corporate, and scientific desire. In this light, a history of Arctic science and empire not only contributes to scholarship on the north, but also connects that scholarship to other historiographical questions within US and Canadian history.[33]

While Cavell, Grace, and other northern scholars reveal searing analyses of these representations of the North, their work often ignores science.[34] Relying on the products of artists, the speeches of bureaucrats, and the travelogues of explorers, they leave open the option of examining scientific publications and practices in relation to the production of the North. Scientists played key roles in shaping the Arctic, whether as a material or imagined place. In the twentieth century, scientists acted as the leading edge of colonialism in a corner of the continent that had little previous engagement with the United States and Canada. Unlike missionaries, police, teachers, and fur traders, scientists did not attempt to embed themselves within northern society. Rather, their task—whether to document, discover, order, tame, or engineer—was not complete until they returned home. Other southern agents moved in similar ways, but none had the motivations of scientific agents. Whalers, trappers, and oil developers were not, by nature of

32 Paul Sutter, "What Can U.S. Environmental Historians Learn from Non-U.S. Environmental Historiography?", *Environmental History*, Vol. 8, No. 1 (Jan., 2003), 109-129.

33 The disconnect between "northern studies" and Canadian and US history has been a point of concern for northern scholars for some time. Kenneth S. Coates and William R. Morrison, "The New North in Canadian History and Historiography," *History Compass* 6, issue 2 (March, 2008): 639-658.

34 Grace, xiii-xv.

their profession, incentivized to circulate knowledge about the Arctic. Scientists, in contrast, built their careers on publishing papers, assembling museum displays, developing resource management programs, and teaching budding scientists.

More than any other southerner who went north, scientists were accepted within North American society as interrogators of place. Through hard data, first-hand observation, and tested theory, they offered visions of the *real* far north, not that of myth or legend. They educated an interested citizenry, informed politics, and rationalized economies. Within the span of a single career, a scientist could find employment in a university, a government bureau, and a consulting firm—in fact, many of the scientists featured in this dissertation did. Science became so entrenched within governmental ideologies and industrial culture that its ties to imperial goals were rarely challenged, even as many Americans and Canadians had themselves never visited the Arctic and were reliant on scientific research for knowledge about the north. In their movement, motivations, and machinations, scientists helped create the Arctic and facilitate its colonization. Northern history, then, cannot be fully understood without a history of science.

We have a rich understanding of the ways teachers, missionaries, police, miners, fishermen, explorers, tourists, bureaucrats, and native residents shaped the North. These are figures who sought to become arbiters of the North's social and supernatural orders. Our understanding of those who acted as arbiters of the natural order—scientists—is thin. We know very little about why they went north, how they got there, what they did while they were there, and how their work sought to control the Arctic—both the place and ideas about it.[35] Their quest

35 There has been some excellent work on Arctic science in North America, but nearly all of it is contained to period after the Second World War. See Matthew Farish and P. Whitney Lackenbauer, "High Modernism in the Arctic: Planning Frobisher Bay and Inuvik, *"Journal of Historical Geography* 35 (2009), 517–544; Matthew Farish, "Frontier Engineering: From the Globe to the Body in the Cold War Arctic," *The Canadian Geographer* 50, no 2 (2006), 177–196.; Stephen Bocking, "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960," *Technology and Culture*, Volume 50, Number 2, (April 2009), 265-290.; Richard C. Powell, ``'The rigours of an arctic experiment': the precarious authority of field practices in the Canadian High

to represent the Arctic was also a quest to intervene in it, and this mission involved complicated, and at times unpredictable, alliances with capital and the state.

Contingent Networks: The Shape of Science and Empire in the Arctic

Nearly twenty years ago, in the pages of *Isis,* three historians of science engaged in heated debate, a practice common among scholars but rarely preserved in print. In their article, "Science and Imperialism," Michael Worboys and Paolo Palladino unleashed a critique of senior historian Lewis Pyenson's recent writing on the subject. At issue was Pyenson's reliance on the core-periphery model, which suggested that modern science developed first in Western Europe during the seventeenth century and diffused to colonies during expansionist projects throughout the ensuing three hundred years. According to this model—which was first introduced by George Basalla in the late 1960s—science was "pure" in that it was in no way affiliated with administrative and commercial motives. It was also "universal" because it applied everywhere. Worboys and Palladino took Pyenson and this paradigm to task. To them, the history of empire revealed tensions between western knowledge and native traditions on the frontier, which challenged the so-called natural order and revealed science's imbrication with colonial power. Science was neither a universal truth nor a European product to be exported—it was a *process* to be explored in myriad historical and geographical contexts.[36]

Arctic, 1958-1970" *Environment and Planning A* 39 (2007) 1794-1811.; Stephen Bocking, "Science and Spaces in the Northern Environment," *Environmental History* 12, (October 2007), 867-894.; P. Whitney Lackenbauer and Matthew Farish, "The Cold War on Canadian Soil: Militarizing a Northern Environment," *Environmental History* 12 (October 2007): 920-50.

36 Paolo Palladino and Michael Worboys, "Science and Imperialism," and Lewis Pyenson, "Cultural Imperialism and Exact Sciences Revisited," *Isis* 84 (1993): 91-108. To be fair to Pyenson, the core-periphery model is typically attributed to George Basalla. See George Basalla, "The Spread of Western Science," *Science* 156, no. 3775 (1967): 611-22. To be fair, Worboys and Palladino were tapping into a discourse in the social studies of science. See Clifford Geertz, "Introduction," "'From the Native's Point of View': On the Nature of Anthropological Understanding," and "Common Sense as a Cultural System," in *Local Knowledge: Further Essays in Interpretive Anthropology,* (New York: Basic Books, 1983), 3-18, 55-72, and 73-93. Donna Haraway,

This commentary on a twenty-year-old debate orients us to the following discussion, where, like the authors, I adopt a spatial framework for the history of science and empire in the Arctic that attends to social and historical relations there. Consideration of scale in historical scholarship has provided a host of metaphors and methodological strategies that help situate the past in its places. Environmental historians, for instance, have argued for the connectivity among urban, rural, and wild lands by traversing the "paths out of town."[37] They have also moved beyond the nation as the reference point in treatments of human and natural history by looking to the human body, the landscape, and the transnational region.[38] Anthropologists, economic historians, and historians of empire have taken up the practice of "following," in which the researcher traces one commodity (salt, sugar, and sushi are examples) through its life-cycle across various physical geographies.[39] All of these approaches allow scholars to apprehend the set of interrelated processes that are typically compressed and concealed under the banners "science," "industrialization," "imperialism," or "globalization." Because of the proliferation of

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Primate Visions: Gender, Race, and Nature in the World of Modern Science,(New York: Routledge, 1989).; Ramachandra Guha, *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya*, (Berkeley: University of California Press, 1989).

37 Cronon, "Kennecott Journey."

38 Joy Parr, "Notes for a More Sensuous History of Twentieth-Century Canada: The Timely, the Tacit, and the Material Body" *Canadian Historical Review*, 82(4) (2001), 720-45.; Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land*, (New York: Basic Books, 2002). The focus on the body no doubt benefits from longer traditions within social history to understand the past along lines of race, gender, and class. While I selected examples from sensuous history and history of science and medicine, food historians have also fleshed out uses of the body in recent years. For an overview, see Nicolaas Mink, "It Begins in the Belly," *Environmental History* 14, no.2 (April, 2009): 312-22. On transnational and global environmental history, see J. R. McNeill, *Something New under the Sun: An Environmental History of the Twentieth Century World,* (New York: Norton, 2000). On the landscape, see Michael P. Conzen (ed.), *The Making of the American Landscape,* (London: Harper Collins, 1990).; Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge,* (Berkeley: University of California Press, 2006.); Nancy Langston, *Toxic Bodies: Hormone Disruptors and the Legacy of DES* (Yale University Press, 2010).; Gregg Mitman, *Breathing Space: How Allergies Shape Our Lives and Landscapes*, (New Haven: Yale University Press, 2007).

39 The examples of "following" alluded to above can be found in Theodore Bestor, "Supply-Side Sushi: Commodity, Market, and the Global City," *American Anthropologist* 103, no. 1 (2001): 76-95; Mark Kurlansky, *Salt: A World History,* (New York: Walker, 2002).; Sidney Mintz, *Sweetness and Power: The Place of Sugar in Modern History,* (New York: Penguin, 1986). The idea of "scapes" comes from Arjun Appadurai, ed., *The Social Life of Things: Commodities in Cultural Perspective,* (Cambridge: Cambridge University Press, 1986).

multi- and alternatively-scaled stories in history, scholars now accept that analyses of historical phenomena are conditioned by the scale at which scholars define problems and set narratives.[40] Investigating Arctic science and empire requires a spatial framework that highlights the flow of people, ideas, and objects over space and time. It requires a methodological sensitivity to the fragile, context-bound meanings of nature so as to recover the linkages, however fleeting, among science, the environment, native residents, corporate power, and the state.

In crafting this approach, this dissertation unites two influential ideas in scholarship on knowledge, nature, and empire: the network of circulation and the contingent lineage. "Network," "circulation," and "contingent lineage" are terms that require some explanation. "Network" is commonly invoked in the history of science and science studies to map relations that are at once material and semiotic. The term's genealogy can be traced to the 1980s to sociologists Bruno Latour and Michel Callon, who developed Actor-Network Theory to understand social and scientific histories that did not presume a top-down or bottom-up orientation to history. Proponents of the theory advocated for a conception of non-human entities as actors, or "actants," whose agency mattered as much as humans. By arranging clusters of actants in a network, rather than confining them to national boundaries or ignoring some altogether, scholars could reveal striking connections among people, politics, knowledge, and place.[41]

Actor-Network Theory has shaped scholarship in the history of science, the history of

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40 William Cronon offers a useful meditation on the importance of place in stories about nature in a post-modern academia: William Cronon, "A Place for Stories: Nature, History, and Narrative," *The Journal of American History* 78, no. 4 (1992): 1347-1376. Tina Loo, "Disturbing the Peace: Environmental Change and the Scales of Justice on a Northern River." *Environmental History* 12 (October 2007): 895-919. Loo suggested that a scale-dependent notion of place (and scholarly toggling between global, regional, and local perspectives) is necessary to see ecologies of justice.

41 M. Callon, "Some elements of a sociology of translation: domestication of the scallops and the fishermen of St. Brieux Bay," in M. Callon, ed., *Power, Action and Belief: A New Sociology of Knowledge*? (London: Routledge Press, 1986) 196-223. Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society*, (Cambridge: Harvard University Press, 1987), 215-57.

empire, and environmental history. A telling example comes from scholarship on the "Atlantic world." By tracking the transnational exchanges of ideas, specimens, bodies, and commodities across the Atlantic in the early modern period, scholars have shown how the development of natural philosophy and the fate of early modern history did not occur in Europe, the Americas, or Africa, but between them. In a geography configured around the ocean and not the axis of Old and New Worlds, epistemological and historical questions absent in previous scholarly treatments of period rise to the surface. Historians demonstrate how the Atlantic connected not just London and Boston, but also Philadelphia and Suriname, and Charleston and West Africa. These locales were linked physically through ships, the communication and transportation technology that carried slaves, sugar, specimens, and scientific apparatuses—all side-by-side. Such a consolidation of activities forced a response from historical actors who defined norms for pursuing natural philosophy in terms of their separation from mercantilism, even as they participated in it.[42] The new generation of colonial historians, therefore, has helped overturn the classic "dissemination" and "core-periphery" models in favor of the "network of circulation," which captures the dense intellectual, political, and material economies they have discovered in the Atlantic world.[43]

One of the benefits of the "network of circulation" is an ability to critique science's relationship with power.[44] In the colonial context, creating scientific facts about nature, disease,

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42 There is an abundant literature on the Atlantic World. For introductions, see Joyce Chaplin, S*ubject Matter: Technology, the Body, and Science on the Anglo-American Frontier, 1500-1676* (Cambridge: Harvard University Press, 2001); Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the British Atlantic World*, (Chapel Hill: University of North Carolina Press, 2006); James Delbourgo, *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America* (Cambridge: Harvard University Press, 2006).

43 On the "network of circulation" in very recent scholarship, see Lissa Roberts, "Situating science in global history: local exchanges and networks of circulation," *Itinerario* 33 (2009): 9-30; Neil Safier, "Global knowledge on the move: itineraries, Amerindian narratives, and deep histories of science," *Isis* 101 (2010): 133-45; and Kathleen S. Murphy, "Translating the vernacular: indigenous and African knowledge in the eighteenth-century British Atlantic," *Atlantic studies* 8:1 (2011): 29-48.

44 If such an assessment seems self-evident, this is because scholarship in the last two decades has taken as a given

or commodities went hand-in-hand with perpetuating control of native peoples and environments. Thus, imagining the history of science and empire as moving between different nodes in a network forces historians to identify the spaces—be they human bodies, natural resource districts, research centers, or administrative offices—of science and the colonial enterprise's mutual construction. These spaces focus the scholarly lens on intra- and inter-colonial dynamics obscured by Basalla's model. In the case of the Arctic, this equates to the local lifeways of Inuit; the international relations among the US, Canada, and England; the consequences of particular state priorities for scientific practice in the Arctic; and the roles scientists played in bestowing legitimacy on political and economic agendas in a remote land. With such a place-based perspective, we see scientific knowledge of the Arctic not as pure, but as partisan, pragmatic, partial, and pinned to power.[45]

Yet, there are drawbacks in transposing the "network of circulation" from the Atlantic to the Arctic. For one, transportation around a northern ocean was not possible. While boosters imagined the Arctic as a "Polar Mediterranean," the reality was that commerce took many different routes in and out of the region. Schooners plied the ocean, steamers and canoes took to rivers and their drainages, dogsleds traveled overland trails during the winter months, and airplanes and helicopters transcended most of these obstacles presented by currents, ice, and shallow waterways. All of these technologies and travel created networks, but only some of them

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what scholars in the 1980s labored so intensively to articulate: scientific knowledge has, over time, won its authority and mobility by concealing the people, governments, economies, institutions, technologies, and landscapes that constitute it Consider the work of Michel Foucault, whose attempts to help scholars see the dynamics of power in colonial knowledge production are now routinely referred to as axiomatic "Foucauldian notions." See Michel Foucault, "Right of Death and Power over Life," and "The Politics of Health in the Eighteenth Century," *The Foucault Reader*, ed. by Paul Rabinow (New York: Pantheon, 1984), 258-89.

45 Paradoxically, or perhaps intentionally, such a scholarly pursuit has made the concept of local knowledge somewhat universal or a "grand narrative", in that this notion has moved across disciplines to suggest that entities like science, capitalism, and politics must always be understood in time and place. See Steven J. Harris, "Long-Distance Corporations, Big Sciences, and the Geography of Knowledge," *Configurations* 6 (1998): 269-304.

persisted in time, and none of them generated a circuit in its patterns of exchange. Thus, when I do employ the term "circulation," it is not meant to characterize a *circular* structure or direction of movement, but to highlight the traffic of knowledge, people, and locales through which power over the Arctic was constituted and conveyed.

Indeed, a broader notion of circulation is helpful in the Arctic, where networks formed and dissolved within a matter of decades. There were many reasons for such instability. Shifting standards for scientific practice altered both the sources of patronage and the sites at which researchers worked (both in "the field" and out). Resource exhaustion elsewhere, when combined with the capricious appetite of industrial societies, could draw the Arctic into global markets and make certain actors invaluable assets to exploitation. Whale bone, fox fur, lichens, and oil in the Arctic could turn from inaccessible or worthless materials into prized commodities just as quickly as whalers, captains, deckhands, and meteorological observers could be supplanted by trappers, bush pilots, and animal biologists. New technologies could bring entirely new networks into being by nature of the paths out of town they created or eliminated. The trauma of war caused certain modes of science and empire to fall out of favor (territorial expansion), allowing others to be elaborated (intensive economic development). All of these changes stemmed from Arctic science and its relations with the northern environment, northern residents, the state, and industry.

Recognizing the need to apprehend the unpredictable connections made between the Arctic and the world—whether through science, commerce, geopolitics, or war—I combine the use of "network" with another concept, "contingent lineages." Ethnographer Anna Tsing coined the term to contextualize globalization, or to take what is commonly understood as a homogenous and homogenizing process and reveal its messy, unexpected entanglements. It

refers to the ways human communities draw meaning from processes working at different scales in order to mediate their immediate surroundings in the face of globalizing forces. In one of her examples, Tsing shows how village elders in the Indonesian Meratus Mountains resisted foreign timber corporations by building partnerships with multi-national environmental NGO's and college-aged backpackers. These alliances were made possible not only because of the frontiers of capitalism that made Indonesian rainforests attractive to Japanese trading companies, but also because of the middle-class distinctions, national anti-politics, and consumer cultures of conservation organizations and nature lovers. Moreover, the "native wisdom" that interlocked with environmental protection was also a product of translocal conjunctions. So-called local knowledge imbricated social status within the community, relations between that community and national political forces, and networks of trade and commerce that had historically privileged certain kinds of knowledge over others. With "contingent lineages," Tsing is able to place globalization in the Indonesian experience without succumbing to appeals to deterritorialization or hyper localism.[46]

Such an analytic helps us approach science and empire in the Arctic.[47] With the aim of facilitating understanding without becoming jargony, I use the term "contingent networks" in this dissertation to trace the shape of science and empire in the Arctic. To be fair, northern scholars have considered the geography of colonialism in Alaska and northern Canada as nodal and ephemeral, or concentrated in both space and time. Looking at the modern-day landscape, environmental historians have described the north as a "broken frontier," comprised of pockets

46 Anna Tsing, *Friction: An Ethnography of Global Connection,* (Princeton: Princeton University Press, 2005), x-xii, and 123-233.

47 David Wade Chambers and Richard Gillespie have offered something similar to historians of science with their phrase "vectors of assemblage." David Wade Chambers and Richard Gillespie, "Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge," in *Nature and Empire: Science and the Colonial Enterprise,* edited by Roy M. MacLeod, (Chicago: University of Chicago Press, 2000), 221-40.

of settlement and exploitation within a vast, sparsely populated area.[48] Such a metaphor helps us see parts of the Arctic in great detail, especially the features of the Arctic's physical environment that resisted biological conquest and prevented it from turning into a neo-Europe. But the broken frontier misses the relations and linkages these parts had, whether over time in that place, across the north, or with places outside the north. The sites we now recognize as influenced by economic development or state interference are layered with colonial history. As we reconstruct these layers through a study of the past, we discover the Western Arctic was always connected to a constellation of economic, intellectual, and political power, even if the connections and constellations shifted over time. By examining the north's interconnections and contingencies, I show that the history of Arctic colonialism is not just nodal, but networked.

The Western Arctic

Like Tsing and Atlantic World scholars, I make the contours of the Arctic's contingent networks visible by grounding my analysis in a transnational region. The center of each chapter is the coastal lowlands along the Beaufort Sea in Alaska, the Yukon Territory, and the Northwest Territories. I will refer to this region throughout the dissertation as the "Western Arctic." On today's map, this region is located between Pt. Hope, Alaska, in the northwest and Paulatuk, Northwest Territories, Canada in the northeast. The southern border follows the converging lines of the Arctic Circle (66^{O} north latitude), the southern limit of continuous permafrost, and the beginning of trees—all indicators that one is leaving the Arctic.

Political boundaries chop the Western Arctic into Alaska and the Canadian Northwest, but nature and culture have often transgressed these borders. The Brooks Range, extending from

48 Liza Piper and John Sandlos, "A Broken Frontier: Ecological Imperialism in the Canadian North," *Environmental History* 12 (2007): 759-795.

Alaska's western shoreline to the edge of Canada's Mackenzie Delta, is a physical point-of-reference for the transnational Western Arctic as it has historically conditioned species migrations, weather patterns, and human activity there (See Figure 1). Similarly, the distribution of Arctic tundra—a biome characterized by slow-growing vegetation and scant precipitation—is another defining characteristic of the Western Arctic. In contrast to subarctic environments, the tundra has few trees, little arable soil, and poor drainage. These conditions forced humans to find sources of fuel in marine mammals and driftwood; to learn how to use existing plants rather than introduce and cultivate foreign crops; and to develop travel technologies that could move people and goods over solid ice in the winter and a boggy mess in the summer.[49]

49 Archaeological records and investigations in the Western Arctic provide the basis for these assessments. See David Morrison, "An Archaeological Perspective on Neoeskimo Economies," in David Morrison and Jean-Luc Pilon, eds., *Threads of Prehistory: Papers in Honour of William E. Taylor, Jr.,* (Ottawa: Canadian Museum of Civilization, 1994), 311-320.

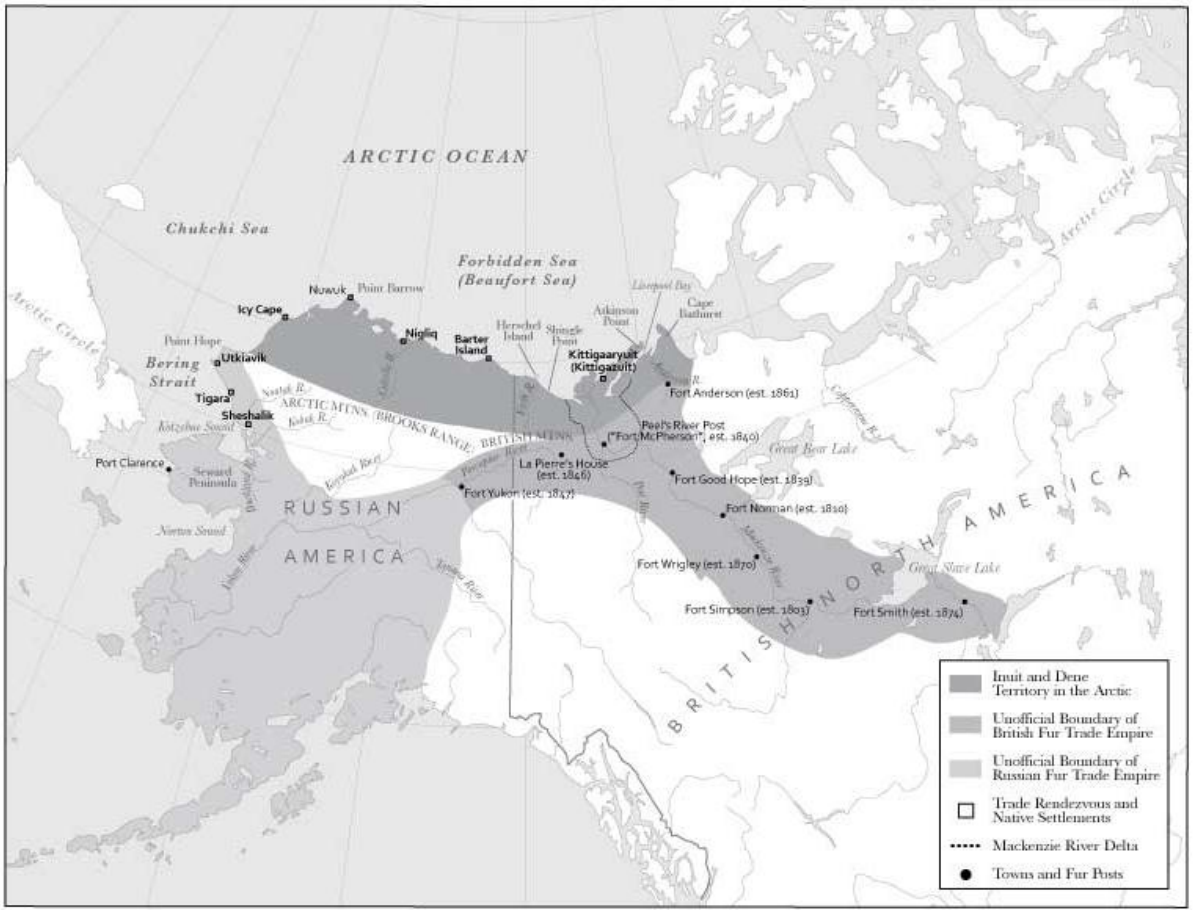

Figure 1. The Western Arctic in 1861. The Brooks Range—at this time known as the "Arctic Mountains"—conditioned the direction of trade routes in the region. Note also the line of the Arctic Circle as a southern boundary of the Western Arctic.

The Western Arctic also presents a culture-area (and we will see how it became one, scientifically, in this dissertation). The tundra has been understood as a "natural" border between indigenous peoples on the North American continent. Inuit peoples, while nomadic for much of the early modern era, developed stable coastal-oriented lifeways in the mid 1800s. In the Western Arctic, a number of distinct Inuit groups emerged because of the diversity of plant and animal life there. Inuit families made use of several species of plants for nutrition and medicinal purposes and relied on abundant driftwood that collected near the mouths of northward-flowing rivers. They fished rivers and lakes for trout, grayling, jackfish, loche, and char and hunted

whales, walrus, geese, seals, ptarmigan, hare, moose, and caribou. Dene tribes, in contrast, typically stayed inland below the tundra, occupying lands rich in beaver, moose, and various freshwater fish species.[50] Because of this human ecology, this dissertation focuses on interactions among Inuit and visiting scientists, though it does consider relevant Dene experiences in the Western Arctic.

I choose "Western Arctic" carefully to signal relationships central to our understanding of science and empire in the far north. Because these relationships were not limited to U.S. and Canadian bureaucrats and instead featured scientists, whalers, fur traders, developers, bureaucrats, Inuit, Dene, and the agency of the Arctic environment, I did not select "American Arctic." It is possible that "Western Arctic" will conceal the different "Arctics" that existed before, during, and after it. For Inuit living along the Beaufort Sea coast and in the Alaskan interior, the Arctic was likely not conceived of as western. It was a homeland, even if there was not a sense of pan-Inuit identity until the 1970s. There may have been more than ten different Inuit and Dene Arctics at play in the region I collapse into Western Arctic (See Figure 2).[51]

50 A good description of the natural history of the tundra and its relationship to Inuit and Dene groups is offered by the Canadian Encyclopedia. John U. Bayly, "North," http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA0005792, (accessed March 28, 2013).

51 For an insightful analysis of the changes in Inuit identity and their relations with sense of place, see Nastasha Lyons, "Inuvialuit Rising: The Evolution of Inuvialuit Identity in the Modern Era," *Alaska Journal of Anthropology,* vol. 7, no. 2 (2009), 63-79.

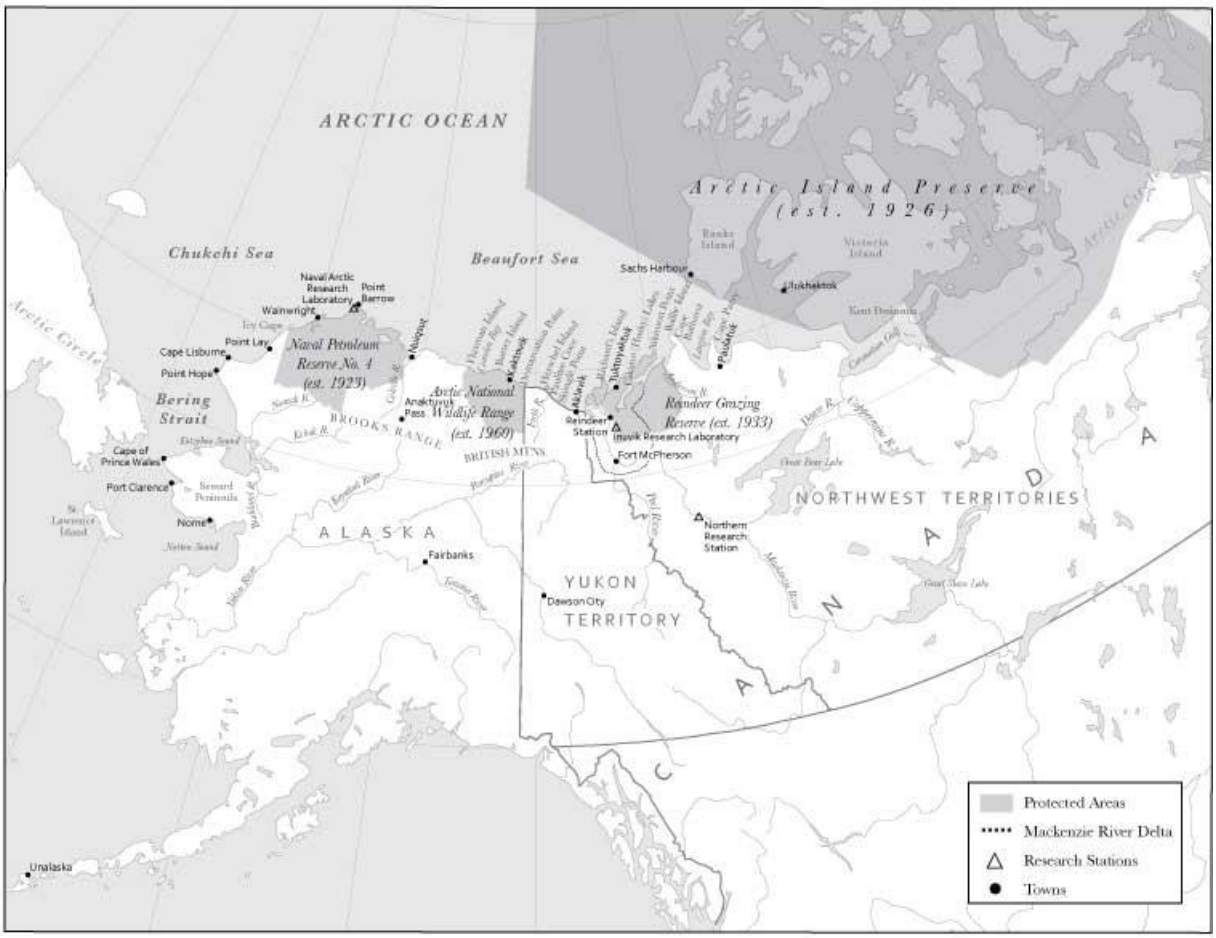

Figure 2. The Western Arctic in 1959. Notice changes in political boundaries, economic activities, and settlements since 1861. These changes are best explored as functions of relationships among many different actors from the U.S., Canadian, Dene, and Inuit nations.

The phrase should not overshadow the large role played by native northerners in the shaping of political economies and ideas about the region. But referring to the region as the Inuit Arctic or Dene Arctic at this time also does not do justice to the ways Inuit, Dene, Canadians, and United States citizens interacted with one another at the end of the nineteenth century in shaping the place. The Western Arctic is thus best considered a "contact zone," a terminological alternative to "frontier," which orients the north as a meeting ground between indigenous and foreign powers rather than the edge of an expanding line of settlement.[52] Contact zones, like the

[52] The term "contact zone" was first suggested by Mary Louise Pratt. See Mary Louise Pratt, *Imperial Eyes : Travel Writing and Transculturation.*

Western Arctic, were not formed at some discrete time, at which point all who entered or left the region could identify the place as such. Rather, the region was always in the process of being made. Neither government, nor commerce, nor science were a given in the Arctic—these entities were constructed over time, as were the relations among them. In contradistinction to comparative history, then, this dissertation seeks a connected transnational study of the Western Arctic and the evolving entanglements of its various human and natural communities.[53]

Where the phrase Western Arctic signals a transnational contribution to the scholarly fields of Alaska and the Canadian north, it also marks out new territory in a growing body of scholarship on American empires. In recent years, historians have brought attention upon the United States as an imperial power. They have eschewed a long standing commitment to American "exceptionalism," the idea that the United States was not an empire because it did not pursue military conquest in the same manner as European powers. Rather than define "empire" by a European standard, these scholars have instead looked at experiences in the late nineteenth century to understand America's overseas activities on their own terms. Americans facilitated broad social and commercial experiments across a string of possessions along the Tropic of Cancer—Caribbean, Canal Zone, Hawaii, and the Philippines. This scattered empire contained volatile landscapes of unfamiliar ecologies, nationalist indigenous populations, and rival imperialists. In prisons, classrooms, farms, and fields, American agents brought the unpredictability and the potential of tropical colonies under control. Not defined exclusively by businessmen or bureaucrats, American empire in the Tropics was characterized by a "nimble-

53 On connected histories in the history of science, see Safier, 137-138. On entangled transnational history as a means of apprehending the flow of knowledge, people, and goods, see Carl J. Guarneri, "Locating the United States Twentieth Century World History," in Michael Adas, Ed., *Essays on Twentieth Century History,* (Philadelphia: Temple University Press, 2010), 213-270.

nexus of private-public alliances" between corporate and federal power.[54] Surprisingly, this scholarship has not considered Alaska or the Arctic as part of the cluster of territories in which the United States worked out its imperial ambitions. Nor has it regarded Canada as nation or imperial power that might resist, contend with, or emerge alongside American empire.

In hopes of linking studies of science, the environment, and empire, this dissertation maps the contingent networks of the Western Arctic. Ultimately, I hope this spatial framework makes visible the channels through which US and Canadian influence was carried to the Beaufort Sea coast and the enduring consequences this history has today.

Overview of Chapters

The story I tell here is neither the beginning nor the end of the Western Arctic's history. It is rather the history of science and empire between 1867 and 1959, or during the North American colonial period. A brief historical background of the Western Arctic prior to 1867 helps provide the context for the chapters that appear between these bookends.

Throughout much of the early modern era, the Western Arctic was the domain of Inuit, with only occasional visits from Russian or English traders. England had long eyed the rim of British North America as a potential route toward Asian markets. Since the 1500s, Spain and Portugal had blocked British ships into the Mediterranean, around the tip of South Africa, and around South America. These difficulties in maritime power created initial interest in exploring a "Northwest Passage." Thus, in the late 1570s, Martin Frobisher sailed to the Eastern Arctic and, a century later, England created the Hudson's Bay Company. The Company—the Empire's New

[54] Alfred W. McCoy, Francisco A. Scarano, and Courtney Johnson, "On the Tropic of Cancer: Transitions and Transformations in the U.S. Imperial State," in Alfred W. McCoy and Francisco A. Scarano, eds., *Colonial Crucible: Empire in the Making of the Modern American State,* (Madison: University of Wisconsin Press, 2009), 7.

World counterpart to the mega-corporation East India Company—concentrated its fur trade in the greater Hudson's Bay region.[55] Because of the proximity of the Eastern Arctic to England, the Western Arctic was harder to reach and therefore less of an immediate concern.

Reports in the 1770s coming into the Hudson's Bay Company in the Barrenlands region west of the Bay prompted English officials to contract Samuel Hearne and Alexander Mackenzie to explore Northwest, leading to "discoveries" of the Mackenzie River, Yukon River, and Coppermine River. Yet these explorations did not provide the economic basis for intense British investment. The Mackenzie River was physically and geographically a transportation and goods corridor suitable for incremental settlement, in the manner of ever-northward expanding fur trade posts. By 1840, the Peel River Post at the base of the Mackenzie Delta was the Company's most northwestern operation.[56]

Meanwhile, whaling operations continued worldwide in search of oil for city street lighting and industrial lubrication material. The Davis Strait was a primary whaling location in Arctic. Again, its geographical position as closer to Dutch and English bases meant it was discovered and exploited first, before the Western Arctic. American whaling concentrated off the New England coast in Nantucket and Long Island sounds. Once these stocks were depleted, whalers moved to Pacific waters along the edge of South America, around the Hawaii islands, and on the California coast. Eager to collect whales for American use and for export to Europe, American whalers pursued whales up the Pacific coast into Bering Strait, identifying stocks of bowhead whales there in the mid 1800s.[57] The entrance of Americans into whaling in the

55 Sam Hall, *The Fourth World: The Heritage of the Arctic and its Destruction*, (London: The Bodley Head, 1987), 83-85 and 102-105.
56 Ibid. See also David Button, "The Role of Fur Trade Technologies in Adult Learning: A Study of Selected Inuvialuit Ancestors at Cape Krusenstern, NWT (Nunavut), Canada, 1935-1947," (Ph.D. Diss., University of Calgary), 2008, 9-21.
57 Ibid, 77-85

Western Arctic was also product of western expansion. Both the US and Canada settled the continent from east to west throughout the 1800s, reaching the Pacific coast by mid century. Americans grew interested in extending Manifest Destiny beyond the mainland and controlling the Pacific trade. This ambition provided interest in purchasing Alaska from the Russian Empire, which had become frustrated by the difficulties in administering the most eastern portions of its land holdings. Out of fear of American growth, Canada moved to unite its territories into a confederacy, which it did the same year Alaska moved into American hands.

Chapter one, “To Encounter the Dangerous Arctic,” details this imperial transition, attending to the ways naturalists experienced and elaborated it. Russia and England finally departed from the New World over the end of the nineteenth century, providing a vacuum of power for the United States and Canada. More importantly, the networks of trade and travel that had defined Russia and England's engagement with Inuit and the Arctic environment shifted substantially with the arrival of commercial whaling to the Beaufort Sea in the 1870s. Whalers eyed creatures of the sea, not the land, and thus concentrated their harvest activities in the open water season and along Arctic shorelines. Their unfamiliarity with Arctic weather and ocean systems encouraged partnerships with Inuit, who found trade through whalers easier and more lucrative than through the remnant fur traders in Alaska and northern Canada. Importantly, these exchange relations provided visiting scientists a proving ground for their own career development. Tracing the encounters of three scientists over the end of the nineteenth century, this chapter connects the shifting political economies of the Western Arctic with scientific perspectives on Inuit and the northern environment. Studying the Arctic through the fur trade evinced a “dangerous” Arctic mostly because the logistics of research—travel, shelter, and exchange—were handled by Inuit. Studying the Arctic through the whaling industry, however,

evinced an Arctic that was “endangered.” Scientists had greater ease of travel and also drew from cultural concerns about the ills of civilization's impacts on foreign peoples across the globe. For Canadians, endangerment also hinted at fears of the ascendancy of American empire.

Chapter two, “To Document and Discover the Endangered Arctic,” continues the investigation of the endangered Arctic by highlighting a series of scientific expeditions in the Western Arctic between 1899 and 1918. Unlike encounters of independent naturalists or collectors stationed in the fur trade, expeditions involved teams of scientists who moved in an organized and coordinated fashion to enumerate the life of the far north. Their missions to document and discover the region harkened governmental and philanthropic interest in both the possibility of deteriorating Inuit races and dying big-game species, as well as the potential of new territories and sources of minerals. Scientists' abilities to travel across the Western Arctic from Alaska to the Mackenzie River were enabled by the transformations in the region over the end of the nineteenth century. Anthropologists, biologists, and geologists were successful in creating an archive of the Arctic because whalers and Inuit had developed a system of ports and thoroughfares as well as regular practices in exchanging guiding and interpreting services for food, American-made goods, and cash. In these ways, expeditions were conjunctions of several historical processes, as well as representations and interventions.

Chapter three, “To Reorder the Unsettled Arctic,” follows expeditions out of the Arctic and through their contingent networks in the 1920s. Scientific collections were paramount in representing and intervening in the Arctic during this decade because material objects—including specimens of animals and artifacts of Inuit cultures—were housed in the nation's capitals. The Arctic was literally and figuratively lodged in spaces of federal power. U.S. and Canadian scientists rarely traveled to the Western Arctic in the 1920s. Instead, they made the

Arctic travel. Sending specimens to experts stationed in North America and Europe, scientists helped broaden theories about North American geology, biology, and culture to incorporate Arctic environments. These intellectual ordering systems matched and informed the development of political structures for managing the Western Arctic. U.S. and Canadian governments withdrew mineral deposits from private staking in Arctic Alaska and northwestern Canada and created conservation areas in the region wherein Inuit residents were restricted from hunting and trapping. The notion that the Western Arctic was unsettled animated the production of knowledge and colonial power in this period. That is, claims to authority over the region seemed contested among US, Canadian, and British scientific sources and neither the Americans nor the Canadians had effectively occupied the far north in order to delineate jurisdiction in the area. Scientific theory and legislative activity went hand in hand in reordering the Western Arctic.

Post-World War I geopolitical demands continued to usher in new outlooks on the Arctic and new approaches to stewarding it. The Great War, along with widespread geographical reconnaissance in the early 1900s, brought an end to territorial expansion through discovery and conquest. Americans and Canadians turned to intensive economic development as a form of colonial power. In chapter four, "Taming the Wild Arctic," I show how interwar representations and interventions sprang from this commitment. Convinced that non-arable northern lands could be cultivated, American and Canadian officials invested in reindeer ranching schemes in the north after 1918. Reindeer, a species foreign to North America, became a technology that could convert the idle energy of the Arctic tundra into financial and cultural gain. Especially as Inuit livelihoods appeared yoked to unpredictable fluctuations in populations of fur-bearing creatures and global markets, reindeer herding sought to make backward hunters and frozen wastelands into stable, productive elements of political economies. This rhetoric was supported by extensive

surveying of Arctic vegetation, which ecologists articulated as the basis for economic development, administration, and new fields of academic study. Attention to lichens and their relations to feeding allowed scientists and bureaucrats to erect a complex regime of management that brought together private industry, the state, native northerners, and field ecologists.

The Second World War signaled another change in the ways outsiders imagined the Western Arctic. The advent of aircraft and missile technologies helped remake the far north from a natural barrier to Soviet power to a strategic zone in desperate need of infrastructure. Scientists were again called to the fore of defense and development projects. In Chapter Five, "To Engineer the Strategic Arctic," I show how knowledge about the Arctic's subsurface environment became critical to continental security and the global economy. "Permafrost," a term coined in the early 1940s to describe phenomena found in the Arctic subsoil, became an interdiscipline that brought together geologists, ecologists, physicists, and engineers. It also united military agencies, governments, and corporations, as all required such knowledge to guide combat operations, travel, oil drilling, and the construction of airfields, laboratories, barracks, and even entire new administrative centers in the Western Arctic. Engineering became a mindset for an academic-military-industrial complex that grew sensitive to the complexities of a strategic and resource-rich Arctic.

In 1959, Congress made Alaska a state and Canada opened Inuvik, its governmental hub built atop the permafrost in the Western Arctic. These activities marked the transfer of power from federal bureaucracies to territorial forms of government, a move in step with promoting North American values of capitalism and democracy in the "underdeveloped" areas of the decolonized world. But even as the Western Arctic was no longer run by officials in Ottawa and Washington, this did not mean the end of colonialism. Thus, this dissertation concludes as it

began, in an imperial transition where networks shifted profoundly along with representations and interventions.

In the 1960s, Inuit leaders drew from an emergent environmental movement as well as a rich database of Arctic science to argue against the wholesale development of the tundra by oil companies. Not only was Arctic ecology inherently "fragile," but Inuit had occupied the Western Arctic for thousands of years and thus were the land's rightful owners. The platform for these claims came from the work of permafrost scientists and archaeologists, whose research in the Western Arctic during the 1940s and 1950s had facilitated the forms of extraction that Inuit labored so hard to prevent. Yet while Inuit were against environmental destruction, they were not necessarily against economic development. Inuit mobilized science and the idea of an Arctic at risk in their favor to become arbiters of the very processes that had once defined colonial power. Signing land claims agreements with the U.S. and Canadian governments in the 1970s recognized their sovereignty but also tied their independence to scientifically-guided economic development. The North American Arctic's colonial period thus ended in 1959, but the hallmarks of colonialism persist even today.

Empires on Ice

In 2009, geographer Michael Bravo wondered why historians have been "so silent on the recent politics of climate change?"[58] He described climate change discourses as they enroll the Arctic as development narratives, those that license scientists to intervene in communities on behalf of federal governments and multi-national corporations. Similarly, in her recent survey of the literature on the "human dimensions of climate change", geographer Emilie Cameron has

58 Michael Bravo, "Voices from the sea ice: the reception of climate impact narratives," *Journal of Historical Geography,* 35 (2009), 264.

convincingly shown that histories of colonialism are obscured and overlooked, while indigenous actors are relegated as local bystanders and research consultants, blocking opportunities for seats at the decision-making table.[59]

In this dissertation, I raise a voice about these politics by situating narratives of the "New North" within deep histories of science and empire in the Arctic. As long as the far north is imagined as a place out of time, the most troubling aspects of the region's history will be invisible to us, and we will be unable to respond attentively to the complexities of global change. That is why I have titled this project "Empires on Ice." This research puts history on display in the Arctic by taking seriously the legacies of knowledge and power there. It reveals the tenuous, but no less significant, associations among science, the state, private enterprise, native northerners, and the physical environment. It spotlights the recurring interventions in Inuit life and the Arctic environment that have been tied inextricably to the ways scientists represented nature and culture. And it shows how this history matters now for all decision-makers contemplating the Arctic's future.

59 Emilie S. Cameron, "Securing Indigenous politics: A critique of the vulnerability and adaptation approach to the human dimensions of climate change in the Canadian Arctic," *Global Environmental Change* 22 (2012): 103-114. At meetings of the Arctic Council in 2011, Mary Simon and Inuit Circumpolar Council president Duane Smith announced that Inuit voices were being "marginalized" in discussions of the intergovernmental group, primarily because the Secretariat for Inuit was underfunded and overloaded with scientific grey literature, leaving Inuit leaders incapable of balancing a scientific-technocratic view of the region with their own views, comments, and critiques. This is ironic, given that Simon helped create the Arctic Council and this body has been instrumental in catalyzing international attention to climate change. Becky Rynor, "Indigenous voices 'marginalized' at Arctic Council: Inuit Leaders," http://www.ipolitics.ca/2011/11/07/indigenous-voices-marginalized-at-arctic-council-inuit-leaders/, (accessed November 15, 2012).

1

To Encounter the Dangerous Arctic:

The Remaking of the Western Arctic, 1861-1898

In his 2010 book, *The Future History of the Arctic,* political scientist Charles Emmerson illustrates what he calls the "making of the American Arctic." Juxtaposing a pair of maps of North America from 1867 and 1880, Emmerson draws attention to the near simultaneity of the United States' and Canada's northern expansion. The purchase of Alaska (Russian America) in 1867 came in the same year as Canadian confederation and just three years before England transferred to the Dominion the North-Western Territory and "Rupert's Land"—large swaths of the northwest corner of British North America. Rather than coincidence, Emmerson argues, these events marked the end of Russian and British influence on the continent and the beginning of northern-oriented colonial visions from New World nations.[60]

For Emmerson, the story behind the maps was one of political might. In Washington, influential leaders like William H. Seward and Charles Sumner yoked the future of American hegemony to the ability to penetrate Asian markets. The purchase of Alaska was thus a strategic move to control the northern Pacific and extend manifest destiny beyond the continent. Meanwhile, leaders in Ottawa, like John A. Macdonald, drummed up nationalist sentiment by warning of the consequences of American growth. Might annexation follow the acquisition of Alaska? Rather than wait to find out, Macdonald went on the offensive to block the Yanks.

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60 Charles Emmerson, *The Future History of the Arctic,* (New York: Public Affairs, 2010), 61-80.

Advocating for the completion of transcontinental railways, Macdonald offered a plan for a united nation, whose inhabitants between its eastern, western, and northern coasts belonged to one country, rather than several British colonies. When Canadian Confederation transformed these scattered possessions into integrated provinces, modern Canada was born. In Emmerson's chronicle, the American Arctic was in place by 1880.[61]

Emmerson's narrative obscures as much as it reveals, however. Importantly, it locates the north as a theater of New World empire, one that emerged after the first generation of western expansion. But Emmerson's analysis unfairly confines imperial aspirations and conflicts to Ottawa and D.C.: it glosses over how these visions played out on Arctic terrain, and between south and north. Such characterizations of colonial spaces, while rooted in diplomatic histories, are no longer tenable among historians of science and empire. Eager to move scholarship beyond monolithic explanations of colonialism, or those that rely too heavily on the view from the "center," these scholars have reached into the thicket of interrelations of natives and newcomers. In foregrounding such *encounters,* scholars position the edges of empire as the hubs of imperial activity, where broad changes in politics, knowledge, economies, and nature took place. Such an approach is particularly helpful in the case of the Western Arctic, a region not conquered by a set of military operations, hordes of settlers, or mere political deal-making. Rather, the north was shaped over time by the collisions and collaborations of Inuit and Dene with the agents of the United States and Canada: U.S. whalers, multinational fur traders, Canadian police, foreign missionaries, North American bureaucrats, and explorers and scientists from around the world.

To get at the multi-stranded character of imperial power—and to begin this dissertation's

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[61] Ibid. For more on the timing of the Alaska purchase and Canadian confederation, see David J. Mitchell, "Continental Stalemate: How the Alaska Purchase Treaty Led to Canadian Confederation," *New Pacific* (Fall 1990). In the late 1870s, the ambitious nations of the New World reprised their expansionist tendencies. After American mineral companies sought to develop graphite deposits on Cumberland Sound in the high Arctic, MacDonald orchestrated the transfer of the Arctic archipelago from England to Canada.

investigation of science and empire in the north—this chapter reads the remaking of the Arctic at the end of nineteenth century through a series of encounters. I first sketch the political and economic changes associated with the transition from Russian, British, Inuit, and Dene rule to U.S., Canadian, Inuit, and Dene power. I then explicate this transition by following three scientists: Hudson's Bay Company fur trader Roderick MacFarlane, who shipped specimens to the Smithsonian between 1861 and 1866; naturalist John Murdoch, who worked for the Smithsonian Institution on the International Polar Year of 1881-1883; and ethnologist Frank Russell, who traveled north between 1892 and 1894 to collect for the Iowa Museum of Natural History. Because scientific travel in the north at this time necessitated close engagement with southern political institutions, northward-expanding economies, and indigenous human ecologies, an analysis of it captures the complex social, symbolic, and material landscape left blank in Emmerson's maps.

Following the three case studies of scientific travel, I interrogate the Arctic representations produced by MacFarlane, Murdoch, and Russell. Economies, bureaucracies, and ideas of nature worked together in shaping contacts between imperial powers and the life of territories distant from metropolitan society.[62] As we will see, in casting the Arctic as a hostile place, British actors made visible their difficulties in penetrating the north's social, environmental, and economic worlds and also tried to legitimize their interventions there. Just as political economies transformed with the arrival of commercial whalers to the Beaufort Sea

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[62] Ricardo D. Salvatore, "The Enterprise of Knowledge: Representational Machines of Informal Empire," in Gilbert M Joseph, Catherine C. Legrand, and Ricardo D. Salvatore, eds, *Close Encounters of Imperialism: Writing the Cultural History of U.S.-Latin American Relations,* (Durham: Duke University Press, 1998) 73. Salvatore uses the term "representational machine" to capture the ways in which ideas function as a form of imperial power. He defines the term as "a set of mechanisms, processes, and apparatuses that produce and circulate representations constitutive of cultural difference." In fusing technology and culture in the phrase, Salvatore hopes to see how powers of an imperial society and the representations they produce work together in imperial contact.

shore, so too would these ideas of a dangerous Arctic be radically reworked.[63]

Sketching the Transition from Russian and British Fur Trading to U.S. Whaling and Canadian Anxiety

MacFarlane, Murdoch, and Russell entered the Arctic at different times and for different reasons and had very different experiences of the place, thereby revealing for us dramatic changes unfolding in the north at the end of the nineteenth century. As northern historians and northerners have long recognized, the driving force of life in the Western Arctic at the turn of the twentieth century was commercial whaling. U.S. whalers and native northerners established regular exchange relations along the Beaufort Sea coast between the 1870s and 1890s, signaling the first sustained encounter between Arctic indigenous communities and non-natives. Less recognized by scholars, but of importance here, were whaling's consequences for regional human and physical environments, scientific knowledge about them, and how these distant landscapes and peoples were folded into the U.S. and Canadian nations. Tracking these changes is as central to understanding the close of the nineteenth century as it is for making sense of the shape of science and empire in the twentieth century.

As historians of science have effectively demonstrated elsewhere, such changes can be rendered visible by attending to networks of circulation. These are the sites and practices that allowed the movement of goods, people, and knowledge between home and abroad. These sites

63 Recent scholarship on American empire often defines itself against diplomatic histories so as to show the differences and benefits of analyzing social, cultural, economic, and political encounters between foreigners and locals in Latin American and the Pacific. For two primers on these historiographic conversations, see Gilbert M Joseph, Catherine C. Legrand, and Ricardo D. Salvatore, eds, *Close Encounters of Imperialism: Writing the Cultural History of U.S.-Latin American Relations,* (Durham: Duke University Press, 1998).; Alfred W. McCoy and Francisco A. Scarano, eds., *Colonial Crucible: Empire in the making of the Modern American State,* (Madison: University of Wisconsin Press, 2009). This narrative and analytical move is not restricted to American empire, it applies to—and emerges from European empire in Africa, India, and South America as well. For one example, see Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950,* (Chicago: The University of Chicago Press, 2011).

could be the floors of manufacturing centers; the research rooms of museums and universities; the offices of colonial officials; the farms and fields of colonial possessions; or, in this case, the trading and whaling outposts scattered about the Arctic.[64]

To bring these sites together is to see all of them as part of a larger project of producing goods and knowledge for the benefit of imperial powers. We can think of them, then, as connected in a *network*. We might imagine an Inuit trapper handing a fox skin to a fur-trader, who tagged it with a Latin species name, carefully preserved it in alcohol, packed it in box, and sent it by boat down the Mackenzie River to museum curators on the shores of the Potomac in Washington. Or we might imagine a fresh-faced naturalist taking passage to the Arctic coast via whaleboat, departing from San Francisco and arriving at Point Barrow (Alaska) several weeks later, sea-sick but eager to trade flour for harpoons, knives, and other Inuit artifacts. Information about colonies was thus shaped by the passage of objects and people throughout the network. But this movement was not unidirectional. Instructions from museum-based scholars could guide the kinds of interactions between foreigners and locals, selecting for some information and objects and not others. It is helpful to think of knowledge in terms of how it flows, or *circulates*, in and out of different locations.[65] In these ways, particular encounters in the Western Arctic illuminate

64 The ideas of circulation and networks—and their combination—has roots in actor-network theory and the scholarship of Bruno Latour. See Bruno Latour, "Circulating reference," in *Pandora's Hope: Essays on the Reality of Science Studies*, (Cambridge: Harvard University Press, 1999), 24-79. Historians of American colonial science have adopted the concept of networks of circulation to great effect, offering fresh insights into this period by adopting as a guiding spatial metaphor "the Atlantic world." Defined not by the political borders of the new country or the Old World, but by a constellation of commercial and social nodes, the notion of the Atlantic world makes visible the ways ideas, people, and objects have traveled in time and place—and provides the strongest existing example of how to rethink the history of American science outside of national boundaries. For two examples, see Jordan Kellman, "Nature, networks, and expert testimony in the colonial Atlantic: the case of cochineal," *Atlantic studies* 7:4 (2010): 373-95.; and Parrish, Susan Scott. *American Curiosity: Cultures of Natural History in the British Atlantic World,* (Chapel Hill: University of North Carolina Press, 2006).

65 In recent years, there has been a surge of scholarship within the history of science employing the model of circulation. For an introduction to this material, see Lissa Roberts, "Situating science in global history: local exchanges and networks of circulation," *Itinerario* 33 (2009): 9-30. To be fair, the use of "circulation" in this section is not completely accurate. Whaling and fur trading vessels moved throughout much of the network but were obviously limited to the seas. Nodes in the network witnessed the movement of commodities and workers,

constellations of economic, intellectual, and political power.

Following Roderick MacFarlane, John Murdoch, and Frank Russell through their networks of circulation underlines a historic transition in the Western Arctic between 1861 and 1899. Before 1867, the region was connected to the intercontinental fur trade, which was managed by Russian, British, Inuit, and Dene actors (See Figure 1). Russian traders based their network in the Bering Strait, while British built theirs along the Mackenzie River. Both empires dealt primarily in furs, but these items moved differently if the final destination was Europe or Asia. At this time, the Beaufort Sea coast was largely the domain of Inuit and Dene traders who moved between these two otherwise separate networks, appropriating the objects and people within them into their livelihoods and domestic economies. Even as northern fur traders developed fruitful relationships with fledgling American museums in this period, an interconnected Western Arctic accessible to government and commercial agents from the US and Canada was not yet made.

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as well as police and missionaries. But none of these agents or objects moved throughout the networks continuously. Scientists were perhaps most likely to perform a complete circuit multiple times—as we will see later in the dissertation with travelers who returned north for several expeditions. Still, the term here is useful in detailing the networks present before expeditions and how things, people, and ideas moved within those networks.

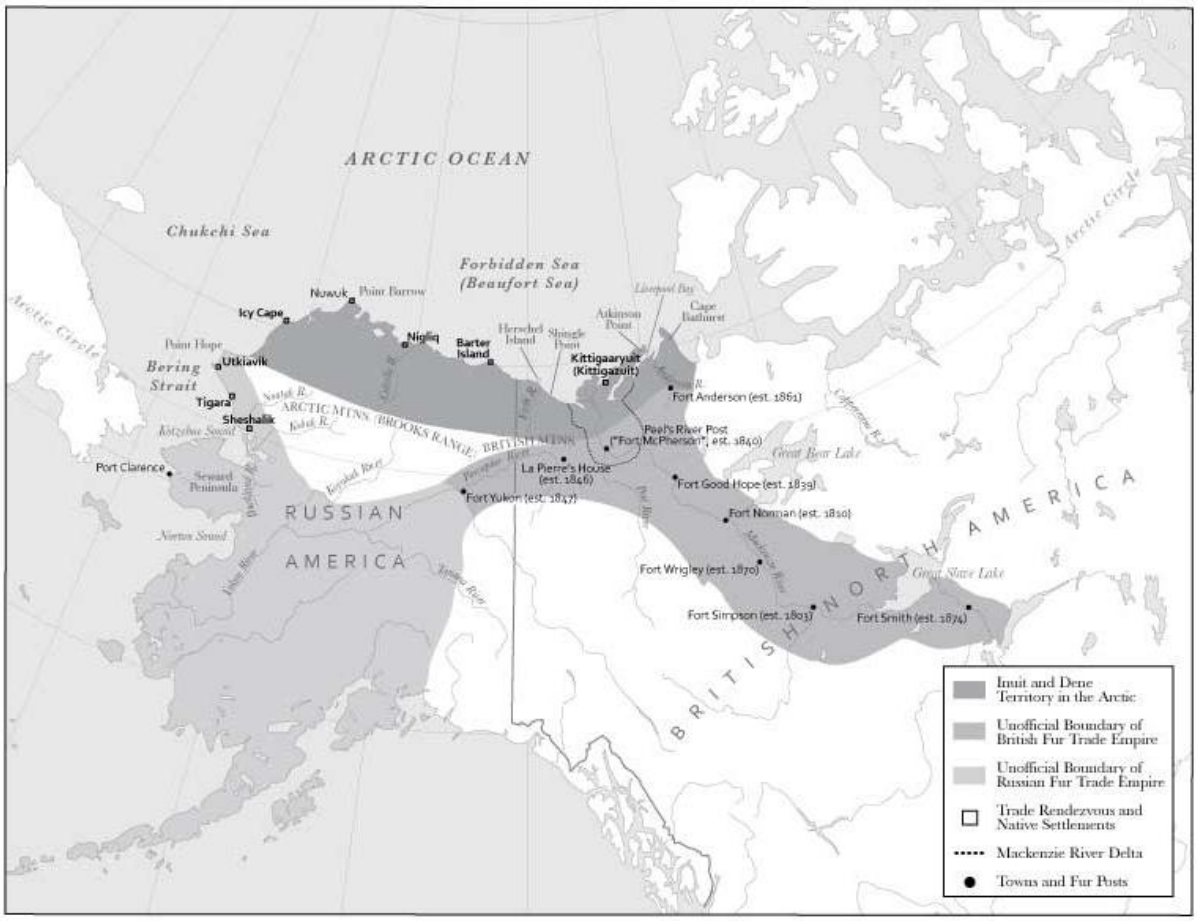

Figure 1. The Western Arctic in 1861. Russian and British fur trading activities were consolidated around the Bering Strait and the Mackenzie River. Inuit and Dene living along the Beaufort Sea coast in the Western Arctic negotiated these empires and stemmed their northward expansion.

After the purchase of Alaska in 1867, the arrival of the U.S. commercial whaling industry to the north disrupted these networks. Gradually exploring the Beaufort Sea coast in the 1870s, whalers provided Inuit along the shoreline with cheaper and more readily accessible goods. Hudson's Bay Company post operators in the Mackenzie District noticed this and acted quickly to stem the reach of whalers, as they feared the loss of business at their northernmost posts. When whalers created permanent whaling stations at Barrow, Alaska (1884) and in Canadian territory at Herschel Island (1889), the fears of these British fur traders were largely realized: the networks of circulation involved in U.S. whaling linked more and more of the native northerners and natural resources of the Beaufort Sea coast to San Francisco. By the 1890s, U.S. whalers in

the north provoked new anxieties in Ottawa, as bureaucrats grew worried about sovereignty. These economic and social relations helped form a new cultural, political, and geographical territory known as the Western Arctic (See Figure 3).

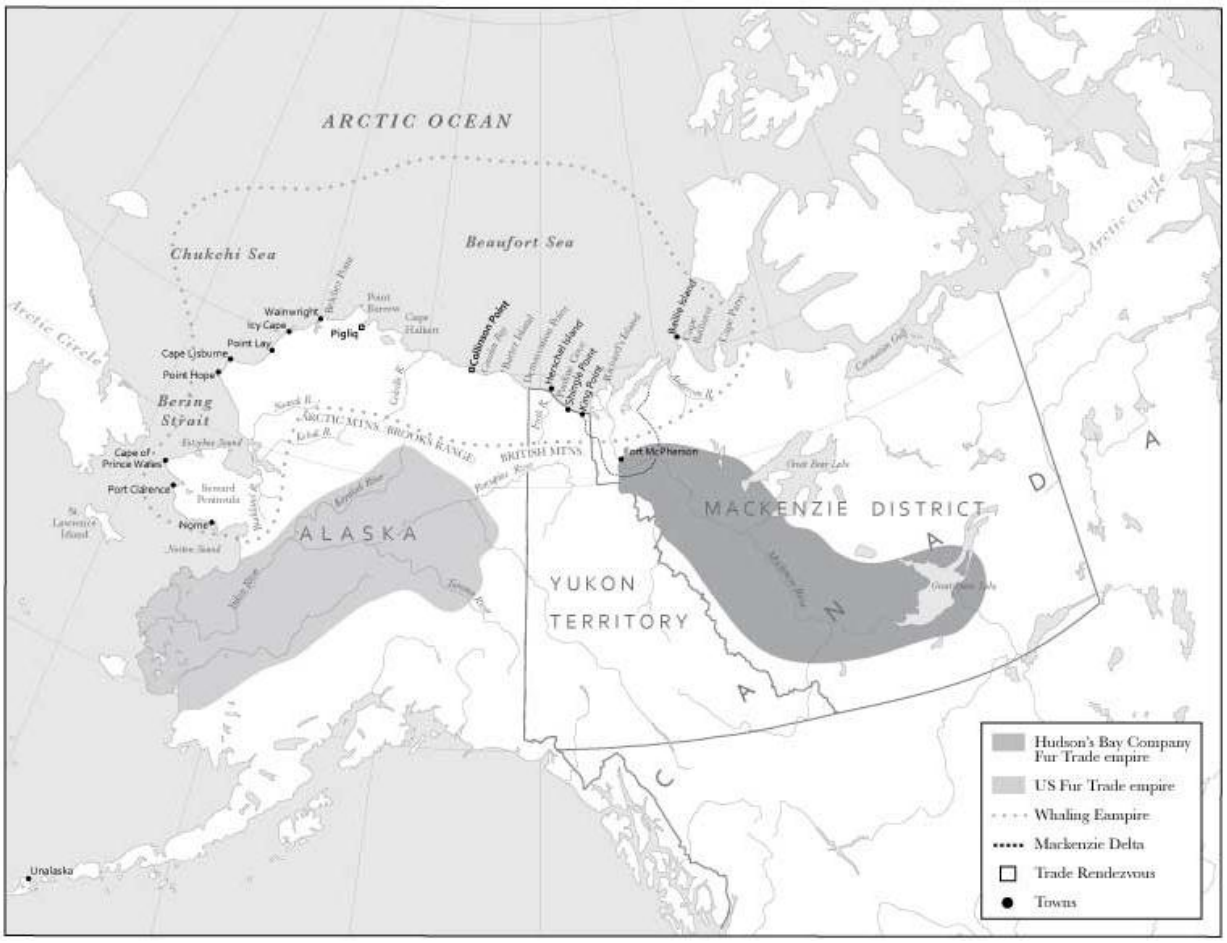

Figure 3. The Western Arctic in 1898. A commercial whaling industry—indicated with the dotted line—arrived in the region over the 1870s and 1880s and altered local human ecologies and economic activities. By 1898, it had spread along the Beaufort Sea cosat, enrolled resident Inuit and Dene, and caused the retraction of inland fur trading.

This transition between Russian/British and U.S/Canadian political economies governed the encounters of scientists in the Western Arctic in the last four decades of the nineteenth century.[66] While accounts of this transition—and its consequences—improve upon existing

66 For simplicity's sake, it is helpful to characterize trading partnerships in general terms. Russian and British fur companies, and later American whaling companies, constituted one end of a trading relationship, while members of over fifty Inuit and Dene communities constituted another. Within these companies and communities, internal conflict and turmoil likely existed. For the sake of gathering a sense of the broad patterns of trade networks,

understandings of Arctic history, they involve a deluge of details about people, places, economies, ecologies, and knowledge. In order to organize these details into a comprehensible whole, the following analysis categorizes the transition according to three periods: the years before the arrival of commercial whaling, marked by the practices and ideas of Russian and British actors (1861-1867); an interim decade in which political and economic relations were established between northerners and U.S. and Canadian actors (1870-1884); and a decade in which these new political and economic relations gave rise to new scientific representations of the Arctic (1889-1899).

Fur Traders and Scientific Collectors in Russian America and British North America, 1861 to 1867

As Felipe Fernandez-Armesto has argued, furs were the "black gold" of the far north in a pre-industrial era of global trade. The skins of beaver, muskrat, and fox linked consumers in European, Chinese, and North American markets to fur frontiers across the world. The opening of New World fur territories in the seventeenth and eighteenth centuries had been a watershed moment in global history, as it marked the beginning of a shift in the distribution of wealth and power toward the West. This shift accelerated in the nineteenth century, in part through the opening of Siberian and North American fur grounds, which boasted an "abundance of under-exploited fur-bearing creatures" unrivaled in Europe. In an effort to control the extraction and circulation of these furs from Arctic land, Russian, British, Inuit, and Dene nations clashed and collaborated in the mid to late nineteenth century.[67]

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however, I group together Russian traders as I do Inuit traders, and so on for British traders, American whalers, and Dene traders.

67 Felipe Fernandez-Armesto, foreword in John R. Bockstoce, *Furs and Frontiers in the Far North: The Contest among Native and Foreign Nations for the Bering Strait Fur Trade,* (New Haven, CT: Yale University Press,

Incorporated in 1670, the Hudson's Bay Company (hereafter as HBC or the Company) was one of the largest and oldest commercial corporations in the world. It concentrated its fur business in the area between the Great Lakes and the Hudson's Bay. Fur resources were plentiful there, and the great inland seas facilitated transportation of furs and goods across the Atlantic. The HBC's rival, the Northwest Company, laid claim to much of the Pacific Northwest, including some sub-Arctic lands around Great Slave Lake. In 1821, these two companies merged, granting HBC sovereignty over North America from the boundary with the United States to the Arctic Ocean. After the merger, the Hudson's Bay Company grew more interested in opening an Arctic fur trade and exercising more control over northwestern territories. The Mackenzie River, named after an explorer sent north by the Company to scout for furs—Alexander Mackenzie—became a tool by which to pursue these interests. The HBC set up a string of fur trading posts along more than 1,000 miles of the river between 1821 and 1840.[68]

By 1840, the Company had successfully opened the Peel River post (known today as Fort McPherson). Trade at the Peel River post primarily engaged Dene living nearby, but it soon attracted Inuit living along the Yukon coast, in the Mackenzie Delta, and between the Mackenzie and Coppermine Rivers. Dene acted as middle-men between the Company and the traveling Inuit, which, in the eyes of Company men, produced tensions between these native northerners. Nevertheless, the value of trade with the Inuit at Fort McPherson grew over the 1850s, from 100 British pounds in 1854 to 1000 pounds in 1858. In response, Company officers paid local Dene not to hassle Inuit neighbors and began to meet Inuit requests, providing the guns, ammunition, and tobacco they desired. The development of trade with Inuit encouraged the Chief Factor of the Mackenzie District, James Anderson, to scout for an outpost situated squarely in Inuit

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2009), xiii-xiv.

68 Helen M. Buss, *Undelivered Letters to Hudson's Bay Company Men on the Northwest Coast*, (University of British Columbia Press, 2003), 3-12.

territory. He called on Roderick MacFarlane, in charge of Fort Good Hope near Great Bear Lake, who journeyed to Anderson River in 1857 (See Figure 1 throughout section).[69]

Roderick MacFarlane (1833-1920) was a Scot who joined the Hudson's Bay Company as an apprentice clerk in 1852, at the young age of nineteen. Before he turned twenty-one, he had gathered experience at the Company's posts in the Mackenzie River valley at Fort Rae and Fort Resolution and been promoted to the rank of manager of the Fort Good Hope post.[70] Traveling to Anderson River with Dene guides from Fort Good Hope, MacFarlane experienced trouble. His guides "quickly abandoned him, and [he] had to leave behind a quantity of his travel rations and stores." These hostilities did not preclude economic advancement, however.[71] MacFarlane wrote a glowing review of the fur resources of the country, concluding that there was a large Inuit population, a suitable river for transportation, and abundant driftwood to use for fuel and shelter. After reviewing MacFarlane's recommendations, the North American director of the Hudson's Bay Company, George Simpson, approved the construction of Fort Anderson in 1861.

Despite MacFarlane's optimism, Fort Anderson presented problems with logistical support, communication, and shipment of goods. The Anderson River was not part of the

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69 John K. Stager, "Fort Anderson: The First Post for Trade in the Western Arctic," *Geographical Bulletin*, vol. 9, no. 1, (1967), 46-8. For the relations between Inuit and Dene in the Mackenzie Delta region, see Robert McGhee, *Beluga Hunters: An Archaeological Reconstruction of the History and Culture of the Mackenzie Delta Kittegaryumiut*, (St. Johns, Nfld.: Institute of Social and Economic Research, Memorial University of Newfoundland), 1974, 3. The Company also supplemented regular trade negotiations with gifts of beads, needles, and rings.

70 These were incredible strides to make within the Company, which typically did not reward its employees with new positions until decades of service had been logged. MacFarlane's life and scientific collections have been the subject of two scholarly treatments: one by historian of science Debra Lindsay and another by a team of archaeologists and resource specialists from the Smithsonian Institutions' Arctic Studies Center and in the Inuvialuit Settlement Region. Both sources are helpful here in understanding the development of science and its relations in the far north. On MacFarlane's early career, see Debra Lindsay, *Science in the Subarctic: Trappers, Traders, and the Smithsonian Institution*, (Washington: Smithsonian Institution Press, 1993), 59-61. On the time necessary to move up the ranks of the Company, see Lindsay, 90-92. On MacFarlane's background, see Inuvialuit Cultural Resource Center, "Inuvialuit Pitqusiit Inuuniarutait (Inuvialuit Living History): Roderick MacFarlane," http://www.inuvialuitlivinghistory.ca/wiki_pages/Roderick%20MacFarlane, accessed 13 July 2012.

71 Natasha Lyons, Kate Hennessy, Charles Arnold and Mervin Joe, "The Inuvialuit Smithsonian Project: Winter 2009-Spring 2011," report produced for the Smithsonian Institution, vol. 1. (June 2011), 2

infrastructure-rich Mackenzie River valley, but rather drained directly into the Arctic Ocean. Travel between the Mackenzie's tributaries and those of the Anderson was possible, but very difficult—especially when hauling loads of trade items. London officials were accustomed to waiting six years to see fur sales bring returns on their investments. In the case of Fort Anderson, they waited seven years. But these vices of Fort Anderson could be converted into virtues. At the most remote fur post in the Company's system, MacFarlane had an unrivaled opportunity to collect materials from a landscape and culture not known by budding scientific communities.[72] Between 1854 and 1866, MacFarlane contracted "oological fever," leveraging his intense seasonal interactions with Inuit and Dene trappers to collect specimens of northern nature and culture. In one five year period at Fort Anderson between 1861 and 1866, he sent more than 5,000 artifacts to the newly-built Smithsonian Institution in Washington, D.C.[73]

As he rose in the ranks of the Hudson's Bay Company, MacFarlane was lured into becoming a scientific collector by the renowned Robert Kennicott, a naturalist and institution-builder whose influence on the development of science in America has been compared to Alexander von Humboldt and John James Audubon.[74] Kennicott had worked for the Illinois State Agricultural Society in the early 1850s as the Illinois Central Railroad was laid down, which opened possibilities for more widespread natural history collecting in the state. These experiences enhanced his status as a naturalist in the United States, allowing him to cultivate a

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72 On the physical distance of Fort Anderson from the Mackenzie River district, see Stager, 43-51.

73 On "oological fever: and the amount of specimens sent, see Lindsay, 59. For more detailed descriptions of the specimens sent and a dynamic interface with which to explore them, visit Inuvialuit Cultural Resource Center, "Inuvialuit Pitqusiit Inuuniarutait (Inuvialuit Living History): Welcome to the MacFarlane Collection," http://www.inuvialuitlivinghistory.ca/collection, accessed 13 July 2012.

74 Lindsay, 56. While it was not uncommon for post operators to do collecting work, it should be noted that Company employees like MacFarlane were often too preoccupied with their duties at the post to take on additional responsibilities as collectors. As historian Debra Lindsay has argued in her study of the labor of Company men engaged in the fur trade, "Collecting and processing specimens was simply too demanding to hold the interest of employees already engaged in physical labor at the posts."Indeed, MacFarlane's promotion to post operator may have allowed him to pursue scientific work that he would not have been able to complete as a lowly clerk.

friendship with the first curator of the Smithsonian Institution, Spencer Baird.[75]

Under the urging of Baird to collect in more northern regions, which were "virtually unknown" to American museums, Kennicott developed an extensive network of fur post operators to gather specimens and ship them to the Smithsonian. In historian of science Debra Lindsay's assessment, Kennicott's energy for natural history was contagious. He was able to convince Company men to take up collecting from his own "amiable character" and "zeal in the pursuit of science."[76] Kennicott's reach extended to more than twenty employees across an incredible geographic area, which corresponded to the system of posts established by the Company in the vast Mackenzie River valley and the tributaries pouring into it. Kennicott had men in several locations along the southern border of the Western Arctic, including James Flett at La Pierre's House (along the Porcupine River) and James Lockhart at Fort Yukon (on the Yukon River). Kennicott tapped Roderick MacFarlane to be his man at Fort Anderson.[77]

The alliance between Baird, Kennicott, and MacFarlane was not uncommon in American science in the 1850s and 1860s. Like in the U.S. West, the Smithsonian was an avid supporter of early Arctic science.[78] The Smithsonian employed interested men or those already living in the far north as collectors. Baird outfitted his Hudson's Bay Company team with dissecting kits, microscopes, pocket compasses, revolvers, opera glasses, and mosquito nets. In turn, Company men induced Inuit and Dene trappers to collect for them, providing American-made goods like handkerchiefs, jewelry, textiles, and the most prized item—double-barreled shotguns—in exchange for the skins of birds, bears, moose, and caribou. Baird also created user-friendly

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75 Ibid, 47-48. Kennicott moved to D.C. in 1857 to train with Baird. See also Ronald S. Vasile, "The Early Career of Robert Kennicott, Illinois' Pioneering Naturalist," *Journal of the Illinois State Historical Society,* vol. 87 no.3 (Autumn, 1994), 150-169.

76 Lindsay, 49. On the state of knowledge about the far north in the 1850s, see Ibid, 1-3.

77 Vaile, 150-169. On the names of collectors at different posts, see Lindsay, 55-60.

78 Daniel Goldstein, "Yours for Science": The Smithsonian Institution's Correspondents and the Shape of Scientific Community in Nineteenth-Century America," *Isis,* Vol. 85, No. 4 (Dec., 1994), 573-599.

checklists for field workers, like his "Directions for Collecting, Preserving, and Transporting Specimens of Natural History," so that his Company workers, regardless of their training, could contribute to science in an ordered and efficient fashion. Zoological collecting had long been conducted out of curiosity, with a fascination for "the bizarre or unfamiliar," and with the intent to "titillate and amuse the readers of travelogues." In enlisting northerners with concrete guidelines, Baird sought to introduce an organized and systematic process of data collection.[79]

Similar procedures guided the acquisition of anthropological collections. Baird's partner at the Smithsonian, George Gibbs, penned "Instructions for Research Relative to the Ethnology and Philology of America" which was directed at improving the state of cultural collections in the nation. Previous collections often gave no reference to tribal or geographic origin, or the material's function within native society. With these instructions in hand, MacFarlane and others bartered store goods for Inuit-made tools, clothing, weapons, and utensils. In these ways, natural history collecting in the north was not only folded into a larger methodological reorientation taking place at the Smithsonian, but was also incorporated into "well-established native-fur trade economies" that enjoyed extensive corporate infrastructure and regular systems of communication, transportation, and exchange. Between 1859 and 1867, more specimens left northern British North America destined for the Smithsonian than had ever left the territory for European museums.[80]

MacFarlane was not a prolific writer, but his collections in some ways speak for themselves. A recent report by a team of museum scholars and Inuvialuit resource specialists

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79 Children, too, were enrolled in collecting efforts. Gifts of raisins and sugar inspired them to gather eggs, nests, and shells. These details of how Baird and MacFarlane enrolled trappers in the trade for science are presented in Lindsay, 64-70. For the use of directions on collecting and preserving so as to improve the order of collections, see 28-40. Lindsay notes that Baird was not the first scientists to prescribe methods in this fashion, but his instructions were "more comprehensive than previous ones."

80 On Gibbs' instructions, see Lindsay, 78-88. On the paths specimens took out of northern Canada between 1859 and 1867, see Lindsay, 122.

described its contents as including "a full range of skin clothing and bags; hunting and fishing gear; domestic tools, personal jewelry, and a wide range of pipes; carving tools and artworks; a model umiat, sleds and kayaks." These objects were made locally but showed evidence of vast trade networks, which, for museum curators then and now, evinced "the vibrant, land-based lifestyle of the local people."[81] Arctic natural history was thus a by-product of the project of promoting a mutually beneficial flow of material goods between Inuit and British fur traders. According to Stephen Loring, who has reviewed surviving letters between MacFarlane and Spencer Baird, Inuit in the region were well-versed in trading relationships and used MacFarlane's presence to their advantage. "Already knowledgeable about the trading economy," Loring noted, "MacFarlane's Inuvialuit collectors took payment for the collections acquired on behalf of the Smithsonian in a wide array of non-native commodities including clothing, tools, tobacco, and even guns."[82] In stark contrast to later itinerants who chastised traders for "contaminating" Inuit by supplying them with modern technologies, MacFarlane was both willing and able to do so in the name of science.

Between 1861 and 1864, MacFarlane reported increasing returns from the newest outpost of the fur trade, with fox pelts bringing over 1,000 British pounds in 1864. However, the fort was beset by a number of obstacles in the next two years. An outbreak of distemper killed sixty-four sled dogs, which hampered already strained communication and transportation between Fort Anderson, the next closest station—Fort Good Hope—and the chain of posts that connected this region to London. An epidemic of scarlet fever among the Dene and Inuit in the region soon followed. By 1865, Fort Anderson relied on Fort Good Hope and other posts for food, fuel, and equipment supplies. The end of the fort in 1866 thus reveals the complex combination of forces

81 Ibid, 2.
82 Ibid, 17.

that underpinned networks of circulation in the Arctic during the 1860s. Social interactions, transportation networks, biological agents, and markets were all at play in the quest for knowledge and black gold.[83]

Yet there was another reason why the Inuit fur frontier was not completely open to British expansion. Indeed, the Russian fur trade, anchored in the Bering Strait and Yukon River, was a fierce competitor for the North American Arctic's fur resources. By the time Fort Anderson was constructed in the 1860s, the influence of the Bering Strait trade could be felt far to the east, among the Inuit groups along the Beaufort Sea coast and the Anderson River. In 1865, Father Emile Petitot visited the Peel River post and witnessed the arrival of Inuit from the Colville River Delta in Alaska. Accompanying these Inuit was a mixed-race native with red hair and freckles, most likely of Russian descent. Petitot thus had first-hand evidence that the exchanges taking place across the Bering Strait had ramifications across Alaska, through Inuit territory, and into the domain of the Hudson's Bay Company.[84]

That Petitot recorded his encounter with this strange looking Inuit man was not merely a matter of fascination—it was also crucial information for economic strategy. Many Inuit did not live in the vicinity of a Russian or British fur trading post. Importantly, all of the Inuit living along the Beaufort Sea coast were not accessible by foreign fur traders. To Russian and British fur companies, this geographic area represented a frontier, one that would either extend the Bering Strait trade further into the New World or allow the Hudson's Bay Company to reach the

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83 Stager, 54-6. While the Hudson's Bay Company's first Arctic post lasted only five years, Fort Anderson allowed Roderick MacFarlane to collect a rich set of ethnological and natural history specimens. Baird was so pleased with the collections streaming into D.C. from the far north that he sent "special clothing and fabrics" as gifts for MacFarlane's collectors. Once in Washington, collections were immediately put to use. Items of Inuit clothing sent by MacFarlane were used in the Smithsonian's display at the U.S Centennial Exhibition in 1876, in conjunction with an appearance by celebrated Arctic explorer, Elisha Kent Kane. Natasha Lyons, Kate Hennessy, Charles Arnold and Mervin Joe, "The Inuvialuit Smithsonian Project: Winter 2009-Spring 2011," 17. By 1867, MacFarlane had collected nearly 5,000 natural history specimens on his travel between Fort Good Hope and Fort Anderson and purchased 300 artifacts from Inuvialuit.

84 Bockstoce, *Furs and Frontiers in the Far North*, 282-283.

Arctic Ocean. On the other hand, in the perspective of the Inuit living along the Beaufort Sea coast, the geographic area was a homeland that could be protected, ironically, through engagement with the fur trade. The proximity of two competing trading companies allowed Inuit to procure items like guns, which gave distinct advantages in hunting and proved to Russian and British fur traders that Inuit were powerful negotiators of empire. Inuit living along the coast developed their own extensive trading networks with Inuit and Dene living in both the Bering Strait and the Mackenzie and Porcupine River districts. Inuit trading relationships occurred mostly during the summer at rendezvous locations along the Arctic coast in Alaska and Canada, like Nigliq, Pigliq, Barter Island, Kittigazuit, Sheshalik. These networks allowed for the transfer of British and Russian technologies beyond the posts stationed at the edge of the fur empire.[85]

We can think of the Inuit connecting the Russian and British networks like tributaries connecting two river systems: one in the west, along the Bering Strait, and one in the east, along the Mackenzie River. Across the Bering Strait, Russian American Company traders provided manufactured goods, like firearms and ammunition, to Siberian and Alaskan Inuit for fox, beaver, and sometimes reindeer products. Alaskan Inuit living around the Seward Peninsula would travel up the Noatak, Kobuk, and Colville rivers, forging an off-shoot of the main flow of goods and thus linking the Bering Strait to the interior of northern Alaska and the Beaufort Sea coast. At rendezvous points like Nigliq in the Colville Delta, Inuit from the Bering Strait region

85 Ibid, 275-285.Bockstoce details the trading relations of Beaufort Sea indigenous groups and their connections to the Bering Strait trade and Mackenzie River district trade. One of the most comprehensive oral histories of the Canadian portion of the Beaufort Sea cost interviewed Inuvialuit men and women born in the first decades of the 1900s. These collaborators mentioned moving from Alaska to the Yukon north slope over the turn of the twentieth century and also noted that the slope had been previously a place of trade between Inuit and Dene communities. See Murielle Ida Nagy, "Yukon North Slope Inuvialuit Oral History," *Occasional Papers in Yukon History No. 1*, Heritage Branch, Government of the Yukon, 1994. University of Iowa ethnologist Frank Russell visited Herschel Island in 1893-4 and described the "great trading places" as those on the coast: "kissging" at Cape Prince of Wales; "Se-enaling" at the mouth of the "Nunatak" River, at Hotham Inlet; "Nigalik" at the mouth of the Colville River; and "Nuivuak" at "Point Barter." See Frank Russell, "Journal of Frank Russell," N-2002-037, NWTA, 157.

would meet Inuit from the Arctic coast—both from as far west as Point Hope and as far east as Fort Anderson. In addition, Dene living around the Firth River and Mackenzie Delta would visit these coastal trading fairs. Here, Russian-made products—including guns, knives, iron, and more—moved to coastal Inuit in exchange for seal-oil, whalebone, and other marine mammal products. The trading activities of Inuit and Dene, then, bridged the watersheds of the Bering Strait and the Mackenzie River. Native northerners on the Beaufort Sea coast thus channeled the goods of two different fur empires without allowing either to encroach upon their own territory.[86]

The presence of Inuit trading fairs helped Inuit manage the power of the Russian American Company and the Hudson's Bay Company. For example, when tensions with Dene at the Peel River post ran high—threatening to deprive Inuit of goods, equipment, and food—Inuit could rely more heavily on the Bering Strait trade. As historical geographer John K. Stager writes, for Inuit in the Mackenzie and Anderson river basins, "the opportunity to trade articles of Russian origin through Eskimo groups along the Yukon and Alaska coasts was far safer and more welcome than any approach through hostile Indians."[87] Indeed, because Inuit along the Mackenzie Delta and Beaufort Sea coast did not immediately embrace trade with the Hudson's Bay Company, British officials presumed that the Russian American Company had made significant inroads into British North America. They could not imagine the kind of trading networks developed by Inuit in the region. Underlining the impulse to expand British control over the Arctic and curtail Russian influence, one Company director identified the mission of Fort Anderson as "intercept[ing] the trade carried on by the Esquimaux with the Russian territory, with which they have been in the habit of carrying on their traffic."[88] At least until the arrival of American whalers, then, Inuit and Dene situated between the Bering Strait and

86 This description is drawn from Bockstoce, *Furs and Frontiers in the Far North*, 275-289.
87 Stager, 46.
88 Hudson's Bay Company records D/8/1, p 27, as cited in Stager, 48.

Mackenzie Rivers were able to negotiate the terms of the trade between Russian and British empires.

When the United States and Canada acquired northern territories in the late nineteenth century, they inherited a place already connected to global markets and global empires. The importance of the fur trade was not lost on the American Commercial Company, who took over the infrastructure and trading operations of the Russian American Company. In 1869, Captain Raymond of the U.S. Army traveled to Fort Yukon, a Hudson's Bay Company post at the top of the Yukon River, to evict the foreign traders from American soil.[89]

While the boundaries of what was once Russian America and British North America were clear to Raymond, the territories of Alaska and northwestern Canada in 1867 were very much still the domain of Inuit and Dene. American and Canadian traders could not move anywhere they desired, but were directed, like the explorers and traders before them, through a fragmented, accessible world.[90] Importantly, northern-bound itinerants could not easily enter the Beaufort Sea coast. In contrast to how newcomers knew the north, Inuit and Dene established a set of trading sites and moved between them, sometimes with ease and sometimes with conflict. Largely existing beyond the reach of commercial or imperial power, these sites were mainstays of Inuit economies until permanent settlements were established through the whaling industry in 1884.

The Seaward Incursions and Orientations of Commercial Whaling and American Naturalists between 1870 and 1884

The transfer of Russian America to the United States, and British North America to

89 Bockstoce, *Furs and Frontiers in the Far North*, 299-302.

90 Historians John Sandlos and Liza Piper have called this geography of settlement a "broken frontier" to signal its fragmentary nature as well as the roles of disease, environment, and politics in shaping life in Canada north of 60° latitude. Liza Piper and John Sandlos, "A Broken Frontier: Ecological Imperialism in the Canadian North" *Environmental History* 12 (2007), 759-795.

Canada, unsettled existing networks of circulation. Kennicott died in 1866, in some ways foreshadowing the passing of the Smithsonian's relationship with the Hudson Bay Company's human and infrastructural resources in the Mackenzie River district. In response, Smithsonian researchers redirected their efforts toward Alaska. They experienced much difficulty in establishing their usual approach to natural history collecting there, however. Russian America had the necessary infrastructure—with fur posts scattered about the river basins of the country—but it had no pool of fieldworkers who were interested in the project of science. Unlike the Hudson's Bay Company men, who kept cabinets and dabbled in taxonomy, the existing Russian post operators had no background in the kind of gentlemanly pursuits that fostered natural history. As Debra Lindsay has concluded, it became obvious to Kennicott and Baird that "any attempt to reform or rationalize field methods in either the natural or the social sciences would be deferred, it not futile, in the absence of willing participants [in Alaska.]"[91]

In addition, United States political, commercial, and military leaders viewed Alaska as an overseas colony rather than a part of the Mackenzie River basin—as Baird and Kennicott had. In the minds of many bureaucrats and boosters, Alaska held a strategic location in the global economy: control of the "Great Circle" route of the North Pacific facilitated the opening of Asian markets to American products. While the purchase of Alaska in 1867 drew criticism—some critics infamously dubbed the move "Seward's Folly"—many others supported it, including those in the American press, on Capitol Hill, and in commercial centers on both coasts.[92] Recognizing Alaskan assets was one issue, but capitalizing upon them was another. The nation's grazing lands, mines, cities, or farms could not be linked to Alaska by land. The colonization of the territory would have to occur through water-based transportation networks. As historian Ted

91 Quotation is from Lindsay, 37. Lindsay devotes a chapter of her book to investigating Kennicott's experiences with the Western Union Telegraph expedition in Russian America in 1865-6. See Lindsay, 105-120.
92 Hinckley, 20.

Hinckley has put it, America's northern empire was borne "neither by wagon train nor by railroad locomotive, but via the sea."[93]

Such connections had important consequences for the practice of science. Before his death in 1866, Western Union invited Kennicott to command the "Scientific Corps" of an expedition to Alaska, itself charged with laying down telegraph cable between Alaska and Siberia. He recommended a travel route through the region that made use of the Mackenzie River district's extensive streams, portages, trails, and fur posts. Western Union balked at this plan, deciding instead to access Alaska from the Pacific Coast and Yukon River.[94] Clearly, American commercial interests wanted to establish connections between Alaska and the existing ports and urban centers on the western seaboard. Science would have to take to the seas, rather than overland, to get to know Alaska.

In addition to private enterprises like Western Union, the American military was instrumental in linking Alaska to the rest of the country. After purchase, Congress solidified a period of military rule in the territory until 1877.[95] The federal government sought to protect and expand its reach and that of the fisheries industries in Alaska, including the booming salmon canneries on the Yukon River and the controversial seal harvest in the Pribilof Islands.[96] The government also sought to support the commercial whaling industry, which gradually explored the northwestern Alaskan coast and Chukchi Sea in search of larger populations of bowhead whales. In the two decades leading up to the turn of the century, whalers in the Arctic harvested

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93 Ibid, 23.

94 Lindsay, 107. See also Morgan B. Sherwood, *Explorations of Alaska, 1865-1900,* (New Haven: Yale University Press, 1965), 18-35.

95 Sherwood, 5-19. See also Naske and Slotnick, 99-122. The U.S. Army withdrew from Alaska in same year as it did the South (1877), with neither territories effectively folded into nation at that time. As the country reeled from the Civil War, both the South and the new northern frontier appeared to political leaders and citizen observers as colonial possessions that had not been fully integrated with the country.

96 Arguing against the grain of other historians of Alaska, who have called the period of military rule one of total federal neglect, Haycox describes the period between 1877 and 1887 as the trials and tribulations of setting up an economic base, a project in which both government and private enterprise were involved. Haycox, 170-187.

thousands of bowhead whales, earning some of the largest profits in American whaling history.[97] The Navy, the Army, the Signal Service, the Revenue Cutter Service, and the U.S. Coast and Geodetic Survey all sent representatives on reconnaissance missions in Arctic Alaska in the 1880s in support of whaling.[98]

Military rule and economic expansion in Alaska turned out to be beneficial for American science in the north. As the Smithsonian could not finance Arctic scientific expeditions alone, its leaders partnered with government agencies like the U.S. Army Signal Service and War Department to attach Smithsonian naturalists to military missions throughout the territory.[99] As we will now see, part of re-making the Western Arctic involved building connections between museums and military agencies to replace those between the Smithsonian and the Hudson's Bay Company.

The arrival of commercial whalers, government agents, and traveling scientists to the Beaufort Sea set in motion a much larger shift in networks of circulation. The pursuit of baleen, the pliable plates of the Bowhead whale's upper jaw, began to redirect trading movements and collection activities from the Arctic interior toward the Beaufort Sea coast. It also linked the Western Arctic to an industrial circuitry based in the United States, not Russia or England. Before 1884, this whaling network operated mostly along sea routes, which fostered encounters with—and thus new knowledge of—surf, skies, tides, and ice. The creation of a connected Western Arctic region, one in which the social and natural life of coastal and inland

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97 For estimates of the bowhead whale population in the Beaufort Sea prior to the American whaling industry, see John R. Bockstoce and Daniel B. Botkin, "The Historical Status and Reduction of the Western Arctic Bowhead Whale (*Balaena mysticetus)* Population by the Pelagic Whaling Industry, 1848-1914," *Scientific Reports of the International Whaling Commission,* Special Issue, no. 5, 107-41.

98 On the support of the whaling industry, see Bockstoce, *Whales, Ice, and Men*, 290-323. Between 1883 and 1886, several parties from the Army, Navy, and Revenue Cutter Service sought to discover a river route through the Alaskan interior from the Bering Strait to the Arctic coast. See Sherwood, 119-138.

99 William Fitzhugh, ""Of No Ordinary Importance": Reversing polarities in Smithsonian Arctic Studies," in *Smithsonian at the Poles: Contributions to International Polar Year Science,* Igor Krupnik, Michael A. Lang, and Scott E. Miller, eds., (Washington: Smithsonian Institution Scholarly Press, 2009), 63-4.

environments was open to commercial and scientific agents alike, remained largely unformed until whaling came ashore in 1884. Still, in this transitional period, native northerners, whalers, scientists, and government agents made important changes to northern political economies and Arctic knowledge.

A suite of factors helped make the Beaufort Sea a new frontier for American empire. As historian John Bockstoce has demonstrated, depleted stocks in the Pacific Ocean and Bering Strait provided an initial incentive for whalers to press the boundaries of their harvesting areas. Whales were harder to find in the short summer season, prompting whalers to extend their searches to the spring and autumn. After hearing reports of abundant whales in the Beaufort Sea from British Royal Navy officials in the 1850s, whalers flocked to northern seas. Foraging crews engaged Inuit living along the Alaskan coast north of the Seward Peninsula. In 1879, Captain E.F. Nye wrote to the *New Bedford Standard,* a prominent journal within whaling communities, describing Point Hope Inuit as knowledgeable traders, who recognized "the value of whalebone and skins."[100]

If over-harvesting pushed whalers north, the richness of whales in the Beaufort Sea pulled them there. The ecology of the Beaufort Sea helped create ideal habitat for the bowhead. The sea receives the flow of several northern Alaskan rivers and the Mackenzie River, Canada's longest inland waterway. Nutrients washing off the land are funneled toward the shallow waters beyond the coastline. These nutrients provide essential ingredients for the growth of phytoplankton, which in turn, attract bowhead whales. Research estimates the population of bowhead whales

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100 Bockstoce summarizes the changes to the whaling industry and its expansion up the northwest coast in Bockstoce, *Furs and Frontiers in the Far North,* 275-315. Quotation from Ibid, 280. A deeper and fuller treatment is available in John R. Bockstoce, *Whales, Ice, and Men: The History of Whaling in the Western Arctic,* (Seattle: University of Washington Press), 1986, 30-180. As the whalers struggled to find suitable and accessible populations of whales, they turned to harvesting walrus—capturing more than 130,000 between 1866 and 1879. On the walrus harvest, see Bockstoce, *Furs and Frontiers in the Far North,* 315-16.; and Bockstoce, *Whales, Ice, and Men,* 129-142.

prior to the American whaling industry to number around 30,000 individuals.[101]

The bowhead appeared as a species uniquely suited to the needs of the whaling industry and vibrant global markets. Whale products were prominent features of metropolitan culture throughout the second half of the 19th century, with whale oil supplying lighthouses, candle-makers, and lubricating machines in factories and baleen used for corset stays and buggy whips.[102] The average bowhead carried more oil and more baleen than any other whale sought by the industry.[103] Once extracted from the Arctic, baleen was processed by economic machinery in San Francisco. There, commercial men established elaborate whaling companies, purchased boats from builders in New England, hired seasoned captains from around the country, and employed "landsharks" to find crew members in the Bay area desperate for work aboard Arctic-bound vessels. The most prominent of these companies, the Pacific Steam Whaling Company, had its headquarters in San Francisco, where it consolidated the hauls from its various ships and distributed these to manufacturers in New York, London, and Paris via ocean and railroad lines.[104]

With the benefit of hindsight, we can see these factors converging and thus creating the possibility for an Arctic whaling industry on the Beaufort Sea coast in the late 1800s. But the encounters taking place in historical moment reveal that American empire's northward expansion was far from inevitable. For much of the century, the dangers of ice thwarted many efforts to reach the so-called "East Shore" of Alaska—that coast around the northwestern hook of the

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101 On ecology of Mackenzie River and Beaufort Sea, see Bockstoce, *Whales, Ice, and Men,*263. For estimates of the bowhead whale population in the Beaufort Sea prior to the American whaling industry, see John R. Bockstoce and Daniel B. Botkin, 107-41.

102 Eric Jay Dolin, *Leviathan: The History of Whaling in America,* (New York: W.W. Norton & Company, 2007), 120; 356.

103 Ibid, 140.

104 Ibid. See also Bockstoce, *Whales, Ice, and Men,* 205-324.

territory.[105] As whaling vessels could harvest only in open seas, whalers timed their entrance and exit so as to allow for the greatest potential catch and a safe passage home. Ice retreated from Icy Cape around June of each year and returned to freeze-in any remaining ships by late September. When depleted stocks forced whalers to test the limits of this open-water season, whalers often risked their life for their livelihood. In 1871, ice crushed thirty-four whaling ships off the coast of Point Belcher. In 1876, the freezing seas consumed a dozen more. Even as steam-power helped alleviate many of these navigational issues, ice remained a force that held in check the economic appetite and geographical expansion of the whaling industry. Indeed, for much of the late nineteenth century, the Beaufort Sea had no other name but "Forbidden Sea."[106]

By the early 1880s, influential investors in New Bedford (Massachusetts) and San Francisco—the powerhouses of the American whaling industry—lobbied the federal government to protect and support the extraction of bowheads. Lobbyists promoted the industry as integral to the nation's economy, as it employed more than 1500 men each year and represented a capital investment of more than 1.4 million dollars. Industry representatives urged the government to erect life-saving stations on land to assist whalers who escaped from wrecked vessels. Unlike other whaling frontiers, the Arctic landscape appeared as "trackless," and "devoid of game." **S**hip captains noted that the normal course of responding to disaster—to "escape by small boats to the shore" and proceed home through communication with local settlements—would be impossible in the "uninhabited and desolate regions."[107]

The U.S. Revenue Cutter Service eventually met these requests. The Service, which had

105 Bockstoce, *Furs and Frontiers in the Far North*, 278.

106 On the loss of whaling ships, see Hinckley, *The Americanization of Alaska*, 79. On the Beaufort Sea as "Forbidden Sea," see Prince of Wales Heritage Center, "Historical Timeline of the Northwest Territories," www.pwnhc.ca/timeline (accessed 12 July 2012).

107 "Memo to the Honorable Secretary of the Treasury, Washington, DC, November 6th, 1884," in M641, Letters Received by the Revenue-Cutter Service, August 11, 1869-September 28, 1910, NARA.

patrolled the waters of the Bering Strait after the Alaska purchase and during a period of intense whaling and fur trading there, gradually explored the northern coast of Alaska in the 1870s and 1880s.[108] Revenue Cutter Service staff confirmed the viability of a shore-based relief station on the Beaufort Sea at Point Barrow in 1881 through their assistance on the International Polar Year Expedition of 1881-1883. This venture was organized by American military organizations, who selected the staff and gave orders in the field. Lieutenant Patrick Henry Ray, of the U.S. Army, worked with General W.B. Hazen, Chief Signal Officer, to obtain supplies, equipment, and hiring staff.[109] Detailing the encounters of naturalists on the expeditions further explicates the imperial transition taking place in the Western Arctic over the end of the nineteenth century.

Under the command of Ray, ten men left from San Francisco with the objective of "mak[ing] a three-year unbroken series of weather and magnetic observations...to learn about the causes of magnetic anomalies." Such an objective reflected both the dictates of an international congress on polar science held in Hamburg in 1879 and the importance of whaling in Arctic Alaska. At the close of the 1870s, scientists convened a series of international polar conferences, wherein the United States joined Austria, Norway, Sweden, Denmark, and Russia to coordinate global observations of meteorological and magnetic phenomena in the circumpolar basin. At the time, meteorologists understood that "the weather in high latitudes held the key to the behaviour of the atmosphere on wide scales."[110] Weather and navigation studies were "of practical interest

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108 The Revenue Cutter Service eventually became the United States Coast Guard. United States Coast Guard, "USCG Missions Timeline," available from United States Coast Guard, "U.S. Coast Guard History: Articles, Information & Downloadable Files," **http://www.uscg.mil/history/h_index.asp**, (accessed December 20, 2011).

109 On the Revenue Cutter Service's work in establishing Point Barrow as a safe station, see Charles D. Brower, *King of the Arctic: A Lifetime of Adventure in the Far North*, (London: Robert Hale Limited, 1958), 12-13. A good summary of the establishment of the International Polar Year Expedition can be found in John Murdoch, *Ethnological Results of the Point Barrow Expedition* ,introduction by William Fitzhugh, (Washington: Smithsonian Institution Press, 1998), ix-xvi.

110 Cornelia Luedecke, "The First International Polar Year (1882-1883): A big science experiment with small science equipment," *Proceedings of the International Commission on History of Meteorology*, vol.1, no.1 (2004): 56.

to the whaling industry" which had lost so many vessels in the Bering and Beaufort Seas in the 1860s and 1870s.[111]

The Smithsonian sent two naturalists with the International Polar Year Expedition, John Murdoch and Middleton Smith. They held different positions within scientific communities in the United States, but both men were budding researchers—not fur traders pulling double duty as gentleman collectors, as was the case with MacFarlane. Murdoch's resume reads like that of a poster child of U.S. science. He held an M.A. from Harvard in zoology, where he studied at the Museum of Comparative Zoology. When the Smithsonian invited him to go to Alaska, he was teaching zoology at the University of Wisconsin-Madison. After returning from the north, he worked with leading scholars like botanist Asa Gray and took a position as librarian at the Smithsonian, where he consulted the expanding Arctic collections in crafting a series of publications about Inuit culture in the 1890s.[112] Middleton Smith, the other naturalist accompanying Murdoch, seems to have been poorly prepared for his duties in the north. Of Smith, Murdoch wrote, he "is the chief wet blanket—fussy old woman ready to take offense, besides being stupid." He continued, "I can't imagine how he ever came to join the party as Naturalist, for he seems to be most utterly ignorant of zoology and in fact of everything else..."[113]

Both naturalists faced unusual challenges in making natural history collections, underlining the nature of the scientific encounter with the Western Arctic in this transitional period. Because the expedition's primary objective was meteorological in nature, they were given the assignment of "observer" and were thus "required to serve two four-hour watches each day,

111 Murdoch, *Ethnological Results of the Point Barrow Expedition,* xii to xvi. The International Polar Year expedition to Barrow was one of two expeditions in the North American Arctic—the other, featuring U.S. Army general and explorer Aldophus Greely and German anthropologist Franz Boas—headed to Lady Franklin Bay in Canada's eastern Arctic.

112 Murdoch, xiv to xxxviii.

113 Quoted in Murdoch, xvii. Letter is from Murdoch to "My Dear Dick" (Richard Rathburn), Aug 8, 1881.

during which time they recorded general weather conditions and took hourly meteorological readings." In addition, on the first and 15th of each month readings were taken "for twenty-four hours at five-minute intervals."[114] Smith's journal entries reveal how his position trained him to look toward the skies and surf of Arctic Alaska—and not the ground in front or behind him. He recorded the daily levels of barometric pressure, temperature, prevailing wind direction, and wind velocity, eventually computing monthly averages for these measurements. He also noted the number of foggy days, cloudy days, and days in which the aurora borealis were visible. He maintained an interest in the state of ice, jotting the presence of cracks and the movements of the ice pack from shore.[115] Because of the commitment to meteorology and hydrography—both in time and in daily practice—Murdoch and Smith could not venture far from the station. They lamented to friends in letters that their natural history work "suffered greatly" as a result.[116]

Despite these difficulties, however, Murdoch and Smith amassed a large collection of natural history and ethnological artifacts. In November of 1883, the Smithsonian accessioned 1,722 specimens from northern Alaska. The shipment included eggs, bird skins, mammal pelts, vertebrate skeletons, skulls, invertebrates, fish, insects, plants, fungi, mosses, minerals, photographs. In ways similar to MacFarlane's collections from the 1860s, Murdoch's was notable for its abundance of manufacturing and hunting equipment.[117] The almost identical compositions of the collections reflected the fact that both scientists relied on trading relations—largely controlled by Inuit—to procure scientific objects. In many cases, the items off-loaded by native northerners were those they no longer needed, given their ability to access and manage trade

114 Ibid, xix.
115 Middleton Smith, "Journal: August 12, 1882 to March 3, 1883," International Polar Year Expedition to Pt. Barrow, Middleton Smith Papers (Subgroup 1), Box 1, folder 2, APR-UAF.
116 Quoted in Murdoch, *Ethnological Results of the Point Barrow Expedition,* xix.
117 Ibid, xxix- xxxi

goods from U.S. whalers and Hudson's Bay Company traders.[118]

The collections of the International Polar Year Expedition revealed that the influence of foreigners was mediated by Inuit and confined largely to the seas of the Arctic Ocean. Yet in achieving its main political mission—confirming Point Barrow as offering safe harbor along the Beaufort Sea coast—the expedition was a portent of dramatic change. The federal government delayed appropriations for its own relief station at Point Barrow, but private enterprise went forward with its own plans. In 1884, the Pacific Steam Whaling Company established facilities at Barrow; the government's building and staff would not arrive until 1890.[119]

The whaling industry finally reached shore in the early 1880s. Prior to this point, economic exchange relations with the Inuit of Arctic Alaska were conducted principally from the ocean. As a consequence, whalers and whaling captains knew very little about the interior landscape beyond the shoreline and the habits, customs, or settlement patterns of Inuit. In addition, the region was still largely divided: a U.S. whaling industry surged in the west and the Hudson's Bay Company maintained its fur posts in the Mackenzie River district to the east. Oriented toward the sea, the whaling industry—and those who followed north in its wake—often had little interest in or ability to access what lay beyond the shoreline.

Science and Settlement on the Beaufort Sea Coast, 1889-1898

In the late 1880s, the whaling industry faced fierce competition from a suite of cheaper alternatives. Hog oils, camphene, and petroleum could be processed and shipped in the south, as

118 Ibid.

119 On the construction of a station by the Pacific Steam Whaling Company, see Bockstoce, *Whales, Ice, and Men,* 317-318. On the U.S. government's relief station, see "Appropriations, 1889-1895," M641 Letters received by the Revenue-Cutter Service, August 11, 1869 to September 28, 1910, Letters Received Concerning Administration of the Point Barrow Refuge Station, 1884-1898, NARA.

opposed to the expensive Arctic whale products.[120] The industry was essentially propped up by the high price of baleen, which had peaked at $5.38 a pound in 1891—up from 80 cents in 1870.[121] These conditions prompted whalers to both intensify and adapt the whaling industry in a variety of ways, which resulted in new patterns of economic life on the Beaufort Sea coast. Scholars have referred to the social, ecological, and economic transformations associated with the settlement of commercial whaling in the region as a "revolution" in northern history.[122] As we will see, science both benefitted from this revolution and contributed to it.

One of the first adaptations to slimmer profit margins was to extend the whaling season by over-wintering in the north. Whalers found that by carrying enough provisions to last an entire year (one summer, one fall, one winter, one spring, and another summer), they could access the migration of bowhead whales from the opening of ice in April—a full two or three months before open-water season began on the Beaufort Sea. To stay in the Arctic for an entire winter required a strong crew, a well-equipped vessel, and a lot of support. Over the 1870s and 1880s, the industry witnessed the emergence of tenders, vessels that were not after whales but acted as go-betweens. Tenders could re-supply active whaling ships during the summer months and take cargoes south, thereby preventing any losses that might occur from unforeseen disaster. Like tenders, certain harbors along the Alaskan coast became instrumental in repairing and restocking boats. Port Clarence offered a safer, more sheltered port than others further northward, like Point Hope. By the mid 1880s, whaling companies had established Port Clarence as a mid-

120 Dolin, 336-341.
121 Ibid, 356.
122 Murdoch and Fitzhugh, *Ethnological Studies of the Point Barrow Expedition*, xiii. David M. Hickock argued that there were four major historical movements that affected the relationship between Alaskan Inuit living along the north slope and the north slope itself between the mid 1800s and WWI1. The first and most important was the establishment of the coastal commercial whaling industry. See David M. Hickock, "Nunamiut Experience and Current Approaches to Subsistence Harvest Problems by the People of Anaktuvuk," Presented before the Federal-State Land use Planning Commission for Alaska, Feb 5-6, 1974," 3-4, David M. Hickock Papers, Box 2, Folder 36, UAA.

summer refitting post: boats would come to stock up on fuel and provisions in July before heading back north to finish the season and begin over-wintering. After leaving Port Clarence, though, the inter-annual movements of whalers varied greatly, since ice conditions dictated how quickly they were able to move around the Alaskan coast to points eastward. Nevertheless, over-wintering was not a limited phenomenon. In the 1890s, whalers made more than seventy winterings on the Beaufort Sea coast.[123]

Over-wintering created new rhythms and exchanges in the whaling network. Inuit had developed technologies and traditions around shore whaling—the art of harvesting whale from the melting shore ice—and whalers were quick to adopt and appropriate these into the commercial industry.[124] Such practices created new relationships among whaling captains, whaling crews, and Inuit and Dene natives. As whalers moved northward from San Francisco in June, they hired Inuit families in coastal Alaskan communities, like Unalaska, St. Lawrence Island, and Nome. As Russian and British traders had done for furs, American whalers relied on Inuit to help identify the location of whales. They also employed Inuit as seamstresses, shelter-builders, and caribou hunters. In return for their year's service on the boats, Inuit men and women were paid in trade goods, whaling gear, and whaleboats, providing native northerners with enhanced mobility. By the 1880s, Point Barrow was populated with whalers from all over the world and Inuit from all over Alaska.[125]

In addition to new rhythms and exchanges, the settlement of the whaling industry on the Beaufort Sea created new nodes in the network of circulation. Over the 1880s and 1890s,

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123 Bockstoce, *Furs and Frontiers in the Far North*, 220-230, 350.

124 On the practice of shore whaling, see Bockstoce, *Whales, Ice, and Men*, 231-254.

125 On the trade relations that marked the expansion of whaling in the 1880s and 1890s, see Bockstoce, *Whales, Ice, and Men*, 201-2. Along the passage between the west coast of Alaska to the Beaufort Sea, whalers often gave these Inuit new English handles (like Cockney, Big Jim, Sam Brown, for instance) because they could not pronounce their native names.

permanent villages comprised of whalers and Inuit emerged along the Alaskan and Beaufort Sea coast, stretching from the Bering Strait to Point Barrow. These new towns—including Cape Lisburne, Point Lay, Point Hope, Wainwright, and Point Barrow—were often sited at existing Inuit encampments (See Figure 3 throughout section).[126] In some cases, these settlements led to the elimination of historic meeting places. Where Inuit fur traders had previously congregated at Sheshalik near the Seward Peninsula in the summertime, they abandoned this site for trade at Barrow by the early 1880s. The site of Nigliq, which had acted as a tributary linking two main channels of trade on the Mackenzie River and Bering Strait, gradually lost its prominence as trade shifted by 1887 to a site closer to Point Barrow called Pigliq. In addition, another historic coastal trading point, Barter Island, temporarily moved closer to Point Barrow—to Collinson Point—in the early 1880s.[127]

There are a few explanations possible for the shift in trading relations. Native northerners living in the interior along the Mackenzie and Porcupine rivers did not have direct access to marine mammals—like seal and whale—which provided valuable oils, skins, and meats. In addition, whaling boats brought cheaper and more extensive loads of American-made goods that might appeal to locals living on the coast or in the interior, including firearms, food stuffs, tobacco, and liquor. As whalers and traders from Russia over-harvested whales, walrus, and seal in the 1850s and 1860s, Inuit from the Bering Strait became more interested in acquiring Beaufort Sea products, whether by temporarily traveling there to trade or permanently relocating. It is also possible that declining caribou populations in the Bering Sea—which were driven by

126 Two of the largest whaling settlements, Point Hope and Point Barrow, were sited at the two largest Inuit villages on the coast, Tigara and Utkiavik. For insightful accounts of the development of these coastal towns, see Brower, *King of the Arctic*, 12-78. Icy Cape also formed in 1918 through the partnership of whaler Charles Brower and Jim Allen. See Arthur James Allen, *A Whaler and Trader in the Arctic, 1895 to 1944: My Life with the Bowhead*, (Anchorage, AK: Alaska Northwest Publishing Company, 1978),

127 On the declining importance of historical trading places, see Bockstoce, *Furs and Frontiers in the Far North*, 335-355.

native Inuit contracted to procure fresh meat for whalers—further motivated Inuit to head north for the goods they once could find at home.[128]

This pattern of searching for whales, establishing trade with natives, and settling new trading centers along the coast eventually led to the U.S. whaling industry's arrival in Canada. In 1889, whalers from Point Barrow explored the mouth of the Mackenzie River with protection from the U.S. Revenue Cutter Service. Finding whales "as thick as bees," near Herschel Island, they established the island as a hub of trading activity. In 1894, fifteen whaling vessels called at Pauline Cove on Herschel Island and the town boasted a population of 1,000.[129] By the time the whaling industry came to Canada, markets had worsened, inspiring additional adjustments in operations. By 1890, whale ships took the bulk of their profits from the sale of flour, firearms, alcohol, and other American goods, effectively becoming floating trading posts.[130]

With Herschel Island and Barrow established as anchors in the Beaufort Sea trade, the Dominion of Canada and the Hudson's Bay Company faced a new threat to its control in the Arctic. Whalers traded goods for much lower prices than the Company: a 100 lb sack of flour fetched $30 at Fort McPherson, but cost only $2 from a whaler.[131] Company representatives noted these conditions and sought to stem the reach of the whaling industry into their territory. John Firth, the post operator at Fort McPherson in 1892, received a party of Inuit with a boat

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128 On the decline of marine mammals in the Bering Strait and the incentive to move north to trade for seal and whale, see Bockstoce, *Furs and Frontiers in the Far North,* 319-324.

129 See Bockstoce, *Whales, Ice, and Men,* 255-288. See also Nagy, 33.

130 For the change in bowhead harvesting practices, see Bockstoce, *Whales, Ice, and Men,* 231-254. On whaling ships becoming trading ships, see Ibid, 274-276.

131 A thorough history of whaling particular to Herschel Island and the Mackenzie Delta is Rob Ingram and Helene Dobrowolsky, *Waves upon the Shore: A Historical Profile of Herschel Island,* prepared for Heritage Branch, Department of Tourism, Government of Yukon Territory, September 1989. For the prices given at McPherson and Herschel, see 78. Canadian concern over the whalers was likely fueled by the economics of whaling. Between 1891 and 1907, whales taken out of Canadian waters of the Beaufort Sea totaled a value of 13.5 million dollars. During the same period, the fur economy of the Northwest Territories was valued at 1.5 million.

loaded with goods purchased from American whalers.[132] Herschel Island thus became a crucial meeting ground between the U.S. whaling industry and the Hudson's Bay Company fur trade—it was a joint that connected the American, British, and Canadian empires in the Western Arctic.

The establishment of the whaling industry on Herschel Island allowed for new kinds of scientific travel to and through the region. On an expedition between 1892 and 1894, ethnologist-in-training Frank Russell surveyed vast swaths of northwestern Canada. A student at the University of Iowa, he became the first man to descend the Mackenzie River to its mouth and reach "civilization" by sailing around Alaska.[133] This was a remarkable feat, given that the many of the available maps for the area were produced by British explorers in the early 1800s.[134] Of course, traveling such a route was made possible by both the Hudson's Bay Company fur posts and the whaling infrastructure at Herschel Island, Point Barrow, and San Francisco. His encounters thus indicate for us the end of a period of imperial transition in Western Arctic political economies.

Russell's research interests mark the growth of scientific institutions in the United States over the end of the nineteenth century and their relationships with the Western Arctic. The development of universities in the last twenty years of the 1800s provided a pool of eager young scholars looking to build a reputation in the field of science and a venue in which those careers could play out.[135] To these ambitious young men, Arctic Alaska and Canada were rich proving grounds for one's future tenure as a professional scientist. Government scientist and Alaskan

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132 Firth sent a note to the whalers through these Inuit that he would no longer forward mail to Herschel Island if they continued buying furs from the Inuit. Bockstoce, *Furs and Frontiers in the Far North,* 351.

133 Carol Harker, "Northward, Ho!" *Iowa Alumni Magazine, (*March 1992): http://www.iowalum.com/magazine/print.cfm?target_url=http://www.iowalum.com/magazine/mar92/northward.cfm?page=print, (accessed October 1, 2011).

134 Frank Russell regularly relied on the narratives and maps of British travelers who had visited the Northwest Territories and Arctic Ocean in the mid-1800s. See Frank Russell, "The Journal of Frank Russell," 149-152.

135 On the development of universities in the late 1800s and their role in the rise of professional science, see Ronald Numbers & Charles Rosenberg, eds., *The Scientific Enterprise in America: Readings from Isis,* (Chicago: University of Chicago Press, 1996). See especially essays by Robert E. Kohler and Stanley M. Guralnick.

promoter Henry Elliot wrote, "It is a paradise for the naturalist, a happy hunting ground for the ethnologist, a new and boundless field for the geologist, and the physical phenomena of its climate are something wonderful to contemplate."[136] Russell had originally planned to do research in northern Saskatchewan, where one of his mentors at Iowa, zoologist C.C. Nutting, had helped build a field station. While at Lake Winnipeg, Russell met Roderick MacFarlane, whose "enthusiastic descriptions of the field" roused in him a "strong desire to visit the Far North."[137] MacFarlane's engagement with northern science in the 1860s, then, echoed throughout the late nineteenth century, helping establish northern regions as fertile frontiers for would-be professional scientists.

As a scientific traveler affiliated with a university in the 1890s, Russell's research responded to impulses distinct from MacFarlane and Murdoch. He received direct orders from the Iowa Board of Regents to obtain specimens of larger mammals, especially the muskox. This big-game species had gained notoriety among sportsmen, university scientists, and leisure-class urbanites as an icon of a growing social movement, natural resource conservation. The destruction of the nation's natural resources had been made painfully evident in the United States through the near extinction of the bison and passenger pigeon, as well as the exploitation of the mid-west's timberlands.[138] As U.S. empire reached northern shores in the late 1800s,

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136 Quoted in Sherwood, 49. Elliot also noted: "It is, and will be for years to come, a perfect treasure-trove for these gentlemen; but alas! It bids fair, from what we now know, never to be a treasure-trove for the miner or the agriculturalist." 49

137 Russell, *Explorations in the Far North,* iii. Nutting was a leading American zoologist: he was a one-time president of the Iowa Academy of Sciences, one of the many state societies that cropped up around the country in the 1880s and 1890s. See Dale R. Calder, "From birds to hydroids: Charles Cleveland Nutting (1858-1927) of the University of Iowa," *Hydrobiologia,* vol. 530/531 (2004): 13-25.

138 Historian John Sandlos details the conservationist and colonialist sentiments that emerged around the muskox in the 1890s and early 1900s, especially in Canada. John Sandlos, *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories,* (Vancouver: University of British Columbia Press, 2007), 113-138. Of a scheme to domesticate muskox proposed by Canadian officials in the 1920s, Sandlos writes: "The history of muskox conservation thus suggests that the federal wildlife bureaucracy functioned as a colonial instrument meant to facilitate the rapid expansion of southern agricultural settlement and industrial activity in northern Canada."

conservationists construed the Western Arctic as a place in which rational study and management of nature would redeem the tragedies of America's environmental history. As a recent observer suggests, in the late 1800s, collecting muskox was thought to be the "responsible thing to do before they disappeared entirely."[139]

To achieve his objectives, Russell followed in the footsteps of explorers and scientists who had already gone north, especially MacFarlane. Like the Company fur trader and gentleman collector, Russell traveled along trade routes. His guides agreed to take him on their summer trade journey between Fort McPherson and Herschel Island. As with the fur trader, the ethnologist found this means of transport suitable for observing his human and natural subjects. The passage to Herschel was taken by canoe through the winding Mackenzie Delta, which in summer, offered Russell a vibrant array of animal life as backdrop. "Muskrats were abundant in the many channels," he wrote, "and ducks, geese, cranes, swans, and loons filled the air with discordant sounds at all hours." He continued, "Bald eagles were seen during the day, one of which Vusso killed for its skin which he carried to the coast to trade with the Eskimos."[140]

Yet there were important differences between Russell and his predecessors. In McPherson, Russell noted that the tensions between Dene and Inuit that were rife in MacFarlane's day had changed. The center of gravity of Inuit-Dene trading relations had moved from the Mackenzie Delta to the Yukon coast near Herschel Island. Dene still had access to guns, ammunition, and European-made goods at Fort McPherson, but they could find better prices for their goods through Inuit, who had closer relations with the American whaling ships and the

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139 University of Iowa, Museum of Natural History, "Frank Russell Expedition." "Collecting musk oxen was the primary goal of Russell's expedition. Scientists at the time assumed musk oxen were doomed to extinction. Collecting some of the last specimens for the Museum was thought the responsible thing to do before they disappeared entirely."

140 Frank Russell, *Explorations in the Far North: Being the Report of an Expedition under the Auspices of the University of Iowa during the Years 1892, '93, and '94,* (Iowa City, IA: State University of Iowa, 1898), 136-8.

provisions they brought north.[141]

In addition, Russell's routes of travel and his interactions with native northerners were not confined to the Mackenzie River district or a remote research station, as MacFarlane and Murdoch had been. Rather, Russell was able to move throughout the Mackenzie River, the Mackenzie Delta, and the Beaufort Sea coast, allowing him greater exposure to more of the Western Arctic region. We get a sense of this through the travel of his shipments of specimens. Before heading down the Mackenzie River to Fort McPherson, and then on to Herschel Island, Russell arranged for a series of boxes of artifacts and specimens to be sent out of the north via Fort Resolution, one of the Hudson's Bay Company's posts. Once at Herschel, however, he sent similar goods not down river, but across the sea, via San Francisco. Both sets of boxes were destined not for D.C., but for Iowa City, and the University of Iowa's Museum of Natural History.[142]

The presence of the whaling industry changed how collectors like Russell conducted their business. Given MacFarlane's occupation in the fur trade and Murdoch's orders to study the ocean and skies, previous scientists had to rely solely on Inuit for knowledge and objects from the Western Arctic. But the establishment of regular schedules of transportation and trade on the Beaufort Sea coast provided Russell with opportunities to gather a more comprehensive knowledge of the Western Arctic. At Herschel Island, Russell found whalers to be a great source of information about a wide geographic expanse he could not possibly cover on his own. As many whalers had arrived to the island via a trip along the Alaskan coast of the Beaufort Sea, he plied them for testimony on a variety of scientific subjects, such as the conditions of the

141 Frank Russell, "The Journal of Frank Russell," 161. Dene and Inuit worked out a schedule for trade at the edge of the mainland of the Mackenzie Delta, whereby trading parties would send up smoke signals to alert the Inuit at Herschel Island that exchange relations were to commence.

142 Ibid, 155-161.

shoreline, the presence or absence of native communities along the edge of land, and the movements of ice, geese, fox, and fish.[143] Beyond accounts and observations, Russell also relied on whalers to help him acquire specimens. He outsourced some of his collecting duties to crewmen aboard the *Jeanette*, a whaling vessel that employed both white men and "Cogmollicks," or Inuit from the Mackenzie Delta area.[144] Whalers did not fully displace Inuit as keepers of Arctic knowledge, but they certainly allowed itinerant scientists more access to the northern world.

Russell's encounters also flag developments taking place outside the Western Arctic, in the halls of government and academia. As we will see in greater detail in subsequent chapters, the conservation movement and the development of science in the United States and Canada were forces that reoriented the positions of science and the state relative to private industry. Overturning centuries-old support of private enterprise and the homesteader, conservationists advocated for the rational use of national resources. As Russell headed north in search of muskox, officials in the United States and Canada considered legislation to prevent the waste of birds, big game, and forests. This legislation created new agencies like the National Parks Service and the Forest Service, and new government agents, many of which relied on scientific training and theories to promote methods of efficient natural resource management.[145]

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143 Ibid, 164.

144 Ibid, 158. Russell authorized a white crewman to purchase a bearskin from an Inuit man for a mixture of American-made goods. He noted that such goods would have cost him $50 at Fort McPherson, but at Herschel, they cost but $10. This deal eventually went through, but not in Russell's favor. Another whaler, "Bob," purchased the skin from the Inuit man, "Coonuk" for three bags of flour, weighing over 150 lbs. That Russell's dealings for bear skins were in competition with whalers draws attention to how the value of a "specimen" could shift depending on how it moved within networks of circulation. At one moment, for the right price, it was destined to be a scientific article. In the next, for a different price, it was part of the whaler's bounty, on a path toward a life as a garment or wall decoration. Of course, Inuit often set these prices and helped negotiate the terms of how the other end of the trading relations played out, looking to fetch the most goods.

145 There is a large literature on the U.S. conservation movement as it relates to land-use, land regulation, and the creation of federal bureaucracies around land tenure. The classic text remains Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890- 1920*, (Cambridge: Harvard University Press, 1959). See especially 27-90 and 148-171.

While not a wildlife manager, Russell eventually did take up a position as a governmental scientist. After returning to the United States, he enrolled in Harvard's ethnology program under renowned archaeologist Frederic Ward Putnam, earning his Ph.D in 1896. He stayed at Harvard as an instructor in anthropology until his death in 1903. Before he passed, Russell took leave from Harvard to spend two years seeking health in Arizona. While there, he performed research for the Bureau of American Ethnology on the Apache and Pima Indians.[146] In 1901, the Bureau purchased the lengthy journals from his Arctic research. Unlike his treatments of the Pima and Apache, however, these northern notes were never published.[147]

The Iowa ethnologist's movements in the north reveal a final aspect of the circuit of knowledge and power taking shape in the Western Arctic during the 1880s and 1890s: Canadian anxieties. By 1895, whalers recognized dwindling bowhead populations around Herschel Island and pushed the edge of the whaling frontier eastward to Baillie Island.[148] The presence of American whalers deep in Canadian territory represented a threat to sovereignty, and missionary reports of debauchery, prostitution, and the free flow of alcohol at whaling outposts gave further cause for concern. In 1903, Canadian officials dispatched northern police to Herschel Island to monitor whaling activities and collect customs duties from ships arriving from Barrow. The presence of police and missionaries on Herschel Island offered Ottawa bureaucrats a sense of control, enforcing social norms, moral codes, and political boundaries along the Beaufort Sea

146 "Frank Russell, Noted Scientist," *The Des Moines Register*, 15 November, 1903. "Dr. Russell Resigns," *Harvard Crimson,* 30 May 1903.

147 A note on the inside cover of Frank Russell's journal indicates this transaction: "Purchased by Bureau of American Ethnology, March 1, 1901, $250." Frank Russell, "Journal of Frank Russell." This may have been because his sponsors at the time required of him a generalist approach and the Bureau was primarily interested in studies of language and material culture. After all, he had admitted to readers of his 1898 book, Explorations in the Far North, that while he had gone north to obtain specimens of large mammals, he was also instructed to "pick up everything else that I could lay my hands on." Frank Russell, *Explorations in the Far North,* iii. Russell does not attribute the quote to anyone, but it is likely either Professor Nutting or the university's Board of Regents.

148 On the expansion of the whaling industry to Baillie Island, see Bockstoce, *Whales, Ice, and Men,* 326-331. See also Ingram and Dobrowolsky, 45-50.

coast. [149]

The Royal Canadian Mounted Police responded to concerns over sovereignty, as did Frank Russell's traveling partner between 1893 and 1894, Count Eduoard de Sainville (also written as Comte de Sainville). While in the sprawling Mackenzie River delta, Russell met de Sainville, a French geographer, who was working with the Canadian government in the region between 1889 and 1894.[150] De Sainville had been enlisted to assist a broader federal project of accounting for the resources and geography of the Canadian Western Arctic.

Unlike its neighbors to the south, Canada was not as prepared to dispatch naturalists or military officials to the Western Arctic in the 1800s. The Dominion boasted fewer universities and museums, and its national museum was not complete until 1907.[151] Like the United States, it was pre-occupied with exploring, surveying, and populating the Great Plains-Great Basin West

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149 On the duties and presence of missionaries and northern police at Herschel Island, see William R. Morrison, *Showing the Flag: The Mounted Police and Canadian Sovereignty in the North, 1894-1925*, (Vancouver: University of British Columbia Press, 1985,) 77-105; 112-120. The Canadian government also supported tours of the Arctic archipelago by explorers and Geological Survey scientists to assert sovereignty over islands in the Arctic ocean, but their activities were more important in the Central and Eastern Arctics than in the Western Arctic. See also Janice Cavell, "Arctic Exploration in Canadian Print Culture, 1890-1930," *Papers of the Bibliographical Society of Canada*, 44, 2 (Fall 2006): 7-16. Perhaps the best evidence of the mixture of political economies and cultures in the Western Arctic is the trade jargon developed and practiced by Inuit, Dene, whalers, police, and missionaries from Barrow through Barter Island to Baillie Island. See Vilhjalmur Stefansson, "Eskimo Trade Jargon of Herschel Island," *American Anthropologist* 11, no. 2 (Apr. - Jun., 1909), 217-232.

150 De Sainville has largely escaped historical scholarship on the Canadian north. Peter Lorenz Neufeld provides a summary of the known documents relating to his time in the Mackenzie Delta, as well as a summary of this scientific background and training. See Peter Lorenz Neufeld, "De Sainville: Forgotten Mackenzie Mapper," *North*, (Winter: 1981), 55-7. His travels and connection with the government are poorly understood, mostly because few records remain to help understand them. A review of the journals of Anglican missionaries and Hudson's Bay Company traders from Fort McPherson reveals that de Sainville was learned in the sciences from astronomy to zoology, and engaged white society in the Arctic by sharing afternoon tea, offering lectures, and giving French lessons. In addition, some correspondence between him and Ottawa bureaucrats remains, which documents keen interests from several elected officials in enumerating northern resources and learning the possibilities of northern administration. The French scientist published a brief account of his travels in a Paris geographical society bulletin in 1898—which was picked up by the British Royal Geographical Society in the same year—and then died thereafter. The review of missionary letters that includes an mention and analysis of de Sainville comes from Walter Vanast, "Mary Had a Sickly Child: The Social Life of Count de Sainville, a French Aristocrat (Perhaps), at Fort McPherson, 1889-1894," available at http://www.scribd.com/doc/49100414/Sainville-Draft-9b, (accessed July 13, 2012).

151 For a review of the development of national institutions of science in Canada, see Morris Zaslow, *Reading the Rocks: The Story of the Geological Survey of Canada, 1842-1972*, (Toronto: Macmillan Company of Canada, Department of Energy Mines and Resources, 1975).

and erecting an urban-industrial complex on the east coast.[152] Indeed, in the late 1880s and early 1890s, Roderick MacFarlane went to lengths to rally support for science in Canada, especially in its northern regions. "If the people wish to own [a national museum of natural history] as they might and ought to have," he wrote, "then every effort should be put forth in order to secure, first, the filling up of the many gaps in the catalogues of well-known species, which are still unrepresented therein."[153]

While MacFarlane sought to inspire Canadians to take up science more seriously, and bring it north, the Canadian government was also beginning to spread its reach northward. Between 1871 and 1899, Dominion agents signed eight separate treaties with First Nations communities in the northwestern provinces and territories. These agreements testify to the emerging federal interest in appropriating lands and establishing sovereignty over the people and resources on them.[154] While none of these treaties reached into the Western Arctic, de Sainville's travels indicate Canada was interested in asserting its claims over this region, too.[155]

By 1898, an imperial transition in networks of circulation had re-made the Western Arctic. The Hudson's Bay Company's system of fur posts constituted a Mackenzie River route, which began in Fort Smith and ended in Fort McPherson, at the base of the snarling Mackenzie

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152 Hinckley, 243.

153 Charles Mair and Roderick MacFarlane, *Through the Mackenzie Basin,* (William Briggs, 1908), 151.

154 On the development of treaties in the Canadian northwest, see Rene Fumoleau, *As Long as this Land Shall Last*, second edition, (Calgary: University of Calgary Press, 2004).

155 The French scientist asserted that the historic British maps for the region were inaccurate: contrary to the existing charts, the region did indeed offer a suitable harbor for large ships. This assertion was based on his own mapping project, which followed the methods and instrumentation approved by French and British geographical societies. De Sainville also suggested that Hutchinson Bay was an ideal harbor in the Mackenzie Delta region, not only because its waters were deep enough for sea-going vessels, but because of the prevailing currents and winds—which pushed the pack ice away from shore earlier than any other location along the coast. This was crucial strategic information for the Canadian government, but the Dominion appears to have not acted upon it. Neufeld, 56. For equipment, De Sainville worked with a sextant made in New York, a Negus chronometer, a large compass; and an aneroid barometer. I suggest that mapping performed by such instruments was deemed acceptable by French and British geographical societies because he was able to publish in the journals of both groups in 1898. See Par Eduard de Sainville, "Voyage a l'embouchure de la Riviere Mackenzie, 1889-1894" *Bulletin de la Society Geographie,* vol.19 (1898), 291-307. "Journey to the Mouth of the Mackenzie," *The Geographical Journal,* vol. 13 (January to June, 1899), 435.

Delta. From here, Inuit, Dene, and missionaries took occasional trips across the Delta to Herschel Island. Around the coast of Alaska, whaling-turned-trading vessels made regular trips between San Francisco, Barrow, Herschel Island, and Baillie Island, while U.S. government ships patrolled the coastal trade only until the unofficial international boundary at Demarcation Point, Alaska. Many Inuit adapted to the arrival of these newcomers, traveling with them to emerging trading sites and those they had previously established on the coast.

De Sainville and Russell left this region together, purchasing a ride from Herschel Island to San Francisco aboard the *Jeanette.* After stopping over at Barrow, and at several locations along the Alaskan and Siberian shores, the men arrived at the docks on the Pacific coast. From here, Russell headed east and eventually returned to Iowa to a "flattering reception" of hundreds of faculty, friends, and townsfolk in 1894.[156] Accompanying him on the train depot that day were extensive collections of zoological, geological, and ethnological specimens from a large geographic area, spanning the territory between Great Slave Lake and the Arctic coast.[157] Like previous collectors, the ways Russell procured these materials helps us understand the history of science and empire in the Arctic. The ethnologist could speak of the state of native life and northern environments in ways MacFarlane and Murdoch could not have imagined before the reassignment of territories to the United States and Canada and the settlement of the U.S. whaling industry on the Beaufort Sea coast. In 1861, the Beaufort Sea had been "forbidden" to science and New World empires. By 1898, it was home to both.

Changes in Arctic Representations: From Dangerous to Endangered

156 Frank Russell, *Explorations in the Far North*, 152-157.

157 These materials are still preserved by the University of Iowa. University of Iowa, Museum of Natural History, "Frank Russell Expedition," available at http://www.uiowa.edu/mnh/researchcollections/russellcollection.html, (accessed 13 July 13 2012). Museum of Natural History, "Frank Russell: An Iowa City Gem," http://uiowamnh.blogspot.com/2011/11/frank-russell-iowa-city-gem.html, (accessed July 13, 2012).

Thus far, we have examined the re-making of the Western Arctic by attending to shifts in politics, economies, and circulatory networks. A final journey takes us through the representations of the Arctic—its environment and the people who lived there—carried north by scientists and promoted by them upon their return south. In following transformations in Arctic imaginaries over the same three periods as we have traced networks of circulation, we can see how ideas of the north emerged from, and helped direct, imperial encounters. Especially in a location as distant and challenging as the Arctic, notions of place helped legitimize investments in whaling, trading, administration, and research. Science and empire, and representations and interventions thus operated on social, material, and symbolic planes.[158]

A Hostile Place, 1861-1867

For much of the eighteenth and nineteenth centuries, travelers to British North America and Russian America imagined the place as hostile. Its bone-chilling climate, its extreme stretches of light and dark, and its notoriously "barren" landscape all vexed British naval officers and fur traders. If these physical conditions were treacherous, so too were Arctic indigenes: they presented fur traders, especially, with unpredictable risks.

The Hudson's Bay Company was largely responsible for the enduring myth of the hostile Inuit trader. In 1771, Samuel Hearne had traveled down the Coppermine River with Dene guides, hoping to initiate trade relations with the Inuit living near the Coronation Gulf. According to Hearne, his Dene guides ambushed a party of Inuit, murdering twenty men, women, and

158 Gregg Mitman has argued that the study of how scientists come to know the natural world—through social, material, and symbolic relations—can inform the practice of environmental history. Gregg Mitman, "In Search of Health: Landscape and Disease in American Environmental History," *Environmental History*, Vol. 10, No. 2 (Apr., 2005): 184-210. See especially page 185.

children. In 1799, Duncan Livingston attempted to replicate Alexander Mackenzie's 1789 journey down the Mackenzie River to the Arctic ocean. After meeting a group of Inuit below Arctic Red River, Livingston's entire crew was killed.[159] Hearne and Livingston's experiences became legend—with Hearne's story referred to as the "Bloody Falls Massacre"—and were preserved in accounts that circulated throughout the Company for the next seven or eight decades.[160] As geographer Emilie Cameron has pointed out in her study of the Bloody Falls Massacre, the discursive practices at play in crafting Inuit and Dene identity worked hand-in-hand with seeking a monopoly over the northwest's biological resources.[161] As we will see, these long-standing representations were overturned as British North America gave way to northern Canada and felt the encroachment of U.S. whalers in the last two decades of the 1800s.

In 1890, under the encouragement of George Dawson, an influential Canadian scientist with the Geological Survey of Canada, Roderick MacFarlane published a summary of his 1857 journey down the Anderson River in the *Canadian Record of Science*.[162] MacFarlane's observations were filtered through his experience as a fur trader, one who hoped to finally extend the Hudson's Bay Company's fur trade into Inuit territory. In his article, MacFarlane directly responded to his superior's orders to detail the food, fuel, and fur resources of the country.[163] His

159 Stager, 45-6.

160 Emilie Cameron, "Copper Stories: Imaginative Geographies and Material Orderings of the Central Canadian Arctic," in A. Baldwin, L. Cameron, and A. Kobayashi (eds.) *Rethinking the Great White North: Race, Nature and the Historical Geographies of Whiteness in Canada, (*Vancouver: University of British Columbia Press, 2011), 169-190. From the Fort Good Hope post on the Great Bear Lake came testimony of "frequent wars" between Dene and Inuit at the base of the Mackenzie Delta, the historic border between coastal-dwelling Inuit and inland-dwelling Dene. From the 1820s to the 1840s, exploration narratives provided by British Royal Navy officers searching for the Northwest Passage helped memorialize the events on the Coppermine River. These narratives created an iconic image of Inuit and Dene as savage and Hearne and other British officials as mediators in the Arctic.

161 Cameron, 169-190.

162 As we will see in more detail in the next chapter, the Klondike gold rush inspired new interests from scientists situated in North American governmental agencies in the region formerly known as British North America. Part of this interest involved resurrecting MacFarlane's work, much of which had not yet been published.

163 Roderick MacFarlane, "On an Expedition down the Begh-ula or Anderson River," *Canadian Record of Science,* vol. 4 (1891): 28-53. He described rivers and their banks in light of how suitable they were to travel and

optimism about the natural resources of the Anderson River area was tempered by his interactions with Dene and Inuit, as he felt pressured to act as mediator between the groups in order to facilitate trade. MacFarlane traveled with an Inuit "chief" between the lower Anderson River and a larger camp of Inuit families stationed at the mouth of the river in Liverpool Bay. Here, his party was overtaken by a large fleet of Inuit canoes and kayaks, which, according to the British fur trader, immediately displayed the intent to engage in battle. "Seven guns were held up to intimate to us that they were as well armed as ourselves," MacFarlane wrote. He quickly abandoned any negotiations with these coastal Inuit, deciding to ditch his canoes and walk seven days back to his camp up river in order to avoid further confrontations. With similar expedience, he blamed this altercation on historic Inuit-Dene tensions around the fur trade without acknowledging that extending the Hudson's Bay Company's reach northward to the Arctic coast may have also agitated native northerners and their trading networks.[164]

MacFarlane's experience along the Anderson River encouraged him to promote the notion of Inuit as naturally antagonistic, aggressive, and inhospitable. To his Hudson's Bay Company superiors, he described native northerners as tall and well-formed, which might have been an indirect measurement of the abilities of Inuit to withstand British economic expansion (See Figure 4). He also worried about their "rather troublesome" character and their tendency to steal if not carefully supervised by white men. When corresponding with Emile Petitot, a missionary stationed in the Mackenzie Delta during the 1860s, MacFarlane unleashed a deeper criticism of Inuit. Inuit were "sea bandits, who looked on theft, violence, deceit, unbridled libertinism, and even murder as virtues in which they took pride, while their womenfolk were shameless

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establishing a fort. He made note of the meandering tree line, the increasing "barrenness" of some parts of the Arctic, and the presence of spruce pines along the Anderson River for construction and heating purposes. He also showed excitement over the abundant signs of wildlife, suggesting the site for a possible fort was "doubtless rich in martens and other fur-bearing animals, as well as rabbits and moose, and [caribou] in season."

164 Ibid. See also E. O. Hohn, "Roderick MacFarlane of Anderson River and Fort," *Beaver,* (1963), 22-26.

courtesans." Here was clear evidence of MacFarlane's views of Inuit, and how he tailored them for his audience, whether fellow Company men or religious society.[165]

Figure 4. An illustration of an "Inuit chief" by Father Emile Petitot. Notice the knife in the right hand and the imposing stature of the man. *Source: Inuvialuit Cultural Resource Center*[166]

MacFarlane's thoughts on Inuit were not contained to the page, however. They directly influenced the architecture of British empire in the north. Take the construction of Fort Anderson, for instance (See Figure 5). The fur post was a space of intervention, wherein the British fur trade literally extracted profits from the Arctic. But because MacFarlane and many of his associates feared Inuit, Fort Anderson was built to allow careful supervision of all activities inside and outside its walls. A description from one journalist captures the structure well:

> It was a substantial establishment surrounded by a square palisade about fifty-five yards long with a twenty-foot-high bastion at each corner...The entrance was through a massive gate tower. Within the

165 Quoted in Hohn, 24.

166 Inuvialuit Cultural Resource Center, "Inuvialuit Pitqusiit Inuuniarutait (Inuvialuit Living History): Emile Petitot Images," http://www.inuvialuitlivinghistory.ca/galleries/19, (accessed July 15, 2012).

> palisade stood the master's house opposite the gate tower, along one side was a house for the employees and on the other a storehouse for furs and another for the trade goods.[167]

Given that the Western Arctic did not allow for easy shipping—and provided few, if any trees—this building was a substantial investment on behalf of the Hudson's Bay Company. It was one that spoke not only to the value of mercantilism, but also the views of the Arctic that accompanied commercial exchange.[168]

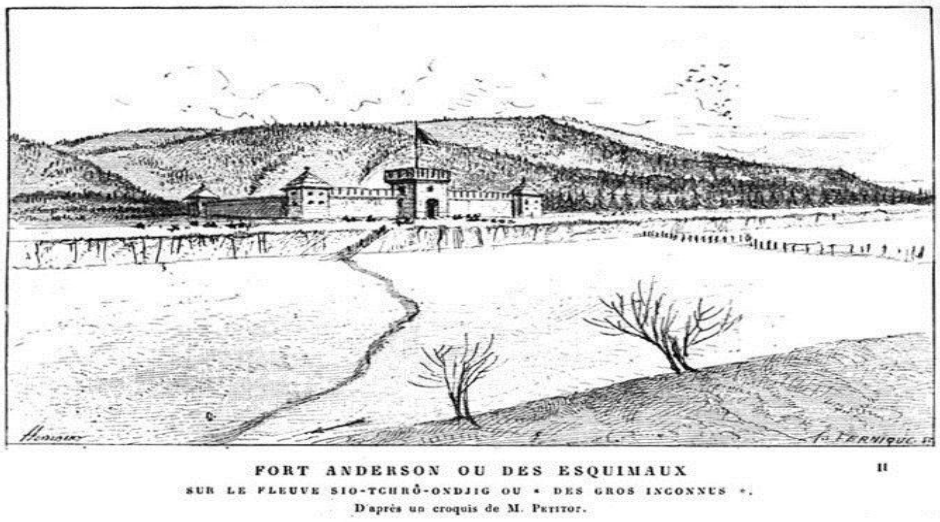

Figure 5. An illustration of Fort Anderson by Father Emile Petitot. *Source: Inuvialuit Cultural Resource Center.* [169]

MacFarlane's ideas of British North America reflected his encounter with the place. Before the acquisition of northern territories by Canada and the United States, the Arctic was contested terrain for Old World powers and indigenous nations. British and Russian empires battled for access to Inuit and Dene traders and in many ways provoked tensions between native

167 Quoted in Hohn, 28.

168 Hohn, 26. It was also a tribute to the relations among scientific ideas and the fur trade. Inside Fort Anderson, MacFarlane kept a cage with five large eagles. It was all he could do to manage the hostile Arctic that always surrounded him.

169 Inuvialuit Cultural Resource Center, "Inuvialuit Pitqusiit Inuuniarutait (Inuvialuit Living History): Emile Petitot Images," http://www.inuvialuitlivinghistory.ca/galleries/19, (accessed July 15, 2012).

northerners. Observers like MacFarlane dreamed that this land would be gradually opened by company fur traders. In his experience, however, the region was still largely the domain of hostile Inuit and Dene.

An Icy, Dangerous Place, 1870-1884

As the mythology of hostile Inuit was inspired by British traders and explorers, so too did U.S. whalers provide their own conceptions of the north based on the importance and difficulties of economic investments in the Arctic. Their notions of the Arctic differed, however, in that they were largely focused on life along the coast. These ideas initially portrayed the Arctic inhospitable and forbidding.

As testament to the role of the Beaufort Sea in the economic development of the Western Arctic, whalers developed a comprehensive knowledge about ice and its relations to navigation and whaling. U.S. whalers during the 1870s and 1880s gained refined understandings of the different stages in the formation and dissolution of Arctic ice. According to Hartson Bodfish, a New England-born whaler who amassed more than thirty years of Arctic whaling experience, Arctic ice was unlike any other kind. "When it starts to make, little cakes form, the size of a plate," he wrote. He continued, "They mass together and keep getting larger and larger, then it piles into points and ridges. When the ice is new it is slightly darker than the water, but most of it is dirty from the dust blowing form the shore and looks more like mud than anything else."[170] Whalers also recognized relationships between ice and wind, as changing wind directions and intensities could shift the ice pack instantaneously, piling it upon itself and presenting dangers to vessels. Knowledge about ice and wind was not only required for navigational purposes, but also for locating and harvesting whales. In explaining the migration patterns of bowhead whales in

170 Hartson Bodfish, *Chasing the Bowhead*, (Cambridge: Harvard University Press, 1936), 41

the Western Arctic, whaler Jim Allen noted, “I would say it's the ice and wind conditions that make the difference. There are no two years the same in the Arctic Ocean.”[171]

Descriptions of Inuit and the Arctic provided through the International Polar Year expedition between 1881 and 1883 followed the whalers' lead, reflecting the still unrealized goal of settling the Beaufort Sea and discovering rich bowhead populations. Lieut. Ray prohibited any of the expedition members from visiting Nuwuk and Utkiavik, two local Inuit communities, as he regarded the Inuit as dangerous. Ray's fears stemmed from what he described as a growing dependency of the native Inuit on the whalers. He noted the local Inuit were “disaffected” because their “usual supply of whisky, arms, and ammunition from the whaling fleet” had been unavailable because of a poor whaling year.[172] He also appealed to his superior, General Hazen, for Revenue Cutters to peruse the area and prevent the sale of “contraband goods.” While perhaps born from genuine concern, these appeals were tactics—not unlike MacFarlane's—to encourage more administrative presence in the area.[173]

Naturalists with the International Polar Year Expedition of 1881-1883 did not cast the Arctic as necessarily hostile. But their confinement to the research station encouraged them to see Inuit as uniquely powerful. For instance, Middleton Smith's notes on the ice conditions of the Beaufort Sea often included remarks about Inuit who were hunting seal or bear from it. Reading Smith's log-book, one can imagine the experience of being shut in at the station at Point Barrow for months on end: such stillness made readily apparent the movement of life around him. Smith showed excitement and trepidation in brief visits from Inuit, who came to the station to trade with him, but who spoke only broken English. These visits must have been nerve-wracking for

171 Arthur James Allen, *A Whaler and Trader in the Arctic, 1895 to 1944*,144
172 Ibid, li.
173 Ibid, xix, li. Other experiences in trading with natives—like Howard and Stoney's just two years later—proved Inuit were not by nature antagonistic.

Smith and Murdoch because they constituted the only chance of procuring natural history collections.[174]

The size of the natural history collections brought to D.C. by Smith and Murdoch thus belies the kinds of ideas about Inuit and the Arctic that accompanied these objects. Naturalists did not scour the land for their museum benefactors or see the terrain as welcoming. Rather, science came to them through Inuit and through the terms of the trade, which were often considered foreign and threatening.

An Endangered Place, 1884-1898

These preconceptions about hostility and danger began to morph over the 1880s and 1890s. As they interacted with Inuit for longer stretches of time, U.S. whalers and scientists developed more knowledge about Inuit life and Arctic land. As whalers over-wintered in the north and became inhabitants of the region, their ideas shifted, presenting the region as more friendly as long as one adapted to it. In turn, U.S. and Canadian scientists and bureaucrats began to fret about the dangers posed to native northerners and northern nature by the encroaching whaling industry. These shifting representations are as important to our understanding of the imperial transition in the Western Arctic in the late nineteenth century as are the shifting political economies in the region.

Through the practice of over-wintering, whalers learned more about shelter, clothing, proper nutrition, and traveling over the tundra. In his autobiography, American whaler-turned-

174 Middleton Smith, "Journal: August 12, 1882 to March 3, 1883," International Polar Year Expedition to Pt. Barrow, Middleton Smith Papers (Subgroup 1), Box 1, folder 2, APR-UAF. See especially journal entry for January 20, 1883. Both men were thus eager to maintain peaceful negotiations with the natives. Neither spoke or learned Inuit languages, so we must assume their trading partners spoke to them in the trade jargon they had begun to develop with U.S. whalers. Smith's journal entries suggests as much: during a January, 1883 meeting in the expedition station, the naturalist noted that an Inuit man interested in exchanging food and tobacco for his implements "assumed a very business like air when being admitted" to the facility.

resident Jim Allen recalled learning how to build houses throughout the year, which involved finding the right kind of snow in winter and collecting driftwood from particular tributaries in the summer. Allen also described the importance of dogs to the project of traveling, providing readers with instructions on how to harness the animals and what to feed them to keep them strong and obedient.[175] Since dogs fed mostly on seal, Allen and other whalers mastered the intricacies of the seal hunt, including what weapons to use and how to make them, when to hunt seal, and how to hunt in various rain and snow conditions.[176] Hartson Bodfish best captured the steep learning curve involved in over-wintering in the Arctic. "We had learned many things during the winter, but perhaps none so important as the proper way to dress to withstand the cold," he remembered. "When we first went north, we provided ourselves with heavy woolen clothing of all kinds, and we formed the opinion that the natives didn't know how to keep warm. But before the end of this first winter we adopted the native dress altogether, and provided outfits for all the men."[177]

Scientists' knowledge about the Arctic also evolved in the 1890s, but not in the same ways as whaler knowledge. Rather, scientists developed great concern over the impact whalers had on northern lands and people, as it represented a local symptom of a much larger problem of civilization. Once at Herschel Island, Frank Russell was startled by the effect of the industry on local Inuit life. The Dene guides he traveled with dropped their Gwich'in language when speaking with coastal Inuit, adopting instead a "trade jargon" unique to the whaling outpost. Stepping inside an Inuit tent on the island, Russell found "coffee, flour, and syrup from the whaling vessel were used by every family." Before leaving for San Francisco by whaling vessel,

175 Arthur James Allen, 65-70.
176 Ibid, 151-3. As with houses and travel methods, whalers embraced the native technology of snow-goggles, which helped filter the radiant light that bounced off the icy surface of the tundra and assaulted the traveler's eyes.
177 Bodfish, 57.

Russell made one final collecting trip in search of a ptarmigan in its summer plumage. Traveling with Inuit families who were crossing to the mainland to trade with Dene there, Russell noted that his water taxi was a whaleboat owned by Inuit made wealthy from commercial whaling. These changes must have appeared as stark for Russell, who, in addition to going north under the objective of salvaging remnants of muskox before extinction, had been reading accounts of British Royal Navy explorers.[178] The British North America of Franklin's day was likely no comparison for the Western Arctic Russell knew.

As a student of ethnology in the early 1890s sent north in search of some of the north's threatened big game, Russell was programmed to see these changes as concerning. They were evidence of civilization's impact on primitive cultures and helpless animals, evidence of much interest to his advisors, sponsors, and peers. In his journals, Russell kept detailed records of his hunting trips to find muskox, caribou, and "buffalo," entering more information about these animals than any other subject. In conversations with fur post operators along the Mackenzie River and with whalers at Herschel Island, he routinely inquired about the habits of these animals. As he moved throughout the region, he began to see it as alarming—not a landscape of exchange and trade between European, American, and Inuit peoples, but as a "country of death." Russell was struck by how much game was killed for the trade, but he found little irony in his own participation in this enterprise for the sake of science. He saw the trade as harmful not just for animal life in the north, but for the prospect of understanding Inuit culture. So much contact between natives and white society, he thought, rendered ethnological research less interesting and less valuable. He noted that it was a "wonder" that any "genuine" item of native manufacture remained in the north, given that others had sought them so persistently for so long.[179]

178 Russell, *Explorations in the Far North*, 144-152.
179 On ethnological research being less valuable, see Russell, *Explorations in the Far North*, v. On the "country of

Whereas U.S. scientists understood whalers as a threat because they symbolized civilization at large, Canadian scientists and bureaucrats saw the whalers as posing particularly *American* hazards to the Arctic. We glimpse this perspective on the "endangered" Arctic through Russell's traveling partner, de Sainville. While in the Mackenzie Delta, de Sainville exchanged letters with two prominent Canadian governmental agents: William Ogilvie, the Dominion Land Surveyor from 1875 to 1898, and Lieut. Gov Dr. John Shultz, Canada's Minister of Interior from 1882-1889. As a member of a federal committee tasked with examining the resources of the Mackenzie basin, Shultz knew the importance of de Sainville's mapping work in the Western Arctic. Shultz pinpointed de Sainville's contributions as holding potential for the Canadian governmental to direct its activities there. "In the great questions whether Canada has, like Russia, an arctic sea-port," he wrote, "the Count's observation, not only on the Mackenzie from Fort Smith to Peel River, which is comparatively well known, but his description of the Delta mouth and their sea approaches which have not been known, will, I trust, prove of much interest."[180] These political and imperial tensions echoed those experienced by British and Russian fur companies in the quest for black gold in the 1860s. But, the ways scientists imagined the Arctic had fundamentally changed. It was no longer a place where travelers put themselves at risk by venturing there. Rather, the Arctic was at risk because industrial society had fully arrived in the north.

Resource economies created a framework for scientific travelers' understanding of native northerners and northern landscapes. Before the settlement of American whaling activities to the Beaufort Sea coast, MacFarlane and Murdoch faced enormous difficulties in traveling throughout the region and engaging the Inuit in trade. Containing their collecting activities to a

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death," see Frank Russell, "The Journal of Frank Russell," 155. On writing about buffalo, caribou, and muskox, see Ibid, 144-154.

180 Neufeld, 55.

fur post and a research station, they viewed Arctic nature and Inuit communities as forceful mediators of British and American power, whether economic or intellectual. In the late 1880s and 1890s, as the whaling industry instituted more regular transportation across a broader set of outposts, scientists changed both their frames of reference and their frames of mind. With infrastructure available on the Mackenzie River and around the Alaskan coast, researchers garnered a greater sense of the regional landscape, including the changing contours of economic activity. These experiences led travelers to characterize northern lands and peoples as coming under the sway of American capital and influence, and even being endangered by them. Traveling with Inuit trading parties throughout northern Alaska and Canada, Russell and de Sainville articulated the whaling industry's impacts on the north as either as a symbol of civilization's deleterious impacts across the world, or as a particular form of American greed.

Conclusion: The Making and Remaking of the Western Arctic

It is not possible to characterize scientific and imperial activities in the Arctic between 1861 and 1899 as monolithic without missing a great deal of the historical phenomena at issue in the region. Neither science, nor the state, nor industry, nor native northerners, nor Arctic nature were unchanging or uniform. The Western Arctic was also not made by mere political deal-making. Rather, scientific, political, and commercial actors had multiple voices, experienced unique landscapes, and brought particular sets of ideas with them on their travels, whether up north or back home. The diversity of experiences among MacFarlane, Murdoch, and Russell helps us see tremendous change across human and non-human environments.

With the benefit of hindsight, we can see that individual encounters, while conducted in drastically different historical moments and for different reasons, do amount to a greater whole.

The arrival of U.S. whalers to the Beaufort Sea coast represented the first sustained encounter of "Western" society with Inuit societies living along the shoreline of northern North America. Inuit and Dene there had only indirect and intermittent contact with British and Russian traders or explorers over the nineteenth century. Whalers formed new relationships with native northerners from across northern Alaska and northwestern Canada, exchanging guns, furs, tools, labor, food, and specialized skills in the dual tasks of surviving the Arctic and processing the harvest. Such relations interrupted flows of materials between Siberia and Alaska across the Bering Strait and between England and Canada along the Mackenzie River. The creation of new nodes of commerce, and the elimination or intensification of historic meeting places, produced an entirely new space. Indeed, it remade the Western Arctic.

Yet, as I have shown in this chapter, and will explore throughout the remainder of the dissertation, material changes in political economies went hand-in-hand with changes in the ways outsiders represented the Arctic. If the coming of the commercial whalers initiated a "revolution" along the shores of the Arctic Ocean, that sea change drew from, and in turn effected, the displacement of a "dangerous" Arctic. To be fair, the Arctic continues today to be imagined as a scary place, one to be feared because of its rugged, craggy landscape. Yet, in the experience of scientists in the Western Arctic during the twentieth century, the far north has been imagined and represented far more regularly as endangered. That transition from hostile to threatened, from risky to at-risk, occurred in the same historical moment where the US and Canada ascended to power in the Western Arctic and professional science rose in North America. These are not coincidences, but conjunctions.

Importantly, the experiences of MacFarlane, Murdoch, and Russell offer a window onto the associations between the embryonic institutions of science and the institution of the U.S. and

Canadian states. As historian Morgan Sherwood has argued for southern Alaska, scientific travel to the nation's newest territory (or the lack of it) reflected federal attitudes toward science in the Gilded Age. While a stark contrast from the coordinated and systematic research that characterized science in the region in the 1900s, nineteenth century science in Arctic Alaska was a product of its time and place. In the 1870s and 1880s, many political functionaries considered federal intrusion in private enterprise taboo. The ideology of laissez-faire capitalism and a free market "unhampered by government intervention" shaped the kinds of governmental science performed in the country.[181] Sherwood's analysis helps us understand science and empire in the Arctic portions of Alaska during the same period.

Encounters in the far north evince a complex relationship among federal governments, private industry, and science. Just as fur posts had provided access points to the region's widely distributed human and non-human communities, the expansion of coastal infrastructure—in the form of regular schedules of whaling vessels between San Francisco and the Beaufort Sea coast, and the construction of numerous whaling outposts—fostered the production of new scientific ideas of the Arctic. It also made visible the value of science to the administration of northern territories. Providing assistance to economic expansion—in the form of studies of weather and navigation—was one avenue through which scientists legitimized investments in research for a government unwilling to fund theoretical pursuits or wary about the costs of Arctic travel.

By the 1890s, however, private industry was not only the means by which to perform

181 Sherwood, 7. Sherwood argues that the picture of federal science in Alaskan between 1867 and the mid 1880s aligns with Alexander Agassiz's Gilded Age ideals for science: the enterprise enjoyed "moderate centralization allowing of great competition." For context, Sherwood points to the infamous Allison Commission of 1884-1886, in which the major U.S. federal scientific agencies were inspected under the charge that their research was being organized toward abstract ends. Theoretical pursuits were untenable within Congress, as many elected officials argued that all science completed by the Weather Service, Coast Survey, and Geological Survey should have immediate practical benefits for the facilitation of industry and administration. Scientists countered that laymen were not in the position to judge what science was or how it should be organized. In the end, Congress maintained the status quo, ignoring the pleas of many elected officials for more limited government in the use of the nation's resources.

science—it was also the target of scientific critique. As evidence of the beginnings of a new era of governmental science and a federally managed Arctic—which came into fruition over the first half of the twentieth century—scientists affiliated with the U.S. and Canadian governments sought to replace historic notions of a "hostile" Arctic by presenting a region endangered by industrial civilization. For these scientists, the U.S. whaling industry symbolized much larger processes of the destruction of natural resources and the contamination of primitive cultures, processes which rational governments armed with scientific research could prevent. American empire in Arctic Alaska thus contained conflicting and contradictory impulses in the uneasy, evolving alliances among public and private sectors.

At the end of the nineteenth century, the Western Arctic was a theater for New World empire. Its vast landscape and strategic geographic position provided eager governmental officials, pioneering developers, and itinerant scientists the opportunity to envision and work out imperial ambitions beyond the West. The encounters along the Beaufort Sea coast comprised an opening scene in the drama of American Empire, one that only decades later would include the Panama Canal and Manila.[182] They also staged a test for the British empire and young Canada. Creating and maintaining a northern border with the United States would define not just the limits of American hegemony, but the sovereignty of the Dominion as well. Given these conditions at the end of the nineteenth century, it would have been impossible to predict that scientists from both nations would work so closely with private industry in the second quarter of the twentieth century to experiment on and engineer the natural resources of the Western Arctic.

182 Alfred W. McCoy, Francisco A. Scarano, and Courtney Johnson, "On the Tropic of Cancer: Transitions and Transformations in the U.S. Imperial State," in Alfred W. McCoy and Francisco A. Scarano, eds., *Colonial Crucible: Empire in the Making of the Modern American State,* (Madison: University of Wisconsin Press, 2009), 7.

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To Document and Discover the Endangered Arctic:

Western Arctic Expeditions as Sites of Historical Conjunction, 1899-1918

In the summer of 1913, the *Mary Sachs* sat in an ice-choked harbor in Nome, Alaska, its decks populated with an unlikely crew. The thirty-ton, sixty-foot whaling schooner was not occupied with captains, deckhands, or seasoned whalers from the ports of San Francisco. Rather, it was the temporary home of Alaskan Inuit and a handful of professional scientists from Canada, Denmark, the United States, and Australia.[183]

These were the members of the Southern Party of the Canadian Arctic Expedition, which constituted the largest and most expensive government-sponsored scientific expedition ever to study northern North America.[184] Comprised of two geologists, a geographer, a marine biologist, a zoologist, and an anthropologist—all with Ph.D.s—the Southern Party was matched by the Northern Party, outfitted with an anthropologist, a geologist, a meteorologist, an oceanographer, and one of the world's decorated explorers, Vilhjalmur Stefansson. Of the nine ships waiting for ice to shove off the Arctic Alaskan coast, three were in pursuit of new lands and scientific

183 These details come from Canadian Museum of Civilization, "Northern People, Northern Knowledge: The Canadian Arctic Expedition of 1913-1918, by David Gray," http://www.civilization.ca/cmc/exhibitions/hist/cae/indexe.shtml, (accessed December 20,2011). This website is an incredible resource for scholars interested in the history and impact of the Canadian Arctic Expedition. Gray has performed archival and field research to detail the expedition, consulting published reports, correspondence, and field diaries of many of the members. He has also visited regions of the Western Arctic to interview family members of the Inuit participants of the expedition. I rely on Gray's work and website in this paper to complement my own archival research of the Canadian Arctic Expedition. I also visited the Museum of Civilization exhibit which is in part based on Gray's research in January 2012.

184 Trevor H. Levere, *Science and the Canadian Arctic: A Century of Exploration, 1818-1918,* (New York: University of Cambridge Press, 1993), 390-417.

knowledge for the Dominion, rather than the baleen of bowhead whales.[185]

The *Mary Sachs* did not just bring scientists and Inuit to the Western Arctic. It was also a harbinger of new relations among science and empire in the north. Between 1899 and 1918, federal agencies, scientific institutions, and wealthy philanthropists from the U.S., England, and Canada helped dispatch four expeditions to the Beaufort Sea coast. Compelled by the desperate search for natural resources across the globe, scientists went north to discover a potential Polar continent and valuable mineral deposits in the region. If the continued encroachment of industry in the far north was the result of the ambitions of bureaucrats, researchers, and social elites, it was also a source of their great anxiety. Thus, alongside geologists, oceanographers, and explorers, other fieldworkers were sent north to be archivists of sorts. Tasked with getting behind the curtain of economic expansion, anthropologists and biologists hoped to preserve traces of so-called "uncontaminated" native peoples and muskox, that bison of the Arctic.

Lost islands, potential mother lodes, never-before-seen peoples, and other endangered species were emblematic of (and produced by) an early twentieth century zeitgeist, the same period that witnessed the Scramble for Africa and the Race to the Poles. Arctic expeditions and the notion of an "endangered" Arctic were underwritten by the project of bringing distant territories into the orbit of the nation and scientific knowledge, as well as asserting imperial power on the world's stage. The Canadian Arctic Expedition, for example, lasted five years, ran a tab of more than a half million dollars, and cost the lives of more than a dozen scientists and crew who were lost aboard the expedition vessel *Karluk*. The *Mary Sachs* became one of the first vessels to fly the Canadian flag while crossing the international boundary at Demarcation Point,

185 Canadian Museum of Civilization, "Northern People, Northern Knowledge: The Canadian Arctic Expedition of 1913-1918, by David Gray," http://www.civilization.ca/cmc/exhibitions/hist/cae/indexe.shtml, (accessed December 20,2011).

signaling the Dominion's sovereignty to both the United States and England.[186] In the first two decades of the 1900s, the representation of an at-risk Arctic helped set in motion historic interventions and investments in science and statecraft.

Early twentieth century Arctic scientists distinguished themselves from previous itinerants not merely by *why* they went north, but *how*. In pursuing their missions, expedition members had more freedom to move throughout the Western Arctic, a byproduct of the establishment of social and economic life on the Beaufort Sea coast in the 1880s and 1890s. Communication and transportation networks along the coast and between the Beaufort Sea and North American metropolitan centers allowed scientists and their sponsors to plan more widespread reconnaissance. In addition, the rules and roles of commerce in the area, established by whalers, traders, and Inuit in the late nineteenth century, enabled scientists to successfully enlist local skills and labor in the project of collecting, observing, and studying the Arctic. These regional conditions were especially important in the far north in the early 1900s, a place that did not have the infrastructure of settler colonialism or military conquest and did not yet know the wireless radio or airplane.[187] Finally, new demands for scientific standards in field practices shaped the kinds of scientific travelers hired for expeditions as well as their conduct abroad. Rather than a mixture of embedded fur-traders, naturalists, and military officials, expeditionary scientists were young, university-trained scholars who sought careers in science. They demonstrated discipline in their movements as a group and in their use of first-rate instrumentation. In doing so, expeditions carved new identities for Arctic fieldworkers,

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186 Ibid.

187 For a comparison of how scientists moved in differing colonial situations—including settler colonialism, military conquest, and informal economic imperialism, see David Arnold, "Plant capitalism and Company science: the Indian career of Nathaniel Wallich," *Modern Asian Studies* 42 (2008): 899-928.; Camilo Quintero, "Trading in birds: imperial power, national pride, and the place of nature in U.S.-Colombia Relations," *Isis* 102 (2011): 1-25.; and Fa-ti Fan, *British naturalists in Qing China: science, empire, and cultural encounter*, (Cambridge, Mass.: Harvard University Press, 2004,) 122-153.

differentiating themselves from the northern explorer or collector.

As historians of science have demonstrated, expeditions are rich sites for investigating the social and material relations underpinning science and empire.[188] Expeditions were unique forms of scientific research in that they were both extensive and intensive. That is to say, they travelled over large swaths of land, and yet performed deep analyses of certain areas, often through the collection of biological, geological, or anthropological objects. Historian Robert Kohler has persuasively argued that environmental, social, and intellectual conditions converged between 1890 and 1940 to allow a "great age of natural-history collecting." Fieldwork along railroads, roads, and rivers—and the "islands of nature" that survived in the spaces between them—was inspired by, and in turn helped foster, desires to unify the U.S. and Canada.[189] Such scientific travel would have been impossible if not for the dramatic landscape changes involved in building transportation infrastructure across the continent, or the widely distributed "amateurs" and resident experts who guided scientists through local environments. Expeditions, then, help scholars apprehend in time the shapes of disciplines, politics, societies, industries, and environments.[190]

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188 There has been a recent flurry of scholarship on expeditions, largely centered on the nations bordering the Atlantic ocean in the early modern era. For a sample of the diversity of this scholarship, and thus the varied roles of the expedition, see Nicholas Dew, "Scientific travel in the Atlantic world: the French expedition to Gorée and the Antilles, 1681–1683," *British journal for the history of science* 43:1 (2010): 1-17; Daniela Bleichmar, "Exploration in print: books and botanical travel from Spain to the Americas in the late eighteenth century," *Huntington library quarterly* 70:1 (2007): 129-51; Daniela Bleichmar, "Visible empire: Scientific Expeditions and Visual Culture in the Hispanic Enlightenment," *Postcolonial studies* 12:4 (2009): 441–66.

189 This formulation, "islands of nature," comes from Robert E. Kohler, "History of Field Science: Trends and Prospects," in Jeremy Vetter, ed, *Knowing Global Environments: New Historical Perspectives on the Field Sciences*, (New Jersey: Rutgers University Press, 2011), 222-223.

190 Ibid. In this article, Kohler develops his ideas of the natural history survey. See especially pages 221-227 for connections among field science, environmental history, and globalization. For a concise summary of Kohler's arguments about the historical conjunctions that mark expeditions in North America, see Robert Kohler, "Finders, Keepers: Collecting Sciences and Collecting Practice," *History of Science*, xlv, (2007), 428-453. On expeditions to the American and Canadian "inner frontiers," see Robert E. Kohler, *All creatures: naturalists, collectors, and biodiversity, 1850-1950*, (Princeton: Princeton University Press, 2006), 137-181; and Suzanne Zeller, *Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation*, (McGill: Queen's University Press, 2009).

This chapter extends Kohler's approach to the Western Arctic. As we will see, the networks of circulation established by expeditions were made possible by the imperial transition of the late nineteenth century, and they rendered possible more scientific, political, and economic engagement along the northern rim. Scientific and political interest in lost islands, northern natural resources, and "primitive" native peoples; shifting international relations between the U.S., England, and Canada; the solidification of infrastructure and guidelines for trade in the region; and new demands from professionalizing research communities: these were the multi-scalar forces that spawned an efflorescence in coordinated scientific travel in the far north. We glimpse these characteristics of Arctic expeditions with the *Mary Sachs*, a former whaling and fur-trading schooner outfitted for the purpose of state-sponsored scientific investigation in 1913. The boat, which crossed national boundaries and carried a distinct ethnic and epistemological community with it, was a symbol of the contingent, but pivotal relationships among knowledge, place, and power in the Western Arctic.

This chapter begins with an overview of the scientific operations to be analyzed, a group I refer to as the "Western Arctic Expeditions." This review highlights the imperial ambitions and anxieties motivating these operations, which expressed themselves in the notion of an "endangered" Arctic and the missions to *document* and *discover* the far north. I then return to the regional scale to analyze economic expansion and the development of social contracts between newcomers and northern residents, both of which had consequences for traveling scientists. I proceed by broadening the gaze to take in the international tensions and disciplinary demands at play in these scientific and political activities.

The Endangered Arctic: The Polar Continent, the "Blonde Eskimo," and other Imperial Ambitions and Anxieties

In the years before the Great War, imperial development was predicated on territorial expansion—whether through discovery, conquest, or purchase. As Europeans descended into Africa, carving up the continent into colonial possessions, they joined Americans in South America, the Pacific, and the Arctic pursuing the same project. Historians have emphasized the search for the North Pole in the early 1900s as part of a global scramble for the earth's remaining lands and resources. Explorers, backed by contracts with publishing companies, asserted America's presence in the circumpolar basin. Covered daily in newspapers around the country, these adventures both galvanized the public's interest in world geography and provided models of the "strenuous life" advocated by public figures like Theodore Roosevelt. Robert Peary and Frederick Cook disputed each other's claims to reaching the Pole in 1909, causing some onlookers to deride Arctic exploration as an expensive spectacle with little benefit to the citizenry. For others, however, the race to the Pole rejuvenated America's pioneering spirit and displayed its technological prowess across the top of the world.[191]

Far less known, but equally as important in early twentieth century imperial history, are a set of expeditions dispatched to the Western Arctic in the first two decades of the 1900s (See Appendix 1). As Sir John Franklin's adventures of the early 1800s were followed by the search for Franklin in the mid 1800s, so too did Arctic expeditions in the early 1900s beget one another

191 On polar exploration, see Lisa Bloom, *Gender on Ice: American Ideologies of Polar Expeditions*, (Minneapolis: University of Minnesota Press, 1993) and Michael F. Robinson, *The Coldest Crucible: Arctic Exploration and American Culture*, (Chicago: University of Chicago Press), 2006. On contemporary imperial overtures in the Pacific, the Caribbean, and Africa, see Alfred W. McCoy and Francisco A. Scarano, eds., *Colonial Crucible: Empire in the making of the Modern American State,* (Madison: University of Wisconsin Press, 2009) and Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950,* (Chicago: The University of Chicago Press, 2011). On territorial expansion as a way of empire before the Great War, see Neil Smith, *American Empire: Roosevelt's Geographer and the Prelude to Globalization,* (Berkeley: University of California Press, 2003).

and shape their particular objectives. Yet rather than seek a Northwest Passage or a missing Royal Naval Officer, these Arctic expeditions were after a supposed Polar Continent that had yet to be claimed. In the early 1900s, American geologists and oceanographers posited that undiscovered lands might exist offshore of northern Alaska. Studying the observations and travelogues of Polar explorers from around the world, these scholars pointed to the movements of currents and tides in the Beaufort and Chukchi seas, which suggested a large landmass just above what is today the Alaska-Yukon boundary. Published in *American Geologist* and *The National Geographic Magazine*, this news stirred interest from the leading geographers, geologists, and explorers of the day.[192]

While the alleged Polar continent turned out to be a mirage—a trick of the eye that mistook bumpy sea ice for a land mass—the presence of this fantasy tells us something about the early twentieth century. The Polar Continent was one of many phantom islands that emerged in the late nineteenth and early twentieth century as the Arctic was being explored by Norway, Germany, England, the United States, Russia, and Denmark. These fictitious territories were based in the fact that imperial powers sensed the limits of their growth. They equated their potential for economic and political domination with the amount of land and resources they owned. Thus, as some "unexplored" spaces on the map were eliminated by exploration, the value of those that remained increased, for both science and empire. British geographer Clements Markham proclaimed in *The Geographical Journal* that the Beaufort Sea was "now the least-known part of the Arctic Regions, and the one which contains the most interesting geographical problems."[193] Markham considered this corner of the Arctic as the last stone in a grand edifice of

192 See Trevor H. Levere, "Vilhjalmur Stefansson, the Continental Shelf, and a New Arctic Continent," *The British Journal for the History of Science*, Vol. 21, No. 2 (Jun., 1988), pp. 233-247.

193 See Clements Markham and Ejnar Mikkelsen, "On the Next Great Arctic Discovery: The Beaufort Sea," *The Geographical Journal,* vol. 27, no 1 (Jan 1906), 1-11. On phantom islands, see Henry Stommel, *Lost Islands:*

Arctic knowledge, whose construction had begun centuries before. Indeed, the discovery of the Arctic's remaining islands on the Canadian Arctic Expedition in 1918 marked for many observers the end of Columbus' project in the New World and the dawn of a new era there.

Markham's promotional efforts can be tied to two expeditions to the Western Arctic. In 1905, the Royal Geographical Society, of which Markham was a leading member, sponsored Alfred Harrison to "penetrate]as far as possible into that unknown region which lies to the north" of the North American mainland in hopes of "discover[ing], if possible, whether there was land hitherto unknown in the Arctic Ocean." Harrison's expedition was financed by the Royal Geographical Society, reflecting the desires of leading British geographers to reinvigorate the status of the British Empire among those hunting for Arctic treasures.[194] While the prospect of new lands and new British frontiers catalyzed Harrison's interests and those of his sponsors, he also had other, more personal, desires. He saw the north as a proving ground, admitting that he went north "with an ulterior purpose of testing both the hardships of the country and my powers of coping with them." Harrison also professed an inquisitiveness about the natives of the region, who he saw as potential allies in his exploration efforts. He wanted to "meet and to get to know the natives, of whom I have always fostered an idea of making use in ice expeditions."[195] As we will see in more detail later, ethnographic sensibilities and the impulse to make contact with remote peoples helped constitute the "endangered" Arctic as much as the quest for a Polar Continent.

While Harrison made his way to the Western Arctic, another expedition had already

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The Story of Islands that have Vanished from Nautical Charts, (Vancouver: University of British Columbia Press, 1984).

194 As with the United States, England experienced severe economic difficulty in the 1890s. Some political and intellectual elites considered formal empire as a solution to these woes. See Philip Buckner, *Canada and the British Empire,* (Cambridge: Oxford University Press, 2008), 66-107.

195 Alfred H. Harrison, *In Search of a Polar Continent, 1905-1907,* (London: Edward Arnold,1908), vi-ix.

appeared in the region. In 1906, Danish explorer Ejnar Mikkelsen and American geologist Ernest de Koven Leffingwell joined together in the Anglo-American Expedition.[196] Their expedition also featured a naturalist, an anthropologist, and a surgeon. While this team shared Harrison's intent to find the "undiscovered continent," they did not share the same motivations to do so. The Anglo-American Expedition was, contrary to its name, not a British scheme, or even a joint-venture between British and American sponsors. Rather, it was bankrolled by a mish-mash of philanthropists, royal elite, publishers, scholars, governmental officials, corporations, and relatives of the expedition's leaders.[197] The diversity of funding sources indicates the expense of outfitting an expedition to a remote place, one that boasted little in the way of local food sources. But it also suggests how much purchase Arctic matters had in the early twentieth century. A Polar Continent appealed to scientists, the reading public, leaders of nations, and the wealthy elite. It was a concept that united metropolitan society to support the exploration and conquest of the corners of the Earth, no matter how hard they were to reach.

Both Harrison and the Anglo-American Expedition were unsuccessful in finding the supposed offshore land. Leffingwell and Mikkelsen spent a winter dog sledding northward from the Alaskan shore, taking soundings through the ice in hopes of identifying the edge of the continental shelf. If their readings showed the ocean floor to be rising closer to the water's surface as they moved toward the Pole, this might prove that floating land did exist. Their soundings, however, showed just the opposite.[198] Many scientists grew to doubt the island's existence, while others maintained that the limited measurements taken by Leffingwell and

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196 These two men had met one another on a separate expedition to the Norwegian Arctic in 1901, the Baldwin-Ziegler Expedition, of which Leffingwell was the scientific director. See Ernest de Koven Leffingwell, "My Polar Explorations, 1901-1914," *Explorers Journal*, vol. 39, Oct 1961, no 3, 2-14.

197 On the funding for the Anglo-American Expedition, see Ejnar Mikkelsen, *Conquering the Arctic Ice*, (Philadelphia: George W. Jacobs and Co, 1909), 1-10.

198 "Report of the Mikkelsen-Leffingwell Expedition," *Bulletin of the American Geographical Society*, vol. 39, no 10, (1907): 607-620.

Mikkelsen could not disprove the Polar Continent theory—more science needed done. Indeed, after 1906, a Polar projection map of the Arctic was circulated, showing a large section above Alaska as "unexplored." The momentum of Western Arctic Expeditions had thus been set. Because of their failures, Harrison, Mikkelsen, and Leffingwell helped put in motion two more ventures, the Stefansson-Anderson Expedition of 1908-1912 and the Canadian Arctic Expedition of 1913-1918.

Importantly, the Polar Continent was only one component of this early twentieth century impulse toward the Arctic. In addition to discovering new lands and riches, scientists sought to document forms of northern life that were sure to be obliterated by an expanding civilization, or those that had somehow not yet met the modern world. As a member of the Anglo-American Expedition, anthropologist Vilhjalmur Stefansson heard rumors of an "uncontaminated" tribe of Inuit in the Western Arctic, which seemed to have European features, like blonde hair and blue eyes. These rumors had been stirred by captain Charlie Klengenberg, who had ventured to Victoria Island—just north of the Coronation Gulf—in 1906, in pursuit of productive whaling and fur-trapping grounds. Scientists and bureaucrats of the time commonly believed that the arrival of civilization to so-called pristine places—through whalers or traders, for example—would result in the elimination of native peoples and native animals. Stefansson's chance meeting with Klengenberg provided him with an opportunity to "get ahead" of the edge of civilization in order to study life there. Stefansson seemed a perfect fit for this Arctic adventure: he had trained under one of the leading American archaeologists at Harvard, Frederic Ward Putnam; he had conducted fieldwork in Arctic conditions in Iceland; and he was aware of the pertinent problems of anthropology, as evidenced by his publications in anthropological journals in 1906.[199]

199 Stefansson's publications between 1903 and 1906 are Vilhjalmur Stefansson, "The Icelandic Colony in Greenland," *American Anthropologist* 8, no.2 (April to June, 1906): 262-270.; Vilhjalmur Stefansson, "Icelandic

Stefansson's excitement in learning about this purported white-looking native race was channeled toward the American Museum of Natural History in New York, with which he collaborated to establish the Stefansson-Anderson Expedition of 1908-1912. Teaming with fellow University of Iowa alum and zoologist Rudolph Anderson, the two men spent four years in Alaska and northwestern Canada looking for this as-yet uncontacted people. Along the way, they documented the biological and cultural life of the region, shipping several tons of specimens and artifacts to the American Museum in New York. Anderson's zoological studies of Arctic birds, bears, and other big game species were largely subsumed by Stefansson's announcement of the discovery of the "Blonde Eskimos."[200]

As historian Michael Robinson has suggested, the fanfare over Stefansson's discovery reveals Progressive Era concerns and fascinations with civilization—both its geographic reach and its cultural values. In the *Seattle Times* and *New York Times,* Stefansson's contact with these Inuit was promoted as an incredible ethnological contribution, one that proved the existence of a Stone Age people in the civilized world. Curiously, the Blonde Eskimos had attributes that suggested they might be the distant relatives of Vikings who had been lost centuries before in their pursuit of the New World. In addition, the Inuit of the Coronation Gulf showed dramatic differences with other peoples who knew civilized life. Stefansson noted that they acted "much

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Beast and Bird Lore," *The Journal of American Folklore,* 19, no. 75, (October to December, 1906), 300-308. For more on Stefansson's background, which includes his teaching at Harvard in anthropology, see Richard Diubaldo, *Stefansson and the Canadian Arctic,* (Montreal: McGill-Queen's University Press, 1978), 1-32.

200 For more on Stefansson's "discovery" of the Blond Eskimos, see Diubaldo, 33-57 and Stefansson, *My Life with the Eskimo,* 203-304. See also, Michael Robinson, "Blonde Eskimos and Yellow Journalism: Reforming the Arctic Narrative in Progressive America," (a paper presented to the History of Science Society, 1996). See American Museum of Natural History to Vilhjalmur Stefansson, 13 April, 1908, PSC. For examples of the American Museum's other expeditions, see The American Museum of Natural History, *The American Museum Journal,* 1911: 100. There are a few differing stories of how Anderson got involved in the expedition. Letters indicate that Stefansson was involved in recruiting Anderson, who attended Iowa with Stefansson. See Rudolph Anderson to Vilhjalmur Stefansson, 25, March, 1908, PSC. A foreword to a later edition of one of Stefansson's other books suggests that Henry Fairfield Osborn was responsible for recruiting Anderson, as Osborn suspected that Stefansson's proposal was not worthy of American Museum funding. See Henry Fairfield Osborn, foreword to *My Life with the Eskimo,* by Vilhjalmur Stefansson, second edition, (New York: MacMillan, 1924), vii.

like the white man" and were "better dressed and healthier than the civilized Eskimos." Here was a remarkable phenomenon: a people who had not yet known industrialization—and thus remained free of the ills of industrial society—but yet appeared to present no inclinations toward savagery. This obsession with out-of-place indigenes was not limited to the Arctic. Indeed, similar animation followed the discovery of the Ainu of Northern Japan and the White Indians of Panama. It also closely followed the fixation with the Polar Continent: both the land and the "lost white tribes" were products of a North American imagination, one intimately concerned with the closing of the western frontier and international competition in its global counterparts.[201]

Not yet finished with his work in the north, Stefansson's translated his reception in 1912 into support for a follow-up expedition. Within months of his return to New York City, he had informal agreements with the National Geographic Society and the American Museum of Natural History to return to the Western Arctic. Initially billed as the "Second Stefansson-Anderson Expedition," this initiative was to feature continued anthropological and zoological fieldwork as well as an attempt to find the Polar Continent. The Canadian government stepped in, as it was concerned with scientific exploration in its own territory. If there were potential new lands and peoples in Canada, the Dominion wanted to be responsible for discovering and documenting them. They also wanted to preserve the right to claim any natural resources in the Canadian portion of the Western Arctic. Extensive copper deposits were rumored to exist in the land of the

201 Michael Robinson, "Blonde Eskimos and Yellow Journalism: Reforming the Arctic Narrative in Progressive America," a paper presented to the History of Science Society, 1996. A Hudson's Bay Company representative remarked during a visit to the Western Arctic in the early 1920s, "If gold had been discovered in the central Arctic region there could hardly have been more excitement than that which prevailed when [the news of the Blonde Eskimo] became generally known." The claim of white blood in Inuit bodies was contentious for many reasons, not least of which because it raised concerns over racial mixing, a critical component of the twentieth century American urban experience. See Stefansson, *My Life with the Eskimo*, 173. See Vilhjalmur Stefansson to Clark Wissler, 5 December, 1910, PSC. See *The New York Times*, 10 September 1912 and *The New York Times*, 11 September 1912. As his biographers have noted, Stefansson moved to the center of a storm of criticism about the Blonde Eskimo claims. For one take on the Blond Eskimo controversies, see Hunt, 57-64. For the quotation, see Phillip Godsell, *Red Hunters of the Snows: An account of thirty years' experience with the primitive Indian and Eskimo tribes of the Canadian North-west and Arctic coast, with a brief history of the early contact between white fur traders and the Aborigines*, (London: National Museum of Canada, 1938) , 278.

"Blonde Eskimos," or as they were also known, "Copper Inuit." Canadian officials informed Stefansson's original sponsors of their intent to take over the expedition, renamed it the Canadian Arctic Expedition, outfitted it through their Geological Survey and Department of Naval Service, and planned for the collected specimens and artifacts to be housed in the newly-constructed Victoria Memorial Museum.[202]

Reflecting the importance of the Western Arctic to Canadian science and politics—and vice-versa—the Canadian Arctic Expedition was the largest and most organized of any expedition to the region. It was split into two groups: a Northern Party, lead by Stefansson and in search of the Polar Continent and other undiscovered lands in the Beaufort Sea; and a Southern Party, commanded by Rudolph Anderson, and charged foremost with investigating reports of copper deposits in the Coronation Gulf. The Southern Party also was tasked with mapping the Mackenzie Delta, collecting serial collections of all terrestrial and marine life, gathering more detailed accounts of the presence or absence of muskox in the region, and documenting the material culture of all Inuit communities of the region, especially the "Blonde Eskimo."[203] As we will see in more detail later in this chapter, the organization of the Canadian Arctic Expedition was not simply the last in a long line of imperious ventures to the Arctic—it was also a means by which Canada marked its boundaries with the United States and England.

Harrison's Expedition, the Anglo-American Expedition, the Stefansson-Anderson Expedition of 1908-1912, and the Canadian Arctic Expedition of 1913-1918 constituted an unbroken stream of scientific activity in the Western Arctic in the first two decades of the 1900s. For simplicity's sake, we might refer to this group of scientific operations as the "Western Arctic

202 For one review of the Canadian take-over of the Second Stefansson-Anderson Expedition, see D. LeBourdais, *Stefansson : Ambassador of the North*, (Montreal, 1963), 60-70.

203 On the specific orders for the Canadian Arctic Expedition, see "Memorandum for Instructions, re: Arctic expedition, by O.E.L (n.d.)," Rudolph Martin Anderson fonds, MG 30-40, Vol 10, file 3, LAC.

Expeditions." Western Arctic Expeditions displayed a complex arrangement of patronage, missions, personnel, and motivations. Outfitted after the closing of the western frontier and in the midst of a global pursuit for land, they were funded to find new resources on recently acquired territories. At the same time, sponsors showed deep concern for the extinction of big game species and the loss of "native races."[204] While the Polar Continent and the Blonde Eskimos turned out to be more fiction than fact, they were real illusions—visual representations of fear and excitement co-produced with the search for the earth's remaining lands, commodities, and peoples. The Arctic, like the Tropics in the same period, was an arena for imperial ambition and anxiety.

The missions to document and discover the north carried weight, but they only went so far in actually executing Western Arctic Expeditions. Coordinated scientific travel became possible in the region because of a number of historical conjunctions. First, the solidification and expansion of commerce along the Beaufort Sea coast provided the regional infrastructure for travel and research as well as the rules that governed the exchange of labor, skills, food, and specimens for cash or goods. But the presence of U.S. whalers in Canadian territory concerned Canadian officials, especially after the Klondike Gold Rush and the boundary dispute it spawned. Thus a second historical process impinging on Western Arctic Expeditions was international tension. This tension came to a head in 1913 with the Canadian Arctic Expedition, as the Canadian government turned to science to help demonstrate and protect its sovereignty in the Western Arctic. Finally, expeditions were sites for the development and execution of new standards for scientific fieldwork, which were being worked out though a broad

204 The director of the Geological Survey of Canada indicated his concern for the loss of native races in his preface to Stefansson's 1924 edition of his book, *My Life with the Eskimo.* He wrote, "Under advancing settlement and rapid development of the country, the native is disappearing, or coming under the influence of the white man's civilization." See Reginald Brock, preface to *My Life with the Eskimo*, by Vilhjalmur Stefansson, second edition, (New York: MacMillan, 1924), xii.

professionalization movement in North America. The remainder of this chapter takes up these regional, international, and professional movements.

The Solidification and Expansion of Economic Infrastructure on the Beaufort Sea Coast

In the last chapter, we explored the changes in the Western Arctic over the end of the nineteenth century by following shifts in networks of circulation—those circuits that linked global empires and indigenous nations in the Western Arctic. Networks of circulation, once based in the Bering Strait and the Mackenzie River district, moved to the Beaufort Sea coast in the 1880s and 1890s. These regional patterns of movement—and the outposts, thoroughfares, and ports on which they relied—persisted in the Western Arctic despite massive changes to the whaling industry in the early 1900s. The solidification and expansion of economic infrastructure on the Beaufort Sea coast in many ways facilitated—and sometimes frustrated—the activities of expeditionary scientists in the region between 1899 and 1918.

The itineraries of the Arctic expeditions make visible the continued importance of whalers, traders, and their vessels in exploring the Western Arctic. Many expeditions began by hitching rides with whalers leaving San Francisco bound for Barrow.[205] Once in the Arctic, scientists often learned valuable information from whalers about the local geography and environment, which helped scientists make most use of the open water season, the best time for safe, extensive travel in the north.[206] Whaling vessels served other scientific purposes beyond providing transportation and research leads. Scientific travelers utilized the seasonal movements of whalers and fur traders so as to ensure communication with loved ones and government

205 See "Anglo-American Polar Expedition", August, 1907, Flaxman Island, Alaska, "Manuscripts," 1-3, PEKL.

206 Ibid. Ernest de Koven Leffingwell, a geologist, followed up the reports of whalers to identify a series of little-known rivers in northeastern Alaska. He also met a former whaler near the Alaska-Canada border who helped him "discover" rock formations far from the more accessible coast.

superiors. News from funders, friends, and family could redirect activities in the months ahead, as it did for Canadian Arctic Expedition members learning of the Great War or fieldworkers attempting to stay up-to-date with recent publications in their disciplines.[207] As such, expedition members were acutely aware of the difficulties in sending and receiving mail, often devoting large sections of their official reports to detailing the schedule, cost, and logistics of shipping letters via the Mackenzie River or around the coast of Alaska.[208]

The whaling industry's infrastructure presented scientists with as many obstacles as opportunities, however. Consider Harrison's expedition to the Arctic in 1905-1906. The Englishmen identified the Western Arctic as a prime location for Arctic exploration not merely because of the Polar Continent theory, but also because of the logistical support available in the region. Explorers, geographers, and politicians in the Commonwealth understood the infrastructure of the Hudson's Bay Company in the Mackenzie River District was key to getting to the Arctic and re-energizing the British Empire. They also hoped newly erected fur posts and police stations in the Mackenzie Delta and along the Beaufort Sea coast could be used as jumping off points for exploring the Beaufort Sea.[209]

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207 On Canadian Arctic Expedition members learning of the Great War, see Museum of Civilization, "Northern People, Northern Knowledge." On fieldworkers staying up-to-date with publications, see Letter from Vilhjalmur Stefansson to Clark Wissler, November 22, 1916, PSC and Letter from Vilhjalmur Stefansson to "Charlie," Dec 9, 1910, PSC.

208 Leffingwell, *Canning River Region*, 68-69. Between October and June, mail was collected from the "south" only twice, since it required a 500 mile trip by reindeer or dog team to the Yukon River. As boats prepared to depart with their hauls of baleen and fur in September, fieldworkers felt the crush of drafting letters, field reports, and other necessary correspondence. Leffingwell noted to a colleague and friend that he had composed fifty letters in preparation for the withdrawal of the whaling boats. Letter from Leffingwell to "Andree", Nov 6, 1906, PEKL. CAE members also had to draft annual field reports while in the Western Arctic. Jenness, *Arctic Odyssey*, 252. The entry in Jenness' diary is from July 30th, 1914.

209 Harrison, who had recently completed an expedition to North Africa, pinpointed Herschel Island as a convenient "base of operations" for his travels. See Clements R. Markham and Ejnar Mikkelsen, "On the Next Great Arctic Discovery: The Beaufort Sea", *The Geographical Journal*, vol. 27, no 1 (January 1906), 1-11. Harrison wrote, "I wished to discover, if possible, whether there was land hitherto unknown in the Arctic Ocean: in ascertaining this, I would make Herschel Island my base of operations. These measures were themselves prompted by the ultimate desire, should opportunity offer, of reaching the Pole; and the conviction with which the results of the expedition now to be related have impressed me is that the grand project of Arctic travelers is fully feasible." See Harrison, viii-ix.

Much to Harrison's surprise, his journey was mired in logistical difficulties. He had relied on the existing whaling industry to provide him supplies and provisions once he arrived to Herschel Island. This move allowed him to travel from England by boat, across Canada to Edmonton by rail, and north from Edmonton to Fort McPherson by steamer without hauling his outfit. Harrison's strategy could not account for the vagaries of ice in the Western Arctic, however. When shore ice delayed whaling vessels at Point Barrow, Alaska for much of the summer of 1905, he was left high and dry at Herschel Island without the necessary equipment for his exploration of the Beaufort Sea. He left the Arctic in the fall of 1906, vowing to organize a second and more ambitious expedition.[210]

In 1906, Stefansson almost repeated Harrison's history on Herschel Island. The leaders of the Anglo-American Expedition, Ejnar Mikkelsen and Ernest de Koven Leffingwell, planned to purchase a whaling schooner in Victoria, British Columbia, and take it along the Alaskan coast around to Herschel Island, following the well-worn route of U.S. whalers. Stefansson was to take the interior route—northward along the Mackenzie River to Fort McPherson, and then across the Mackenzie Delta to Herschel Island—and meet the rest of his team there. Stefansson made it, but his expedition mates did not: they could take their vessel, the *Duchess of Bedford,* only as far as Flaxman Island, just west of the international border in Alaska.[211]

Stefansson's isolation from his team became an incredible asset. While waiting for the other members of the Anglo-American Expedition to arrive to Herschel Island from the Alaskan coast, Stefansson heard rumors about previously unknown Inuit on Victoria Island, a landmass

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210 When the ships did get to Herschel Island, Harrison's requests for "two-year's provisions" were submerged by the local whalers and native traders who got first priorities. Harrison, 135-150; 280. He described a 260 day expedition to explore and survey "that unknown region which lies between Prince Patrick's Island and Spitsbergen" in the circumpolar basin. He would be accompanied by "11 Eskimo, 18 sledges, 162 dogs." He never followed-through on these ideas.

211 See "Appendix: "Mr. Ejnar Mikkelsen's Plan" in Markham and Mikkelsen, 9-11.

further east near the Coronation Gulf. Sensing the possible value of a study of these people, Stefansson wrote his mentor, leading American archaeologist Frederic Ward Putnam, describing a desire to hire a native family and head east, to collect specimens before whaling activities penetrated the region and altered the native culture forever. He reasoned he would have to live off what the land provided, as there was no settlement at which to restock supplies beyond Herschel Island. He decided not to pursue this course of action in 1906, but upon his return south in 1907, he went to work in securing his own expedition back north.[212]

By April of 1908, Stefansson had ironed out a contract with the American Museum to study the Inuit of the Coronation Gulf region. Stefansson had aroused interest in the Museum's new curator of anthropology, Clark Wissler, through his description of a tribe of natives who "have never seen white men."[213] While his colleague Rudolph Anderson would handle zoological collection, Stefansson would test a fascinating approach to anthropological fieldwork and Arctic exploration. He decided he would not take supplies many fieldworkers considered vital in Arctic ventures: food, clothing, and materials for building a house (or funds for purchasing space in one). This approach demanded he rely on local land resources, such as driftwood on Arctic shores and migrating caribou, for shelter and sustenance. He anticipated hiring a native family to help him hunt, manage transportation by boat and dog team, and construct winter and summer homes.[214]

Once in the Arctic, Stefansson's plans were sensitive to a host of new influences. His

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212 Klengenberg had visited a tribe of Eskimos in the winter of 1905 and returned with samples of their clothing and copper tools. Vilhjalmur Stefansson to Frederic Putnam, August 28, 1906, PSC. See also, Clark Wissler, "Notes Concerning New Collections," *The Anthropological Papers of the American Museum of Natural History* 2, no.3 (1909): 314-5.

213 American Museum of Natural History to Vilhjalmur Stefansson, April 13,1908, PSC.

214 Ibid. Though it went unmentioned in the contract, the native family must also have appeared as a useful entourage for Stefansson's plan live and travel like an Inuit. He noted this native source of labor had two important advantages over assistants hired stateside: local Eskimos had the mental capacity to manage the stress of harsh Arctic conditions and they cost very little to employ

initial attempts to travel over land by dog team, hunt his own food, and collect specimens and observations of Inuit life were mired by the challenges of the local physical environment and patterns of economic development in the north. Two months after arriving in the Arctic, both Stefansson and Anderson had not moved a mile toward their destination. Stefansson had counted on whaling vessels to provide him with tea, tobacco, and matches—items essential to the survival of the scientists and the larger research project of the expedition. These "civilized goods" were valuable trade items and necessary barter for artifacts of Inuit culture.[215] Though prior experience in the Arctic taught him that shore ice retreated by early summer, 1908 proved to be an exception to this rule. By mid August, no boats could enter Barrow due to ice. When the boats finally arrived, he quickly purchased four tons of supplies, including extra pack dogs and ammunition, and hired Inuit companions to accompany him. This transaction in Alaska was a sign that his relationship with the local economy would help define his expedition's failures and successes, even if his goal was to get beyond the whaling frontier.[216]

What Stefansson could not have known was that the whaling industry was experiencing a dramatic shift at that exact moment. The arrival of plastic substitutes for baleen after 1907 undercut the industry. Between 1907 and 1911, many whalers and whaling vessels discontinued their yearly trips to the Beaufort Sea. The network of circulation in the Western Arctic did not disappear, however. After 1907, some whalers converted their operations to the procurement and

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215 On Stefansson's journey North, see Morris Zaslow, *The Opening of the Canadian North*, (Toronto: McClelland and Stewart Limited, 1971), 236-237. On purchase of supplies and boat traffic at Barrow in the winter of 1908, see "The Stefansson Anderson Arctic Expedition," *The American Museum Journal* 7 (November, 1908): 103-5.; and Vilhjalmur Stefansson to Herman C. Bumps, August 29, 1908, PSC.

216 These acquisitions brought Stefansson very near his budget. He explained this expense by blaming fellow scientists, who had increased the wages for native labor in recent years, thus forcing him to burn through cash resources faster than expected. There was a silver lining: because whaling ships were unable to get to Herschel Island, the supplies he now possessed would command better "prices," meaning he could acquire more and possibly rarer materials from those he would encounter on his journey east. Vilhjalmur Stefansson to Herman C. Bumps, August 29, 1908, PSC. Some of Stefansson's letter also appears in "The Stefansson Anderson Arctic Expedition," *The American Museum Journal* 7 (November, 1908): 103-5. Stefansson noted changing prices for native labor in Vilhjalmur Stefansson to American Museum, July 9, 1908, PSC. The scientists Stefansson referred to were actually Ernest deKoven Leffingwell and his local assistant, former prospector Ned Arey.

sale of Arctic fur. The most successful of these—including Jim Allen, Charles Brower, Tom Gordon, Fritz Wolki, and C.T Pedersen—transformed their whaling stations into fur posts and their whaling vessels into floating stores. Because fur-bearing animals and whales have different habitats and life-cycles, the bulk of harvesting activity was shifted from the open waters to the coastline and from the summer to the winter months. Despite these shifts the open-water season remained the critical period of exchange. In addition, the Beaufort Sea coast remained the home of trading relations, especially at places like Wainwright, Point Barrow, Demarcation Point, Shingle Point, Herschel Island, and Baillie Island.[217]

C.T. Pedersen's case is illustrative of this near seamless conversion from whaling to fur trading in the Western Arctic. He first came north with whalers in 1894 before beginning work for the fur enterprise H. Liebes and Company, a firm not unlike the Pacific Steam Whaling Company, which was based in San Francisco and dominated Arctic commerce. Pedersen left H. Liebes because of a contract dispute in 1923, opening up his own business, the Northern Whaling and Trading company, which he certified in Canada as the Canalaska Company to comply with Canadian laws.[218] In exchange for any number of southern goods—flour, tea, tobacco, ammunition, clothing, weapons, canned foods—he bought the skins of fur-bearing animals, especially the prized white fox. Like baleen, these furs were shipped south and

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217 Plastic substitutes could be mass-produced domestically in a factory, producing a remarkable savings when compared to costs of Arctic whaling. For overviews of the transition between Beaufort Sea whaling and trading economies, see Rob Ingram and Helene Dobrowolsky, W*aves Upon the Shore: an Historical Profile of Herschel Island*, prepared for Heritage Branch, Department of Tourism, Government of Yukon, 148-167; and David Libbey and William Schneider, "Fur Trapping on Alaska's North Slope," in *Le Castor Fait Tout: Selected Papers of the Fifth North American Fur Trade Conference*, eds Bruce G. Trigger, Toby Morantz, and Louise Dechene, (Lake St Louis Historical Society, 1987), 335-358. For individual accounts of this transition provided by whalers-turned-traders, see Charles D. Brower, *King of the Arctic: A Lifetime of Adventure in the Far North*, (London: Robert Hale Limited Press, 1958), 125-131; Arthur James Allen, *A Whaler and Trader in the Arctic, 1895 to 1944: My life with the Bowhead* (Anchorage: Alaska Northwest Publishing Company, 1978), 130-9; 180-88. In addition, the town of Aklavik began to emerge as a hub for trading activities in the 1910s, accelerating its growth in the 1920s and 30s. As we will see later in this dissertation, coastal trading failed in the 1930s for a number of reasons, including not but not limited to the rise of Aklavik as a hub of commerce in the Mackenzie Delta; the Great Depression ; and the entrance of Russian fur into U.S. markets.

218 Ingram and Dobrowolsky, 164-170.

converted into coats, hats, and scarves for city-dwellers all over North America and Europe.[219]

Pedersen found great success along the Arctic coast. Inuit from Alaska, the Yukon Coast, and the Mackenzie Delta remember him as a captain who was fair, determined, and intelligent, and who knew the contours of the Beaufort Sea coastline better than any navigator. He also encouraged local Inuit trappers to purchase boats from him and thus expand the fur trade on their own. Such business practices won Pedersen many faithful customers, but also brought the ire of the Hudson's Bay Company. As was typical in the 1910s and 1920s, Pedersen opened a trading post at Shingle Point on the Yukon coast in 1917, only to have the Company open one there three years later. During one year of trading, the Hudson's Bay Company vessel was stuck on a sandbar near the mouth of the Mackenzie River. Pedersen agreed to pull them out, but charged them sixty fox pelts for the service. This back-and-forth between the Hudson's Bay Company and Pedersen's business contributed to the extension of the fur trade throughout the Western Arctic in the 1910s and 1920s, offering a bittersweet resolution to the Company's long-deferred dream of operating trade in the Arctic.[220]

As the whaling industry pulled out of the Western Arctic, it left dramatic ecological and social consequences in its wake. The population of bowhead whales—estimated to include more

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219 Bockstoce, 255-270; 324-330. Brower, 85-131.

220 Ingram and Dobrowolsky, 148-170. For a personal account of his interactions with locally-based traders and the Hudson's Bay Company, see "Transcript of Interview with G.W. Porter," N-1992-173, NWTA. The best source for the growth of the fur trade in the Arctic remains Peter Usher, *Fur Trade Posts of the Northwest Territories, 1870-1970,* (Ottawa: Northern Science Research Group, Dept. of Indian Affairs and Northern Development, 1971). The tensions between Pedersen and the Company spilled over to Inuit as well. Jimmy Jacobson recalled his father receiving a black eye from a Hudson's Bay Company trader for selling to Pedersen, evidence of just how "fur crazy" American and Canadian entrepreneurs were. Relations among Inuit, the Hudson's Bay Company, and the Canalaska Company were responsible for the solidification of coastal trading and social life in the Western Arctic over the 1910s and 1920s after the decline of commercial whaling. For an excellent overview of Inuit perspectives on the expansion of the coastal fur trade, see Murielle Ida Nagy, "Yukon North Slope Inuvialuit Oral History," *Occasional Papers in Yukon History No. 1,* Heritage Branch, Government of the Yukon, 1994, 45-55. Such competition echoed historic relations between Russian and British empires and Inuit and Dene traders.

than 30,000 individuals before 1880—was reduced to 10,000 between 1880 and 1910.[221] In addition, the biological invaders accompanying American whalers took a staggering toll on native Inuit. Epidemics of measles and Spanish Influenza drastically reduced human populations. In 1850, an estimated 2,500 Inuvialuit inhabited the Beaufort Delta region. By 1910, only 150 survived.[222] Remarkably, fur trading filled some of these voids left by commercial whaling. The ever-eastward push of the fur frontier in the first two decades of the twentieth century contributed to a migration of Alaskan Inuit into the Mackenzie Delta, which acted to offset the human losses due to disease.[223] In contrast to this movement and flux in the Inuit population, the geography of coastal commerce—whether in baleen or fur—had largely stabilized by the early 1900s. Between Point Barrow in the west and Baillie Island at its eastern edge, the Western Arctic coastline was dotted almost every 15 miles with a "community" of Inuit families and resident whalers who utilized the new industry for shipments of goods, equipment, and ammunition in the summer time.[224] As we will see in next section, this stabilization was necessary for the social contracts between local residents and newcomers who wished to perform extensive and intensive scientific research in the region.

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221 Bockstoce and Botkin, 107-141.

222 McGhee, 5.

223 Historian John Bockstoce noted that in 1894-5, more than one hundred of the Inuit from Pt. Hope (Alaska) and Point Barrow were at Herschel Island. In interviews conducted in the early 1990s, anthropologist Murielle Nagy and archaeologist Cathy Cockney recorded the resettlement of various Alaskan Inuit families into the Yukon coast and Mackenzie Delta region between 1870 and 1940. Some of these families were in search of more favorable hunting grounds after the caribou if interior Alaska were over-harvested in response to the Bering Sea whaling and fur industries. Others sought employment on whaling ships and still others yearned for an escape from disease outbreaks. In any case, today's Inuvialuit population reflects this legacy of the whaling industry. One dialect of Inuvialuktun language, Ummarmiut, is so named after the "people of the evergreens and willows, who are the "descendants of Alaskans who moved into the Delta at the end of the nineteenth century and again in the 1920s as muskrat trapping developed." See Nagy, 1-3; For specific oral histories on this theme, see pg 34-36 and the testimony from Albert Oliver, Hope Gordon, and Jimmy Jacobson.

224 Flaxman Island, Barter Island, Demarcation Point, Clarence Lagoon, and Shingle Point all solidified near the turn of the twentieth century in response to the growing importance of commercial coastal whaling in social and economic life. In addition, some long-time whalers never left the Arctic, marrying local Inuit women and inspiring long family lines. Ned Arey, Charles Brower, Tom Gordon, Christian Klengenberg, Jim Allen, Peter Lopez, and Fritz Wolki all remained in the north, becoming successful trappers and raising children who led Inuit communities over the early and mid twentieth centuries. On whalers in the area, see Nagy, 7.

The conversion from whaling to fur trading influenced the remainder of the Stefansson-Anderson Expedition of 1908-1912. In 1910, after waiting two years for results from Stefansson and Anderson, the American Museum pulled its funding for the expedition and ordered the two men home.[225] However, because of the delay in communication between New York and Herschel Island, by the time the mail reached the north, Stefansson was already in the country of the "Blonde Eskimo." Between May 1910 and April 1912, he stayed within the Coronation Gulf region, moving along the Coppermine River between Great Bear Lake in the south to Langton Bay and Victoria Island in the north, zig-zagging across the land visiting a total of thirteen Inuit groups. His field diaries and correspondence indicate that Stefansson was only able to operate in this district because collected valuable furs, which he traded with locals for food, specimens, and other goods. Stefansson's achievements were thus directly related to the expansion of commerce eastward along the Arctic coast and into the Coronation Gulf.[226]

Stefansson's arrival and survival in the Coronation Gulf owed as much to whaling captains as the fur trade, his own abilities, or those of his native companions. Even as the anthropologist attempted to beat whalers and traders to the fringes for the economic frontier in the Arctic, he relied on them once he got there. In the fall of 1910, for instance, Captain Joseph

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225 Herman C. Bumpus to Vilhjalmur Stefansson, May 12, 1910, PSC. Members of other expeditions also used whalers to ship out collections already amassed, a service whalers performed for scientists in exchange for cash or goods. Scientists obliged, not only because they made space for more collections to be shipped in the future, but also because these materials were guaranteed to not deteriorate or be pillaged by curious animals. More importantly, though, this merchandise gave superiors at home an early indication of the pay-off of Arctic expeditions. On sending supplies back to funders, see Vilhjalmur Stefansson, "Suitability of Eskimo Methods of Winter Travel in Scientific Exploration," *Bulletin of the American Geographical Society of New York* 60, no. 1 (1908): 210. On the response from sponsors upon receiving collections, see *The Forty-Fourth Annual Report of the American Museum of Natural History*, (New York: Irving Press, 1913), 69 and 195.; *The Forty-Third Annual Report of the American Museum of Natural History*, (New York: Irving Press, 1912), 62.

226 Vilhjalmur Stefansson to "Percy", December 12, 1910, PSC. He estimated that nearly one thousand people lived within this area, took physical measurements of two-thirds of them, and photographed many. He purchased a "complete ethnological collection" for the tribes he met, including bows, arrows, needle cases, thimbles, knives, adzes, drills, combs, coats, pants, and boots. His excitement in these moments of discovery is palpable in his writing, as he indicated the exact date and time—to the minute—that he first encountered the "unknown" tribes. For details on the measurements and collections see Vilhjalmur Stefansson to Clark Wissler, December 5, 1910, PSC.

Bernard sailed from Herschel Island to Langton Bay, where he held a rendezvous with Stefansson and Anderson. Stefansson, in need of restocking some of his own supplies, purchased a rifle, some ammunition, some flour, and some cloth for a tent in exchange for fox skins. Given that Bernard agreed to ship some of Stefansson's ethnological collections to Nome the following summer, it is likely that the anthropologist promised in return a continued supply of fur.[227] Clearly, Stefansson embraced the trading ships as they fit the project of exploring the north for science.[228]

Once back in New York, Stefansson began an international lecture tour, combining these public appearances with private meetings with potential sponsors for a new Arctic expedition. He originally intended to apply his method of Arctic travel to exploration of the Arctic archipelago, an area believed to be the frontier of the Polar Continent. But the Canadian government sought a comprehensive study of the Coronation Gulf and the Canadian portions of the Western Arctic. While Stefansson headed up the Northern Party in search of new lands, the Southern Party focused its work on documenting the cultural, biological, and geological life of the Coronation Gulf. The lands once considered "unknown" were now eyed as a potential source of natural

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227 Vilhjalmur Stefansson to Herman C. Bumpus, January 21, 1910, PSC. On trading for rifle and ammunition, see Vilhjalmur Stefansson to Charles Hamel, January 24, 1911, PSC. On promise to take collections to Nome in summer of 1911, see Rudolph Anderson to Herman C. Bumpus, January 17, 1911, PSC. Normally the anthropologist would have saved such skins for the Museum, but by this point, Stefansson had already learned that the AMNH had terminated the expedition. He felt free to treat the skins as he saw fit.

228 In the winter of 1910, he agreed with captain Fritz Wolki to store specimens at the captain's ice house at Baillie Island, where the following summer the captain would pick up said items and ship them to New York. Stefansson openly acknowledged that provisions from trading ships were his form of currency, used to purchase specimens for the Museum. In an article in the *Bulletin of the American Geographical Society*, he recommended that Arctic scientists have some goods with which to trade and curry favor with Inuit, cautioning that this method should only apply to natives who had previous contacts with whites. Yet while in the Coronation Gulf area, it appears he used trading supplies to purchase copper weapons, stone utensils, and clothing. These specimens were immediately brought to Cape Bathurst to be shipped to New York aboard a trading vessel, incorporating him once again in the Beaufort Sea coast economy. Stefansson's suspicious "purchase" of ethnological specimens from the Coronation Gulf region is described in Vilhjalmur Stefansson to Herman C. Bumpus, April 19, 1911, PSC. For Stefansson's published words on trading with natives, see Stefansson, "On Suitability of Eskimo Methods of Winter Travel in Scientific Exploration," 3. For the anthropologist, purchasing specimens from natives with tea, tobacco, and matches was more mutually beneficial for Eskimos than grave-robbing (though Stefansson robbed graves as well). For history of grave robbing in Arctic work, consult Hrdlicka, 182. See also Vilhjalmur Stefansson to Clark Wissler, December 5, 1910, PSC.

resources, especially copper, a mineral whose uses were expanding along with the industrialization of the Dominion in the early 1900s. As evidence that a fur trading economy had solidified on the Beaufort Sea coast by 1913, the Southern Party made its headquarters at Langton Bay, which was soon named Bernard Harbour after the whaling captain Stefansson met there in the fall of 1910.[229]

Among the Southern Party was Diamond Jenness, a New-Zealand born anthropologist whose duty on the Canadian Arctic Expedition was a three-year study of the "Blonde Eskimo." Unlike Stefansson, Jenness spent his first year and a half stationed at Bernard Harbour, inviting in Inuit for investigation as these natives engaged in trading activities with nearby whalers-turned-traders. He also executed a six-month journey with a family throughout Victoria Island, during which he relied on a local translator, himself the son of the whaler who originally told Stefansson about the Coronation Gulf people.[230] These partnerships and movements (and lack of movements) would have been impossible if not for the trade relations established in the region in the years leading up to the Canadian Arctic Expedition.

Between 1899 and 1918, the Western Arctic experienced a shift in its patterns of economic activity. Inuit families and visiting traders continued to meet along the Beaufort Sea coast at whaling outposts, which soon became fur posts. The pursuit of fur-bearing animals spread economic infrastructure, both human and non-human, further eastward and northward from Herschel Island toward Victoria Island and the Coronation Gulf. These developments facilitated Western Arctic Expeditions, even as delays in shipping schedules and the vagaries of

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229 For a description of Stefansson's return from the north in 1912 and the beginnings of the Canadian Arctic Expedition, see Diubaldo, 66-68. On international lecture tour, see *The London Times*, 22 April, 1913. For NGS and AMNH's continued support of Stefansson, see *The New York Times,* 26 May, 1913.

230 Jenness did not have a mastery of the language, so he relied on a phonograph to record native songs and stories. For a description of the scientific staff of the Canadian Arctic Expedition, see *The New York Times,* 21 May, 1913. On Jenness' duties, see *The New York Times,* 9 August, 1916.

ice conditions at times frustrated their execution. While the Polar Continent and the Blonde Eskimos represented imperial dreams of the early twentieth century's search for land and resources, these visions could not have been followed without particular economic and environmental changes in the region.

Social Contracts between Expeditionary Scientists and Arctic Residents

Expeditionary science was not as simple as performing research within the confines of an outpost or from the hinterland of one's tent. Owing to the large financial investment of Arctic expeditions and the missions to discover and document the land and life there, members were encouraged to collect as much as possible from as many sites as possible. Where whalers sought baleen and traders sought furs, scientists sought caribou skins, human skeletons, the latitude and longitude of particular land features, geological fossils, and more. Expeditions in the Western Arctic were thus comprised of what Arctic historians have called touring scientific "omnivores."[231] Disciplinary norms prescribed certain movements and help explain the various activities on expeditions: zoologists hunted game in a number of watersheds; anthropologists traveled only where their Inuit subjects went; geographers attempted to thoroughly map poorly known regions by referencing known landmarks; and geologists concentrated on areas rumored to contain mineral deposits. Some of these areas and items were easier to access than others, but all relied on leaving the coast and entering the interior of the Arctic landscape—a banality of Inuit life that became an extraordinary feat for expeditionary science.[232]

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231 Sverker Sorlin, "Rituals and Resources of Natural History: The North and the Arctic in Swedish Scientific Nationalism," *Narrating the Arctic: A Cultural History of Nordic Scientific Practices*, ed. by Michael Bravo and Sverker Sörlin, (Canton, MA: Science History Publications, 2002), 109.

232 Even if over-wintering was in some ways made possible by whaling bases at Barrow, Herschel Island, and Baillie Island, the ability to travel inland was something whalers did not have or want to pursue. Still, expedition members had little experience within their own scientific communities to draw upon. Previous naturalists and surveyors had confined their Arctic visits to the summer months. Consequently, they had contained their research

In order to move across the Arctic tundra, through the Mackenzie Delta, and along the Beaufort Sea in the winter months, scientists formed new traveling partners. When searching for specimens and data points, fieldworkers engaged the expertise of northerners. Many Inuit were familiar with the local landscape and the habits and habitats of Arctic animals, as were whalers or trappers who never left the region and started families there. More fundamentally, these northerners knew intimately the proper methods for living, eating, and traveling in the north throughout the seasons of the year. A generation of Inuit living along the Beaufort Sea coast had helped create the social and financial contracts which bound newcomers to natives. These contracts allowed for the exchange of cash or goods for certain services, like guiding, interpreting, making clothes, building shelter, hunting, collecting wood for fuel, and even helping to prepare or find scientific specimens.[233]

Ernest de Koven Leffingwell's desire to map the coastline and topography of northeastern Alaska provides a telling example of these associations. Upon arriving to the Western Arctic in 1906, Leffingwell chose the site of his field camp, Flaxman Island, chiefly because of the presence of two Inuit families there.[234] During his first fall and winter in the area, Leffingwell met Ned Arey and his family at Barter Island. Arey was a whaler-turned-prospector who had married an Inupiat woman and had two teenage sons. Arey's camp became a critical site for the geologist as it was centrally located between Flaxman Island and Herschel Island, offering a

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to contiguous waterways and transportation technologies familiar to them, like the steamer, boat, or canoe. For examples of researchers containing their work to the summer months and technologies of travel in open-water, see Caswell,184-207.

233 There are many examples within the history of science of the crucial roles played by local labor or "go-betweens" in helping scientists navigate foreign places. For a primer on these, see Richard White, *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650-1815,* (Cambridge: Cambridge University Press, 1991,) 94-141.; David Turnbull, "Boundary-crossings, cultural encounters, and knowledge spaces in early Australia," in *The Brokered World*, ed. by Simon Schaffer et al., (Sagamore Beach, MA: Science History Publications, 2009,) 387-428.

234 Letter from Leffingwell to Andree, November 6, 1906, PEKL. The geologist noted that these families "bring us seal and some caribou meat, sew our clothes, and visit us often."

suitable resting spot on an otherwise daunting five week sledding trip. While stationed at Barter Island, Leffingwell picked up experience from Arey and his family in sledding, harnessing dogs, building fire and shelter, and preparing for the Arctic winter. This training allowed Leffingwell to provide an extended treatise in his 1919 report on how to construct winter shelters, where to find materials for them, how to locate food, and how to preserve it.[235]

Primarily because of the site of their camp and their manual abilities, Arey and his family became research assistants for Leffingwell in the geologist's topographical work. Following the United States Coast and Geodetic Survey's instructions, Leffingwell and his team toiled to set up a system of micrometric stadia traverses and "as many lines of triangulation as could be run" along a one hundred mile stretch of the Beaufort Sea shoreline in spring of 1911. Such work demanded that the research party build signal stations on several mountain peaks that lie across the coastal tundra, and then return to the edge of land in order to observe the intersections of the lines of sight. Leffingwell may have been able to complete this work alone, but it was made much more efficient with help. Assistants constructed stations with driftwood and whale vertebrae, and repaired them when knocked down by wind. Even with the team and the signals in place, foggy days, snow events, and haze affected visibility and the overall task of mapping the coastline to the degree and scale demanded by governmental standards.[236]

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235 Leffingwell discussed his interactions with Arey's family in correspondence and in an unpublished manuscript. See Letter from Leffingwell to Andree, November 6, 1906, PEKL.; "'Anglo-American Polar Expedition', August, 1907, Flaxman Island, Alaska, PEKL. His treatise on these subjects is found in Leffingwell, *Canning River Region*, 19-28.

236 Leffingwell, *Canning River Region*, 36-45. The previous fall, Leffingwell made no progress on his research because he had been "employed in getting driftwood for the winter" and in securing and repairing his shelter and sleds. Leffingwell, like many other expedition members, also found that dogs had important roles to play in Arctic science. The field researcher was visibly despondent when Jim, his finest husky, was stolen, a victim of the hustle and bustle of life at the Herschel Island whaling outpost. But the kinship between human and animal was not purely sentimental: Leffingwell recognized the importance of sled dogs as a means of moving about the Arctic and conducting any kind of research. As he had done with shelter and food, he committed a significant entry in his USGS publication to the topic of sled dogs and dog sledding. He provided the reader with recommendations for how to select particular breeds, how to train them, what to feed them, how to harness them, how to mush them in winter, and how to use them as pack animals in summer. On Leffingwell's sadness at losing

Leffingwell's interactions with northerners were common to expedition members in the period. Zoologist Rudolph Anderson, who performed zoological collecting in the same region where Leffingwell lived in 1908-1909, relied on Inuit families for finding and hunting a variety of game animals. After his experience in the Anglo-American and Stefansson-Anderson Expeditions, Vilhjalmur Stefansson published a manual for building efficient dog teams for the American Geographical Society.[237] Stefansson was well-known for adopting Inuit approaches to travel and survival, a method other scientists referred to as "turning Kogmollik."[238] The Canadian Arctic Expedition's lead geographer, Kenneth Gordon Chipman, explicitly praised and adopted Leffingwell's methods in mapping the area between the international boundary and Herschel Island, as well as the Mackenzie Delta in 1914.[239] Like Leffingwell, the maps produced on these later expeditions added considerably to knowledge about the region.

Leffingwell's example makes clear that expeditionary science was completed along with the help and expertise of local residents. But what of other scientific activities beyond surveying, topography, and marking boundaries? The study of Arctic nature and culture, for instance, often necessitated not only observation and the calculation of data points, but harvesting animals, bartering for artifacts, and delivering them to museums where other scientists could identify and analyze them. Zoologists and anthropologists leaned on local sources of information and labor to find, harvest, and prepare specimens. But since zoological and anthropological materials often

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Jim, see Ejnar Mikkelsen, *Conquering the Arctic Ice*,135. His treatment of handling dogs is found in Leffingwell, *Canning River Region*, 26.

237 Vilhjalmur Stefansson, "The Technique of Arctic Winter Travel*," Bulletin of the American Geographical Society of New York* 44, no.1 (1912): 2, 5-7

238 The description of Stefansson's "turning Kogmollik for science" is given in Clark Wissler, "'Turning Kogmollik' for Science'," *The American Museum Journal* 10, no. 7 (November 1910): 212-220. Though Wissler is not named as the author, he was responsible for writing up much of the anthropological sections of the *Journal.* It is curious that the author put the term in scare quotes. This could mean that the phrase had been previously circulated to describe Stefansson's work. It could also be a gesture other colloquialisms for "going native" or "turning Indian." In the sources I surveyed for this chapter, I have not found any evidence to corroborate either of the above interpretations.

239 Letter from KG Chipman to Geological Survey, July 9, 1914, MG 30 B 66, Vol 1, File: Correspondence and Reports, July-Sept 1914, LAC.

began their lives as food or personal property, there were important tensions in this fieldwork. Time and again, expedition members convinced Inuit to preserve animals or dispose of personal items by paying them cash and bartering for them with foreign goods. Arctic fieldworkers also had few of the resources available to their counterparts in continental survey parties, who tapped informal networks of amateur birders find and collect specimens.[240] There were, however, resident whalers who had begun to amass their own assortment of curios. In these ways, the pursuit of scientific knowledge in the north was negotiated through the social contract linking scientists, local residents, and the Arctic environment.

While Rudolph Anderson's seven years in the Western Arctic involved a diverse set of experiences as commander, mammalogist, and ornithologist, a picture of his habits as scientific collector can be captured with a certain photograph (See Figure 6).[241] Anderson sat alongside his tent at Bernard Harbour in June 1915, his chin tucked to his chest, eyes fixed on his hands. In his lap, an animal transformed. Its body was now subject to the demands of science; it was becoming the property of Canada. Next to him, a young boy—his assistant Patsy Klengenberg—took a similar posture. Klengenberg, the son of a Danish whaler, spoke fluent English and Inuktitut. He

240 Kohler, *All Creatures*, 161.

241 In order to further interrogate the regional exchange relations that guided expeditionary science in the Western Arctic, I turn to the experiences of Rudolph Anderson and Diamond Jenness. Between them, zoologist Rudolph Anderson and anthropologist Diamond Jenness tallied ten years of field experience in the Western Arctic. Anderson teamed with explorer-anthropologist Vilhjalmur Stefansson in the Stefansson-Anderson Expedition of 1908-1912, and later became the leader of the Southern Party of the Canadian Arctic Expedition of 1913-1918. Jenness accompanied Anderson as the sole anthropologist and archaeologist of the Southern Party. On Rudolph Anderson's career, see *Arctic Shadows: The Arctic Journeys of Dr. R.M. Anderson.* DVD. Directed by David Gray. 2009; Mountain Studios and Grayhound Information Services, 2009. On Jenness's career in the CAE, see Jenness, *Arctic Odyssey,* xxvii-xliii. The two men's collection activities and scientific travel were different from one another in ways that reflect disciplinary norms in the early twentieth century. In line with previous northwestern field biologists, like E.A. Preble, Wilfred Osgood, and Ernest Thompson Seton, Anderson spent the majority of his time hunting wild animals in order to amass a "representative" series of collections of regional species. Jenness, on the other hand, directed his energies toward a broader methodological project of anthropological research. Jenness performed archaeological digs, anthropometric measurements, sound and photographic recordings of rituals and regalia, artifact collecting, and traveled with an Inuit family for six months to observe Inuit behaviors, beliefs, and social structures. This portfolio of activities is consistent with what historians have described for professional anthropology in the early 1900s. Fieldworkers in the early 1900s had not yet specialized into archaeologists, physical anthropologists, and cultural anthropologists. As a result, they were often responsible for all of these tasks.

had traveled with Anderson for months, learning how to prepare bird and mammal skins. The two men engaged in one of the final stages of scientific collecting, seemingly ignorant of the camera.[242] With this image, we see the kinds of exchanges produced by and necessary for scientific expeditions in the Arctic.

Figure 6. Patsy Klengenberg (left) and Rudolph Anderson prepare specimens in the field as members of the Southern Party of the Canadian Arctic Expedition of 1913-1918. *Source: Canadian Museum of Civilization*.[243]

Anderson's absorption with his scientific work in this snapshot is a signal of an important victory for the zoologist: he was able to look at animals as something other than food. With Stefansson between 1908 and 1912, Anderson cut his teeth on daily life and zoological collecting in the Arctic. His first winter brought him illness and near starvation, which highlighted the conflicting values of animal parts.[244] When scientists suffered from hunger, any specimens they

242 Museum of Civilization, "Northern People, Northern Knowledge."

243 Photo is available from Museum of Civilization, "Northern People, Northern Knowledge." Caption at the site reads: "Dr. R. M. Anderson and Patsy Klengenberg cleaning specimens, both seated alongside tent, Bernard Harbour, Nunavut. June 10, 1915. GHW 50932. *Source: Canadian Museum of Civilization"*

244 Vilhjalmur Stefansson, "My Quest in the Arctic," *Harper's Monthly Magazine*, December 1912, 10.; Vilhjalmur Stefansson to Herman C. Bumpus, August 19, 1909, PSC. On sickness in field notes, see Palsson, *Writing on Ice*, 169-190. On August 7, 1909, Stefansson notes that the entire party fell victim to an "epidemic

had amassed quickly became dinner. Stefansson recalled his guilt in digging up a noteworthy cache in 1910. Earlier in the winter, he and Anderson had spent a day burying grizzly bear specimens in the frozen ground. "Now," he remembered, "their food value impressed us so strongly that we spent a day digging them up to eat the heads and paws, though we destroyed thereby the scientific value of the skins."[245] Not surprisingly, Anderson often complained to his museum sponsors during this expedition about the incompatibility of Arctic life and zoological fieldwork. He cursed incessant movement around the landscape as interfering "materially" with science, objecting to the fact that his collecting activities had to be oriented toward sustenance.[246]

But soon, Anderson gained skills and assistance that allowed him to see "living off the country" as consistent with, if not beneficial for his collecting. While in the Colville River area in 1909 and again along the Coppermine River in 1911, Anderson hired Inuit families to take him to areas no previous whaler, trader, or government agent had entered. Travel down rivers and into the interior brought him to migrating caribou and into the ponds housing muskrat, marten, mink, and beaver. Between 1909 and 1911, Anderson mastered the technique of preserving animal materials, which involved proper skinning, treating with chemical baths, stashing in caches atop driftwood frames (to prevent predation), and thwarting the efforts of pesky mice.[247] In the summer of 1912, he returned to New York with over eighteen boxes of specimens. By October,

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cold." Both he and Stefansson were unfamiliar with surviving the cold and finding suitable sources of food. In one case, the men forced down whale tongue originally rescued from a carcass and intended as dog food. In another, the crew resorted to boiling their sealskin boots for dinner.

245 Stefansson's quote comes from Vilhjalmur Stefansson, "My Quest in the Arctic," 11. On the cache method, see Vilhjalmur Stefansson, "Suitability of Eskimo Methods of Winter Travel in Scientific Exploration," *Bulletin of the American Geographical Society of New York* 60, no. 1 (1908): 210. The grizzly bear was particularly memorable for Stefansson and Anderson, as both men were keenly aware that only one such specimen existed in any of the museums in the entire United States.

246 A letter from Anderson, dated October 14, 1908, is found in "News from the Museum's Arctic Explorers" *The American Museum Journal*, no.5 (May, 1909): 113

247 David Gray, *Arctic Shadows.*

many of these specimens were on display at the American Museum of Natural History.[248]

Anderson's diary entries confirm how he regularly contracted Inuit to assist him.[249] Anderson hired Ambrose Agnavigak, an Inuit man from Herschel Island, in the summer of 1915, to help the Southern Party with its general work. For his efforts in hunting, trapping, as well is in helping to build and repair a 14 foot dog sled, Anderson paid Agnavigak $88 in cash. While difficult to know the exact value of that salary, the Inuit man would have been able to translate this payment into a slew of goods at Herschel Island, including a new high-powered gun ($25-$30) and a winter's worth of flour, tobacco, and tea.[250] These relationships between scientists and Inuit were repeated with several other men, including Ikey Bolt, Adam Ovayuak, Manilenna, and Palaiyak, who were referred to in scientists' diaries as the "Southern Party Boys."[251]

Inuit families were familiar with working for white men. Since the 1880s, they had signed contracts with whalers to provide meat and clothing to outposts at certain intervals throughout the year. They also were paid by fur post operators, who rarely left the forts, but were eager to capitalize on the region's natural bounty.[252] Hiring Inuit was an established mechanism for accessing their expertise and labor, while guaranteeing one's own profits and the more basic needs of eating, sleeping, and moving safely. In ways critical for expeditionary work,

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248 Ibid. Letter from Stefansson to Anderson, October 13, 1912., Rudolph Martin Anderson Fonds, MG 30 40 Vol 1 File 7: Correspondence, LAC.

249 When Anderson ascended to the role of commander of the Canadian Arctic Expedition, he was able to effectively administer the collection of mammals and birds from around the region. Other scientists, while not traveling with Anderson, often pursued, hunted, and dressed animals for the zoologist. Anderson faced many delays in pursuing his own collecting work as he was constantly coordinating people, ships, salaries, equipment, and correspondence with expedition members, whalers, and government personnel. See Jenness, *Arctic Odyssey,* 370-390. Museum of Civilization, "Northern People, Northern Knowledge." See also Jenness, *Arctic Odyssey,* 166-186; 240-260; and David Gray, *Arctic Shadows.*

250 Quotation from Rudolph Anderson's diary, Feb 27, 1916, as cited in Museum of Civilization, "Northern People, Northern Knowledge." In November, Agnavigak shot three caribou and hauled them back to camp to contribute to that winter's clothing and food requirements. In February, Agnavigak trapped a wolverine, which Anderson found to be a "a very prettily marked light-colored specimen."

251 Museum of Civilization, "Northern People, Northern Knowledge"

252 Natasha Lyons with a contribution by Sandra Jezik, "Early 20th Century Lifeways in Qainiuqvik (Clarence Lagoon): Report on the 2003 Archaeological Investigations at Site 76Y," (Cultural Resource Services, Parks Canada, 2004), 17-18.

these guides and interpreters had familiarity with native languages, trade jargons, subsistence activities, and Inuit customs.[253] These Inuit, then, held the power of being able to transport Anderson to places labeled "unknown" on his map and yet tell him in English where he was. The size and scope of Anderson's collections reflect debts to his Inuit assistants and fellow expeditionary members. Anderson returned to the National Museum in 1916 with over 400 specimens of mammals, representing over 22 species, and 600 specimens of birds, representing over 70 species. As we will see in the following chapters, these materials became the basis for a series of reports, museum displays, and policies concerning Arctic nature.[254]

Like Anderson, Diamond Jenness used a rifle to collect anthropological materials. For the young Cambridge-trained scholar, trade goods—shotguns, ammunition, tea, flour, and tobacco—were essential to the project of documenting Inuit culture.[255] Trading was a recognized component of anthropological collecting. Yet this did not liberate the activity from its commercial ties. Jenness had to manage the boundary between trading-for-science and trading-for-profit. His official contract with the Canadian Arctic Expedition forbade him from "trading or other commercial transactions" unless these were completed for "the expedition itself, or the Geological Survey of Canada."[256] But it was nearly impossible for Jenness to avoid trading activities, even if he found other means, like the camera, the field diary, or the phonograph, to document Inuit life. Jenness was the only member of the Southern Party who understood and

253 Kohler, "Finders, Keepers," 445-446. Kohler talks about how various collecting sciences (like geology, natural history, anthropology) need to access local knowledge and labor on the ground because residents have such detailed understandings of place, culture, and landscape.

254 Such power was priceless for the zoologist, who was interested in recording the ranges and distribution of northern animals.

255 Mikkelsen, "The Report of the Mikkelsen-Leffingwell Expedition," 614. Northern-bound anthropological collectors had learned an important lesson about the value of trade materials. Stefansson, Jenness' mentor on the CAE, was the anthropologist for the Anglo-American Expedition. While stationed at Herschel Island, he found wonderful opportunities to study Inuit language and take physical measurements of the natives. But without money earmarked for purchasing goods and then trading for specimens, he left with few material objects representative of Inuit culture. The official report of the expedition published in the *Bulletin of the American Geographical Society* admitted this oversight as a cautionary tale for future Arctic scientists.

256 A copy of the contract Jenness signed is reprinted in *Arctic Odyssey*, 728.

could speak Inuit languages, as well as the trade jargon that became the primary means of communication among whalers, prospectors, traders, and Inuit in the region during the early twentieth century. Jenness constantly toggled between his roles as anthropologist and negotiator, bargaining with Inuit to secure the services and goods the expedition required, such as seamstresses, navigators, boat mechanics, clothes, and food for themselves and their dogs.[257]

Trading was a natural venue for collecting ethnological specimens and garnering important services for the maintenance of the expedition. But what of gathering archaeological artifacts, those items presumably made obsolete by changes in local cultures or economies? Ironically, the regional whaling industry had produced a means by which to study the life it had helped displace. Jenness, like the anthropologist Stefansson and the ethnologist Russell, realized that whalers themselves could be rich sources of archaeological curios, since they had been in the north longer than itinerant scientists. Twice Stefansson purchased "Eskimo implements and charms" from Charles Brower, a whaler at Point Barrow and self-proclaimed "King of the Arctic." While iced-in at Point Barrow in February of 1914, Jenness took to sketching Brower's collections of Inuit goods, so as to create a database for comparison with items he anticipated gathering further east. Jenness also found that local residents, whether whalers or Inuit, could

257 Jenness, *Arctic Odyssey,* 671-672. Jenness's trading activities were primarily restricted to the winter months, when travel was more difficult due to extreme temperatures and waning daylight. Fortunately, for his scientific work, regional Inuit also traveled less between November and March. After the Southern Party established its station at Bernard Harbour in the summer of 1914, the following two winters (1914-1915; 1915-1916) witnessed the emergence of a temporary community around the station. Jenness took to referring to this station as the "Mecca" for tribes in the region, as more than 100 Inuit began camping below the expedition's quarters. Likewise, Jenness found the temporary Inuit a convenient and unrivaled research group. The anthropologist kept detailed notes on his "methodical bartering" which took place over the two winters at the station. The first winter's trade items were dominated by caribou, seal meat, and dried fish, mostly because the field party was inadequately equipped with dog food. The second winter allowed for more anthropological collecting. In exchange for empty pemmican tins and malted milk cans, knives, cartridges, traps, gun powder, matches, and scissors, Jenness pulled in an incredible load of Inuit goods. He acquired boots, sealskin slippers, long mits, short mits, stone lamps, snow-knives, 3-pronged spears, copper needles, musk-ox ladles and copper *ulus* (seal knives). *Appendix 3 in Arctic Odyssey* is dedicated to a complete reproduction of the trade items Diamond Jenness exchanged for his anthropological collections. *Arctic Odyssey,* 672-696.

interpret the uses and history of certain artifacts.[258]

Paying for archaeological items was far easier than digging for them, not simply because of the savings in energy and time. Snow covered the ground for up to nine months of the year, and, for the remainder, the soil was often frozen just inches below the surface. Accordingly, Jenness timed his digs in the summer months and located them at abandoned shelters and grave sites.[259] From May to July, 1914, Jenness and his assistants Teriglu, Aiyaka, and Qovun camped at Barter Island. There, uncovered by the melting snow, the men found a variety of specimens from the over one-hundred abandoned houses, or "old ruins" as Jenness called them (See Figure 7). Jenness and his Inuit partners found "a great number of bones," a white stone labret, bows, drum-sticks, lamp-wicks, needle-cases, an *ulu*, and a spear thrower.[260] Upon finishing the task, Jenness paid Teriglu with a 20-gauge shotgun, a box of brass shells, $9 cash, a tin of lard, a pound of tobacco, and a tin of baking powder—a bounty whose cash equivalent surpassed Jenness's own monthly salary ($42/month).[261] For the anthropologist, the specimens became central to his project of describing Inuit culture, especially its historical movements and its encounters with western civilization.[262] Fortunately for him, the emergence of the fur economy—and the shift in harvest seasons from summer to winter—meant that many Inuit were available for archaeological work in the only part of the Arctic year when it was possible.

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258 The first of these purchases in 1912 was sent to the American Museum of Natural History in New York and the second, in 1914, to the National Museum in Ottawa. On interactions with Brower, see *Arctic Odyssey* 145-147. On purchase of collection at Point Hope, see *Arctic Odyssey,* 622. This was also the case with the specimens Jenness bought from Jimmy Asecaq at Point Hope in 1916 on his way out of the Arctic en route to Ottawa

259 *Arctic Odyssey,* 186. This was a practice that Stefansson initiated on the Stefansson-Anderson expedition and seems to have instructed Jenness to do. It is possible to read the entry without seeing Jenness as receiving specific instructions on this practice.

260 Ibid, 212-217

261 Ibid, 240.

262 Diamond Jenness, "The Eskimos of Northern Alaska: A study in the effect of civilization," *Geographical Review,* vol. 5, (1918): 89-101. Jenness referred to his Barter Island work to demonstrate both Inuit culture's Siberian origins and its destruction in the face of the whaling industry. Barter Island became Jenness's primary archaeological field site, as he performed only one other dig in July 1916, and that was conducted mostly by his assistant at the time, Patsy Klengenberg. Ibid, 214-220; 616.

Figure 7. An archaeological dig at an abandoned shelter on Barter Island, performed during the Canadian Arctic Expedition of 1913-1918. *Source: Canadian Museum of Civilization.*

Like elsewhere on the American continent, expeditionary scientists in the Arctic made use of existing transportation and communication networks to conduct their fieldwork. Without the luxury of automobiles and trains, however, Arctic scientists utilized boats and dog-sleds, traveling along shipping routes and trade systems cobbled together through the efforts of American whalers and Inuit in the second half of the nineteenth century. But the demands of comprehensive scientific knowledge did not always conform with commerce, even with an extensive network of settlements, harbors, and transportation schedules along the Beaufort Sea coast. In gathering information for their sponsors, members of expeditions had to travel both inside and outside the networks of whaling and trading economies, relying on social contracts and Inuit expertise as much as transportation facilities.

Scientists over wintered in the Western Arctic, turning former whaling vessels like the *Mary Sachs* and the *Duchess of Bedford* into transient community centers, research stations, and, sometimes trading posts. They also convinced Inuit to guide them to the blank spaces on the

map. These negotiations in the region—between the missions of Western Arctic Expeditions and existing knowledge and infrastructure; and between traveling scientists and northern residents—conditioned the execution of scientific activities in the Western Arctic in the first two decades of the twentieth century. They make clear the complicated conjunctions in science and empire, the contingencies that brought certain representations and interventions into being.

Encroaching Whalers, the Klondike Gold Rush, and Tensions between the United States and Canada

The expansion of coastal commerce on the Beaufort Sea allowed expeditionary scientists to perform extensive and intensive research, collecting massive amounts of specimens, observations, and data-points. Yet these regional social and economic changes—and the scientific travel they facilitated—could also constitute a threat to national sovereignty. The Canadian Arctic Expedition, for instance, was a direct result of political tensions over the movements of foreign scientists in northern Canada as well as the US industries that had supported expeditions in the Western Arctic. The *Mary Sachs*, the boat on which we journeyed to open this chapter, was part of the Canadian Arctic Expedition's fleet of five schooners known as the "The Expedition Navy," suggesting the role of science to protect and enforce Canadian sovereignty in the Beaufort Sea.[263] The Expedition also became the first coordinated scientific activity to the Canadian Arctic wherein all collections remained within the country.[264] Specimens were not only "government property," but the observations gathered by scientists became items

263 The Royal Canadian Navy, which was established in 1910 (just three years before the Canadian Arctic Expedition), had six vessels, several of which were former British naval ships.

264 Museum of Civilization, "Northern People, Northern Knowledge: The Canadian Arctic Expedition of 1913-1918, by David Gray," http://www.civilization.ca/cmc/exhibitions/hist/cae/indexe.shtml, (accessed December 20,2011). On the American Museum's work on its Arctic material, see *The Forty-First Annual Report of the American Museum of Natural History*, (New York: Irving Press, 1910): 29-38.

of national security, too. The manuscript notes, photographic material, and journals of the scientists were to be returned to the Geological Survey and the Department of Naval Service, the venture's two leading agencies.[265] To fully appreciate expeditions as a site of science and empire in the north, we must examine the international tensions behind the Canadian Arctic Expedition of 1913-1918.

International relations between the United States and Canada were already fraught by 1913. The Canadian Arctic Expedition was in part a response to Arctic exploration by foreigners—especially Americans—on Canadian soil, which dated back to the 1860s. Frank C. Loring, a Canadian mining engineer and geologist, wrote his Minister of Interior in 1913, after hearing about the plans for the as-yet American sponsored Second Stefansson-Anderson Expedition. "I respectfully submit that it appears of the utmost importance that Canadians secure the first information regarding this region," he noted, as the Canadian government could not afford "to allow others to supersede it in this matter."[266]

Loring's comments also echoed a more recent history. That the Dominion struggled to assert its claims to the north had been made painfully clear during the search for gold over the turn of the century. In 1898, with ports in Seattle and San Francisco stirring over reports of massive gold strikes in the Klondike, more than twenty steamers left the American west, carrying with them nearly twenty-thousand stampeders. Destined for Dawson City (Canada) prospectors, miners, and corporate elites opened a series of transportation routes connecting the gold mines

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265 See "Memorandum for Instructions re: Arctic expedition, by O.E.L (O.E. LeRoy), n.d.," Rudolph Martin Anderson Fonds, MG30 40, vol. 10, File 3, LAC. The control of personal diaries was a matter of great contention in the Canadian Arctic Expedition. While expeditionary members were prepared to submit their work to the government, they were caught off guard when Stefansson, the commander of the Northern Party, demanded that they submit them to him first. See Diubaldo, 76-125.

266 Letter from Frank C. Loring to James Roche, Feb 6, 1913; RG 42, volume 490, file 84-2-55, LAC; Letter from R.W Brock to W.J Roche, Feb 4, 1913, RG 42, volume 490, file 84-2-55, LAC; Letter from R.L. Borden to Gilbert Grosvenor, Feb 21, 1913, RG 42, volume 490, file 84-2-55, LAC.

with coastal British Columbia and Alaska.[267] In the winter of 1898-1899, Fort McPherson was one of the busiest towns north of Edmonton, with over 500 prospectors passing through, on their way in and out of the Klondike.[268] Canadian officials worried about the presence of so many Americans on their own soil and all the profits they were taking with them out of the country.

Importantly, the Klondike gold rush catalyzed the establishment of the international boundary line between Alaska and the Yukon Territory—the 141st meridian—in 1903. The boundary between the two countries had remained unofficial in the 1800s and the recent influx of prospectors demanded that a formal line be drawn between the northern territories. Since Canada's foreign affairs were handled by England at the time, London was in control of negotiations with President Roosevelt and the United States. The two powers each appointed three members to a tribunal, which deliberated over the exact path of the international boundary. Both Canadian and U.S. historians have concluded that the decision of the tribunal—which granted the United States much of the Alaskan panhandle and the key sea port of Skagway—was in part a gift from England to the United States to maintain good international relations. Over the next decade, surveyors and geologists from both the United States and Canada worked to mark this line on the ground, eventually reaching the Western Arctic in the summers of 1911 and 1912. This scientific labor helped provide the outlines of Canadian and American jurisdiction in the northwest during the early twentieth century.[269] Yet, all the while, Canadians felt their national development had been sacrificed for the benefit of England, and thus set on a path over the next

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267 See Kathryn Morse, *The Nature of Gold: An Environmental History of the Klondike Gold Rush,* (Seattle: University of Washington Press, 2003), 42-66; and Stephen Haycox, *Alaska: An American Colony,* (Seattle: University of Washington Press, 2002), 200-215.

268 Bruce W. Hodgins and Gwyneth Hoyle, *Canoeing North into the Unknown: A Record of River Travel, 1874-1974,* (Dundurn, 1997), 132.

269 Lewis Green, *The Boundary Hunters: Surveying the 141st Meridian and the Alaska Panhandle,* (Vancouver: University of British Columbia Press, 1982). See especially 159-168.

several decades to assert their national claims in the north for themselves.[270]

Thus, when American whalers-turned-traders partnered with Inuit expanded operations eastward along the Beaufort Sea coast in the 1910s, it must have seemed to Canadians that the history of economic imperialism was repeating itself. Newspaper reports circulated throughout the country in the early 1900s, detailing the unbridled resource extraction of the foreign fishermen and its effects on local peoples and environments. A reporter for the *Ottawa Citizen* warned, "Today American capitalists are going into [northern country] and taking legitimate trade from Canadians." He professed his concern for the Inuit population who depended on the natural resources of the area, which were being destroyed by the Americans. He asserted, "It is time for the Dominion government, and the Department of Trade and Commerce in particular, to take action to stop the exportation of furs by American companies."[271] Here, an endangered Arctic acted as pretext for Canadian sovereignty in the north.

These international tensions—and the desire for Canada to prove itself in the north—are evident in the correspondence between Canadian officials and U.S. scientific leaders over the conversion of the "Second Stefansson-Anderson Expedition" to the Canadian Arctic Expedition. Deciding to take over the expedition from the National Geographic Society and American Museum of Natural History, Prime Minister R.L. Borden wrote the heads of those agencies in February of 1913. Thanking them for courteously withdrawing their support, he noted that since the expedition was to take place in Canada, it was more appropriate for the Canadian government

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270 Kurkpatrick Dorsey, *The Dawn of Conservation Diplomacy: U.S.-Canadian Wildlife Protection Treaties in the Progressive Era*, (Seattle: University of Washington Press, 1998), 8-11. Dorsey looks at three examples of international wildlife treaties to document the growing independence of the Canadian nation, especially in its relationships with England and the United States. Dorsey concludes that Canadians and Americans had no serious conflicts with one another, but their cultural and political similarities engendered heated competition for natural resources, especially as their individual economies grew in the 1910s, often in search of the same products.

271 *Ottawa Citizen*, November 25, 1916.

to have responsibility for its expenses and management.[272] One of the members of the venture, Kenneth G. Chipman, was authorized to take customs duties and enforce customs laws if he saw infractions along the Beaufort Sea coast. This aspect of the expedition was referred to as its "administrative side," which put the regulations of Canada "into force."[273] In this instance, science and empire merged in the activities of an expeditionary geographer.

If the decision of the international boundary tribunal forced Canadians to become more aggressive in the Western Arctic, it might have also encouraged the United States to be less aggressive there.[274] While the American Museum of Natural History and National Geographic Society remained interested in the Arctic, they shifted their approach to the region to a less

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272 Grosvenor, the director of the National Geographic Society, issued a statement to the press to quell any rumors of friction between the two countries, noting that his institution was interested in the scientific results only, not political claims to territory. Cable from Grosvenor to Stefansson, Feb 15, 1913, Rudolph Martin Anderson Fonds, MG 30 40, Vol 1, File: Correspondence, Jan-Feb 1913, LAC.

273 Letter from Commissioner of Customs to KG Chipman, May 28, 1913, Kenneth Gordon Chipman fonds, 1913-1918, MG 30 B-66, Vol 1, File: Correspondence and Reports, LAC. *Burwick Register,* March 13, 1913 (found in Kenneth Gordon Chipman fonds, 1913-1918, MG 30 B-66, Vol 2, File 1: Scrapbook No.1. 1913)

274 As Canadian governmental interests in the Western Arctic surged after 1912, American governmental interests appeared to have waned. In 1906, President Roosevelt had communicated to the leaders of the Anglo-American Expedition that any new land discovered was to be U.S. property. By 1913, interest in new Arctic lands was focused on the Eastern Arctic, not the western portion. With the Second Stefansson-Anderson Expedition taken from its hands, the American Museum of Natural History looked to access the Polar Continent from a less heated Arctic region, geopolitically speaking. Along with the American Geographical Society and the University of Illinois Museum of Natural History, it sponsored the Crocker Land expedition, headed up by Donald MacMillan. Crocker Land was the name of a possible island drifting in the Arctic ocean off the coast of Ellesmere Island, spotted by Robert Peary in 1906. Crocker Land was also believed to be the eastern edge of the possible Polar Continent predicted by U.S. Coast and Geodetic Survey R.A. Harris. This expedition was as ambitious as the Canadian Arctic expedition. With a staff of a zoologist, botanist, Naval engineer, and surgeon—in addition to the explorer MacMillan—the Expedition planned to examine Crocker Land's "geology, geography, glaciology, meteorology, terrestrial, magnetism, electrical phenomena, seismology, zoology (both vertebrate and invertebrate), botany, oceanography, ethnology, and archaeology"—if they were able to locate it. The expedition was a disaster. Not only did Crocker Land turn out to be a mirage, but much of the planned scientific work was never executed, owing to continual logistical delays, equipment failure, and inability to move efficiently in the Arctic ice. See *New York Times,* Feb 10, 1906. "The Crocker Land Expedition," *Bulletin of the American Geographical Society* , Vol. 44, No. 3 (1912), 189-193. Quotation from The William R. and Clarice V. Spurlock Museum, "Crocker Land Expedition Collection from the Arctic," (accessed June 15, 2012), http://www.spurlock.uiuc.edu/collections/browse/crockerland/crockerland_txt.html. See, The Basement Geographer, "Crocker Land: Last of the Phantom Islands," http://basementgeographer.blogspot.com/2010/12/crocker-land-last-of-phantom-islands.html, (accessed June 15, 2012).; and Michael Kaplan, "Crocker Land: Immortality," http://bozosapiens.blogspot.com/2010/04/crocker-land-immortality.html, (accessed June 15, 2012).

politically volatile place: Greenland.[275] More importantly, with the panhandle of Alaska now squarely within the boundaries of the nation, the United States Geological Survey focused its efforts on the expansive mineral districts of the southern parts of the territory. In 1895, two years before the gold rush, the U.S. congressional appropriation for geological work in Alaska was five thousand dollars; in 1904, it was eighty thousand. The United States Geological Survey—the primary scientific agency operating in Alaska—directed the bulk of their research support in the early 1900s to gold producing districts, with only occasional reconnaissance to the Arctic.[276] As historian Mary C. Rabbit has argued, as long as mineral deposits in other parts of the territory remained productive, the Geological Survey had little incentive to continue to fund exploratory work elsewhere.[277]

The work of scientists in the gold-producing districts of the Yukon revealed how little was known about Arctic terrain hundreds of miles to the north. After an expedition down the Colville River, the US Geological Survey published a map of Arctic Alaska in 1904, indicating

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275 In addition, the U.S. Bureau of Biological Survey dispatched biologists to the Yukon interior, which led to landmark publications on northern flora and fauna by Wilfred Osgood and Edward Preble. The Canadian government also sent its Geological Survey toward the northwest in the late 1800s. Geologists combed the shores of the Mackenzie River, Great Bear Lake, and the rivers leading from this lake to the Coppermine River. See Wilfred H. Osgood, "Biological Investigations in Alaska and Yukon Territory," North American Fauna No. 30, U.S. Department of Agriculture, Bureau of Biological Survey, (Washington: Government Printing Office, 1909).; Edward A. Preble, "A Biological Investigation of the Athabaska-Mackenzie Region," North American Fauna No. 27, U.S. Department of Agriculture, Bureau of Biological Survey, (Washington: Government Printing Office, 1908). See also John Sandlos, "Landscaping Desire : Poetics, Politics in the Early Biological Surveys of the Canadian North" *Space and Culture* 6, 396-409.

276 In 1901, a pair of geologists entered Arctic Alaska, scouring the basin of the Colville River for valuable minerals. A second party was sent north in 1904 to the northwest coast of Alaska. Just above the mines at Nome, these scientists examined a potential coal source to fuel mineral processing. See Morgan Sherwood, *Exploration of Alaska, 1865-1900,* (New Haven: Yale University Press, 1965), 132-181. See also A.J. Collier, "Geology and Coal Resources of the Cape Lisburne Region, Alaska," U.S. Geological Survey Bulletin no. 278 (Washington: Government Printing Office,1906). After the peak of activity in the Klondike, prospectors and miners fanned out throughout the Yukon River basin, testing little known areas for possible mother lodes. The reconnaissance of these miners was largely responsible for subsequent gold rushes in Nome (1900) and Fairbanks (1902).

277 Mary C. Rabbit, *Minerals, lands, and geology for the common defence and general welfare : a history of public lands, Federal science and mapping policy, and development of mineral resources in the United States, vol. 3. 1904-1939,* (Washington: United States Geological Survey, 1986), 2-65.; Natural Resources Canada, "Geological Survey of Canada: No Stone Unturned: The First 150 years of the Geological Survey of Canada, Christy Vodden," http://gsc.nrcan.gc.ca/hist/150_e.php#growing, (accessed December 20, 2011).

the eastern and western portions as "unexplored" (See Figure 8). Indeed, geologists with the U.S. Geological Survey, after exploring the Klondike in the early twentieth century, lamented the fact that the widely distributed knowledge and experiences of prospectors was not immediately available to U.S. officials. "Most of these men," they wrote, "have left few records of their trips, so that while some of them probably traversed parts of this area, almost none of them handed their experience to others, and it is therefore not possible to record their achievements."[278] These relationships between the United States and Canada, and geology and gold within Alaska, help explain the fate of Ernest de Koven Leffingwell, who remained in the Canning River region for seven years after the completion of the Anglo-American Expedition of 1906-7.[279] The geologist had financed the remainder of his studies through the donations of his father. But in the late 1910s, the US Geological Survey showed great interest in his geographical and geological research and eventually published his results. Leffingwell had essentially provided the nation with rigorous scientific knowledge of a little-known part of Alaska at little to no cost to the federal government.

278 The same could have been said for the thousands of whalers and crew who preceded miners to the Arctic. See Phillip S. Smith and J.B. Mertie, Jr., "Geology and Mineral Resources of Northwestern Alaska," Bulletin 815, U.S. Department of Interior, Geological Survey, (Washington: U.S. Government Printing Office, 1930), 7.

279 See Alfred Brooks and others, "Report on the Progress of Mineral Investigations in Alaska, 1906," Department of Interior: United States Geological Survey, Bulletin 314, (Washington: Government Printing Office, 1907), 11-18. Brooks and others, 11-12. On timing of appropriations, see Alfred Brooks and others, "Report on the Progress of Mineral Investigations in Alaska, 1912," Department of Interior: United States Geological Survey, Bulletin 542, (Washington: Government Printing Office, 1913), 7. Indeed, both the USGS and the GSC were alternately praised and criticized for their overtly practical aims, depending on the winds of national politics and mineral markets. See Alfred Brooks and others, ""Report on the Progress of Mineral Investigations in Alaska, 1907," Department of Interior: United States Geological Survey, Bulletin 345, (Washington: Government Printing Office, 1908), 5.

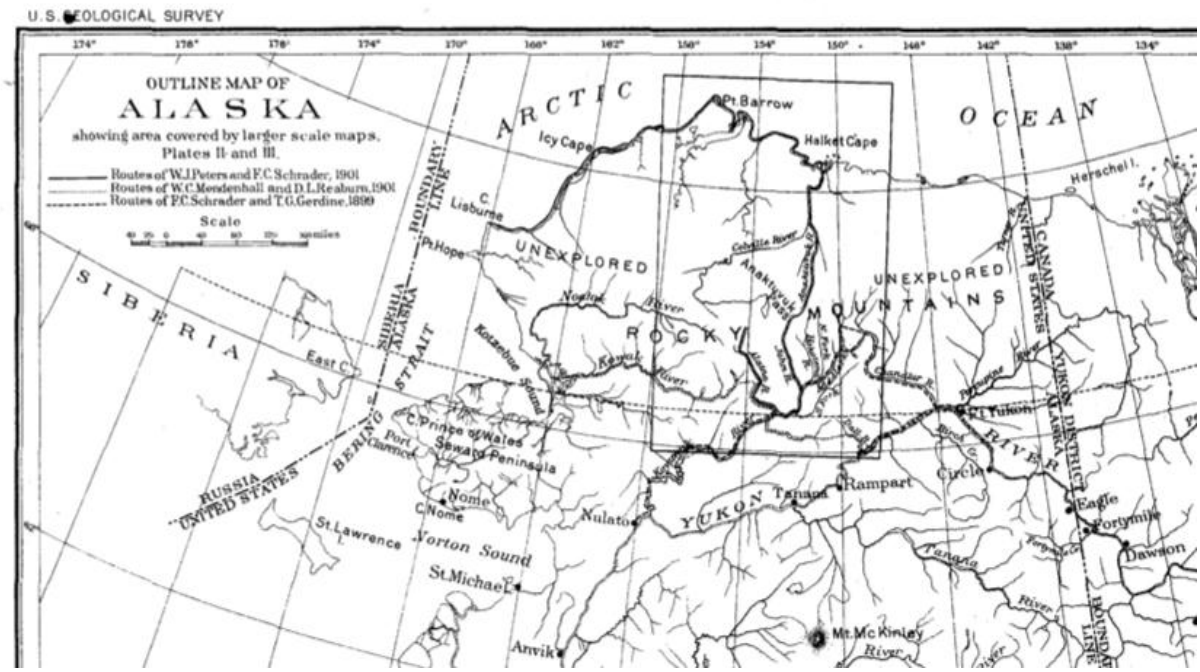

Figure 8. In the early 1900s, much of Arctic Alaska remained "unexplored." Some of the northwestern coast was explored by a U.S. Geological Survey Party in 1904. The northeastern coast remained largely unknown by American science until the publication of Ernest de Koven Leffingwell's research in 1919. *Source: United States Geological Survey*[280]

International tensions between the United States, Canada, and England comprised an important thread running through the Canadian Arctic Expedition, the last of the Western Arctic Expeditions. These tensions were provoked by the very economic activities that defined imperial ambition at the turn of the twentieth century and which formed the regional infrastructure and exchange relations necessary for coordinated scientific travel in the north. Both whaling bonanzas on Herschel Island and the Klondike gold rush inspired new kinds of travel and new perspectives on the north from political and intellectual leaders in the New and Old Worlds.

Disciplines and Disciplining Scientific Practice in Western Arctic Expeditions

The final historical process imprinted on the Western Arctic and Western Arctic

280 Frank Charles Schrader and W. J. Peters, "A Reconnaissance in Northern Alaska: Across the Rocky Mountains, Along Koyukuk, John, Anaktuvuk, and Colville Rivers, and the Arctic Coast to Cape Lisburne, in 1901," Department of the Interior, United States Geological Survey, (Washington: Government Printing Office, 1904),

Expeditions was the professionalization of science. By "professionalization," I refer to the trend over the turn of the twentieth century for scientists to create new standards for scholarly practices of research, publication, and information sharing. These standards helped bond scientists with particular training into specialized communities, which were identified through formal "societies," research circles, and academic disciplines. These same standards also worked to exclude individuals who did not have requisite trainings or social status. As fieldworkers and scientists became professionals, others became "amateurs," whose contributions were welcomed by scientists, but ultimately had to be processed by experts.[281]

The rise of professionalization opened questions about the nature of Arctic knowledge and who was best authorized to secure it. Frank Russell, the Iowa ethnologist who noticed American empire spilling over into Canadian territory in the 1890s, became one of the first victims of new standards for American and Canadian science and politics in the early twentieth century. His book, *Explorations in the Far North,* was reviewed in the journals *The American Naturalist* and *American Anthropologist,* offering us a window onto the contingencies of networks of knowledge circulation and the challenges facing researchers in this period. The first review suggested his work was an important contribution to science and his collections and observations should be "applauded" given the difficulty of travel in the region. The second review, by leading American physical anthropologist Arles Hrdlicka, condemned the research as non-technical and suited more for popular audiences interested in exploration and adventure.[282]

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281 The literature on professionalization as it relates to scientific credibility is immense. For a good review, see Mark Barrow, *A Passion for Birds: American Ornithology after Audubon* (Princeton: Princeton University Press, 1998).; Daniel Kevles, *The Physicists: The History of a Scientific Community in Modern America* (New York: Knopf, 1977).; Margaret Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore: Johns Hopkins University Press, 1995). Kenneth Manning, *Black Apollo of Science: The Life of Ernest Everett Just* (New York: Oxford University Press, 1983).

282 W.J. McGee, "Explorations in the Far North by Frank Russell," *American Anthropologist,* vol. 1, no 3 (July, 1899), 568. Arles Hrdlicka, "Explorations in the Far North," *The American Naturalist,* vol. 33 no 390 (June, 1899), 514-516.

Russell's case hints at the continuities and discontinuities in Arctic science over the turn of the twentieth century. Like it had for MacFarlane, Murdoch, and Russell in the late 1800s, the region presented exciting opportunities for young and ambitious students in the early 1900s. Yet, as these reviews show, the scientific community of the early twentieth century had begun to create new standards by which to evaluate whether or not work performed in the Arctic was scientific enough. The mixed reviews that Russell received were indicative of the ways established scholars began to assess northern research in the first two decades of the 1900s. Northern itinerants often longed to be deemed scientists and loathed to be relegated as adventurous explorers.

To get a better sense of the differences between explorers and scientists, and what was at stake in these different identities and standards for practice, we can turn to the Anglo-American Expedition. The expedition's leaders, Ernest de Koven Leffingwell and Ejnar Mikkelsen, represented two different traditions of scientific travel in the Arctic. Leffingwell was a trained geologist; Mikkelsen a self-proclaimed explorer. In working together to build the Anglo-American Expedition, they often had to confront their different aims for Arctic travel. These confrontations help us parse the ways professionalization shaped science and empire in the Western Arctic.

Consider the sponsors that these men appealed to for financial backing. Mikkelsen courted the support of the National Geographical Society and the Royal Geographical Society. Both men also enticed wealthy philanthropists to contribute to their cause, including the Duchess of Bedford and John Rockefeller.[283] In many ways, the portfolio of the Anglo-American

283 On the funding for the Anglo-American Expedition, see Mikkelsen, *Conquering the Arctic Ice*, 1-10. There were corporate sponsorships, too. Waltham Watch company provided seven watches, useful for marking longitude; Burroughs Welcome Company of London gave a "complete medicine chest and a photographic outfit;" and Horlick's malted milk company gave 1,100 lbs of milk products. Ernest de Koven Leffingwell, one

Expedition reflected the channels of support that had flowed into Arctic exploration since the 1860s. Especially as the newspaper and popular magazine industry grew in North America and abroad in the late nineteenth century, publishing contracts became lucrative sources of money for explorers. Explorers banked on the sale of books and articles in periodicals like *National Geographic Magazine* after an expedition to pay off debts to donors or lenders. To attract readers, explorers often regaled sensationalistic accounts of their travels, which cashed in on the cultural value of the Arctic as a place of danger. Harrison quickly penned *In Search of a Polar Continent* (1908) and Mikkelsen wrote *Conquering the Ice* (1909), even though both their expeditions were unsuccessful in finding new land.[284]

Through Mikkelsen, the Anglo-American Expedition maintained ties to a tradition of Arctic travel dominated by explorers, the publishing industry, and the imaginary of the dangerous Arctic. Through Leffingwell, the expedition showed the ways an "endangered" Arctic aligned with scientific and political sensibilities and communities. Ernest de Koven Leffingwell was trained in geology from the University of Chicago.[285] In his training and his temperament, he was not an explorer, but a scientist. Mikkelsen, his partner, recognized this, suggesting to readers of his own travelogue that the two men were "not at all alike."[286] Later, Leffingwell showed disappointment in the ways his Anglo-American Expedition was received. He considered the name of the venture to be pretentious and he denied interviews to journalists who sought typical Arctic stories. Gesturing to the values of disinterestedness and objectivity, Leffingwell described the role of science in the Arctic in a comment that is worth quoting at length,

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of the commanders of the party, invested his own money while his father put up more than $5,000. The Canadian government chipped in, too.

284 On the relations between publishers and explorers in Arctic exploration, see Robinson, *Coldest Crucible,* 1-30; Janice Cavell, "Arctic Exploration in Print Culture, 1890-1930," *Papers of the Bibliographical Society of Canada*, 44, 2 (Fall 2006): 7-43; and Bloom, *Gender on Ice,* 57-82 and 111-136. These books often paid back debts to corporate sponsors, as explorers advertised the products they had been sent with.

285 See Ernest de Koven Leffingwell, "Autobiographical notes for *Encyclopedia Arctica,"* PEKL.

286 Mikkelsen, *Conquering the Arctic Ice,* 1.

> "I explained that I had not been engaged in gathering material for popular presentation, nor had I many tales of hardships and sufferings to relate. In fact, I have avoided them. . .because to my mind they are usually the result of carelessness or incompetence. If I ever had any hardships I blush to own them on paper."[287]

For Leffingwell, and many other scholars, the accounts of explorers were a means to distinguish the values of rationality, planning, and objectivity from hardship, adventure, and danger.

Perhaps to distance himself from Mikkelsen and exploration in general, Leffingwell decided to stay in the north after the completion of the Anglo-American Expedition in 1907. Between 1907 and 1914, he spent five summers and three winters at his field station on Flaxman Island.[288] As a testament to his commitment to scientific rigor in the Arctic, Leffingwell had custom instruments made for him to withstand the cold and wind of the region. He also refused to allow environmental conditions to stand in the way of scientific standards, returning to the Arctic repeatedly to complete his survey in the method described by the U.S. Coast and Geodetic Survey and the U.S. Geological Survey.[289]

Leffingwell's decision to go out "on his own"—from the established tradition of Arctic exploration—put him in a precarious situation when it came to support, both financial and social. After the Anglo-American Expedition, he relied on his wealthy father to finance his trips to northeastern Alaska. He seemed not to want for money—he outfitted his field station at Flaxman Island with a dark room for developing photos; he kept a large library beside his roll-top desk;

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287 Ernest de Koven Leffingwell, "A Communication from Leffingwell," *The University of Chicago Magazine, 7*6-79, found in PEKL. Historian of science Gray Kroll has argued that with the rise of laboratory science and the fall-out of the Peary-Cook dispute in the first decade of the 1900s, exploration had to situate itself as a scientific business, rather than an adventure. See Gray Kroll, "Exploration in the *Mare Incognita:* Natural History and Conservation in Early-Twentieth Century America," (Ph.D Diss., University of Oklahoma, 2000), 24-65,

288 Leffingwell, "My Polar Explorations," 12-14. There, he triangulated a stretch of 150 miles of coastline and mapped its details to a scale of 1/125,000 and entered the positions of about 1,500 soundings. He made a sketch map of the entire coastline between Point Barrow and the Canadian border—the first of its kind—on a scale of 1/500,000. He also mapped the main features of an area of about fifty by eighty miles of the Arctic Alaskan mainland on a scale of 1/250,000, drawing known and probable distribution of fifteen geological deposits, among which five or six were described for the first time.

289 Ibid, 4-12.

and he enjoyed evaporated potatoes, dried fruit, and pancakes on his daily menu.[290] What Leffingwell longed for was social support from fellow scientists. He lamented that he had "burned bridges" with the University of Chicago's Department of Geology when he abandoned his dissertation research and advisors. While he followed the codes of fieldwork established by federal agencies and even had his custom instruments calibrated by the National Bureau of Standards, he realized that he was not "connected with any organization as is usual in such cases." Leffingwell was "much relieved" when Alfred Brooks, the director of the United States Geological Survey, granted him desk room to write up his report and a commitment to publish it, "if it were acceptable."[291] The Survey did publish Leffingwell's work, in its premier line of research reports, the professional series. Later, Leffingwell went on to glow in the support he so long desired. He was recognized as a member of the Washington Academy of Sciences in 1915, had a series of publications printed by the *Scottish Geographical Magazine,* and was awarded with an honorary doctorate degree from Trinity College, where he had earned his Bachelor's degree.[292]

The split between explorers, danger, adventure, and newspaper industries on one hand, and field-workers, science, endangerment, rationality, and professional communities on the other, speaks to much larger shifts in science and empire in the early twentieth century. As historian Michael Robinson has noted, by the end of the first decade of the 1900s, the role of adventure and the newspaper industry in exploration was being replaced with the role of science and the professional community. Arctic travelers of the 1910s and 1920s, as well as their sponsors and audiences, offered not outlandish stories, but hard facts. They did not write tales of danger for

290 See William S. Hanable, "Leffingwell: Prudhoe's Pioneer Scientist," *Exxon USA,* first quarter, 1973, vol. xii, no 1, 28-31. Found in PEKL.
291 Leffingwell, "Communication from Leffingwell," 76-9.
292 See Roza Ekimov, "Bio bibliography of Ernest de Koven Leffingwell," in "Articles," PEKL.

popular consumption, but monotonous accounts of the people and landscapes of foreign places, often for limited bureaucratic and intellectual circles.[293] Bland, plain-dealing narratives reflecting particular scientific missions were coupled with great concern for the loss of species and cultures. Indeed, appeals to rational knowledge met desires to study and control nature better than appeals to adventure. Like Robinson, historian Christina Adcock (née Sawchuk) has argued that this shift in exploration values occurred as explorers faced competition from university-trained fieldworkers in the field and in realms of authority. Like elsewhere in the history of science in the early 1900s, geography was a discipline undergoing rapid professionalization, with new boundaries being erected between "amateurs" and "experts."[294] In the Arctic, these changes expressed themselves in the ways Mikkelsen and Leffingwell represented and engaged the Arctic.

The consequences of professionalization for Western Arctic Expeditions glimpsed thus far were thrown into bright context in the Canadian Arctic Expedition. At the turn of the century, Canadian geologists worried about the state of Arctic knowledge. For them, the history of scientific travel in the last four decades of the nineteenth century was growing insufficient given the new political and economic conditions wrought by the whaling and mineral industries. In the late 1890s, the director of the Geological Survey of Canada, George M. Dawson, argued that the northern expansion of resource economies had been followed by collectors with few capable

293 Robinson, 1-30 and 160-165. The Duchess of Bedford, for instance, helped sponsor Mikkelsen and Leffingwell out of an interest to record any sightings of muskox, an Arctic species that many worried was endangered. Mikkelsen, *Conquering the Arctic Ice*,1-10.

294 Christina Sawchuk, "Amateur explorers and the 'opening' of the Canadian North," (A paper presented at the Canadian Historical Association annual meeting), June 3, 2008.; For the changes in the discipline of Geography, see David Livingstone, "Human Acclimatization: Perspectives on a Contested Field of Inquiry in Science, Medicine, and Geography," *History of Science*, 1987, 25: 359-94.; and David Livingstone, "Geography," in *Companion to the History of Modern Science*, ed. R.C. Olby, G. N. Cantor, and M.J.S. Hodge (Routledge, 1990), 743-760. "Scientific" travel, in rhetoric and practice, promoted careful planning and precise execution in the field. If exploration was hazardous, it reflected upon the character of the explorer, who was deemed unfit, unscientific, and incompetent.

instruments and little professional training. The knowledge, maps, and collections they procured, he lamented, had been only "incidentally obtained."[295] For Dawson and other government scientists, a thorough understanding of Western Arctic territory and its resources could only be achieved through scientific agents with the highest standards in university education and the best scientific equipment. It is not surprising that just a few years after Dawson's indictment of amateur collectors, the Geological Survey of Canada, like its counterpart in the United States, mandated all of its staff scientists hold Ph.Ds. Inviting United States Geological Survey staff to train up its own, the Geological Survey of Canada began sponsoring, organizing, and outfitting expeditions to the Western Arctic in 1913.[296]

The Canadian Arctic Expedition was known widely as boasting "the largest scientific staff ever taken on an Arctic expedition."[297] One of its leaders, Rudolph Anderson, described this staff as different from others in the history of Arctic science. An expedition, he noted, required intelligent, specially trained, young, and ambitious men. They were recruited not by enormous salaries or book contracts, but by the "desire of accomplishing some individual work which would do credit to himself and aid him in his future work."[298] It is no coincidence, then, that among the more than two-dozen specialists hired to take part in the Canadian Arctic Expedition, the majority were younger than thirty years of age and had just finished their doctoral degrees in

295 G.M. Dawson, *On Some of the Larger Unexplored Regions of Canada. A Paper Presented at the Ottawa Field Naturalists' Association* (Ottawa: Ottawa Naturalist, 1890), 2.

296 Zaslow describes how Reginald Brock brought the Geological Survey of Canada into the "modern scientific age." Zaslow, *Reading the Rocks,* 264-287. On U.S. geologists training up Geological Survey of Canada staff, see Rudolph M. Anderson Fonds, MG30-40, Volume 10, file 5, "Karluk Chronicle," LAC.

297 Rudolph Martin Anderson, "Canadian Arctic Expedition—Preliminary History," Rudolph Martin Anderson, MG 30-40, Vol 10, File 4, p 11, LAC.

298 Ibid, 11. Where geographers had clear interest in the Arctic as a field of possible discovery, other scientists from around the world also considered the Arctic intellectually valuable. In *Scientific American,* an American scientist described the region as "virgin territory" for the ethnologist and archaeologist. Burt McConnell, "The Aeroplane in Arctic Exploration," *Scientific American,* (September, 1916).

the sciences—ready to launch their careers.[299]

Led by the Geological Survey of Canada and the Department of Naval Service, these young men were not sent to roam the Arctic. Rather, they had particular objectives, coordinated in particular ways. As one expedition member put it, organized scientific work was "essentially a different thing from a one or two man expedition in one particular line, or with one object."[300] The Northern Party was to pursue, in order of importance, studies of geography, oceanography, and marine biology, while the Southern Party was to study geology, geography, anthropology, and biology. The Southern Party was to focus primarily on the investigation and mapping of copper-bearing and associated rocks of the mainland between Cape Parry and Kent Peninsula. In all of its scientific work in both parties, the expedition was to make "full and representative collections" for the Victoria Memorial Museum, Canada's new national museum. In addition, expedition members were expected to maintain regular communication with their supervisors in Ottawa through "summary reports" that were to be issued for each of the "individual lines of investigation" for each year in the field.[301]

The orders for the Canadian Arctic Expedition highlighted discipline—both in the use and protection of instruments and in the coordinated movements of its members. Kenneth G. Chipman, the geographer for the Southern Party, was instructed to safeguard and maintain the scientific recording instruments to his best ability, as the geographic work "depend[ed] on the systematic and careful attention paid to these instruments." The deployment of scientific tools was just one part of a larger field method, established by both the U.S. Geological Survey and

299 "Names of Members of the Canadian Arctic Expedition, their age, height and weight and the name and address of the proper person to notify in case of accident, etc," Rudolph Martin Anderson Fonds, MG 30 40, vol. 10, file 5, LAC. Of the twelve men listed on this sheet, eight were under thirty years of age. Four were under twenty-five. The oldest was thirty-five.

300 Letter from KG Chipman to Mr. Boyd, August 8, 1914, Kenneth G. Chipman Fonds, MG30 B-66, Vol 1, File: Correspondence and Reports, July-Sept 1914, LAC.

301 On the specific orders for the Canadian Arctic Expedition, see "Memorandum for Instructions, re: Arctic expedition, by O.E.L (n.d.)," Rudolph Martin Anderson Fonds, MG 30 40, vol. 10, File 3, LAC.

Canadian Geological Survey in the early 1900s. This method directed Chipman and others to set up a main depot or headquarters and establish its latitudinal and longitudinal coordinates before any other observational work was started. By following this "regular scheme" for fieldwork, funders could guarantee that the science was of a "high order" and advanced the state of knowledge and control of nature over previous work.[302] This efficient team also required an effective leader. Rudolph Anderson noted that scientific expeditions required not only a staff of specialists, but a "competent leader," who could handle them tactfully and fairly without limiting their freedoms or exploiting them.[303]

In its coordination and precision, the Canadian Arctic Expedition was an especially *scientific* expedition. Yet it also forwarded the most ambitious plans for polar exploration ever assembled. Vilhjalmur Stefansson, the leader of the Northern Party, aimed to "wipe from the map" one million square miles of the unknown Arctic by floating on the moving ice pack and living off hunted game.[304] In these ways, the Canadian Arctic Expedition captured two missions of scientific travel to the Arctic, which, while potentially in conflict, were not contradictory. Documenting natural and cultural life through rigorous science and discovering new lands through Polar exploration were forms of science and empire that informed one another in the early twentieth century. Recognizing this dual nature of the venture, a reporter from *The New York Times* wrote that the Canadian Arctic Expedition was unique in Arctic exploration history, "in that its objects are practical and commercial as well as scientific."[305] The Canadian Arctic Expedition thus marks an important moment in the history of the Arctic science. No longer the

302 See Kenneth Gordon Chipman Fonds, MG 30 B-66, Vol 1, File: Geological Survey instructions, June 1913, LAC. The geographical work could proceed with the "micrometer, boat-log, time, and sledgemeter," as circumstances permitted.
303 Rudolph Martin Anderson, "Canadian Arctic Expedition—Preliminary History"
304 *London Times,* 11 March 1913.
305 *New York Times,* 17 June 1913.

domain of the Hudson's Bay Company, U.S. whalers, or independent explorers, the far north was beginning to be carved up by government agents—like traveling scientists—who proclaimed dominion there by collecting valuable information about the place and imagining it as an endangered place.[306]

Conclusion: The Historical Moment and Legacies of Western Arctic Expeditions

While the planet—and the Western Arctic—had witnessed scientific travel in previous centuries, the twentieth century version was markedly different. Western Arctic Expeditions covered the same ground, both literally and figuratively, in their attempts to map, collect, study, and observe the natural and cultural life of the Western Arctic. It was not a contradiction that Western Arctic Expeditions featured research geologists working alongside salvage ethnographers, zoologists, and explorers. While some looked for new sources of minerals to fuel economic growth or even imaginary lands that might establish imperial powers in the Arctic basin, others sought to preserve any traces of native life and endangered species before they were bulldozed by encroaching empires. In their make-up, scientific expeditions were shaped by the opportunities and concerns inherent in the global search for natural resources.[307]

In Western Arctic Expeditions, the trajectory of these imperial ambitions and anxieties intersected with regional changes, international tensions, and disciplinary demands. Scientists made use of the extensive infrastructure in the Mackenzie River district and along the Beaufort

306 The final cost of the Canadian Arctic Expedition was $519, 370.97, as decided by the House of Commons in March of 1920. Found in Kenneth Gordon Chipman Fonds, MG 30 B-66, Vol 1, File: Scrapbook, 1918-1931, LAC.

307 Western Arctic Expeditions signaled a change from the Gilded Age and the relations among government, science, private enterprise it spawned. As a trio of historians of American empire have recently argued, during the 1890s and 1900s, Americans shed "their Gilded Age, laissez-faire reticence about intervention into 'natural' realms" and embraced "new tactics for the relentless imposition of rationality and order." Alfred W. McCoy, Francisco A. Scarano, and Courtney Johnson, "On the Tropic of Cancer: Transitions and Transformations in the U.S. Imperial State," in Alfred W. McCoy and Francisco A. Scarano, eds., *Colonial Crucible: Empire in the Making of the Modern State,* (Madison: University of Wisconsin Press, 2009), 13.

Sea coast, which had been developed over the last four decades of the nineteenth century and solidified in the early twentieth. They also engaged the skills and labor of Inuit guides through gifts, trade, and cash, as had become standard procedure in the whaling and fur trading economies. As national boundaries were established between Alaska and the Yukon Territory between 1903 and 1912, the control of scientific movement and knowledge in the Western Arctic became an issue of national security. In the case of the Canadian Arctic Expedition of 1913-1918, the expedition was a tool for establishing jurisdiction in the north.

The complicated picture of Western Arctic Expeditions as products of material and social factors at multiple scales comes into focus when we locate these scientific operations in time. Gone were the days of Martin Frobisher, Samuel Hearne, or Alexander Mackenzie, explorers who ventured north in hopes of reinvigorating British empire in British North America during the seventeenth and eighteenth centuries.[308] After the Alaska Purchase and Canadian confederation in 1867, U.S. and Canadian governments, scientists, and corporations showed interest in their new northern territories. But, in retrospect, their encounters with native communities and Arctic nature were either extensive *or* intensive—which became an issue for both scientists and bureaucrats in the early twentieth century. In addition, by the early 1900s, whaling and trading networks had emerged along the Beaufort Sea coast and stampeders had streamed into the Klondike, creating local infrastructure and exchange relations that were crucial to the kinds of travel and research found in Western Arctic Expeditions. At the same time, these newcomers produced international tensions that resulted in Arctic science becoming an vehicle for Canadian sovereignty.

Following the vessels of Western Arctic Expeditions, like the *Mary Sachs*, provided our

308 See A. Cooke and C. Holland, *The Exploration of Northern Canada 500 to 1920: A Chronology,* (Toronto, 1978).; Trevor H. Levere, *Science and the Canadian Arctic: A Century of Exploration, 1818-1918.*

entree to the study of expeditions. A similar journey foreshadows the legacies they left behind for the remainder of the twentieth century. After serving as a hunter and guide on the Stefansson-Anderson expedition, Alaskan Inupiat Natkusiak accompanied scientists on the Canadian Arctic Expedition of 1913-1918. As payment for his services, he received the schooner *North Star,* which became an engine of settlement in the following years. Based on his knowledge of the lands in the central Arctic and on the Arctic islands—knowledge he gained through his travels with Stefansson—Natkusiak became the first native trapper on Banks Island, an island north of the Canadian mainland that had been uninhabited. By 1921, he had hunted over one thousand white foxes on Banks Island, using *North Star* as transportation to fur posts at Herschel Island managed by the Hudson's Bay Company and their rival, C.T. Pedersen's CanAlaska. His success inspired others to join him in forming a permanent settlement on Banks Island in 1928. While there, Natkusiak and his associates discovered parts of the *Mary Sachs* had been abandoned by the Canadian Arctic Expedition's Northern Party and used its supply of wood in constructing the new settlement. This community, known as Sachs Harbor, has more than just a nominal relationship with the history of science in the region.[309]

Natkusiak was not alone in capitalizing upon skills picked up from expeditions. Soon after Stefansson pronounced the discovery of the "Blonde Eskimo" in 1912, several locals entered the Coronation Gulf in hopes of bringing the tribe into the growing trading economy. In 1916, Charlie Klengenberg—the whaler-turned-local who told Stefansson of the possibility of "primitive" Inuit—opened the first trading post in the Central Arctic on the Coppermine River. By that time, Klengenberg's Eskimo wife Qimnig had birthed six children. One of these, Patsy, became the manager of the Hudson's Bay Company's fur trading posts in the Central Arctic in the

309 Eddie Dean Kolausok, Ishmael Alunik, and David Morrison, *Across Time and Tundra: The Inuvialuit of the Western Arctic*, (Seattle: University of Washington Press, 2003), 124-125.

1930s after acting as a translator, guide, and assistant to the Southern Party during the Canadian Arctic Expedition.[310]

As the region embraced the trading economy, native Inuit continued to pursue new areas for harvests and development. In the mid 1910s, several locals set up a small trading post near Walker Bay, in the heart of the Coronation Gulf region and the land of the famed "Blonde Eskimo." Elders from this region, belonging to what is now known as the Kanigiryuarmuit people, remember the "Westerners" (Mackenzie River Inuit) as wealthy trappers and traders, not the subsistence hunters common in the Central Arctic. The Walker Bay post eventually became a permanent settlement, first called Holman and later Ulukhaktok. The community was settled by members of Klengenberg's family, Natkusiak, and a young multiracial man named Alex Stefansson—Vilhjalmur's son.[311]

These Inuit-led changes in the Western Arctic constitute part of the inheritance of expeditions. Today's Inuvialuit Settlement Region—the homeland of the Inuvialuit in the Canadian Western Arctic—includes two communities whose histories are inextricably linked to expeditionary fieldwork. Just as Inuit were hired to share their residential knowledge and physical labor to scientists, scientists afforded locals the opportunity to negotiate the spread of disease and loss of caribou in their homelands while expanding the fur economy.

Expeditions are conjunctions of several historical processes, making visible for historians the ways science intersects with politics, environmental change intersects with social change, and representations of the Arctic intersect with interventions there. Expeditions continued the shape the physical, cultural, intellectual, and economic spaces of the Western Arctic, even after their

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310 Kolausok, et al, *Across Time and Tundra*, 122-3. On Patsy Klegenberg's work with HBC, see "Western Arctic District," *The Beaver* (June, 1934), 60.

311 Kolausok, et al, *Across Time and Tundra*, 125-7. There are also great descriptions of these Inuit-led changes in the museum exhibit of the Canadian Arctic Expedition.

completion. Between 1918 and 1928, scientists and bureaucrats relied on expeditionary materials and observations to create new systems of knowledge and power about the region. By 1918, when the Canadian Arctic Expedition returned from its five year reconnaissance in the region, many political and intellectual elites agreed that the task of scouring the north was complete. Scientists returned with evidence of previously undiscovered islands and Inuit peoples and massive amounts of collections and information about the region. Moreover, the trauma of World War I had effectively terminated territorial expansion as a mode of empire. Accordingly, Arctic scientists largely retired extensive travel and the discovery of new lands as practices of knowledge production. Instead, they turned to the load of recently acquired Arctic materials to understand and map the human and non-human environments of northern North America—and help governments take advantage of them.[312]

312 Richard Finnie made note of Ottawa's change in orientation to northern geography and administration after the Great War in Richard Finnie, *Canada Moves North,* (New York: Hurst and Blackett, 1942), 30. On the end of territorial expansion as a model of empire after the Great War, see Neil Smith, *American Empire: Roosevelt's Geographer and the Prelude to Globalization,* (Berkeley: University of California Press, 2003), 1-30.

Interlude

To Develop the Friendly Arctic:

Debating and Assuming Development after the Great War

When Vilhjalmur Stefansson heard about the outbreak of the Great War, he "broke down" in tears. The news had traveled up to the distant shores of the Beaufort Sea and stopped the footloose explorer and anthropologist in his tracks. For other expeditionary scientists, the beginning of war ended their fieldwork and signaled the start of a new life on the battlefields of Europe. Diamond Jenness left the Arctic and traded research equipment for a uniform and a gun. In the Arctic, the First World War had deeply personal and broadly transformative impacts on science and its social and material relations.[313]

As we will see in the chapters to come, empire was overhauled after 1918. As geographer Neil Smith has cogently argued, after the Great War, modes of empire fundamentally changed from *extensive* capital accumulation, in which economic expansion was dependent on gathering lands and "extending the absolute social and spatial sway of capital," to an *intensive* mode, "in which the intensification of economic exploitation, in part via technological innovation, now held the key to economic growth." The United States—and Canada, too—boasted no significant territorial holdings beyond the continent. Thus, Smith asserts, North American powers turned to

313 D. LeBourdais, *Stefansson : Ambassador of the North*, (Montreal, 1963), 117. Stuart Jenness, *Stefansson, Dr. Anderson, and the Canadian Arctic Expedition*, 310.

science to recalibrate what seemed like distant and scattered lands (and resources) into an imperial geography in which home and abroad could be understood relative to one another.[314] During the Great War, science was embedded in the state apparatus like never before. Military officials and government bureaus supplied institutional and financial support and science earned unprecedented prestige through practical applications in chemical warfare and nutrition. In the peace-time that followed, science remained central to state planning in North America as New World powers sensed an opportunity to become world powers by making most efficient use of natural and cultural resources. In turn, science moved beyond the forms of natural history and exploration that had been so closely allied with territorial expansion and into an array of spaces and practices—medical laboratories in the Philippines, industrial research firms in New York, biological field stations in the Caribbean, rubber plantations in Africa, and cotton fields in the American south.[315] While Smith, like other scholars of American Empire, largely overlooks the Arctic as an imperial space, his arguments both apply to the far north and can be enriched through a closer examination of the region.

To begin to see how an intensive economic development model of empire would materialize in the Arctic experience, we can briefly interrogate a debate between expeditionary scientists Vilhjalmur Stefansson and Rudolph Anderson. Recall that Stefansson and Anderson joined up for two expeditions to the Western Arctic between 1908 and 1918 and attended the

314 Smith, *American Empire,* xviii-15.

315 For overviews of the relationship between science and the US government during and after World War I, see A. Hunter Dupree, *Science in the Federal Government: A History of Policies and Activities to 1940* (Cambridge: Harvard University Press, 1986).; and Ronald Numbers & Charles Rosenberg, eds., *The Scientific Enterprise in America: Readings from Isis,* (Chicago: University of Chicago Press, 1996). For more specific treatments of science in American Empire after 1918, see Warwick Anderson, "'Where Every Prospect Pleases and Only Man is Vile': Laboratory Medicine as Colonial Discourse," *Critical Inquiry* 18 (1992): 506-29.; Megan Raby, "Making Biology Tropical: American Science in the Caribbean, 1898-1963," (Ph.D Diss., University of Wisconsin Madison, December, 2012).; Gregg Mitman and Paul Erickson, "Latex and Blood: Science, Markets, and American Empire," *Radical History Review* 107 (2010): 45-73.; and Alexandra Rudnick, "Diets and Landscapes of Deficiency: Pellagra, Sacks of Cornmeal, and Economic Underdevelopment in the American South, 1907-1940," a presentation to the American Society of Environmental History, April 6, 2013, Toronto, Canada.

University of Iowa together. Stefansson and Anderson—the former a self-employed and self-proclaimed "Prophet of the North," the latter a lifetime zoologist in the Geological Survey of Canada—diverged in how they understood the Arctic and sought to intervene in it.[316] The discord between their plans became flashpoints in a war of words carried out over the early 1920s in newspaper editorials, speeches, letters, books, and scientific publications. Yet, even as they sought to distinguish themselves against one another, Stefansson and Anderson shared much in common. Their views, however in tension, make clear the ways economic development, not territorial expansion, mediated encounters among science, empire, and the Arctic after the Great War.

The debate between these two men stemmed from one of Stefansson's books, *The Friendly Arctic* (1921), published after the completion of the Canadian Arctic Expedition. Here, he explained that the north was actually full of resources and hospitable to settlement and development. Stefansson saw the tundra as "desirable country" which, like the West, could be transformed from desert to garden by pioneering citizens and interested companies who understood it was not perpetually dark and cold.[317] He scolded scientists like Anderson for clinging foolishly to the notion of a frozen wasteland and for losing the "Scientific spirit" necessary to capitalize upon the north. "What one needs," Stefansson said, "is a scientist of the Darwin type...whose mind is open to the truth of every sort. The scientist in the civil service... is likely to have every other attribute that you would expect of a man who arrives at his office at

316 On Stefansson as the "Prophet of the North," see David C. Nutt, "Stef at Dartmouth," *Polar Notes: Occasional Publication of the Stefansson Collection* No. IV (November, 1962): 33.

317 Stefansson's ideas about the desirability of northern country and the effects of the whaling industry on Inuit life are found in his books, Vilhjalmur Stefansson, *My Life with the Eskimo*, (New York: Macmillan Company, 1913), Vilhjalmur Stefansson, *The Friendly Arctic: The Story of Five Years in Polar Regions* (New York: G.P. Putnam's Sons, 1921).; and Vilhjalmur Stefansson, *The Northward Course of Empire*, (New York: Harcourt, Brace and Company, 1922).

9:15 in the morning and leaves at 4:55 in the afternoon."[318] He announced his retirement from exploration and began campaigning for a number of northern projects by working his connections in the House of Commons, Washington, and in the Explorer's Club in New York City. He advocated colonizing Wrangell Island in the Chukchi Sea, testing airplanes and submarines in the Arctic Ocean, and introducing reindeer to the Western Arctic. As it had in Scandinavia and in Alaska, this "Camel of the Frozen Desert" could convert so called "primitive" Inuit into civilized citizens and abundant northern vegetation into food resources for local and national markets.[319]

Anderson fought back. He called Stefansson a "peerless leader" and a sensationalist who distorted the facts to get seats in auditoriums, not to drive at scientific truths. He said the Arctic was "desirable country" only to the extent that people would be "satisfied to huddle in tiny igloos and subsist on a simple diet of meat and blubber." He thought Stefansson crazy for advocating notions of a welcoming Arctic, one open to any American and Canadian, especially given the loss of life during the Canadian Arctic Expedition (which Anderson blamed on Stefansson). Anderson mobilized the print media and the Canadian bureaucracy to attack Stefansson's character and to displace him as an Arctic expert. But, in the mid 1920s, he pulled back from these efforts as he realized that the attention contributed to Stefansson's popularity and portrayed

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318 This quotation comes from an interview Stefansson gave to the *Christian Science Monitor* in May of 1919. A clipping from this publication can be found in Rudolph Martin Anderson fonds, MG30 40 Volume 10, File 10: CAE: Misc Memoranda, Library and Archives Canada, Ottawa, Canada (Hereafter as "LAC")

319 On Stefansson's tenure as an Arctic explorer, and the concerns that propelled it see Trevor H. Levere, *Science and the Canadian Arctic: A Century of Exploration, 1818-1918*, (New York: University of Cambridge Press, 1993), 390-417.; or any of his biographies: William Hunt, *Stef : A Biography of Vilhjalmur Stefansson, Canadian Arctic Explorer*, (Vancouver: University of British Columbia Press, 1986).; Richard Diubaldo, *Stefansson and the Canadian Arctic*, (Montreal: McGill-Queen's University Press, 1978).; and Gisli Palsson, *Traveling Passions: The Hidden Life of Vilhjalmur Stefansson*, (Hanover: Dartmouth College Press, 2003). Or his own autobiography: Vilhjalmur Stefansson, *Discovery: The Autobiography of Vilhjalmur Stefansson*, (New York: McGraw Hill Publishers, 1964).

both Canadian science and the Canadian government in a poor light.[320]

The toxic relationship between Stefansson and Anderson has been the focus of much analysis by Stefansson's biographers. These authors find differences in personality and approaches in the field as wellsprings for the conflict. Where Stefansson was a showman, an eloquent writer, and clever networker, Anderson was a quiet man, sobered by his service in the Spanish American War, and attracted more to the solace of his office than that of a stage. Where Stefansson sought to enter Inuit society to become one of them, Anderson despised living in a so-called hand-to-mouth existence. He preferred setting up one scientific base as a headquarters, which he did with the Southern Party between 1913 and 1916, rather than traveling incessantly throughout the Western Arctic, which he did with Stefansson between 1908 and 1912. These incompatibilities, along with other disagreements between the two men, played into Stefansson and Anderson's debate about the friendliness of the Arctic and the role of science in its development.[321]

An additional element of the debate helps us further contemplate science and empire in the Western Arctic after the Great War. Regardless of his anti-Stefansson position, Anderson never allowed his views to be conflated with anti-development. Importantly, he did not disagree with Stefansson's description of potential resources in the north or his plan to introduce reindeer there. Indeed, he admitted to relatives that such a scheme would prove to his government superiors the "tangible useful results of several years of Arctic travel." What Anderson was more concerned with was the model of development that Stefansson promoted—that mix of settler

320 For the "peerless leader" comment, see Letter from RM Anderson to J.J. O'Neill, Dec 12, 1928, J.J. O'Neill fonds, MG 30 B 171, Volume 5, File 5, LAC. Quotation from an interview RM Anderson gave to "a representative of the press," the contents of which can be found in Rudolph Martin Anderson fonds, MG30 40 Volume 10, File 12, LAC. On not playing into Stefansson's publicity, see Letter from Anderson to J.E. Anderson, November 14, 1919, Rudolph Martin Anderson Fonds, MG 30 40, Vol 3, File: Correspondence, 1919, LAC.

321 Diubaldo, 42-50; 76-96; Hunt, 209-211.; LeBourdais, 68-85. See also Gisli Palsson, *Writing on Ice: The Ethnographic Notebooks of Vilhjalmur Stefansson,* (Hanover: University Press of New England, 2001), 1-13.

colonialism and corporate capitalism. In a letter to his father, Anderson suspected that Stefansson's motivation to introduce reindeer had more to do with capitalists in Alaska wanting to grow their business. Unlike Stefansson, Anderson saw Inuit as the only possible labor source in any Arctic future. He was acutely aware of the ways Inuit in the Mackenzie Delta, many of whom he employed in his scientific work, were developing the fur trade to the Arctic coast and islands, tying their livelihoods even more closely to fluctuations in fox populations and global markets. Anderson wanted government scientists to steer development in the Canadian north, rather than turn it over to foreign corporations or explorers like Stefansson, because they could be the best supervisors of Inuit and Arctic nature. He preferred the approach taken by Denmark in Greenland, where colonial officials controlled exploration through a scientific licensing program and only dispatched state agents who held "the utmost rigid moral and physical qualifications."[322]

The difference here is slight, but crucial. Anderson and Stefansson crossed swords over *who* would be in charge of the Arctic and its natural and cultural resources. Anderson saw government as the sovereign, not private citizens or private enterprise. He used Stefansson and his views as a counterpoint for the idea of development itself. For the zoologist, development necessitated both scientific planning and governmental oversight to bring out the full potential of Arctic life. In Anderson's opinion, Stefansson's plans utilized Inuit and Arctic resources only for personal gain. Even worse, they risked the corruption of native societies and the desecration of northern environments precisely because they were not coordinated by properly trained managers. Anderson did not hesitate to point out that he held a Ph.D and Stefansson did not. What the explorer offered to the North American public, therefore, was not development, but

322 Letter from Anderson to J.E. Anderson, Nov 14, 1919, MG30 40, Vol 3, File: Correspondence, 1919, LAC. This quotation is from the *Ottawa Citizen,* "Denmark Conducting Unique Experiment," May 3, 1924, found in Rudolph Martin Anderson Fonds, MG 30 B 40, Vol 26, File 3: Clippings, 1921-1923.

exploitation.[323]

In waging these battles, Stefansson and Anderson bypassed the question of *whether* the Arctic should be developed by outsiders. That the Arctic could and should be the domain of settlers, private enterprise, and/or the government was a given. This form of common sense after 1918 was only possible because of the Western Arctic's history up until this point. No longer the fringe of the Russian and British fur empires, the region had been transferred to the US and Canada. It had been thoroughly explored in the first two decades of the twentieth century, its natural and cultural resources enumerated. The deep belief in the Arctic as a space for intensive economic development stood in stark contrast to a previous generation of scientists and imperial agents who deemed the region unknown, dangerous, largely void of resources, or compelling because of a possible Polar Continent. These notions periodically appeared in movies, travelogues, and other popular media, but were gradually laid to rest in scientific circles after 1918. Even Anderson, who bristled against Stefansson's "friendly" Arctic, did not offer a "hostile" Arctic to counterbalance it.

Still, both Stefansson and Anderson—and those scientists who inherited their legacies in the twentieth century—continued to employ notions of an Arctic at-risk in order to catalyze their chosen brands of development. A tireless promoter, Stefansson lobbied bureaucrats in Ottawa and Washington, the Lomen Corporation of Alaska, and the Hudson's Bay Company to occupy and exploit the Arctic, suggesting to each that claims to the region were not yet settled.[324] In print, Stefansson pleaded with his readers—the "average intelligent person who is not a geographer or meteorologist"—to finally overcome the burden of history and see the Arctic as

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323 *Montreal Standard*, Saturday, Jan 21, 1922. Anderson may have been responsible for an editorial in this paper that said Stefansson had been behaving "more like an exploiter than an explorer."

324 Stefansson, *The Northward Course of Empire*, 178. See also Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918-1925* (Toronto: University of British Columbia Press, 2010.)

livable, full of potential, and awaiting proper colonization.[325] By replacing notions of a barren, desolate, or ice-locked wilderness with scientific knowledge of the tundra, its wildlife, and its climate, Stefansson sought to prove that there was "no northern boundary beyond which productive enterprise cannot go till North meets North on the opposite shores of the Arctic Ocean as East has met West."[326] To animate the Arctic's undecided future, Stefansson titled his 1922 book *The Northward Course of Empire* and referred to the circumpolar basin as a "Polar Mediterranean."[327] Stefansson's gesture to the Mediterranean was intended as a call to action to his readers in the United States, Canada, and Europe: which superpower would build the first Arctic empire? Anderson, on the other hand, used all of Stefansson's enunciations to characterize the threats posed to the Arctic by corrupt explorers, ignorant settlers, and greedy corporations. He dedicated more and more of his working hours to sitting on wildlife conservation boards and crafting resource management programs, rather than working up his own field research into scientific publications.

The debate between Stefansson and Anderson polarized two ideological camps that divided along definitions of science, power, and progress. These divisions clearly demonstrated that the answer to Arctic development was still unsettled, even if the question itself was no longer asked, and forevermore assumed.

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325 Ibid, 250.
326 Ibid, 19.
327 Ibid, 178. "Most of us will get a wider view of the commercial, political, and military future of the world," he charged, "when we realize that the airplane, the dirigible, and the submarine are about to turn the polar ocean into a Mediterranean and about to make England and Japan, Norway and Alaska, neighbors across the northern sea."

3

To Reorder the Unsettled Arctic:

Post-Expeditionary Science and its Structures of Knowledge and Power, 1918-1928

Introduction: Following Expeditions

In 1918, members of the Canadian Arctic Expedition delivered to the Victoria Memorial Museum a load of scientific objects. The contents quickly overwhelm the mind: one thousand bird and mammal specimens, including skulls, skins, eggs, and nests; more than two and a half thousand articles of clothing, hunting and fishing equipment, tools, tents, and kayaks; four thousand photographs; nine thousand feet of film; and ninety-two wax-cylinder recordings of songs and performances. Logbooks and field journals also contained piles of untreated data, like daily observations of weather conditions and a list of tidal observations at seven different locations for three consecutive years.[328]

In a matter of years, these heaps of scientific objects had been sorted, analyzed, and re-assembled into a lucid picture of scientific knowledge and imperial power. Consider the evening of March 23rd, 1927, when some of the highest-ranking members of the Canadian government

328 These details come from Canadian Museum of Civilization, "Northern People, Northern Knowledge: The Canadian Arctic Expedition of 1913-1918, by David Gray," http://www.civilization.ca/cmc/exhibitions/hist/cae/indexe.shtml, (accessed December 20, 2011). Similar types of collections constituted the five tons of specimens delivered to the American Museum of Natural History following the Stefansson-Anderson Expedition and the mounds of fossils Ernest de Koven Leffingwell brought with him to the offices of the U.S. Geological Survey in D.C. after his seven years in the north. For information on the delivery of specimens from the Stefansson-Anderson Expedition, see *The New York Times*, 28 November, 1912.

gathered in the Victoria Memorial Museum for the Conversazione of the Professional Institute of the Civil Service of Canada.[329] Before a midnight film featuring Canada's "natural resources in wild life, parks, timber, fisheries, mines, and cereals," visitors perused more than two dozen specially-prepared exhibits on the museum's four floors. There, collections from the recent Canadian Arctic Expedition figured prominently in a display of the Dominion's cultural heritage, natural assets, and scientific prowess. The second floor boasted an array of stuffed birds, carefully reconstructed nests (with eggs resting in their vortices), seal knives, and caribou parkas. On the third floor, passers-by scanned the shelves of the Library of the Geological Survey, "one of the best equipped scientific libraries in Canada." Engulfed by the thousands of books, reports, photographs, lantern slides, and bathymetric charts, guests may have noticed the new maps of the Mackenzie Delta and Coronation Gulf drawn by expedition geographers Kenneth G. Chipman and John Cox. Returning to the lecture hall for their film on national natural resources, the flickering lights of the movie would have revealed the pelts of several northern big game species adorning the walls.[330]

The program of the Conversazione helps historians see relationships among expeditionary fieldwork between 1899 and 1918, northern development in the decade after the Great War, and the intellectual and political pursuits connecting the two. While necessary to achieve the objectives set by sponsors, scientific objects did not constitute knowledge about Arctic nature and culture. As long as observations, journals, and specimens remained as untreated collections, they offered North American governments little authority in determining the quality and distribution of resources in the north. Like the whalers who earned their profits

329 Department of Mines, "Exhibits on the occasion of the Conversazione of the Professional Institute of the Civil Service of Canada, Wednesday Evening, March 23, 1927," found in Rudolph Martin Anderson Fonds, MG 30 40, Vol 14, File 20, LAC.

330 Ibid.

only by selling baleen at market in San Francisco, fieldworkers had to process their raw materials into items of greater scientific value—maps of new Arctic islands, international boundaries, and mineral deposits, or reports on the zoological life and Inuit cultures of the north. In doing so, scientists and bureaucrats turned from documenting and discovering the Arctic to imposing new orders upon it. Likewise, in this chapter, I leave the Western Arctic to follow expeditions throughout the 1920s, to explore the channels through which science and empire moved after fieldwork. As we will see, in making the Arctic travel—through sharing specimens and publications—scientists established a network of knowledge and power that exercised control over the far north from well beyond its borders.

As suggested by the program of the Conversazione, North American governments embraced science as central to national political and economic development in the 1920s. The scientific materials gathered from expeditions—and the theories developed from them—directly informed the establishment of northern-oriented bureaucracies in the US and Canada after the First World War. Governmental officials withdrew known mineral deposits from private staking, enclosing stretches of the tundra as federal property. They also entered the realm of natural resource development through the introduction of a foreign species, reindeer, and the establishment of government-managed herding programs.[331] These measures sought to establish the means of settlement in the Western Arctic, proving science's worth in practical matters and

331 Both historians of Alaska and historians of the Canadian north have maintained a bias toward polar exploration and scientific travel and away from the work that proceeds in the wake of scientific expeditions. For a few examples, see Morgan Sherwood, *Exploration of Alaska, 1865-1900* (New Haven: Yale University Press, 1965).; and Robert Bruce Campbell, *In Darkest Alaska: Travels and Empire Along the inside Passage*, (Philadelphia: University of Pennsylvania Press, 2007); Arthur Ray, "Recent trends in Northern historiography," *Essays on Canadian Writing*, Issue 59, (Fall, 1996), 3-5. Very recently, Canadian scholars have begun to investigate scientific travelers that were employed by the government and maintained long careers as civil servants. Christina Adcock, "Tracing warm lines: northern Canadian exploration, knowledge and memory, 1905-65," (Ph.D Diss., Scott Polar Institute, Cambridge University, 2010), 1-29. Historians of science, on the other hand, have often isolated the "expedition" as a unit of analysis for understanding science in the field (scientific travel, patronage, the personae of fieldworkers, instrumentation, and representations of nature). They have not fully explored the after-lives or legacies of expeditions.

also making use of what had long appeared as useless environments on the fringe of the continent. While Chapter four takes a much closer look at these schemes, this chapter investigates the theoretical and political systems that allowed them to conceived of as rational approaches to rationalizing a far-off land.

In the 1920s, science and empire merged in the ways new systems of classification and new structures of power reinforced one another. That collected objects formed the basis of intellectual and political authority is likely no surprise to historians of science. These scholars are accustomed to seeing natural history museums and geological surveys as what sociologist and anthropologist Bruno Latour calls "centres of calculation." In these institutions, teams of scientists encircled fragments of nature and culture (reversing the situation in the field); brought specimens, observations, and artifacts from multiple expeditions together; and integrated them to produce a view of life that was impossible to achieve at any given moment on the ground. With this data at their disposal, entire ecosystems and societies could be "flattened, combined, reshuffled, superimposed, [and] redrawn at will."[332] Latour argues that, with the maps, statistics, and catalogues from previous travel in hand, scientists explored more territory more efficiently—sustaining what he calls a "cycle of accumulation" of knowledge and power. From Carl Linnaeus in the eighteenth century to Alexander von Humboldt in the nineteenth, extensive scientific travel, natural history collections, new scientific paradigms, and imperial political economies were all inextricably related.[333]

Yet, there is a danger in plucking Latour's concepts from Europe in the eighteenth

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332 Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society*, (Cambridge: Harvard University Press, 1987), 215-57. Quotation from 224. This selection of Latour's work has clearly shaped scholarship from historians of science on expeditions, the exchange and production of knowledge, and the application of knowledge in colonial settings. See Lissa Roberts, "Situating Science in Global History: Local Exchanges and Networks of Circulation," *Itinerario* 33 (2009): 9-30.

333 Robert E. Kohler, "Finders, Keepers: Collecting Sciences and Collecting Practice," *History of Science*, xlv, (2007): 428-453.

century—his area of focus—and applying them to the North American Arctic in the twentieth. For one, the histories of exploration in the region were at that point hundreds of years old—there were centers of calculation strewn about Western Europe and Russia, with extensive collections and libraries concerning the natural history of the north. Second, many of the sciences represented on twentieth century expeditions were hardly stable enough to act as foundations for new knowledge. Over the first three decades of the 1900s, "natural history" fractured into the biological subspecialties of entomology, botany, ornithology, mammalogy and marine biology; anthropology became ethnology, archaeology, ethnography, and physical anthropology; and geography nearly dissolved, with part of the discipline reconstituting in economic geography, biogeography, and anthropogeography.[334] Third, the trauma of the Great War and the large investments in Arctic exploration during the first two decades had rendered territorial expansion as outmoded form of empire. Indeed, between 1918 and 1928, US and Canadian scientists rarely traveled to the Arctic but instead attempted to plan its development from afar. For all of these reasons, crafting knowledge and power over the Arctic took routes more circuitous and complicated than Latourian models would suggest.

To follow these routes, I turn to the official reports published after the Western Arctic Expeditions.[335] These reports became governmental and intellectual property—they represented

334 Ibid, 446-450. Kohler describes the development of collecting sciences into exact and theoretical pursuits, calling this grouping of disciplines as "collecting sciences for places."

335 These include Rudolph Anderson's analysis of the natural history collections of the Stefansson-Anderson Expedition (1913); the completed volumes of Canadian Arctic Expedition technical reports (1918-1928); and Ernest de Koven Leffingwell's three-hundred page professional paper for the United States Geological Survey on his six years in Arctic Alaska (1919). Since several ethnographies written by Vilhjalmur Stefansson and Diamond Jenness were also considered official reports, these are included here as well (*My Life with the Eskimo* (1913); *The Friendly Arctic* (1921); and *People of the Twilight* (1928)). In contrast, explorers like Ejnar Mikkelsen and Alfred Harrison (who led the Anglo-American Expedition and Harrison Expedition, respectively) produced travel narratives for popular consumption in Europe and they supported their publications with lecture tours outside of North America. Explorers were no less interested in the Arctic than scientists, but they approached their craft through different channels of communication and power. Indeed, while Stefansson largely carried out an explorer's lifestyle in the United States and Canada, his reports are included here because he was also extremely active in stirring political action in the Arctic through federal governments in both nations. On

the most synthetic, specialized knowledge available on the far north as well as strategic information for bureaucrats eager to build administrative capacity there. Within histories of science and empire, such documents are typically relegated to analyses of fieldwork, exploration, discovery, and experimentation.[336] In tracing the motivations and networks involved in the creation of technical documents, we gain a more nuanced understanding of the shape of science and empire. Not only was a widely dispersed and loose community of scholars drawn together in the project of knowing the Arctic, but new structures of knowledge gave rise to new structures of political might focused on scientifically-guided development. As we will see, after Western Arctic Expeditions, the goal of science (which bureaucrats shared, to be sure) was nothing less than the reordering of the Arctic.

Post-Expeditionary Science: Sorting, Redistributing, Calculating, Accumulating, Innovating, Consolidating, and Consulting

Because of their centrality to knowing nature and culture, objects became a currency in the political economy of early twentieth century Arctic science. Specimens engendered a sense of control over the Western Arctic. The region had been labeled "unknown" in the nineteenth and early twentieth century precisely because collections from the region paled in comparison to other regions of the world, including Arctic territories in Europe. In order to fold new objects into the existing scientific record, expeditionary scientists and museum scholars processed materials, enrolling them in a careful study of some aspect of Arctic geography, geology, biology,

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Stefansson's role in U.S. and Canadian politics in the period 1918-1928, see Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918-1925*, (Toronto: University of British Columbia Press, 2010), 1-11.

336 Warwick Anderson discusses the invisibility of technical reports in histories of science and empire in Warwick Anderson, "'Where Every Prospect Pleases and Only Man is Vile': Laboratory Medicine as Colonial Discourse," *Critical Inquiry* 18 (1992): 506-29.

and anthropology. Their efforts can be organized in a chain of activities, which I refer to here as "post-expeditionary science." With this term, I draw a line between fieldwork and the labors involved in enriching the meaning of found objects, labors that involved sorting, redistributing, calculating, accumulating, innovating, consolidating, and consulting. Importantly, scientists did not work alone after expeditions, but with an existing body of knowledge and loose community of scholars in Europe and North America.[337]

The Canadian Arctic Expedition provides a window onto the communities of practitioners that surrounded expeditions and how they were kept in orbit. Once back in Ottawa, two distinct committees were established to help *sort* the scientific objects brought from the north and suss out remaining labor necessary to process them. One committee developed policies regarding the handling of scientific reports and the other managed the stockpile of materials in the Victoria Memorial Museum. These committees were a "Who's Who" of Canadian governmental science.[338] Their energies were central to the production of scientific reports from expeditionary objects. They decided what topics the reports would address, who should be hired to assist in their creation, and where finished reports should be distributed. Committee members, especially chief editor (and expeditionary zoologist) Rudolph Martin Anderson, were also responsible for *redistributing* specimens and artifacts to hired specialists, shepherding their manuscripts from drafts through publication, and recommending the means of handling excess specimens and

337 Such a place-based, historicist approach to Latour's concepts has been a useful way for historians to fold them into analyses of particular sciences, societies, politics, and natures. For examples, see Daniela Bleichmar, "Exploration in Print: Books and Botanical Travel from Spain to the Americas in the Late Eighteenth Century," *Huntington library quarterly* 70:1 (2007): 129-51.; Michael Bravo, "Ethnographic Navigation and the Geographic Gift," In *Geography and Enlightenment*, edited by David Livingstone and Charles Withers, (Chicago: University of Chicago Press, 1999).; and Brett Walker, "Foreign Affairs and Frontiers in Early Modern Japan: A Historiographical Essay," *Early Modern Japan* 10 (2002): 44-62.

338 Chaired by Dr. Edward E. Prince, the Dominion Commissioner of Fisheries, they featured C. Gordon Hewitt, the Dominion entomologist; Prof. A.B. Macallum, the Chairman of the Commission for Scientific and Industrial Research; Mr. James M. Macoun, the Curator of the National Herbarium, and Dr. R.M. Anderson, the commander of the Southern Party of the Canadian Arctic Expedition.

reports not needed by the government. By 1920, the Canadian Arctic Expedition committees decided to pursue a series of over sixty reports contained in more than a dozen volumes covering the biological, geological, and cultural life of the Western Arctic.[339]

It is tempting to think of these committees as "centres of calculation." After all, materials, people, and publications moved through them. They pulled many of the strings on how post-expeditionary science was completed. But identifying the actual location of the committee is harder than identifying its importance in producing knowledge after 1918. The first committee, charged with the policies of publication, held a series of meetings in Dr. Anderson's office in the Victoria Memorial Museum in early 1918.[340] Was the museum the center, or was it the Parliament building, where the Minister of the Department of Naval Service, G.J. Desbarats, and the Minister of the Department of Mines, R.G. McConnell, directly managed the committee itself? Desbarats and McConnell influenced the publication process, whether through divvying up which department paid for which volumes or lobbying for monies to be earmarked for printing. Indeed, when Desbarats and McConnell moved on to other positions within the government, either because of elections or the vagaries of reorganization, science suffered. New ministers had less familiarity with the Canadian Arctic Expedition and were unwilling to support post-expeditionary science after 1926.[341] To be sure, the ministers and the committee members were located in Ottawa. But to call the nation's capital a "center" would be to homogenize different kinds of calculations going on in the museum and the halls of government.

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339 They sought to print three to four thousand copies of each individual report as "separates" and also print one thousand additional copies on "superior paper" for assembly into bound volumes. Stuart E. Jenness, *Stefansson, Dr. Anderson, and the Canadian Arctic Expedition, 1913-1918,* (Gatineau, QC: Canadian Museum of Civilization, 2011), 307-310. Jenness, the son of Canadian Arctic Expedition anthropologist Diamond Jenness, has pulled together the first comprehensive account of the expedition. His book is an indispensable volume for any scholar interested in his and other Arctic expeditions of the time. The distribution of Canadian Arctic Expedition reports is mentioned in a note written by Rudolph Anderson on July 4, 1927. See Rudolph Martin Anderson fonds, MG 30 40, File 13 "Memoranda and Reports about the Canadian Arctic Expedition," LAC.

340 Stuart Jenness, 307-310.

341 Ibid, 311. See also, 331-333.

Moreover, much of the leg work of science after fieldwork did not take place in Ottawa or even in Canada. The bulk of *calculating*—specimen identification and analysis, as well as manuscript drafting—was conducted by a host of scientists outside of the Dominion and not originally affiliated with the Canadian Arctic Expedition. To help create reports, the "CAE Editorial Committee" recruited more than seventy scientists stationed in institutions across the United States, England, France, and Scandinavia. Desbarats, McConnell, and committee members had hoped to enlist as many Canadian scientists in these roles as possible. But Canada had developed its university system and governmental scientific institutions slower than these other nations, so there was not an extensive pool of young scholars available. In addition, the U.S., England, Norway, and Denmark had long track records of Arctic exploration by the 1920s. Consequently, there was more Arctic and scientific expertise outside Canada than within it.[342] As we will see, these relations both enhanced the role of the national museum as a site of consolidation—especially as it related to keeping these extra scientists on task and on schedule—and diminished the importance of Ottawa as locus of calculation.

The scientists hired on to help calculate expeditionary materials can be fit into two categories: "specialists" and "assistants." Specialists received direct communication from the coordinating committee, often along with a package of particular specimens to identify, examine, and comment upon in a short paper. Specialists represented the leading thinkers in their field. They were employed by governmental scientific bureaus, state universities, research institutions established by wealthy philanthropists, and national museums, revealing an institutional

342 Stuart Jenness, 307-310. These connections were initiated for reasons both idiosyncratic and intentional, whether the result of the Great War, the deliberations of governmental scientists, the global distribution of knowledge about the Arctic, or the research interests of particular disciplines. Rudolph Martin Anderson blamed the "exigencies of war" on the delay in lining up specialists to help work on the results of the Canadian Arctic Expedition. "Report of the Canadian Arctic Expedition, 1913-1918," found in Rudolph M. Anderson fonds, MG30-40, Volume 10, File 13, LAC.

landscape more variegated than that of the eighteenth century.[343] "Assistants" were additional staff called upon not by the committee but by specialists. They either worked at the same institution as their supervisors, as advisees or young scholars, or held some role in the specialist's own professional development—like a former advisor or colleague left behind in taking up a new position elsewhere. Specialists and assistants often compared materials at hand to those in other repositories around the world or to existing English translations of Arctic-themed publications from Greenland, Scandinavia, or Russia. In other cases, these assistants helped create engravings or illustrations for final publications.[344] Research after expeditions thus involved a host of scholars from around the world. It contributed to the development of science in many different locations, not just one center.

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343 For instance, for various families of insects collected in the Western Arctic, the organizing committee hired G.H.F. Nuttall (Quick Professor of Biology at Cambridge), J.R. Malloch (of the Division of the Natural History Survey of Illinois); and J.M Swaine, (the Chief of the Division of Forest Insects for the Entomological Branch of the Canadian Department of Agriculture). The majority of specialists brought on board represented the biological sciences—particularly entomology, marine biology, and botany. The expedition's anthropologist (Diamond Jenness), geographers (John Cox and Kenneth Chipman), and geologist (J.J O'Neill) often worked directly with their field notes and collections to write up their analyses. If non-biologists did require specialists, they were often in-house, like the members of the Geodetic Survey or Geographical Board who confirmed place-names and drafted finished maps, or the Chief of Anthropology of the Geological Survey, Edward Sapir, who looked over Jenness's manuscripts before publication. See C. Gordon Hewitt, "Introduction and List of New Genera and Species Collected by the Expedition," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Ottawa, Issued 10 December 1920, v. See also A.W. Baker, G.F. Ferris, and G.H.F. Nuttall, "Part D: Mallophaga and Anoplura," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Ottawa, Issued 12 September 1919, 3-11.Stuart Jenness, 310-311. See J.J. O'Neill, "Part A: The Geology of the Arctic Coast of Canada; West of the Kent Peninsula," in *Report of the Canadian Arctic Expedition, 1913-1918: Southern Party, 1913-1916* Ottawa, Issued 8 July 1924, 7-9. While he worked on many of his own fossils and notes, O'Neill states that he did send Pleistocene fossils to William Healey Dall at the United States National Museum. See also Kenneth G. Chipman and John R. Cox, "Part B: Geographical Notes on the Arctic Coast of Canada," in *Report of the Canadian Arctic Expedition, 1913-1918: Southern Party, 1913-1916,* Ottawa, Issued 8 July 1924, 5-15.

344 A good example on the connections between specialists and assistants, and their work, comes in Charles W. Lowe, "Part A: Freshwater Algae and Freshwater Diatoms," *Report of the Canadian Arctic Expedition, 1913-1918: Volume IV: Botany: Southern Party, 1913-1916,* Ottawa, Issued 20 February 1923, 3-11. Lowe, a lecturer on Botany at the University of Manitoba, Winnipeg, writes, "Many of the species are recorded as being found in Canada for the first time. My work has been handicapped to some extent by imperfect library facilities. Certain papers dealing with the arctic flora, which I wished to consult, I was unable to obtain. Hence is it possible that a few records have been omitted from the table." 11A. In reference to his assistants, Lowe thanked Prof. AH Reginald Buller; Dr. Theodore Holm "for Latin descriptions of new varieties and species", Prof. W. A. Setchell for identification of *Scytonema crustaceum;* expedition member Frits Johansen for the specimens; and also late Prof. G.S. West of Birmingham, England, "not only for valuable help and advice during the earlier stages of the investigations recorded here, but also for the training and stimulating influence which I received from him during a number of years which I was privileged to spend in his laboratory." P 11A

Interactions between expedition members, specialists, assistants, and editors were not unique to the Canadian Arctic Expedition. Following the Stefansson-Anderson Expedition of 1908-1912, Rudolph Anderson worked with specialists from the American Museum of Natural History, the New York Botanical Garden, and the Geological Survey of Canada to describe and analyze rock formations, plant collections, and animal specimens.[345] For his part, Stefansson worked closely with Clark Wissler, the curator of anthropology at the American Museum, on a series of ethnological reports concerning Stefansson's collections of Inuit material culture. Much of the knowledge gleaned from these materials was consolidated in displays in the Museum's "Eskimo Hall." It was also circulated through Stefansson's book *My Life with the Eskimo* (1913), which included not only rich descriptions of Inuit social life, but also an eighty-page "Report of the Natural History Collections of the Expedition," authored by Anderson.[346]

While Ernest de Koven Leffingwell worked "alone" in the field after 1907—the remaining members of the Anglo-American Expedition leaving the north or taking up new expeditions—the American geologist's support staff paralleled that of other Western Arctic Expeditions. After leaving the region, Leffingwell spent over a year in the headquarters of the

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345 He sent fragments of copper deposits to R.W. Brock of the Geological Survey of Canada, turned over samples of trees, shrubs, and lichens to Dr. P.A. Rydberg of the New York Botanical Garden; and preserved bumblebees in alcohol for Dr. Frank E. Lutz, the assistant curator of the Department of Invertebrate Zoology of the American Museum of Natural History.

346 These reports were published in the American Museum's annual reports, its Anthropological *Papers* series, as well as its journal. Stefansson's publishing career is documented in Janice Cavell, "Arctic Exploration in Print Culture, 1890-1930," *Papers of the Bibliographical Society of Canada*, 44, 2 (Fall 2006): 7-43. The issue of the rights to publication after expeditions, especially the Canadian Arctic Expedition, has been the subject of much scholarship on Stefansson's life and Canadian politics. Stefansson upset many of the scientists when, in 1913 on the way north to the Arctic from Victoria, British Columbia, he announced that all diaries and field notebooks would become his property, rather than the Canadian government's. Many scientists disagreed with Stefansson, leading to a years-long private and public debate about a supposed "mutiny" among his men. See Richard Diublado, *Stefansson and the Canadian Arctic*, (Montreal: McGill-Queen's University Press, 1978), 92-109. See also Stuart Jenness, 20-24. The other anthropologist, Diamond Jenness, also split his publications between popular books and scientific articles. Diamond Jenness was responsible for authoring the Canadian Arctic Expedition's "official" report on anthropological and ethnological results. This report was published in five volumes which covered the folk-lore, material culture, belief systems, and seasonal movements of Inuit from Alaska to the Central Arctic. Jenness also contributed articles on Inuit culture to *The Geographical Review* and penned two books on Alaskan and Canadian Inuit, *Dawn in Arctic Alaska* and *The People of the Twilight*.

United States Geological Survey in Washington, D.C, in an office space reserved for him by the Survey's director, Alfred Hulse Brooks. Leffingwell also worked closely with the staff of the U.S. Coast and Geodetic Survey to analyze his tidal observations, occulations, and latitudes. It is likely that he made use of the libraries of the Smithsonian, given Leffingwell's lengthy survey of Arctic exploration narratives provided in his 1919 report, *The Canning River Region.*[347]

Indeed, Leffingwell's cartography of Arctic Alaska issued in his report helps us understand the next two activities in the chain of post-expeditionary science: *accumulating* and *innovating.* For many scientific itinerants who encountered the Western Arctic prior to 1918, the region was recognizably British, both in print and on the land. The Franklin Search Party Expeditions of mid 1800s provided the most widely used maps for both the Mackenzie River and the Beaufort Sea coast. Travelers who followed in the wake of Royal Naval officers recognized the mountain chains, river forks, and conspicuous bluffs they had named. Upon entering the Arctic, they took photographs or noted their location in journals of particular features, like John Richardson's "Ramparts" and Sir John Franklin's "Point Separation."[348] To those seeing the region from the sea in the late nineteenth and early twentieth centuries, "the Arctic" became recognizable through places like Point Barrow, Herschel Island, Cape Simpson, Cape Halkett, and the Colville River. These features called to mind their namesakes: royal admiralty, English scientists, and former governors of the Hudson's Bay Company.[349]

What would happen to this heritage as the United States and Canada took possession of

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347 Ernest de Koven Leffingwell, *The Canning River Region: Northern Alaska,* Professional Paper 109, United States Geological Survey, 1919, 12-14.

348 The map published in Volume 11 of the Canadian Arctic Expedition labels Point Separation in the insert of the Mackenzie Delta. See "Arctic coast between Darnley Bay and Bathurst Inlet," in "Part B: Geographical Notes on the Arctic Coast of Canada," in *Report of the Canadian Arctic Expedition, 1913-1918: Southern Party, 1913-1916,* Ottawa, Issued 8 July 1924. In his book, *In Search of a Polar Continent,* British explorer Alfred Harrison showed a picture of "The Ramparts," taken on his journey down the Mackenzie River to the Arctic coast. See Alfred H. Harrison, *In Search of a Polar Continent, 1905-1907,* (London: Edward Arnold, 1908), 26.

349 Hudson Stuck, *A Winter Circuit of our Arctic Coast: A Narrative of a Journey with Dog-Sleds around the Entire Arctic Coast of Alaska* (New York: Charles Scribner's Sons, 1920), 250-270.

northern territories? Would building upon British maps be construed as a weakness of New World scientific authority? For the most part, Leffingwell sought to preserve the names attributed to the land by previous explorers. Both his research site, Flaxman Island, and the waters that washed upon its shores, Camden Bay, had been previously named by Sir John Franklin. He reproduced these names, *accumulating* them along with those he generated, likely because he could not claim to be the first to discover the places to which they referred, even if they had such great importance in defining his work. But in other cases, such preservation was not possible. The northwestern Alaskan coast of the Beaufort Sea was known for its numerous sand-spits, bays, and islands which formed and reformed every year. Leffingwell realized that some of the features on British charts no longer existed. There were also entirely new landforms without names. In naming places, he had to *innovate.* In doing so, he had an opportunity to leave his mark—and that of Western Arctic Expeditions—on Arctic Alaska.[350]

As he calculated his final reports, Leffingwell questioned the credibility of British maps and, by extension, British scientific authority. Most of the reefs that British explorers pointed out west of Point Ellice had been submerged by the waters of the Beaufort Sea.[351] There were other features—like the distance of a given coastline between two prominent peninsulas—that had to be adjusted because of shifting sands.[352] Leffingwell suggested that nature alone was not responsible for this adjustment: the observational methods employed by British travelers had

350 Leffingwell, *The Canning River Region*, 90-100. Leffingwell provides a list of all the geographic names used in his maps of the Alaskan coast. For each listed item, he also provides the authority for that name (who named it) and the source of that name (to whom the name referred). Leffingwell tried to use as many existing names as possible. "After the original names had been entered on the map as accurately as possible it was found that many new names were necessary for the purpose of geographic description." 92. In one memorable passage, Leffingwell found that the place Sir John Franklin had run aground in the Beaufort Sea, causing him hardship and also instigating contact with the Inuit—the mud flats of the Sadlerochit River—was "all awash and inconspicuous." 88

351 Ibid, 88-90.

352 The U.S. geologist found the area between Points Humphreys and Martin given by British travelers as "much to great" to correspond to the stretch of the actual coastline.

produced many inaccuracies. He knew that Franklin and other naval officers were "far from land" and "often in fog," which created distortions in their charts.[353] Franklin's maps diverged from Leffingwell's experience in other ways. Franklin had named Mountain Indian River, near the present day border between Alaska and the Yukon Territory, because he learned that Dene traders from the interior used this waterway to access the coast. But in the early 1900s, the same body of water was called Herschel Island River, a designation given it by whalers.[354] Whether because of erosion, scientific methods, or frames of reference, the lineages of Franklin and the subsequent Searching Expeditions faded in Leffingwell's maps of the Western Arctic.[355]

Historian D. Graham Burnett has argued that practices like Leffingwell's—in which his maps challenged the work of intellectual antecedents and established new geographies—were strategies used by explorers and scientists to bolster their own authority as well as territorial claims to distant regions. In examining the travels of British explorers in South America, Burnett found that explorers traced familiar routes through strange places, paying homage to the legendary pioneers who first visited colonial holdings. Ultimately, these newcomers portrayed their claims to knowledge as credible by asserting observations and information that previous

353 Ibid. The space between the British map and the Arctic shoreline might have been due to the gradual movement of peninsulas over time, or the result of eyeballing this length from the deck of a ship.

354 Ibid, 91-98. When he did have an opportunity to provide his own name for a new landmark, Leffingwell oriented the Western Arctic according to the movements of whalers, traders, Inuit, and Dene. Leavitt Island, for instance, was an homage to George Leavitt, Sr., a whaling captain who assisted the scientist after Leffingwell's *Duchess of Bedford* was locked in the shore ice. Hulahula River" was borrowed from a party of natives from Herschel Island, who held a big dance on the river after killing many caribou. Leffingwell also named land features after prospectors, geologists from the University of Chicago (where he pursued his Ph.D), fur traders, and Inuit traders—all collaborators in his project of knowing the Western Arctic. These connections among academe, industry, and the Arctic were unique to the early twentieth century, of course, and thus represented the place in ways British travelers could not have. On other naming conventions, see Stuck, 290 and 298.

355 Ibid. Leffingwell's depictions of the Arctic were not born from callousness or carelessness toward British tradition: he took pains to account for discrepancies between text and land. Franklin had named a particular island Return Reef, but since his day, local whalers and traders had used that name to refer to a string of islands along the Beaufort Sea coast. In order locate Return Reef, Leffingwell re-enacted the British officer's travelers, searching for the exact spot from which Franklin had been able to see "a large bay to the west, beyond which lay a point and a distant mound." Hopping from island to island and testing the panorama against the description, the American found that Franklin must have been at what was locally called "Egg Island." Return Reef, as it was known to whalers and traders, was miles away.

visitors had missed. In drawing connections with the past, these travelers suggested a continuous history of exploration and occupation, lending stability to colonial rule in a volatile and remote landscape. In breaking with the past and presenting unique data, however, geographers implored readers to trust them—and their experiences and instruments—over historical accounts. These appeals to credibility threatened to destabilize the foundations of British imperial history in South America. Burnett argues that such relations created a paradox, where "taking possession always implies a previous *lack* of possession."[356]

Burnett's analysis helps us see an important tension in the 1920s and in post-expeditionary science. By the time Leffingwell and others arrived to the Beaufort Sea coast, the area was simultaneously American, Canadian, Inuit, and Dene, with traces of Russian and British heritage. The geologist's mapping work in part perpetuated British title in Arctic Alaska. Yet, Leffingwell also asserted his authority by poking holes in that of his predecessors. New scientific knowledge of Alaska thus became possible through re-patriating the legacies of the land—through both accumulating and innovating.

Outside of geology and geography, scientists faced similar challenges as Leffingwell. We have already seen that naturalists in the nineteenth century visited the Arctic and returned their collections to museums. Thus, by the 1920s, biological and anthropological specialists dealing with Western Arctic Expeditions looked at their scientific objects with existing theories in mind. As we will see later in this chapter, twentieth century Arctic biogeographers and anthropogeographers had to carefully negotiate the tensions inherent in drawing on the past to make new knowledge without sabotaging their own authority.

In post-expeditionary science, objects were sorted in museums and redistributed across

356 D. Graham Burnett, *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado*, (Chicago: University of Chicago Press, 2000), 25-66. Quotation from 46.

the world, where specialists and their assistants compared them to the database of existing knowledge found in catalogues, research papers, and museum collections. But these objects had to come back, along with the new information that specialists teased out of them. Thus, the influence of museums and geological surveys inhered not only in the practices of calculation but in practices of *consolidation*. Editor Rudolph Martin Anderson was responsible for literally binding together the discrete manuscripts of dozens of scientists into thematic volumes. He orchestrated the activities of scientists around the world, integrating disciplinary knowledges that had become highly specialized. Scientists in the nineteenth and early twentieth centuries produced generalist natural histories of the Arctic, combining descriptions of the land and its features with observations of Inuit customs, bodies, and histories. Arctic specialists after the Great War used the objects sent them to investigate a much smaller slice of northern life. While one consultant considered the expedition's mollusk collection, another examined its stores of mosquitoes. Archaeological artifacts were split from measurements of heads and faces, and these were separated still from observations of Inuit songs and dances. Yet, all of this specialized research conducted outside of Canada made its way back to the national museum to be fastened together in compendiums dedicated to Western Arctic science. That the museum had become a place of consolidation of knowledge might be no better expressed than the title given to individual reports prepared by specialists. As "separates," they required museum-based scientists to bring them together to some larger whole.[357]

We gain a clearer sense of the issues at stake in consolidating Arctic knowledge when we review instances in which this aspect of post-expeditionary science unraveled. Connections with specialists were maintained through correspondence and the exchange of objects. But these linkages could break down. Canadian Arctic Expedition biologist Frits Johansen, for example,

357 On "separates," see footnote 12. On the specializations of biological specialists, see footnotes 66 to 81.

was tasked with writing a report on the fishes of the Western Arctic. While he drafted a long manuscript, he never produced an acceptable final publication. The delay in writing, sending, reading, and receiving letters between Ottawa and Copenhagen, where Johansen lived and worked, was one factor. The other was the Dane's poor grasp of English, which frustrated relations between him and editor Anderson.[358]

Johansen's case is peculiar, but it gestures to a much wider issue. Consolidating Arctic science required exhaustive, intact materials; willing participants; and uninhibited channels of communication. In most cases, biological, geological, and anthropological specimens (and the reports they helped generate) were ferried among specialists, expedition members, and editorial committees without issue. But there were rare cases where objects and reports did not move as they should. The photos and film of the Canadian Arctic Expedition, for instance, were taken out of Canada by expedition members George Wilkins and Vilhjalmur Stefansson, inciting outrage in Anderson. Anderson considered these materials as property of the Canadian government and crucial to the analysis of specimens and field notes.[359] The bulk of fossils that geologist Ernest de Koven Leffingwell returned to D.C. sat in storage at the offices of the U.S. Geological Survey, because staff there were too busy to take up analyses of his materials.[360] In the Canadian Arctic

358 After years of this back-and-forth, and after bringing Canadian marine biologist A.G. Huntsman on board to review and edit Johansen's work, the Dane became unwilling to contribute to his work any further. For a summary of the particular troubles regarding Johansen, see Stuart Jenness, 315.

359 Photos and film from the Canadian Arctic Expedition did return to Ottawa in 1923, but by then, most of the publications had been completed and the funding stream for additional reports was close to being terminated On the movement of film and photos after the Canadian Arctic Expedition, see "Memorandum re: Investigation of Canadian Arctic Expedition, 1922", found in Rudolph M. Anderson Fonds, MG30-40, Volume 10, File 10, LAC. The memorandum was part of an investigation into the actions of Vilhjalmur Stefansson sponsored by Anderson and fellow expedition members O'Neill, Chipman, and Jenness. Anderson later examined all of the photographs that Stefansson used in his publications between 1912 and 1922 to determine which of the published photos were Anderson's. Stefansson and Anderson had agreed that Anderson would have sole rights over publishing natural history results—but Stefansson did not hold up his end of this deal, publishing this material and not compensating Anderson. See Rudolph Anderson, "Arctic Photographs, March 27, 1924," RG 45, Volume 67, File 40781, LAC.. The document is a letter signed by Anderson but not addressed and apparently not sent.

360 See Ernest de Koven Leffingwell, "Portrait Study with Arctic Setting," Part 2, 37, PEKL. "Mr. Leffingwell brought home an extensive and supremely valuable collection of fossils. These he presented as a gift to the

Expedition, some proposed volumes were never finished because there were not enough well preserved specimens to conduct an appropriate study.[361]

Just as his early field experiences were frustrated by the work necessary to survive and collect in the north, the project of consolidating Arctic science swallowed up Rudolph Anderson. Correspondence with scores of specialists and assistants took hours of his time, distracting him from his own duties to prepare a narrative of the Southern Party and volumes on birds and mammals of the Western Arctic. On top of all this, Anderson could not agree with the Victoria Memorial Museum's resident ornithologist, Percy A. Taverner, on how to collaborate on a report of the bird collections from the Canadian Arctic Expedition. As a result of his editorial obligations and this infringement on his "territorial rights" to ornithology, Anderson never completed a written publication for the Canadian Arctic Expedition, even though he edited all the others.[362]

On balance, these relations often worked smoothly and to great success. In many cases, scientists working on Western Arctic Expedition materials translated their work into careers in civil service and political advocacy, becoming *consultants* on resource management decisions. After landing a post in the Geological Survey of Canada, Anderson was promoted to Chief of

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Geological Survey. Many of these fossils have as yet not been classified."

361 The work of publishing CAE reports was finally abandoned in 1946, with only 75% of the ambitious project complete. See Morris Zaslow, *Reading the Rocks: The Story of the Geological Survey of Canada, 1842-1972*, (Toronto: Macmillan Company of Canada, Department of Energy Mines and Resources, 1975), 324. Anderson noted that some of the Canadian Arctic Expedition reports failed to come to fruition, either because of lack of specimens or because the death of the assigned authors. This note was found written on an excerpt of *The Polar Regions in the Twentieth Century: Their Discovery and Industrial Revolution*, located in Rudolph M. Anderson fonds, MG30-40, Volume 10, File 15 ("Canadian Arctic Expedition—Reports"), LAC.

362 See Stuart Jenness, 308-315. Even more distracting than his editorial duties and his disagreement with Taverner was his long-standing feud with Vilhjalmur Stefansson. Anderson purposefully delayed his publication of Volume 1 (his part was to include a narrative of the Southern Party's activities) so that Stefansson could not get a hold of it and use it to defend himself against the on-going investigation into his role as commander. Stefansson was indeed waiting for this document to write up his own part of Volume 1 (he was to write the narrative of the Northern Party's activities). But, Stefansson did not wait to write up his books *The Friendly Arctic* (1921) and *The Northward Course of Empire* (1922), both of which were wildly popular. Anderson lambasted Stefansson for making money off the expedition through his popular novels but not contributing anything to the operation's scientific results.

Biology, a title he held until the 1940s. Anderson was a leading advocate for the conservation of big game species in the north like caribou and muskox through hunting regulations, the creation of parks and sanctuaries, and the introduction of reindeer.[363] Diamond Jenness was hired as an anthropologist in the Geological Survey of Canada, eventually becoming the nation's state anthropologist. Over his tenure in this position, he advocated for federal legislation to protect and preserve so-called dying Inuit cultures and served as a regular member of a committee tasked with supervising the government's experimental reindeer herding program.[364]

Not all expedition members had such prominent careers as civil servants, however. Vilhjalmur Stefansson maintained a grudge against governmental scientists in Canada, including Anderson and Jenness, which effectively barred him from Canadian government science. Despite this, Stefansson was instrumental in shaping Arctic political affairs in Canada in the 1920s and again during World War II. His transcontinental lecture tours and incessant networking inspired Ottawa to consider introducing reindeer herding programs and catalyzed the Dominion's partnership with the Lomen Corporation of Alaska, from which the Canadian Department of Interior purchased 3,000 reindeer in 1929. Ernest de Koven Leffingwell, on the other hand, faded into obscurity in the 1920s, giving up his scientific career for a quieter life on his family's citrus ranch in California. Later in life, he reflected on how his research led to the creation of Naval Petroleum Reserve no. 4 on Alaska's north slope and the development of an oil empire there.[365]

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363 On Anderson's involvement in conservation, see John Sandlos, *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories,* (University of British Columbia Press), 2007. Anderson's lone biographer has called him "the greatest mammalogist that Canada has ever had." The quotation is from David Gray, *Arctic Shadows.*

364 For this work, he was referred to as the "Father of Eskimo Archaeology."On Jenness' subsequent influence in Canada, see Peter Kulchyski, "Anthropology in the Service of the State: Diamond Jenness and Canadian Indian policy," *Journal of Canadian Studies* 28, no. 2 (1993): 21-50.; Henry Collins,. "Diamond Jenness: Arctic Archaeology," *The Beaver* (Autumn 1967): 78-79.; Nansi Swazye, *Canadian Portraits: Jenness, Barbeau, Wintemberg: The Man Hunters,* (Toronto: Clarke, Irwin, and Company Limited, 1960), 40-94.

365 See Museum of Civilization, "Northern People, Northern Knowledge." See Cavell and Noakes, 1-11. On Leffingwell's move to California and reflections about the uses of his science, see Ernest de Koven Leffingwell,

In the remaining sections of this chapter, we investigate the conclusions drawn by specialists about the Western Arctic's geography, geology, biology, and anthropology. Cutting across these disciplinary orientations was a fascination with rationalizing North American environments by carving them into identifiable natural and cultural districts. Scientists in the 1920s mobilized the wealth of collections and information available to them through Western Arctic Expeditions to understand the spatial patterns of land features, flora and fauna, and human communities from the Equator to the North Pole. In forwarding the concepts of geological provinces, life zones, and culture areas, scientists helped reorient the Arctic. No longer a remote, frozen, or worthless backwater, the value of the far north could be understood according to a set of scientific principles that applied to any landscape on the continent. This *reordering* had ramifications beyond scientific knowledge to possibilities for administration and development there.

Reordering the Physical Arctic: Political Geographies, Geological Provinces, and Economic Geographies

Maps of the Western Arctic were symbols of global knowledge. They demarcated the fringes of the known world and served as a device through which geographers, explorers, and geologists made unique appeals to science. Explorers, like Stefansson, sought to remove unknown places from the existing charts. He famously promoted his exploits in the Canadian Arctic Expedition as "wip[ing] a vast area of 1,000,000 square miles off the face of the unexplored map." There were kernels of truth to this claim: on the Canadian Arctic Expedition, Stefansson located four new islands in the Arctic archipelago. These discoveries curried him favor with high ranking political officials in Ottawa, many of whose names graced these new

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"My Polar Explorations, 1901-1914," *Explorers Journal*, vol. 39, no 3 (Oct 1961), 8-14.

territories.[366] Such favor was instrumental for Stefansson's reputation as an Arctic expert, which scientists continuously attacked in the 1920s. Indeed, in the pages of *The Geographical Journal* and *Science,* U.S. and Canadian geographers and geologists questioned whether Stefansson had discovered new land or simply misread the landscape.[367] Sensing that the controversy might undermine Canadian sovereignty on these new lands, the Canadian Privy Council came to Stefansson's defense. On maps, global knowledge and global power shaded into one another.

Where explorers removed unknown places from the map, geographers and geologists sought to add known places to it. Unlike explorers, geographers could do more than sketch the outlines of distant lands. In the field, they used first-rate instrumentation to apply new levels of rationality to lands already discovered. In post-expeditionary science, they drew from logbooks and field journals to provide detailed descriptions of their physiography and natural resources. Geographers were also responsible for coordinating these places: they drew the lines and boundaries that defined the shape of the north. Explorers tried to do this, but couldn't. After the Canadian Arctic Expedition, the Geographical Board and Geodetic Survey of Canada would not approve Stefansson's rough illustration of the Western Arctic. The explorer was forced to work with an independent publisher in Chicago for the maps featured in his 1921 book, *The Friendly Arctic.*[368]

Establishing the geography of the U.S. and Canadian Arctic began in the field, with a

366 Stefansson promoted the Canadian Arctic Expedition as completing Columbus' project in the New World, solidifying the expedition as a scientific and imperial venture. *New York Times*, 21 May, 1913. See also "Certified Copy of a Report of the Committee of the Privy Council, approved by His Excellency the Governor General on the 21st January, 1921," found in Rudolph Martin Anderson Fonds, MG 30-40, Volume 10, File 3, LAC. The Privy Council, on behalf of the Prime Minister, extended formal recognition and appreciation for Stefansson's services, which "extended the boundaries of Canada." The new islands included Borden Island (after Prime Minster Sir Robert Borden), Meighen Island (after Prime Minster Arthur Meighen), Lougheed Island (after James Alexander Lougheed, Minister of Mines and Interior under Meighen), and Brock Island (after Reginald Walter Brock, the former director of the Geological Survey of Canada).

367 "The Geographical Work of the Canadian Arctic Expedition," *The Geographical Journal*, vol. LXV, no 4, (April 1925), 340-342.; Charles Camsell and Vilhjalmur Stefansson, "The Friendly Arctic," *Science*, New Series, Vol. 57, No. 1484 (June 8, 1923), 665-666.

368 Stuart Jenness, 320.

map. In order to locate the land features they eventually named and mapped, geographers and geologists used a system of control points, or locations whose latitude and longitude were known. These allowed fieldworkers to ensure the proper function of their chronometers, which in turn, helped scientists connect poorly known areas to those already located.[369] In both Arctic Alaska and northwest Canada, expeditionary base camps were ideal spots for such purposes. Fieldworkers departed from and returned to these camps often, and thus could tie a constellation of new features back to them. In very material ways, the headquarters of expeditionary scientists became fixed anchor points of federal power in the north. The mapping activities and maps of expeditionary members were oriented around them.[370]

Yet the geographic order provided through post-expeditionary science actually relied on previous imperial encounters in the Arctic. Expeditionary scientists had purposefully sited their research stations in areas of the far north that needed documenting and discovering—their precise locations were not known. In order to become control points, they had to first be yoked to existing control points. In Arctic Alaska, Ernest de Koven Leffingwell followed the U.S. Coast and Geodetic Survey's standards for triangulation, building over fifty stations along the Alaskan coast to establish his topographical control. One of these was at Ned Arey's house (the whaler-turned-trader whose family assisted his fieldwork) and another was at Barter Island, where whalers and Inuit maintained a trading rendezvous. In addition to many other stations, these helped Leffingwell secure the geography of the Arctic Alaskan interior and shoreline, including

369 The latitude and longitude of a mountain top or a previously undiscovered river, for instance, could be calculated through simple measurements of time and distance from control points.

370 On the establishment of control points in Leffingwell's fieldwork and the Canadian Arctic Expedition, see Kenneth G. Chipman and John R. Cox, "Geographical Notes on the Arctic Coast of Canada," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume XI: Geology and Geography: Southern Party, 1913-1916,* Ottawa, Issued 8 July 1924, 7B-9B and 36B-37B. See also Leffingwell, *The Canning River Region,* 15-18 and 36. The idea that U.S. and Canadian Arctic empire was oriented around the control point of the field station is inspired by David Turnbull's work in David Turnbull, "Boundary-Crossings, Cultural Encounters, and Knowledge Spaces in Early Australia," in *The Brokered World*, ed. by Simon Schaffer et al., (Sagamore Beach, MA: Science Publications, 2009), 387-428.

his research base Flaxman Island. For Canadian Arctic Expedition members Kenneth Chipman and John Cox, their headquarters, Bernard Harbour, was established by linking it to the Royal Northwest Mounted Police barracks at Herschel Island and the Hudson's Bay Company post at Fort McPherson. While Flaxman Island and Bernard Harbour became visible sites of U.S. and Canadian presence in the Western Arctic—both on the ground and on the map—their construction was possible only through the contemporary activities of whalers, traders, and police.[371]

In addition, both U.S. and Canadian scientists made use of the recently demarcated international boundary to identify their own stations as control points. Between 1909 and 1912, surveyors from the United States and Canada were engaged in finding and establishing the 141st meridian in the Arctic regions of Alaska and the Yukon Territory.[372] It was not enough to divide northern North America on maps alone—politicians wanted to mark the line on the ground. International Boundary Survey workers, and the horses with which they traveled, carried on their backs the bronze shafts, each weighing over three hundred pounds, that were to be laid down every three to four miles along the meridian.[373] This physical boundary was thus a principal feature of Western Arctic Expeditions. Leffingwell ended his field survey at the border; Chipman and Cox began theirs only after passing across it. Both U.S. and Canadian scientists also used the bronze structure laid by Survey members at Demarcation Point as a known location, establishing

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371 See Chipman and Cox, 36B-37B. Leffingwell, *The Canning River Region*, 36-42.

372 As mentioned previously, in 1903, the 141st meridian had been declared the border between Alaska and the Yukon Territory, but the exact position of that line above the Yukon River to the Arctic coast had not been plotted. To expedite the fieldwork, U.S. fieldworkers were dispatched to the territory between the Porcupine River and the Arctic coast, while their Canadian counterparts attended to the land south of the Porcupine River to the Yukon River. D.D. Cairnes, *The Yukon-Alaska International Boundary, between Yukon and Porcupine Rivers*, Department of Mines: Geological Survey, memoir 67, no 49, Government Printing Office: Ottawa, 1914, 2-19.; A.G. Maddren, "Geologic Investigations along the Canada-Alaska Boundary," in Alfred Brooks and others, "Report on the Progress of Mineral Investigations in Alaska, 1911," Department of Interior: United States Geological Survey, Bulletin 520, (Washington: Government Printing Office, 1912), 297-314.

373 Cairnes, 2-19. See also "Alaska Canada Boundary Line Nearly Down," *The San Francisco Examiner,* 10 November, 1912.

their control points through it. The elaboration of new geographic orders in the north thus went hand-in-hand with new political geographies there.[374]

More than travel narratives or other visual representations of the Arctic, maps were documents that catalyzed exploration, scholarly research, political administration, and economic development. While they required intense field and office work, they could be circulated with ease to non-academics, including the bureaucrats, police officers, missionaries, and school teachers traveling to or through Arctic frontiers. Maps also reveal how closely associated geography and geology were in post-expeditionary science. Ernest de Koven Leffingwell combined his surveys of coastal and interior topography with geological reconnaissance, later producing five new maps of the Canning River Region of Alaska. These documents inspired the U.S. Geological Survey to send a series of research parties to Arctic Alaska between 1923 and 1926 to follow up on Leffingwell's findings. In the Canadian Arctic Expedition, geologist J.J. O'Neill and geographers Kenneth G. Chipman and John R. Cox traveled with one another, helping establish the exact positions of landmarks, mineral deposits, and collected fossils. Like Leffingwell, their maps of the Mackenzie Delta and Coronation Gulf region portrayed the latest and most up-to-date scientific observations of the north. They also helped coordinate the development of the Arctic.

Following the reports of expeditionary geographers and geologists, both the United States and Canadian governments enclosed large areas of mineral deposits, withdrawing them from private staking. In December of 1918, Parliament laid claim to several thousand acres of the

374 See Kenneth G. Chipman and John R. Cox, "Memorandum to accompany Report to Geological Survey, March 16, 1915" in Kenneth Gordon Chipman fonds, 1913-1918 MG 30 B-66, Vol 1, File "CAE, Jan-Dec 1915, Correspondence and Reports," LAC. See also Letter from KG Chipman to Geological Survey, 9 July 1914, in Kenneth Gordon Chipman fonds, 1913-1918 MG 30 B-66, Vol 1, File "CAE, Jan-Dec 1915, Correspondence and Reports," LAC. Chipman notes in this letter that he and Cox went to the Boundary Line to tie their position at Collinson Point (Alaska) and also to "check our watch ratings."

Coronation Gulf region, the same stretch of land that had been thoroughly surveyed by geologist J.J. O'Neill in the Canadian Arctic Expedition.[375] O'Neill's initial reports from the field in 1917 had been more than encouraging. "I have made a very conservative estimate of the amount of this copper-bearing rock," he wrote, "and it seems that two billion tons is well within the limit."[376] This was exciting news for a Canadian economy in the midst of the Great War, whose major source of native copper was found across the border in Michigan.[377] The Canadian government wasted little time in laying claim to these copper resources, though there were considerable delays in extracting the valuable mineral.

For the Geological Survey of Canada, whether or not the Arctic held copper deposits was a necessary step toward resource development, but not a sufficient one. Accessibility was the litmus test of natural resources in the nation, not predicted value or manageability. Though it had high hopes for the far north, the Survey realized that southern Canada was a safer bet in meeting pressing post-First World War demands. The Canadian government established a reserve around Bathurst Inlet, claiming the land was of considerable economic value, but too inaccessible for immediate use. After closing the area to staking until further notice, the Geological Survey turned its attention toward resources within the reach of the nation's growing network of railroads and rivers. Hydroelectric power of Niagara Falls, iron and zinc mines in British Columbia, the agricultural frontier of Manitoba—these were the landscapes that provided the

375 Letter from JJ O'Neill to RG McConnell, March 3, 1919, in J.J. O'Neill Fonds, MG 30 B 171, Vol 1, File 14, LAC. O'Neill wrote that Order in Council of Dec 21, 1918 (PC 5154) withdrew "that part of arctic Canada lying between 105 and 116 degrees west longitude and north of 165 degrees north latitude." Indeed, the possibility of copper in the vicinity of Coppermine River and Bathurst Inlet as reported by Rudolph Anderson and Vilhjalmur Stefansson following the Stefansson-Anderson expedition of 1908-1912 was partly responsible for setting in motion the Canadian Arctic Expedition. Anderson's report in *My Life with the Eskimo*, 441. Anderson returned with geological specimens from the Coppermine River and Coronation Gulf area and had them "painstakingly examined" by R.W. Brock of the Geological Survey of Canada. Anderson wrote that Brock "informs me that only two out of the more than fifty specimens of this rock formation failed to show traces of copper." 441

376 O'Neill's field report was included in Stefansson, *The Friendly Arctic*, 754.

377 Morris Zaslow, *Reading the Rocks: The Story of the Geological Survey of Canada*, (Toronto: MacMillan Company, 1975), 309.

best opportunities for Canadian economic development.[378] In this way, Ottawa construed the north as a storehouse, part of the nation's geography of resources, but not yet part of its economy.[379]

Canada's copper situation found its counterpart in oil in northern Alaska. The extent of oil in northwestern Alaska may have been common knowledge to native Inupiat and resident whalers, but governmental geologists and wealthy capitalists did not learn of it until Ernest de Koven Leffingwell published on it. After 1919, when Leffingwell issued his synthetic analysis of Alaskan geology and mineralogy, private companies dispatched geologists to the north slope in 1921 to gather more information. Meanwhile, the Navy began converting its fleet from coal to petroleum fuel, necessitating governmental protection of oil reserves in United States territory. In 1923, President Warren Harding created Naval Petroleum Reserve No. 4 in northwestern Alaska by Executive Order. In one fell swoop, science, the state, and private industry shuffled power in the Arctic: the Executive Order negated the claims of dozens of private companies in the reserve. It also allowed the federal government to establish new jurisdiction in the Arctic on the basis of Leffingwell's field research.[380]

Prior to initiating oil development, the Navy contracted the U.S. Geological Survey to

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378 Zaslow discusses the use of resources in Canada in terms of the needs of the nation, the Great War, and existing infrastructure. See Zaslow, *Reading the Rocks,* 285-306, 309-325. Zaslow indicates that the International Geological Congress, held in Canada in 1913, brought the Geological Survey "into the mainstream of world scientists," Zaslow, *Reading the Rocks,* 305. During this meeting, visiting scientists explored Canada's landscapes of major potential—these included British Columbia, Niagara Falls, and the Klondike area in the sub-Arctic—but no Arctic regions. See Zaslow, *Reading the Rocks,* 301-305. For information on the creation of the reserve in the Bathurst Inlet area, see Zaslow, *Reading the Rocks,* 323. Janice Cavell also discusses the north as a "second frontier" due to Canada's mostly east-west orientation during development in the 1900s. See Cavell, "The Second Frontier: The North in English Canadian Historical Writing," 369-382.

379 Peter Coates writes about Alaska's status as a "storehouse" of wealth and resources. See Peter A. Coates, *The Trans-Alaskan Pipeline Controversy: Technology, Conservation, and the Frontier,* (Anchorage: University of Alaska Press, 1993), 1-63. Human geographers have recently refocused attention on the notion of "resource geographies" as a means of understanding the social production of nature and the natural production of society. For a primer, see Karen Bakker and Gavin Bridge, "Material Worlds? Resource Geographies and the 'matter of nature,"' *Progress in Human Geography,* vol. 30, no 5 (2006): 5-27.

380 Phillip S. Smith and J.B Mertie, Jr., "Geology and Mineral Resources of Northwestern Alaska," United States Geological Survey, Bulletin 815, Government Printing Office, Washington, 1930, 274-5.

perform extensive reconnaissance in the reserve. Between 1923 and 1926, four research teams scoured more than twenty thousand acres of "hitherto unknown country" to determine the optimal locations for initial oil wells. These surveys had surprising results. While geologists were excited to note the presence of oil and coal, they were constantly beset by problems of access. There were no transportation lines in or out of the region. The only routes to oil involved "long, arduous journeys" by canoe or dog team from existing towns (Nome or Fairbanks) or by the "occasional trading vessel" around the Alaskan coast. Travel by sea was limited to the short open season and was itself not without risk. There were no established harbors near the reserve site, but there were frequent storms and an almost ever-present fog. Once in the reserve, travel was not much easier. Rivers were shallow and swift; there were no roads or trails on the ground; and employing wheeled vehicles was "attended with serious difficulty because of the soft surface of the ground and the spongy mat of vegetation." Beyond all of this, there was a small local labor pool from which to draw, so any development projects would have to account for their own personnel. Principally because the Arctic was unsettled, it was able to thwart southern machines and methods of development.[381]

The geologists were quick to point out two means of overcoming the Arctic. The first recommendation fell in line with Stefansson's promotion of a "friendly" Arctic: realize that the Arctic was not as harsh as popular opinion suggested. "Doubtless some of the adverse climatic conditions of the region are overemphasized in the minds of many people," geologists wrote. They advocated "proper preparation and precautions" as antidotes and even implied that the cold, open working environment was "far healthier than that of many regions where people live and work." Second, the geologists noted that the attraction of working in the Arctic was simply a

381 Ibid, 287-288. The geologists described the natives as "not accustomed to regular routine types of work," and concluded that the "long winter of darkness and cold" would "deter people from accepting employment there."

matter of price. If employees had the right "inducements", they might be lured there for jobs, even though this did increase the operating costs for the employer.[382]

Post-expeditionary scientific research on northern minerals pinned the problems of northern development not on local environments, but on the complex economic geographies in which the Arctic was enrolled. Ultimately, while geologists reported rich mineral contents in the Naval Petroleum Reserve, they noted that certain "geographic factors" hindered the possibility of "developing oil pools in the region." These factors, which included transportation, labor, and working conditions, were understood not on their own, but in relation to existing oil reserves and similar factors in California and Oklahoma. As Ottawa had done with the Coronation Gulf region, Washington situated northern Alaska within a cartography of settlement, resources, and accessibility in North America.[383]

Whether in the case of new islands, control points, international boundary lines, or mineral deposits, the post-expeditionary practices of geography and geology were assertions of power. Leffingwell, Chipman, Cox, and O'Neill sought to project the north as American and Canadian, overlaying a new world over an old, overshadowing or even removing the region's historical geographies.[384] Maps produced by expedition members like Leffingwell and Chipman

382 Ibid, 289.

383 Ibid, 288.

384 A note should be made about how expeditionary scientists confronted Inuit heritage on the land. In his report for the Canadian government, Chipman presented readers with a four-page list of Inuit names for places in the Mackenzie River District, Coronation Gulf region, Victoria Island, and Banks Island. These words corresponded to Inuit uses for the land. For example, *Inyuernerit,* an island in the Coronation Gulf, roughly translated to "a place formerly inhabited now uninhabited." Similarly, the name *Kingmiktorvik,* which referred to a peak beside Mount Arrowsmith on Victoria Island, meant "the place where caches of fish were made." In some ways, then, Canadian scientists found value in preserving some Inuit names, if only to help direct travelers through the landscape. It was of great import to know where to find sustenance and fuel (for dogs) in a foreign and unfamiliar place. This function of place-names was absent in references to top-ranking Hudson's Bay Company officers. While Chipman conveyed these Inuit place-names and their translations to the reader in print, they did not always show up on his map of the Western Arctic. Instead, Chipman replaced the majority of Inuit names with English ones, covering over native routes and roots with the new patterns of politics and commerce in the north. Chipman did not directly state why he replaced these particular names. One can speculate, however, that the order Inuit saw in the land did not correspond with how Canadians saw it. While Chipman organized his

produced a tangible sense of order over the region. Maps could be requested, delivered, and put to use in navigating and developing the north.[385] For readers, maps signaled the solidification of scientific knowledge and political claims in the region. Leading scientists and explorers in the U.S. lauded Leffingwell's work as providing information that assisted industry and administration. His publication, *The Canning River Region*, was recognized by US Geological Survey officials as a significant contribution to an otherwise unknown corner of Alaska. "He presents the first accurate chart of the north Arctic coast of Alaska," wrote director Alfred Hulse Brooks, "and his coastal maps are a valuable contribution to the knowledge of shore-line topography in polar regions."[386]

As his geographical work was embraced by the scientific community, resident whalers, and local missionaries, the reception of Leffingwell's geological studies was mixed. Geological Survey supervisors did not deem his geological maps as rigorous as his charts of the shoreline.[387]

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report along the Beaufort Sea coast—introducing the reader to the Western Arctic from west to east, just as he entered the region via whaleboat—Inuit place-names were oriented toward the land. They did not consider the coast as a barrier separating them from a far-off land they could not see—as whalers, traders, and scientists often did—but as the fringe of a territory they knew very much about. This is perhaps best expressed in the Inupiat term for the inhabitants of the coastal village of Wainwright, Alaska, which means "a person of the River." For many Inuit, the coast was the edge of land, a place contiguous with the interior. For other visitors, the coast was the edge of the sea. Like Leffingwell, Chipman attributed land features to schooners, captains, scientists, explorers, traders, and whalers. As with the American, the Canadian geographer saw place names as means of exerting control over the region, of bestowing nation on the landscape by recognizing patrons, supporters, and agents of empire. The names he used to replace Inuit names for the land were approved by the Geographic Board of Canada. See Chipman and Cox, 36-42. On the various Inuit names for the Mackenzie Delta and Beaufort Sea coast, see Prince of Wales Northern Heritage Center, "The Inuvialuit Place Name Virtual Exhibit," http://www.pwnhc.ca/inuvialuit/index.html, (accessed July 24, 2012). On the meaning of Wainwright, see *Puiguitkaat (The 1978 Elder's Conference)*, transcription and translation by Leona Okakok, edited by Gary Kean, (Barrow, Alaska: North Slope Borough Commission on History and Culture, 1981), 194. For an excellent review of Inuit place-naming, see Beatrice Collignon, "Inuit Place Names and Sense of Place" in *Critical Inuit Studies – An Anthology of Contemporary Arctic Ethnography*, Pamela Stern and Lisa Stevenson, eds, (Lincoln: University of Nebraska Press, 2006) 187-205. In this survey of place-names in the Coronation Gulf region, Collignon found that the Arctic coastline could be identified as either an inland or marine feature. On Chipman's names, see his list of geographic names in Chipman and Cox, 36B-42B.

385 Missionary Hudson Stuck reproduced Leffingwell's map with permission from the U.S. Geological Survey and included it in a sleeve at the back of his book, *A Winter Circuit of our Arctic Coast.*

386 Leffingwell, *The Canning River Region, 9.*

387 In reviewing Leffingwell's publication, U.S. Geological Survey director Alfred Hulse Brooks wrote "It was not possible with his facilities to map the inland region with the same degree of refinement [as his coastal charts]." See Leffingwell, *The Canning River Region*, 9.

Leffingwell's fossils and collections were met with both disinterest and exuberance. US Geological Survey staff were too bogged down with their own work to analyze most of Leffingwell's specimens. On the other hand, the samples of petroleum residue that he brought from Cape Simpson sparked a small "oil rush" in Arctic Alaska between 1917 and 1920.[388]

Leffingwell's geological research resulted in one final map, which, like the others, sought to redefine and reorder Arctic life. In the early 1900s, Alfred Hulse Brooks had published a map on which he identified four geological provinces in Alaska: Arctic Slope, Rocky Mountains, Central Plateau, and Pacific Mountain System.[389] But by 1916, Brooks revised this conclusion, accumulating and innovating knowledge based on the work of expeditionary scientists Leffingwell, Chipman, Cox, and O'Neill. Brooks noted that recent investigations by Canadian and American geologists showed that the northernmost chain of mountains in Alaska—what is today referred to as the Brooks Range—was not part of the Rocky Mountain system. Rather this fifth geological province, the "Arctic Mountain System," was a "discordant element." It was a dividing line between the Central Plateau and the Arctic Slope, separating Arctic Alaska from the major geological formation of the continent, the North American cordillera.[390]

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388 Leffingwell himself referred to the reaction to his oil "residues" as inciting a "small oil rush," in Leffingwell, "My Polar Explorations, 1901-1914" 14. The small oil rush was described in some detail by U.S. geologists Mertie and Smith in their 1930 report on the oil resources of northwestern Alaska. Mertie and Smith, 274-276 "The first published record of the occurrence of petroleum in northwestern Alaska appears in a report of the United States Geological Survey published in 1909 and was based on materials collected and statements made by E. de K. Leffingwell regarding a seepage near Cape Simpson. In 1915 reports of an oil seepage in the vicinity of Wainwright Inlet were noted in the annual progress report of the Geological Survey. In 1919 Leffingwell's report of this work in northern Alaska, which he had been carrying on since 1906, was published." 274 The authors note that an independent oil prospector, A.M Smith visits the seepage and reports on them to a private oil company in 1917, which sends geologist H.A. Campbell to conduct more studies in 1921. At the time of Mertie and Smith's report, there were nearly thirty applications made to the government for oil leases on the federal land.

389 See Alaska's Digital Archives, "Geographic provinces of northwestern North America," http://vilda.alaska.edu/cdm/singleitem/collection/cdmg11/id/10795/rec/10, (accessed September 6, 2012). The map does not list a date of publication, but the University of Alaska-Fairbanks suggests 1900.

390 Brooks' 1916 paper, "The Physiographic Provinces of Alaska," originally published in *The Journal of the Washington Academy of Sciences*, was reprinted in Charles C. Coby, ed, *Source Book for the Economic Geography of North America*, (Chicago: University of Chicago Press, 1922), 412-413.

This seemingly minor reclassification of Arctic geology had major implications for the conception and management of Arctic resources. In a 1919 US Geological Survey report entitled "The Future of Alaska," Brooks linked the knowledge of Alaska's geological provinces to the territory's political and economic development. Because Alaska did not yet have any identifiable "political subdivisions," Brooks took liberty to organize the place via the known geological formations in northwestern North America and the mineral extraction industries built upon them. Alaska boasted rich coal and gold deposits—and sophisticated coal and gold industries—on the panhandle, near Fairbanks, and near Nome. Consequently, Brooks bracketed these regions as "southeast," "interior," and the "Seward Peninsula." Brooks also defined a "Northern Alaska" region, which was characterized not only by the distinctive geology of the Arctic Mountain System and Arctic Slope, but also by an absence of industrial activity. Reordering the Arctic in this deterministic fashion allowed the geologist to envision not only the current situation in Alaska, but also its future. The minerals of "Northern Alaska," he noted, "are not only entirely undeveloped, but are certain to remain so until the time in the future when the accessible coal of Alaska and the United States approaches exhaustion."[391]

In making maps, expedition members and scientific specialists attempted to redefine an already defined place. We might think of their representations of islands, coastlines, international boundaries, and physiographic patterns as both adding and removing layers to the palimpsest of the Western Arctic. Simply accumulating knowledge was not possible. They had to impose over the land and its histories an order that marked new, intimate experiences in the north, rigorous scientific training, and blueprints for federally-managed settlement and economic development. Redrawing the lines of the Western Arctic was thus an act that asserted intellectual as well as

391 Brooks's 1919 paper, "The Future of Alaska: Mining and the Mining Industry in 1919," originally published in the U.S. Geological Survey *Bulletin*, was reprinted in Colby, *Source Book for the Economic Geography of North America*, 417.

political claims in the north.

Reordering the Biotic Arctic: Life Zones and Zones of Influence

Rivers, bluffs, sand spits, and mineral deposits were all phenomena that could be fixed in space by the maps that represented them. Flora and fauna were not so easily contained to geographical boundaries or the surfaces of a chart, however. How could scientists determine the range of the brown bear, given that a specimen was shot on the east channel of the Mackenzie River? Was it a species particular to Canada, the Mackenzie Delta, North America, or the circumpolar Arctic? How widely distributed was the *Cladonia* genus of lichens, samples of which were found along the Beaufort Sea coast? There were differences and connections among geography, geology, and biology, which, in turn, had consequences for how U.S. and Canadian scientists attempted to reorder the biotic Arctic.

As with naming places or marking boundaries, the ways biologists went about imposing order on the flora and fauna of the north often had much to do with the work of predecessors. But the logistics of doing biology meant that relationships with the existing scientific record played out differently than with geography and geology. Expedition biologists, like Frits Johansen and Rudolph Anderson, often handed off specimens to specialists, who worked up results. This involved a more uncertain process about how to certify knowledge, since specialists did not have the same kinds of experiential authority as fieldworkers. Instead, they relied on the objects at hand to analyze species. Sometimes they referred to field journals for rich descriptions of the context in which specimens were found so as to breathe new life into the dead specimens, to see them as embedded in a regional environment rather than as abstracted from place or time.[392]

392 William Healey Dall, "Part A: Mollusks, Recent and Pleistocene," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VIII: Mollusks, Echinoderms, Coelenterates, Etc.* Issued 24 September 1919, 3A. Leon J.

Referring to this process as a progressive accumulation of information, as Bruno Latour has, might misconstrue the kind of work necessary to calculate and innovate knowledge on the Western Arctic.[393] Much of the existing data on the region did not come from North American museums: specialists gathered materials from elsewhere to process Western Arctic Expedition objects. One specialist wrote that the fauna of the Arctic had received much attention prior to the Western Arctic expeditions, but this attention had not yet come from North American scientists. Rather, it had emerged from Greenland in the 1860s, German expeditions to the European Arctic in the 1890s, and Russian expeditions in the first years of the twentieth century.[394] The Western Arctic thus held rare scientific value principally because it was less accessible than other Arctic regions and knowledge claims about it were less settled.[395] Such characterizations helped portray the region as unique given the histories of empire, exploration, and scientific development. Biological specialists did calculate new knowledge that served the U.S. and Canada's project of administering the Western Arctic. But they did so by sculpting a conceptual space that cast the Western Arctic as scientifically unresolved and relying on many different points of calculation to settle matters of fact.

The reach of biologists in the north was supported by trends evolving in broader

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Cole, "Part F: Pycnogonida," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VII: Crustacea,* Issued 3 January 1921, 3F.; Alex D. MacGillivray, "Part G: Hymenoptera and Plant Galls Sawflies (Tenthredinodea)," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Issued 3 November, 1919, 3G.

393 Latour, 219-223.

394 Greenland and Labrador were closer to the English and Danish empires, just as the European and Asian Arctics were closer to the metropolitan areas of Germany, Russia, and Norway. A.R. Cooper, "Part G-H: Trematoda and Cestoda," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume IX: Annelids, Parasitic Worms, Protozoans, Etc.,* Issued 4 February, 1921, 3G-H.

395 One specialist underlined the Western Arctic as a missing piece in the scientific edifice of the Arctic, suggesting that for the last one hundred years, exploration had been concentrated on the eastern portion of the Arctic—from Smith Sound in Canada to the Kara Sea in Siberia. Cole, 3F. Specialist Chauncey Juday offered a typical accolade, suggesting that his zoological specimens were of interest because they were from an area "in which collections had not been made previously" and which complemented known collections from Greenland, Labrador, and Alaska. See Chauncey Juday, "Part H: Cladocera," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VII: Crustacea,* Issued 3 January 1921, 3H.

intellectual communities.[396] As historian of science Peter Bowler has argued, geography at the turn of the century was largely consumed by sciences like entomology, mammalogy, marine biology, and botany that took up more regional and detailed approaches to the human and physical dimensions of geographical studies.[397] This project of understanding the spatial characteristics of biological life on earth, referred to as biogeography, was inherent to the colonial enterprise. Exploration and exploitation provided scientists the materials with which to organize the world. Their organization systems, in turn, had imperial casts. Bowler has noted that it is "difficult to escape the feeling that late nineteenth-century Europeans and Americans were fascinated by the attempt to carve the world up into biological provinces which matched their own political and economic zones of influence."[398]

In twentieth century Arctic biogeography, science and politics converged in the myriad ways northern specimens were registered in studies of biology's geography.[399] To those hired on to assist the Canadian Arctic Expedition, Arctic plants and animals seemed both separated from and connected to global environments. The Arctic's extreme winter climate and short but intense

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396 The idea that scientists extend authority over a place by rendering it known through standard disciplinary practices—such as those used by biological specialists here—is explored in further detail by Stephen Bocking in Stephen Bocking, "Science and Spaces in the Northern Environment," *Environmental History* vol. 12, no 4, 867-94. Bocking's focus is on the Canadian north between 1940 and 1970, when ecologists enjoyed new levels of authority and responsibility in northern resource management and, in turn, deployed a suite of new ideas of the place.

397 Peter J. Bowler, *The Fontana History of the Environmental Sciences: Geography, Geology, Oceanography, Meteorology, Natural History, Paleontology, Evolution Theory, Ecology,* (London: Fontana, 1992), 391. For good reviews of the changes in the discipline of geography at the turn of the century, see David N. Livingstone, "Geography," in *Companion to the History of Modern Science*, edited by R.C. Olby, G.N. Cantor, J.R.R. Christie, and M.J.S. Hodge, (New York: Routledge), 743-758.

398 Bowler, 380. For an more in-depth analysis of biogeography and the idea of "biological province," see Janet Browne, *The Secular Ark: Studies in the History of Biogeography,* (New Haven: Yale University Press, 1983). See especially 32-85. Browne argues that the idea of "biological provinces" emerged in the late 18th century, in the midst of an era of exploration that allowed for an "avalanche" of new collections. Browne traces the development of biogeography from Linnaeus through Alexander von Humboldt at mid-nineteenth century to Charles Darwin in the 1860s to American biogeographers J.A. Allen and C. Hart Merriam in the 1880s.

399 Browne, 117-137. Arctic plants and animals had figured prominently in nineteenth century biogeography. British scientists like Darwin, Hooker, and Lyell worked on the collections of the Franklin Searching Expeditions to understand historical processes of creation and dispersion as simultaneously geological, biological, and geographical phenomena. Specialists in the twentieth century seemed less concerned with the origins of biological life than its current geographic state.

growing season encouraged specialists to set it apart from the rest of the world. They underlined the influence of local conditions—like topography, temperature, and soil—on the life cycles and patterns of regional flora and fauna. Yet, Arctic conditions were not always restricted to the Western Arctic. The place could be imagined as a sub-region of a circumpolar area, which spotlighted the connections between the eastern and western hemispheres. Many botanists were also convinced that the life at high latitudes could be understood alongside the life at the tops of mountains. Understanding Arctic biogeography, then, involved putting the region in conversation with many other places, thus enrolling plants and animals in many geographies and many natural and social orders.

A view of the Arctic as its own unit was a longstanding approach to making sense of plant life in northern regions. In North America, J. A. Allen, the first curator of birds and mammals at the American Museum of Natural History, had argued in 1891 for the separation of the Arctic from the continental land masses. Allen was fascinated with the Arctic because of the "intolerability" of the climate there, which produced few species in relation to its size. Indeed, like those working up Western Arctic Expeditions, Allen decided that because the Arctic was so life-less, the life that did exist necessitated very careful study. He found vegetation to be highly uniform across the circumpolar region, a byproduct of the homogeneity of climate at the top of the world. He also noted that the characteristic marine and terrestrial species—polar bear, seal, Arctic fox, and muskox, for example—were found only in the Arctic portions of Europe, Asia, and North America. In addition to its characteristic species, Allen determined the boundaries of the Arctic by gesturing to the 32° isotherm and the northern limit of the tree line.[400]

400 Joel Asaph Allen, "Article XIV: The Geographical Distribution of North American Mammals," *Bulletin of the American Museum of Natural History,* vol. 4, (1892), 219-220. He based his life-areas on mammals, but said that they also corresponded to birds, plants, insects: "While the divisions of North America, as set forth in the present paper, are presented from the standpoint of mammals, it may be premised that many of them were first

These conditions made the Arctic so unlike any other place on earth that Allen thought it best to not even consider it a region. He deemed the Arctic a "realm," the highest and most undifferentiated rank in a hierarchy of spatial areas representing the order of life.[401] In doing so, Allen overturned a tradition within zoogeography of dividing the globe between the Old and New worlds, or what English biogeographers had called the "Nearctic" and the "Paleoarctic." A single Arctic realm dissolved these hemispheric borders and saw the north as one unified—and very different—place.[402] Following Allen's lead, specialists working on Western Arctic Expeditions routinely commented that their scientific objects helped them extend the ranges of previously identified Arctic species. Rather than limited to one corner of the north, they were actually circumpolar.[403] To these scientists, materials from Western Arctic Expeditions only

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outlined on the basis of birds, and that they have been found equally applicable to reptiles and bratracians, and also in a measure to insects and plants." 203. For much more on Allen's career and contributions to biogeography, see Peter J. Bowler, *Life's Splendid Drama: Evolutionary Biology and the Reconstruction of Life's Ancestry 1860-1940*, (Chicago: The University of Chicago Press, 1996), 376-403.

401 Allen, 206-7. After realm followed region, then province, the sub province (or district), then fauna or flora. "It is thus so homogenous in its ontological characters as not to require subdivision into regions and provinces, though embracing several slightly-marked areas of the rank of faunae." 206. Arctic Realm was one of 7 principal life areas of the world—the others were a north temperate realm, an American tropical realm, an info-african realm; a South American temperate realm, an Australian realm, a Lemurian realm (an 8th often recognized realm was Antarctic realm, a "counterpart of the arctic realm" because of the homogeneity and difference of its species), 206-7

402 Allen, 212. Previous biogeographers had essentially organized the geography of life according to New and Old worlds—in this case "Nearctic" did not refer only to the land above the Arctic circle in North America but everything above the Equator. The same classification system also used the terms "Neotropical" and "Paleotropical." See a footnote in Allen's 1892 paper on 212: "We reject the term 'Nearctic' proposed by Mr. P.L. Sclater, and adopted by Mr. A.R. Wallace, for American north of Central America, for the reason that it seems to us an unnatural and artificial term. The fauna is essentially American north temperate, while the Arctic regions of American and Europe-Asia for ma a realm by itself, of much less importance, it is true, than the north temperature realm..."

403 See the review of the Canadian Arctic Expedition reports, "Book Review, for "Canadian Field Naturalist": Report of the Canadian Arctic Expedition, 1913-1918," 1-10, Rudolph M. Anderson fonds, MG30-40, Volume 10, File 13, LAC. Circumpolarity could be the result of several historical processes, depending on the species under consideration. Some presumed that the retreat of ice during the glacial period created a refugia in the north, an ice-free zone to which some freshwater copepods migrated and then adapted to conditions there. Such a theory suggested that the north was home to more "primitive forms" of life. See C. Dwight Marsh, "Part J: Freshwater Copepods," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VII: Crustacea*, Issued 21 April 1920, 3J. Alternatively, specialists on hydroids suggested that the circumpolar region was the source, rather than the sink, of certain species. Rather than collect species seeking an escape from glaciers, the Arctic was home to species that migrated southward along the coasts of North America, Asia, and Europe. See C. McLean Fraser, "Part I: Hydroids," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VIII: Mollusks, Echinoderms, Coelenterates, Etc.*, Issued 24 August 1922.

solidified an accepted theory of the Arctic as a region that spanned the tops of the eastern and western hemispheres, but that was incongruous with the much of the rest of the globe.[404]

Yet other specialists working on Western Arctic expeditionary collections were eager to refine Allen's conclusions about Arctic life. Many scholars from the United States and Canada found that, contrary to his assertions, the region boasted abundant life, not a dearth of it. "The abundance and variety of the arctic and sub-arctic insect life," wrote Canadian entomologist C. Gordon Hewitt, "will be surprising perhaps to many entomologists." This abundance owed somewhat to the extreme sunlight of the summer months. Hewitt described a "burst of plant and insect life" that took place during the short Arctic summer when "the land is clothed with vegetation and flowers." His scene of Arctic bounty continued by tracing the arrival of "innumerable bumble bees, moths and butterflies and other sun-loving insects" who enjoy a "brief spell of existence" that was afforded by a release from the "gelid land and water."[405] As Hewitt's description implies, specialists noted that the particular forms of abundance in the Arctic stemmed from particular adaptations. This focus on adaptations had been a feature of Allen's work as well. But with more Arctic collections and observations at their fingertips, post-expeditionary biologists were able to gather a more sophisticated view of northern places than Allen had. They saw bumble bees, moths, and butterflies as characteristically Arctic along with polar bears.

Moreover, exploration in other parts of the globe allowed scientists to make connections between the Arctic and other "extreme" environments. Specialists compared Arctic species to those found in the tropics and at the south pole, so as to demonstrate the ways in which fauna made use of their surroundings, despite the particular challenges these environments presented.

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404 This perspective was likely enhanced by the logistics of combining these particular materials with others from across the world.

405 Hewitt, "Introduction," v.

Noting abundant marine life in the Antarctic, one specialist argued for "any difference between Arctic and Antarctic diatoms" to "wholly disappear." He asserted that the abilities of some species to thrive in the north would "impress anyone familiar only with material coming from temperate or tropical waters."[406] Here, the measurement of life was not diversity or luxuriance, but the proliferation of niche species. By focusing on adaptation to harsh conditions, specialists bridged the obvious gaps between the Arctic and the tropics to link studies in a global biogeography.[407] These kinds of conclusions might have reinforced the idea of the Arctic as distinct, but they did so by considering the physical conditions of northern places in a class of similarly extreme regions.

In refining Allen's views of the Arctic, scientists plotted out new geographies in the north. Given a particular biological specimen, the Arctic might stand alone as its own unit or it might be connected to the tropics or the Southern Ocean. These varying spatial orders suggested the changing imperial orders unfolding in these same regions over the early twentieth century. It was easy to see Allen's biogeographical work as casting northern realms as a natural barrier or northern limit to civilization. When Allen wrote of a circumpolar world that should be cleaved from the southern portions of Europe, Asia, and North America, he implied that civilization and empire in the nineteenth century were not welcome or possible in the high north. Allen's representations mirrored those British scientists who thought of the far north as hostile, dangerous, and barren. Canadian and U.S. specialists working on Western Arctic Expeditions three decades later, however, began to see the place as a frontier amenable for political,

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406 Albert Mann, "Part F: Marine Diatoms," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume IV: Botany,* Issued 12 November 1922, 4F. Mann continued: "The species adapted to a life in those frigid waters, with their long winters of night, are indeed few; but the fecundity of those that do grow there probably surpasses anything to be found in temperate or tropical regions."

407 For instance, in detailing mosquito biology, one author wrote, "Many stories are current about the extraordinary abundance of mosquitoes in the Arctic regions, rivaling the tropics in this respect." Harrison G. Dyar, "Part C: Mosquitoes," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Issued 14 July 1919, 31C.

economic, and intellectual development. This frontier was richer and more heterogeneous than previous scientists had believed. It could be better understood and managed because of the collections streaming into metropolitan centers from far-off places all over the continent. Rather than dangerous, or even endangered, the biotic Arctic appeared an unsettled place, where human life was overshadowed by animal and plant life, and knowledge claims about the region had yet to be fixed.

These linkages between imperial expansion and the science of biogeography percolated through one of the major issues highlighted by biological specialists: that the U.S. had comparatively little Arctic territory relative to Canada. Clinton Hart Merriam, student of J.A. Allen and one time Chief of the Division of Economic Ornithology for the U.S. Department of Agriculture, had noticed this in his development of the "life zone" concept. Over the end of the nineteenth century, Merriam categorized biomes of North America according to latitudinal and altitudinal sequences from the Equator to the North Pole. He produced lists of regionally-specific plant and animal species in hopes of facilitating economic development in the United States. Equipped with such geographically-oriented catalogues of species, bureaucrats—especially those interested in crop and livestock production—could customize the development of a variety of territories based on their distinctive attributes.[408]

In looking north, Merriam sought to reposition the Arctic, reigning in the region that Allen had allowed to drift away, alone in polar seas. Given the abundance of new knowledge of

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408 See Rexford F. Daubenmire, "Merriam's Life Zones of North America," *The Quarterly Review of Biology*, Vol. 13, No. 3 (Sep., 1938), pp. 327-332.; and Keir B. Sterling, "Selected Works of Clinton Hart Merriam," in *Natural Sciences in America*, edited by Keir B. Sterling, (New York: Arno Press, 1974). Sterling notes that the "number of known species of North American mammals had increased fourfold by 1900, a development for which Merriam was largely responsible." Daubenmire argues that Merriam's ambitious project of mapping the continent reflected not only the mutual relationship between biology and geography around the twentieth century, but also the irruption of American empire in the 1890s. Merriam's scholarship was enriched by, and helped enrich in turn, the settlement and development of agriculture in the American West and U.S. interventions elsewhere on the continent, like the Panama Canal and the Caribbean.

biotic and abiotic factors—produced by explorers and scientists heading to Alaska, northern Canada, and Greenland—Merriam saw a "boreal zone" that comprised much of northern North America. He partitioned this life zone into three sub-divisions. The Canadian and Hudsonian areas, characterized by abundant spruce and fir stands, defined much of the Canadian north and Alaskan interior. Above these biological provinces, forming a ribbon along the Arctic ocean no more than a hundred miles wide, was a third biological province, dubbed Arctic-Alpine. Here, at the edge of the continent (and the tops of its highest peaks), lichens and grasses dominated a mostly tree-less terrain. With these terms, Merriam acknowledged important economic and environmental conditions in northern North America. The Arctic-Alpine zone in Alaska was not only "far too cold for agriculture," it also had more in common with Canada—in terms of plants and animals—than it did the rest of the U.S. After all, Canada was contiguous with its Arctic territories and Alaska was an overseas American colony.[409]

But simply because the Arctic-Alpine life zone was non-arable did not mean it was worthless. Indeed, Rudolph Martin Anderson, the editor of the series of Canadian Arctic Expedition reports, argued for the development of the far north *because* of its biogeography. Anderson likely had the most encompassing view of flora and fauna of the Western Arctic.[410] In his two expeditions and seven years in the north, he covered "nearly all" of the Western Arctic.[411] He also was motivated to find a practical application for the extensive government investments

409 C. Hart Merriam, *Life Zones and Crop Zones of the United States*, Bulletin 10, U.S. Department of Agriculture, Washington, 1898, 19.

410 Anderson did not publish his own report on the mammals of the Western Arctic, attributing this to the weight of his other duties as editor and coordinator, as well as his service on wildlife protection boards. We do know that Anderson maintained a keen interest in mapping out the life of the Arctic however, as he submitted reviews of publications in Arctic biogeography to the *Canadian Field Naturalist* and *The Auk* throughout the 1920s. See Rudolph M. Anderson Fonds, MG30-40, Volume 18, Files 5 ("Reviews printed in Canadian *Field Naturalist*) and 8, LAC.

411 Anderson's references to his fieldwork might have been the platform upon which he felt able to criticize Merriam's work. Merriam often decided upon life zones after creating long lists of the flora and fauna across the continent and considering the presence or absence of certain species, which he correlated to temperature and humidity. Yet, he faced much criticism for this approach in the early twentieth century as he did little fieldwork to confirm his findings. See Daubenmire, 330-332.

in biological surveys. Anderson admitted to colleagues at the Victoria Memorial Museum that geological lines of research were more readily applicable to economic means than their biological equivalents, but this did not mean that biological surveys were useless.[412] In an article in *The Canadian Field-Naturalist,* Anderson followed the lead of US biologists in quantifying the value of biogeography in terms of accounting for sources of food and fur, as well as predators, pests, and diseases.[413] If northern landscapes had fur-bearing animals or those that contributed to the nation's food supply, those landscapes were valuable—regardless of whether they were suitable for crop production.

In a paper read before the Biological Society of Washington in 1919, Anderson promoted the value of the Arctic by offering a tentative reinterpretation of the region's life zones. He noted that Merriam's method of organizing plant and animal life—the isotherm, or the line on the map that connected locations with the same average temperature—was unreliable. This was a direct challenge to US scientific authority, as were the implications of Anderson's own take on geographic distribution of northern plant and animal life. Anderson also claimed that "tongues" of the Hudsonian zone stretched far above the Arctic circle.[414] This was not a trivial point: the Hudsonian zone was a Canadian phenomenon; it did not appear in the United States. In addition, the Hudsonian zone was typified by a variety of fur-bearing animals and at least three different species of trees (spruces and firs) that did not exist on the windswept tundra. Timber and fur were useful resources for northern development and those considered "staples" in the Canadian

412 Rudolph Anderson jotted down this admission on a note card, found in Rudolph Martin Anderson fonds, MG 30 40, Vol 14, File 20 ("National Museum Activities,") LAC. There was no date on the note card. The document is a rare look into the everyday life at the museum, where Anderson likely passed many colleagues in the hall and had many conversations about science and development in the Canadian north.

413 Rudolph Martin Anderson, "Field Studies of the Life Histories of Canadian Mammals," *The Canadian Field-Naturalist,* vol. 33, 86-89.

414 Rudolph Martin Anderson, "Recent zoological explorations in the western Arctic," (communicated by M.W. Lyon, Jr) a paper read before the Biological Society of Washington, 5 April 1919, reprinted in *Journal of the Washington Academy of Sciences,* Vol IX, (1919): 312-315.

economy.[415]

After visiting the eastern Arctic in 1928 with the Canadian government, Anderson was prepared to offer more solid conclusions about Arctic biogeography. He titled a 1929 lecture "Canada's Arctic Regions," signaling to the audience that his scientific research about Arctic biogeography had allowed the country to lay claim to the far off place. Echoing Stefansson, Anderson urged his listeners to dispense with the notion that the Arctic Circle was a natural boundary encasing a frozen land. Such ideas, he said, did not correspond to what scientists now knew of the place. In building from but ultimately fine-tuning Merriam's work, he explained to his audience the details of the life zones and Canada's future in developing northern natural resources. He noted that the raw fur production of the Northwest Territories in 1926 was valued at 1.5 million dollars, or one tenth of the fur economy of the country. He also highlighted the prospects for copper development in the Coronation Gulf, prospects that had been mapped and described by members of the Canadian Arctic Expedition. Finally, he showed optimism for the introduction of reindeer to the Western Arctic, a scheme taken up by Canada's Department of Interior in 1926. Reindeer were a foreign species that could replace the caribou that had been reduced to near extinction by the US whaling industry over the turn of the twentieth century. The semi-domesticated animals could also transform the abundant lichens and grasses of the otherwise useless Arctic-Alpine zone into food for both local and national markets.[416]

In working up their results, biologists, botanists, and entomologists connected collections of Western Arctic species with those found in many other locations. Arctic life was understood

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415 The "staple thesis"—that Canada's politics, culture, and economy has been shaped by the exploitation of fur, fish, wood, wheat, metals, and fossil fuels—was developed by political economist Harold Innis at about the same time that Anderson was giving his lecture. For a review of his work, see W.T. Easterbrook and M.H Watkins, M.H. "Introduction", and "Part 1: The Staple Approach" in *Approaches to Canadian Economic History* (Ottawa: Carleton University Press, 1984).

416 Anderson's 1929 lecture "Canada's Arctic Regions," was found in Rudolph M. Anderson Fonds, MG30-40, Vol. 24, File 2: Lecture Notes, 1923, 1929, n.d." LAC. See also "Zoological Work in the Arctic Regions," in *Natural Regions of Canada, Oct 1928*, vol. 7, no 10, Department of Interior, found in RG 45, Vol 67, File 4079, LAC.

not on its own, but through relational practices of comparison and juxtaposition with many other landscapes—the tops of mountains, similarly extreme environments, and high latitudes regions in Greenland, Europe, and Asia. In reading these landscapes and attempting to order them, scientists organized the Western Arctic according to new scientific standards and new applications of power.

Reordering the Cultural Arctic: Positioning Anthropologists between Inuit Pasts and Northern Futures

Like biologists, geographers, and geologists, anthropologists organized their understanding of human nature by combining collections from the Western Arctic with others from across the circumpolar region. As one historian has noted, the early twentieth century witnessed anthropologists documenting not just series of tools or dwellings, but the "common histories and cultural responses to specific ecological regional demands." Developing new methodological approaches to arranging material culture, museum-based anthropologists isolated shared geographical and cultural elements in native North America so as to track changes in societies over space and time. Emphasizing the presence of "lower" forms and their gradual replacement by higher, more advanced societies had purchase in a broader Social Darwinist ideology of conquest and progress that marked science and politics in the early twentieth century.[417] Arctic science and scientists were crucial actors in this project of understanding native pasts in the New World—and what these histories might imply for the future of New World empire.

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417 Peter J. Bowler, "The Geography of Extinction: Biogeography and the Expulsion of 'Ape Men' from Human Ancestry in the Early Twentieth Century," in *Ape, Man, ApeMan: Changing Views since 1600,* Evaluative Proceedings of the Symposium *Ape, Man, Apeman: Changing Views since 1600,* Leiden, the Netherlands, 28 June-1 July, 1993, edited by Raymond Corbey and Bert Theunissen, 185-192. There were clear parallels here between anthropology, or more specifically, archaeology, and paleontology.

As many historians of anthropology have shown, disciplinary approaches to culture were evolving rapidly in the early twentieth century. Influential anthropologists, like Franz Boas, helped demonstrate new practices for field research, new concepts for understanding exotic peoples—like the term "culture"—and also new methods for analyzing artifact collections.[418] These changes responded not only to the avalanche of materials flowing into American and Canadian museums from exploits in Africa, South America, the Pacific, and the Arctic, but also from a desire to improve upon anthropological traditions in understanding the human relationship with nature. Against methodologies based on typologies of language or anatomy, anthropologists asserted a "culture area" analysis. This approach, through a three-step process, allowed anthropologists to substitute a spatially distributed set of specimens for a pattern of historical change in a given territory.

First, anthropologists identified a suite of tribal groups that shared similar traits and a regional environment. For instance, the Great Plains of the American West was a recognizable physical landscape that could be differentiated from regions that bordered it and whose human communities all employed the horse as a tool in everyday life. Second, traits within this zone of habitation, or "culture-area," were aged by their geographic extent: the more widely spread a given trait, the older it was assumed to be. Third, scholars identified "culture centers" within a culture area based on the most concentrated location of a number of traits, called trait complexes. Scholars referred to these culture centers as the "typical" forms of culture, but disagreed whether these forms indicated the most historic form within the culture area or simply the geographical

418 For changes in anthropology in the early 1900s and their connection to Franz Boas, see George Stocking, "Ideas and Institutions in American Anthropology: Thoughts Toward a History of the Interwar Years," in *The Ethnographer's Magic and Other Essays in the History of Anthropology*, ed. George Stocking (Madison: University of Wisconsin Press, 1992), 134-5.; and George W. Stocking, Jr., "Anthropology as *Kulturkampf:* Science and Politics in the Career of Franz Boas," in *The Ethnographer's Magic and Other Essays in the History of Anthropology*, ed. George Stocking (Madison: University of Wisconsin Press, 1992), 99. See also Curtis Hinsley, *Savages and Scientists : The Smithsonian Institution and the Development of American Anthropology*, 1846-1910, (Washington D.C.: Smithsonian Institution Press, 1981), 97-105.

location that fostered the best expression of that culture's traits. Harkening biologists who infused their study of flora and fauna with the language of empire, anthropologists often imagined culture centers invading or being invaded by "marginal" groups, both of which could be weakened by the diffusion of new technologies.[419] While the notion of the culture area emerged across anthropological and archaeological communities in the 1890s and 1900s, its development is often credited to the collaboration of Franz Boas with his assistant at the American Museum of Natural History, Clark Wissler.[420]

Like geologists did with geological provinces and zoologists did with life zones, anthropologists re-calibrated the map of native North America. Wissler identified nine culture areas from the Equator to the North Pole. He noted that such organization was needed because "the number of social groups in the New World is so large that no one can hope to hold in mind more than a small portion of them."[421] In addition, a comparative analysis made up for shortcomings in field anthropology: if materials were missing, this could be a function of either poor collecting practices or a genuine absence of a particular item in a material culture. For Wissler then, classification and comparison assisted comprehension, facilitating the skillful and careful analysis of the history and development of social units. He likened the museum to a laboratory, where the administration and structuring of material objects would allow anthropologists to apply "experimental and scientific methods in as precise and definite a form as

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419 Clark Wissler, "Material Cultures of the North American Indians," *American Anthropologist,* Vol. 16, no. 3 (Jul-Sep. 1914), 469-479.

420 Carter A. Woods, "A Criticism of Wissler's North American Culture Areas," *American Anthropologist* 36, no. 4 (October to December, 1934), 517-523. On the reception to Wissler's culture-area approach in general, see Frank A. Salamone, "Wissler, Clark," http://www.anb.org/articles/14/14-00712.html; American National Biography online, (accessed December 4, 2009).; George Peter Murdock, "Clark Wissler, 1870-1947," *American Anthropologist* 50, no.2 (1948): 292-304. A.L. Kroeber, another student of Franz Boas, also worked on the culture area concept in the 1920s. See Thomas Buckley, "Kroeber's Theory of Culture Areas and the Ethnology of Northwestern California," *Anthropological Quarterly,* Vol. 62. No 1 (January, 1989), 15-26.

421 Clark Wissler, *The American Indian: An Introduction to the Anthropology of the New World,* (New York: McMurtrie, 1917), 204.

the various morphological sciences."[422]

When understood in relation to what we have already seen in geography, geology, and biology, Wissler's testimony helps us isolate research themes that cut across the disciplines in the 1920s. Scientists held a deep fascination with place, especially the environmental and historical conditions that constrained human, plant, and animal relationships in space and time. Such a fascination was not simply the result of a progressive accumulation of facts and materials. We have already seen that Western Arctic Expedition materials encouraged specialists to challenge disciplinary norms and create new scientific paradigms. The scientific gaze of specialists, one fixed on interrelations of space, environment, and time, was made possible in 1920s, as expeditionary scientists returned home, faced a world reeling from the Great War, lodged their collections in institutions (or maybe added them to the pile), confronted changing expectations for their work, and sought to assist the intensive development of North American imperial spaces. Thinking about these phenomena as post-expeditionary science, and drawing the linkages among scientific representations and interventions, helps us see the connections between geological provinces, life zones, and culture areas—and the forms of statecraft with which they were co-produced.[423]

Peering into North America, Wissler noted the Arctic's unique human life, designating all of Arctic North America as the "Eskimo Area." He described several striking similarities across Inuit communities from Alaska to Greenland, including the kayak, the lamp, the harpoon, and

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422 Wissler, "Material Culture of the North American Indians," 502.

423 Other scholars have brought forth and analyzed the themes cutting across various nascent disciplines like anthropology, geography, and physiology. See Michael Bravo, "Measuring Danes and Eskimos," in *Narrating the Arctic: a cultural history of Nordic scientific practices*, ed. by Michael Bravo and Sverker Sörlin, (Canton, MA: Science History Publications, 2002), 235-73. Bravo's work features Danish anthropogeographer Hans Peder Steensby, whose approaches to analyzing Inuit cultures inspired and shaped Clark Wissler's work on the "Eskimo Area" throughout the 1910s and 1920s. See Clark Wissler, "Review of *An Anthropological Study of the Origin of Eskimo Culture* by H.P. Steensby," *American Anthropologist* 20, no.2 (1918): 213-215; and Clark Wissler, "Arctic Geography and Eskimo Culture: A Review of Steensby's Work," *Geographical Review* 9, no.2 (1920): 125-38.

snow goggles, which reflected common activities of camping on sea ice, hunting seal in winter, and hunting land mammals in summer.[424] For anthropologists in the early 1900s, the "Eskimo Area" held immense possibilities for the so-called "science of man." Like Allen and other biogeographers, anthropogeographers were astonished at the Inuit's "apparent immunity to extreme cold" and the ability to survive in an environment "where only a few highly specialized plants and animals make their home."[425] As the "Eskimo Area" spanned the Bering Strait, the bridge between the Old and New Worlds, it offered a rich opportunity for studying the origins of human life in North America. Inuit artifacts from the Coronation Gulf—where both expeditionary scientists Vilhjalmur Stefansson and Diamond Jenness concentrated their fieldwork—were especially prized. In the early 1900s, leading theorists from the United States and Greenland pinpointed this region as manifesting the most "typical" form of Inuit culture still existing on earth. For Ales Hrdlicka, one of America's leading physical anthropologists, and Franz Boas, the Inuit of the Coronation Gulf constituted the nucleus of the culture area, as they were a "pure" race whose neighbors in Alaska and Greenland had "mixed" with others.[426] In contrast, Danish scholars believed that Inuit culture originated in the Bering Sea. Investigations of Coronation Gulf material culture, then, would allow anthropologists to entertain the question of whether this typical form was a "marginal form" of an original Inuit culture focused elsewhere or an as-yet uncontaminated culture center.[427]

These disciplinary questions aside, other factors collided to foster the culture area

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424 See Clark Wissler, "Arctic Geography and Eskimo Culture: A Review of Steensby's Work," *American Anthropologist* 9, no. 2 (February 1920), 125-138.

425 Ibid, 125.

426 Ales Hrdlicka, "Contribution to the Anthropology of Central and Smith Sound Eskimo," *The Anthropological Papers of the American Museum of Natural History* 5, part 2, (1910): 179. Anthropological interest in Inuit because of uniformity over range dates back to the 1880s with John Murdoch and others. See John Murdoch, "On the Siberian Origin of Some Customs of the Western Eskimos," *American Anthropologist* 1, no.4, (October, 1888): 325-336. Also see Clark Wissler, *The American Indian: An Introduction to the Anthropology of the New World*, (New York: McMurtrie, 1917), 333-334.

427 See Clark Wissler, "Arctic Geography and Eskimo Culture: A Review of Steensby's Work," 127.

analysis as a means of imposing order upon the cultural Arctic in the early 1900s. Permafrost thawed and froze throughout an Arctic year, exposing objects lodged in it to alternating warm and cool air. Before the era of carbon dating, eroded artifacts concealed their own age, thus leaving their geographic location as a clue to their historical analysis.[428] In addition, Western Arctic Expeditions had returned with incredible loads of specimens, encouraging Clark Wissler to declare the American Museum of Natural History as home to "exceptional facilities for comparative studies," which afforded "an Arctic archaeological series not paralleled anywhere." These features—a plethora of materials from a relatively intact culture presumed to have only recent influence by civilization, which itself was contained within a geographic region—made Inuit of the Western Arctic and the American Museum partners in the explication of the culture area concept.[429]

Among the items in his Western Arctic collection, Wissler zeroed in on pottery shards, harpoons, and darts. At the time, Arctic scholars believed pottery to be a trait restricted to Inuit in Alaska. Indeed, in letters from the field in 1910 and 1911, Stefansson observed that these shards were similar to previous descriptions given by Murdoch for the Barrow region and Boas' account of Southampton Island. Stefansson suggested to Wissler that commerce along the Arctic coast in prehistoric times must have been more active than previously thought.[430] Wissler was ecstatic to receive this news and these collections. With some hesitation, he admitted to readers of the American Museum's *Annual Report* that this pottery suggested a link among Inuit tribes across North America, in part validating his "Eskimo Area." He spent the next several years developing

428 On the relationship between soil/permafrost conditions and dating archaeological artifacts, see Clark Wissler's reflections in *The Forty-Fourth Annual Report of the American Museum of Natural History*, (New York: Irving Press, 1913), 69 and 195.

429 Quotation from Clark Wissler, "Archaeology of the Polar Eskimo," *Anthropological Papers of the American Museum of Natural History* 22, part 3 (1918): 110.

430 Vilhjalmur Stefansson to Clark Wissler, July 20, 1911, PSC. Stefansson mentions checking his "notes" on Murdoch and Boas to verify his tentative conclusions, which suggests that he either carried Murdoch and Boas' work with him or had committed it to memory.

this theory, relying on Stefansson's collections and a series of publications from Danish ethnologists translated into English in the 1910s and 1920s. Tracing the slow disappearance of nets, piercings, and pipes in the collections as they were arrayed from west to east, he deduced that pottery, discovered across all locations, must have been an older trait. Given his culture area theory, pottery thus became a marker of "typical" northern human cultures. [431]

Collections from Western Arctic Expeditions continued to inform Wissler's elucidation of the "Eskimo Area" and accepted anthropological knowledge about Inuit peoples.[432] Wissler's interest in Arctic history continued through the 1920s, as he correlated Stefansson's collections with those from expeditions to Greenland by Danish scholars and Jenness's work on the Canadian Arctic Expedition.[433] He looked to western Alaska as a zone of influence, impinging upon the virgin territory of the eastern portions of the Western Arctic. In comparing harpoons and darts from Stefansson's collection with those analyzed by other Arctic scholars, Wissler noted that a particular screw-joint used in these weapons was of recent origin, emerging first in Alaska and then moving eastward across North America. Wissler drew his authority on the subject from

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431 On Stefansson's discovery of pottery, see Ibid. On Wissler's tentative conclusions, see *The Forty-Fourth Annual Report of the American Museum of Natural History*, (New York: Irving Press, 1913), 69 and 195. On Wissler's excitement over learning of the initial dig, see *The Forty-Third Annual Report of the American Museum of Natural History*, (New York: Irving Press, 1912), 62. For Wissler's report on the Stefansson Collection, see Clark Wissler, "Harpoons and Darts in the Stefansson Collection," *The Anthropological Papers of the American Museum of Natural History* 14, part 2, [1916]: 397-475. Also see Vilhjalmur Stefansson and Clark Wissler, "The Stefánsson-Anderson Arctic Expedition of the American Museum: Preliminary Ethnological Report," *The Anthropological Papers of the American Museum of Natural History* 14, part 1 (1914): 454-457.

432 Clark Wissler, *An Introduction to Social Anthropology*, (New York: Henry Holt and Company, 1929). See chapters on technology, archeology, and culture areas. This book, and Wissler's culture-area, have been referenced by anthropologists in explaining several broad trends within the discipline, such as the tendency to fuse cultural and geographical reference (as in "Bantu-speaking Africa") and the emergence of "area studies" programs in the United States.

433 On Wissler's work on the Eskimo culture area, see Clark Wissler, "Review of *the Ammassalik Eskimo: Contributions to the Ethnology of the East Greenland Natives* by William Thalbitzer," *American Anthropologist* 18, no. 1 (1916): 115-117; Clark Wissler, "Archaeology of the Polar Eskimo," *Anthropological Papers of the American Museum of Natural History* 22, part 3 (1918): 103-65; Clark Wissler, "Review of *An Anthropological Study of the Origin of Eskimo Culture* by H.P. Steensby," *American Anthropologist* 20, no.2 (1918): 213-215; Clark Wissler, "Review of *Implements and Artifacts of the North-East Greenlanders: Finds from Graves and Settlements* by Thomas Thomsen," *American Anthropologist* 20, no.2 (1918): 215-16; Clark Wissler, "Arctic Geography and Eskimo Culture: A Review of Steensby's Work," *Geographical Review* 9, no.2 (1920): 125-38.; Clark Wissler, "Ethnology of the Copper Eskimo," *Geographical Review* 12, no. 3 (1922): 506-7.

the expeditionary collection, calling it "the most extensive collection of Eskimo archaeology yet reported."[434]

Wissler's work on the "Eskimo Area" was not only a contribution to scientific theories of cultures and their distributions. It was also a means by which to orient Euro-Americans as a superior culture on earth. Outside his office, Wissler applied his culture area approach to the organization of the American Museum's exhibitions.[435] Where halls in the late 1800s displayed artifacts from many different regions, by the 1920s, the Museum dedicated separate galleries to the various culture complexes Wissler used to categorize North American native peoples. "Eskimo Hall" was but one of many intricately designed display spaces that matched anthropological ordering of nature and culture—the Museum also presented "African Hall," and the "Hall of the Plains Indians," Wissler's primary culture area of interest.[436] In addition to his written work on the movement of Inuit material culture, Wissler's work with museum displays was designed to help order and stabilize a certain image of native northerners. As confined to and defined by a challenging, remote environment, Inuit were a barometer, a scientific object with which to measure the human relationship with nature and track the courses of history, progress, conquest, and civilization.

In his writings, Diamond Jenness echoed Wissler's stage-management of Inuit life. Jenness explained to readers that he had concentrated his efforts in the field on documenting the material culture of central Arctic Inuit for a specific purpose: he had realized local people were

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434 Clark Wissler, "Harpoons and Darts in the Stefansson Collection," 442.

435 As the American Museum of Natural History's website suggests, "...professional ethnographic reports of tribal cultures were needed both as an empirical base for the construction of theory and for the preparation of accurate and informative exhibitions. Artifacts and information were combined in exhibitions which grew apace with the collections." See American Museum of Natural History, Division of Anthropology, "North American Ethnographic Collection," http://research.amnh.org/anthropology/database/nae_sub, (accessed 25 July 2012).

436 Ibid. On African Hall and its links to colonial ideologies and sciences, see Donna Haraway, *Primate Visions: Gender, Race, and Nature in the World of Modern Science.* (New York: Routledge, 1989), 27-57.

undergoing a swift change due to the influence of whites.[437] He openly worried about Inuit becoming "slaves" to an economic machine in the south, which might result in their hardy, primitive ways being destroyed by intermingling with others.[438] Like prominent Inuit anthropologist Knud Rasmussen, Jenness advocated quarantines for Inuit in Canada, which he hoped would keep them protected from the fur trade. [439] He realized that his science was implicated in the juggernaut of civilization and grew concerned that his time spent in the north might have contributed to the changes he hoped to stem. In the final line of his 1928 book, *The People of the Twilight,* Jenness left his readers to meditate on a question that had obviously haunted him since the Canadian Arctic Expedition. "Were we harbingers of a brighter dawn," he wondered, "or only the messengers of ill-omen, portending disaster?"[440] Jenness spent the rest of his career as state anthropologist understanding and managing what he called a rare living example of a "transition" of a people from "stone age" to "iron age," placing himself as the mediator between tradition and modernity.[441]

In seeking to analyze Inuit pasts, anthropologists positioned themselves as arbiters over both past and present. Their control of expeditionary materials provided them an authority over historical origins, movements, and traditions, as well as current life-ways and encounters with civilization. By gesturing to changes over time and space, especially those changes that presented threats to Inuit, anthropologists construed themselves, their objects, and their

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437 See Diamond Jenness, "The Cultural Transformation of the Copper Eskimo," *Geographical Review,* Vol. 11, no. 4 (October, 1921), 541-550.

438 Diamond Jenness, "The Copper Eskimos," *The Geographical Review,* Vol. 4, no 2, (1917), 81-91.

439 Jenness, "The Cultural Transformation of the Copper Eskimo," 550.

440 Jenness, *The People of the Twilight,* 247.

441 Diamond Jenness, "Origins of Copper Eskimos and their Copper Culture" *Geographical Review,* vol. 13, no 4, 540-551, 1923; and Diamond Jenness, "The Ethnological Results of the Canadian Arctic Expedition, 1913-1916," *American Anthropologist,* Vol. 18, No. 4 (Oct.-Dec. 1916,) 612-620. For a deeper treatment of the roles of anthropologist in deciding what is "authentic" and the consequences for administration, see Paige Raibmon, *Authentic Indians: Episodes of Encounter from the Late-Nineteenth Century Northwest Coast,*(Durham: Duke University Press, 2005), 1-14.

expeditions as sources of objectivity for understanding historic Inuit culture, the relationship between people and the Arctic environment, and the ills of modern life. Anthropologists pitted themselves at a turning point in Arctic history, articulating a particular historical moment—the coming of civilization—so as to be gatekeepers over both the past and the future. Relegating Inuit agency to a now banished past, they considered themselves spokes-people for what was considered authentic and how Inuit should be treated, whether as scientific or political objects.

This was no more visible than on the pages of *The Geographic Journal* in 1921. Invited to review an article on specimens collected in the north, Diamond Jenness solidified his place as master of Inuit culture by calling the article and the artifacts inauthentic. He noted that the copper goods described were not fashioned by a traditional Inuit family, to be used for weapons and cooking utensils. Rather, they were manufactured for sale and were thus products of a group that had lost its culture in the face of civilization.[442] It seemed only an anthropologist with a deep knowledge of Inuit pasts could determine what was genuinely Inuit and what wasn't, what was appropriate behavior for native northerners and what was corruption. Only someone like Diamond Jenness—who went on to consult on Canada's experiment with reindeer herding in the Arctic—could convince the government that the best way to protect the Inuit from the coming specter of civilization was to engage fully in their cultural and economic development.

Conclusion: Arranging the Arctic, Developing the Arctic

We began this chapter following civil servants through the Victoria Memorial Museum on

442 Diamond Jenness, "Note on Cadzow's "Native Copper Objects of the Copper Eskimo"" *American Anthropologist*, New Series, Vol. 23, No. 2 (Apr. - Jun., 1921), 235-236. Jenness took issue with many of the specimens that Cadzow, a Museum of the American Indian anthropologist, obtained in 1919 on the Mackenzie River and later described in a 1920 paper. But, Jenness did say that there were a few genuine artifacts among Cadzow's collection, a status he could guarantee by referring to the existing scientific record: " The remaining specimens seem not to differ from the genuinely old types scattered in different museums throughout America." 236.

a night dedicated to the national natural resources of Canada. Returning to that scene in 1927, we see more clearly the interrelations of science and empire present in the people, museum displays, and the institution that housed them both. In 1918, the results of Western Arctic expeditions were still latent, contained in the boxes and diaries stuffed with collections and observations, themselves spread between Ottawa, New York City, and Washington, D.C. By the late 1920s, the potential for these materials to inform knowledge and management of the Arctic had been realized—through a complex arrangement of official reports, journal articles, travel narratives, lectures, or, in this case, museum exhibits. More importantly, as at the Victoria Memorial Museum, one could move seamlessly between these vignettes to create a far-reaching perspective of the Western Arctic.

Thinking of museums as "centers of calculation" and the knowledge-making process as a "cycle of accumulation" impoverishes our view of the histories of science and empire—and how they mattered to each other in the Arctic. Following the chain of activities involved in post-expeditionary science, however, helps us appreciate several phenomena of the post-war period: the disciplinary and multi-disciplinary character of Arctic science; the large, dispersed network of practitioners necessary to process expeditionary materials; and the new impositions of order emerging from political and intellectual interest in the north after the Great War. Like expeditions, post-expeditionary science had important legacies. Governmental agencies in the U.S. and Canada justified the expenses of expeditions by promoting their material results. Circulating reports to scientific institutions around the world was one means of convincing scientific and political audiences that the region had been effectively surveyed, rendering further expeditions unnecessary. It is no coincidence that the two decades following expeditions witnessed far less scientific travel than did the first two decades of the twentieth century. Even

when scientists did go north in the 1920s and 1930s, they often used Western Arctic Expeditions as a frame for their research—either directing their studies to questions raised by expeditionary scientists, specialists, and assistants; or carrying with them copies of reports to guide their movements in the north. In successfully reordering the Arctic, Western Arctic Expeditions lived on long after their completion.

Scientists and politicians hailed the results of post-expeditionary science as groundbreaking. Aldolphus Greeley, the renowned American polar explorer, called the Canadian Arctic Expedition volumes the "most valuable scientific contributions relative to Polar Canada ever published."[443] In the *Canadian Field Naturalist*, one reviewer who surveyed the reports of the Canadian Arctic Expedition suggested they were a systematic synthesis of Arctic flora and fauna on the order of Sir William Jackson Hooker's epic "Fauna Boreali-Americana", published in 1840.[444] Alfred Hulse Brooks, the director of the US Geological Survey, referred to Ernest de Koven Leffingwell's 1919 *Canning River Report* as filling in what was a "complete hiatus in the scientific knowledge of Alaska."[445]

Beyond these proclamations, the everyday work of scientists in the 1920s and 1930s paid homage to the legacies of post-expeditionary science. In 1930, US geologists published a review of nearly a decade's worth of investigations in northern Alaska. They regarded Rudolph Anderson's work on birds and insects as so exhaustive they considered it impossible to add any new knowledge on these subjects in their own report.[446] When botanist Alf Erling Porsild was dispatched to the Western Arctic in 1926 to study lichens in northern Alaska and the Mackenzie

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443 A.W. Greeley, *The Polar Regions in the Twentieth Century: Their Discovery and Industrial Evolution* (Boston: Little, Brown, and Company, 1928), 73.

444 "Report of the Canadian Arctic Expedition, 1913-1918," found in Rudolph M. Anderson fonds, MG30-40, Volume 10, File 13, LAC. The review may have been written by R.M. Anderson himself. A search of the *Canadian Field Naturalist* archives shows no publication of this name in the 1920s.

445 Leffingwell, *The Canning River Region*, 9.

446 Smith and Mertie, Jr., 91-2.

Delta, he brought only four books with him, one being Stefansson's report of the 1908-1912 expedition, *My Life with the Eskimo,* and another a copy of Leffingwell's *The Canning River Region.* Porsild so trusted Stefansson and Leffingwell's accounts of Arctic geography, Inuit language, and methods of survival in the north that he used them as his guides for more than a year of Arctic travel and research.[447] Especially as Porsild was an agent of the Canadian state charged with building an experimental reindeer herding program in the Western Arctic, this form of recognition confirms the enduring view of northern nature and culture provided by expeditionary scientists, their collections, the community of practitioners involved in post-expeditionary science, and the publications that stemmed from them.

Moving from sorting objects to reordering Arctic knowledge meant setting expeditionary materials in much larger picture of North America. Specialists in geology, geography, biology, and anthropology looked to the Western Arctic to forward a broad project of understanding the spatial dimensions of life on the continent. This project held power because it rescued the Arctic from its status as unsettled. Scientists in North America could now explain the processes that gave rise to Arctic geological, biological, and cultural life, which assured their credibility and also transformed the far north into another possible resource district. No scientist in the 1920s would argue against the notion that the Arctic's land, geologic history, flora, fauna, and cultures were unique—but such a characterization, in principle, did not make the north any different than the Great Plains. In redefining Arctic through geological provinces, life zones, and culture areas, scientists declared that the far north operated according to a set of scientific truths that guided the trajectories of nature and culture everywhere.

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447 A.E. Porsild, "Field Journal of an Expedition through Alaska Yukon and the Mackenzie District being a botanical reconnaissance with special reference to the suitability of the country for domesticated reindeer. Also many notes on the physiography of the country, its inhabitants, wild life and general economic conditions, 1926-1928" Alf Erling Porsild Fonds, R5495-0-7-E, M-1958, LAC.

In holding this power, scientists also held the keys to natural resource development. There was no need to waste time planting corn in the Western Arctic or searching extensively for gold there. Rather, scientists claimed, governments and private industries could rationalize their approach to northern development by capitalizing upon the region's distinctive assets. Bureaucrats and researchers took the initial steps in enclosing mineral deposits, articulating the economic value of the Arctic-Alpine zone, and becoming arbiters of Inuit life in the 1920s. By 1959, however, they had extended every effort toward the Arctic's comprehensive development.

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To Tame the Wild Arctic:

Ecology, Reindeer, and the Experimental State of Nature, 1919-1944

> "Like a black mass of some fluid the herd slowly approached the edge of the plateau—began to flow down first slowly—a few deer at a time but soon gathering impetus and speed and ending in a wild rush...It was a grand sight that I will never forget...The drive is on its way to Canada."
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> *Alf Erling Porsild, 1929* [448]

One was a Danish botanist raised in Greenland. The other was an American plant ecologist trained on the sheep lands of Utah. For two men with such different backgrounds, Alf Erling Porsild and Lawrence Palmer shared a common purpose: they helped transform the Western Arctic into reindeer country.

They met on the depot in Anchorage in July of 1926. Porsild had been sent by the Canadian Department of Interior to learn about Palmer's work with the U.S. Bureau of Biological Survey. Palmer had spent the last seven years studying the territory's vegetation and teaming with the Lomen Company of Nome, Alaska to build an expansive reindeer industry. The biologists' destination that summer day was not one of the many thriving herds on the Seward Peninsula or along the Beaufort Sea coast, or any of the Inuit villages or Lomen facilities where Porsild might observe herds, corrals, castrating equipment, or branding tools. Rather, they were headed for Fairbanks, for Palmer's field station and experimental farm, so that the Canadian

448 A.E. Porsild, "Trip to Alaska to Select Reindeer to be Purchase for Delivery to the Mackenzie Delta, NWT, Autumn and Winter, 1929-1930. Daily Journal of A.E. Porsild," 39, Alf Erling Porsild Fonds, Microfilm reel M-1958, LAC.

representative could see the real foundation of the reindeer system.

As they toured the grounds, Palmer showed off his network of quadrats and the reindeer that were being crossbred with caribou to create a more perfect grazing animal. Here, in the enclosures of lichens and domesticated species, sat the makings of science and state power in the interwar north. These spaces allowed Palmer and Porsild to generate new knowledge of plants, animals, and their relationships, and then apply it throughout the Western Arctic. It must have been difficult for Porsild to determine what was most impressive about his visit—the fact that a foreign species now covered most of Alaska's coastline; that Inuit hunters were being converted into herders as fast as tundra vegetation was turning into reindeer meat; or that science, private enterprise, and the federal government had collaborated so closely in developing the north. Porsild left Fairbanks and traveled along the Beaufort Sea shoreline into Canada, where he surveyed the Yukon coast, the shores of the Great Bear Lake, and the Keewatin District to identify a suitable home for a Canadian herd. His official report of these travels, *Reindeer Grazing in Northwest Canada*, provided the basis for the Canadian government's choice of the Mackenzie Delta as a home for its Canadian Reindeer Project, the Dominion's attempt to replicate the U.S. Bureau of Biology's success.[449] In 1929, Porsild returned to Alaska to meet Palmer again, this time to purchase 3,000 reindeer from the Lomen Company and drive them to Canada. When the Danish botanist celebrated that "grand sight" in his field journal, then, he

449 A short history of Porsild's involvement with the Canadian Reindeer Project is given in Alf Erling Porsild, *Reindeer Grazing in Northwest Canada: Report of an Investigation of Pastoral Possibilities in the Area from the Alaska-Yukon Boundary to Coppermine River*, (Ottawa: F.A. Acland, 1929), 6-14; 29. The language of "experiment" was explicitly used in reference to a governmental herd as early as January 1920. See "Royal Commission: Reindeer and Muskox Industry, Vol. 1: Hearings of Royal Commission on Muskox and Reindeer" (Nelson R. Butcher & Co., Stenographers), RG 33-105, LAC. The "Canadian Reindeer Project" was likely to also be called "Canada's Reindeer Experiment" as it was in 1936 in the publication RHG Bonnycastle, "Canada's Reindeer Experiment," *Proceedings of the North American Wildlife Conference*, Feb 3-7, 1936, Senate Committee Print, 74th congress, 2nd session, (Wash DC, 1936), 424-427. Numerous newspaper articles also referred to the Project as an experiment. For one example, see "Canadian Reindeer are doing very well," *Globe and Mail*, Oct 1, 1939.

commemorated a historic moment. Reindeer ushered in a new era for people and nature in the north.[450]

This chapter continues the examination of the interwar period as a moment in which imperial agents and scientists developed new understandings of and new forms of control over the Western Arctic. I follow the creation and implementation of the Canadian Reindeer Project between 1919 and 1944 as a means of revealing government-sponsored and scientifically-managed reindeer industries as colonial representations and interventions. As is suggested by the opening vignette, the Project involved partnerships between the Canadian Department of Interior and the U.S. Bureau of Biological Survey, between both federal governments and the Lomen Company of Alaska, and between scientists and the north's ecological and human communities. In the logic that placed reindeer as a technology of development and administration, scholars can see how science and empire shaped one another and the Arctic between the world wars.

This chapter offers an alternative view of the state's role in northern affairs during the interwar period. U.S. and Canadian historians have characterized governmental activity in the north after 1918 in contrasting ways. Historians of Alaska generally point to Washington's failed attempts to regulate the powerful salmon fishery and to settle the interior—through the Matanuska Valley Settlement Project—as examples of the enduring power of private industry and the physical environment to thwart governmental development of northern nature.[451] Canadian historians have argued that Ottawa was neglectful of the north because it maintained an

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450 There is a very useful and comprehensive treatment of Porsild's research and correspondence during his "reindeer years" offered by Patricia Wendy Dathan, 1988, "The Reindeer Years: Contribution of A. Erling Porsild to the Continental Northwest," (MA Thesis, Department of Geography, McGill University). Dathan's thesis is not explicitly concerned with the relationships between science and the state, but rather Porsild's contributions to an as-yet inchoate discipline of circumpolar Arctic botany between the 1920s and 1940s. As I was finishing writing this dissertation, Dathan published a monograph from her research, Wendy Dathan, *The Reindeer Botanist: Alf Erling Porsild, 1901-1977* (Calgary: University of Calgary Press, November 2012). This is an extensive treatment of Porsild from a biographical perspective and makes possible this chapter's investigation.

451 See Haycox, *American Colony*, 235-256; Naske and Slotnick, 157-163; and Haycox, *Frigid Embrace*, 61.

isolationist and reactive posture to issues of sovereignty and welfare. On issues of conservation, mineral development, and the fur trade, however, bureaucrats in the Canadian Department of Interior in the 1920s and 1930s appear interested, involved, and exacting.[452] A closer look at reindeer in the north brings these disparate readings of the state together by treating the interwar era as a crucible of governmental might, where power was produced—and sometimes muted—by interactions of social, economic, and ecological elements. The metaphor of the crucible is useful for analyzing the Canadian Reindeer Project, a strategy of the period which tested the abilities of the state to manage a species, culture, and landscape it knew very little about.

Indeed, knowledge was crucial to the organization and implementation of reindeer projects in the Western Arctic. While the Canadian Reindeer Project is far from the beginning of the north's history of science, it marks an important transition point. Prior to the Project, the Canadian and U.S. governments had mobilized scientific knowledge about the Arctic as a means of enumerating the resources of these remote territories. With Palmer and Porsild, the state mobilized science not to document entire landscapes or bring samples of them back to museums, but to reduce complex human and physical environments to a few key variables and manipulate these toward particular political and economic ends. This transition is not unrelated to the emergence of the north as a field for the elaboration of state power after 1918. Reindeer projects were experimentalist projects scientifically as well as the U.S. and Canadian governments' first

452 Morris Zaslow has demonstrated that state agents spent the roaring 20's protecting the corporate interests of the Hudson's Bay Company, as private fur-trading companies from the United States earned the business of Inuit living on the Beaufort Sea coast in the Yukon Territory. Liza Piper has documented the state's commitment to mining and commercial fishing on Great Slave Lake and Great Bear Lake, which culminated in the establishment of Yellowknife as a center for extractive and administrative activity. John Sandlos, Jeff Noakes, and Janice Cavell have shown how legislative decisions around hunting, game management, and international relations made in the south turned the north into touchstones for Canada's conservation movement and its presence as a modern northern nation Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918-1925* (Toronto: University of British Columbia Press, 2010); Liza Piper, *The Industrial Transformation of Subarctic Canada*, (Vancouver: University of British Columbia Press, 2009).; John Sandlos, *Hunters on the Margin: Native People and Wildlife Conservation in the Northwest Territories* (Vancouver: University of British Columbia Press, 2007); and Morris Zaslow, *The Northward Expansion of Canada, 1914-1967*, (Toronto: McClelland and Stewart, 1988), especially 141-145.

experiments in Arctic resource development.

Examining the Canadian Reindeer Project thus promises insights about the Arctic environment, science, and the state in the interwar period. How did reindeer, a non-native species, become the key to developing administrative and economic capacity in the north? How did an ecologist more familiar with sheep than reindeer and a Danish botanist become the principal investigators and managers of reindeer programs in the north? What kinds of knowledge about Arctic nature did they gather and how did these inform the state of northern development over the 1930s? In what follows, I take up these questions in turn.

The Impulses behind Reindeer Introductions in North America

> "Experience has proven that there are periodical fluctuations in the number of fur-bearing animals and that caribou cannot be depended upon to follow the same migration routes each year. With the object of broadening the basis of subsistence of the natives, especially in view of the rapid advance of mining in the Northwest Territories, the Department of the Interior has for a considerable time been looking into the possibilities of increasing the numbers of the larger ruminants."
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> *Canada's Reindeer Experiment, 1936* [453]

Reindeer had been introduced to Alaska and Canada several times before the Canadian Reindeer Project officially began in 1926. These introductions stemmed from the initiative of missionaries and eventually gave way to federal, corporate, and scientific interest in northern animal husbandry economies. By the 1930s, reindeer were envisioned as a multi-faceted tool for developing, conserving, and civilizing the far north, or taming the Arctic's wildness.

Historian Roxanne Willis demonstrates that reindeer were initially brought to North America to alleviate starvation among Alaskan Eskimos whose subsistence base of caribou and

453 Bonnycastle, "Canada's Reindeer Experiment," 424.

marine mammals had been destroyed by commercial fisheries industries.[454] Like their wild cousins, reindeer were adapted to the Arctic climate and their bodies provided the basis for nutrition, clothing, and tools. For missionaries, the reindeer's consumption of tundra vegetation turned non-arable hinterlands into productive grazing lands and primitive Inuit hunters into sophisticated herders.[455] Reindeer provided another kind of salvation as well. With the conflicts and consequences of westward expansion evident to them, missionaries hoped to atone for the treatments of Native Americans.[456] Increasingly, they believed the best method for doing so was by persuading Eskimos to take up herding, a practice unfamiliar to them. Inuit had not been forcibly removed from their homelands like American Indians has, but the unforgiving Arctic environment condemned them to a meager existence. Missionaries believed reindeer could remedy both the historic injustices of native peoples in America and the inadequacies of northern nature. Sheldon Jackson brought a herd across the Bering Strait from Siberia to Port Clarence, Alaska in 1892, which increased in size and spread throughout the Bering Strait region over the next twenty years. Historians Gilles Seguin and John Sandlos have shown how missionary Dr. Wilfred Grenfell spearheaded the introduction of reindeer to Newfoundland in 1908 with motivations that mirrored Jackson's in Alaska.[457]

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454 In the Western Arctic, hunting pressure on the caribou intensified through the expansion of commercial whaling industries on the Beaufort Sea. Two good sources on this phenomenon have been provided by John Bockstoce. See John R Bockstoce, *Whales, Ice, and Men: The History of Whaling in the Western Arctic*, (Seattle: University of Washington Press), 1986.; and John R. Bockstoce and Daniel B. Botkin, "The Historical Status and Reduction of the Western Arctic Bowhead Whale (*Balaena mysticetus)* Population by the Pelagic Whaling Industry, 1848-1914," *Scientific Reports of the International Whaling Commission*, Special Issue, no. 5, 107-41.

455 There are many historical records that suggest the various cultural and economic benefits of reindeer in the interwar period. For one example, consider C.L. Andrews, *The Eskimo and his Reindeer in Alaska*, (Caxton Printers, 1939), 30.

456 See Roxanne Willis, "A New Game in the North: Native Reindeer Herding, 1890-1940," *Western Historical Quarterly* 37 (Autumn 2006): 277–301. Quote from John Taliaferro, *In a Far Country: The True Story of a Mission, a Marriage, a Murder, and the Remarkable Reindeer Rescue of 1898*, (New York: Public Affairs, 2006), 60.

457 Seguin, 1-10. John Sandlos, "Where the Reindeer and Inuit Should Play: Animal Husbandry and Ecological Imperialism in Canada's North," (unpublished MS). My thanks to the author for allowing me to review this piece.

These initial introductions had differing fates. Jackson's Alaskan herd swelled in the early 1900s. Smaller herds were spun off the main group and driven to each Inuit settlement on the Beaufort Sea coast. Congress grew interested in the possibility of pairing the civilizing mission behind missionary-led herding with education and dispatched US Bureau of Education staff and Saami herders from Scandinavia to each village to teach the would-be Inuit herders.[458] Meanwhile, countless obstacles plagued the initial Canadian herds. Predacious wolves, pestering flies, straying animals, and poor grazing lands were all problems reindeer officials could not solve. In addition, as a federal bureaucracy expanded to incorporate new departments for the Canadian north and for wildlife in the late 1910s, Ottawa bureaucrats disappointed in reindeer shuffled the responsibility for herding programs. After many of the animals died, the Parks Branch took over those that remained, only to transfer them to the Anticosti Island Administration in 1923. This herd remained small and isolated compared to what became of the Canadian Reindeer Project in the 1930s and 1940s.[459]

After 1918, corporate agents and government officials gained new motivation and partners to develop reindeer industries. In Alaska, an outbreak of Spanish influenza devastated Inuit herders on the Seward Peninsula, crippling villagers' access to food and annihilating the sources of expert knowledge needed to manage reindeer. The situation encouraged the Bureau of Indian Affairs to abandon the Saami tradition of close herding—where apprentices and teachers lived and moved with the herd throughout the year—for open herding, which essentially put the reindeer out to pasture and relied on natural barriers or fences to prevent mixing. While the effect of the flu appeared to jeopardize the budding reindeer industry, it also created a business opportunity for wealthy capitalists nearby in Nome. The Lomen family, which had made its

458 C.L. Andrews, *The Eskimo and his Reindeer in Alaska,* (Caldwell, Idaho: The Caxton Printers, 1939), 30-37.
459 Sandlos, "Where the Reindeer and Inuit Should Play," 4-7.

money in gold over the turn of the century, abandoned mineral extraction and began purchasing reindeer on the Seward Peninsula in the 1910s. By the mid 1920s, it had become the largest private owner of livestock in Alaska with over 14,000 animals.[460]

Over the next three years, the Lomen Company began forging relationships with high-profile businessmen and bureaucrats in the East to turn reindeer into an American industry. Carl Lomen, one of the brothers heading up the family company, secured the backing of investors in New York City to purchase steamships, outfit them with storage compartments, and deliver reindeer meat from Nome to Seattle for distribution to restaurants in major cities throughout the country. Meanwhile, he drummed up interest in reindeer through newspaper men and antics like "Reindeer Week," where parades featuring the animals marched down Manhattan streets. According to one Washington official, the campaign was an "instant success." By 1921, Lomen had contracted three railway lines to serve reindeer meat in their dining cars. He also had "made an excellent impression" with leaders in the nation's capital, including E.W. Nelson, the Chief of the U.S. Bureau of Biological Survey. Nelson and Lomen agreed that the industry, and the vegetation upon which it was based, could be better managed by science. Nelson chose Seymour Hadwen, a veterinary scientist, and Lawrence Palmer, a recent graduate of Nebraska who was working with the U.S. Forest Service in Utah, to initiate a research program on reindeer ecology in Alaska.[461] As has already been suggested, and as I will show in more detail later in this chapter, Palmer's work in Fairbanks at his research station and with the Lomen Company had a great influence on reindeer projects in the Western Arctic.

Meanwhile, as Palmer was setting up in Alaska, members of the Canadian Arctic Expedition of 1913-1918 returned to Ottawa to champion reindeer as a vehicle of economic

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460 Carl J. Lomen, *Fifty Years in Alaska*, (New York: David McKay Company, Inc., 1954), 117-135.

461 Ibid, 144-153 and 170-181. On "instant success" see Vilhjalmur Stefansson, "Arctic Headlines in Fact and Fable," *Foreign Policy Association* no. 51, (January: 1945), 79.

development and game management. In the winter of 1919-1920, members of the Royal Commission on Muskox and Reindeer sat down to a series of meetings in Ottawa. This body was brought together by explorer-anthropologist Vilhjalmur Stefansson to "investigate the possibilities of the reindeer and musk-ox industries in the Arctic and sub-Arctic regions of Canada."[462] The Commission heard from whalers, missionaries, northern police, elected officials, and eight of the scientists from the Canadian Arctic Expedition.[463] Like missionaries before them, biologists, geographers, geologists, and anthropologists leaned on their own experience to deploy a complicated rhetoric about protection and exploitation. Having passed through Nome on their way in and out of the north, these scientists had witnessed the growth of the Lomen Company's reindeer operations in just five years and observed the ways Inuit managed herds on the Beaufort Sea coast. Just as Carl Lomen built public and private interest for his new endeavor, these researchers promoted the north as a potential meat-producing factory. But they also worried about the impact commercial whaling had on caribou populations on the Yukon Coast and Mackenzie Delta. They framed introducing reindeer (and domesticating muskox, a resident big-game species) as a means of both commodifiying northern prairies and conserving large native mammals.[464]

These attempts by Lomen and expedition scientists to redefine the Arctic through the reindeer mediated post-World War I concerns about food scarcity and industrialization in North America. As Western ranches gave way to settlement, European agricultural fields recovered from the wounds of battle, and urban populations exploded, the north appeared as a both a promising frontier for livestock and a landscape on the verge of repeating the West's

462 This was the subtitle to the 1922 report of the Department of the Interior, *Reindeer and Muskox: Report of the Royal Commission upon the possibilities of the Reindeer and Musk-Ox Industries in the Arctic and Sub-Arctic Regions,* (Ottawa, 1922). See the first page of the report for the full subtitle.

463 The list of witnesses can be found in Department of Interior, *Reindeer and Muskox,* 9-11.

464 I return to these themes with a more specific treatment below.

environmental history.[465] Historian John Sandlos has argued the discursive practices relating to conservation in the north created an "Arctic Pastoral," in which bureaucrats, sportsmen, scientists, and other conservationists positioned the native hunter as "irrational and destructive" and portrayed the Arctic tundra as an environment ripe for government-sponsored development.[466] In combination with other measures, such as regulating hunting and creating national parks, taming the muskox and introducing reindeer sought to stem the supposed "wanton slaughter" of certain game species, like caribou. In so doing, bureaucrats in Ottawa sought to establish northern lands and animals as national resources and southern bureaucrats as the logical managers of these assets. Certainly, Sandlos' argument applies to U.S. bureaucrats and businessmen as well.[467]

As we attend to the elaboration of the Canadian Reindeer Project in the 1920s and 1930s, it is important to draw distinctions between two kinds of northern nature at stake in the Arctic Pastoral: wildlife and tame-life. Administrators articulated social, economic, and political impulses behind reindeer herding as distinct from—though related to—the conservation of muskox, bison, and caribou. These impulses responded in part to the particular challenges of engaging Inuit in the Western Arctic, a population and region unlike other native northerners and landscapes in Alaska and the Northwest Territories, in the project of development.

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465 On food scarcity issues spawned by the war, see Stefansson, *Northward Course of Empire*, 64 and 135. On the north as an escape from civilization in the inter-war period, see Christina Adcock, "Many tiny traces: Antimodern anxieties and colonial intimacies in the Canadian North," Network in Canadian History and Environment, http//niche-canada.org/node/10088, (accessed October 9, 2012).

466 For an overview of the "Arctic Pastoral" concept, see Sandlos, *Hunters at the Margins*, 161-170.

467 Letter from George Bird Grinnell to Mr. George Lawyer, Oct 17, 1922, RG 22, Entry 162, Box 21, Folder: Experimental Station, Lomen Brothers, General Correspondence, NARA. Here, Grinnell worried that the spread of reindeer in Alaska might threaten wild caribou, and that he is thinking about drumming support for legislation that would grant the U.S. Department of Agriculture authority to "control the grazing range of the domesticated reindeer" by circulating letters to sportsmen clubs and conservation agencies to inform them of situation. See also Letter from E.W. Nelson to George E King, Mar 7, 1921, RG 22, Entry 162, Box 21, Folder: Experimental Station, Lomen Brothers, General Correspondence, NARA. This letter is one example of Nelson receiving letters from citizens around the country after it is made public that he is urging Congress to give appropriations to the U.S. Department of Agriculture to help manage the reindeer business.

For instance, a livelihood based on managing and harvesting reindeer appeared to state agents as more stable than the fluctuations inherent in caribou migrations and the fur trade, which was rapidly expanding across the Beaufort Sea coast after the Great War. Regulating hunting of native species would not necessarily address the unpredictability of markets and nature, but building up reindeer as a subsistence base might. Such a "native-run industry," the kind government agents promoted after the Great Depression, gradually replaced the visions of a grand northern meat industry.[468] And, as we will see later in this chapter, the task of creating a domestic economy around tame-life in the north so challenged the abilities of bureaucrats, northern promoters, and wildlife conservationists, that new, transnational partnerships between scientific experts and the state were called into being.

These distinctions between wild and tame and hunting and herding can be brought into focus by attending to the legal relationship between governmental agents and Inuit in the early twentieth century. In Alaska, the U.S. Bureau of Education teacher acted as the governmental agent, making reindeer herding a form of enrollment in the federal system. Such oversight had not yet been possible in Arctic Canada. The federal government was unable to secure a treaty with Inuit (as they had with Dene living along the Mackenzie River), as Inuit did not sign Treaty 11, the comprehensive agreement of 1921. According to one Inuit scholar, "Our people had the necessary tools for surviving and there was enough game around to meet their needs, so they didn't see the need to sign any treaty."[469] While the Royal Canadian Mounted Police and missionaries had enforced legal and moral codes at whaling and fur trading outposts in Inuit territory, the formal designation of Inuit as wards of the state did not occur until an amendment

468 Porsild, *The Reindeer Industry and the Canadian Eskimo,* 4.
469 Randal Pokiak, *Inuvialuit History,* (unpublished manuscript, 1991), 58, ICRC.

to the Indian Act made in 1924.[470] Still, Inuit had never agreed to the terms of this amendment nor dissolved any rights to the land, and thus federal agents must have been eager to find some additional apparatus to bring Inuit under the purview of national law. Indeed, in the contemporary case of muskox conservation, consultants to the Canadian Advisory Board on Wildlife Protection suggested the federal government practice diplomacy with Inuit to enlist northerners in the project of protecting nature rather than double-down on game regulations that could not be effectively enforced.[471]

Accounts from Inuit scholars suggest that reindeer acted as a legal device, bringing together bureaucrats and Inuit in the Western Arctic. According to Inuit scholar Randall Pokiak, Inuit living in the Mackenzie Delta and along the Arctic coast in the early 1900s were troubled by the recent influx of Alaskan Inupiat into the area, as they deemed these foreign natives responsible for the recent decline in caribou populations. Alaskan Inupiat had traveled eastward since the 1880s, first with commercial whalers who had over-harvested caribou in the Bering Strait and north slope regions, and later to avoid the epidemic of Spanish Influenza after 1918. Calling on a local shaman, Inuvialuit leaders hoped to alter the migration patterns of caribou to force the Inupiat to return to Alaska. The caribou did go away, but did not return, and Inuvialuit thus became amenable to new means of procuring food. When government agents approached the Inuit in the 1920s, Inuit leaders asked for the delivery of reindeer from Alaska, having "heard stories from the Inupiat that reindeer had the same diet as caribou."[472] Oral histories indicate that one Inuvialuit man, Mangilaluk, negotiated with the government on behalf of local communities,

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470 This amendment appears to have been an attempt to legitimize federal appropriations for forms of relief that were distributed to Inuit through missions and fur posts. See John Leonard Taylor, *Canadian Indian Policy During the Inter-War Years, 1918-1939* (Ottawa: Department of Indian Affairs and Northern Development, 1984), 87-88.

471 See Sandlos, *Hunters at the Margins,* 126.

472 Pokiak, 44-45.

suggesting to treaty officers, that "if they brought reindeer from Alaska to Tuk area they would think about signing an agreement."[473] In both Arctic Alaska and Arctic Canada, reindeer created possibilities for making citizens out of Inuit, whether through religion, education, commerce, or the legal system.

The politics of taming the Arctic continued to shape the organization of reindeer industries in Alaska and the Canadian Reindeer Project. The technologies necessary for herding could foster panoptic vision for state and scientific agents. Corrals brought widely dispersed animals and herders to one geographic location at two distinct points in the year, allowing for counting, branding, slaughtering, and evaluating. The Canadian Reindeer Project built similar tools to enframe people and resources in the Mackenzie Delta. The Project was enacted on Inuit homelands through the creation of a 6,000 acre Reindeer Grazing Preserve in the Mackenzie Delta and a federal protection ordinance for reindeer. These were forms of statecraft, like the game sanctuaries and national parks produced by conservation efforts, because preserves and protection ordinances made nature a federal responsibility. In other cases, the actualization of state and scientific power over nature required some brokering.

In the context of an introduced reindeer industry, protected areas would have to be managed according to the demands of recruiting Inuit to herding animals, rather than preventing them from hunting wild species. In a 1935 meeting of the Interdepartmental Reindeer committee, a body organized in 1932 to help guide the Project's evolution, biologist Rudolph Anderson and anthropologist Diamond Jenness contrasted the functions of national parks with those of the Reindeer Grazing Preserve. The scientists agreed that the national parks were designed to protect all wildlife in perpetuity. But in the preserve, hunting and trapping must be carried out by

473 This quotation is Pokiak's, from *Inuvialuit History*, 58. There are other accounts of Mangilaluk, recorded by Elisa Hart. See Elisa J. Hart, *Reindeer Days Remembered*, (Inuvik, NWT: Inuvialuit Cultural Resource Center, 2001), 14.

herders, as they required a certain amount of fur for winter clothing. The scientists noted it would be nearly impossible to attract natives to herding if trapping privileges were denied. In making this distinction, Jenness and Anderson helped construe the Reindeer Preserve as an experimental space for breeding novel forms of Inuit subjects and state power. With their desires to domesticate, study, and develop nature, reindeer projects were more like botanical gardens than pristine wilderness areas.[474]

In addition to engaging a community that was not fully within federal jurisdiction—and potentially bringing them under direct control—reindeer herding became a key mechanism in plans for Arctic mineral extraction. Reconnaissance work in the Coronation Gulf during the Canadian Arctic Expedition of 1913-1918 returned with the promise of extensive copper deposits there. Scientists argued that, in order to capitalize upon these resources, a local food source would need to be established, since populations of migrating caribou had been decimated over the turn of the century. Many southern Canadians also believed that white men were unlikely to want to live in the north and might be physically unable to do so. Reindeer and Inuit offered solutions to these problems. Inuit could be responsible for maintaining reindeer herds, the meat from which could be shipped to the Coronation Gulf, reducing overhead costs for private- or federally-sponsored mineral extraction. Drawing connections among labor needs, environmental changes, and the possibilities of reindeer and mineral economies, promoters of northern development often articulated Inuit as the Arctic's most valuable asset. Without them, the government would "spend millions" to get people to live and work there. Anthropologist Diamond Jenness, who had recently returned from three years of study among the Copper

[474] For a comparison of national parks and the ordinances used to establish the Reindeer Grazing Preserve, consider the minutes of the Interdepartmental Reindeer Committee from June 18, 1935, Microfilm reel T-13324, vol. 82, file 7128, "Lapp herders, 1929-1938," LAC. For a discussion of the relationships between ideas of nature in relation to laboratories and other scientific spaces, see Robert Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology,* (University of Chicago Press, 2002).

Eskimo of the Coronation Gulf, distilled the situation for his audience at a 1923 lecture at the Victoria Memorial Museum. "Unless we use the Eskimos," he argued, "we can never develop the Northland."[475]

Rhetoric about reindeer reflected the complicated project of administering nature, people, and development in the Western Arctic during the interwar period. Emerging from missionary-sponsored civilizing missions and conservation movements, bureaucrats, scientists, and developers gave new impetus to reindeer projects after 1918. Industrial boosterism, the limits of formal legal relationships with Inuit, concerns about the volatility of wild nature and markets, and desires to build a mineral industry in the Coronation Gulf all infused discourses around herding programs. After the Great War, many Americans and Canadians believed that taming the Arctic was the key to the region's future, one in which governmental agents helped domesticate the people and resources of the region for the benefit of the nation. In the coming years, a series of trials and errors would test this optimism and catalyze new relationships between science and the state.

"Exploratory Engineer" or "Botanist"? Shifting Definitions of Arctic Expertise after 1918

Lawrence Palmer had been sent north by Edward Nelson, the Chief of the Bureau of Biological Survey, to carry out ecological research in service of the government and the Lomen Company. But it was not as clear in Canada what kind of expert would lead the Dominion's reindeer experiment. The Royal Commission on Muskox and Reindeer, for example, called thirty-five witnesses to testify on the opportunities and obstacles facing a reindeer industry in

475 See "Royal Commission: Reindeer and Muskox Industry, Vol. 1" RG 33-105, LAC. Quote used in above paragraph from George Comer, p 32. Notes from Jenness' lecture are found in "A Lecture delivered at the Arts and Letters Club, by Diamond Jenness, Victoria Memorial Museum, Jan 9, 1923: 'Our Eskimo Problem,'" Rudolph Martin Anderson Fonds, MG 30 40, vol. 14, file 1-Eskimos, LAC.

Canada, providing us with a baseline with which to evaluate the changing state of knowledge and authority concerning Arctic administration. That no trained botanist had spent enough time in reindeer country to give evidence before the Commission did not appear to be an issue, though it became one in 1926.[476]

Commission members queried witnesses on issues suspected to be indicators of failure or success of reindeer introductions, including "vegetation, soil, climate, topography, and surface conditions."[477] Testimony detailed the extent and distribution of vegetation in certain geographical districts; the presence or former presence of caribou—which was assumed to denote the potential for reindeer; and the existence of mosquitoes and prevailing winds (to account for a troublesome pest, the mosquito).[478] Excitement for reindeer industry grew with each meeting. The Commission outlined vast swaths of the north as Canadian reindeer country, including several islands in Hudson's Bay, the entire Ungava and Mackenzie Districts, the interior of the Yukon, and the Arctic coast from the international boundary to Kent Peninsula. Given northern Canada's similarities with Alaska, Siberia, and northern Europe—all areas with thriving reindeer industries—witnesses believed animal husbandry would finally capitalize upon "vast tracts of country that are not utilized."[479]

Yet there were also many concerns with existing knowledge about northern lands. Commissioners admitted that there was much "conflicting evidence" about whether Inuit would take to herding, how reindeer managed pests, and how much time plants needed to recover after

476 Ibid, 18. Porsild documented the existing knowledge on flora in the Western Arctic in 1937 in *Canada's Western Northland.* See W.C. Bethune, *Canada's Western Northland: Its History, Resources, Population, and Administration,* Dept of Mines and Resources, Lands, Parks, and Forests Branch, Ottawa, 1937, 130-141.

477 Ibid, 12.

478 Ibid, 18.

479 The published report lists these witnesses, but only prints excerpts of their testimony. The records of the hearings are found in Library and Archives Canada, RG 33 105, under the titles "Royal Commission: Reindeer and Muskox Industry, Vol. 1" and "Royal Commission: Reindeer and Muskox Industry, Vol. 2" The quotation is from Bishop Isaac Stringer from the February 4th, 1920 meeting, found on pages 197-198 of the Vol. 1 hearings.

grazing. Commissioners underlined the importance of continued governmental presence "to remove the elements of doubt and uncertainty, and so tend to encourage private enterprise and investment." This could be accomplished through "careful study" of individual localities, so as to "utilize to the best possible advantage, as means of control, any suitable valleys or other special topographical features, which may be available."[480]

Following the last Royal Commission hearing in 1920, federal officials and wealthy capitalists considered themselves sufficiently informed about the conditions necessary for a successful reindeer industry in Canada. Scientists had helped collect, consolidate, and circulate such requisite knowledge; missionaries, police, and others with northern experience had testified to the need for reindeer in the north. Participants agreed that the Canadian government should lead the initial reindeer trials, beginning with a small, manageable herd, working out any kinks in logistics, and paving the way for future investment by private groups.[481]

Despite this faith in government-led development, the first attempt to cash in on reindeer after the Royal Commission came through the north's biggest corporation and biggest personality. Resigning from the body, Vilhjalmur Stefansson introduced reindeer to Baffin Island in 1921, in conjunction with a new subsidiary of the Hudson's Bay Company, the Hudson's Bay Reindeer Company. This project was a public disaster. The $200,000 spent to transport 600 reindeer and six Saami herders from Norway was squandered in six years. In 1921, the herd was delivered to Baffin Island and by 1927, most of the reindeer had died or disappeared, prompting the government to cancel the Company's grazing permit.[482] As reports of this debacle—and the controversy they inspired—catalyzed the hiring of botanist Alf Erling Porsild and major changes

480 Department of Interior, *Reindeer and Muskox,* 19-24.
481 Ibid, 45 and 95.
482 The Baffin Island situation is covered by both Seguin and Sandlos. See Seguin, 1-10 and Sandlos, "Where the Reindeer and Inuit Should Play," 9.

in the relations between science and the state, it is necessary to examine them in detail.

The Hudson's Bay Company hired Alaskan reindeer specialist W.T. Lopp in 1925 to assess the problems with Baffin Island and survey the island for potential areas for continued experimentation. Lopp's report concluded that the Company herd failed because of the choice of location, calling the plot "virtually worthless as range for reindeer." Lopp's insistence on this root problem seemed to call the whole enterprise into question. While the Company could buy more animals, replace its manager, Storker Storkerson, or invite more Saami families to assist them, Lopp wrote that the tundra itself—the "handicap" of its operations—could be neither "remedied nor removed." His surveys of the remainder of Baffin Island showed little hope for future industries there.[483]

Newspapers across the United States and Canada covered Lopp's report, sparking a controversy with Vilhjalmur Stefansson. Stefansson interpreted the report as inflicting severe damage on his reputation as an expert on northern matters. During one of the anthropologist-explorer's high profile lectures in Ottawa, the Director of Anthropology at the Geological Survey of Canada—Edward Sapir—challenged Stefansson on the Baffin Island ordeal, asking for some explanation for the "Reindeer experiment on Baffinland." Stefansson blamed the failure on issues of management, suggesting that the Hudson's Bay Company did not heed his advice and also had mistreated Storkerson. Sensing that he was losing favor with Canadian audiences—whether in that lecture hall, or in broader commercial, intellectual, or political circles—Stefansson sent a private letter to Carl Lomen, the head of the Lomen Company. The explorer-anthropologist admitted to Lomen that Lopp's report might result in Hudson's Bay Company

483 The details of Lopp's report were found in several sources. For thoughts as Lopp pieced together his report, see Letter from Lopp to R H Parsons, Sep 7, 1925, Kathleen Lopp Smith Family Papers, Series 4, Box 2, Folder 4, APR-UAF.; For his final thoughts, see Letter from Lopp to RH Parsons, July 1 1926, Kathleen Lopp Smith Family Papers, Series 4, Box 2, Folder 5, APR-UAF.

backing out of the reindeer business, and that Lomen should consider working with Stefansson in buying up land on Baffin Island. Lomen did not take up the offer, signaling Stefansson's increasingly marginal role in reindeer industries after 1925.[484]

Stefansson was known for his contentious nature, but this case was as much about changing requirements for knowledge about the north and about development as his knack for the spotlight.[485] Before 1921 and the formation of the Hudson's Bay Reindeer Company, members of the Canadian Department of Interior relied on substantial northern experience—like the kind Stefansson had amassed in his ten years in the Arctic, or that embodied by the witnesses to the Royal Commission on Muskox and Reindeer—over pure academic scientific training when appraising the needs of a possible reindeer industry. Those with both academic expertise and northern experience, like many of the scientists invited to the Commission, seemed especially useful sources.[486] In early 1926, after Lopp's report was made public, the Department of Interior retained their emphasis on northern experience and academic expertise, but refined their interest to a particular type of knowledge and know-how—applied botany. This change materialized in the hiring of Danish botanist Alf Erling Porsild, and his brother Robert Porsild, to lead the Canadian Reindeer Project in May,1926.

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484 For the interaction between Sapir and Stefansson, see "The Friendly Arctic," Rudolph Martin Anderson Fonds, MG 30 40, Vol 11, File 8, LAC. This file contains notes on the lecture as recorded by Anderson's wife, not a complete transcript. For correspondence between Stefansson and Carl Lomen, see Letter from Stefansson to Carl Lomen, June 20, 1927 Lomen Family Papers, Series 2: Carl Lomen, Box 10, Folder 232, APR-UAF.; Stefansson thanks Lomen for submitting a rebuttal to Lopp's report in the *Ottawa Morning Journal* in Letter from Stefansson to Carl Lomen, Apr 17, 1928, Lomen Family Papers, Series 2: Carl Lomen, Box 10, Folder 232, APR-UAF. The details of Stefansson's bid for the Lomens to purchase land on Baffin Island are covered in Letter from Stefansson to Leonard Baldwin, July 20, 1925, Lomen Family Papers, Series 2: Carl Lomen, Box 10, Folder 232, APR-UAF.

485 On Stefansson's controversial nature, consult Richard Diubaldo, *Stefansson and the Canadian Arctic*, (Montreal: McGill-Queen's University Press, 1978).

486 I deduce that northern experience and scientific training, when combined, were especially useful through the following quotation in the Royal Commission's report: "Your commissioners were fortunate in being able to secure much valuable information as to the potentialities, from a reindeer point of view, of the territory lying within about thirty miles of the Arctic coast, between the International Boundary on the west, and Kent peninsula on the east." Department of Interior, *Reindeer and Muskox*, 26. This area was the exact area covered by the recent Canadian Arctic Expedition 1913-1918 and the International Boundary Survey of 1908-1912.

Lopp's report was not solely responsible for a change of this nature. Indeed, just months before the Porsilds were hired, the head of the Northwest Territories and Yukon Branch could see little value in a botanist. In January 1926, before the publication of Lopp's report, O.S. Finnie wrote the Deputy Minister of the Interior, making a plea for a man with practical skills to lead a governmental reindeer project. "I do not think the qualifications as a Botanist is sufficient," he wrote, because "I believe we would get better results if we could get a practical reindeer man who knows the kind of feed that the reindeer live on, and one who is a good traveler and could go through the country and size up the situation accurately and quickly."[487] Finnie wanted to hire Lopp, but the Alaskan was unavailable due to his contract with the Hudson's Bay Company. In addition, the stress placed on the ability to travel raised concerns about his age—Lopp was nearly seventy years old.[488]

In addition to the failure of the Hudson's Bay Reindeer Company, and an analysis of it by a long time reindeer man, Finnie and other reindeer enthusiasts in Canada were convinced of the value of applied science by their counterparts in Alaska. Two months after Finnie sent his letter about botanists, high-ranking Canadian official W.W. Cory visited New York City and Washington to consult with US officials on best practices for a Canadian reindeer industry. While in the American capital, Cory met with Dr. E.W. Nelson, the chief of the United States Bureau of Biological Survey. Nelson impressed upon Cory that a single man could not handle the duties of getting the Canadian Reindeer Project off the ground. These duties involved conducting surveys and experiments on reindeer, including their principal movements, feeding habits, and major predators, pests, and diseases. They also required surveying Canada for suitable forage and

487 O.S. Finnie to Gibson, January 1926, as quoted in Dathan, 32.

488 Much of the Arctic region at the time offered little inland transportation infrastructure for would-be surveyors. In order for a fieldworker to travel and "size up the situation" efficiently, as Finnie wished, he or she would have to master dog-sledding techniques, as there was no feasible alternative to cover ground beyond the open-water season.

building the systems of reindeer management, like the supervisory hierarchies, corrals, and storage facilities needed to round-up, slaughter, and process reindeer.

Moreover, Nelson advocated for trained botanists to fill these roles, as the importance of scientific studies of reindeer feed had been made clear by the Bureau's grazing scientist, Lawrence Palmer. Nelson attributed the steady growth of reindeer populations in Alaska to Palmer's ability to translate his studies to the management of grazing lands. In 1901, 1,000 animals roamed the coasts of Alaska; in the mid-1920s, that number had exploded to over 200,000. Palmer had also argued that, when his research was fully applied, reindeer country in Alaska could support three million livestock. Nelson suggested that the Department of Interior hire two botanists and have them apprentice with Palmer for six months, learning the particulars of reindeer ecology and the reindeer business. Cory relayed this news to Finnie, and with both men sold on the model of the Alaskan industry, they began to see botanical expertise, both academic and applied, as fundamental to reindeer management.[489]

By 1927, Finnie expressed a firm commitment to applied botanical science as a way of knowing and managing reindeer. We see this through his correspondence with a second private venture, the Dominion Reindeer Company of Vancouver. When the Company inquired in 1927 about leasing land in the Northwest Territories, Finnie responded with caution. He was unable to recommend any location "until the different districts in the North West Territories had been thoroughly cruised with a view to determining their value as feeding grounds for the reindeer." Finnie admitted to the director of the National Herbarium, M.O. Malte, that his hesitance with the Dominion Reindeer Company emerged from the Baffin Island incident. A lease was granted

489 The details of this meeting among U.S. and Canadian officials are drawn from several sources. See Letter to A.E. Porsild, March 23, 1926, RG 132, vol. 31, file 4492, LAC. See also Letter from O.S. Finnie to Colonel Starnes, May 19, 1926, Microfilm Reel #T13273, vol. 765, File 5095—Porsild, 1926-36, LAC. For more general descriptions of the hiring of the Porsilds, see North, *Exodus*, 27-34 and Dathan, 33-34.

to the Dominion Reindeer Company in the Eastern Arctic in 1928, contingent on a scientific survey of the region. This survey was never completed, the Dominion Reindeer Company never introduced reindeer, and the government terminated the lease in 1931. As Finnie noted, the recent history with commercial enterprise had "served as a lesson" for governmental managers of reindeer experiments.[490]

These conversations among Stefansson, Lopp, Finnie, Malte, Cory, and Nelson mark important moments in the shared histories of state power and science in the Western Arctic. They echo the complicated emergence of grazing sciences in America and Canada over the turn of the twentieth century. Historians have shown that scientists on the range and in newly-formed wildlife preserves often competed for authority with ranchers, government agents, hunters, and sportsmen—and with one another—forcing an emphases on the applications of science, rather than theories of nature.[491] With reindeer, research by botanists on vegetation distribution and grazing habits seemed to grow the industry, and thus created particular incentives for a fruitful marriage among biologists, corporations, and bureaucrats. Just as the Royal Commission had provided the Canadian government with a mandate to employ "caution, care, and foresight" as well as "sound practical knowledge," in any actions relating to the reindeer industry, expeditionary scientists were eager to consult on the introduction of herding programs.[492]

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490 For quotation at end of paragraph, see Letter from O.S Finnie to Rev. Canon CW Vernon, June 10, 1929, Microfilm Reel T-13267, vol. 759, file 4824—WT Lopp, 1925-1939, LAC. See also Letter from O.S. Finnie to WH Collins, May 14, 1928, RG 132, vol. 23, file 364, LAC.; Letter from O.S. Finnie to M.O. Malte, Feb 20, 1928, RG 132, vol. 23, file 364, LAC. See also Sandlos, "Where the Reindeer and Inuit Should Play," 10.

491 John Sandlos, "Where the Scientists Roam: Ecology, Management, and Bison in Northern Canada," in David Freeland Duke, ed, *Canadian Environmental History: Essential Readings* (Toronto: Canadian Scholars' Press, 2006), 333-360.; Morgan Sherwood, *Big Game in Alaska*, (New Haven: Yale University Press, 1981), Christian C. Young, "Defining the Range: The Development of Carrying Capacity in Management Practice," *Journal of the History of Biology* 31 (1998): 61-83. On Palmer, see Sherwood, 66-67. Of the wildlife specialists in Alaska with the Bureau of Biological Survey, there were Ernest P Walker, W.H. Osgood, Alfred M Bailey, Seymour Hadwen, and Lawrence J Palmer and only Walker was a "permanent employee." Sherwood argues this reflects a lack of a federal commitment to scientifically-guided resource management, which is not rectified until the solidification of wildlife ecology and game management disciplines in the late 1930s.

492 Department of Interior, *Reindeer and Muskox*, 22. Letter from Rudolph Martin Anderson to J.H. Brownlee,

Finnie's correspondence, then, was indicative of recent experiences on Baffin Island and with the US Bureau of Biological Survey, but also much more comprehensive social, ecological, and intellectual circumstances.

State priorities clearly helped construe what counted as expertise in northern affairs. Scholars have described relationships among the Canadian state, naturalists, explorers, and professional scientists during the interwar as tumultuous, especially as the north became a site of economic and political development and as bureaucrats endured debates over science and spectacle provoked by Vilhjalmur Stefansson.[493] In the case of reindeer in the Western Arctic, fields of expertise were similarly unstable. Finnie's initial doubts about botanists are revealing because they signal that some forms of science were not *a priori* features of northern development. Naturalists, explorers, geographers, geologists, topographers, biologists, and anthropologists had been instrumental in documenting and discovering the Arctic before the Great War. They also had helped articulate the feasibility of reindeer introductions by reordering the Arctic-Alpine zone as a possible site for development. But none of these specialists appeared as "qualified men" for the duties necessary in starting a government herd. The relationship among science, the state, and northern resources was not something ready-made, but instead, was crafted over time through schemes like the Canadian Reindeer Project.

In 1925, Finnie and Cory referred to the person capable of guiding the Project as an "Exploratory Engineer." But by May, 1926, Finnie hired both a "Botanist" and an "Assistant Botanist." These titles captured the shifting position of science relative to the state as well as the

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1919, n.d., RM Anderson Fonds, MG 30 40: Vol 3, File: correspondence, 1919, LAC. Anderson, the Commander of the Southern Party of the Canadian Arctic Expedition between 1913-1916, and participant in the Stefansson-Anderson Expedition of 1908-1912—both to the Western Arctic region—commended in this letter the work of Stefansson in promoting the development of the country through reindeer industries. This praise for the application of science was remarkable, given Anderson and Stefansson's otherwise toxic relationship in this period.

493 See Sandlos, *Hunters at the Margins;* and Cavell and Noakes, *Acts of Occupation.*

place of the north in North America during the interwar period. The jobs required an expert traveler who could make use of the north's existing transportation networks and yet "size up the situation" from the dog-sled when necessary. He was a botanizer, who systemically collected data about vegetation patterns from landscapes in Alaska, Yukon, the Northwest Territories, and the Keewatin District. Finally, he was a project manager, who could apply extensive and intensive studies to selecting appropriate pastures and best management practices, the foundations of a new industry in the north.[494]

Finding the Men for the Job: Alf Erling Porsild, Robert Porsild, and a Transnational Reindeer Network

With the help of Dr. Malte of the National Herbarium, Finnie prepared a memo soliciting Canadian universities and governmental departments for trained botanists. This memo stated clear requirements for knowledge of systematic botany, with specific competence in the flora of the Canadian north. They wanted candidates who could work independently in a harsh, remote, and difficult terrain. They had to have common sense and a proven ability to apply knowledge to economic benefit. Yet queries to schools in Ontario, Alberta, Saskatchewan, and Quebec failed to turn up a single nomination. No government men applied for the job either. But, by a stroke of luck, Malte knew of two Danish brothers who fit the Department of Interior's bill.[495]

Malte had recently been contacted by Morten Porsild, the director of the Arctic's first biological station at Disko Island, Greenland. Morten's sons, Alf Erling and Robert Porsild, grew up in the shadow of the station, within a transient community that offered useful training in

494 See O.S. Finnie to Moran, December 4,1925, Microfilm Reel # T-13267, vol. 759, file 4824—WT Lopp, 1925-1939, LAC. "Exploratory Engineer" seems to be an established class or rank within the governmental payroll system. On hiring a "Botanist" and "Assistant Botanist" see O.S. Finnie to Moran, April 20, 1926, #T13273, vol. 765, File 5095—Porsild, 1926-3, vol. 765, File 5095—Porsild, 1926-36, LAC.

495 Memo from R.A. Gibson, April 19, 1926, Reel #T13273, vol. 765, File 5095—Porsild, 1926-36, LAC.

northern botany and Arctic travel. The two men spent their youth building elaborate plant collections, competing with one another to win their father's approval. They met government officials and Arctic scientists from around the world and cut their teeth on dog sledding while accompanying research parties. When Morten Porsild contacted Malte to inquire about employment possibilities for his sons, Malte was ecstatic to learn of trained botanists with Arctic experience—even though the men knew little about reindeer.[496]

The decision to hire the Porsild brothers again made use of the US Bureau of Biological Survey's Director, E.W. Nelson. W.W. Cory first contacted Alf Erling and Robert Porsild, meeting the two brothers while they visited Chicago. Cory was impressed by Alf Erling's knowledge of Inuit culture and language and northern vegetation. In April 1926, Finnie, Cory, and A.E. Porsild went to Washington to meet with Nelson. Here, Nelson facilitated what would become the brothers' indoctrination to reindeer: a half-year spent visiting the Alaskan operations and studying the work of Bureau of Biological Survey biologist, Lawrence Palmer. Finnie wrote the brothers in May, 1926, detailing the orders to be completed.[497]

The Porsilds' recruitment makes visible a network that bureaucrats, scientists, and developers created through the elaboration of reindeer industries in the 1920s and 1930s. We have briefly visited several nodes in this network: Disko Island; Palmer's field station in Fairbanks; the Bureau of Biological Survey's headquarters in Washington; and, in Ottawa, the Royal Commission's hearings and Finnie's reindeer team. As we will see, between 1926 and 1944, this network expanded to include Kautekeino, Norway, where Porsild hired Saami herders hired to train Inuit apprentices; the Norlite building in Ottawa, where the Interdepartmental Reindeer Committee met to discuss the Project's progress; and the Mackenzie Delta—the

496 Dathan provides a rich description of the Porsild's upbringing. See Dathan, 2-10.

497 See O.S. Finnie to Messrs A.E. and R.T. Porsild, May 19, 1926, Microfilm Reel #T13273, vol. 765, File 5095—Porsild, 1926-36, LAC. See also Dathan, 48 and North, 28-35.

eventual home for Canadian reindeer. This network makes up the intellectual, political, and physical space of reindeer herding in the Western Arctic and continued attention to it helps us further comprehend the relationship between science and empire. At these sites and the knowledge produced therein, the Canadian and U.S. governments were able to direct the day-to-day operations of the Lomen Company, Saami herders, Inuit herders, and imported reindeer. This network was also responsible for realizing a long-imagined dream for Canadian reindeer in Arctic vegetation specialists Robert and A.E. Porsild.

Their abilities to speak an Inuit language and travel in harsh northern conditions, combined with studies at a pioneering institution for Arctic science, met the expectations of the Canadian Department of Interior and the US Bureau of Biological Survey.[498] While Finnie had been initially resistant to the value of a botanist, other northern promoters bristled against the shifting domains of credibility surrounding reindeer. The Porsild brothers' lack of practical work with reindeer was not lost on Vilhjalmur Stefansson, who lobbied his peers to reconsider their hiring.[499] However, these deficiencies did not bother Finnie, Cory, and Nelson, who came to believe in the Porsilds' talents and skills, and were convinced that time in Alaska spent gaining hands-on experience with reindeer and grazing science would fill in any remaining gaps. While his brother Robert eventually left the reindeer business, US and Canadian bureaucrats and scientists soon identified Alf Erling Porsild as a leading authority on Arctic vegetation and reindeer.[500]

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498 See Porsild, *Reindeer Grazing in Northwest Canada,* 5-6.

499 Letter from Vilhjalmur Stefansson to Carl J. Lomen, 20 June 1927, Lomen Family Papers, Series 2, Box 10, Folder 232, APR-UAF. Stefansson wrote, "I think it would also be well to point out that the Porsild brothers coming from Greenland are from a country where there is no reindeer industry and where the wild reindeer (caribou) are practically extinct." This is ironic as Stefansson, who was born in Canada, was also from a country with no reindeer industry.

500 Finnie, *Canada Moves North,* 16. See also Percy Cox, Professor Seward, and Colonel Vanier, "The Reindeer Industry and the Canadian Eskimo: Discussion," *The Geographical Journal,* 88, No. 1 (Jul., 1936), 17-19. This paper was a published version of a discussion with A.E. Porsild after he presented his paper "A Four Year Trail

Lichens and Legibility in Reindeer Country

In May 1926, the Porsilds headed for Fairbanks, where they began their studies with Lawrence Palmer. They carried a note from the director of the US Bureau of Biological Survey to serve as a set of instructions for the Alaskan ecologist. Palmer was to offer the Porsilds his "fund of information" on reindeer.[501] This fund had been generated by his quadrat studies on tundra regrowth and carrying capacity at the Fairbanks experimental station and his collaboration with the US Bureau of Animal Industry on the nutritive quality of various types of forage.[502] E.W. Nelson also recommended that the Porsild brothers be introduced to the practical workings of the herds, trying their hands at corralling, capturing, marking, castrating, and branding.

Discerning the Porsild's apprenticeship with Palmer is crucial to our understanding of the Canadian Reindeer Project and how it and reindeer herding more generally unfolded in the remainder of the interwar period. This partnership guided the Porsilds in siting the Project and crafting its inner workings. Palmer emphasized the importance of a particular kind of knowledge in first selecting and subsequently managing a reindeer grazing area. The Porsild brothers, Nelson wrote, "should be taught as much as possible concerning the forage plants used by these animals, with a special view to the differences between the summer and winter forage and the need of safeguarding the winter forage areas from use in summer in order that the range may be perpetuated."[503] Recognizing and protecting forage were foundational to managerial decisions in

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from Alaska to the Mackenzie Delta," to the Royal Geographical Society.

501 Quoted in Dathan, 49.

502 N.R. Ellis, L. J. Palmer, and G.L. Barnum, "The Vitamin Content of Lichens," *Journal of Nutrition*, 6, no. 5 (September 1933), 443-454. This paper references another, L. J. Palmer and G.H. Kennedy, "A Report on Digestibility in Reindeer. The Digestibility and Nutritive Properties of a Mixed Ration of Lichens and Oats, of Lichens Alone and of Alfalfa Hay Alone," which was, at the time, in the process of publication. Below, I cite sources that pre-date the Porsilds' arrival to demonstrate that Palmer was working on these studies in the early 1920s and not just in the early 1930s.

503 Quoted in Dathan, 49

the Western Arctic reindeer industries. As such, these twinned convictions were inscribed onto the physical landscapes of the north slope of Alaska and the Mackenzie Delta, as well as the social interactions of developers, Saami, Inuit, and governmental supervisors.

To understand how this could be so, we must first gather the details of what the Porsilds learned in Alaska and, thus, become familiar with the work of Lawrence Palmer. Palmer had studied forestry and botany at the University of Nebraska between 1911 and 1915 before becoming a grazing assistant with the US Forest Service. Hired in 1919 as an Assistant Biologist for the Bureau of Biological Survey, Palmer considered himself a botanist, biologist, ecologist, and range manager—suggestive of the kinds of relations between plant studies and agricultural development in place at the time.[504] He applied his knowledge of grazing relationships in the American West to the study of reindeer. His first five years in Alaska were taken up with reconnaissance surveys of the herds along Alaska's meandering coastline. These surveys supplied Palmer with a sense of the reindeer industry in Alaska, and the seasonal movements of people and animals across the land. As with range management in the West, Palmer concluded that the bases of the industry were the major species of plants that provided nutrition for reindeer. He arrived at this conclusion after careful study of these plants in the field and at the experimental station in Fairbanks.

Nelson's instructions to impress upon the Porsilds the significance of winter forage likely did not surprise Palmer. After all, it was the Fairbanks biologist who had first articulated the significance of this component of the reindeer industry. Palmer developed an elaborate system of experimental pastures and quadrat studies in Fairbanks. These he explored with several lines of research, including the conditions governing forage and range management, the various relations of lichens to grazing, the relative carrying capacity of lichen and non-lichen ranges, and the

504 "Record of Members: Society of American Foresters," L.J. Palmer Papers, Box 2, Folder 1, APR-UAF.

methods of feeding and their effects.[505] Palmer parceled out eleven pastures, each with slightly different vegetation based on its position on the slope of the hill on which the farm sat. He brought reindeer to graze within these pastures, learning about how the animals ate, what plants they selected in different seasons, how they dealt with snow, and how the plants responded in spring. He established quadrats within these different pastures and performed his own tests, cutting plants and picking them by hand. These experiments convinced Palmer that winter forage, comprised mostly of the genus *Cladonia*, was the keystone in the architecture of a modern, successful reindeer industry.[506] Palmer was certain that the study of lichens would also open an entire field of inquiry for Alaskan and broader scientific communities interested in ecology, beyond supplying the local industry with valuable data.[507]

By 1926, Palmer had made a case for organizing the entire industry around *Cladonia*. He noticed that winter ranges were patchier than summer ranges and so winter resources had to be protected—especially given the observation that reindeer bunched up in colder temperatures, potentially over-grazing their food source. A closer look at the nutritive quality of winter forage plants and their reaction in quadrat studies to mowing, picking, and feeding showed surprising results.[508] Even after only a few years of observations, Palmer noticed that it might take winter lichen ranges ten to fifteen years to "come back to a normal height growth of four to five inches," and thus "proper management of the winter range presents an exceptionally important

505 L.J. Palmer and Seymour Hadwen, "Reindeer In Alaska," United States Department of Agriculture Bulletin no 1089, Sep 22, 1922, Government Printing Office, Washington, D.C., 1926, 19-23.

506 L.J. Palmer, "Progress of Reindeer Grazing Investigations in Alaska," United States Department of Agriculture Bulletin no 1423, Oct, 1926, Government Printing Office, Washington, D.C., 1927, 1-11.

507 L.J. Palmer to E.W. Nelson, 22 March 1923, Lawrence J. Palmer Papers, APR-UAF.

508 L.J. Palmer, "Progress of Reindeer Grazing Investigations in Alaska," 30. Palmer determined the nutritive quality of lichens by sending samples to the Bureau of Chemistry and to Bureau of Plant and Industry in Washington, D.C. See Letter from LJ Palmer to Chief of Bureau, Biological Survey, Nov 6, 1929, RG 75, Bureau of Indian Affairs, Lawrence J. Palmer Correspondence, Box 2, Digestion Studies, 1920-34, NARA-A.

problem."[509] Palmer had initially estimated that each reindeer required 30 acres of land per year. But this number was based on the supposition that tundra could recover from grazing within five to ten years. After allotting time for recovery, especially the winter range, he asserted that carrying capacity must be on the order of 40 to 60 acres per head. Extrapolating to the available land in Alaska suitable for grazing, he estimated that the territory could support three million reindeer, three times as many the fully-stocked industry had in 1926.[510]

Palmer's concerns and visions for the reindeer industry must have been colored by his experiences with the Forest Service in Utah. He was a biologist in Ogden, part of Region 4, which boasted more acreage under federal supervision than any other western region. It also boasted more cows, sheep, ranchers, and problems with soil erosion.[511] Working at the Great Basin research station between 1915 and 1919, Palmer had been exposed to the Forest Service's goals for watershed protection and the scientific studies that helped meet those goals. In Region 4, managers balanced multiple uses of the land—recreation and grazing, for example—with perpetuating natural resources into the future. To do so efficiently, range ecologists sought to maintain a ratio of browse and grasses to provide a basis for the livestock industry. They also had to choose appropriate vegetation species that kept dirt from washing away even after having its tops eaten by grazers.[512] They based their decisions on information gathered from "period studies," those that determined the "season" for grazing by documenting the life cycles of plants and organizing the movements of animals to prevent overgrazing of new, young plants. Region 4 led the US in these types of studies and helped make common the use of quadrats as research

509 "'Progress Report: Quadrat Studies,' Nov 1, 1923," RG 75, Box 4, NARA-A.
510 L.J Palmer, "Progress of Reindeer Grazing Investigations in Alaska," 31.
511 The Forest History Society, "Range Management and Research: 1910 to 1929," http://www.foresthistory.org/ASPNET/Publications/region/4/history/chap5.aspx (accessed March 8 2013).
512 The Forest History Society, "Range Management Bulletin," http://www.foresthistory.org/ASPNET/Policy/Grazing/Jardinebook.aspx (8 March 2013); and The Forest History Society, "Letter," http://www.foresthistory.org/ASPNET/Policy/Grazing/GrazingInspection.aspx (accessed March 8 2013).

tools. Palmer's work in Utah also helped solidify the broad concept of "carrying capacity," a measurement of the maximum amount of grazers the land could support without becoming exhausted. When he made recommendations for the future of Alaska's reindeer, then, Palmer synthesized his personal experiences in the West and the North, as well as a diverse set of ecological relationships between plants, soil, animals, and humans.[513]

Palmer's conclusions about *Cladonia* and carrying capacity fit into a larger Bureau of Biological Survey scheme of modernizing the reindeer industry. Palmer lamented that reindeer handling in Alaska suffered "from lack of application of improved modern methods."[514] What he meant was modern science, and more specifically, the concept of rotational grazing. This was another concept Palmer imported to Alaska through the Department of Agriculture from sheep and cattle range science in the West. In theory, this approach made maximum use of forage available by moving herds between a series of summer and winter pastures and preventing overgrazing by allowing some tracts of land to go fallow each year. In order to make this kind of grazing possible, Palmer noted, the industry's management and infrastructure would need careful overhaul and supervision. The territory must be divided into grazing units, which could be delimited by "natural monuments" such as divides between drainages. Corrals should be constructed to facilitate round-ups and slaughter. Permanent winter cabins should be built to ease herd management in winter, the most important phase for the protection of *Cladonia*. But most importantly, rotational grazing depended on open herding, where animals were free to select food on their own. This approach contrasted with the Saami tradition of close herding, where herders and animals stayed together as they moved over the land. Both Palmer and Nelson agreed that rotational grazing replaced the "crude methods of the original herders" and instilled in the

513 The Forest History Society, "Range Management and Research: 1910 to 1929"
514 L.J. Palmer, "Progress of Reindeer Grazing Investigations in Alaska," 33.

industry "definite scientific investigations [and] oversight."[515]

The modern methods advocated by Palmer and the Bureau of Biological Industry converged with the needs of private industry in Alaska. Starting in Nome and working their way outward across the Seward Peninsula and nearby districts, the Lomens began buying reindeer and creating a vertically-organized corporation, where they owned herds, corrals and processing facilities, ice-shelters for meat storage, and ships with insulated hulls for refrigerated transport to Seattle. Open herding fit within this business model, as it was limited only by the size of the grazing allotment, not the amount of labor needed to move with the herd, as was the case with close herding. The Bureau of Indian Affairs also advocated open herding at the time, given the outbreak of influenza across Alaska which had killed many of the experienced herders. Despite immense growth of reindeer villages in the territory after the collapse of whaling and the gold rush, the reindeer industry found itself in desperate need of capital, both human and financial, to stay alive. Open herding seemed to provide a safety net for the Inuit families in the industry, as it allowed a small number of inexperienced herders to manage a herd together, sharing knowledge and labor.[516]

Open herding was not without its problems, however. It encouraged straying of animals and attacks from predators that would not be scared off by the presence of herders. Some Bureau of Indian Affairs and Bureau of Education staff also suspected that open herding was not creating the deep knowledge and respect of reindeer and the land that close herding had. They wondered, then, if open herding provided fewer cultural benefits for so-called savage Inuit hunters.[517] The

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515 Ibid, 3. See also **L**etter from E.W. Nelson to Edmund Seymour, (President of American Bison Society), Dec 30, 1921 RG 22, Entry 162, Box 21, Folder: Experimental Station, Lomen Brothers, General Correspondence, NARA.

516 Willis, 293-296. See also U.S. Department of the Interior, *Hearings of the Reindeer Committee in Washington, D.C., February – March, 1931*, (Washington: Office of the Secretary, 1931), 27.

517 W.T. Lopp, "Comparison of Herding Systems Used in the Alaska Reindeer Service," May 16, 1936, in Kathleen Lopp Smith Family Papers, Box 2, Folder 22, UAF-APR.

thorniest issue, for native northerners, the Lomens, scientists, and government officials, however, was mixing. When Lomen herds mixed with local Inuit herds—which they inevitably did in areas without fences—herders often corralled large groups of the animals so they could be separated. In almost all cases, some reindeer were found to have no brand to indicate the owner. These unmarked animals were to be distributed to owners based on a percentage scheme, itself derived from the size of the herds, with the larger herd receiving more of the share of the unmarked animals. This practice likely encouraged the Lomens not to worry about mixing, as they stood to gain nearly as many animals from a well-supervised open herd as they were a herd subject to straying.

Palmer's research and recommendations provided the foundation for these interactions among herders. He had worked closely with the Lomen Company, the Bureau of Indian Affairs, and the Alaska Game Commission to create the procedures around branding animals and distributing unmarked animals in mixed herds, thereby aiding the growth of the industry and the company's growing influence within it. His stated aim, shared by his superior Nelson, was to unite "scattered herds into large herds, each under white supervision with natives as herders."[518] The tight association here between industry, science, and social control, would later form the center of a debate over reindeer ownership in Alaska, resulting in a 1937 law that disallowed non-native ownership. But until that point, the union of governmental and commercial interests largely buried complaints from Alaskans about the use of science in the service of corporate greed and land tenure.[519]

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518 Letter from E.W. Nelson to Edmund Seymour, (President of American Bison Society), Dec 30, 1921 RG 22, Entry 162, Box 21, Folder: Experimental Station, Lomen Brothers, General Correspondence, NARA.

519 W.B. Bell to Mr. Wm B. Miller, 27 November 1928, Lawrence J. Palmer Papers, APR-UAF. See also "Survey of Conditions of the Indians in the United States: Hearings before a Subcommittee of the committee on Indian Affairs," U.S. Senate, 74th congress, second session, part 36, Alaska (including reindeer), U.S. Government Printing Office, 1939, 20173. Here, former Alaska Native Service staff member C.L. Andrews testifies that the Bureau of Biological Survey was in league with the Lomen Corporation and that scientific research has been

Palmer and his agency's support of private enterprise might at first seem to counter the long-standing narrative about the Progressive Era, in which conservationists and the public fought for environmental protection and against monopolies. That big business needed to be kept in check—especially as it related to the potential destruction of natural resources—was a widely-held belief in the United States in the 1920s. Indeed, battles between government agents and coal syndicates in Alaska had made national headlines in the lead-up to the 1912 election, resulting in the firing of conservation leader and Forest Service director Gifford Pinchot. If Alaska was viewed as a national treasure, to be used by the people, how could the Bureau of Biological Survey blatantly support the Lomens over Inuit interests?[520]

In recommending open herding and creating management procedures that favored the Lomens, Palmer and Nelson found themselves balancing two competing interests: foster the development of Alaska and prevent the creation of monopolies. As Nelson explained to the governor of Alaska in 1921, permits and grazing allotments were the best mechanism for reaching this balance. Nelson touted the Lomen company as Alaska's best bet, principally because by establishing economic ties to the United States from within Alaska, the company helped create an autonomous territory that was not dependent on government subsidy, as was a native-run industry. Yet Nelson made clear that the company could be appropriately managed by preventing the "vast sale of tracts" and instead issuing a "system of permits." This approach, which had been so successful in the National Forests of the American West, allowed the government the regulatory power over the land and its bounty while encouraging land uses that met private and public goals—the greatest good for the greatest number. These relationships

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marshaled in the service of the state and capital.

520 On the "Ballinger-Pinchot Affair," see Naske and Slotnick, 150. On standard narratives of conservation that pit nature-protectors against corporate elites, see David Stradling, "Introduction," in *Conservation in the Progressive Era: Classic Texts,* ed. David Stradling, (Seattle: University of Washington Press, 2004), 8-9.

around reindeer in Alaska make visible the blurry boundaries between social reform and social control, and between conservation and development in the interwar era. As Rudolph Anderson had hoped when pushing back against Stefansson's notions of a "friendly" Arctic, reindeer programs allowed bureaucrats to push for expanded governmental power at all levels, even with courting partnerships with industry.[521]

As we consider the relationship of Porsild and Palmer—and the connections among science, the Canadian state, and the Canadian Reindeer Project—we must remember the concepts of winter forage and carrying capacity were components of a management regime, just like open herding, permits, and allotments. This regime made room for the expertise of scientists to guide the activities of Saami herders and native apprentices. To better visualize the linkage between scientific knowledge, state supervision, and the reindeer industry, consider the tables and maps Palmer presented to his readers in his 1926 Department of Agriculture publication (See Figures 9 and 10). Through reference to the chemistry of various tundra plants and the spatial distribution of what he called "tundra types", Palmer argued for the merit of a rational, scientific manager to preside over people and nature in the north. This was a person who could hold together the particular nutritive value of *Cladonia* and the landscape mosaic of topography, vegetation, and climate while directing the right number of herders and reindeer to the right places at the right times. Winter forage and carrying capacity were thus mechanisms for what scholars have called *legibility*, the capacity of governments to represent the resources of particular territories so as to exploit them. Palmer's charts and maps provide telling examples of

521 Letter from E.W. Nelson to Thomas Riggs, Jr. Aug 3, 1921, RG 22, Entry 162, Box 21, Folder: Experimental Station, Lomen Brothers, General Correspondence, NARA. On conservation as a form of social control, see Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation,* (Berkeley: University of California Press, 2001).

"the radical reorganization and simplification of flora to meet man's goals."[522]

TABLE 3.—*Summary of forage types in the stand on summer and winter ranges showing in percentages the composition density, palatability, and forage value*[1]

Section	Composition					Density	Palatability	Forage value
	Lichen	Browse	Sedge	Weeds	Moss			
Coast summer range:								
St. Lawrence Island	0	5	91	3	1	90	65	58.5
Kivalina	5	15	47	31	2	79	68	53.7
Kotzebue Sound	10	26	51	5	8	93	64	59.5
Seward Peninsula	7	15	53	24	1	68	60	40.8
Norton Sound	11	22	50	5	12	92	51	46.9
Yukon–Nunivak Island	9	15	57	15	4	90	60	54.0
Kuskokwim	6	40	34	17	3	70	67	46.9
Average	7	20	55	14	4	83	62	51.4
Interior summer range:								
Broad Pass	18	28	27	12	15	96	70	67.2
Gulkana-Tangle Lakes	16	34	29	10	11	88	68	59.8
Average	17	31	28	11	13	92	69	63.5
Coast winter range:								
St. Lawrence Island	65	12	2	11	10	40	80	32.0
Kotzebue Sound	50	25	15	10	0	60	70	42.0
Seward Peninsula	50	15	30	5	0	70	75	52.5
Norton Sound	50	10	30	4	6	87	67	58.3
Yukon–Nunivak Island	50	10	30	2	8	99	66	65.3
Kuskokwim	47	30	10	3	10	70	70	49.0
Average	52	17	20	6	6	71	71	50.0
Interior winter range:								
Broad Pass	50	20	8	4	18	85	76	64.6
Gulkana-Tangle Lakes	53	23	11	6	7	85	83	70.5
Average	52	22	10	5	13	85	80	67.5

[1] Forage value derived by multiplying the percentage of density of forage stand by the percentage of palatability.

Figure 9. Palmer converts the Alaskan tundra into the terms of lichen ecology, with special attention to the nutritive value of particular reindeer districts. *Source: U.S. Department of Agriculture*

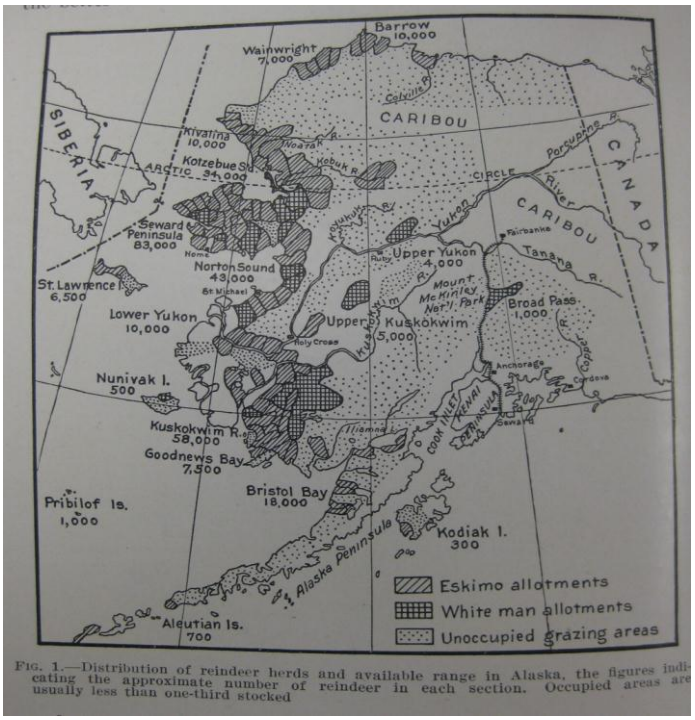

FIG. 1.—Distribution of reindeer herds and available range in Alaska, the figures indicating the approximate number of reindeer in each section. Occupied areas are usually less than one-third stocked

Figure 10. Palmer charts Alaskan reindeer herds according to district and existing owners, and indicates possible areas for future development. *Source: U.S. Department of Agriculture.*

522 The best source on legibility remains James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*, (Yale University Press, 1999). See in particular 1-9.

The Porsilds' studies with Palmer brought science and the state a long way from the Royal Commission on Muskox and Reindeer. Enclosures and quadrat studies produced new knowledge about the tundra, which highlighted a set of problems, solutions, and problem solvers unique to a form of development founded on grazing ecology. Lichens and "reindeer mosses" were known to Canadian bureaucrats before the Porsilds' visit with Palmer, but *Cladonia*, "winter forage", "carrying capacity," and "tundra types" had not yet been quantified or made intelligible. Similarly, the creation of a scientific grazing manager reordered the positions of Saami, Inuit, Lomen businessmen, government teachers, and federal administrators relative to one another. Armed with charts, maps, specimens, and observations, the scientist-manager abstracted himself from the day-to-day operations of the industry, even as he governed them. Perhaps paradoxically, this scientific and managerial ethos meant that Saami could remain authorities on tacit knowledge about reindeer in ways that no longer threatened researchers or bureaucrats. The novelty of Palmer's ecology and its applications might be why some Alaskans considered him not a practical reindeer man, but a man with a briefcase, issuing figures pulled from thin air.[523] It may also account for renowned ecologist Frederic Clements' interest and support of Palmer's research, which he called "exceedingly important and helpful" in the development of plant ecology.[524]

When the Porsild brothers were given orders to learn what Palmer had to teach them about reindeer, a passage was opened between the Canadian Reindeer Project and scientific ideas emerging from the Fairbanks station. The Porsilds visited extensively with Palmer, touring his

523 "Extracts from Report of W. B. Miller on Kuskokwim Reindeer Investigations, Dated Jan 17, 1931," an addendum within *Reindeer Hearings*, Washington, D.C. 1931. Palmer was described in this addendum as follows: "The new man comes here with his brief case full of formulas which he intends to apply. He publishes and describes their use as an improvement of methods, etc."

524 Letter from Frederic Clements to L.J. Palmer, Nov 6, 1926, RG 75, Box 4, Quadrat Studies, 1922-1935, NARA-A.

experimental pastures and traveling with him around Alaska to observe herds. Palmer walked the brothers through the practices of marking, corralling, and butchering and shared "all his reindeer files" with A.E. Porsild. The Bureau biologist also conveyed his views about the advantages of open herding and, by association, the superiority of "modern" methods for handling reindeer over native Alaskan and Saami ways of knowing the animal.[525]

The Porsilds left Nome, Alaska in December 1926, attempting and completing a trek to the Mackenzie Delta to test a possible route for the delivery of the herd to Canada. Upon arriving in Aklavik, A.E. Porsild wrote O.S. Finnie to proclaim the reconnaissance mission with Palmer a success. Porsild imbibed Palmer's teachings, for his observations of the northern tundra and Inuit culture took place through the lens of Palmer's science. Noting the plant cover in the Mackenzie Delta flats, Porsild characterized them as one of many tundra "types," which "entirely conform[ed] with similar deltas of Buckland, Kobuk, or Noataq in Alaska." While on his way to the International Boundary, he observed the herds owned by Inupiat in the vicinity of Point Barrow. Porsild lamented that the "lack of white initiative and of adequate supervision" had resulted in poor management and even a notable decrease in the size of reindeer.[526]

Home on the Range: Surveying the Canadian North, Building the Canadian Reindeer Project

> "The main camp of the new reindeer station had been established on the... Mackenzie river delta, where during the last few years a small hamlet had grown up to provide living accommodation and warehouse facilities for the staff

525 Quote about files in A.E Porsild, "Field Journal of an Expedition through Alaska Yukon and the Mackenzie District being a botanical reconnaissance with special reference to the suitability of the country for domesticated reindeer. Also many notes on the physiography of the country, its inhabitants, wild life and general economic conditions. 1926-1928, by AE Porsild," Microfilm Reel M-1958, Library and Archives Canada, p8. See also Dathan, 53-62. See L.J Palmer to Chief of Bureau Biological Survey, 27 August 27 1926, Lawrence J. Palmer Papers, Box 3, Folder 4, APR-UAF.

526 A.E Porsild, "Field Journal of an Expedition through Alaska Yukon and the Mackenzie District...", 57, Microfilm Reel M-1958, LAC. Porsild, *Reindeer Grazing in Northwest Canada,* 14.

> connected with the experiment. On the Arctic coast...two long wire fences lead to a large, circular palisaded enclosure from which a complicated system of holding pens, separated by sliding gates, lead to a 30-foot-long chute, so designed that only one reindeer at a time is able to pass, thus permitting a careful and thorough inspection."
>
> *A.E. Porsild, 1936*[527]

Between 1926 and 1931, Alf Erling Porsild visited Alaska twice, scoured the Canadian north for a home for reindeer, and also visited Kautekeino, Norway to hire three Saami families responsible for teaching Inuit how to herd. Ultimately, Porsild recommended that only two districts, the Mackenzie Delta and the Dease River valley, were suitable for governmental reindeer.[528] Over the next few years, Porsild helped build Reindeer Station, oriented the Saami families to the place, and waited for the herd to arrive.[529] When viewed together, these activities and the reports Porsild wrote about them reveal how Palmer's regime of reindeer configured Porsild's observations, his conclusions, and the final construction of the Canadian Reindeer Project.

Between April and August, 1927, A.E. Porsild and his brother completed a survey of the "Husky Lakes" region between present-day Inuvik and Tuktoyaktuk. Porsild was hopeful this landscape could house the Canadian Reindeer Project. "Magnificent lichen cover over vast areas," he scribbled in his journal. "50 to 80% [of which are] pure lichen." With excitement, he pictured the region with Palmer's lichen ecology in mind: "*Cladonia rangiferina* and *Cl. silv.* and *Cl. Uncinalis, Cl. alpestris, Cetr. aiv.* and many others. *Cladonia rangiferina* and *Cl. silv* probably covers more ground than all the rest together...This lake would be ideal location for

527 Erling Porsild, "The Reindeer Industry and the Canadian Eskimo, *The Geographical Journal,* vol. 88, no 1 (Jul 1936),15-16.

528 He noted later that the government preferred the Mackenzie Delta because its proximity to Alaska would ease the delivery of reindeer. Indeed, Finnie had already suspected that the Mackenzie District—a region much larger than the Mackenzie Delta—would be the best home for reindeer. See O.S. Finnie to Messrs A.E. And R.T. Porsild, May 19, 1926, Microfilm Reel #T13273, vol. 765, File 5095—Porsild, 1926-36, LAC.

529 Porsild, "The Reindeer Industry and the Canadian Eskimo," 6-10.

winter reindeer camp."[530] Based on his observations of forage in the area, Porsild estimated the country could support up to 250,000 reindeer.[531]

The carrying capacity of the Husky Lakes region did not dwarf other areas Finnie asked the Porsilds to study, which included the shores of Great Bear Lake and the Keewatin District. In 1928, the brothers inspected the valley of the Dease River, which extends northeast of Great Bear Lake, and the "northern plains" running south and west of the lake. Porsild described the region as a "natural grazing unit" as it was "closed in from all sides," and afforded abundant vegetation. He increased the number of acres that should be allotted per reindeer there, though. The units presented a different "tundra type" than the Mackenzie Delta and Porsild found it difficult to estimate grazing potential in this "unmapped country." Still, the botanist suggested that the twenty five million acres of the Great Bear Lake basin could support a total of 300,000 reindeer.[532]

The Great Bear Lake basin presented other ecological problems particular to reindeer. The southern shores of the lake were "too heavily timbered to make herding and control of tame reindeer practicable."[533] But more importantly, both the Dease Valley and the northern plains units offered little protection from mosquitoes, the ubiquitous, yet temporary, pest of reindeer and reindeer industries. Porsild's diaries are peppered with comments about how annoying mosquitoes could be, as well as how troublesome they were to effective reindeer management. When visiting Palmer in 1929, Porsild learned that nearly fifty of Palmer's stock at Fairbanks had been killed by mosquitoes in the previous year. In 1936, Porsild spelled out the consequences of mosquitoes, and the Canadian north's natural means of defending against them—hills and

530 As cited in Dathan, 118.
531 Porsild, *Reindeer Grazing in Northwest Canada,* 40.
532 Ibid, 19-39.
533 Ibid, 34.

wind—in terms of a spatiality of reindeer potential:

> "In the entire North-West Territories, with the exception of the northern archipelago and the sea-coast, flies and mosquitoes occur in such unbelievable numbers during the short summer season that neither the reindeer nor the hardiest of herders can endure their torments. The only method of escaping these pests is by moving the herd during June and July to the sea-coast, where the cooling effect of the sea gives some measure of relief, or to drive the deer to high hills. Nowhere in the area under consideration are there hills high enough to permit the reindeer to escape the flies during the summer, and for this reason reindeer ranching in Arctic Canada will always be definitely limited to the sea-coast and adjacent hinterland."[534]

Porsild's thoughts on *Cladonia,* carrying capacity, and mosquitoes make clear how an enriched awareness of certain ecological factors underlying reindeer husbandry in Canada was at play in siting the Canadian Reindeer Project. This ecological knowledge found its clearest expression in descriptions of vegetation. "Reindeer ranching under a system such as has been evolved in Alaska," he argued, "requires summer and winter pastures."[535] With rotational grazing in mind, Porsild admired the patchwork of tundra plants evident in the Mackenzie Delta and Arctic coast. He employed Palmer's models of tundra types and the Alaskan scientist's ecological counting methods to determine the exact proportion, distribution, and nutritive values of sedges, grasses, and lichens there.[536] In this grazing unit, Porsild pointed out that the highest parts of the interior were covered by a "hard and fairly dry type of tundra'" while low-lying areas were comprised of brackish lakes and lagoons. "Although not so rich in succulent grasses and herbs as the Alaska tundra," Porsild wrote, "this type of pasture is nevertheless more valuable as summer pasture for reindeer, as it is not so susceptible to damage by the trampling of grazing herds." Ranking the "Husky Lakes" region as the best winter grazing land in Canada, Porsild

534 Porsild, "The Reindeer Industry and the Canadian Eskimo," 16
535 Ibid, 6
536 A.E Porsild, "Field Journal of an Expedition through Alaska Yukon and the Mackenzie District...," 70, Microfilm Reel M-1958, LAC.

commented on its “high percentage of palatable species,” and the possibility for its “maximum development.” In one turn of phrase, Porsild even pictured reindeer in this winter pasture “put[ting] on their back fat,” directly linking the growth of plants with the growth of a northern reindeer industry.[537]

Porsild's observations did not seem to favor the obstacles or opportunities of reindeer in Canada, but rather the logical consequences of ecological data for the institution of animal husbandry. His attention to mosquitoes and forage makes this clear, as does his impression of the Hudson's Bay coast. In 1929-1930, A.E. Porsild teamed with the Royal Canadian Air Force to perform aerial surveys of vegetation on the shores of Hudson's Bay. While exhilarated by the plane's ability to ease the rigors of fieldwork, Porsild admitted that the Keewatin district was poor country for reindeer. He later wrote that the flights proved this area was “entirely unsuited to reindeer”: when viewed from a plane, “the almost total absence of soil and closed plant cover is most striking."[538] Ironically, then, ecology both made reindeer possible in the Mackenzie Delta and circumscribed its possibilities within Canada. As historian P. Wendy Dathan has noted, just as the Royal Commission's grand plans for reindeer came into being in the Delta through scientific research on lichens, the application of this knowledge to other potential reindeer landscapes confirmed that Canada's north would never boast a vast industry.[539]

Porsild did not only apply his new knowledge to natural conditions—he also used it to affirm ideas about the social organization of the Project. In his journals and his reports to the Department of Interior and the Royal Geographical Society, Porsild found evidence to support a hierarchical regime of supervision over Saami instructors, Inuit herders, and the tundra itself.

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537 Porsild, *Reindeer Grazing in Northwest Canada*, 29-32. See also Letter from AE Porsild, June 25, 1927, Microfilm Reel M-1958, LAC. The letter was not listed to anyone.
538 Porsild, “The Reindeer and the Canadian Eskimo,” 6-7.
539 See Dathan, 134-184.

While crossing from Barrow, Alaska to Aklavik in the winter of 1926-7, Porsild met Tarpoq, an Inupiat man and owner of a reindeer herd. Porsild found that Tarpoq was "a good reindeer man under the supervision of a white man," but when he had been left unsupervised by the U.S. Bureau of Education, he started to "neglect his herd when his increase and profits is [sic] not up to his expectations."[540]

Financial concerns and the need for governmental oversight animated Porsild's engagement with native Inuit in the Mackenzie Delta region. While at Atkinson Point, Porsild noted that the Inuvialuit had "too much easy cash" and had not yet learned the value of caring for their possessions. Moreover, he found that in the region between the international boundary and the Mackenzie Delta, Inuit had given up their customary seal hunt in favor of trapping fox, as the latter activity afforded them enough money to buy dog food (rather than hunt seal for it) and purchase other goods of interest, like flour, tobacco, ammunition, and rifles. The botanist also worried about the future of Inuit in a fur economy that was more volatile than one based on herding.[541] Later, in 1929, Finnie echoed Porsild's sentiments, suggesting that the "natives...might be seriously affected by the periodic fluctuations in the numbers of fur-bearers and by changes in the fur markets."[542] For Porsild and Finnie, as well as Palmer and Nelson, reindeer helped tame these wild elements of the north.

Scientists and state officials drew clear boundaries between white society and Inuit culture even as the reindeer projects meant to erase them. But officials sometimes got their lines crossed on the roles of scientists and Saami herders. While the reindeer were being driven from

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540 Letter from AE Porsild, June 16, 1927, Microfilm Reel M-1958, LAC. The letter was not listed with a "to" field. Porsild wrote, "The case of Tarpoq is not unique. Similar cases have been met with in other places in Alaska, when an eskimo, though a good reindeer man under the supervision of a white man, when left to himself, soon starts to neglect his herd when his increase and profits is not up to his expectations."

541 A.E Porsild, "Field Journal of an Expedition through Alaska Yukon and the Mackenzie District...," 73-78, Microfilm Reel M-1958, LAC.

542 Porsild, *Reindeer Grazing in Northwest Canada,* 5-6.

Alaska to the Mackenzie Delta, they faced incredible delays: a trip that was estimated to take eighteen months was completed in just under five years. These delays inflamed relationships among Saami, the Canadian government, and Porsild. Anxious for the herd to arrive in Canada, bureaucrats in Ottawa suggested that Porsild relieve the current supervisor of the drive, Saami Andy Bahr, and guide the animals to their destination. Porsild was infuriated, as he both had advocated for "white men" to lead the drive originally and because he interpreted this order as a demotion from his position as scientist. On the verge of losing both Porsild and the reindeer, a representative of the Lomen Company stepped in, paying the botanist a handsome $2,500 to manage the delivery of the herd.[543]

Porsild's conclusions, themselves informed by Palmer's teachings, directly informed the creation of a series of instruments to further guide the Canadian Reindeer Project. In 1931, he traveled to Kautekeino, Norway, identifying and selecting three Saami families to relocate to the Mackenzie Delta to train Inuit in reindeer herding. In 1931 and 1932, Porsild chose the site for, and helped build Reindeer Station, the government's first town in the Arctic.[544] In 1933, following Porsild's recommendations, Parliament established federal ordinances to protect the reindeer as a national resource and created a 6,000 acre Reindeer Grazing Preserve to contain and control northern pastures—as well as who trapped or hunted there. In that year, the Inter-Departmental Reindeer Committee, having formed to consult the Department of Mines and Resources staff on the best practices for the reindeer industry, nominated Porsild to become the

543 For a summary of this controversy, see Dick North, *Exodus,* 195-197; 217.

544 There were other towns in the Western Arctic at the time, but these had emerged in response to private industry. Herschel Island was a product of the commercial whaling industry, just as Aklavik, Fort McPherson, and Tuktoyaktuk were created as outposts of the fur trade. Reindeer Station, in contrast, was built from the ground up to service the government's reindeer program. Families were relocated from these outlying towns to the new settlement. This history prefigured the attempt in the late 1950s to relocated residents of Aklavik to the government hub of "New Aklavik," also known as "East-Three," and, later, "Inuvik."

first superintendent of the Canadian Reindeer Project.[545] In October, 1935, after supervising the arrival of the herd and the first six months of operations at Reindeer Station, Porsild left the north for Ottawa. After spending ten summers and seven winters in the Arctic, "getting Canada's first Government-owned reindeer off to a good start," he took up new roles as Chief Botanist of the National Herbarium and consultant for the Interdepartmental Reindeer Committee.[546] This continued investment in the Canadian Reindeer Project throughout the early 1930s is remarkable, given the retrenchment of the civil service in Canada and the reorganization of northern bureaucracies after the Great Depression.[547]

By 1940, the reindeer inhabited a landscape that looked quite different from that Porsild had surveyed in the late 1920s. The image of thousands of reindeer that the botanist had projected on the land had been replaced by regular seasonal movements of people and animals. In the spring, Saami herder Mikkel Pulk and Inuit apprentices pushed the main herd from its winter range to the coastal area, where fawning commenced in early April and lasted until June. In the summer, reindeer were driven to Richards Island, where consistent winds dispersed mosquitoes. Before the annual round-up, which took place at the summer corral near Kittigaruit, herders caught fish, harvested whale, and prepared this meat for the long winter.[548] Reindeer supervisors, who were hired through the Department of Mines and Resources, directed the schedule of the main herd and supervised the nascent native-owned herds.[549] In addition, they

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545 Minutes from a meeting of the Interdepartmental Reindeer committee, January 18 1933, G79-069, File 1-3, NWTA.

546 Porsild, "To the Mackenzie Delta to inspect and report on Reindeer Experiment, June-August, 1947, Daily Journal of A.E. Porsild," Microfilm M-1958, Library and Archives Canada, 3.

547 On retrenchment, see North, *Arctic Exodus*, 170-2; and Richard Finnie, *Canada Moves North*, (New York: Hurst and Blackett, 1942), 65-70. Finnie and Cory resigned at the end of 1931; the Northwest Territories and Yukon Branch was abolished and territories came under jurisdiction of Dominion Lands Board.

548 Richard Finnie, *Canada Moves North*, 141. See also A.E. Porsild, 1947 Report, 1-7, RG 109 , Vol 491, file 111, LAC. Porsild notes that between 1936 and 1947, Canadian Reindeer Project sent Aklavik 5,000 carcasses, amounting to 500,000 pounds of meat.

549 List for File: Staff at Reindeer Station, Nov 15, 1935, Microfilm reel, T-13323, vol. 822, File 7128, Lapp

kept supplies and equipment on hand; maintained communication with governmental agents in Aklavik by radio service; and arranged for the training of as many young boys as possible in reindeer husbandry.[550] Finally, supervisors issued regular reports to Ottawa, to be reviewed and evaluated by the Interdepartmental Reindeer committee.

That these movements of supervisors, herders, apprentices, and reindeer had become routine by 1940 belies the dramatic transformations in scientific understanding of Arctic nature and governmental capacity that had taken place in the previous two decades.

Reaction and Reorganization: The Great Depression, Economic Transitions, and the End of the Interwar Era

In 1936, a crowd of military officials, academicians, interested citizens, and Department of Interior bureaucrats gathered at the Royal Geographical Society to hear Alf Erling Porsild speak on "The Reindeer Industry and the Canadian Eskimo." In the discussion that followed the presentation, Albert Charles Seward, a professor of Botany at Cambridge University, offered his support of Porsild's work and the Canadian government's initiative. "I feel that you will agree with me when I congratulate Mr. Porsild on having most successfully carried out this great experiment," Seward announced. "It was an experiment which I think there is no doubt will yield very valuable results, not only as regards value to the Dominion of Canada but particularly in improving conditions under which the Canadian Eskimo are living in those far northern regions."[551] When the first Inuit-run herd was established in 1938, it provided evidence for

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herders, 1929-1938, LAC. Inuit who signed up as apprentices earned $25 a month, a "ration" valued at $200, meat and skins,

550 Lands, Parks, and Forests Branch, *Canada's Reindeer*, Northwest Territories Administration (Ottawa, 1940), 5-7.

551 Percy Cox, Professor Seward, Colonel Vanier, "The Reindeer Industry and the Canadian Eskimo: Discussion," *The Geographical Journal*, Vol. 88, No. 1 (Jul., 1936), 18.

Seward and others of a new system of administration for northern territories, one that complemented education, religion, commerce, and law enforcement.

Despite its foundations, the Canadian Reindeer Project fell apart in a matter of twenty years. While six teams of Inuit became owners of herds after 1938, all of these operations collapsed by 1959. In that year, the Canadian government handed the project to private developers, having little to show for its million-dollar investment.[552] Meanwhile, along the north slope of Alaska, reindeer herding followed a similar trajectory. The number of reindeer in Barrow—the largest town in the region, with a population over 1200 Inuit—had dropped from an estimated 35,000 in 1935 to fewer than 5,000 by 1940. By 1952, domestic reindeer were no longer found in the Barrow area or on the entire Arctic slope of Alaska.[553] What happened? Seeking answers to this question takes us away from the research efforts of Palmer and Porsild and toward the ways bureaucrats, companies, and Inuit negotiated economic transitions in the Western Arctic during the 1930s and 1940s. This context underscores how the interwar period acted as a crucible, a test of the state's ability to develop people and nature in the north.

Historian Roxanne Willis has pointed to the Great Depression as an underlying cause and turning point for widespread changes in the Alaskan reindeer industry over the 1930s and 1940s. Willis shows that the crash in stock markets jeopardized the Lomen Company's solvency. Exports of reindeer carcasses to the lower 48 fell from the tens of thousands to just over six hundred in 1931. In 1933, the financial backers in New York City that had supported the Company passed away, and the Lomens struggled to secure investors. Adding insult to their

552 R.M. Hill, "Mackenzie Reindeer Operations," Northern Coordination and Research Centre, Department of Indian Affairs and Northern Development, August 1967, DHC. The Canadian Reindeer Project did not end with World War II or even 1959, as is implied here. It continued to be passed back and forth between private and public hands throughout the 1960s and 1970s. Today, the small extant herd in the Mackenzie Delta is owned partly by a private individual and partly by the Inuvialuit Regional Corporation.

553 J. Sonnenfeld, "An Arctic Reindeer Industry: Growth and Decline," *Geographical Review,* vol. 49, no. 1 (Jan., 1959), 77-78. See also A.D. Johnson, "Brief History of the Reindeer in the Arctic," found in RG 75, Box "Historical Files, 1929-1948," Folder "History—Reindeer in Barrow Region, 1942," NARA-A.

injury, the success enjoyed by the Lomens in the 1920s now appeared as a threat to the cattle industry, as cattlemen and their representatives in Washington worried about the inroads reindeer had made in beef markets. Meanwhile, Alaskan natives living in the Nome area raised complaints of deliberate mixing practices that favored the Lomens. In response to all of these conditions and complaints, the US government called a series of hearings in Washington in the early 1930s to evaluate the Alaskan reindeer industry.[554]

Rising New Deal sentiments for reorganization of government and relations among business, citizens, and natural resources resulted in the departure of the Lomen company from the reindeer industry. Initially, the Department of Interior decided not to pursue any sanctions against any of Lomen's business practices. The field men sent to investigate reindeer herding—many of whom came from western states, the heart of the beef industry—realized that the reindeer industry was much smaller than their fears warranted. The Lomens acquired a government loan, which allowed them to continue business but also invited an audit of their assets. By 1935, the Department of the Interior was concerned about the Lomen Company given their decreasing exports. Alaskan native herders remained outraged, referring to initial investigations and subsequent government support as deliberately exploitative and unfairly biased in the Lomens' favor. Bureau of Indian Affairs Commissioner John Collier began advocating for a government take-over of reindeer as part of efforts to create village governments and encourage Alaskan Natives to develop their own economic activities in the region. Such a move required bureaucrats to buy-out the Lomen herds and redistribute them to Alaskan natives. In 1936, Congress passed the Alaskan Reorganization Act which put these plans

554 Willis, 297-300. See also Dean F. Olson, *Alaska Reindeer Herdsmen: A Study of Native Management in Transition*, (Fairbanks, Alaska: Institute of Social, Economic, and Government Research, 1969). See especially Chapter 3: The Period of Decline, 1933-1950, http://www.alaskool.org/projects/reindeer/history/iser1969/reindeer_3.html, (accessed March 8, 2013).

in motion. The next year, Congress passed the Reindeer Act to authorize $700,000 to be spent moving reindeer from the Lomen Company to the hands of native owners.[555]

These changes in Washington and the Nome area shaped reindeer herding on Alaska's Arctic slope. The Reorganization Act required that native villages form joint-stock corporations to manage reindeer, which rendered obsolete the support of apprenticeships through Bureau of Education schools. According to a 1959 article by geographer Joseph Sonnenfeld, this business model did not work well with Inuit herders on the north slope, since their labors supported people who did far less work, but still were paid through shares of meat and hides. In response, fewer Inuit on the north slope entered the herding business and more herds were left unsupervised. While straying, mixing, and predation remained constant problems, herders in northern Alaska also took to killing animals for non-food purposes, such as baiting fox traps.[556] However, there were other factors at play in the Western Arctic that explain the actions of north slope herders and also help explain the situation in Canada, where Inuit herders became apprentices in a government program without any competition from private enterprise and were not subject to the Reorganization or Reindeer Acts. The Great Depression did contribute to the decline in herding in the Western Arctic, but not solely because it sunk the Lomen Company and fostered a New Deal for natives.

In the Western Arctic, one of the driving factors in the fate of the reindeer industry was the fur trade, and the way the Great Depression reshaped it. As explained in Chapter 2, the collapse of commercial whaling in the Beaufort Sea in the early 1910s gave rise to a thriving fur trading economy over the next three decades. Some whalers, like Captain C.T. Pedersen, outfitted whaling schooners as floating posts and others established shore-based trading

555 Willis, 297-300.
556 Sonnenfeld, 82-5.

operations from Wainwright, Alaska to Baillie Island, Northwest Territories. Pedersen's business, the CanAlaska Company, relied on the open water season and enterprising Inuit trappers to turn the Beaufort Sea and the fur bearing creatures living along its shores into sources of wealth. Pedersen supplied Inuit trappers with gas-powered schooners to seek out foxes (but also beavers, mink, muskrat, marten, and more) along the north slope, the Yukon Coast, on Victoria and Banks Islands, and further into the nooks and crannies of peninsulas in the Coronation Gulf. By the early 1930s, Pedersen, along with shore-based whaler-turn-traders, and their loyal Inuit partners had worked out a regular schedule and system of ports that brought furs from a large portion of the Western Arctic to San Francisco.

Inuit decisions to enter, avoid, or leave reindeer herding were often negotiated by their experiences with the fur trade. According to the geographer Sonnenfeld, the "tradition" of the fur trade—in which goods or cash were supplied in exchange for services—made Inuit "unwilling to work without some compensation, even if necessary work remained undone."[557] Elisa Hart, who conducted oral histories with Inuit herders in the Mackenzie Delta region during the 1990s, heard similar testimony. Inuit involved with the Canadian Reindeer Project expressed frustration with the lack of individual freedoms within the herding lifestyle, as contrasted with the opportunities available through the fur trapping economy.[558] This choice—between the fur trade and reindeer herding—had been the source of concern for Canadian scientists in the Interdepartmental Reindeer Committee. It infused rhetoric about wildly unstable markets and fluctuations in fox populations and decisions to allow trapping within the Reindeer Grazing Preserve in order to recruit apprentices. Thus, when the rippling effects of the Great Depression washed into the fur

557 Ibid, 88-89.

558 Elisa Hart, *Reindeer Days Remembered*, 25. David Roland said, "I could have been a herder when I was a young man, but when the fur was good, I didn't like to have a boss. Yes, then the fur [prices] got so low that I had to take a job. That was in 1953."

trade on the Beaufort Sea, the relations among Inuit livelihood, the physical environment, and government intervention began to shift.

In 1936, as bureaucrats in Washington contemplated the reorganization of reindeer herding in Alaska, C.T. Pedersen sold his business to the Hudson's Bay Company. Like the Lomen Company, he found his integrated export operations proving less and less viable in each year since 1929.[559] The Hudson's Bay Company decided to not to pursue trading operations in the Beaufort Sea, as had been established by Pedersen and local and Inuit traders. This decision put Inuit livelihoods in jeopardy and influenced the fate of reindeer herding in the Western Arctic. Rather than continue service between the Pacific coast (either San Francisco, Vancouver, or Victoria) and the Arctic coast, they relied on the Mackenzie River to connect the Western Arctic to markets and distribution centers in the south. Recognizing the value of furs along the Yukon coast between the Mackenzie River mouth and on Banks and Victoria Islands, the Company invested in a port at the end of the Mackenzie Delta, where river and coastal boats could meet. This town, Tuktoyaktuk, eventually replaced Herschel Island as a rendezvous and trading location. These geographic and economic changes meant that all Inuit living along the north slope of Alaska and Canada west of Tuktoyaktuk who had relied on Pedersen for essential goods now had to find alternative means of procuring food and clothing items.[560]

The removal of Pedersen's trading system from the Western Arctic led to broad changes in the region's settlement geography and the place of reindeer in the lives of Inuit. The proliferation of fur trade posts east of Barrow, Alaska along the Beaufort Sea coast along with the presence of reindeer herds at these posts had stabilized populations of traders and trappers,

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559 Rob Ingram and Helene Dobrowolsky, *Waves Upon the Shore: an Historical Profile of Herschel Island*, (prepared for Heritage Branch, Department of Tourism, Government of Yukon, September 1989), 164-167.

560 These plans to build up Tuktoyaktuk were in place as early as 1930. F.H. Kitto, "The Northwest Territories, 1930," (Department of the Interior, Northwest Territories and Yukon Branch, 1933), 38-45.

encouraging Inuit to stay east and not travel to Barrow to trade. But, with the trade pulled out from under them, these communities now had fewer reasons to stay put. Barrow residents quickly faced a food and fuel shortage and many native families moved out of town and into the interior, to use "oil soaked peat soil" as a fuel source and to rely on abundant ptarmigan, rabbits, fish, and reindeer for food.[561] The remaining Barrow residents attempted to subsist off of the 21,000 reindeer that still survived on the range beyond the community. Residents of nearby coastal towns at the mouth of the Colville River and at Barter Island pleaded with Barrow residents for a share of these reindeer and 3,500 animals were cut from the herd and sent eastward to these towns. But by 1938, Inuit in Colville and Barter Island had killed all of these animals for food.[562] These actions surely contributed to the decrease in herd sizes reported by Sonnenfeld in 1959.

In addition, many Inuit on Alaska's Arctic slope migrated into the Mackenzie Delta over the late 1930s and early 1940s to search for more suitable trapping conditions, continuing a trend in westward movements that began in the 1880s with commercial whaling.[563] This migration disturbed residents in the Mackenzie Delta and ultimately conditioned how the Canadian Reindeer Project played out. Trapping prices remained high throughout late 1930s and early 1940s, and thus Alaskan Inuit were willing to risk the dangers of relocating to Aklavik (a multi-week trip across thousands of miles of tundra) to continue a trapping lifestyle. The Hudson's Bay Company stood to gain from this situation, having access to more trappers given both the removal of Pedersen's competition and the addition of a skilled workforce. The influx of Alaskan

561 Joseph Sonnenfeld, "Changes in Subsistence among the Barrow Eskimo," (Ph.D. Diss., Johns Hopkins University), 307-309.

562 A.D. Johnson, "Brief History of the Reindeer in the Arctic," found in RG 75, Box "Historical Files, 1929-1948," Folder "History—Reindeer in Barrow Region, 1942," NARA-A.

563 Letter from Pete Paulson to Mrs. Isabella Hutchinsen, n.d, Dorothy and Grenold Collins Collection, Box 7, Series 5, Folder 1, UAA. Paulson writes that after Barter Island and Colville residents slaughtered herds, most families living along northeastern slope moved either to Barrow (and on to Wainwright) or into Canada.

Inuit into the region concerned Canadian Inuit, however, who pleaded with the Canadian government to establish trapping sanctuaries that prohibited non-native residents—including Alaskan Inuit—from harvesting local game. The government did hear these suggestions but did not enact the proposed measures.[564]

All of these movements inspired by the Great Depression and the economic transition of the fur trade puts into perspective the choices Inuit made about reindeer herding, and the abilities of the US and Canadian governments to wield power over Inuit through reindeer after 1936. In Alaska, dire situations turned reindeer from a stable food source into an emergency food source. In Canada, Inuit avoided reindeer because of the flourishing trapping economy, even when locals faced increased competition from Alaskan trappers and limited choices regarding where they could sell furs. Indeed, many of the Inuit who ran the six native-owned herds in the Canadian Reindeer Project between 1938 and 1956 were Alaskan Inuit or Copper Inuit from the Central Arctic, not Inuvialuit from the Mackenzie Delta.[565] Inuvialuit had the liberty to avoid Reindeer Station in the 1930s and 40s because of the existing, though shifting, trapping and trading economy.

By the early 1940s, the state of herding in Arctic Alaska was in disarray and the administrators of the Canadian Reindeer Project faced difficulty recruiting young Inuit men to become apprentices. The situation shifted yet again in 1944. On September 9th, the "worst storm in years" blew over the Western Arctic region, sweeping up an innocent victim, the schooner

564 Royal Canadian Mounted Police memo "Alaskan Natives entering Canada at Demarcation Point, Y.T., Trapping in N.W.T.," July 23, 1946, found in Microfilm reel T-13329, volume 829, file 7282 "Mackenzie Delta Game Preserve, 1930-1949, (Parts 1 and 2)", LAC.

565 See Hart, 19-28 and 72-9 and Inuvialuit *Pitiiqsuit,* 66: "In the end, the herd was kept by the government. It hired the Inupiat herders who drove the reindeer from Alaska to stay and manage the herd. Inuit from the Coppermine area were hired to be herders along with the Inuvialuit. The meat supplied by the herd was sold to the mission schools and elsewhere. The herd was eventually sold by the government to an individual and, to this date, the Inuvialuit have profited very little from the herd." See also, Nagy, "Yukon North Slope Cultural Resources Survey: Final Report" When Nagy asked Inuvialuit elders about the major forces that shaped life between 1900 and 1964, the reindeer program was not listed.

Cally. On board were Peter Kaglik and Charlie Rufus, the owners of the two native-run herds, and their families, as well as Stanley Mason, the acting post manager of Reindeer Station. In a single day, nearly ten years' worth of hard work and investment—on behalf of scientists, Saami, Inuit, and the Canadian government—washed away.[566] Arguably, the Project never recovered. After 1944, three other native herds were spun-off of the government herd, but each collapsed by 1956.[567]

As reindeer herding in the Western Arctic fell apart, activities in the late 1940s and early 1950s reinforced the project's historicity as a product of governments testing out science and development in the north. Inspired by shifting Cold War geopolitics—which pitted the Western Arctic as vulnerable border-zone with the Soviet Union—Washington and Ottawa went north with renewed vigor in the 1940s and 1950s. As we will see in the next chapter, bureaucrats placed high priorities on defense and modernization initiatives. These choices relegated reindeer herding as unimportant and antiquated. Kittigaruit, where the reindeer were corralled in the Mackenzie Delta during summer, became home to a meteorological station for aerial navigation in the mid 1940s. By the mid 1950s, the animals would have grazed coastal vegetation in the shadows of radar stations on the Yukon north slope.[568] As Ottawa planned the relocation of the residents of Aklavik and Reindeer Station to a new governmental town, "East-Three," the feasibility of maintaining the reindeer program was brought into question.[569] By 1958, much of the labor pool at Reindeer Station had washed toward construction projects related to "East

566 "Disaster at Tuktuk," *Moccasin Telegraph* (March 1945), 24. Available in the Public Reference file on Reindeer, NWTA.

567 Hart, 74-79. A sixth native herd, the fourth to be started after the *Cally* accident, began in 1954 and was returned in 1964. It was the longest running native herd at that point.

568 Pokiak, 80. Hart and Cockney, 1. On the Bar-1 DEW line site, see David Neufeld, "Commemorating the Cold War in Canada: Considering the DEW line," *The Public Historian* 20, issue 1 (1998), 9-19.

569 For a compelling history of Inuvik's construction in the 1950s and its effect on local labor and land use, see Dick Hill, *Inuvik: A History, 1958-2008: The Planning, Construction and Growth of an Arctic Community,* (Trafford Publishing: Victoria, BC, 2008), 38-59.

Three" and defense.[570] The government transferred the herd to private developers in that year, maintaining a staff person at Reindeer Station for oversight.[571]

The demise of government-sponsored reindeer herding coincided with and was made legible by the rise of high-modernism in the north. US and Canadian officials, Interdepartmental Reindeer Committee members, and university researchers from both countries began wondering why this project—so destined to succeed—never lived up to its potential. Drawing on ecological and sociological analyses of the Alaskan industry, they turned the Canadian Reindeer Project into a case study of historic attempts to scientifically-manage development in the north. Analysts hung the troubles of the Project on Inuit culture, immature science, and poor planning. Anthropologists concluded Inuit were inherently resistant to the herding lifestyle and some government officials believed Inuit were by nature lazy. To ecologists, the scientific tools used in mapping the Preserve and estimating its carrying capacity now seemed outdated. Those that inherited reindeer management in the 1950s defined its limits not by lichen distribution, but by the presence of infrastructure, like processing and storage facilities, and its proximity to local communities.[572] But beyond the particulars was a broad conclusion about the past. Both the U.S. and Canadian governments and science itself had moved on from the uncertainties and trials of

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570 R.M. Hill, "Mackenzie Reindeer Operations," Northern Coordination and Research Centre, Department of Indian Affairs and Northern Development, August 1967.

571 Hart, 84. On labor pool problems in conjunction with DEW line and Inuvik's construction, see "Annual Report, Reindeer Station, April 1 1958 – March 31, 1959," G1979-003-70-1, NWTA. The Canadian Reindeer Project did not end with World War II or even 1959, as is implied here. It continued to be passed back and forth between private and public hands throughout the 1960s and 1970s. Today, the small extant herd in the Mackenzie Delta is owned partly by a private individual and partly by the Inuvialuit Regional Corporation.

572 On published analyses of the Canadian Reindeer Project, see Joseph Sonnenfeld, "An Arctic Reindeer Industry: Growth and Decline," *The Geographical Review* 49, no. 1 (1959): 77-94; George W. Scotter, "Reindeer husbandry as a land use in northwestern Canada," in *Proceedings of the Productivity and Conservation in Northern Circumpolar Lands Conference* W.A. Fuller and P.G. Kevan, eds. IUCN New Series, 16 (1969): 159-169. And also Scotter, "Reindeer Ranching in Canada," 1972. Unpublished memos and annual reports from Reindeer Station post managers between 1952 and 1959 detail many of these "problems" with reindeer and make gestures to research on the Alaskan industry's failure. See, for example, Laco Hunt, "Some Observations on the Reindeer Industry, 1952" G1979-003-70-1, NWTA.; and Letter from R.C. Robertson to "Mr. Steele," 27 May 1960, G1979-003-70-1, NWTA. These documents gave little consideration to the ways Inuit residents consciously avoided the Program.

interwar ways and into a new era of command and control of the northern environment.

Conclusion: The Experimental State of Nature

In this chapter, I have positioned the Canadian Reindeer Project as a window on attempts to bring dominion to the Western Arctic during the interwar period. This positioning complements recent scholarship from northern scholars such as Stephen Haycox, John Sandlos, Liza Piper, Jeff Noakes and Janice Cavell, and Christina Adcock that identifies the interwar period as a critical moment for the US and Canadian states in the north. The lands above the sixtieth parallel became a space, both physical and conceptual, in which the US and Canada staged performances as empires. Through the region, Canada defined itself, in legal terms, against Europe and the United States; developed global economic relations through mineral and fisheries industries; and asserted its power over native northerners through conservation areas and hunting regulations. At the same time, explorers and the Canadian public engaged the landscape and idea of the north to come to terms with civilization and its discontents. In Alaska, the US government took on Big Business in the form of salmon canneries and coal syndicates, created a route to interior settlement via the Alaskan Railroad, and attempted to colonize the heart of the territory through the Matanuska Valley Settlement Project. When considered alongside these histories, the reindeer episode does not seem like an oddity of the historical record, but as emblematic of it.

More than any other example from the period, reindeer industries highlight how relations among scientific knowledge, governmental power, and the northern environment shifted between 1919 and 1944. The Canadian Reindeer Project makes clear that state priorities for the Arctic called into being new partnerships between the government and science. By the end of the Great

War, Washington and Ottawa held little institutional knowledge for understanding the north as reindeer country, despite having introduced reindeer to several parts of the continent over the turn of the century. This kind of information—maps, statistics, and archives of research papers—had been instrumental in the contemporary cases of mining and commercial fishing in the subarctic. There, bureaucrats turned to scientists within geological surveys to assist private industry in manipulating human and natural resources. As Liza Piper has shown, geologists and biologists provided a framework in which industrial operations took place, converting complex lake ecosystems into "enormous fish ponds," diverse human communities into so-called lazy natives, and invisible subsurface environments into rationalized and mechanized mines.[573] Legibility in the subarctic was a product of well-established ideas, communities, and stereotypes being transported to terrestrial and aquatic environments in the large lake region.

Mining, fishing, geology, and biology offered historic forms of science and resource exploitation for governmental and commercial agents to bring northward. But the reindeer was a whole other animal. There was no university system in place to provide a pool of students trained in reindeer husbandry science, northern botany, or Arctic ecology. There were few archives, maps, or statistics that bureaucrats could rely on to plot their schemes with reindeer—though these were being calculated at the time by economic geographers, biogeographers, and cultural anthropologists. The Royal Commission on Muskox and Reindeer was one attempt to create this database and define the characters and characteristics of reindeer expertise. But this gathering produced false starts, spawning Vilhjalmur Stefansson's spectacular failure with reindeer on Baffin Island. Thus, the government turned to Alaska, which by 1926 had begun to amass a wealth of research through its biologists Seymour Hadwen and Lawrence Palmer, and to Denmark, which had already made science and empire work in the Arctic in Greenland. It also

573 On fishing and biological research, see Piper 192-223; On mining and geology, see Piper, 114-139.

imagined Inuit as central to the success of Canada in the north, and not just a population that could be supplanted by fishermen or prospectors.

Just as state interests forged new commitments to science, international partners, and local residents, so too did the production of scientific knowledge about Arctic life alter how state agents understood the north and their capacity there. Visions of vast herds had preceded Palmer and Porsild, but the biologists created the instruments and concepts by which the dream of a domesticated Arctic could become a reality. Through notions of lichens, tundra types, and carrying capacity, these scientists helped bureaucrats quantify northern terrain, to see it not as barren or backward, or even as an unending prairie, but as a set of districts with varying degrees of potential for people and reindeer. Scientific understanding of geography, vegetation patterns, mosquitoes, reindeer feeding habits, climate, and the organization of herding operations directed where and how state power moved north. Interventions with reindeer required nuanced knowledge of the Arctic environment and science showed both the opportunities for governmental action and the limits northern nature imposed upon southern ambitions.

In the example of reindeer, we see clearly how state power could begin with an idea—crude but compelling, nebulous but with clear potential—and transform into a program buttressed by research, capital, public support, policy, and labor.[574] Even as the re-drawing of lines of sovereignty and jurisdiction through conservation legislation and international agreements about Arctic claims seemed to happen with a pen or a single vote, such "acts of occupation" required maintenance, approval, and knowledge to be enshrined on the historical record. In its rise and fall, the Canadian Reindeer Project thus makes visible the intentions and contingencies of the state and science in the north.

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574 This view is being assembled in research beyond the north, by geographers working on the social construction of nature (and the ways nature produces society as well). For a primer, see Bruce Braun, "Producing Vertical Territory: Geology and Governmentality in late Victorian Canada," *Cultural Geographies* 2000 7:7-46.

This point can be crystallized by returning to the ways historical actors referred to the Canadian Reindeer Project. At the Royal Geographical Society event, Professor Seward chose his words carefully. The Canadian Reindeer Project was an experiment, a study in how governments could administer the Arctic and its resources more effectively. It was experimental, relying on an unorthodox technology (reindeer), creating innovative alliances (with Danish and American scientists, Inuit hunters, and Saami herders), and building new spaces for intensive economic development (Reindeer Station and the Reindeer Grazing Preserve). It was also experimentalist. The project employed professional biologists whose quadrat studies and surveys provided crucial data to guide the implementation of a government-run animal husbandry economy and civilizing program. Without exaggerating or downplaying it, the introduction of reindeer herding was an attempt to remake ecological, political, and social relationships in the Western Arctic. Reindeer Station, the Grazing Preserve, and the "reindeer country" that extended from the Arctic coast of Alaska to the Mackenzie River became a natural laboratory for state power and scientific knowledge, the best expression of an experimental state of nature in the interwar period.

5

To Engineer the Strategic Arctic:

Permafrost and the Academic-Military-Industrial Complex, 1944-1959

> "The engineer, then, is responsible in the very broadest sense, for the physical basis of life today, for the technology (if you will) which provides the necessities which alone make modern life possible and the conveniences which make it comfortable."
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> *R.F. Legget, "Resources for Tomorrow: The Engineer's Stewardship," 1953*[575]

By July, 1947—after three years of trial and error—Stephen J. Eszenyi worried about the US Navy's prospects of extracting oil from the frozen earth. As the Officer in Charge of the US Naval Arctic Test Station at Point Barrow, Alaska, Eszenyi had witnessed firsthand how the tundra thwarted the machinery and methods of oil production. Bulldozers, tractors, and Weasels—a tank-like tracked vehicle built during World War II for use in snow—could muster a top-speed of only five miles per hour because the terrain was so rough. Driving in second gear for hours on end burnt out the transmissions on at least two principal pieces of equipment. Running logistics to drill sites was one problem—the actual drilling was another. At each location, the ground had to be "prethawed before driving piles," which required steam jet heaters and a forty horse-power boiler to power them. Once the surface had been warmed and excavated, and the piles had been inserted correctly, the biting cold returned in force. "A very serious obstacle to pile driving is the swelling of the material in the active area which has frozen to the

575 R.F. Legget, "Resources for Tomorrow: The Engineer's Stewardship," The Sixth Wallberg Lecture, Convocation Hall, Feb 10, 1953, found in MG 30 J 44, R.F. Legget Fonds, Vol. 5, File 6, LAC.

pile," Eszenyi noted. Frustrated, but recognizing the unique nature of the north, he concluded that "Pileloading in the Arctic is not the same problem as it is in the States."[576]

Failure was not an option for Eszenyi. Alaska's north slope had become a critical source of fuel for military operations in an emerging theater of conflict with the Soviet Union. To find creative solutions, the Naval officer embarked on a radical course of action. Rather than succumbing to the "tendency...to combat nature and her forces by strengthening material, designs, etc.," Eszenyi recommended that the Navy develop an entirely new approach to the north. "In the Arctic and Subarctic, the customary engineering principles and designs cannot be successfully employed but have to be adapted to the prevailing frost conditions," he charged. "It is therefore necessary to cooperate with nature rather than oppose her." He proposed an extensive research program that investigated "permafrost," the term given to describe the frozen, foreboding, and yet fragile subsurface conditions throughout much of the far north. In a memo to the Officer in Charge of the US Naval Advance Base Depot in Port Hueneme, California, he called for coordinated investigations into the "methods and principles necessary" for the construction and design of excavation, pile driving, drainage and sewage, roads, airfields, buildings and insulation, steel erection, fuel storage pits, and feed storage lockers. "Since permafrost is one of the greatest obstacles, the importance of an investigation and study cannot be overemphasized," he remarked. He was confident that results from such research would "make it possible for future economical planning."[577]

Within a dozen years, Eszenyi's plan to cooperate with, study, and manipulate the Arctic's physical environment came to fruition. In the same year that he dispatched his memo, the Office

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576 Stephen J. Eszenyi, Officer in Charge of U.S. Naval Arctic Test Station to Office in Charge, U.S. Naval Advance Base Depot, "Monthly Report no. 1-47," 6-22, July 16, 1947, found in RG 57, Entry: Geologic Division, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 2, Folder: Arctic Research Laboratory, Data on Barrow, Alaska, NARA.

577 Ibid, 24.

of Naval Research created the Naval Arctic Research Laboratory, the United States' first laboratory in the Arctic. Scientists from universities across the continent, along with members of the Air Force and Army from both the US and Canada, worked side by side with the Navy and its contractors to understand the limits of the frozen earth and how to work within them. Less than five years later, the National Research Council of Canada opened a similar laboratory in Norman Wells, Northwest Territories, the site of an oil production and processing facility operated by Imperial Oil, once a subsidiary of Standard Oil. By the mid 1950s, with rising consumer and military demand in North America for petroleum products, private enterprise grew interested in Western Arctic oil resources and the permafrost research necessary to extract them. The US and Canadian governments seized this moment, leasing millions of acres of the land to oil companies. In 1959, Canada completed construction on a new town in the Mackenzie Delta, initially called “New Aklavik,” to serve as the administrative center of the north and its future oil economy, much like Fairbanks in Alaska. In less than a generation, scientific cooperation with the north had helped catalyze the region's transformation.

This chapter traces the elaboration of these military, industrial, governmental, and scientific networks in the Western Arctic between 1944 and 1959. I argue that knowledge about the physical environment became a nexus for an academic-military-industrial complex in the Arctic. As Eszenyi's example suggests, an understanding of the land (or a lack of it) guided martial and economic operations on the frozen earth. Defense and development initiatives created needs for the Western Arctic's first laboratories and allowed scientists unprecedented access to the region. Through these spaces and experiences, engineers, ecologists, geologists, and geophysicists helped produce a new field of knowledge centered on “permafrost,” a term coined

in the 1940s to describe phenomena associated with Arctic subsoil.[578] In turn, scientific research on permafrost directed how and where the academic-military-industrial complex moved in the north. Oil companies drew from permafrost data to determine how to build on, travel over, and pull oil out of the land. The Canadian government relied on permafrost scientists to identify the most appropriate site for its new hub in the Western Arctic. Consequently, a region that had been understood as unstable because of its ties to volatile global fur markets and fluctuating fur-bearing creatures was produced as a strategic location—both conceptually and materially—for continental security, economic growth, and efficient administration.

Eszenyi pleaded with his superiors to provide the science necessary for these projects in 1947, making clear the essential relationship between environmental knowledge and imperial strategy in the Western Arctic after World War II. Such a relationship is less visible in existing historical literature. Cold War history remains dominated by tightly focused treatments of foreign affairs officers, military officials, and strategists in Moscow and Washington.[579] Historians of Cold War science have emphasized science's centralization through examinations of the National Science Foundation and the national laboratories, as well as the pervasive influence military agencies, funding, and concepts.[580] Environmental historians have recently turned to the place of nature—and knowledge about it—in America's pursuit of a "New World Order" in the tropical world, itself emerging from the shadow of formal empire at the time.[581] Given these literatures,

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578 Stephen Taber, "Perennially frozen ground in Alaska: its origin and history," *Geological Society of America Bulletin*, Vol. 54, (1943): 1433-1548.

579 Matthew Farish, "Review of *Entangled Geographies: Empire and Technopolitics in the Global Cold War,*" *Isis*, 103, 4 (2012), 805-806.

580 Stuart Leslie, *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia University Press, 1993).; Paul Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge: MIT Press, 1996).; Jessica Wang, *American Science in an Age of Anxiety: Scientists, Anticommunism, and the Cold War* (Chapel Hill: University of North Carolina Press, 1999).; Peter Westwick, *The National Labs: Science in an American System, 1947-1974*. (Cambridge, MA: Harvard University Press, 2003).

581 Scott Kirsch, *Proving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving* (New

Eszenyi might seem out of place. Here was a scientist who emphasized the importance of the land and worked outside the confines of metropolitan centers, their institutions, and the global networks that defined European imperialism. As historical geographer Ruth Oldenziel has argued for America's island possessions, focusing on the edges of empire and characters like Eszenyi helps explain "why Cold War historiography exhibits a persistent difficulty in grasping the territorial bases of America's global power and a recurrent self-definition of the U.S. as an exceptional world power."[582] In the Arctic, permafrost scientists were central to the U.S. and Canada's military and industrial expansion during and after the 1950 because the pressures of global decolonization and the global Cold War converged on one another.

I begin with a review of the ways an idea of the Arctic as "strategic" became enrolled in political, scientific, and economic discourse in the 1940s and 1950s. This survey demonstrates how projects of defense and development maintained imperial relationships in the far north, despite growing awareness of decolonization movements elsewhere. To better highlight the interconnections of knowledge and the academic-military-industrial complex, I center my analysis on two episodes from the period. The first addresses the Navy's operations outside Point Barrow, Alaska from the perspective of scientists working at the Naval Arctic Research Laboratory. Geological research on the temperature profiles of oil wells and soil moisture improved knowledge of the dynamics of freezing and thawing in permafrost, which helped address problems of transport, construction, and oil production in the Naval Petroleum Reserve no. 4. The lessons learned in northwestern Alaska allowed the northward expansion of private oil companies to Arctic Alaska and northwest Canada in the mid to late 1950s.

Brunswick, NJ: Rutger's University Press, 2005). J.R. McNeill and Corinna R. Unger, *Environmental Histories of the Cold War,* (New York: Cambridge University Press, 2010).

582 See Ruth Oldenziel, "Islands: The United States as Networked Empire," in Gabrielle Hecht (Ed.), *Entangled Geographies: Empire and Technopolitics in the Global Cold War,* (Cambridge: MIT Press, 2011), pp. 13-42.

The second episode investigates the scientific surveys associated with the siting and establishment of Inuvik, formerly "New Aklavik," Canada's governmental center in the Western Arctic. Canadian engineers and geologists selected the location for Inuvik after an in-depth, multi-year research project that involved extensive surveys of the Mackenzie Delta by air and on the ground. These surveys drew from permafrost science emerging from the laboratories and oil facilities at Barrow, Alaska and Norman Wells, as well as expeditions conducted by the US Army of Corps of Engineers, Purdue University, and Canada's Division of Building Research. As in the case with an expanding oil empire, the completion of Inuvik symbolized not only the establishment of a "modern" Arctic, but the ways scientific ideas of nature drew from and effected the reorientation of the region's political, economic, and ecological networks. In the conclusion, I bring these case studies together to highlight permafrost science as a nexus through which the academic-military-industrial complex engaged and engineered the north.

The Strategic Arctic: Defense, Development, and Devolution in the Post-World War II Era

In 1950, leading northern scholars, elected officials, and civil servants gathered in Washington, D.C. to move Alaska and the Arctic region to the center of geopolitical and scientific interests. The opening ceremonies of the Alaskan Science Conference were a testament to the ways in which the recent events of the Second World War and the growing tensions with the Soviet Union had turned the northwestern corner of the North America from a distant hinterland into a frontline for continental and global security. The governor of the Alaskan territory, Ernest Gruening began his remarks by citing the words of General William Mitchell: "He who holds Alaska, holds the world." C. Earl Albrecht, the Commissioner of the Alaskan Department of Health and a member of the University of Alaska's Board of Regents echoed this

sentiment, noting how the territory was "strategically located in global power politics." H.E. Landsberg, the Executive Director of the Committee on Geophysics and Geography for the U.S. Research and Development Board, was more concerned, suggesting that Alaska was "the most exposed area of our northern defense sector." Following Gruening, Albrecht, and Landsberg at the at the podium that day were representatives from the U.S. Department of Agriculture, the Department of Interior, the Secretary of Commerce, the Coast Guard, and the Federal Security Agency.[583]

As is suggested by these proceedings, the notion of a strategic Arctic was often articulated and repeated between 1944 and 1959. In 1950, the same year as the Alaskan Science Conference, for example, the Royal Society of Canada held a symposium on the Arctic that also brought together leaders across military, government, business sectors to consider the geographic position of the northwest relative to its state as a defensible territory.[584] These enunciations about the Arctic highlighted not only the security issues surrounding the Arctic, but its potential economic value in mineral deposits and the need to transfer power from the federal government to more local forms of authority. In all of these concerns about defense, development, and devolution, the idea of a "strategic" Arctic came up time and again. A review of these themes helps make clear the interconnections of military, industrial, governmental, and scientific networks that will become the focus of this chapter's analysis in two historical episodes.

In the terms of continental defense, the conception of a strategic Arctic reflected the military's perception of the region's vulnerability and its demographics. With the Soviet Union rising as a global presence to rival the United States, and the advent of airplane and missile

583 Individual speeches from the Alaska Science Conference of 1950 are found in Naval Arctic Research Laboratory Records, Box 74, Folder: "Alaska Science Conference, First, November 1950," APR-UAF.

584 J.J. O'Neill, "Symposium on the Arctic," *Proceedings of the Royal Society of Canada,* vol. 64, series 3, (June, 1950), 125-6, found in DHC, Folder: Arctic.

technologies in the past decade, the far north appeared as a thin barrier between these two superpowers. The long-standing confidence in Alaska's "vastness" as "its own defense" had been shattered.[585] If combat were to break out in the far north, how would the armed forces respond? An air-lift style operation that had proved successful in Europe during World War II was too expensive. Thus, troops would have to learn how to fight on the ground, and the Air Force, Navy, and Army would need to develop transportation and survival capabilities in cold temperatures, frost conditions, darkness, and vast stretches of land without commercial services.[586] At the same time, the Arctic appeared, like many of the United States' island possessions, relatively unpopulated. This allowed scientists and military agents to view the north as a proving ground for testing nuclear technologies that might aid both war- and peace-time initiatives. Because the Arctic was (believed to be) empty, the political costs of possible destruction of the land were (thought to be) negligible.[587]

In the decade and a half that followed the end of the Second World War, U.S. and Canadian military forces moved to the northern rim to defend the terrain. As we have already glimpsed and will see in more detail soon, between 1943 and 1953, the U.S. Navy explored the Naval Petroleum Reserve in northwest Alaska for oil to fuel military operations in a possible Arctic theatre. Over the second half of the 1940s, the U.S. and Canadian air forces funded the construction of a series of weather stations on the tundra to aid aerial navigation, including sites at Barter Island on the Beaufort Sea coast and in the Mackenzie Delta.[588] In the late 1940s, U.S, Canadian, and British armed forces cooperated on broad military exercises, like Exercise

585 *The New York Times*, November 5, 1950.

586 H.E. Landsberg, "Alaska Research and National Defense" in Naval Arctic Research Laboratory Records, Box 74, Folder: "Alaska Science Conference, First, November 1950," APR-UAF. Landsberg was the Executive Director of the Committee on Geophysics and Geography, for the U.S. Research and Development Board.

587 Oldenziel, 20-22. See also Scott Kirsch, P*roving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving* (New Brunswick, NJ: Rutger's University Press, 2005), 45-76.

588 John C. Reed, "Pet 4: A Key to Arctic Operations," in RG 401, John C. Reed Papers, Collection XJCR, Box 11, Folder: "Presentations and Speeches," NARA.

Muskox and Exercise Permafrost, which tested technologies of warfare and travel in Arctic conditions in preparation for combat operations. In the early 1950s, the U.S. and Canadian governments collaborated on the Distant Early Warning Line, a string of radar stations built every fifty miles from Alaska to Greenland. The influx of armed forces into the region, the legacies they left on the physical landscape, and the mutual relations between these activities and the imaginary of a vulnerable and strategic north have convinced northern historians to characterize the 1940s and 1950s as the moment of "militarization" in northern North America.[589]

While this characterization is accurate, it might obscure other movements taking place at the time. Military agencies were but one part of a set of networks seeking to reach the Arctic, networks that also included industrial and political powers. By 1959, more than twenty million acres of the Western Arctic had been leased to oil companies like Standard Oil, Imperial Oil, and Atlantic Richfield.[590] The United States and Canadian governments had also invested large sums in projects of administration, whether providing new forms of housing and sewage treatment in Barrow, Alaska or creating a brand new hub for governmental services in the Mackenzie Delta.[591] Political leaders in both countries advocated for the end of colonial rule in the north and

589 P. Whitney Lackenbauer and Matthew Farish, "The Cold War on Canadian Soil: Militarizing a Northern Environment," Environmental *History* 12 (October 2007): 920-50.; Matthew Farish, "Frontier Engineering: From the Globe to the Body in the Cold War Arctic," *The Canadian Geographer* 50, no 2 (2006), 177–196. See also John C. Reed, "Summary Report on 'Exercise Permafrost,'" in RG 57, Military Geology Branch: General Correspondence Files, 1943-1953, Box 1, Folder: "Alaska, 1947-Aug 1950, Permafrost Activities: Defense Department," NARA.

590 For Alaska, see B.J. Galloway, "Appendix D: Historical Overview of North Slope Petroleum Development and *Exxon Valdez* Oil Spill," in *Environmental Report for Trans Alaska Pipeline System Right-of-Way Renewal* (February 2001), D-1. For Canada, see "Proceedings: National Northern Development Conference: The Last Frontier in North America, Edmonton, Alberta, Sept. 17, 18, 19, 1958," 38-43, found in DHC, Non-Vertical Files.

591 On the modernization of Barrow, see Margaret B. Blackman, *Sadie Brower Neakok: An Inupiaq Woman,* (Seattle: University of Washington Press, 1989,) 24-28. Between 1947 and 1953, the Navy and Alaskan Native Service built 100 new frame houses, a sanitary waste program, a new generator, and also performed a survey of local streets. On the construction of the hub in the Mackenzie Delta—eventually named Inuvik—see Dick Hill, *Inuvik: A history, 1958-2008: The Planning, Construction and Growth of an Arctic Community,* (Victoria, BC:

the devolution of power from Washington and Ottawa to northern settlements.[592] Alaska became a state in January of 1959, just as construction on the Canadian government's center in the Western Arctic was finished. These modernization initiatives were wrapped up with the Arctic's militarization.

In advocating the development and decolonization of the far north, bureaucrats and developers conjured visions of the strategic Arctic that did not necessarily invoke its geopolitical currency. In the 1950s, leading government officials in the United States and Canada imagined the north as significant to (inter)national development because of its abundant mineral resources, particularly oil and natural gas. In 1957, R.G. Robertson, then Commissioner of the Northwest Territories, demonstrated the enormous potential of the Arctic as an economic frontier. The deposits that had produced wealth in places like Ontario and Quebec, he said, were but "tiny spots" within the vast deposits of the far north. At the same time, the most important mineral resources around the globe were becoming exhausted, rendering northern supplies as "vital."[593] In the same year, Atlantic Richfield struck oil on Alaska's Kenai Peninsula in the southeast, which sparked a flood of capital investment into the territory that echoed the Klondike Gold Rush of the 1890s. By the mid 1950s, oil had become the most important mineral product of the Western Arctic. While Robertson predicted the exploitation oil and gas in the lower Mackenzie River valley, Ernest Gruening, the governor of Alaska at the time and a leading advocate for statehood, spelled out the strategic economic nature of the north in a statement that is worth quoting at length:

Trafford Publishing, 2008).

592 In Alaska, the leading voice on devolution was Ernest Gruening. See Ernest Gruening, *The State of Alaska*, (New York: Random House, 1954). His counterpart in Canada was R. Gordon Robertson. Gordon Robertson, *Memoirs of a Very Civil Servant: Mackenzie King to Pierre Trudeau*, (Toronto: University of Toronto Press, 2000).

593 "Vital" is from History of Naval Petroleum Reserve No. 4, Alaska" by John C Reed, A.G. Ronhovde, and Stewart French (DC Nat archives). Events from 1951-4 in world affairs "served to emphasize, especially to the United States, that petroleum supplies were both vital and vulnerable." 9

> Sixty years before, the cry had been "Gold!" and thousands of individual adventurers had made their way north and reminded Americans of the existence of Alaska. Now the adventurers were sophisticated multibillion dollar industrial complexes whose "grubstake" was provided by thousands of stockholders, who gambled on the profit-ability of investing millions of dollars in high-cost exploratory activities in Alaska.[594]

Alaska had become a critical global site for the industrial world's fuel.

Private industry elaborated upon the notion of an Arctic made strategic because of its potential for the development of petroleum resources. In 1960, Imperial Oil issued a "Report on the North," a summary of recent knowledge-gathering efforts in the Arctic, which was meant to sustain shareholder interest in continued investment in the region. The authors noted that the start of a new decade marked the end of a "decade of feverish activity" in exploring for and extracting northern oil and also marked the beginning of a new world order centered around the North Pole. The opening essay, entitled "Hub of the World?" featured a polar-projection map (which also graced the cover of the report), centering the earth on the Arctic Ocean. The image and the text supported the idea that the far north was quickly becoming a lynchpin in the global economy. With its Arctic lands, both the United States and Canada seemed poised to capitalize upon northern assets. Similar ideas could be found in the discussions in meetings of the Chambers of Commerce in Fairbanks and Anchorage and the panel sessions of the National Northern Development Conferences that began in Canada in the late 1950s.[595]

Hopes for developing the Arctic's strategic mineral reserves went hand-in-hand with bureaucratic desires for devolving power from federal to territorial governments. Leading northern officials pointed to the Arctic as an "underdeveloped" location, one that required local state agents to help lift the region out of poverty and take advantage of its distinct natural wealth.

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594 Gruening, *The State of Alaska,* 35.

595 *Imperial Oil Review, October 1960,* found in DHC, Folder: Northern Development. See Ernest Gruening, ed., *An Alaskan Reader, 1867-1967,* (New York: Meredith Press, 1966).

"The Canadian north is one of the last great undeveloped regions on this globe," announced Canadian civil servant Gordon Robertson. "There are few other parts of the world of great size that have not been occupied—insofar as they are capable of it—and to a substantial degree exploited."[596] Robertson was a leading advocate for devolution and northern economic activities. He was the right-hand man to Prime Minister Diefenbaker's "Road to Resources" program, which sought to establish transportation infrastructure in the north to facilitate resource extraction.[597]

With regard to devolving power to the north, the clearest expression of a strategic Arctic orbited the discussion of transportation facilities. Consider *The State of Alaska,* the book written by governor of the Alaskan territory, Ernest Gruening, as a tool to lobby for statehood in the 1950s. In a chapter entitled "Transportation: Tangled Life Lines," he pinned the potential for statehood and a correction of a history of "remote control" on the development of shipping, air travel, highways, and railways. Gruening explained that the "lag in Alaska" was due to the "distantly man-made obstacles" of federal bureaucracy and that local investments in "those vital arteries through which the lifeblood of commerce would course" would guarantee a bright future for the state. Without such strategic construction, the economy of Alaska would continue to resemble "the emerging nations of Latin America or Asia."[598] Similarly, for the Canadian Robertson, northern underdevelopment was the "old story of any frontier area": transportation facilities were too expensive to build without a viable market for minerals, and resource exploitation would not proceed without transportation infrastructure in place. Both U.S. and Canadian officials called upon the public to break this "vicious circle" by investing in railroads,

596 R.G. Robertson, "The Future of the North," 6.
597 Robertson, *A Very Civil Servant,* 146-199.
598 Gruening, *The State of Alaska,* 409-456; 527.

roads, and airfields.[599]

One of the biggest and most obvious modernization projects in the Western Arctic during the 1940s and 1950s was the construction of Inuvik, an entirely new town. Inuvik was designed to create new administrative infrastructure for a northern oil economy. While the United States had a Naval presence in the far north and Fairbanks as an administrative hub, the Canadian government began to fret about its capacity in the Arctic. In the 1940s, the government and the Royal Canadian Mounted Police conducted surveys of the town of Aklavik, situated in the Mackenzie Delta, to ascertain its suitability as a logistical center for Arctic operations. These surveys showed Aklavik to be a poor site. The soggy land surrounding the hamlet could not support the construction of an airfield. The nearby Mackenzie River flooded each year, threatening investments in infrastructure. It was clear that this "mudtropolis" was an artifact of the fur trade and reindeer economies, built incrementally on the main water route with little concern for sources of oil or the gravel that supported airstrips. Casting Aklavik as a "complete mistake", bureaucrats and engineers embarked on the construction of a new settlement which would meet the needs of development, defense, and devolution.[600]

The clearest marker of imperial life in the far north at mid-century is the idea of the Arctic as a strategic place. After the attack on Pearl Harbor crippled the U.S.'s capabilities in the Pacific, and Japanese forces occupied islands in Alaska's Aleutian chain, the military importance of the north was thrown in sharp relief. As hostilities ended in 1945 and the Cold War began, government leaders pointed to the Western Arctic as "the unprotected bald spot of the western hemisphere." Meanwhile, a growing appetite for petroleum in North America and a difficulty in sustaining access to petroleum resources made the Arctic an essential source of energy. Total

599 Robertson, "The Future of the North,"12-13.
600 Hill, *Inuvik: A History,* 22-30.

demand for oil and natural gas in North America reached a record high in 1955, and again in 1956. Meanwhile, the Korean War (1950-3); the shutdown of Iranian oil in 1951; and the Suez Conflict in 1956-1957 convinced political and economic elites that domestic supplies in the Arctic were central to meeting military and civilian needs.[601] As one governmental memo put it, the "problem of an adequate supply of petroleum," was far more than a military issue, because it involved "industry and transportation of the whole country."[602]

Finally, the Arctic was strategic because it allowed U.S. and Canadian authorities to reconcile a desire to spread universal values and maintain a vision of themselves as anti-colonial nation-states. North American bureaucrats, engineers, and developers descended on Barrow, Alaska and the Mackenzie Delta just as they did villages in India, Africa, and Latin America. As "underdeveloped" locations, these sites required significant investments in infrastructure to allow private enterprise to make use of nature, to eradicate poverty, to establish productive societies, and effectively stave off communism. Modernizing these areas required creating democracies there and transferring federal bureaucratic power to local forms of governance. By 1959, Alaska had become a state, Inuvik had been constructed, and native northerners had their first representation in the governing bodies of the region.[603] These political infrastructures were designed not only to assist the economic infrastructure of towns, roads, airfields, and pipelines, but also to serve as a symbol of North America's status as an exception to the rule of empire and revolution in the Tropics.

A review of the strategic Arctic discourse captures the expansion of military, industrial, and political networks in the far north. But these networks relied upon, and in turn shaped, the

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601 Reed, "Pet 4: A Key to Arctic Operations," 8-13.

602 "To the President: The Commission appointed by you to consider the Naval Reserve Oil situation respectfully submits the following report of its operations to date," n.d., RG 57, Program and Office Files, Records Concerning Naval Oil Reserves, 1921-1927, Box 1, Unmarked Folder, NARA.

603 Gordon Robertson, *Memoirs of a Very Civil Servant*, 107-201.

elaboration of scientific networks. As we will see in the remainder of this chapter, environmental knowledge about the far north was fundamental to the state and industry's initiatives in the region. Drilling for oil and administering the Western Arctic called into being a host of new problems, which required new solutions and problem-solvers. Engineering the strategic Arctic made sciences of the physical environment crucial to the shape of empire at mid-century. So, too, did environmental knowledge reshape how defense, development, and devolution played out on the ground.

Building Oil Empires: The Naval Petroleum Reserve and the Naval Arctic Research Laboratory

> It was an historic occasion, although the little group [of scientists] sweltering in unfamiliar Navy-issued cold-weather clothing did not realize it as they gazed around at the strange environment. The temperature was in the 50's and all around was the noise and bustle of an oil-exploration camp. Caterpillar tractors churned the soft sand as they hauled equipment to storage areas. Weasels (M29C), those small tracked vehicles so useful in the Arctic, seemed to be scooting in all directions on a variety of missions. The landscape was dotted with 56-gallon fuel drums, that ubiquitous trade mark of the American developer in out-of-the-way places all over the world.
>
> *John C. Reed and Andreas G. Ronhovde*[604]

Thus began John C. Reed's short history of the Naval Arctic Research Laboratory. Reed, a geologist with the U.S. Geological Survey's Alaska division, was intimately familiar with the Laboratory and oil exploration in Alaska. He served as a deputy on the Advisory Committee that supervised operations at the Naval Petroleum Reserve no. 4 site and as Chairman of the Laboratory at the Office of Naval Research from the station's creation until the early 1950s.[605] In commemorating this opening scene, the birth of U.S. laboratory research in the Arctic, Reed

604 John C. Reed and Andreas G. Ronhovde, *Arctic Laboratory: A History (1947-1966) of the Naval Arctic Research Laboratory at Point Barrow, Alaska,* (Arctic Institute of North America, 1971), 1-2.

605 Reed, "Pet 4: A Key to Arctic Operations," 2.

instantly linked the project of studying nature with the project of drilling for Arctic oil. For scientists arriving in Barrow, Alaska as well as for many other observers at mid-century, these two projects were inseparable. Researchers could perform local investigations only because of the logistics available at the oil camp. In turn, the process of traveling to oil fields and extracting resources from the frozen earth was made possible by the wealth of data produced by scientific fieldwork.

The Naval Petroleum Reserve no. 4—which was often shortened as "Pet 4"—was a program of the U.S. Navy to search for oil possibilities along the Arctic Slope of Alaska between the Brooks Range and the Beaufort Sea. Pet 4 earned its name as the fourth such petroleum reserve in the United States, with the first three located in California and Wyoming. These reserves, created over the first few decades of the 1900s, were always imagined as a ready source of crude oil in times of short supply or emergencies.[606] Similarly, Pet 4 became a necessity because of war-time developments—but not in the Arctic. The destruction of the U.S. Navy's base at Pearl Harbor in 1941 was followed by the occupation of islands in Alaska's Aleutian chain. Suddenly, the United States' ability to conduct operations in the Pacific theatre had been crippled. In response, in June of 1942, President Franklin Delano Roosevelt approved the U.S. Army's proposal to construct a massive transportation corridor across the subarctic. Both the U.S. and Canadian governments had recently completed the Northwest Staging Route, a string of airfields built to connect Edmonton with Fairbanks and to supply lend-lease aircraft to Soviet forces on the Eastern Front. Now, with immediate threats to continental security just offshore, these airfields became a central piece of a larger military infrastructure for the corner of the

606 U.S. Department of Energy, "Naval Petroleum Reserves-Profile," updated on December 22, 2011, http://fossil.energy.gov/programs/reserves/npr/, (accessed March 12, 2013).

continent.[607]

Over the next twenty months, U.S. and Canadian governments and private enterprise built transportation facilities on the frozen earth, foreshadowing the kinds of activities that would trouble Naval officers like Eszenyi. The U.S. Army Corps of Engineers, together with the joint venture Bechtel-Price-Callahan and Standard Oil, cleared a 1,700 mile roadway to supply logistical support and ready access to northern airstrips. They also erected a 1,000 mile pipeline from Norman Wells, in the interior of the Northwest Territories, to Whitehorse, Yukon—a secure source of oil to fuel the ongoing defense initiatives in Alaska.[608] In 1943, as government vehicles drove across the Alaskan Highway for the first time and oil began flowing through the CANOL pipeline, more than 450 aircraft per month flew overhead on their way to outposts in the far northwest.[609] Meanwhile, the 40,000 soldier-workers and engineers called on to complete these projects returned south, or headed off to other outposts across the world.[610]

The CANOL pipeline provided the U.S. with a protected source of oil for northern operations, but it proved to be a spectacular blunder. Not only did it cost more than five times its $20 million dollar-estimate, the shoddy craftsmanship behind its rushed creation riddled the pipeline with countless needs for repair. The pipeline was closed thirteen months after it opened, leaving the Canadian and U.S. governments in search of a source of oil as well as a symbol of failure on the northern landscape—a "junkyard monument to military stupidity."[611] In response, the U.S. Bureau of Mines sent a reconnaissance team to the abandoned Naval Petroleum Reserve

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607 Richard Finnie, *CANOL*, (San Francisco: Taylor and Taylor, 1945).
608 Ibid.
609 The Canadian Encyclopedia, "Northwest Staging Route," written by Kenneth S. Coates, http://www.thecanadianencyclopedia.com/articles/northwest-staging-route, (accessed March 12, 2013). Wikipedia contributors, "Canol Road," *Wikipedia, The Free Encyclopedia*, http://en.wikipedia.org/wiki/Canol_Road, (accessed March 12, 2013).
610 Kenneth S. Coates and William R. Morrison, "Soldier-Workers: The U.S. Army Corps of Engineers and the Northwest Defense Projects, 1942-1946," *Pacific Historical Review,* Vol. 62, No. 3 (Aug., 1993), 281-283.
611 The Canadian Encyclopedia, "Canol Pipeline," written by Kenneth S. Coates, http://www.thecanadianencyclopedia.com/articles/canol-pipeline, (accessed March 12, 2013).

no. 4 in northwest Alaska in the summer of 1943. While geologists in the 1920s had concluded the petroleum deposits were remote and not extensive enough for commercial exploitation, the vagaries of an emerging tension with the Soviet Union raised the value of the land. By the next year, the Navy would be on site along with Arctic Contractors (Arcon), the civilian group hired to help extract the oil and natural gas. The Navy and Arcon would spend the next decade scouring Pet 4 for oil.[612]

The Arctic's remote location and its lack of existing infrastructure complicated operations at Pet 4, eventually giving rise to the partnership between the lab and the oil camp. Consider the drilling of a 5,000 foot test hole two-hundred miles from Point Barrow, the main camp. This was a routine activity during the ten-year lifespan of Pet 4. To begin, a decision had to be made to drill the hole at a specific location somewhere in the 70,000 square miles of "Arctic wilderness" that comprised Pet 4.[613] This decision had to pass through an Operating Committee, itself a maze. Established under the Director of Naval Petroleum Reserves in the Navy, the Committee consisted of that Director and his deputy, a member of the oil exploration firm De Golyer and MacNaughton, a member of the oil exploration firm of Hoover, Curtice, and Ruby, the Director of the U.S. Geological Survey, and a representative of the Bureau of Yards and Docks. But because little geological or physiographic information was available on the land, preliminary surveys had to be completed before the drilling could commence. Once sufficient data was in hand, the Operating Committee would debate a proposal in November—after the summer field season was over. Then, equipment and supplies would have to be listed and procured during winter and moved to a shipping point on the Pacific coast—either Point Hueneme or Seattle—to

612 Reed and Ronhovde, 11-12.

613 Quote and acreage from "Draft, Statement by the Director of Naval Petroleum and Oil Shale Reserves," RG 181, Naval Districts and Shore Establishments, 17th Naval District, Alaska: Records of the Office in Charge of Construction, 1944-1977: Naval Petroleum Reserve, no 4: Historical Files, 1953-1974, Box 1, Folder: "Historical Matters," NARA-A.

arrive on the beach at Point Barrow by the following August. This material needed to be organized, perhaps winterized, and prepared for shipment before being moved by caterpillar train in February. Upon delivery, it would remain until April when it could be assembled and put to use. A year and a half had elapsed between the decision to drill and the date on which the drill was put in.[614]

But, as we have already glimpsed, the timing of the logistics was not the central concern for the Operating Committee. Of more significance, and trouble, were the ways Arctic environmental conditions complicated transportation, construction, and oil extraction. First, the north slope of Alaska and Canada had low total annual precipitation, which forced operators to attend to water resources. Point Barrow, the site of the most developed camp, was situated on the ocean and could take advantage of ocean deliveries. Umiat, the main subsidiary camp, was placed on the Colville River for similar reasons. Still, there was no ground water in permafrost and transportation of water at any distance risked freezing the liquid. The installation and maintenance of sewers was costly and difficult because pipes froze if not heated. Yet, if heated, they altered the grade of the land by melting the frozen subsurface material.[615]

Second, the seasonal differences between summer and winter frustrated any kind of oil exploration activities and, again, put emphasis on the need to understand the physical environment. Winter was long, with few frost-free days, which created a long heating season and unusual demands on building operation, building design, and building costs. The Navy initially created foundations by pouring concrete slabs on gravel pads for its galley, shop, laundry, and power house facilities. But within a month, "the concrete slabs began to crack and settle unequally" because they had melted the ice beneath the soil. When officials believed the

614 Reed, "Pet 4: A Key to Arctic Operations," 8.
615 Reed and Ronhovde, 18-19.

"equilibrium had been reached" they re-poured the floors, but soon experienced the same problem.[616] When winter was over, summer created still more issues. Navy operators initially began using weasels and LVT's (landing vehicles tracked), but found that these would routinely get stuck in the "wet, soggy tundra." They learned that transportation was best suited for winter, when the land was frozen solid and could bear the weight of machines, equipment, and personnel. Between December and May in 1953—or, after freeze-up in the fall and before the thaw in late spring—Pet 4 operators logged more than 2.5 million ton-miles of overland freighting.[617]

Committed to avoiding the mistakes made in the CANOL pipeline, the Navy put in place a system whereby engineers and contractors worked closely with research scientists to address many of these environmental engineering issues. In early 1947, the Naval Arctic Research Laboratory was established in Barrow, Alaska. This was a site that could take advantage of the existing infrastructure and logistics of oil exploration going on in the nearby Naval Petroleum Reserve no. 4 as well as make use of the enthusiasm by oil exploration leaders for research on oil development.[618] (See Figure 2) The first structure for scientific research was a Navy-built 20' x 40' Quonset hut refashioned as a laboratory, with equipment, animal quarters, and temperature control chambers. By 1968, the Naval Arctic Research Laboratory consisted of forty one

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616 John C. Reed, "Permafrost and Pet 4," in RG 401, Collection XJCR, John C. Reed Papers, Box 11, Folder: Presentations and Speeches, Subfolder: Permafrost and Pet 4, January 1969, NARA. Robert Legget, "Potentialities of the Northwest: An Engineering Assessment," from Symposium on The Canadian Northwest: Its Potentialities, Royal Society of Canada, 1958, Technical paper No. 65 of the Division of Building Research, Ottawa, May, 1959, p 16-17, found in R.F. Legget Fonds, MG 30 J44, Volume 5, File 26, LAC.

617 Reed, "Permafrost and Pet 4"

618 Reed and Ronhovde, 30-38. Naval officials recognized the need for science from first-hand experience. See Letter from W.P. Platt to John C. Reed, June 14, 1948, RG 57, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 14, Folder: John C. Reed (Correspondence), NARA. "There is an urgent need for additional study and research in the fields of snow, ice, and permafrost. Occasionally, we are faced with the task of placing foundations and base material for roads and landing fields where one of these conditions exists, and usually the result is not too encouraging. For example: late in the construction season, last year, wooden pilings were driven for a bridge spanning a body of water subjected to sea ice...Upon arrival at the site this spring, it was found that all the piling had suffered severe heaving during the winter months. The change in alignment was negligible, but the vertical heave of some of the piling was 3' above the original elevation."

laboratory facilities, with sleeping space for more than eighty people on a footprint of more than 45,000 square feet.[619] As a testament to its importance in scientific, geopolitical, and commercial affairs, the Naval Arctic Research Laboratory's budget over the 1940s and 1950s was equal to all other Office of Naval Research projects carried out in the subarctic and Arctic combined.[620]

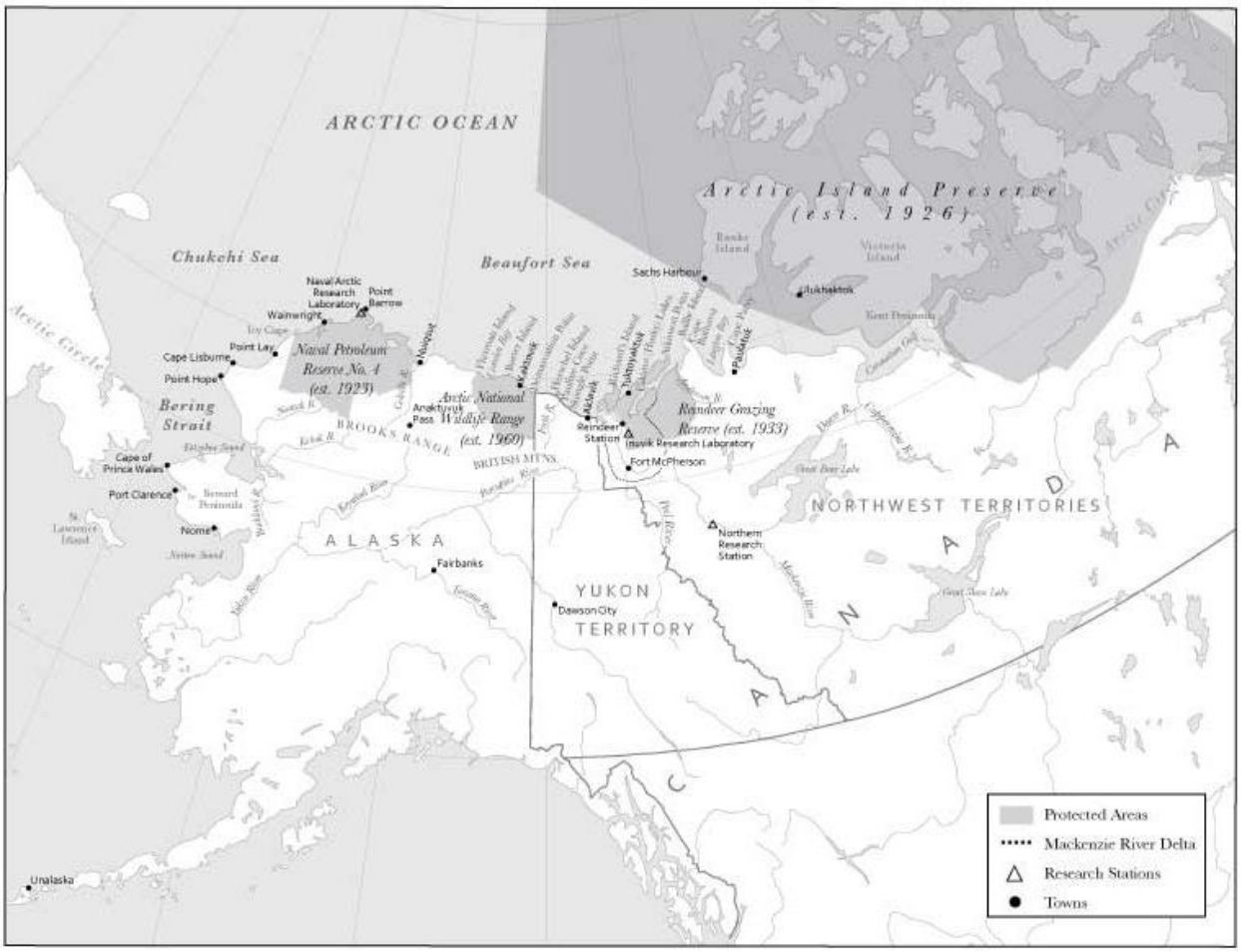

Figure 2. The Western Arctic in 1959. The Naval Arctic Research Laboratory was established next to the community at Point Barrow and just above the Naval Petroleum Reserve No. 4. As we will see later in this chapter, research stations in Canada were sited in similar places for similar reasons.

From the outset, the Naval Arctic Research Laboratory pursued an interdisciplinary research program that brought together scientists from across academia, the government, and

619 M.C. Shelesnyak, "The History of the Arctic Research Laboratory," *Arctic,* vol. 1, no. 2, 101. "Arctic Symposium underway at UA" *Fairbanks Daily News-Miner,* April 10, 1969.

620 Letter from John C. Reed to Head, Geography Branch, April 4, 1952, RG 57, Records of John C. Reed, Staff Geologist for Territories and Island Possessions, 1932-1953, Box 7, Folder: Correspondence with Navy, NARA.

industry. M.C. Shelesnyak, a Lieutenant Commander with the Office of Naval Research, coordinated early correspondence with leading Arctic specialists at the time. He reached out to polar explorers, including Vilhjalmur Stefansson, as well as anthropologists and biologists at the Smithsonian. Shelesnyak also worked closely with the Arctic Institute of North America, a non-governmental, bi-national group formed in 1945 to promote U.S. and Canadian partnerships in Arctic research. Drawing from these contacts, the Office of Naval Research proposed an initial program that built upon publications by the Arctic Institute of North America and the American Geographical Society and which highlighted research into climate, geography, hydrography, biology, and human health. The first full summer of research included scientists from Cal Tech, Creighton Medical School, Stanford, Fordham, the Naval Ordinance Laboratory, and the University of Minnesota.[621] This research program was part of a larger U.S. effort to integrate "oceans, airways, and outer space into a single system under U.S. global command." In the Arctic, oceanographic work was linked to submarine travel, physiological studies on metabolism were connected to survival techniques for armed forces doing battle in extreme temperatures, and studies of the northern lights became crucial for possible control of the atmosphere as a form of warfare.[622]

Over the late 1940s and early 1950s, the program of research at the Naval Arctic Research Laboratory remained diverse in its disciplinary representation and its connections to global imperial interventions. However, within the fields of ecology, geology, and geophysics, the research was largely uniform. These scholars were primarily interested in permafrost, and,

621 Reed and Ronhovde, 35-52.

622 Quotation from Oldenziel, 29. On controlling weather patterns and biological warfare, see McNeill and Unger, 14-15. Matthew Farish has noted that the research at the Naval Arctic Research Laboratory was "ostensibly basic science." It was basic, but not necessarily "pure." See Mathew Farish, "Creating Cold War Environments: The Laboratories of American Globalism," in *Environmental Histories of the Cold War,* (New York: Cambridge University Press, 2010), 76.

through contact with local oil development, explored research questions and methods that assisted the extraction of petroleum resources from the north slope of Alaska. Consider the longest running program at the Naval Arctic Research Laboratory, the "Arctic Ice and Permafrost Project." This program was organized in 1949 by the United States Geological Survey in conjunction with the Bureau of Yards and Docks, and funded through the Office of Naval Research—all agencies with significant interest and influence in the Pet 4 operations. The project also enjoyed the support of the Snow, Ice, and Permafrost Research Establishment of the U.S. Army Corps of Engineers, which was created in the same year.[623] The project maintained a variety of topical investigations, from creating detailed maps of the distribution of permafrost in northern Alaska, to the study of effects of "continuous" permafrost on human geography in northern regions (as contrasted to areas with only sporadic permafrost), to compiling a bibliography of research publications relating to permafrost to supplement the work of the U.S. Army, Air Force, the Arctic Institute of North America, and the U.S. Geological Survey. But the most significant lines of investigation—those that gathered the most funding, the biggest investments of time and labor, and the most interest from U.S. and Canadian authorities—were examinations of the "economic aspects" of permafrost. These entailed the "seasonal freezing and thawing as applied to living conditions, house building, water supply, underground cold storage, sanitation, roads," as well as the building of "airfields, telephone and power lines, sewage disposal units, drainage ditches, permanent bench marks, underground storage vaults, [and] of drilling...in northern Alaska."[624]

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623 Letter from Director, USGS to Rear Admiral Bolster, Aug 9, 1951, RG 57, Entry: Geologic Division, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 2, Folder: Arctic Research Laboratory, Data on Barrow, Alaska, NARA.; Edmund A. Wright, *CRREL's First 25 Years, 1961-1986,* (U.S. Army Cold Regions Research and Engineering Laboratory, June, 1986), ii.

624 Letter from Director, USGS to Rear Admiral Bolster, Aug 9, 1951. See also Letter from Frank C. Whitmore to Colonel FB Hall, March 2, 1953, RG 57, Records of John C. Reed, Staff Geologist for Territories and Island Possessions, 1932-1953, Military Geology Branch: General Correspondence Files, 1943-1953, Box 1, Folder:

The research questions and research methods of the Alaska Ice-Permafrost program reveal the connections among science, military, and industry through the problem of the frozen ground. The first scientist to head up the Arctic Ice-Permafrost Project was Dr. R.G. MacCarthy, a professor of Geology at University of North Carolina-Chapel Hill.[625] MacCarthy's research addressed the temperature profile and moisture content of permafrost by working closely with the Navy operators and the oil wells they were punching in the land throughout Pet 4. Between February 1949 and July 1959, MacCarthy had sunk more than thirty thermistors—a cable that offered indirect measurements of temperature through measurements of resistance—into test wells throughout northeast Alaska. These wells varied in depth between 200 and 1000 feet, offering MacCarthy unique access to the subsurface world. By creating a database of recordings at various depths, the geologist hoped to determine the character and extent of the "active layer," the area between the surface and the solidly-frozen earth beneath that was subject to seasonal changes in temperature. MacCarthy also used resistance to measure soil content. He placed four electrodes into the earth and passed a known electrical current through two of them. In this way, he could measure the change in potential between the remaining two electrodes—which became an indirect measurement of soil moisture. In turn, he used soil moisture to indicate the kind of materials in the ground, whether silt, sand or gravel.[626]

Alaska, 1947-Aug 1950, Permafrost Activities: Defense Dept, NARA. Of the Alaskan permafrost work, Whitmore writes, "The basic activity of the program is the field mapping of strategic Alaskan areas according to a progressive plan determined by the best available estimates of the relative importance of the several areas. . . .These are called Strategic Engineering Studies and bear the security classification RESTRICTED."

625 Institutional affiliation given in Letter from Ira L. Wiggins to Dr. G W. Rowley, Mar 30, 1951, Naval Arctic Research Laboratory Records, "Arctic Research Collection," Box 5, Folder: "Investigations (USGS) Permafrost, 1949-1951," APR-UAF.

626 "Disposition of thermistor cables, Pt. Barrow, Alaska: Permafrost Project," Naval Arctic Research Laboratory Records, "Arctic Research Collection," Box 5, Folder: "Investigations (USGS) Permafrost, 1949-1951," APR-UAF.; Dr. R.G. MacCarthy, "Something about Permafrost," (Seminar held at the Naval Arctic Research Laboratory, July 28, 1949), Box 6, Folder: "Seminars," Naval Arctic Research Laboratory Records, "Arctic Research Collection," APR-UAF. On the soil moisture test method, see "Engineers Find Way to Measure Soil Moisture," American Association for Advancement of Science, Alaska Division, 1959-1969 Records, Box 5, Folder 86, APR-UAF. There was no date or publication title, but I suppose this article comes from the *Fairbanks*

Such work would have been possible without the Navy's infrastructure in camp facilities and regular shipping schedules from Point Barrow throughout the Naval Petroleum Reserve—but just much more difficult. One of MacCarthy's colleagues, Robert F. Black, described his work on ground ice as "labor in the wilderness" and complained about the time investments of doing field research on permafrost. Any fieldwork took "two to four times longer" than in the States and involved incredible effort. "How many places do you find it necessary to chop frozen ground and ice for as much as 4 hours to get a decent sample for study?" he asked.[627] MacCarthy and others could circumvent these issues by following the trails blazed by the Navy in their work in Pet 4.

MacCarthy did not just take advantage of Navy facilities to find physical locations for his research—the Navy (and other agencies) used MacCarthy's research to their advantage as well. His work in measuring soil moisture was a means by which to map the distribution of permafrost throughout northern Alaska, to mark sites for oil recovery and locations that could bear foundations for power plants, barracks, hangars, and even hospitals.[628] If the permafrost consisted of solid or fragmented rock, or of dry and well drained sand and gravel, the subsurface phenomena were scientifically interesting but of no unusual engineering significance. However, if the permafrost consisted of waterlogged silt—and had a higher value in MacCarthy's resistivity

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Daily News-Miner. On the test method's connection to finding soil types, see Letter from Jams A Roy to Gerald R McCarthy, Nov 10, 1951, RG 57, Records of John C. Reed, Staff Geologist for Territories and Island Possessions, 1932-1953, Box 2, Geologic Division Files, Alaska Terrain Permafrost Program, NARA. See also "Arctic Research Laboratory Newsletter, Point Barrow, Alaska," no 3.5, April 1952, RG 57, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 2, Folder: Arctic Research Laboratory, Data on Barrow, Alaska, NARA. This and other newsletters from the laboratory document the month-by-month work of the Arctic Ice-Permafrost Project.

627 Letter from Robert Black to Harry E Balvin, Jan 30, 1951, Naval Arctic Research Laboratory Records, Box 5, Folder: "Investigations (USGS) Permafrost, 1949-1951," APR-UAF. Memo from RF Black to LL Ray, Nov 23, 1949, RG 57, Geologic Division, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 4, Folder: Robert Black, NARA.

628 Letter from Thomas G. Roberts to Louis L. Ray, March 28, 1951, RG 57, Geologic Division, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 2, Folder: Arctic Research Laboratory, Data on Barrow, Alaska, NARA.

studies—the ground might create a potential nightmare for construction and travel. In these cases, the thermal balance of the frozen soil and water could be easily disrupted, and previously solid permafrost would assume "the consistency of soup when thawed." MacCarthy's work found that the greatest concentration of the potentially troublesome permafrost existed along the coast of the Beaufort Sea and in the Mackenzie Delta in the Western Arctic, the same area underlain by oil and natural gas.[629] Not surprisingly, U.S. and Canadian governmental, military, and corporate elites followed his research closely.[630] When the Director of the Naval Arctic Research Laboratory sent an abstract of MacCarthy's results to colleagues in Canada, there was great interest from the Defence Research Board and the Department of Transport to help facilitate travel, navigation, and resource exploitation in the Canadian Arctic.[631] MacCarthy's methods also informed the work of Imperial Oil in Norman Wells, Northwest Territories, as their staff engineer R.A. Hemstock adopted many of the approaches taken by Alaskan fieldworkers.[632]

MacCarthy and his colleagues' work with thermal resistors also responded to, and helped mediate, concerns from Navy oil operators. Arctic Contractors, one of the firms working with the Navy to drill and maintain its wells, had reported that the casings of its wells were mysteriously collapsing. In December of 1950, the director of Naval Petroleum Reserve called a special meeting "on the subject of production in and through the permafrost." Bringing together representatives of the Arctic Contractors, the Bureau of Yards and Docks, the U.S. Geological Survey, and the Petroleum Committee of the Munitions Board, this meeting sought to outline the challenges that oil producers faced in drilling in the Arctic. Contractors and naval officials noted

629 Legget, "Potentialities of the Northwest," 19.

630 Memo to Commodore W G Greenman Feb 25 ,1949, RG 57, Geologic Division, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 10, Folder: Naval Petroleum Reserves, NARA. Letter from E.L. Davis to Officer in Charge, February 13, 1951, Naval Arctic Research Laboratory Records, "Arctic Research Collection," Box 5, Folder: "Investigations (USGS) Permafrost, 1949-1951," APR-UAF.

631 Letter from G.R. Rowley to Dr. I. L. Wiggins, Mar 9, 1951, Naval Arctic Research Laboratory Records, Box 5, Folder: "Investigations (USGS) Permafrost, 1949-1951," APR-UAF.

632 R.A. Hemstock, *Permafrost at Norman Wells, N.W.T: February 1949* (Calgary: Imperial Oil, Ltd., 1953).

it seemed either an outside force from the ground supplied a crushing pressure on the oil wells, or that the pipes were put under stress because of the freezing temperatures.[633] Temperature studies of wells became one of only three year-round projects ever conducted at the Naval Arctic Research Laboratory. After MacCarthy left the laboratory, this research was picked up by RF Black of the U.S. Geological Survey's Alaska Terrain and Permafrost Section and geologist Max J Brewer in 1950, who then managed the research until 1959.[634] According to Brewer, the insights from this research "proved critical" to the development of Alaska's oil industry over the second half of the twentieth century.[635]

In 1953, after extensive exploration in the Naval Petroleum Reserve, the Navy discontinued its operations in northern Alaska. Despite finding and developing two oil fields, two gas fields, one prospective oil field, and four prospective gas fields—an estimated 30-100 million barrels of oil and 370-900 billion cubic feet of gas—the Navy felt that the amount of fuel was insufficient to justify future investment.[636] With the Navy pulling out of the north, an opportunity opened for other groups to move in and take advantage of the Naval Arctic Research Laboratory, the information they had helped gather, and the oil in Alaska's north slope. Almost immediately, Fairbanks economic elites proposed building a pipeline from the largest of the oil

633 Memorandum for the Files, Subject: Special Meeting Held at 0830, 4 December 1950, in Room 1515, T-3 Building, Navy Department, on the Subject of Production in and through Permafrost, Navy Department, Washington 25, D.C, found in RG 181 (Naval Districts and Shore Establishments, 17th Naval District, Alaska: Records of the Office in Charge of Construction, 1944-1977: Naval Petroleum Reserve, no 4: Historical Files, 1953-1974), Box 3: Office of the Officer in Charge of Construction, 1947-1951, Reports Relating to Oil Exploration, 1944-1953, Folder: "Permafrost Studies," NARA-A.

634 "Progress Report for Arctic Ice-Permafrost Program, 1949-1952, with Projections for Work to be Done in 1953," RG 57, Records of John C. Reed, Staff Geologist for Territories and Island Possessions, 1932-1953, Box 2, Geologic Division Files, Alaska Terrain Permafrost Program, NARA. Anchorage Daily News, "Max Brewer: Obituary," September 30, 2012, http://www.legacy.com/obituaries/adn/obituary.aspx?pid=160163549, (accessed March 13 2013).

635 See *Anchorage Daily News*, "Max Brewer: Obituary."

636 Joseph Sonnenfeld, "Changes in Subsistence among the Barrow Eskimo," (Ph.D. Diss., Johns Hopkins University), 485. Reed, "Pet 4: A Key to Arctic Operations."

fields.[637] At the same time, scientists and bureaucrats began to push for the reform of Alaska land laws to allow individual and industrial development of the territory's natural resources. Laurence Irving, a director of the Naval Arctic Research Laboratory, announced before the Alaska Division of the American Association for the Advancement of Science that basic land legislation was holding back the efficient use of "thousands of acres of valuable land."[638] Similarly, Ernest Gruening, the governor of the territory, pressed for statehood on the platform of allowing Alaskan residents and interested companies to lease the north slope for private development.[639]

The knowledge gained at the Naval Arctic Research Laboratory became central to the eventual development of an oil empire in northern Alaska. In 1954, John C. Reed, the geologist who went on to write the history of the Laboratory, wrote a short memo entitled "Pet 4 – A Key to Arctic Operations" to Earl G. Droessler of the Coordinating Committee on General Sciences for the Office of Research and Development in the Department of Defense. This document meant to share the "rich store of information" gleaned from research in the Arctic in hopes of systematizing it for "maximum advantage" by other operations and corporations. Reed covered detailed experiences with planning, administration, and direction; construction and maintenance; camp operations; transportation; heavy equipment; personnel; and communications. He distilled his recommendations into a short list of "Do's and Don'ts" for potential future operators in Alaska, all of which emphasized the importance of environmental features in oil production. Interested parties should "make maximum use of favorable seasons," "provide space for air circulation under buildings" to prevent the melting of permafrost, and avoid grading roads or runways "without removing sufficient frozen silt."[640] While it is difficult to know if oil

637 Sonnenfeld, 514-5; Reed and Ronhovde, 364-66 and 375.
638 "Scientists hear need of Alaska Development" *Anchorage Times*, September 24, 1952.
639 Gruening, *The State of Alaska*, 230-1; 527-535.
640 Reed, "Pet 4: A Key to Arctic Operations."

companies consulted Reed's document, the information he and other agencies shared were of great interest to these companies. In 1954, the Department of Defense made all of the records and geophysical data relating to oil explorations at Pet 4 available for public inspection both in D.C. and at the Naval Petroleum Reserve's offices in Fairbanks. It also ordered the U.S. Geological Survey to publish all information obtained by the Navy and its researchers between 1944 and 1953 because "elements of the industry and others have shown interest in further exploratory work in Alaska."[641] In 1958, the federal government returned lands of Pet 4 to public domain, which caused "feverish speculation and exploration despite the remoteness of the area."[642] By the end of the decade, more than twelve million acres of Arctic land—sitting on top of oil and natural gas deposits—had been leased by the state of Alaska to multi-national oil corporations.[643]

By the late 1960s, with the benefit of hindsight, scientists, military agents, and bureaucrats could see more clearly how knowledge about permafrost contributed to the U.S. and Canada's position in global affairs over the 1950s. In January, 1969, less than a year after Exxon and Atlantic Richfield made Prudhoe Bay one of the largest oil fields in the United States, geologist John C. Reed drafted a speech entitled "Permafrost and Pet 4." The speech captured some of the strides scientists had made in understanding the Arctic's physical environment over the 1940s and 1950s and how these related to the expansion of oil industries across the northern rim from 1959 to 1969. The close associations between physical science and oil production at the

641 "Alaska Petroleum Reserve Data to be made Available by Navy", Dept of Defense Office of Public Information Immediate release, Sep 14, 1954, found in Naval Arctic Research Laboratory Records, "Arctic Research Collection," Box 7, Folder: "USGS—1955," APR-UAF.

642 "Testimony of Mr. Bartlett to Congress, April 28, 1967, 'Alaska Oil Progress Report: Naval Petroleum Reserve no. 4'," RG 181, Naval Districts and Shore Establishments, 17th Naval District, Alaska: Records of the Office in Charge of Construction, 1944-1977: Naval Petroleum Reserve, no 4: Historical Files, 1953-1974, Box 12 Folder: "Historical Matters, histories, etc." NARA-A.

643 B.J. Galloway, "Appendix D: Historical Overview of North Slope Petroleum Development and *Exxon Valdez* Oil Spill," in *Environmental Report for Trans Alaska Pipeline System Right-of-Way Renewal* (February 2001), D-1.

Naval Arctic Research Laboratory and Pet 4 created a wealth of knowledge that later allowed for the expansion of private oil industry throughout the Western Arctic in Alaska and Canada. Geologists mapped over 67,000 square miles of Pet 4 and aerial photography covered another 112,000 square miles. Navy officials and contractors drilled 36 test wells at a total depth of over 169,000 feet.[644] Personnel spun off of government defense initiatives and into the corporate world, helping fuel and satiate America's thirst for petroleum products. One of the Navy Seabees instrumental in establishing the oil camp and research station, Ralph J. Coleman, left the Navy to become Vice President of Colorado Oil and Gas, which explored for oil on the north slope in the 1960s. "The knowledge gained of the geology, the oil and gas possibilities, and operating conditions and techniques in that part of Alaska have been invaluable," Reed said.[645] Science might have seemed priceless, but Reed was also prepared to put a price on it. He noted that the combined results of the Arctic Ice and Permafrost Program allowed the efficient and effective construction of the Distant Early Warning Line over the second half of the 1950s. Permafrost science also saved the U.S. and Canada thousands of dollars, more than all of the money spent on the Arctic Research Laboratory in more than two decades of operations.

Building Administrative Capacity: Integrating Knowledge during the Siting of Inuvik

When Prime Minister John Diefenbaker landed at the airstrip in Inuvik in 1961, the historical gravity of the moment was not lost on him. As the first Prime Minister ever to visit

644 Letter from Kenneth C. Lovell to E.L. Bartlett, September 3, 1964, RG 181, Naval Districts and Shore Establishments, 17th Naval District, Alaska: Records of the Office in Charge of Construction, 1944-1977: Naval Petroleum Reserve, no 4: Historical Files, 1953-1974, Box 12 Folder: "Historical Matters, histories, etc." NARA-A.

645 John C. Reed, "Permafrost and Pet 4," RG 401, Collection XJCR (John C. Reed Papers), Box 11, Folder: Presentations and Speeches, Subfolder: "Permafrost and Pet 4, January 1969," NARA. He said, "Certainly the work provided a larger part of the substantive bases on which all sorts of activities have gone on in the area since—including the oil exploration that resulted in the recent discoveries by Atlantic Richfield on the state leases near Prudhoe Bay about 70 miles east of the eastern boundary of NPR4." See also "Impressive gathering at Naval Symposium," *Fairbanks Daily News-Miner,* April 11, 1969.

Canada's Arctic territories, the native of Saskatchewan could easily see the connections between his trip and that of another influential western Canadian, Sir John A. Macdonald. Before the crowd and under the midnight sun, Diefenbaker recalled the "famous journey" made by Sir John to the shores of British Columbia by the newly-completed transcontinental railway, an event that was "full of the drama of nationbuilding." Diefenbaker likened his travels northward to Macdonald's, as both men sought to spark "the imagination of Canadians" with a "vision of a greater Canada."[646] For the mid-century political leader, a "Roads to Resources" program would link the country's northern and southern borders and, echoing the confederation of Canada in the 1860s, create a more expansive geographic, cultural, and political territory.

Science sat at the center of the Prime Minister's dreams and dedication that day, because knowledge of the Arctic environment was so central to the construction of Inuvik, the monument to modernization he was there to commemorate. He noted, "One does not have to be an engineer to realize that the construction of Inuvik must have called on the full resources of Canada's Arctic building research." He continued, "For so far north, you are contending with some of the most difficult frost conditions in Canada...Great reserves of resourcefulness and ingenuity had to be summoned to work out new and special types of construction." Again, he turned to history to show that Canada was just now ascending to its northern shores, and that Inuvik held a special place as the beginning of a project of scientifically-guided development. "You will say - and I agree - that since 40% of our country lies north of the provinces it was time we took major Arctic construction seriously," he admitted. "Inuvik is the teacher, which will stimulate the thirst for more knowledge of the Arctic." Not only was he the first Prime Minster to visit Canada's Arctic

646 Dick Hill, "Diefenbaker's 'Opening of Inuvik' Speech," http://www.inuvikheritage.com/Feature1.html, (accessed March 13, 2013)

lands, but, for Diefenbaker, Inuvik signaled the start of scientific research on the tundra.[647]

Diefenbaker's comments were both myopic and accurate, historically speaking. Of course, scientific research and the state had preceded the Prime Minister to the Western Arctic by about a century. But the building of Inuvik did call upon the full resources of Canada's Arctic building research, and push that research in new directions. As we will see, scientists within the National Research Council's Division of Building Research were central to the planning and construction of the town between 1951 and 1959. Moreover, the project made use of a growing institutional knowledge about permafrost stored in the United States military and civilian science agencies, as well as the knowledge-sharing networks that scientists were developing at mid-century. Finally, the process of creating Inuvik—from identifying a need for the town, to selecting possible sites, to deciding upon a final location, and then initiating construction—expanded the very capabilities of Arctic research in North America. Scientists created partnerships with one another, tested out new methods for aerial photography and ground-truthing, and generated new knowledge about the northern environment. They also created a new space in which science could be housed. Just across the street from where Diefenbaker spoke in 1961 stood the foundation for the Inuvik Research Laboratory, Canada's first laboratory in the Western Arctic.

The building of Inuvik properly starts not in 1961, but ten years earlier, with the Canadian Arctic Permafrost Expedition of 1951. This was a joint venture between Purdue University, the U.S. Army Corps of Engineers, and the National Research Council of Canada, which, between May and August of that year, scoured the Mackenzie River and the Arctic coast to "obtain field data on soils and permafrost."[648] The ultimate goal of the survey was "the development of a

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647 Ibid.

648 "Manuscript Report," 2-3, in RG 401, 46: Alton A. Lindsey Papers, Box 7, Entry 8: Papers Relating to the

technique for determining soil types and permafrost conditions from aerial photographs." Such work had been carried out in Alaska in the previous five years by Purdue and the Army Corps of Engineers, but fieldwork in the Canadian Arctic was required to "enable airphoto patterns...to be interpreted."[649] As with Purdue and the Army Corps' previous work along the Alaskan Highway, the Canadian Arctic Permafrost Expedition centered on major arteries of transportation to facilitate the logistics of data collection but also to understand the relationship between terrain features and infrastructure so as to foster more efficient construction in the future. With a crew of seven scientists from a variety of disciplines and a trusted bush pilot from the town of Hay River, Northwest Territories, the expedition took off for its reconnaissance mission in the north.

The itinerary for expedition underscores the differences in science between the pre and post-World War II periods. Stefansson and Anderson and other members of the Western Arctic Expeditions (which I surveyed in Chapter 2), relied on schooners, whaling outposts, dog-sledding and the exchange relations developed on the Beaufort Sea coast to document and discover the Arctic in the first two decades of the twentieth century. The Canadian Arctic Permafrost Expedition of 1951 moved in an entirely different fashion. Some members of the group, including ecologist Alton A. Lindsay, flew from Chicago to Edmonton, and then Edmonton to Yellowknife, which had become a gold-mining center on the banks of the Great Slave Lake in the southern Northwest Territories over the 1930s. Others, like Professor of Engineering at Purdue, K.B. Woods, and his colleague James Shepard, drove from St. Paul, Minnesota through Winnipeg, Regina, Calgary, and Edmonton in order to view the land forms

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Purdue-Canadian Arctic Permafrost Expedition, 1951-2, Folder: "Expedition 1951: Manuscript Report," NARA.

649 Ibid, 3. See also Folder: Alcan Highway Photos and Miscellaneous Maps, RG 401, Paul C. Dalrymple Papers, Box 21, NARA. This folder shows the images and studies commissioned by the Quartermaster corps in the 1940s to better understand a set of Alaskan highways (Glenn, Steese, Richardson, Tok, and Alcan). The purpose of these studies was to gain a better sense of how to deliver goods and equipment to remote areas in case of emergencies while allowing the continued operation of roads, pipelines, and airfields in a war scenario. Studies involved close attention to vegetation, aerial photo interpretation, soil and mud conditions, and clothing and gear.

and material of the Canadian shield, interior plains, and great plains for comparison with northern Canada. Once in the Mackenzie Delta, the rhythms of summer field work seemed more consistent between the early and mid 1900s. Shepard cruised aboard a steamer, the *Cheechako,* from Fort Good Hope to Aklavik. Their hopes of studying the vegetation communities along the banks were dashed as the weather made it "hard to do a lot of good work." Similarly, Alton Lindsay harkened the work of reindeer biologists Palmer and Porsild when he completed some ecological surveying by canoe in the vicinity of Reindeer Station.[650]

Importantly, the reliance on the airplane and helicopter as a means of getting in, around, and out of the north altered historical relations among scientific visitors and northerners. These technologies relieved researchers from establishing extensive and regular relationships with locals as guides, interpreters, and informants. Scientists could largely produce knowledge about the Arctic environment without Inuit expertise. Inuit still gained employment through scientific research, but their hiring owed to their labor, not their knowledge. Inuit living in Barrow, Alaska often worked as mechanics, cooks, or carpenters in the nearby Naval Arctic Research Laboratory, throughout the Pet 4 area, or at one of the Distant Early Warning Line stations along the coast. Because these employment opportunities provided cash in the face of a declining fur trade in the 1950s, Inuit did not necessarily resist their exclusion from science and their participation in the creation of an academic-military-industrial complex in the 1940s and 1950s.[651] This situation

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650 Ibid, 3-7. Lindsey corresponded with Porsild after the completion of the permafrost expedition. Letter from Alton A. Lindsey to A.E. Porsild, March 19, 1952, RG 401, 46: Alton A. Lindsey Papers, Box 7, Entry 8: Papers Relating to the Purdue-Canadian Arctic Permafrost Expedition, 1951-2, Folder: "Expedition 1951: Correspondence, 1951-2," NARA.

651 A similar argument has been made for the difference between place-based and "portable" knowledge in the Cold War. See Donna C. Mehos and Suzanne M. Moon, "The Uses of Portability: Circulating Experts in the Technopolitics of Cold War and Decolonization," Gabrielle Hecht (Ed.), *Entangled Geographies: Empire and Technopolitics in the Global Cold War,* (Cambridge: MIT Press, 2011), 43-5. On Inuit employment in Barrow, at Pet-4, at the DEW Line stations nearby, see Reed and Ronhovde, 28-9. The authors write, "[Inuit] are... tractor operators, natural gas technicians, store owners and employees, communications operators, airfield personnel, carpenters, plumbers, and electricians in construction and maintenance operations." See also Hill, *Inuvik: A*

would change dramatically after 1959, as we will see in the conclusion to this dissertation.

The major difference between the Canadian Arctic Expedition and the Canadian Arctic Permafrost Expedition was not that scientists had access to different modes of transportation—it was that different ways of moving through nature offered scientists different ways of seeing the environment. The decisions around driving, canoeing, cruising, and flying through the Arctic were made carefully to create a picture of the total environment, to combine the perspective of the vast landscape as seen from a seat of an airplane with the detailed picture of the patch of lichens, as seen on the banks of the East Channel of the Mackenzie River. This was especially important in assembling plans for roads, railways, and airfields, as the subsurface conditions were not uniform throughout the north, even in a given area that featured continuous permafrost. The view from the plane allowed for the identification of what one scientist called the "patterned ground," or the different "circles, nets, polygons, steps, and stripes" unique to the largely treeless area above the Arctic Circle. The view from the canoe allowed the correlation of each of these distinct patterns with a set of plant communities, and possibly, an underlying ecological or geological process that created the pattern over time. By the mid 1950s, botanists and geologists had developed a complex nomenclature that categorized the physical environment according to the shapes it took when seen from the air and the subsurface materials likely to be found underneath these shapes. For example, "nonsorted polygons" likely consisted of "silt, sand, or gravel," below the topsoil and could be distinguished from "sorted polygons" by the characteristic tussock-birch-heath vegetation found on the surface. In these ways the Canadian Arctic Permafrost Expedition brought together multiple disciplines and ways-of-seeing to

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History, 44. Inuit men and women took jobs in the construction of Inuvik as painters, mechanics, drivers, and cooks. Northerners eventually retaliated against this complex in the 1960s, as I describe in the conclusion.

enhance knowledge of the Arctic's permafrost environment.[652]

Aerial photographs thus became powerful tools for "seeing like a State," or framing the Arctic environment according to the priorities for defense, development, and devolution. Indeed, the military agents associated with the collection of aerial photographs often referred to the knowledge they helped create as "terrain intelligence" or "engineering intelligence," signaling that even the concept "terrain" bespoke the practices of science and aviation.[653] Terrain intelligence could help armed forces understand which areas of the ground would be impossible to move vehicles over and where to find gravel in order to build a road or airfield in an emergency situation. Purdue scientists, working with Army engineers, claimed to reach such a detailed understanding of permafrost and its interactions below and above the ground that, given a few photographs, they could "name the area anywhere in North America."[654] One observer wrote, "they have found enough indications that they can recognize permafrost in almost any type of soil from aerial photographs. Finely textured soils develop soil polygons. Meadow depressions develop cracks around the edges due to sliding of the active layer over the frozen subsurface. A wet hollow on a grave ridge is another sure indication." [655] Scientists snapped over 6,000 photos during the Canadian Arctic Permafrost Expedition. With the database from Purdue University, the U.S. Army Corps, and the Royal Canadian Air Force at their disposal, expedition

652 A.L. Washburn "Classification of Patterned Ground and a Review of Suggested Origins," *Bulletin of the Geological Society of America*, Vol. 67 (July 1956), 831-833. The relationships among surface vegetation and underlying geological processes relating to permafrost were a major feature of Arctic research in the United States and Canada over the period. See the work of M.E. Britton on "Reciprocal Relationships of the Physical Environment and Vegetation of the Alaskan Tundra at Point Barrow," in "Status Report to Office of Naval Research, Code 414C," January 10, 1953, Naval Arctic Laboratory Records, "Arctic Research Collection," Box 6, Folder: "Britton, M.E.--1953," APR-UAF. Others working at the intersection of botany and geology included Ira L. Wiggins, H.C. Hanson, William S. Benninghoff, and R.S. Sigafoos.

653 Letter from Acting Director to Col. W.C. Hall, March 1, 1943, RG 57, Records of John C. Reed, Staff Geologist for Territories and Island Possessions, 1932-1953, Military Geology Branch: General Correspondence Files, 1943-1953, Box 1, Folder: "Alaska, 1943-July 1945, Permafrost: Vol I-A," NARA.

654 Letter from H.P. Wilson to Director of Air Services, Controller of Meteorology, September 24, 1951, T-14212, Volume 1039, File 21525 ("Purdue University/R.E. Frost Permafrost"), LAC.

655 Ibid.

members concluded that "sufficient data" was collected to extend permafrost studies for the benefit of developing the Canadian Arctic.[656]

In less than a year, these photographs would be put to work in one of Canada's most ambitious plans of the twentieth century—building a governmental hub in the Mackenzie Delta from the ground up. In 1953, the Advisory Committee on Northern Development met to discuss the need for a new Delta community to serve as the "educational, administrative, and welfare centre" of the Western Arctic as well as center for the petroleum industry.[657] The Committee created a subcommittee to study and survey possibilities in the Mackenzie Delta for a site for this town. Chaired by the director of the Northern Administration Branch under the federal Department of Northern Affairs and National Resources, the committee featured three permafrost scientists in R.F. Legget of the National Research Council, R.J. Brown of the Division of Building Research, and J.A. Pihlanien, who was Canada's lone representative from the Purdue expedition in 1951.[658] While the survey eventually brought a select group of scientists northward in 1954 to perform intensive fieldwork, they began their work without leaving Ottawa. Looking at recent aerial photographic records, they identified land forms, vegetation cover, and the general patterns of soil types in the Delta region. From here, they selected twelve sites for closer field investigations.[659]

Photographic keys were instrumental to the eventual creation of Inuvik, first and foremost because they allowed scientists and bureaucrats to match particular landscapes with particular goals for the state (See Figure 2 for reference). In their summary of the site survey, permafrost

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656 "Manuscript Report," 9.

657 Hill, *Inuvik: A History,* 27. Irene Baird, "Inuvik: Place of Man," *The Beaver* (1960); "'Gamble on Stilts' Portent of New North," *The Red Deer Advocate*, July 27, 1961.

658 Hill, *Inuvik: A History,* 27.

659 C.L. Merrill, J.A. Pihlanien, and R.F. Legget, "The New Aklavik: Search for the Site," *The Engineering Journal,* (January 1960), 52-57.

scientists C.L. Merrill, J.A. Pihlanien, and R.F. Legget described the requirements for the new site, which they created in negotiation with the federal government. The location would have to be suitable "from economic and social points of view," meaning that it would be situated near the abundant oil and gas fields of the Mackenzie Delta and as close as possible to a navigable waterway. Similarly, the remaining criteria for selection reflected the desires for modernization inherent in the government's decision to create a settlement in the Arctic. The new town should "allow installation of permanent sewer and water systems, building foundations, and roads;" have a "first class airfield" nearby. It should provide for economic and convenient disposal of sewage and have suitable public water supply. All of these principles corresponded with the problems posed by permafrost for any kind of construction, travel, and maintenance of infrastructure. Indeed, the authors commented that it "would be convenient if gravel and sand sources were nearby for construction purposes" given that hospitals, roads, and airfields could not be placed directly on the land surface. Using aerial photographs, they reduced their survey time by selecting sites that met these criteria based on the terrain intelligence only they had.[660] The authors explained it this way: "If the interest of the observer is the engineering use of soils, the identification of the soils in various patterns is attempted. Thus instead of taking soil samples at regular intervals, samples are taken in strategically located positions in the land form." Aerial photography not only "greatly reduced" the time necessary for preliminary sampling, it also allowed scientists with little physical experience in the Arctic to become familiar with the place "in a manner similar to the way in which one identifies various acquaintances by their stature and facial features."[661]

In construing the new town with these practices and according to these criteria, scientists

660 Ibid, 53-54.
661 Ibid, 54-55.

and bureaucrats simultaneously defined it as modern while defining all other northern towns as backward. When engineers and scientists visited Aklavik in March of 1954, they quickly identified all the ways in which the town did not meet the demands of the new Arctic they were planning. Given aerial photographs and soil sampling performed locally, the site survey team concluded that Aklavik rested on organic silt with "very high moisture content," and that 60% of the frozen fine-grained soil consisted of ice. If the town were to be developed—through land clearing and the installation of heated buildings—ground subsidence would ensure with "serious results." Moreover, the subsurface conditions would prevent the construction of a major airstrip and inhibit adequate draining for sewers or water mains. Even the Mackenzie River, which had given rise to the fur trade that made Aklavik the "fur capital of the world" and had for so long been instrumental to Canadian and British empire in the north, became a liability by mid-century. Because the town was situated on a river bend, there was no "natural land for the town to expand to" which was necessary "to fulfill its role as the centre for administration for northwest Canada." Given their knowledge of the subsurface environment, and the correlation between this knowledge and state priorities for the north, permafrost scientists could easily frame Aklavik as an area *naturally* doomed to poverty. This was clear in the ways researchers described housing opportunities in the Mackenzie Delta. Raising the standard of living in the north meant raising the standard of housing. As permafrost scientists were uniquely qualified to point out, Aklavik, with its poor subsoil conditions, simply did not offer the foundation for modern living.[662] The future of Canada lay elsewhere in the Arctic, in a town site that maximized the potential for oil and gas development while avoiding, as much as possible, the limits placed on development by nature.

662 R.F. Legget, "Permafrost Research in Northern Canada," *Nature* (October 1956), found in RF Legget Fonds, MG 30 J 44, Vol. 5, File 21, LAC.

When considering the possible sites from the ground, scientists and engineers continued to draw from the knowledge gained about permafrost from the U.S. military and civilian agencies. The field team replicated the combination of aerial reconnaissance and ground-truthing carried out on the Canadian Arctic Permafrost Expedition. Beginning in March allowed the team to observe "potential townsite areas...under late winter conditions, during spring break-up, and during the summer season." Using a helicopter to do an initial fly-by of the twelve sites resulted in a paring down to six, because the others were "obviously unsuitable" when examined in the field.[663] For the remaining sites, the team established a rigorous testing procedure that included topographic and hydrographic studies, as well as soil sampling and more aerial photography. They set up a base camp which could be transported by "tractor train, dog team, and by a small barge and scows," to each prospective town site as the season progressed. The centerpiece of the base camp was a permafrost drill developed by the U.S. Corps of Engineers, which was used to collect soil samples and make judgments about the site's feasibility relative to the criteria for construction, gravel, sewage, airfields, and roads. The drill was "essentially similar to a diamond drill" using wash water to carry out cuttings, but could be broken down "into small light components for easy transportation by bush aircraft." Its portability, like the base camp, revealed that science and technology had begun to adapt to the special problems of the Arctic's seasons and environment, fulfilling in part Eszenyi's call a decade before.

Soil samples from drilling became crucial in making a decision between four sites (two more had been discarded because of "low-lying topography" and "possible difficulties in reaching them by river transport.") Samples were taken to the Norman Wells laboratory for "routine engineering" tests which included moisture content and grain size. These tests showed that one site, "East Three," was preferred in terms of the diversity of soil types (for locating

663 C.L. Merrill, J.A. Pihlanien, and R.F. Legget, "The New Aklavik: Search for the Site," 52-53.

gravel and sand for construction purposes) and the extent of glacial till, which "will yield more satisfactory foundation conditions than at the old site." While the glacial character of soils meant that "some eventual ground subsidence" was to be expected, every site under consideration had this drawback—permafrost could not be avoided. East Three also had the benefit of topographical relief, which would ensure adequate drainage for all the proposed uses of the town. Moreover, the site was aesthetically pleasing—it was "beautiful...especially in summer, and spreads over rolling hills that are enlivened with small lakes." The engineers could easily see with "careful town planning" that the future of East-Three "should be as attractive physically as the old Aklavik was disappointing."[664]

The Advisory Committee on Northern Development wasted little time in forwarding the survey team's recommendation. After R.G. Robertson and the Minister of Northern Affairs visited the site—which marked one of the "first occasions when the Federal Minister responsible for Northern Canada has been able to study in the field"—the federal cabinet officially decided to relocate the town of Aklavik to the new site on November 18, 1954. The survey team considered its work a major success—a demonstration of "what can be achieved by real team-work in the interests of the awakening North."[665]

The survey team drew from its knowledge about permafrost and the state's goals for the north to find a home for a future administrative center there. The shape of northern empire—right down to its geographic location at "East Three" in the Mackenzie Delta—bore the influence of science. Similarly, the desire to develop people and resources in the Arctic created opportunities, like the survey, to test out photographic keys, permafrost drills, and other field practices that generated new information about the frozen earth. All members of the survey team

664 Ibid, 57
665 Ibid, 57.

became recognized authorities on permafrost and northern affairs. R.F. Legget had already earned a distinguished reputation as a leading civil engineer before joining the survey, but that reputation became internationally recognized in the 1950s, as his research and writing on soils in Canada and building standardization earned him numerous awards and honors. C.L. Merrill moved from survey supervisor to the director of the site preparation for Inuvik, and then to a position as administrator for the Mackenzie district. He also translated his experiences in the survey to research, in the form of a paper "Physiography of the Mackenzie Delta Region and its relation to the relocation of Aklavik, N.W.T, Canada." J.A. Pihlanien also stayed in the Inuvik area, using the new town "as a field laboratory" for studies of permafrost. He was instrumental in setting up the Division of Building Research's Northern Research Station at Norman Wells and then transferring it to East-Three once the town was complete. His deep knowledge of the northern landscape and its associated engineering problems earned him the nickname "Johnny Permafrost" and respect outside of the halls of government. He became a private consultant to Arctic engineering companies before his death in 1964.[666]

The mutually beneficial relationship between science, the state, and industry comes into more detail when we consider what Mackenzie Delta residents thought of the new town site. The survey team did create and consult with a "local advisory committee" comprised of two missionaries, a Royal Canadian Mounted Police officer, a well-regarded independent fur trader, a government agent stationed at Aklavik and Reindeer Station, and two native men—Charles Smith and Frank Carmichael. That this committee agreed with the selection of East Three likely

666 The Canadian Encyclopedia, "Robert Ferguson Legget," http://www.thecanadianencyclopedia.com/articles/robert-ferguson-legget, (accessed March 13, 2013). Roger J.E. Brown, "John Aito Pihlainen (1926-1964)," *Arctic*, vol. 17, No. 2 (1964), 142. Letter from Troy L. Pewe to "Presenters at Conference's Geology Sessions," April 15, 1955, American Association for Advancement of Science, Alaska Division, 1950-1969, Box 5, Folder 83, APR-UAF. C.L. Merrill is scheduled to present with a paper entitled "Physiography of the Mackenzie Delta Region and its relation to the relocation of Aklavik, N.W.T, Canada." On transfer of Northern Research Station at Norman Wells to Inuvik, see RF Legget Fonds, MG 31 J 44, Vol 20, File: NRC, *Division of Building Research: The First 25 years, 1947-1972.*

represents only Smith and Carmichael's perspectives. East Three sat within the confines of the Reindeer Grazing Preserve, and since Smith was a reindeer herder and Carmichael operated a logistics company which serviced Reindeer Station, the two men were in good position to see potential advantages to having a new town nearby.[667] Meanwhile, many other residents of Aklavik were infuriated by the choice of East Three. Moving to the new town made little sense, since they would be required to acquire a permit to hunt and trap outside of town and within the Preserve. Many locals also considered the hunting areas in the region as poor and preferred more familiar grounds near the Richardson Mountains west of Aklavik.[668] When the government opened East Three in 1958-59, some of Aklavik's 1600 residents moved to the "model northern town," but some stayed. The decision not to go foreshadowed conflicts between the state and northerners over control of the land and its resources, which would explode in the coming decade of the 1960s. Those who refused to relocate saw their decision as a form of resistance to the state's plans for the north. Subsequently, Aklavik residents invented a motto for their home, "Never Say Die."[669]

The engineering of East Three, which was soon christened with the name "Inuvik," has drawn attention from Canadian historians as a symbol of the "high modernism" of the 1950s. Historical geographer Matthew Farish and historian P. Whitney Lackenbauer describe the building of Inuvik in the Western Arctic and Frobisher Bay (today known as Iqaluit) in the Eastern Arctic as prime examples of the Canadian government's attempts to extend state power to the Arctic. Farish also clearly demonstrates the place of social science in the early years of Inuvik. When Aklavik residents decided not to move to the new town, government agents hired anthropologists and sociologists to investigate why. Inuvik, in many ways, became a natural

667 C.L. Merrill, J.A. Pihlainen, and R.F. Legget, "The New Aklavik: Search for the Site," 57.
668 Hill, *Inuvik: A History,* 35.
669 Aklavik, Northwest Territories, "History," http://www.aklavik.ca/?p=history, (accessed March 13, 2013).

laboratory for the kinds of research supporting modernization projects and modernization theory because it created conditions wherein a supposed primitive people were being exposed to the machineries of civilization for the first time.[670]

The episode of Inuvik can be taken even further. As Diefenbaker pointed out in his commemoration speech in 1961, and as I have shown in this section, natural science and knowledge of permafrost were key to the shape of the Canadian government in the north, from the matrix of above-ground pipes that shuttled sewage across town, to the sources of gravel and sand used to support roads and airstrips, to the geographical position of "East Three." Understanding these connections between environmental knowledge and modernization informs historical scholarship because scholars see how scientists working on permafrost helped create, elaborate, and direct state power far beyond the halls of government during the Cold War. Indeed, science and empire continued to beget one another after Inuvik was up and running. The presence of a growing town and its facilities offered Canadian bureaucrats and scientists a site through which to coordinate governmental research on Arctic matters. Inuvik sat in close proximity to a "wide and varied range of ecological conditions in the region." By the early 1960s, construction began on a laboratory to "serve as a centre for research in this transitional zone" and to be used "either as a base for field parties or as a centre for study in the immediate area."[671] Because of connections among science, the state, and industry, the name and town of Inuvik became "accepted symbols of the social, political, and economic change in the north."[672]

Indeed, because scientists had articulated nature as something to cooperate with, and not

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670 P. Whitney Lackenbauer and Matthew Farish, "The Cold War on Canadian Soil: Militarizing a Northern Environment," 920-50.; Matthew Farish, "Frontier Engineering: From the Globe to the Body in the Cold War Arctic," 177–196.

671 V.F. Valentine and J.R. Lotz, "Northern Co-Ordination and Research Centre of the Canadian Department of Northern Affairs and National Resources," *Polar Record* 11, no. 73 (1963): 419-422.

672 Robertson, *Memoirs of a Very Civil Servant,* 136.

to be opposed, scientists became important arbiters of northern empire. Contrary to military men, bureaucrats, and even other engineers and scientists, permafrost scientists understood the tundra as a system that needed to be adapted to, not overcome, in order to be successfully built upon. C.L. Merrill, the director of the site survey team, became the supervisor for the town's construction. Cognizant of the potential dangers in clearing vegetation from permafrost and disrupting subsurface hydrology and integrity, he enforced a careful environmental ethic, threatening to fire anyone who did not follow the detailed plan in tree removal.[673] Rather than a symbol of conquering the Arctic by brute force, Inuvik was a monument most of all to the ways scientists sought to understand relations among human activity, the surface of the earth, and the space underneath—and worked within nature's limits to reengineer it.

Conclusion: A Nexus of Knowledge and Power

In 1943, Stephen Taber published "Perennially Frozen Ground in Alaska: Its Origin and History," which became a foundational paper in the field of permafrost science. That Taber distinguished between the origin of phenomena in the earth and that phenomena's history signals an embryonic moment in knowledge about Arctic ground. Taber spent the article describing the phenomena found in the subsoil when its perennial mean temperature is always less than 0 Celsius. But he also highlighted the problems with the term "permafrost" to describe these curious features. "Permafrost" had been created only recently and used widely, even to describe soils in non-Arctic locations whose water-bearing silts were frozen, even if their annual temperatures rose above freezing. His colleagues spent much of the 1950s in similar debate, proposing other terms, like "cryopedology" or "peregelisol" that they thought were more accurate. Like any emerging field, attention to terms and their representation of underlying

673 Hill, *Inuvik: A History*, 50-51.

concepts is often richest at transitional moments, when possibilities are being shaped and limitations resisted. Just as military, industrial, and governmental networks transformed the Arctic in the 1940s and 1950s, scientists needed to transform the very way they thought and talked about the Arctic.[674]

By 1958, when Canadian officials held the First National Northern Development Conference in Edmonton, Alberta, it was clear that permafrost was a term, concept, and issue that had solidified. There, knowledge about the physical environment tied together the academic-military-complex because of the promise and problems of defense, development, and devolution in the north. Alvin Hamilton, the recently appointed Minister of Northern Affairs and National Resources, gestured to the Western Arctic as the scene of the "world's greatest search for oil and gas." Exploration had covered more than 70 million acres in the past decade, monies invested in such activity reached several million dollars annually by 1958, and the extent of leases in the Mackenzie Delta and Arctic coast region had doubled since 1950. The climate—whether economic, political, or environmental—no longer seemed a barrier in Arctic development. Following Hamilton was a member of Canada's Division of Building Research, who spoke about the importance of permafrost in guiding any attempts to defend, live in, or develop the north. He gestured to recent work in the United States and in the Mackenzie Delta on this phenomenon. Upon the close of the conference, which was sponsored by an Alberta mining group and the Edmonton chamber of commerce, the first resolution was to ask the Canadian government for more information about permafrost to be shared with private agencies through military and governmental research groups, as had been done in Alaska four years before.[675]

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674 Memo from Mr. John G. Wells to Frank C. Whitmore, Dec 29, 1949, RG 57, Military Geology Branch: General Correspondence Files 1943-1953, Box 1, Folder: "Alaska, 1947-Aug 1950, Permafrost Activities: Defense Department," NARA.

675 "Proceedings: National Northern Development Conference: The Last Frontier in North America, Edmonton,

The priorities of militaries, governments, and corporations drew the attention of scientists to the physical environment, and away from the other aspects of the north that had defined the Arctic in the twentieth century. Hamilton wasn't the only bureaucrat pointing to the ground as the foundation, and potential barrier, to a new future for North America. The governor of Alaska, Ernest Gruening, banished popular concerns about an Arctic that was doomed to underdevelopment because of its climate as "climythology." In his "Future of the North" speech before Carleton University students and faculty in Ottawa, Gordon Robertson noted that northern temperatures would present an issue only if "we saw the future in terms of growing pineapples."[676] The "frigid zone" could be reduced to a cost factor and active governments could shoulder capital investment to pave the way for private companies to exploit natural resources in the north.[677] Geologist John C. Reed referred to Inuit cultures as simple in relation to the complex physical landscape of the north.

In turn, the work of scientists made permafrost synonymous with the Arctic. In the mid 1950s, the U.S. government established its second Arctic research center in Greenland at the Thule Air Force Base. Research conducted here focused on the Greenlandic ice sheet environment and the curious weather patterns associated with it, like intense fog and whiteouts. Scientists continually referred to science conducted at Thule as "Polar," distinguishing it from that conducted at the Naval Arctic Research Laboratory, which targeted "Arctic" phenomena—

Alberta, Sept. 17, 18, 19, 1958," 38-43; 140-5; and 164.

676 Robertson, "The Future of the North," 10. On "Climythology," see Ernest Gruening, "Climythology: Ernest Gruening's Address to the American Meteorological Society," in Ernest Gruening, ed, *An Alaskan Reader, 1867-1967* (New York: Meredith Press, 1966), 367-372.

677 Permafrost was also essential to northern public health issues concerning sewage treatment and fresh drinking water, which had not entered the radar of US or Canadian officials prior to the Second World War. See Letter from John C. Reed to Frank C. Whitmore, September 30, 1948, RG 57, Records of John C. Reed, Staff Geologists for Territories and Island Possessions, 1932-1953, Box 2, Geologic Division Files, Alaskan Terrain Permafrost Program, NARA.

namely, permafrost.[678] The environments and communities of the Western Arctic had been previously bonded in terms of their physical, political, and economic conditions. But after the Second World War, these bonds from lichens, copper, reindeer, and the displacement of unstable fur trapping economies to permafrost, oil, and the modernization and militarization of the total environment.[679]

Whether in Edmonton, Inuvik, Point Barrow, Washington, or Ottawa, permafrost became a nexus that brought together many different scientific practitioners, put them in contact with one another, and made possible their relationships with powerful leaders of businesses, armed forces, and national governments. U.S. geologist R.F. Black described permafrost research as an interdiscipline, a "descriptive, theoretical, and applied science" that involved geology, botany, climatology, physics, and engineering.[680] Gathering knowledge about permafrost could take place through a number of channels and research networks—within the United States Geological Survey, the Office of Naval Research's Naval Arctic Research Laboratory, Purdue University, the Snow, Ice, Permafrost Research Establishment in the U.S. Army Corps of Engineers, Canada's Division of Building Research, or at the Norman Wells Research Station next to Imperial Oil's fields in the Northwest Territories.[681] This research could be shared through journal articles,

678 There were a variety of responses to the special problems of Arctic nature in the Cold War, from attempting to overcome the land to adapting to its natural limits. See Janet Martin-Nielsen, "The other cold war: the United States and Greenland's ice sheet environment, 1948-1966," *Journal of Historical Geography*, 38 (2012) 69-80.; and P. Whitney Lackenbauer and Matthew Farish, "The Cold War on Canadian Soil: Militarizing a Northern Environment," Environmental *History* 12 (October 2007): 920-50.

679 Even the Lomen Company of Alaska deemed reindeer as "a thing of the past" by the 1940s and swung "back into the mining game" that had catapulted them to success in Nome over the turn of the twentieth century. Letter from Carl J. Lomen to John Reid [sp], April 18, 1941, RG 401, John C. Reed Papers, Box 1, Folder: Correspondence and other papers, USGS (1933-1951), Subfolder: Lachenbruch, NARA.

680 Letter from RF Black to W. Roberts, August 19, 1947, RG 57, Entry: Geologic Division, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 10, Folder: Naval Petroleum Reserves, NARA.

681 While military scientific agencies often garnered more funding and personnel than civilian counterparts, the armed forces recognized that partnerships and institutional sharing were essential to creating richer knowledge sets and, consequently, enhancing security. See "Usefulness of SPIRE to Engineering Intelligence," RG 57, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 3, Folder: "Army: Snow, Ice, and Permafrost Research Estab," NARA.

presentations before meetings like the National Northern Development Conference, the Alaskan Science Conference, classified memos to Navy superiors, or in lectures at the colleges and universities where many permafrost researchers taught throughout the year.[682] John C. Reed, for example, was the United States' Staff Geologist for Territories and Island Possessions in the 1940s and a go-between for the US Geological Survey and the Office of Naval Research. He was also a card-carrying member of the Cosmos Club in Washington, the Explorer's Club in New York, the Arctic Institute of North America in Montreal and Baltimore, the Society of Economic Geologists, the Geological Society of America, and the American Geophysical Union.[683] As these knowledge-sharing networks articulated across military, governmental, academic, and industrial circles over the 1950s and 1960s, they reified the Western Arctic as a crucial site for science, defense, and development. The Western Arctic became recognized as "one of the most active areas from the standpoint of permafrost research and also petroleum investigation."[684]

Just as permafrost science served as a nexus of knowledge and power for an emergent academic-military-complex, it also served as a site in which the dawn of global development and the end of empire confronted one another. A central claim of this dissertation is that knowledge about the Arctic was co-produced with imperial activity there. The period of the 1940s and 1950s supports this claim, even as this era spanned the moment of global decolonization. Anti-colonial uprisings spread across Africa and India after 1947, but the U.S. and Canada faced no such turmoil in the Arctic before 1959. Still, even without the threat of revolution, the modernist

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682 A telling example of the ways journal articles became a space for community-building around Arctic and permafrost issues comes through "Comments LA Spetzman's Plant Geography and Ecology of the Arctic Slope of Alaska, July 11, 1951," RG 57, Records of the Alaska Terrain and Permafrost Section, 1945-1954, Box 2, Folder: Arctic Institute of North America, NARA. Here, ecologist Robert Sigafoos offered feedback on a colleague's proposed article for *Arctic,* helping to create and sustain a professional network around topics such as climate, vegetation, permafrost, and the interactions among these factors.

683 "John C. Reed," RG 401, Collection XJCR, John C. Reed Papers, Box 1, Folder: Bio Data/Personnel Files/Performance, Sub-Folder: "Bio Data," NARA.

684 "Permafrost in Western Canada—A Report of the Third International Permafrost Conference, January 30, 1979" found in Louis DeGoes Papers, Box 8, Folder: Pewe Conference Report, APR-UAF.

interventions of post-colonial politics came to the Arctic. The end of formal European empire coincided with the emergence of tensions with the Soviet Union, turning the Western Arctic into a strategic location in the Cold War. Just as the retreat of Old World powers from northern North America in the late 1800s had allowed both the creation of the modern U.S. and Canadian nations and their first attempts at imperial expansion, so too did the Arctic figure prominently in North America's global identity after World War II. To defend the north was to defend democracy and capitalism. To develop oil resources was to raise the standard of living of Inuit citizens. To devolve power to local forms of governance was to maintain (and facilitate) private enterprise's access to northern natural resources.

Knowledge about permafrost helped U.S. and Canadian leaders pursue these imperial ambitions while maintaining anti-colonial ideologies.[685] By the end of the 1950s, the research questions and methods that permafrost scientists deployed made the concept of permafrost foundational to a new vision of the North that seemingly moved beyond the history of empire. Bureaucrats and scientists bemoaned the fact that, in the popular view, the north remained a place long forgotten and misrepresented by southerners.[686] But the creation of a wealth of new knowledge about the Arctic environment had shown the potential of a New North dotted with wells, mines, and "normal" living facilities—and connected more seamlessly than ever to the south through aircraft. Canadian officials, in particular, relied on this vision to separate themselves from British empire, traces of which could be found in the Arctic. When compared to the New North of Inuvik, the Old North now looked more like one defined by the mainstays of British colonialism. In his speech before Carleton University students in Ottawa, Gordon Robertson suggested that the Arctic "was left to the missionaries [and] the fur traders." By pitting

685 Oldenziel, 19-29.
686 Robertson, "The Future of the North," 7.

the New North of modern towns and oil economies as an answer to this history of imperialism, Robertson implied that Canada's future in the north was somehow anti-colonial.

Gesturing to British history was one means of displacing North American empire in the annals of history. Bureaucrats like Robertson were not against erasing this history, either. Civil servants and scientists in Canada defined the "Eskimo problem" in the Arctic through the paucity of available social services, pointing repeatedly to Alaska as a comparative case. There, the expansion of the reindeer industry during the post-WWI era created a network of villages, initially used by Bureau of Education teachers and Bureau of Indian Affairs officers. This infrastructure could be repurposed through town cooperatives, which would help local communities pick themselves up by their own bootstraps and begin a devolution of power to the north.[687] Canadian officials bemoaned the sparse state presence in the vast northern frontier, even as they looked past their own historic experiences with reindeer and sold the herd in the Mackenzie Delta to private developers.[688] Robertson wondered why previous Canadian leaders had not built "one single school, not even a one-room school" in any location other than Yellowknife.[689] Of course, he had to gloss over the creation of Reindeer Station and the

687 Ibid. His vision for the "New North" would make up for past mistakes by issuing social services through family allowance payments, old age and blind pensions, hospital care for cases of tuberculosis, and education through residential schooling and vocational training.

688 An undated article titled "What's the State of the Reindeer Project?" which references government activities in 1957, suggested that the public and the government was in the dark about the status and management of the project. The author wondered why the NWT Council did not hear questions about reindeer herding at its sessions. "What's the State of the Reindeer Project," G1979-003-70-2, NWTA.

689 Robertson, "The Future of the North," 7 and 20-1. Education became a crucial space for converting the underdeveloped, colonial Arctic into the developed, post-colonial Arctic. There was "no need for an education" to "chase a walrus or a caribou," but such knowledge was "vital" to be "a clerk in a mining office or a successful carpenter." As Stefansson had imagined reindeer in the 1920s, Robertson saw school teachers and sociologists as helping native northerners adjust to the "disruption of old patterns of life, old customs, [and] old standards of value." While Inuit in Alaska and Canada had known missionaries, teachers, and northern police before, the arrival of hordes of doctors, nurses, social workers, engineers, and Northern Service Officers and the establishment of entire towns dedicated to governmental administration of people and nature (like Inuvik) indicated a New North. For an interesting discussion of Northern Service Officers, their relation to the Distant Early Warning Line construction, and change in the Western Arctic region, see David Neufeld, "Distant Early Warning (DEW) Line: A Preliminary Assessment of its Role and Effects upon Northern Canada" Revised for the Arctic Institute of North America, May, 2002, 16. Neufeld writes, "The NSO were to facilitate communications

introduction of reindeer for this appeal to have a glimmer of truth. Meanwhile, Alaskan leaders hardly recognized the reorganization of reindeer herding by the federal government in their arguments for statehood. Rather, they romanticized the episode's early years in which private enterprise (Lomen company) single-handedly created an extensive and vertically-integrated operation based on herding, processing, and shipping infrastructure.[690] The message was mixed, but clear. The state had either never been in the north, or its presence had stunted the region's development. In either case, unions among industry and government at mid-century were an antidote to the Arctic's problems.

Ideas about permafrost revealed these tensions and attempted to resolve them. Bureaucrats like Robertson and Gruening—along with Navy officials like Eszenyi and many scientists and capitalists—pointed to knowledge about permafrost as central to solving "the special problems of providing for life in the north" precisely because it allowed for an effacing of history. They imagined their application of this knowledge as being more evolved than their historical counterparts. The networks of knowledge and power that allowed the creation and circulation of permafrost science were highly coordinated and efficient, a great improvement over the crude, unsystematized, and individual efforts of early twentieth century northern explorers.[691] Walter Dinsdale, the Minister of Northern Affairs and National Resources, made these connections clear. He charged that government's objective was to "establish in the north an environment of policy and services within which money can be invested to bring the north into the modern social and economic milieu of Canada and indeed the whole world." Completing

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between northern construction crews, government agencies, and native people. Basically they were to protect the interests of the Inuit and Inuvialuit and prevent any local difficulties from slowing the pace of defence construction....Hired to represent the best interests of the Inuit and Inuvialuit and so encourage their participation in local government, the NSO were instructed to maintain tight control over the relations between aboriginal peoples and non-natives."

690 Gruening, *The State of Alaska*, 212.

691 Farish, "Creating Cold War Environments," 76.

such an objective required that Canadians and Americans base all northern development activities not on "the north's colorful past" or "its supposed quaint and remote characteristics" but on "the most advanced social and economic thinking."[692] This was a rhetorical move that matched the ways leaders erased histories of Arctic colonialism. Pursuing defense, development, and devolution necessitated an approach to the north through permafrost science, one that could be distinguished as new, modern, and anti-colonial by gesturing to an Old North, itself a void of colonial history and rationality. In the hands of mid-century scientists and modernizers, Arctic history could be, paradoxically, both concealed and repeated.

692 Walter Dinsdale, "Canada from the Atlantic to the Pacific to the Arctic," a presentation to the Second National Northern Development Conference, Edmonton, Alberta, September 13th, 1961 , found in RG 92, vol. 14, file 400-3-1, LAC. See also Robertson, "The Future of the North," 23.

Conclusion

> There are two kinds of Arctic problems, the imaginary and the real. Of the two, the imaginary are the more real; for man finds it easier to change the face of nature than to change his own mind.
>
> *Vilhjalmur Stefansson*[693]

The Fragile Arctic: Colonial History after 1959

In 1959, Congress made Alaska a state and Canada opened Inuvik, its administrative hub atop the permafrost in the Western Arctic. These activities marked the transfer of power from federal bureaucracies to territorial forms of government, a move in step with promoting North American values of democracy in the decolonized world. In one sense, the decentralization of political power should create a natural stopping point for the narrative arc of this dissertation because it ended internal colonialism. Bureaucrats no longer managed distant territories from Ottawa and Washington and elected representatives from the Western Arctic could now guide decision-making processes that affected their daily lives. The darkness of colonialism gave way to the dawn of post-colonialism.

In another sense, however, devolution did not right the unequal power dynamics of the colonial period. By leasing out the Western Arctic to oil companies, the federal government had both assigned itself the responsibility of overseeing natural resources and granted unprecedented outside access to them. Over the 1960s, Shell Oil, Atlantic Richfield, British Petroleum, and Imperial Oil explored the Western Arctic for deposits of oil and natural gas. Their aerial

693 Vilhjalmur Stefansson, "Arctic Headlines in Fact and Fable," *Foreign Policy Association* no. 51, (January, 1945): 5.

reconnaissance and seismic blasting detected some of the largest petroleum fields in the world, including the Prudhoe Bay deposits, discovered in 1968.[694] Through the elaboration of an oil industry supervised by administrators in Anchorage, Fairbanks, Inuvik, and Yellowknife, state and corporate control over nature lived beyond the "official" end of empire. Meanwhile, as US and Canadian officials continued to imagine government's role as using public capital to provide the "infrastructure" for private enterprise, new structures, technologies, and representations of the Arctic allowed Inuit to harness power over economic development. Throughout the 1960s, Inuit leaders drew from a rich database of Arctic science to argue against the wholesale development of the tundra by oil companies and to assert their own claims to the lands of the Western Arctic.[695] Thus, this dissertation concludes as it began, in an imperial transition where political, economic, and intellectual networks shifted profoundly, and perhaps unexpectedly, along with representations and interventions in the Arctic.

Part of the platform for Inuit appeals to conservation and sovereignty came from the work of permafrost scientists. John C. Reed, Russell Hemstock, and Max Brewer claimed oil companies were leaving "scars on the tundra" through their exploration and exploitation of natural resources.[696] Not only was permafrost a keystone in the Arctic's delicate architecture, but

694 R.D. Carter, C.G. Mull, K.J. Bird, and R.B. Powers, "The Petroleum Geology and Hydrocarbon Potential of Naval Petroleum Reserve No. 4, North Slope, Alaska," United States Department of Interior, United States Geological Survey, April 1977. Hill, *Inuvik: A History*, 50-75; 80-100; 113-119. See also Leah Fusco, "Developing Canada's Oil Frontier: Panarctic and the Bent Horn Oil Project," A paper delivered to the American Society for Environmental History Conference, April 5, 2013, Toronto, Canada.

695 Terry Fenge (negotiator of Inuit land claims agreements in Canada since 1985), in discussion with the author, January 31, 2012. See also Douglas Pimlott, "Offshore Drilling in the Beaufort Sea: A Report to the Committee for Original People's Entitlement (COPE)," Prepared by Canadian Arctic Resources Committee, (Inuvik, NWT: 1974).; Peter J. Usher, "Eskimo Land Use and Occupancy in the Western Arctic," Prepared for Milton Freeman Research, Ltd. (Hamilton, ON, 1974). R.R. Riewe, "Interactions between Wildlife, Trapper-Hunters, and Seismic Lines in the Mackenzie Valley Region, N.W.T., Canada," A report prepared under contract for the Arctic Land Use Research Program, Northern Environmental Protection and Renewable Resources Branch, Department of Indian Affairs and Northern Development. January, 1979. 1-35. See also interviews with Wally Firth, Bill Erasmus, Bertha Allen, and Nellie Cournoyea, in "CBC Transcripts," N-1992-014, NWTA.

696 "Interview of Max Brewer, John Schindler, and Jess Walker by Sam Means, Denise and Deidre Ganopole, and David Hickock, July 18, 1975, Anchorage, Alaska," David M. Hickock Papers, Box 35, Folder 31, UAA. Russell

the slow-growing vegetation of the north meant that any alteration of the physical environment would remain on the landscape as a grim reminder of industrial society's impacts on nature.[697] Permafrost scientists working at the Naval Arctic Research Laboratory were in a unique position to make observations about the Arctic's sensitive physical environment, as the nearby Naval Petroleum Reserve offered telling examples of "intense vehicular activity" and the disturbance of underlying permafrost underneath. Some reports suggested that the trails left by machinery—in some cases more than 100 feet wide and fifteen feet deep—would never completely heal.[698] In agitating for land claims agreements, Inuit also drew from archaeological research. Inuit living in the Western Arctic had teamed with archaeologists in the 1940s and 1950s to identify sites of cultural heritage, so these locations could be studied before industry altered the integrity of specimens and artifacts in the permafrost. Using radiocarbon dating techniques, archaeologists determined that Inuit had occupied the Western Arctic for thousands of years.[699] Science with

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A. Hemstock, "Impact of Petroleum Activities on Arctic Ecology," prepared for Imperial Oil Co., Ltd, found in American Association for Advancement of Science, Alaska Division, 1950-1969 Records, Box 19, APR-UAF. ; Jerry Brown, "Tundra Biome Applies new look to Ecological Problems in Alaska," *The Northern Engineer* 3, no 2, (Summer 1970), 9.; John C. Reed, "Discussion with M.E. Britton on Aug 3, 1969," a personal note written to himself, in RG 401, John C. Reed Papers, Collection XJCR, Box 4, Subfolder: Britton-Reed Discussion of Aug 3 1965, NARA. "Oil Boom Cuts Deep Scars into Alaskan Wilds," *San Francisco Examiner and Chronicle,* September 14, 1969.

697 Biologists also pointed to vegetation as a symbol of the Arctic's fragile nature. Lawrence Palmer, the ecologist so instrumental in reindeer herding in Alaska and the Canadian northwest, articulated the tundra as "unstable and readily effected by disturbance." Lawrence J. Palmer, "The Alaska Tundra and its use by Reindeer," U.S. Department of Interior, Office of Indian Affairs, (1945), 5. Palmer's work was influential in shaping the ecological studies of A. Starker Leopold and F. Fraser Darling in Alaska. A. Starker Leopold and F. Fraser Darling, *Wildlife in Alaska: An Ecological Reconnaissance,* (New York: Ronald Press, 1953). Stephen Bocking has shown how Canadian ecologists working in the 1960s understood the Arctic ecosystem as fragile by conflating a relatively low biodiversity with simplicity and ease of disturbance. Bocking, "Science and Spaces," 880-884.

698 Ernest Lathram, "Analysis of state of vehicular scars on Arctic tundra, Alaska, 1973," 1-2, in SF-GG-60-30-2036, ATDU.

699 R.S. MacNeish, "Archaeological Reconnaissance of the Delta of the Mackenzie River and Yukon Coast," *National Museum of Canada Bulletin,* no 142, (Ottawa., 1956).; J.A. Ford, *"*Eskimo Pre-history in the Vicinity of Point Barrow, Alaska," *Anthropological Papers of the American Museum of Natural History* 47, pt 1, 1959. J.R. Mackay, Mathews, W.H, and MacNeish, R.S., "Geology of the Engigstciak Archaeological Site, Yukon Territory," *Arctic* 14.1 (1961): 25-52. North Slope Borough Contract Staff, *Native Livelihood and Dependence: A Study of Land Use Values Through Time,* (Anchorage: US Department of the Interior, National Petroleum Reserve in Alaska, 1979). Of course, Inuit had maintained oral histories that recorded this same history of land use. But, in the political moment of the 1960s, scientific evidence held important sway.

colonialist roots, then, had become the basis for anti-colonial interventions.

As battles for power percolated among civil rights activists, feminists, and environmentalists elsewhere in North America, Inuit leaders and scientists pointed to these two concerns—Arctic ecology and Arctic cultural history—to bring the issue of environmental protection and indigenous sovereignty to a boil. Inuit aligned themselves with a growing environmental movement that was largely anti-development, thus building important alliances with conservationists and ecologists who lobbied Washington and Ottawa to discontinue leases to oil companies.[700] Inuit also benefitted from the work of activists in First Nations communities in the James Bay region of Canada, who set an important precedent by blocking a hydroelectric dam project in the late 1960s. By promoting the notion of a "fragile Arctic," Inuit captured not only the weight of the scientific arguments for a historic and vulnerable northern environment, but also the gravity of the concerns for social justice in public and political opinion at the time.[701]

While representations of the Arctic had always involved internal tensions, the 1970s "fragile Arctic" became quite contradictory. At a 1968 meeting of the Alaskan Science Conference (in Whitehorse, Yukon Territory), ecologist Cowan McTaggart described the human

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700 D.M Hickock, "Some Background Notes on the Creation of the Arctic National Wildlife Range," David M. Hickcok Papers, Box 2, Folder 52, UAA. "Memorandum To Mayor Eben Hopson from Billy Neakok, n.d," David M. Hickock Papers, Box 24, Folder 5, UAA. Paul Sabin, "Voices from the Hydrocarbon Frontier: Canada's Mackenzie Valley Pipeline Inquiry (1974-1977)," *Environmental History Review* 19, no.1 (Spring, 1995), 17-48. "19th Alaskan Science Conference at Whitehorse, Yukon Territory, Canada, August 26-30, 1968" printed by the Alaska Division of the American Association for the Advancement of Science, 7-8, found in DHC. The push for wilderness protection in northeast Alaska over the mid to late 1950s—eventually legislated in 1960—was also a push for creating space for the scientific study of northern environments. See George Collins and Lowell Sumner, "Northeast Arctic: The Last Great Wilderness," George L. Collins Papers, Series 1, National Park Service, Box 3, Folder 23, APR-UAF.

701 Thomas R. Berger, *Northern Frontier, Northern Homeland: Report of the Mackenzie Valley Pipeline Inquiry, Volume I.*, (Ottawa: Minister of Supply and Services Canada, 1977). "Eskimo peoples gather," *Alaska Advocate*, June 23, 1977. "Inuit Circumpolar Conference, 1977," Conference pamphlet, found in David M. Hickock Papers, Box 24, Folder 5, UAA. Under the title, "Purpose of the Conference," the pamphlet reads: "Within this lifetime, the possibility of extensive damage to the fragile environment of the Arctic has become a real threat. To those living in the Arctic, this possibility becomes a threat to the very foundation of Inuit society. As the quest for resources leads the dominant cultures to one of the most promising, unexplored areas of the world, the Arctic Polar region, exchange among Inuit becomes not only important but essential." 1

"appetite for energy and minerals" as unleashing untold ecological and human consequences across the world, and potentially throughout the north.[702] Scientists pointed to these concerns to advocate for the expansion of wilderness areas on the Beaufort Sea coast—namely to grow the Arctic National Wildlife Range (legislated into being in 1960) into an internationally protected area to prevent the most likely route for pipelines out of the region.[703] Prime Minister Jean Chretien redressed ecological protection as colonialism, because locking up the north as a sanctuary would squash Inuit aspirations for jobs and leading roles in oil extraction. Yet, Canadian administrators also used notions of a delicate Arctic to assert sovereignty in the north vis-a-vis American oil companies, pushing through environmental protection legislation as a means of controlling potential shipping lanes in the Beaufort Sea and Northwest Passage. Curiously, development had become both imperialism and decolonization. Conservation had become both a motive for state action and the newest iteration of the trope of governmental "neglect and indifference."[704]

Starting in the 1970s, and arguably continuing today, science seems to be both the problem and the solution in these Arctic tensions. Canadian geographer Trevor Lloyd gave opening remarks to participants at the Arctic Institute of North America's conference on community development in 1969. He lamented how, over the first half of the 1900s, governments and scientists had developed independently of one another in the North, such that

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702 "19th Alaskan Science Conference at Whitehorse, Yukon Territory, Canada, August 26-30, 1968" printed by the Alaska Division of the American Association for the Advancement of Science, p 7-8, found in DHC.

703 University of California, "George Collins: The Art and Politics of Park Panning and Preservation: An Interview," Regional Oral History Office, Bancroft Library, 1980, 215-225.

704 Jean Chretien, "Plain Talk on Northern Development," a speech given before the Inuvik Chamber of Commerce, June 1972, Dick Hill Collection, Inuvik Centennial Library. "It has become fashionable in some southern circles to call for a freeze on northern development for two, three or five years while southerners think out what they believe would be a better northern future. Those I call the "Toronto-Montreal Professional Northerners" would halt development of jobs and futures for all of you here...A freeze in this vast land would be a return to the days of neglect and indifference. It would make it impossible to achieve our national goals in the North. It would thrust northerners back into a new Dark Age." 4 Lackenbauer and Farish, 933. "A delicate Arctic became a convenient pretext to extend Canadian jurisdiction northward, and the government took direct action to securitize the region."

Arctic Alaska—and knowledge about it—was separate from Arctic Canada, even if the region containing these places was ecologically connected. Lloyd accused historical interveners with "balkanizing the North," thus presenting the Arctic Institute of North America as an agency that could "bridge these different culture zones." It was clear that the explosion of research activity associated with the search for oil and gas meant that social and natural scientists penetrated all facets of everyday life in the Arctic. One of the conference reports included as an opening epigraph a statement from Eric Kierans, Minister of Communications: "The average Eskimo family consists of the father and mother, five children, an aunt or uncle, one or more grandparents, an anthropologist and a sociologist."[705]

The answer, for scientists and residents of Arctic towns, was not less research but more local control over it. Arctic Institute scientists called for the creation of multiple task forces on subjects ranging from mineral development to the creation of craft industries and education policy.[706] These sentiments were shared in the north, too, even if conference organizers were unsuccessful in recruiting northerners to attend the meeting in the south. In Inuvik, scientists stationed at the Inuvik Research Laboratory collaborated with local residents to convene the Mackenzie Delta Environmental Project, a "communication program to acquaint the residents of the Mackenzie Delta with present government and industrial activities so that they can be more involved in the 'action.'" The Project was itself part of a larger community group called the Mackenzie Institute, which brought citizens and researchers together to share knowledge and expertise and build capacity for development programs.[707] These institutional structures

705 Quoted in "Man in the North Technical Paper: Communications Study/Part II Arctic Institute of North America," found in DHC.

706 "Community Development in the Middle North: Report of a Conference Seminar, Sponsored by the Arctic Institute of North America," 13.

707 Rose Mary Thrasher, "Mackenzie Delta Environmental Project."; "Introductory Prospecting for Northerners," and "A New Northern Educational Institute." My sincere thanks to Dick Hill for providing me these documents from his personal collection. See also *Inuvik Drum* Oct 10, 1968, vol. 3, no 25, "Public Notice" which

paralleled the development of the University of Alaska-Fairbanks and many observers in the 1960s and 1970s hoped for a similar University of the North in Canada. In the 1960s and 70s, universities and the "knowledge industry" adopted much of the force of the academic-military-industrial complex of mid-century, acting as a hybrid space for local engagement with research, economic development, and policy formation.[708]

All of these concerns informed the Arctic Institute's recommendations moving forward from the 1969 conference on community development. In a two-part technical paper released in 1971, the Arctic Institute of North America laid out detailed plans for supporting massive communications programs in the North to address the social and ecological dimensions of resource exploitation.[709] Their audience was broad, including "interested persons in industry, government, the professions, academia, and the public at large," but they also attempted to speak to northern residents. Inuit leaders in the Western Arctic also turned to radio broadcasting, local newspapers, television programs, and research collaboratives to circulate concerns about political

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announced the formation of the Mackenzie Institute and its objectives.

708 Indeed, the Arctic Institute positioned itself as a clearing house for correlating and inspiring community development efforts to mediate the north's delicate ecology and "to meet the specific needs and aspirations of northern peoples." In order to do so, it developed a standing independent from, but connected to, government and industry. Because of its "unusual status as a private organization" and its "close relations with both the Canadian and United States governments and with commercial and academic institutions," the Arctic Institute could prevent the "repetition of past errors" of colonialism and environmental destruction. See also *Inuvik Drum,* Sep 26, 1968, vol. 3, no 24. In this edition of the local paper, the editors ran a reprint of *The Canadian Forum* from 1968 that is worth quoting at length: "Development specialists have recently come to realize that information and knowledge are forms of capital and of production. In Alaska, the booming state university locate at Fairbanks contrasts strongly with the moribund conditions of the mining industry. Gold mining employs 150 people in the area; the University has a staff of 570. The "knowledge" industry forms a vital and growing part of Alaska's economy. In the summer of 1967, activities on the campus ranged from the Arctic Institute of North America's international conference on circumpolar health problems to a training course for sawmill operators...Although Canada prides itself on being a northern nation, it does not yet possess a northern university...Many "Northern" problems are similar to those in the developing countries. The lessons we can learn in the north may have a vital part to play in understanding how man can control and use his social and physical environment. The balance is delicate in the north, and research there can tell us how the balance is tipping." The University of the North did not come to fruition, but Yukon College, Aurora College, and Ilisagvik College are all products of this line of thinking. See Amanda Graham, "The University that Wasn't: The University of Canada North, 1970-1985," M.A. Thesis, Lakehead University, 1994.

709 "Community Development in the Middle North: Report of a Conference Seminar, Sponsored by the Arctic Institute of North America," Dartmouth College, Hanover, NH, Feb 26, 27, 28 and March, 1, 2, p A-3. This document found in DHC.

representation, ecological protection, and their desire to administer sustainable economic development.[710] Inuit voices were as diverse as any other, however—some northern residents wanted control of their own land and the resources in it; others were fine to let oil companies in as long as they didn't interfere with trapping; and still others offered diatribes against the wholesale destruction of wildlife, the tundra, and the ocean, signs of which were already evident through seismic exploration in the 1950s and 60s.[711]

Southerners often pointed to a changing, unstable northern environment, whether social or natural, as a cause for concern about cultural loss. These concerns were inflamed when northerners described the possibility that oil development might weaken cultural traditions. But, as Paul Sabin has noted, for Inuit, Dene, and Metis residents in the Mackenzie Delta during the 1970s, "tradition" did not refer to a "a preserved specimen from the ancient past, but rather a way of life that had evolved in concert with the fur trade, missions, mines, and transportation infrastructure. Just because these people lived in history, however, did not condemn them to be victims of it." By the time sweeping land-claims decisions redrew lines of jurisdiction in Arctic Alaska and Canada in the late 1970s, the region's future had been caricatured into winner-take-all choices between environmental conservation and economic development, industrialization and

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710 A recent speech before the Inuit Studies Conference by Nellie Cournoyea, current Chair and CEO of the Inuvialuit Regional Corporation, makes clear the role of northern communications programs in building community political engagement. See Nellie Cournoyea, "Adaptation and Resilience: The Inuvialuit Story," a speech before the 18th Inuit Studies Conference, Washington, DC, October 26, 2012. See also Natasha Lyons, "Inuvialuit Rising: The Evolution of Inuvialuit Identity in the Modern Era," *Alaska Journal of Anthropology,* Vol. 7, no 2, (2009), 71-73.

711 Peter Usher's interviews with Western Arctic Inuit in 1973 and 1974 provide a great indication of the variety of opinions on oil development. See Peter Usher, "Notes on interviews," on file at the Inuvialuit Cultural Resource Center, Inuvik Northwest Territories, File E 99 INT, accessed 1-27-11. See also Paul Sabin, "Voices from the Hydrocarbon Frontier: Canada's Mackenzie Valley Pipeline Inquiry (1974-1977)*," Environmental History Review* 19, no.1 (Spring, 1995), 17-48. See also "Inuvik designed as a base for Arctic development," *Edmonton Journal,* Tues Sep 17, 1974. In the article, Sam Raddi, the president of COPE (Committee for Original Peoples Entitlement) said "The whites are welcome to the gas and oil, for it is no good to us. So we say take the oil and gas but don't hurt the environment and people."

cultural preservation.[712]

There are three reasons why identifying 1959 as a transition—and not an end point—enriches our understanding of the history of science and empire in the Arctic in the twentieth century. First, as the term transition implies, the events taking place in the Western Arctic during the lead-up to land-claims legislation were made possible because of the Arctic's colonial history. The rise of an academic-military-industrial complex in the 1940s and 1950s both facilitated the extension of an oil industry and laid some of the groundwork for reacting against it. Permafrost and archaeological research from the 1940s and 1950s created a foundation for a hybrid knowledge of Inuit and Arctic life that was leveraged in Inuit negotiations with scientists, conservationists, and federal governments. Second, the anti-colonial notion of a "fragile Arctic" shared much with the ways the far north was conceived during the region's colonial period. The nineteenth century brought the world the dangerous Arctic; the twentieth century boasted the endangered Arctic. Whether imagined as unsettled, wild, or strategic, Arctic colonialism was defined by imaginaries that placed the region as "at risk." If the signing of land claims agreements in the 1970s made history by recognizing Inuit independence, it also perpetuated history by invoking a deeply colonial imaginary to argue for autonomy.

The third and final reason for thinking about the end of this dissertation as a transition is related to the first two points. As the struggle for power over natural resources and development in the 1960s and 1970 makes clear, experiences of colonialism could not be contained to the colonial period. Colonial interventions had provided administrative centers in the Western Arctic for corporations who sought to extract profits from the frozen earth. They also provided northern residents with jobs in labs, radar stations, drilling sites, and construction projects when fur trapping faltered in the mid to late 1950s. Colonial experiences were diffused throughout

712 Sabin, 17-48.

scientific knowledge and Inuit partnerships with scientists. They had created the political and academic institutions that circulated ideas of nature and allowed a forum for environmental and indigenous activism. To consider 1959 the beginning of a post-colonial era is misleading. Such a sharp break obscures the ways colonial history continued to figure in Arctic life, even as colonialism had come to an official close.

Reading the "New North" against Histories of Science and Empire in the Arctic

For the same reasons, modern conceptions of the "New North" present serious issues. In the introduction, I promised to demonstrate that the "unprecedented" situation playing out across the top of the world today is better understood as the most recent iteration in a series of attempts to understand, protect, and exploit the region. Returning to the notion of a "New North" in modern discourse helps us see the continuities and discontinuities between the Arctic's colonial history and its position in global change narratives. In casting the Arctic as a place to be saved or utilized, "New North" storytellers unknowingly draw from a tradition of Arctic representations closely associated with corporate and bureaucratic intervention. Yet in projecting notions of the Arctic as timeless, pristine, and *just now* experiencing globalization, these same storytellers erase this troubling history and their own connections to it.

The recurrence of the adjective "new" in these stories reflects an embedded view of the northern frontier as culturally, ecologically, and historically "exceptional," or as somehow shielded from the rest of the world in space and time.[713] When conservationists, ecologists, and

713 For an insightful read on the place of "exceptional" discourse in a contemporary Arctic Alaskan case, see Josslyn Cassady, "State Calculations of Cultural Survival in Environmental Risk Assessment: Consequences for Alaska Natives," *Medical Anthropology Quarterly* 24, Issue 4, (2010): 451-471. Alun Anderson discusses how it is time to consider the Arctic as a "region unto itself" and also worries about the consequences of this line of thinking. "By writing about the Arctic as a region, though, I don't want to reinforce the notion of its being a separate, distant, remote place. Nothing could be further from reality; the Arctic is ever more entangled with the south and ever more at the mercy of decisions made elsewhere, often without the slightest consideration for the

permafrost scientists worry about the expansion of oil economies in Alaska and northwest Canada into a "new" Arctic, for example, their concern is invigorated by their perception that northern communities live in "close contact" with the surrounding environment. Here, as in many other instances, an Old North had been called into being as a foil for imaginations of the Arctic's future.[714] The presumptions of difference are three-fold: southerners do not live so closely to nature; the north has not arrived on the stage of modern history because its residents have not yet transcended natural limits; and southern nature can be sufficiently distinguished from northern nature. Without these common-sense ideologies at play, this observation, like others in the Arctic's colonial history, would be a non-starter rather than a point for intervention.[715]

Dissections of the "New North" of today (and tomorrow) have entrenched the notion of the Arctic-as-exotic to provide a cautionary tale about how the world will someday look. If the North is changing, so must the earth, they say. These tendencies have created paradoxes about the past and the future, about nature and culture, about south and north. If urbanization at home had inspired pastoral dreams abroad in the interwar period, the post-Prudhoe, and post-land claims North has fueled obsessions with climate change's impacts in a seemingly untouched northern zone. In the potent symbol of the polar bear stranded on an ice floe—invoked by Al Gore, and emblazoned on the cover of Alun Anderson's book—we see how global warming threatens to destabilize an already fragile ecosystem. But we also see why contemporary

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top of the world." Anderson, 9.

714 Grace, 16-17. Grace writes, "True of any discursive formation, the North that is deadly, cold, barren, lifeless, isolated, mysterious, which allowed for the playing out of heroic masculinity and victorious southern technology also contains its opposite—the North of sublime beauty, abundance, natural resources, waiting to be exploited and of great spiritual power—because discursive formations exits by negating or subsuming what it is not."

715 Taylor, 155-165. Grace, 266-267. Grace calls this a "politics of location," because where one sits in space and time determines their view of the North.

Americans and Canadians tend to think of the Arctic as an unpeopled wilderness.[716] Such narratives are meant to bring into bright context the tragedy and rapidity of environmental change, but they end up further entrenching notions of a north empty of history as well.

At the same time, the newest New North contains themes that remove history more subtly. In his prediction of the world in 2050, geographer Laurence Smith provides the clearest example of a global Arctic commanded by its local residents. Smith shows how citizens across the world will abandon flooded coastal cities and underperforming farms in the south to find open land in the north.[717] There, Inuit and First Nations communities will negotiate the terms of development and land use, given the existing land-claims agreements in northern North America. In this case, changes in the future turn historical decisions about jurisdiction and indigenous rights into mechanisms for redeeming a deeper history of colonialism.[718] But, in order for such projections to have meaning, readers must imagine that colonial experience differently than I have presented here. For Smith's future to appear startling or refreshing, the past needs to be written as winner's history in the strict dichotomies of colonizers and colonized, leaving little room for middle ground, gray area, or complex understandings of colonial encounters. It should be possible to imagine the Arctic as a "canary in the coal mine" without overlooking its complicated colonialism. Rather than a complete success or a "broken frontier," Arctic

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716 Anderson notes this in his introduction: "All too often, the city folk down south forget that the Arctic is a peopled place, and are unaware of how its inhabitants live. That can lead to some serious misunderstandings, few echoes of which reach the south." Alun Anderson, *After the Ice*, 7.

717 Smith, *The New North*, 5-20.

718 There are indications that elements of Smith's predictions are already afoot. As Bob Reiss illustrates, Alaskan Inupiat, led by former mayor of the North Slope Borough Edward Itta, are working with Shell Oil, the state, and federal government in the U.S. to find a path toward sustainable development of north slope oil reserves. See Reiss, *The Eskimo and the Oil Man*, 1-23. In Greenland, the arrival of Big Oil is a harbinger of economic independence and self-rule, not capitalist invasion and native resistance. See Kirsten Thisted, "Inuit without Igloos: Documenting the Arctic Transition" 18th Inuit Studies Conference, Washington, D.C., October 25, 2012. At a recent International Polar Year conference, Inuvialuit leaders called on scientists to provide more data on the ecological and social impacts of development so that they could design more sustainable extraction programs. Bob Simpson, "Inuvialuit Research Agenda," presentation before the NWT International Polar Year Results Conference, January 20, 2011.

colonialism was complex—in some cases imperial schemes failed, in other cases they remained concentrated in particular areas, and in all cases they involved significant negotiations and networks with scientists, local communities, the northern environment, and constellations of economic and political power.

Beyond ecology and culture, knowledge is clearly at issue in today's "New Norths." The role of science should not surprise us, given the relationship between networks of power and shifting scientific practices and applications. When scientists looked north in the late 1800s, they saw a training ground for young professional scientists. By the interwar era, the North was misunderstood. In the 1940s, all scientific data that had been collected to that point was misguided and a new body of work needed inventing. Today, Alun Anderson, a research biologist, suggests the International Polar Year has produced an unprecedented amount of research that remains unsynthesized.[719]

These views of Arctic science reflect the creation of new conceptual and technological tools that rendered the far north a frontier for knowledge, a place of exception for scientific communities the world over. The airplane, for example, provided the basis for photo-mapping practices which allowed the disciplines of geology, geography, botany, and ecology to extend a different set of research questions to northern terrain.[720] As a result, the north appeared as new ground. Changes in knowledge production were (and are) not always internally guided—they are also connected to goals for development. When scientists conceived of the Arctic as a void that could be filled by more (or more efficient) study, they sought to apprehend the region so as to

719 Alun Anderson, *After the Ice,* 9. "Nothing has driven the circumpolar view forward more than the International Polar Year that lasted until the spring of 2009. Thousands of scientists—natural and social—tackled the myriad issues that are needed to form a big picture of the Arctic. My worry now is not that too little is known, but that so much is known which has not been synthesized."

720 Both Liza Piper and Stephen Bocking have made similar claims for the subarctic and the Cold War Arctic. See Liza Piper, 32-58; and Stephen Bocking, "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960," *Technology and Culture* 50, Number 2, (April 2009): 265-290.

license their authority over it. This is nowhere more evident than in mid-century concerns about permafrost (and the lack of scientific understanding of it) as an obstacle to the goal of constructing governmental hubs and oil facilities on the frozen earth. As Ricardo D. Salvatore has argued in the Latin American context, the recurrence of enunciations concerning the "very possibility of knowing" the frontier became a strategy for legitimizing bureaucratic, corporate, and academic interventions in foreign lands. A similar role is clear for science in northern empires.[721]

Triumphalist and apocalyptic narratives of the Arctic today leave little room for nuanced understandings of the connections among the past, present, and future. This dissertation has sought to make and reveal those connections by telling a different story about the Arctic. Relying on a conceptual framework that perceives representations as entangled with interventions, and a spatial framework that organizes the flow of people, ideas, and power into contingent networks, I have explored the history of science and empire in the Western Arctic between 1867 and 1959. The result, I hope, is a portrayal of the region as a deeply historical place, one shaped over time by the twin forces of knowledge and power.

Representations of the Arctic between 1867 and 1959 held important similarities, despite their differences and impermanence. Scientists did not just observe nature and culture, they attempted to structure and direct them. An endangered Arctic of nearly extinct peoples and fauna could only be understood through the commercial whaling industry and the rise of American empire. An unsettled Arctic was tied to the struggle among US, Canadian, and European

721 Ricardo D. Salvatore, "The Enterprise of Knowledge: Representational Machines of Informal Empire," in Gilbert M. Joseph, Catherin C. Legrand, and Ricardo D. Salvatore, eds., *Close Encounters of Empire: Writing the Cultural History of U.S-Latin American Relations*, (Durham: Duke University Press, 1998), 90. On the role of science in northern empire, see Richard C. Powell, ``'The rigours of an arctic experiment': the precarious authority of field practices in the Canadian High Arctic, 1958-1970" *Environment and Planning A* 39 (2007): 1794-1811.; and Peter Kulchyski and Frank Tester, *Kiumajut (Talking Back): Game Management and Inuit Rights,1900-1970*, (Vancouver, UBC Press, 2007).

scientists to place the Arctic in post-World War I geographies of power, which revealed contests over scientific authority and political demands for acts of occupation to demonstrate sovereignty. A wild Arctic emerged from concerns about civilizing Inuit citizens and the forces of global markets as well as hopes for animal husbandry. A strategic Arctic made clear the position of the far north on the stage of modern geopolitics and hydrocarbon economies. In all cases, placing the Arctic as "at risk" provided the license for continued scientific and colonial authority. Such appeals always depended on the historical moment and the particular scientist, but they all intended to sanction outsiders' interventions in a land that did not belong to them.

Looking at the Arctic as I have displayed it here helps scholars take seriously the ways humans have come to know the natural world, and how that knowledge has mediated interactions with that world. Too often, environmental historians engage with science only as a tool for reconstructing past environments and not as an agent of historical change. My narrative, however, has sought to recover the ways historical actors imagined and represented nature, used those representations to intervene in it, and developed new knowledge because of those interventions. I have been less interested in determining the origins of a particular idea and more focused on how ideas and imperial power interact, relate, and produce each other. Such a choice has allowed me to move beyond a linear narrative of Arctic history and instead follow the channels, however fleeting, through which science and empire flowed and constituted one another. Arctic colonialism was not an inevitable process, but a historical one. Engagement with the Arctic shifted in surprising ways, given the vagaries of war, the demands of markets, the limits of nature, the paradigms of scientific disciplines, and the advent of new technologies. Colonial power was always evolving, forming associations among private enterprise, scientists, the state, and native northerners in one moment, and severing them the next. Because of these

historical phenomena, experiences of Arctic colonialism are multiple and contradictory, adding nuance to our understanding of science and empire.

If I have succeeded in highlighting the contingency of Arctic history, I hope that success has not sacrificed the persistence and meaning of colonial power. The networks through which science and empire moved in one era could be quickly replaced by others. But, importantly, they were overlaid in the same landscape. A project as transformative as the introduction of reindeer herding could be dissolved in a matter of a decade and rendered invisible, to scientists and bureaucrats that is. Even as domesticated animals roamed in the vicinity of Inuvik and the Naval Arctic Research Laboratory, the connections between imperialism in the interwar and post-Second World War were lost on those who visited the Arctic from the south. Tracing scientists over time helps us see these evolving patterns and enduring processes. Scientists were agents of the state and capital. They were interested in conservation and development. They were responsible for creating the Western Arctic landscape as we know it, but yet largely invisible in popular understanding of that place. An ephemeral, nodal, and networked colonialism needs to be understood as no less profound.

In conceiving of the Arctic as a rich palimpsest of colonial history, we can make sense of the apparent contradictions about the place evident in "New North" stories today. According to climate scientists, political scientists, and many others, the region appears as both fundamentally different from the rest of the world and yet interconnected with it. From the perspective of the story I have told here, these are not contradictions in terms. The Arctic is an intersection. There, the local meets the global, the past meets the present, east meets west, and north meets south. In the circumpolar basin, Arctic ecologies and industrial economies interact, just as the emissions of those economies in the temperate zone drift northward to accumulate in (and eventually reshape)

the land and seascapes of the far north. Along the coastline of the Beaufort Sea, indigenous politics and world geopolitics encounter one another and become one another. Over the top of the world, history is sucked into visions of the future, and both resist, erase, and create each other. Developing the capacity to analyze the Arctic's apparent paradoxes and sit with the cognitive dissonances they produce helps us better understand the place. The region is vast, beautiful, unique, and sparsely populated. But these ideas should not be conflated with emptiness, wilderness, timelessness, and disconnectedness. It is possible to regard the Arctic as both exceptional and inseparable, whether ecologically or historically.

Today's "New North" authors show great sensitivities to the landscape of history, geography, and knowledge in the Arctic. Yet, Inuit agency is being unduly contained through "New North" discourse and practices, especially as they relate to science. At meetings of the Arctic Council in 2011, Mary Simon and Inuit Circumpolar Council president Duane Smith announced that Inuit voices were being "marginalized" in discussions of the intergovernmental group, primarily because the Secretariat for Inuit was underfunded and overloaded with scientific grey literature, leaving Inuit leaders incapable of balancing a scientific-technocratic view of the region with their own views, comments, and critiques. This is ironic, given that Simon helped create the Arctic Council and this body has been instrumental in catalyzing international attention to climate change.[722]

In this dissertation, I have raised a voice about the politics of understanding Arctic change over the last century, from the arrival of commercial whalers to the arrival of commercial oil companies. In the late 1800s and today, scientific representations of the Arctic redraw lines between north and south, east and west. In bridging the actual and the potential, "New North"

722 Becky Rynor, "Indigenous voices 'marginalized' at Arctic Council: Inuit Leaders," http://www.ipolitics.ca/2011/11/07/indigenous-voices-marginalized-at-arctic-council-inuit-leaders/, (accessed November 15, 2012).

storytellers create a rhetorical space where it is possible to define and redefine, to fix and loosen the Arctic. At their worst, these stories present the Arctic as a vacuum, eliding colonial histories to authorize the continued exploitation of nature and labor. At their best, these narratives confront previous injustices to redistribute power and wealth more equally between southern institutions and northern communities.

There is no doubt that an open ocean, melted permafrost, altered seasons, and unpredictable migrations present unusual ecological conditions in the Arctic. But if history is any guide, it will be the stories we tell about the Arctic that shape the lasting response to climate change. For these reasons, our scholarly hackles should rise anytime we see the word “new” in front of “north”—not just because it signals unexpected and unfamiliar dimensions of Arctic life, or because it flags a bid to seize authority on northern matters, but because it attempts to keep history from being at stake in our future.

Appendix 1: Western Arctic Expeditions and other Scientific Operations, 1899-1918

Expedition	Year	Members	Affiliation	Objective
A Reconnaissance in Northern Alaska	1901	F.C. Schrader (geologist) and W.J. Peters (topographer)	U.S Geological Survey	Searching for minerals along Colville River to Alaskan coast, near Pt. Barrow
Geology and Coal Resources of the Cape Lisburne Region, Alaska	1904	Arthur J. Collier (geologist)	U.S. Geological Survey	Exploring northwestern Alaskan coast between Cape Thompson and Cape Beaufort for coal
Harrison Expedition	1905	Alfred Harrison (explorer)	Royal Geographical Society (RGS)	Searching for Polar Continent in Beaufort Sea via Herschel Island
Anglo American Expedition	1906-1907	Ernest de Koven Leffingwell (geologist); Ejnar Mikkelsen (explorer); Vilhjalmur Stefansson (anthropologist); Ejnar Ditlevsen (naturalist); George P. Howe (surgeon)	RGS; American Geographical Society (AGS); Publishers; Philanthropists; Canadian government	Searching for Polar Continent in Beaufort Sea via Flaxman Island on northeastern Alaskan coast
Continuation of Anglo American Expedition	1907-1914	Ernest de Koven Leffingwell	None	Geological and topographical survey on northeastern Alaskan coast, in the Canning River region
Stefansson-Anderson Expedition	1908-1912	Vilhjalmur Stefansson; Rudolph Anderson (zoologist)	American Museum of Natural History (AMNH); Geological Survey of Canada; Meteorological Survey of Toronto; Publishers	Document cultural and zoological life along Alaskan and Canadian coasts through specimen collections; report on possible "uncontaminated" tribe on Victoria Island
International Boundary Survey	1911-1912	D.D. Cairnes (geologist); J.D. Craig (surveyor); A.G. Maddren (geologist); Thomas Riggs (surveyor)	U.S. Geological Survey; Canadian Geological Survey	Establish international boundary—the 141st meridian—from the Porcupine River to the Arctic coast
Crocker Land Expedition	1912-1916	Donald Baxter MacMillan (explorer); Walter Ekblaw (geologist, ornithologist, and botanist); Fitzhugh Green (physicist); Maurice Tanquary (zoologist); Harrison J. Hunt (surgeon)	AMNH; AGS; University of Illinois' Museum of Natural History	Look for "Crocker Land," a supposed Polar island
Canadian Arctic Expedition	1913-1918	Commanded by Vilhjalmur Stefansson and Rudolph Anderson; includes fifteen other scientists (see Appendix 2)	Geological Survey of Canada; Department of Naval Service	Search for Polar Continent; Document cultural, zoological, and geological life of Canadian coast, especially the Coronation Gulf

The Western Arctic Expeditions—those ventures sharing missions and begetting one another—are in grey
Expeditions in white took place in the Western Arctic but were only indirectly related, as they were not after new lands. The Crocker Land Expedition, while inspired by undiscovered polar lands, took place in the Eastern Arctic.

Archival Collections

APR-UAF — **Alaska and Polar Regions Collections. Elmer F. Rasmuson Library. University of Alaska-Fairbanks. Fairbanks, Alaska.**

- American Association for Advancement of Science, Alaska Division, 1950-1969 Records.
- George L. Collins Papers.
- Kathleen Lopp Smith Family Papers.
- Lawrence J. Palmer Papers.
- Lomen Family Papers.
- Louis DeGoes Papers.
- Middleton Smith Papers.
- Naval Arctic Research Laboratory Records.

ATDU — **United States Geological Survey, Alaska Techincal Data Unit. Anchorage, Alaska.**

DHC — **Dick Hill Collection. Inuvik Centennial Library. Inuvik, Northwest Territories.**

ICRC — **Inuvialuit Cultural Resource Center. Inuvik, Northwest Territories.**
Permission to use informally published and unpublished materials.

- Cathy Cockney, *Kitigaaryuit Oral Traditions Research Project 1996: English Translations and Transcriptions of Interview Tapes #1-17.*
- Cathy Cockney, *Kitigaaryuit Oral Traditions Research Project 1997: English Translations and Transcriptions of Interview Tapes #1-16.*
- Elisa J. Hart, *Reindeer Days Remembered,* 2001.
- Elisa J. Hart and Cathy Cockney, *Yellow Beetle Oral History and Archaeology Project,* 1999.
- Murielle Ida Nagy, “Aulavik Oral History Project on Banks Island, NWT: Final Report,” 1999.
- Murielle Ida Nagy, “Yukon North Slope Inuvialuit Oral History,” 1994.
- Randal Pokiak, *Inuvialuit History,* 1991.

LAC **Library and Archives Canada. Ottawa, Ontario.**

- Alf Erling Porsild Fonds, R5495-0-7-E.
- J.J. O'Neill Fonds, MG 30 B 171.
- Kenneth Gordon Chipman Fonds, MG 30 B 66.
- R.F. Legget Fonds, MG 30 J 44.
- Rudolph Martin Anderson Fonds, MG 30 40.
- RG 33, Records of Royal Commissions.
- RG 42, Department of Marine Fonds.
- RG 45, Geological Survey of Canada.
- RG 92, Geographical Branch.
- RG 109, Canadian Wildlife Service.
- RG 132, National Herbarium.
- T-13267; T-13273; T-13323; T-13324; T-13329; T-14212, Northwest Territories and Yukon Branch.

NARA-A **National Archives and Records Administration at Anchorage. Anchorage, Alaska.**

- RG 75, Bureau of Indian Affairs.
- RG 181, Records of Naval Districts and Shore Establishments.

NARA **National Archives and Records Administration at College Park. College Park, MD**

- M641. Letters Received by the Revenue-Cutter Service, August 11, 1869-September 28, 1910.
- RG 22, United States Fish and Wildlife Survey.
- RG 57, United States Geological Survey
- RG 401, Collection 46, Alton A. Lindsey Papers.
- RG 401, Collection XJCR, John C. Reed Papers.
- RG 401, Collection 95, Paul C. Dalyrmple Papers.

NWTA **Northwest Territories Archives. Prince of Wales Heritage Center. Yellowknife, Canada**

- Canada, Advisory Commission on the Devleopment of Government in the Northwest Territories Fonds, N-1992-221.
- Canada, Interdepartmental Reindeer File, G-1979-069.
- Canada, Northern Administration Branch, G-1979-003.
- Canadian Broadcasting Company Transcripts, N-1992-014.
- “C.T. Pedersen,” Public reference file
- “Distant Early Warning Line,” Public reference file.
- “Inuvik,” Public reference file.
- Journal of Frank Russell, N-2002-037.
- Northern Newsletter Collection, N-1998-037.

NWTA (cont) **Northwest Territories Archives. Prince of Wales Heritage Center. Yellowknife, Canada**

- "Reindeer," Public reference file.
- Sven Johansson, "The Canadian Reindeer Herd," N90-002.
- Transcript of Interview with G.W. Porter, N-1992-173.
- "Whaling," Public reference file.

PEKL **Papers of Ernest deKoven Leffingwell, 1900-1961. Rauner Special Collections. Dartmouth College Library. New Haven, Connecticut.**

PSC **Papers of Vilhjalmur Stefansson, 1902-1962. Rauner Special Collections. Dartmouth College Library. New Haven, Connecticut.**

UAA **University of Alaska-Anchorage. Consortium Library. Archvives and Special Collections. Anchorage, Alaska.**

- David M. Hickcock Papers.
- Dorothy and Grenold Collins Collection.

Bibliography

Newspapers

Aklavik Journal
Anchorage Times
Fairbanks Daily News-Miner
Inuvik Drum
The Globe and Mail
The London Times
The New York Times
The San Francisco Examiner

Web Content

Adcock, Christina. “Many tiny traces: Antimodern anxieties and colonial intimacies in the Canadian North.” Network in Canadian History and Environment. http//niche-canada.org/node/10088.

Aklavik, Northwest Territories. “History.” http://www.aklavik.ca/?p=history.

Alaska's Digital Archives.“Geographic provinces of northwestern North America.” http://vilda.alaska.edu/cdm/singleitem/collection/cdmg11/id/10795/rec/10.

American Museum of Natural History, Division of Anthropology. “North American Ethnographic Collection.” http://research.amnh.org/anthropology/database/nae_sub.

Anchorage Daily News. “Max Brewer: Obituary.” http://www.legacy.com/obituaries/adn/obituary.aspx?pid=160163549.

Canadian Museum of Civilization.“Northern People, Northern Knowledge: The Canadian Arctic Expedition of 1913-1918, by David Gray.” http://www.civilization.ca/cmc/exhibitions/hist/cae/indexe.shtml.

Hill, Dick. “Diefenbaker's 'Opening of Inuvik' Speech.” http://www.inuvikheritage.com/Feature1.html.

Inuvialuit Cultural Resource Center.“Inuvialuit Pitqusiit Inuuniarutait (Inuvialuit Living History).” http://www.inuvialuitlivinghistory.ca.

Kaplan, Michael. “Crocker Land: Immortality.” http://bozosapiens.blogspot.com/2010/04/crocker-land-immortality.html.

McCartney, Duane. “Country Pasture/Forage Resource Profile.” http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Canada/Canada.html

Murphy, Brian. “Prepare now to save polar bears, say researchers.” University of Alberta. February 4, 2013. http://www.news.ualberta.ca/newsarticles/2013/february/preparenowtosavepolarbears.

Museum of Civilization. “Northern People, Northern Knowledge: The Canadian Arctic Expedition of 1913-1918, by David Gray.” http://www.civilization.ca/cmc/exhibitions/hist/cae/indexe.shtml.

Museum of Natural History. “Frank Russell: An Iowa City Gem.” http://uiowamnh.blogspot.com/2011/11/frank-russell-iowa-city-gem.html.

National Geographic. “Arctic—News Watch.” http://newswatch.nationalgeographic.com/tag/arctic/.

National Oceanic and Atmospheric Associaiton. “Arctic settles into new phase—warmer, greener, and less ice.” December 1, 2011. http://www.noaanews.noaa.gov/stories2011/20111201_arcticreportcard.html.

Natural Resources Canada. “Geological Survey of Canada: No Stone Unturned: The First 150 years of the Geological Survey of Canada, Christy Vodden.” http://gsc.nrcan.gc.ca/hist/150_e.php#growing.

Natural Resources Defense Council.“Global Warming Puts the Arctic on Thin Ice.” November 22, 2005. http://www.nrdc.org/globalwarming/qthinice.asp.

Prince of Wales Northern Heritage Center. “Historical Timeline of the Northwest Territories.” www.pwnhc.ca/timeline.

. “The Inuvialuit Place Name Virtual Exhibit.” http://www.pwnhc.ca/inuvialuit/index.html.

Rynor, Becky. “Indigenous voices 'marginalized' at Arctic Council: Inuit Leaders.” http://www.ipolitics.ca/2011/11/07/indigenous-voices-marginalized-at-arctic-council-inuit-leaders/.

Salamone, Frank A, for American National Biography Online. “Wissler, Clark.” http://www.anb.org/articles/14/14-00712.html.

The Basement Geographer. “Crocker Land: Last of the Phantom Islands.”

http://basementgeographer.blogspot.com/2010/12/crocker-land-last-of-phantom-islands.html..

The Canadian Encyclopedia. “Canol Pipeline, written by Kenneth S. Coates.” http://www.thecanadianencyclopedia.com/articles/canol-pipeline.

. “Northwest Staging Route, written by Kenneth S. Coates.” http://www.thecanadianencyclopedia.com/articles/northwest-staging-route.

. “Robert Ferguson Legget.” http://www.thecanadianencyclopedia.com/articles/robert-ferguson-legget.

. “North, written by John U. Bayly.” http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA0005792.

The Coca-Cola Company.“Coke Raises More Than $2 Million to Save Polar Bears.” http://www.coca-colacompany.com/our-company/coke-raises-over-2-million-to-save-polar-bears.

The Forest History Society. "Letter." http://www.foresthistory.org/ASPNET/Policy/Grazing/GrazingInspection.aspx.

. "Range Management Bulletin." http://www.foresthistory.org/ASPNET/Policy/Grazing/Jardinebook.aspx.

. “Range Management and Research: 1910 to 1929.” http://www.foresthistory.org/ASPNET/Publications/region/4/history/chap5.aspx.

The William R. and Clarice V. Spurlock Museum. “Crocker Land Expedition Collection from the Arctic.” http://www.spurlock.uiuc.edu/collections/browse/crockerland/crockerland_txt.html.

U.S. Department of Energy. “Naval Petroleum Reserves-Profile.” Updated on December 22, 2011. http://fossil.energy.gov/programs/reserves/npr/.

United States Coast Guard. “USCG Missions Timeline.” http://www.uscg.mil/history/h_index.asp**.**

University of Iowa, Museum of Natural History. “Frank Russell Expedition.” http://www.uiowa.edu/mnh/researchcollections/russellcollection.html.

Vanast, Walter.“Mary Had a Sickly Child: The Social Life of Count de Sainville, a French Aristocrat (Perhaps), at Fort McPherson, 1889-1894.” http://www.scribd.com/doc/49100414/Sainville-Draft-9b.

Wikipedia contributors. “Canol Road.” *Wikipedia, The Free Encyclopedia.* http://en.wikipedia.org/wiki/Canol_Road.

Published Sources (Books, Articles, Reports)

The Forty-First Annual Report of the American Museum of Natural History. New York: Irving Press, 1910.

The Forty-Third Annual Report of the American Museum of Natural History. New York: Irving Press, 1912.

The Forty-Fourth Annual Report of the American Museum of Natural History. New York: Irving Press, 1913.

"News from the Museum's Arctic Explorers." *The American Museum Journal* no.5 (May, 1909): 113.

"Report of the Mikkelsen-Leffingwell Expedition." *Bulletin of the American Geographical Society* vol. 39, no 10, (1907): 607-620.

"The Crocker Land Expedition." *Bulletin of the American Geographical Society* vol. 44, no. 3 (1912): 189-193.

"The Geographical Work of the Canadian Arctic Expedition." *The Geographical Journal* LXV, no 4 (April 1925): 340-342.

"The New North," *Nature* 478 (October 13, 2011): 172-174.

"The Stefansson Anderson Arctic Expedition," *The American Museum Journal* 7 (November, 1908): 103-5.

"Western Arctic District." *The Beaver* (June, 1934): 60.

Abel, Kerry and Coates, Ken. *Northern Visions: New Perspectives on the North in Canadian History.* Toronto: University of Toronto Press, 2001.

Adcock, Christina "Tracing Warm Lines: Northern Canadian Exploration, Knowledge and Memory, 1905-65." Ph.D. Diss., Scott Polar Institute, Cambridge University, 2010.

Allen, Arthur James. *A Whaler and Trader in the Arctic, 1895 to 1944: My Life with the Bowhead.* Anchorage, AK: Alaska Northwest Publishing Company, 1978.

Allen, Joel Asaph. "Article XIV: The Geographical Distribution of North American Mammals." *Bulletin of the American Museum of Natural History* vol. 4, (1892): 199-243.

Anderson, Alun. *After the Ice: Life, Death, and Geopolitics in the New Arctic.* HarperCollins, 2009.

Anderson, Rudolph Martin. "Recent zoological explorations in the western Arctic." (communicated by M.W. Lyon, Jr.). A paper read before the Biological Society of Washington, 5 April 1919. Reprinted in *Journal of the Washington Academy of Sciences* IX,

(1919): 312-315.

.“Field Studies of the Life Histories of Canadian Mammals.” *The Canadian Field Naturalist* 33: 86-90.

Anderson, Warwick. “‘Where Every Prospect Pleases and Only Man is Vile’: Laboratory Medicine as Colonial Discourse.” *Critical Inquiry* 18 (1992): 506-29.

Andrews, C.L. *The Eskimo and his Reindeer in Alaska.* Caldwell, Idaho: The Caxton Printers, 1939.

Appadurai, Arjun, ed. *The Social Life of Things: Commodities in Cultural Perspective.* Cambridge: Cambridge University Press, 1986.

Arctic Shadows: The Arctic Journeys of Dr. R.M. Anderson. DVD. Directed by David Gray. 2009; Mountain Studios and Grayhound Information Services, 2009.

Arnold, David. “Plant capitalism and Company science: the Indian career of Nathaniel Wallich.” *Modern Asian Studies* 42 (2008): 899-928.

Baker, A.W., Ferris, G.F, and G.H.F. Nuttall. “Part D: Mallophaga and Anoplura.” *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Ottawa, Issued 12 September 1919.

Bakker, Karen and Bridge, Gavin. “Material Worlds? Resource Geographies and the 'matter of nature.'” *Progress in Human Geography* 30, no 5 (2006): 5-27.

Barrow, Mark. *A Passion for Birds: American Ornithology after Audubon.* Princeton: Princeton University Press, 2000.

Basalla, George. “The Spread of Western Science.” *Science* 156, no. 3775 (1967): 611-22.

Berger, Thomas R. *Northern Frontier, Northern Homeland: Report of the Mackenzie Valley Pipeline Inquiry, Volume I.* Ottawa: Minister of Supply and Services Canada, 1977.

Bestor, Theodore. "Supply-Side Sushi: Commodity, Market, and the Global City." *American Anthropologist* 103, no. 1 (2001): 76-95.

Bethune, W.C. *Canada's Western Northland: Its History, Resources, Population, and Administration.* Dept of Mines and Resources, Lands, Parks, and Forests Branch, Ottawa, 1937

Blackman, Margaret. *Sadie Brower Neakok: An Inupiaq Woman.* Seattle: University of Washington Press, 1989.

Bleichmar, Daniela. “Exploration in Print: Books and Botanical Travel from Spain to the Americas in the Late Eighteenth Century.” *Huntington Library Quarterly* 70:1 (2007): 129-

51.

. "Visible empire: Scientific Expeditions and Visual Culture in the Hispanic Enlightenment." *Postcolonial Studies* 12:4 (2009): 441–66.

Bloom, Lisa. *Gender on Ice: American Ideologies of Polar Expeditions*. Minneapolis: University of Minnesota Press, 1993.

Bocking, Stephen. "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960." *Technology and Culture* 50, Number 2, (April 2009): 265-290.

."Science and Spaces in the Northern Environment." *Environmental History* 12, no 4 (October 2007): 867-94.

Bockstoce, John R. and Botkin, Daniel B."The Historical Status and Reduction of the Western Arctic Bowhead Whale (*Balaena mysticetus)* Population by the Pelagic Whaling Industry, 1848-1914." *Scientific Reports of the International Whaling Commission.* Special Issue, no. 5 (1983): 107-41.

Bockstoce, John R. *Furs and Frontiers in the Far North: The Contest among Native and Foreign Nations for the Bering Strait Fur Trade.* New Haven, CT: Yale University Press, 2009.

. *Whales, Ice, and Men: The History of Whaling in the Western Arctic*. Seattle: University of Washington Press, 1986.

Bodfish, Hartson. *Chasing the Bowhead*. Cambridge: Harvard University Press, 1936.

Bonnycastle, RHG. "Canada's Reindeer Experiment." *Proceedings of the North American Wildlife Conference, Feb 3-7, 1936.* Senate Committee Print, 74th congress, 2nd session. Washington, 1936. 424-427.

Bowler, Peter J. "The Geography of Extinction: Biogeography and the Expulsion of 'Ape Men' from Human Ancestry in the Early Twentieth Century." *Ape, Man, ApeMan: Changing Views since 1600,* Evaluative Proceedings of the Symposium *Ape, Man, Apeman: Changing Views since 1600,* Leiden, the Netherlands, 28 June-1 July, 1993. Raymond Corbey and Bert Theunissen, eds.185-192.

. *Life's Splendid Drama: Evolutionary Biology and the Reconstruction of Life's Ancestry 1860-1940.* Chicago: The University of Chicago Press, 1996.

. *The Fontana History of the Environmental Sciences:Geography, Geology, Oceanography, Meteorology, Natural History, Paleontology, Evolution Theory, Ecology.* London: Fontana, 1992.

Braun, Bruce. "Producing Vertical Territory: Geology and Governmentality in late Victorian

Canada." *Cultural Geographies* (2000):7-46.

Bravo, Michael. "Ethnographic Navigation and the Geographic Gift." David Livingstone and Charles Withers, eds. *Geography and Enlightenment*. Chicago: University of Chicago Press, 1999.

. "Measuring Danes and Eskimos." Michael Bravo and Sverker Sörlin, eds. *Narrating the Arctic: A Cultural History of Nordic Scientific Practices*. Canton, MA: Science History Publications, 2002.

. "Voices from the sea ice: the reception of climate impact narratives." *Journal of Historical Geography* 35 (2009): 256-278.

Brock, Reginald. Preface to *My Life with the Eskimo*, by Vilhjalmur Stefansson, second edition, New York: MacMillan, 1924.

Brooks, Alfred Hulse. "The Physiographic Provinces of Alaska." Charles C. Coby, ed, *Source Book for the Economic Geography of North America.* Chicago: University of Chicago Press, 1922. 412-413.

. *Report on the Progress of Mineral Investigations in Alaska, 1906.* Department of Interior: United States Geological Survey, Bulletin 314. Washington: Government Printing Office, 1907.

. *Report on the Progress of Mineral Investigations in Alaska, 1907*. Department of Interior: United States Geological Survey, Bulletin 345. Washington: Government Printing Office, 1908.

. *Report on the Progress of Mineral Investigations in Alaska, 1912.* Department of Interior: United States Geological Survey, Bulletin 542. Washington: Government Printing Office, 1913.

Brower, Charles D. *King of the Arctic: A Lifetime of Adventure in the Far North.* London: Robert Hale Limited Press, 1958.

Brown, Jerry. "Tundra Biome Applies new look to Ecological Problems in Alaska." *The Northern Engineer* 3, no 2, (Summer 1970): 9.

Brown, Roger J.E. "John Aito Pihlainen (1926-1964)." *Arctic* 17, no. 2 (1964): 142.

Browne, Janet. *The Secular Ark: Studies in the History of Biogeography.* New Haven: Yale University Press, 1983.

Bruno, Andy. "Making Nature Modern: Economic Transformation and the Environment in the Soviet North." Ph.D. Diss., University of Illinois at Urbana-Champaign, August 2011.

Buckley, Thomas. “Kroeber's Theory of Culture Areas and the Ethnology of Northwestern California.” *Anthropological Quarterly* 62, no. 1 (January, 1989): 15-26.

Buckner, Philip. *Canada and the British Empire.* Cambridge: Oxford University Press, 2008.

Burnett, D. Graham. *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado*. Chicago: University of Chicago Press, 2000.

Buss, Helen M. *Undelivered Letters to Hudson's Bay Company Men on the Northwest Coast*. University of British Columbia Press, 2003.

Button, David. “The Role of Fur Trade Technologies in Adult Learning: A Study of Selected Inuvialuit Ancestors at Cape Krusenstern, NWT (Nunavut), Canada, 1935-1947.” Ph.D. Diss., University of Calgary, 2008.

Cairnes, D.D. *The Yukon-Alaska International Boundary, between Yukon and Porcupine Rivers.* Department of Mines: Geological Survey, memoir 67, no 49, Government Printing Office: Ottawa, 1914.

Calder, Dale R. “From birds to hydroids: Charles Cleveland Nutting (1858-1927) of the University of Iowa.” *Hydrobiologia* 530/531 (2004): 13-25.

Callon, M. “Some elements of a sociology of translation: domestication of the scallops and the fishermen of St. Brieux Bay.” in M. Callon, ed., *Power, Action and Belief: A New Sociology of Knowledge*? London: Routledge Press, 1986. 196-223.

Cameron, Emilie S.“Securing Indigenous politics: A critique of the vulnerability and adaptation approach to the human dimensions of climate change in the Canadian Arctic.” *Global Environmental Change* 22 (2012): 103-114.

. “Copper Stories: Imaginative Geographies and Material Orderings of the Central Canadian Arctic.” A. Baldwin, L. Cameron, and A. Kobayashi (eds.) *Rethinking the Great White North: Race, Nature and the Historical Geographies of Whiteness in Canada.* Vancouver: University of British Columbia Press, 2011. 169-190.

Campbell, Robert Bruce. *In Darkest Alaska: Travels and Empire Along the Inside Passage.* Philadelphia: University of Pennsylvania Press, 2007.

Camsell, Charles and Stefansson,Vilhjalmur. “The Friendly Arctic.” *Science* New Series, vol. 57, no. 1484 (June 8, 1923): 665-666.

Carter, R.D. Mull, C.G., Bird, K.J. and R.B. Powers. “The Petroleum Geology and Hydrocarbon Potential of Naval Petroleum Reserve No. 4, North Slope, Alaska.” United States Department of Interior, United States Geological Survey, April 1977.

Cassady, Josslyn. “State Calculations of Cultural Survival in Environmental Risk Assessment:

Consequences for Alaska Natives." *Medical Anthropology Quarterly* 24, Issue 4, (2010): 451-471.

Cavell, Janice and Noakes, Jeff. *Acts of Occupation: Canada and Arctic Sovereignty, 1918-1925.* Toronto: University of British Columbia Press, 2010.

Cavell, Janice. "Arctic Exploration in Canadian Print Culture, 1890-1930." *Papers of the Bibliographical Society of Canada* 44, 2 (Fall 2006): 7-43.

. "The Second Frontier: The North in English-Canadian Historical Writing."*The Canadian Historical Review* 83, 3 (September, 2002): 364-389.

Chambers, David Wade and Gillespie, Richard. "Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge." Roy M. MacLeod, ed., *Nature and Empire: Science and the Colonial Enterprise*. Chicago: University of Chicago Press, 2000. 221-40.

Chaplin, Joyce. S*ubject Matter: Technology, the Body, and Science on the Anglo-American Frontier, 1500-1676.* Cambridge: Harvard University Press, 2001.

Chipman, Kenneth G. and Cox, John R. "Part B: Geographical Notes on the Arctic Coast of Canada." *Report of the Canadian Arctic Expedition, 1913-1918: Southern Party, 1913-1916.* Ottawa, Issued 8 July 1924, 5-15.

."Geographical Notes on the Arctic Coast of Canada." *Report of the Canadian Arctic Expedition, 1913-1918: Volume XI: Geology and Geography: Southern Party, 1913-1916.* Ottawa, Issued 8 July 1924.

Coates, Kenneth S. and Morrison, William R. "Soldier-Workers: The U.S. Army Corps of Engineers and the Northwest Defense Projects, 1942-1946." *Pacific Historical Review* 62, No. 3 (Aug., 1993): 273-304.

. "Writing the North: A survey of Contemporary Canadian Writing on Northern Regions." *Essays on Canadian Writing* 59 (Fall, 1996): 5-25.

. "The New North in Canadian History and Historiography." *History Compass* 6, issue 2 (March, 2008): 639-658.

Coates, Kenneth. *Canada's Colonies: A History of the Yukon and Northwest Territories.* James Lorimer and Company, 1985.

Coates, Peter A. *The Trans-Alaskan Pipeline Controversy: Technology, Conservation, and the Frontier.* Anchorage: University of Alaska Press, 1993.

Cole, Leon J. "Part F: Pycnogonida," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VII: Crustacea.* Issued 3 January 1921.

Collier, A.J. “Geology and Coal Resources of the Cape Lisburne Region, Alaska.” U.S. Geological Survey Bulletin no. 278. Washington: Government Printing Office, 1906.

Collignon, Beatrice. “Inuit Place Names and Sense of Place.” *Critical Inuit Studies – An Anthology of Contemporary Arctic Ethnography.* Pamela Stern and Lisa Stevenson, eds, Lincoln: University of Nebraska Press, 2006. 187-205.

Collins, Henry. "Diamond Jenness: Arctic Archaeology." *The Beaver* (Autumn 1967): 78-79.

Conzen, Michael P. ed., *The Making of the American Landscape.* London: Harper Collins, 1990.

Cooke, A and Holland, C. *The Exploration of Northern Canada 500 to 1920: A Chronology,* Toronto, 1978.

Cooper, A.R. “Part G-H: Trematoda and Cestoda.” *Report of the Canadian Arctic Expedition, 1913-1918: Volume IX: Annelids, Parasitic Worms, Protozoans, Etc.,* Issued 4 February, 1921.

Cournoyea, Nellie. “Adaptation and Resilience: The Inuvialuit Story.” A speech before the 18th Inuit Studies Conference, Washington, DC, October 26, 2012.

Cox, Percy, Professor Seward, and Colonel Vanier. “The Reindeer Industry and the Canadian Eskimo: Discussion.” *The Geographical Journal* 88, no. 1 (Jul., 1936): 17-19.

Craig, Peter and Haldorson, Lewis. “Pacific Salmon in the North American Arctic.” *Arctic* 39, No. 1 (March 1986): 2-7.

Cronon, William. “A Place for Stories: Nature, History, and Narrative.” *The Journal of American History* 78, no. 4 (1992): 1347-1376.

. “Kennecott Journey: The Paths out of Town.” William Cronon, George Miles, Jay Gitlin (eds.), *Under an Open Sky: Rethinking America's Western Past.* New York: Norton, 1992.

Dall, William Healey. “Part A: Mollusks, Recent and Pleistocene.” *Report of the Canadian Arctic Expedition, 1913-1918: Volume VIII: Mollusks, Echinoderms, Coelenterates, Etc.* Issued 24 September 1919.

Dathan, Patricia Wendy.“The Reindeer Years: Contribution of A. Erling Porsild to the Continental Northwest.” MA Thesis, Department of Geography, McGill University. 1988.

Dathan, Wendy. *The Reindeer Botanist: Alf Erling Porsild, 1901-1977.* Calgary: University of Calgary Press, November 2012.

Daubenmire, Rexford F. “Merriam's Life Zones of North America.” *The Quarterly Review of*

Biology 13, No. 3 (Sep., 1938): 327-332.

Dawson, G.M. *On Some of the Larger Unexplored Regions of Canada. A Paper Presented at the Ottawa Field Naturalists' Association*. Ottawa: Ottawa Naturalist, 1890.

de Sainville, Par Eduard. "Voyage a l'embouchure de la Riviere Mackenzie, 1889-1894." *Bulletin de la Society Geographie* 19 (1898): 291-307.

."Journey to the Mouth of the Mackenzie." *The Geographical Journal* 13, no. 4 (April 1899): 435.

Delbourgo, James. *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America*. Cambridge: Harvard University Press, 2006.

Dew, Nicholas. "Scientific travel in the Atlantic world: the French expedition to Gorée and the Antilles, 1681–1683." *British Journal for the History of Science* 43:1 (2010): 1-17.

Diubaldo, Richard. *Stefansson and the Canadian Arctic*. Montreal: McGill-Queen's University Press, 1978.

Dolin, Eric Jay. *Leviathan: The History of Whaling in America.* New York: W.W. Norton & Company, 2007.

Dupree, A. Hunter. *Science in the Federal Government: A History of Policies and Activities to 1940*. Cambridge: Harvard University Press, 1986.

Dyer, Gwynne. *Climate Wars: The Fight for Survival as the World Overheats.* Oneworld, 2011.

Easterbrook, W.T. and Watkins, M.H. "Introduction." and "Part 1: The Staple Approach." *Approaches to Canadian Economic History.* Ottawa: Carleton University Press, 1984.

Edwards, Paul. *The Closed World: Computers and the Politics of Discourse in Cold War America.* Cambridge: MIT Press, 1996.

Ellis, N.R, Palmer, L. J., and Barnum, G.L. "The Vitamin Content of Lichens." *Journal of Nutrition* 6, no. 5 (September 1933): 443-454.

Emmerson, Charles. *The Future History of the Arctic.* New York: Public Affairs, 2010.

Fan, Fa-ti. *British Naturalists in Qing China: Science, Empire, and Cultural Encounter*. Cambridge: Harvard University Press, 2004.

Farish, Matthew and Lackenbauer, P. Whitney. "High Modernism in the Arctic: Planning Frobisher Bay and Inuvik."*Journal of Historical Geography* 35 (2009): 517–544.

Farish, Matthew. "Creating Cold War Environments: The Laboratories of American Globalism." J.R. McNeill and Corrina R. Unger, eds. *Environmental Histories of the Cold War.* New York: Cambridge University Press, 2010. 51-84.

. "Frontier Engineering: From the Globe to the Body in the Cold War Arctic." *The Canadian Geographer* 50, no 2 (2006): 177–196.

. "Review of *Entangled Geographies: Empire and Technopolitics in the Global Cold War.*" *Isis* 103, 4 (2012): 805-806.

Fienup-Riordan, Ann. *Freeze Frame: Alaska Eskimos in the Movies.* Seattle: University of Washington Press, 2003.

Finnie, Richard. *Canada Moves North.* New York: Hurst and Blackett, 1942.

. *CANOL.* San Francisco: Taylor and Taylor, 1945.

Fitzhugh, William. ""Of No Ordinary Importance": Reversing polarities in Smithsonian Arctic Studies." , Igor Krupnik, Michael A. Lang, and Scott E. Miller, eds. *Smithsonian at the Poles: Contributions to International Polar Year Science*. Washington: Smithsonian Institution Scholarly Press, 2009. 61-77.

Ford, J.A "Eskimo Pre-history in the Vicinity of Point Barrow, Alaska." *Anthropological Papers of the American Museum of Natural History* 47, pt 1, 1959.

Foucault, Michel. "Right of Death and Power over Life," and "The Politics of Health in the Eighteenth Century." . Paul Rabinow, ed. *The Foucault Reader*. New York: Pantheon, 1984. 258-89.

Fraser, C. McLean. "Part I: Hydroids." in *Report of the Canadian Arctic Expedition, 1913-1918: Volume VIII: Mollusks, Echinoderms, Coelenterates, Etc.*, Issued 24 August 1922.

Frazier, Ian. "In the Beautiful, Threatened North." *The New York Review of Books* 60 , no. 4 (March 7, 2013).

Fumoleau, Rene. *As Long as this Land Shall Last.* Second edition. Calgary: University of Calgary Press, 2004.

Funk, McKenzie. "Cold Rush: The Coming Fight for the Melting North." *Harper's Magazine* (September 2007): 45-55.

Fusco, Leah. "Developing Canada's Oil Frontier: Panarctic and the Bent Horn Oil Project." A paper delivered to the American Society for Environmental History Conference, April 5, 2013, Toronto, Canada.

Galloway, B.J. "Appendix D: Historical Overview of North Slope Petroleum Development and *Exxon Valdez* Oil Spill." *Environmental Report for Trans Alaska Pipeline System Right-of-Way Renewal* (February 2001).

Geertz, Clifford. “Introduction,” “'From the Native’s Point of View’: On the Nature of Anthropological Understanding,” and “Common Sense as a Cultural System.” *Local Knowledge: Further Essays in Interpretive Anthropology.* New York: Basic Books, 1983. 3-18; 55-72; and 73-93.

Godsell, Phillip. *Red Hunters of the Snows: An account of thirty years' experience with the primitive Indian and Eskimo tribes of the Canadian North-west and Arctic coast, with a brief history of the early contact between white fur traders and the Aborigines*. London: National Museum of Canada, 1938.

Goldstein, Daniel. "Yours for Science": The Smithsonian Institution's Correspondents and the Shape of Scientific Community in Nineteenth-Century America.” *Isis* 85, No. 4 (Dec., 1994): 573-599.

Grace, Sherrill E. *Canada and the Idea of North*. Montreal: McGill-Queen's University Press, 2001.

Graham, Amanda. “The University that Wasn't: The University of Canada North, 1970-1985.” M.A. Thesis, Lakehead University, 1994.

. “Reflections on Contemporary Northern Canadian History.” *Essays on Canadian Writing* 59 (Fall, 1996). 182-200.

Grant, Shelagh D. “Northern Nationalists: Visions of ‘A New North,’ 1940-1950.” in Kenneth S. Coates and William R. Morrison, eds. *For Purposes of Dominion: Essays in Honour of Morris Zaslow*. North York, ON: Captus Press, 1989. 47-70.

Greeley, A.W. *The Polar Regions in the Twentieth Century: Their Discovery and Industrial Evolution.* Boston: Little, Brown, and Company, 1928.

Green, Lewis. *The Boundary Hunters: Surveying the 141st Meridian and the Alaska Panhandle.* Vancouver: University of British Columbia Press, 1982.

Gruening, Ernest. *The State of Alaska.* New York: Random House, 1954.

.ed. *An Alaskan Reader, 1867-1967.* New York: Meredith Press, 1966.

Guarneri, Carl J. “Locating the United States Twentieth Century World History.” Michael Adas, ed., *Essays on Twentieth Century History.* Philadelphia: Temple University Press, 2010. 213-270.

Guha, Ramachandra. *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya*. Berkeley: University of California Press, 1989.

Hacking, Ian. *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science.* Cambridge: Cambridge University Press, 1983.

Hall, Sam. *The Fourth World: The Heritage of the Arctic and its Destruction.* London: The Bodley Head, 1987.

Hanable, William S. "Leffingwell: Prudhoe's Pioneer Scientist." *Exxon USA* xii, no. 1 (first quarter, 1973): 28-31.

Haraway, Donna. *Primate Visions: Gender, Race, and Nature in the World of Modern Science.* New York: Routledge, 1989.

Harris, Steven J. "Long-Distance Corporations, Big Sciences, and the Geography of Knowledge." *Configurations* 6 (1998): 269-304.

Harrison G. Dyar, "Part C: Mosquitoes," in *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Issued 14 July 1919, 31C.

Harrison, Alfred H. *In Search of a Polar Continent, 1905-1907.* London: Edward Arnold, 1908.

Haycox, Stephen. *Frigid Embrace: Politics, Economics, and Environment in Alaska*. Oregon State University Press, 2002.

. *Alaska: An American Colony.* Seattle: University of Washington Press, 2006.

Hays, Samuel P. *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890- 1920.* Cambridge: Harvard University Press, 1959.

Hemstock, R.A. *Permafrost at Norman Wells, N.W.T: February 1949.* Calgary: Imperial Oil, Ltd., 1953.

Hewitt, C. Gordon. "Introduction and List of New Genera and Species Collected by the Expedition." *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Ottawa, Issued 10 December 1920.

Hill, Dick. *Inuvik: A History, 1958-2008: The Planning, Construction and Growth of an Arctic Community.* Victoria, BC: Trafford Publishing, 2008.

Hinckley, Ted C. *The Americanization of Alaska*, 1867-1897. Pacific Books, 1972.

Hinsley, Curtis. *Savages and Scientists: The Smithsonian Institution and the Development of American Anthropology, 1846-1910.* Washington D.C.: Smithsonian Institution Press, 1981.

Hodgins, Bruce W. and Hoyle, Gwyneth. *Canoeing North into the Unknown: A Record of River Travel, 1874-1974.* Dundurn, 1997.

Hohn, E. O. "Roderick MacFarlane of Anderson River and Fort." *Beaver* (1963): 22-26.

Hrdlicka, Ales. "Contribution to the Anthropology of Central and Smith Sound Eskimo." *The*

Anthropological Papers of the American Museum of Natural History 5, part 2, (1910): 179.

. "Explorations in the Far North." *The American Naturalist* vol 33, no 390 (June, 1899): 514-516.

Ingram, Rob and Dobrowolsky, Helene. *Waves upon the Shore: A Historical Profile of Herschel Island.* Prepared for Heritage Branch, Department of Tourism. Government of Yukon Territory, September 1989.

Jacoby, Karl. *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation.* Berkeley: University of California Press, 2001.

Jenness, Diamond. "The Ethnological Results of the Canadian Arctic Expedition, 1913-1916." *American Anthropologist* 18, No. 4 (Oct.-Dec. 1916): 612-620.

. "The Copper Eskimos." *The Geographical Review* 4, no 2, (1917): 81-91.

. "The Eskimos of Northern Alaska: A Study in the Effect of Civilization." *Geographical Review* vol 5, (1918): 89-101.

. "Note on Cadzow's "Native Copper Objects of the Copper Eskimo"." *American Anthropologist* New Series, 23, no. 2 (Apr. - Jun., 1921): 235-236.

. "The Cultural Transformation of the Copper Eskimo." *Geographical Review* 11, no. 4 (October, 1921): 541-550.

. "Origins of Copper Eskimos and their Copper Culture." *Geographical Review* 13, no 4, (1923): 540-551.

. *People of the Twilight.* New York: MacMillan Press, 1928.

. *Dawn in Arctic Alaska.* Chicago: University of Chicago Press, 1957.

Jenness, Stuart E. *Arctic Odyssey: The Diary of Diamond Jenness, Ethnologist with the Canadian Arctic Expedition in Northern Alaska and Canada, 1913-1916.* Hull, Quebec: Canadian Museum of Civilization, 1991.

.*Stefansson, Dr. Anderson, and the Canadian Arctic Expedition, 1913-1918.* Gatineau, QC: Canadian Museum of Civilization, 2011.

Joseph, Gilbert M., Legrand, Catherine C., and Salavatore, Ricardo D., eds. *Close Encounters of Imperialism: Writing the Cultural History of U.S.-Latin American Relations.* Durham: Duke University Press, 1998.

Juday, Chancey."Part H: Cladocera." *Report of the Canadian Arctic Expedition, 1913-1918: Volume VII: Crustacea*, Issued 3 January 1921.

Kellman, Jordan. "Nature, networks, and expert testimony in the colonial Atlantic: the case of cochineal." *Atlantic studies* 7:4 (2010): 373-95.

Kevles, Daniel. *The Physicists: The History of a Scientific Community in Modern America.* New York: Knopf, 1977.

Kirsch, Scott. *Proving Grounds: Project Plowshare and the Unrealized Dream of Nuclear Earthmoving*. New Brunswick, NJ: Rutger's University Press, 2005.

Kitto, F.H. "The Northwest Territories, 1930." Department of the Interior, Northwest Territories and Yukon Branch, 1933.

Kohler, Robert E. *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology.* University of Chicago Press, 2002.

. *All Creatures: Naturalists, Collectors, and Biodiversity, 1850-1950*. Princeton: Princeton University Press, 2006.

. "Finders, Keepers: Collecting Sciences and Collecting Practice." *History of Science*, xlv, (2007): 428-453.

. "History of Field Science: Trends and Prospects." in Jeremy Vetter, ed, *Knowing Global Environments: New Historical Perspectives on the Field Sciences.* New Jersey: Rutgers University Press, 2011. 212-240.

Kolausok, Eddie Dean, Alunik, Ishmael, and Morrison, David. *Across Time and Tundra: The Inuvialuit of the Western Arctic.* Seattle: University of Washington Press, 2003.

Kroll, Gray. "Exploration in the *Mare Incognita:* Natural History and Conservation in Early-Twentieth Century America." Ph.D Diss, University of Oklahoma, 2000.

Krupnik, Igor. "From Boas to Burch: One Hundred Years of 'Eskimology,' 1880-1980." Presentation, Inuit Studies Conference, Washington, D.C, October 25, 2012.

Kulchyski, Peter and Tester, Frank. *Kiumajut (Talking Back): Game Management and Inuit Rights,1900-1970.* Vancouver, UBC Press, 2007.

Kulchyski, Peter. "Anthropology in the Service of the State: Diamond Jenness and Canadian Indian Policy." *Journal of Canadian Studies* 28, no. 2 (1993): 21-50.

Kurkpatrick Dorsey, *The Dawn of Conservation Diplomacy: U.S.-Canadian Wildlife Protection Treaties in the Progressive Era*, (Seattle: University of Washington Press, 1998).

Kurlansky, Mark. *Salt: A World History*. New York: Walker, 2002.

Lackenbauer, P. Whitney and Farish, Matthew. "The Cold War on Canadian Soil: Militarizing a Northern Environment." *Environmental History* 12 (October 2007): 920-50.

Lands, Parks, and Forests Branch, *Canada's Reindeer*, Northwest Territories Administration (Ottawa, 1940).

Langston, Nancy. *Toxic Bodies: Hormone Disruptors and the Legacy of DES.* Yale University Press, 2010.

Latour, Bruno. *Science in Action: How to Follow Scientists and Engineers through Society*, Cambridge: Harvard University Press, 1987.

. "Circulating reference." *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge: Harvard University Press, 1999. 24-79.

LeBourdais, D. *Stefansson : Ambassador of the North*. Montreal, 1963.

Leffingwell, Ernest de Koven. *The Canning River Region: Northern Alaska.* Professional Paper 109. United States Geological Survey, 1919.

. "My Polar Explorations, 1901-1914." *Explorers Journal* 39, no 3 (Oct. 1961): 2-14.

Leopold, A. Starker and Darling, F. Fraser. *Wildlife in Alaska: An Ecological Reconnaissance.* New York: Ronald Press, 1953.

Leslie, Stuart. *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford.* New York: Columbia University Press, 1993.

Levere, Trevor H. "Vilhjalmur Stefansson, the Continental Shelf, and a New Arctic Continent." *The British Journal for the History of Science* 21, no. 2 (June 1988): 233-247.

. *Science and the Canadian Arctic: A Century of Exploration, 1818-1918.* New York: University of Cambridge Press, 1993.

Libbey, David and Schneider, William. "Fur Trapping on Alaska's North Slope." *Le Castor Fait Tout: Selected Papers of the Fifth North American Fur Trade Conference*. Bruce G. Trigger, Toby Morantz, and Louise Dechene, eds. Lake St Louis Historical Society, 1987. 335-358.

Lindsay, Debra. *Science in the Subarctic: Trappers, Traders, and the Smithsonian Institution.* Washington: Smithsonian Institution Press, 1993.

Livingstone, David. "Human Acclimatization: Perspectives on a Contested Field of Inquiry in Science, Medicine, and Geography." *History of Science* 25 (1987): 359-94.

. "Geography." *Companion to the History of Modern Science.* R.C. Olby, G. N. Cantor, and M.J.S. Hodge, eds. Routledge, 1990. 743-760.

Lomen, Carl J. *Fifty Years in Alaska.* New York: David McKay Company, Inc., 1954.

Loo, Tina. *States of Nature: Conserving Canada's Wildlife in the Twentieth Century.* Vancouver: University of British Columbia Press, 2006.

."Disturbing the Peace: Environmental Change and the Scales of Justice on a Northern River." *Environmental History* 12 (October 2007): 895-919.

Lowe, Charles W. "Part A: Freshwater Algae and Freshwater Diatoms." *Report of the Canadian Arctic Expedition, 1913-1918: Volume IV: Botany: Southern Party, 1913-1916,* Ottawa, Issued 20 February 1923.

Luedecke, Cornelia. "The First International Polar Year (1882-1883): A Big Science Experiment with Small Science Equipment." *Proceedings of the International Commission on History of Meteorology* 1, no.1 (2004): 56.

Lyons, Nastasha. "Inuvialuit Rising: The Evolution of Inuvialuit Identity in the Modern Era." *Alaska Journal of Anthropology* 7, no. 2 (2009): 63-79.

Lyons, Natasha, Hennessy, Kate, Arnold, Charles, and Joe, Mervin."The Inuvialuit Smithsonian Project: Winter 2009-Spring 2011." Report produced for the Smithsonian Institution, vol 1. June 2011.

Lyons, Natasha, with a contribution by Sandra Jezik. "Early 20th Century Lifeways in Qainiuqvik (Clarence Lagoon): Report on the 2003 Archaeological Investigations at Site 76Y." Cultural Resource Services, Parks Canada, 2004.

MacFarlane, Roderick. "On an Expedition down the Begh-ula or Anderson River." *Canadian Record of Science* 4 (1891): 28-53.

MacGillivray, Alex D. "Part G: Hymenoptera and Plant Galls Sawflies (Tenthredinodea)." *Report of the Canadian Arctic Expedition, 1913-1918: Volume III: Insects,* Issued 3 November, 1919.

Mackay, J.R., Mathews, W.H, and MacNeish, R.S. "Geology of the Engigstciak Archaeological Site, Yukon Territory." *Arctic* 14.1 (1961): 25-52.

Maddren, A.G. "Geologic Investigations along the Canada-Alaska Boundary," in Alfred Brooks, "Report on the Progress of Mineral Investigations in Alaska, 1911," Department of Interior: United States Geological Survey, Bulletin 520, (Washington: Government Printing Office, 1912), 297-314.

Mair, Charles and MacFarlane, Roderick. *Through the Mackenzie Basin.* William Briggs, 1908.

Mann, Albert. "Part F: Marine Diatoms." *Report of the Canadian Arctic Expedition, 1913-1918: Volume IV: Botany,* Issued 12 November 1922.

Markham, Clements and Mikkelsen, Ejnar. "On the Next Great Arctic Discovery: The Beaufort Sea." *The Geographical Journal* 27, no 1 (Jan 1906): 1-11.

Marsh, C. Dwight. "Part J: Freshwater Copepods." *Report of the Canadian Arctic Expedition, 1913-1918: Volume VII: Crustacea,* Issued 21 April 1920.

Martin-Nielsen, Janet. "The other cold war: the United States and Greenland's ice sheet environment, 1948-1966." *Journal of Historical Geography* 38 (2012): 69-80.

McConnell, Burt. "The Aeroplane in Arctic Exploration." *Scientific American* (September, 1916): 1, 208.

McCoy, Alfred W. and Scarano, Francisco A. eds. *Colonial Crucible: Empire in the making of the Modern American State*. Madison: University of Wisconsin Press, 2009.

McGee, W.J. "Explorations in the Far North by Frank Russell." *American Anthropologist* 1, no 3 (July, 1899): 568.

McGhee, Robert. *Beluga Hunters: An Archaeological Reconstruction of the History and Culture of the Mackenzie Delta Kittegaryumiut.* St. Johns, Nfld.: Institute of Social and Economic Research, Memorial University of Newfoundland, 1974.

McNeill, J. R. *Something New under the Sun: An Environmental History of the Twentieth Century World.* New York: Norton, 2000.

McNeill. J.R. and Unger, Corinna R., eds. *Environmental Histories of the Cold War.* New York: Cambridge University Press, 2010.

McNeish, R.S. "Archaeological Reconnaissance of the Delta of the Mackenzie River and Yukon Coast." *National Museum of Canada Bulletin* 142 (Ottawa., 1956).

Mehos, Donna C. and Moon, Suzanne M."The Uses of Portability: Circulating Experts in the Technopolitics of Cold War and Decolonization." Gabrielle Hecht, ed. *Entangled Geographies: Empire and Technopolitics in the Global Cold War.* Cambridge: MIT Press, 2011. 43-74.

Meriam, C. Hart. *Life Zones and Crop Zones of the United States.* Bulletin 10, U.S. Deparment of Agriculture, Washington, 1898.

Merrill, C.L., Pihlanien, J.A., and Legget, R.F. "The New Aklavik: Search for the Site." *The Engineering Journal* (January 1960): 52-57.

Mikkelsen, Ejnar. *Conquering the Arctic Ice.* Philadelphia: George W. Jacobs and Co, 1909.

Mitman, Gregg. "In Search of Health: Landscape and Disease in American Environmental History." *Environmental History* 10, No. 2 (Apr., 2005): 184-210.

. *Breathing Space: How Allergies Shape Our Lives and Landscapes.* New Haven: Yale University Press, 2007.

Mitman, Gregg and Erickson, Paul. "Latex and Blood: Science, Markets, and American Empire." *Radical History Review* 107 (2010): 45-73.

Morrison, David. "An Archaeological Perspective on Neoeskimo Economies." David Morrison and Jean-Luc Pilon, eds., *Threads of Prehistory: Papers in Honour of William E. Taylor, Jr.*. Ottawa: Canadian Museum of Civilization, 1994. 311-320.

Morrison, William R. *Showing the Flag: The Mounted Police and Canadian Sovereignty in the North, 1894-1925.* Vancouver: University of British Columbia Press, 1985.

Morse, Kathryn. *The Nature of Gold: An Environmental History of the Klondike Gold Rush.* Seattle: University of Washington Press, 2003.

Mulvihill, Peter R., Baker, Douglas C., and Morrison, William R."A Conceptual Framework for Environmental History in Canada's North." *Environmental History* 6, No. 4 (Oct., 2001): 611-626.

Murdoch, John. "On the Siberian Origin of Some Customs of the Western Eskimos." *American Anthropologist* 1, no.4, (October, 1888): 325-336.

. *Ethnological Results of the Point Barrow Expedition*. Introduction by William Fitzhugh. Washington: Smithsonian Institution Press, 1998.

Murdock, George Peter. "Clark Wissler, 1870-1947." *American Anthropologist* 50, no.2 (1948): 292-304.

Murphy, Kathleen S. "Translating the vernacular: indigenous and African knowledge in the eighteenth-century British Atlantic." *Atlantic studies* 8:1 (2011): 29-48.

Nash, Linda. *Inescapable Ecologies: A History of Environment, Disease, and Knowledge.* Berkeley: University of California Press, 2006.

Naske, Claus-M. and Slotnick, Herman E. *Alaska: A History.* Norman, OK: University of Oklahoma Press, 2011.

Neufeld, David. "Commemorating the Cold War in Canada: Considering the DEW line." *The Public Historian* 20, issue 1 (1998): 9-19.

. "Distant Early Warning (DEW) Line: A Preliminary Assessment of its Role and Effects upon Northern Canada." Revised for the Arctic Institute of North America, May, 2002.

Neufeld, Peter Lorenz. "De Sainville: Forgotten Mackenzie Mapper." *North* (1981): 55-7.

North Slope Borough Contract Staff. *Native Livelihood and Dependence: A Study of Land Use Values Through Time.* Anchorage: US Department of the Interior, National Petroleum Reserve in Alaska, 1979.

North, Dick. *Arctic Exodus*: *The Last Great Trail Drive.* Guilford, CT: Lyons Press, 1991.

Numbers, Ronald and Rosenberg, Charles, eds. *The Scientific Enterprise in America: Readings from Isis.* Chicago: University of Chicago Press, 1996.

Nutt, David C. "Stef at Dartmouth." *Polar Notes: Occasional Publication of the Stefansson Collection* IV, (November, 1962): 33.

Oldenziel, Ruth."Islands: The United States as Networked Empire." Gabrielle Hecht (ed.), *Entangled Geographies: Empire and Technopolitics in the Global Cold War*. Cambridge: MIT Press, 2011. 13-42.

Olson, Dean F. *Alaska Reindeer Herdsmen: A Study of Native Management in Transition.* Fairbanks, Alaska: Institute of Social, Economic, and Government Research, 1969.

O'Neill, J.J."Part A: The Geology of the Arctic Coast of Canada; West of the Kent Peninsula." *Report of the Canadian Arctic Expedition, 1913-1918: Southern Party, 1913-1916.* Ottawa, Issued 8 July 1924.

Osborn, Henry Fairfield. Foreword to *My Life with the Eskimo*, by Vilhjalmur Stefansson. Second edition. New York: MacMillan, 1924.

Osgood, Wilfred H. "Biological Investigations in Alaska and Yukon Territory." North American Fauna No. 30, U.S. Department of Agriculture, Bureau of Biological Survey. Washington: Government Printing Office, 1909.

Palladino, Paolo and Worboys, Michael. "Science and Imperialism." *Isis* 84 (1993): 91-108.

Palmer, Lawrence J. "Progress of Reindeer Grazing Investigations in Alaska." United States Department of Agriculture, Bulletin no. 1423. Oct, 1926, Government Printing Office, Washington, D.C., 1927.

. "The Alaska Tundra and its use by Reindeer," U.S. Department of Interior, Office of Indian Affairs, 1945.

Palmer, L.J. and Hadwen, Seymour. "Reindeer In Alaska." United States Department of Agriculture Bulletin no 1089, Sep 22, 1922, Government Printing Office, Washington, D.C.,

1926.

Parr, Joy. “Notes for a More Sensuous History of Twentieth-Century Canada: The Timely, the Tacit, and the Material Body.” *Canadian Historical Review* 82, 4 (2001): 720-45.

Parrish, Susan Scott. *American Curiosity: Cultures of Natural History in the British Atlantic World.* Chapel Hill: University of North Carolina Press, 2006.

Palsson, Gisli. *Writing on Ice: The Ethnographic Notebooks of Vilhjalmur Stefansson.* Hanover: University Press of New England, 2001.

Pimlott, Douglas. “Offshore Drilling in the Beaufort Sea: A Report to the Committee for Original People's Entitlement (COPE).” Prepared by Canadian Arctic Resources Committee. Inuvik, NWT: 1974.

Piper, Liza and Sandlos, John. “A Broken Frontier: Ecological Imperialism in the Canadian North.” *Environmental History* 12 (2007): 759-795.

Piper, Liza. *The Industrial Transformation of Subarctic Canada.* Vancouver: University of British Columbia Press, 2009.

Porsild, Alf Erling. *Reindeer Grazing in Northwest Canada: Report of an Investigation of Pastoral Possibilities in the Area from the Alaska-Yukon Boundary to Coppermine River.* Ottawa: F.A. Acland, 1929.

Porsild, Erling. “The Reindeer Industry and the Canadian Eskimo.” *The Geographical Journal* 88, no 1 (July 1936): 1-16.

Powell, Richard C. ``'The rigours of an arctic experiment': the precarious authority of field practices in the Canadian High Arctic, 1958-1970.” *Environment and Planning A* 39 (2007): 1794-1811.

Pratt, Mary Louise. *Imperial Eyes: Travel Writing and Transculturation.* New York: Routledge, 1992.

Preble, Edward A. “A Biological Investigation of the Athabaska-Mackenzie Region.” North American Fauna No. 27, U.S. Department of Agriculture, Bureau of Biological Survey. Washington: Government Printing Office, 1908.

Puiguitkaat (The 1978 Elder's Conference), transcription and translation by Leona Okakok, edited by Gary Kean. Barrow, Alaska: North Slope Borough Commission on History and Culture, 1981.

Pyenson, Lewis. “Cultural Imperialism and Exact Sciences Revisited.” *Isis* 84 (1993): 91-108.

Quintero, Camilo. “Trading in Birds: Imperial Power, National Pride, and the Place of Nature in U.S.-Colombia Relations.” *Isis* 102 (2011): 1-25.

Rabbit, Mary C. *Minerals, lands, and geology for the common defence and general welfare : a history of public lands, Federal science and mapping policy, and development of mineral resources in the United States, vol. 3. 1904-1939.* Washington: United States Geological Survey, 1986.

Raby, Megan. "Making Biology Tropical: American Science in the Carribean, 1898-1963." Ph.D Diss., University of Wisconsin Madison, December, 2012.

Raibmon, Paige. *Authentic Indians: Episodes of Encounter from the Late-Nineteenth Century Northwest Coast.* Durham: Duke University Press, 2005.

Ray, Arthur. "Recent Trends in Northern Historiography." *Essays on Canadian Writing* Issue 59, (Fall, 1996): 211-229.

Reed, John C. and Ronhovde, Andreas G. *Arctic Laboratory: A History (1947-1966) of the Naval Arctic Research Laboratory at Point Barrow, Alaska.* Arctic Institute of North America, 1971.

Reiss, Bob. *The Eskimo and the OilMan: The Battle at the Top of the World for America's Future.* Business Plus, 2012.

Riewe, R.R. "Interactions between Wildlife, Trapper-Hunters, and Seismic Lines in the Mackenzie Valley Region, N.W.T., Canada." A report prepared under contract for the Arctic Land Use Research Program, Northern Environmental Protection and Renewable Resources Branch, Department of Indian Affairs and Northern Development. January, 1979

Riffenbaugh, Beau. *The Myth of the Explorer: The Press, Sensationalism, and Geographical Discovery.* New York: Belhaven Press, 1993.

Roberts, Lissa."Situating Science in Global History: Local Exchanges and Networks of Circulation." *Itinerario* 33 (2009): 9-30.

Robertson, Gordon. *Memoirs of a Very Civil Servant: Mackenzie King to Pierre Trudeau.* Toronto: University of Toronto Press, 2000.

Robinson, Michael. "Blonde Eskimos and Yellow Journalism: Reforming the Arctic Narrative in Progressive America." A paper presented to the History of Science Society, 1996

. *The Coldest Crucible: Arctic Exploration and American Culture*. Chicago: University of Chicago Press, 2006.

Rossiter, Margaret. *Women Scientists in America: Struggles and Strategies to 1940.* Baltimore: Johns Hopkins University Press, 1995.

Rudnick, Alexandra. "Diets and Landscapes of Deficiency: Pellagra, Sacks of Cornmeal, and

Economic Underdevelopment in the American South, 1907-1940." A presentation to the American Society of Environmental History, April 6, 2013. Toronto, Canada.

Russell, Frank. *Explorations in the Far North: Being the Report of an Expedition under the Auspices of the University of Iowa during the Years 1892, '93, and '94.* Iowa City, IA: State University of Iowa, 1898.

Sabin, Paul."Voices from the Hydrocarbon Frontier: Canada's Mackenzie Valley Pipeline Inquiry (1974-1977)*." Environmental History Review* 19, no.1 (Spring, 1995): 17-48.

Safier, Neil. "Global knowledge on the move: itineraries, Amerindian narratives, and deep histories of science." *Isis* 101 (2010): 133-45.

Salvatore, Ricardo D. "The Enterprise of Knowledge: Representational Machines of Informal Empire." Gilbert M Joseph, Catherine C. Legrand, and Ricardo D. Salvatore, eds., *Close Encounters of Imperialism: Writing the Cultural History of U.S.-Latin American Relations.* Durham: Duke University Press, 1998.

Sandlos, John. "Where the Reindeer and Inuit Should Play: Animal Husbandry and Ecological Imperialism in Canada's North." Unpublished MS.

."Landscaping Desire: Poetics, Politics in the Early Biological Surveys of the Canadian North." *Space and Culture* 6: 396-409. 2003.

. "Where the Scientists Roam: Ecology, Management, and Bison in Northern Canada." David Freeland Duke, ed. *Canadian Environmental History: Essential Readings.* Toronto: Canadian Scholars' Press, 2006. 333-360.

. *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories.*Vancouver: University of British Columbia Press, 2007.

Sawchuck, Christina. "Amateur explorers and the 'opening' of the Canadian North." A paper presented at the Canadian Historical Association annual meeting. June 3, 2008.

Schrader, Frank Charles and Peters, W. J. "A Reconnaissance in Northern Alaska: Across the Rocky Mountains, Along Koyukuk, John, Anaktuvuk, and Colville Rivers, and the Arctic Coast to Cape Lisburne, in 1901." Department of the Interior, United States Geological Survey. Washington: Government Printing Office, 1904.

Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed.* Yale University Press, 1999.

Scotter, George W. "Reindeer husbandry as a land use in northwestern Canada." *Proceedings of the Productivity and Conservation in Northern Circumpolar Lands Conference.* W.A. Fuller and P.G. Kevan, eds. IUCN New Series, 16 (1969): 159-169.

Seguin, Gilles. “Reindeer for the Inuit: The Canadian Reindeer Project, 1929-1960.” *Muskox* 38 (1991): 6-26.

Serrezze, Mark. “The Arctic as the Messenger of Global Climate Change.” Presentation delivered before the Inuit Studies Conference, Washington, D.C., October 26, 2012.

Shelesnyak, M.C. “The History of the Arctic Research Laboratory.” *Arctic* 1, no. 2, 101 (1948): 97-106.

Sherwood, Morgan. *Exploration of Alaska, 1865-1900.* New Haven: Yale University Press, 1965.

. *Big Game in Alaska.* New Haven: Yale University Press, 1981.

Simpson, Bob. “Inuvialuit Research Agenda.” Presentation before the NWT International Polar Year Results Conference, January 20, 2011.

Smith, Laurence C. *The New North: The World in 2050.* Profile Books, 2011.

Smith, Neil. *American Empire: Roosevelt's Geographer and the Prelude to Globalization.* Berkeley: University of California Press, 2003.

Smith, Phillip S. and Mertie, Jr., J.B. “Geology and Mineral Resources of Northwestern Alaska.” Bulletin 815, U.S. Department of Interior, Geological Survey. Washington: U.S. Government Printing Office, 1930.

Sonnenfeld, Joseph. “Changes in Subsistence among the Barrow Eskimo.” Ph.D. Diss, Johns Hopkins University. 1956.

. “An Arctic Reindeer Industry: Growth and Decline.” *Geographical Review* 49, no. 1 (Jan., 1959): 76-94.

Sorlin, Sverker. “Rituals and Resources of Natural History: The North and the Arctic in Swedish Scientific Nationalism.” Michael Bravo and Sverker Sörlin, eds. *Narrating the Arctic: A Cultural History of Nordic Scientific Practices.* Canton, MA: Science History Publications, 2002. 73-122.

Stager, John K. “Fort Anderson: The First Post for Trade in the Western Arctic.” *Geographical Bulletin* 9, no. 1, (1967): 46-8.

Stefansson, Vilhjalmur. “The Icelandic Colony in Greenland.” *American Anthropologist* 8, no.2 (April to June, 1906): 262-270.

. “Icelandic Beast and Bird Lore.” *The Journal of American Folklore* 19, no. 75 (October to December, 1906): 300-308.

. "Suitability of Eskimo Methods of Winter Travel in Scientific Exploration." *Bulletin of the American Geographical Society of New York* 60, no. 1 (1908): 210-213.

. "Eskimo Trade Jargon of Herschel Island." *American Anthropologist* 11, no. 2 (Apr. – Jun., 1909): 217-232.

. "The Technique of Arctic Winter Travel." *Bulletin of the American Geographical Society of New York* 44, no.1 (1912): 340-347.

. "My Quest in the Arctic." *Harper's Monthly Magazine* (December 1912).

. *My Life with the Eskimo*. New York: MacMillan Company, 1913.

. *The Friendly Arctic: The Story of Five Years in the Polar Regions.* New York: MacMillan Company, 1921.

. *The Northward Course of Empire.* London: George G. Harrap, 1922.

. "The Arctic Headlines in Fact and Fable." *Foreign Policy Association* 51, (January 1945).

Stefansson, Vilhjalmur and Wissler, Clark. "The Stefánsson-Anderson Arctic Expedition of the American Museum: Preliminary Ethnological Report." *The Anthropological Papers of the American Museum of Natural History* 14, part 1 (1914): 454-457.

Sterling, Keir B. "Selected Works of Clinton Hart Merriam." Keir B. Sterling, ed., *Natural Sciences in America.* New York: Arno Press, 1974.

Stocking, Jr., George W. "Anthropology as *Kulturkampf:* Science and Politics in the Career of Franz Boas." *The Ethnographer's Magic and Other Essays in the History of Anthropology*, ed. George Stocking, ed. Madison: University of Wisconsin Press, 1992. 92-113.

Stocking, Jr., George W. "Ideas and Institutions in American Anthropology: Thoughts Toward a History of the Interwar Years." *The Ethnographer's Magic and Other Essays in the History of Anthropology*. George Stocking, ed. Madison: University of Wisconsin Press, 1992. 114-177.

Stommel, Henry. *Lost Islands: The Story of Islands that have Vanished from Nautical Charts.* Vancouver: University of British Columbia Press, 1984.

Stradling, David ed. *Conservation in the Progressive Era: Classic Texts.* Seattle: University of Washington Press, 2004.

Stuck, Hudson. *A Winter Circuit of our Arctic Coast: A Narrative of a Journey with Dog-Sleds around the Entire Arctic Coast of Alaska.* New York: Charles Scribner's Sons, 1920.

Sutter, Paul. "What Can U.S. Environmental Historians Learn from Non-U.S. Environmental

Historiography?" *Environmental History* 8, No. 1 (Jan., 2003): 109-129.

Swazye, Nansi. *Canadian Portraits: Jenness, Barbeau, Wintemberg: The Man Hunters.* Toronto: Clarke, Irwin, and Company Limited, 1960.

Taber, Stephen. "Perennially frozen ground in Alaska: its origin and history." *Geological Society of America Bulletin* 54, (1943): 1433-1548.

Taliafero, John. *In a Far Country: The True Story of a Mission, a Marriage, a Murder, and the Remarkable Reindeer Rescue of 1898.* New York: Public Affairs, 2006.

Taylor, Joseph E. III. "The Many Lives of the New West." *Western Historical Quarterly* 35, no. 2 (2004): 141-165.

Taylor, John Leonard. *Canadian Indian Policy During the Inter-War Years, 1918-1939.* Ottawa: Department of Indian Affairs and Northern Development, 1984.

Tester, Frank and Kulchyski, Peter. *Tammarniit (Mistakes): Inuit Relocation in the Eastern Arctic, 1939-1963* Vancouver: UBC Press, 1994.

Thisted, Kirsten. "Inuit without Igloos: Documenting the Arctic Transition." A presentation at the 18th Inuit Studies Conference, Washington, D.C., October 25, 2012.

Tilley, Helen. *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950*. Chicago: The University of Chicago Press, 2011. *Travel, 1874-1974.* Dundurn, 1997.

Tsing, Anna. *Friction: An Ethnography of Global Connection.* Princeton: Princeton University Press, 2005.

Turnbull, David. "Boundary-Crossings, Cultural Encounters, and Knowledge Spaces in Early Australia." *The Brokered World*. Simon Schaffer et al. Sagamore Beach, MA: Science Publications, 2009. 387-428.

University of California, "George Collins: The Art and Politics of Park Panning and Preservation: An Interview," Regional Oral History Office, Bancroft Library, 1980, 215-225.

United States Department of the Interior. *Hearings of the Reindeer Committee in Washington, D.C., February – March, 1931.* Washington: Office of the Secretary, 1931.

Usher, Peter J. *Fur Trade Posts of the Northwest Territories, 1870-1970.* Ottawa: Northern Science Research Group, Dept. of Indian Affairs and Northern Development, 1971.

. "Eskimo Land Use and Occupancy in the Western Arctic." Prepared for Milton Freeman Research, Ltd. Hamilton, ON, 1974.

Valencius, Conevery Bolton. *The Health of the Country: How American Settlers Understood Themselves and Their Land.* New York: Basic Books, 2002.

Valentine, V.F and Lotz, J.R. "Northern Co-Ordination and Research Centre of the Canadian Department of Northern Affairs and National Resources." *Polar Record* 11, no. 73 (1963): 419-422.

Vasile, Ronald S. "The Early Career of Robert Kennicott, Illinois' Pioneering Naturalist." *Journal of the Illinois State Historical Society* 87, no.3 (Autumn, 1994): 150-169.

Walker, Brett. "Foreign Affairs and Frontiers in Early Modern Japan: A Historiographical Essay." *Early Modern Japan* 10 (2002): 44-62.

Wang, Jessica. *American Science in an Age of Anxiety: Scientists, Anticommunism, and the Cold War*. Chapel Hill: University of North Carolina Press, 1999.

Washburn, A.L."Classification of Patterned Ground and a Review of Suggested Origins."*Bulletin of the Geological Society of America* vol. 67 (July 1956): 823-865.

Westwick, Peter. *The National Labs: Science in an American System, 1947-1974*. Cambridge, MA: Harvard University Press, 2003.

White, Richard. *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650-1815*. Cambridge: Cambridge University Press, 1991.

Willis, Roxanne. "A New Game in the North: Native Reindeer Herding, 1890-1940." *Western Historical Quarterly* 37, (Autumn 2006): 277–301.

. *Alaska's Place in the West: From Last Frontier to the Last Great Wilderness.* University Press of Kansas, 2011.

Wissler, Clark. "Notes Concerning New Collections." *The Anthropological Papers of the American Museum of Natural History* 2, no.3 (1909): 314-5.

."'Turning Kogmollik' for Science'." *The American Museum Journal* 10, no. 7 (November 1910): 212-220.

. "Material Cultures of the North American Indians." *American Anthropologist* 16, no. 3 (Jul-Sep. 1914): 469-479.

. "Harpoons and Darts in the Stefansson Collection." *The Anthropological Papers of the American Museum of Natural History* 14, part 2, (1916): 397-475.

. "Review of *the Ammassalik Eskimo: Contributions to the Ethnology of the East Greenland Natives* by William Thalbitzer." *American Anthropologist* 18, no. 1 (1916): 115-117.

. *The American Indian: An Introduction to the Anthropology of the New World.* New York: McMurtrie, 1917.

. "Archaeology of the Polar Eskimo." *Anthropological Papers of the American Museum of Natural History* 22, part 3 (1918): 103-165.

. "Review of *An Anthropological Study of the Origin of Eskimo Culture* by H.P. Steensby." *American Anthropologist* 20, no.2 (1918): 213-215.

. "Review of *Implements and Artifacts of the North-East Greenlanders: Finds from Graves and Settlements* by Thomas Thomsen." *American Anthropologist* 20, no.2 (1918): 215-16.

. "Arctic Geography and Eskimo Culture: A Review of Steensby's Work," *Geographical Review* 9, no.2 (1920): 125-38.

. "Ethnology of the Copper Eskimo." *Geographical Review* 12, no. 3 (1922): 506-7.

. *An Introduction to Social Anthropology.* New York: Henry Holt and Company, 1929.

Woods, Carter A."A Criticism of Wissler's North American Culture Areas." *American Anthropologist* 36, no. 4 (October to December, 1934): 517-523.

Worster, Donald, ed. *The Ends of the Earth: Perspectives in Modern Environmental History.* New York: Cambridge University Press, 1988.

Wright, Edmund A. *CRREL's First 25 Years, 1961-1986.* U.S. Army Cold Regions Research and Engineering Laboratory, June, 1986.

Young, Christian C. "Defining the Range: The Development of Carrying Capacity in Management Practice." *Journal of the History of Biology* 31 (1998): 61-83.

Zaslow, Morris. *The Opening of the Canadian North, 1870-1914.* Toronto: McClelland and Stewart Limited, 1971.

. *Reading the Rocks: The Story of the Geological Survey of Canada, 1842-1972.* Toronto: MacMillan Company, 1975.

. *The Northward Expansion of Canada, 1914-1967*. Toronto: McClelland and Stewart, 1988.

Zeller, Suzanne. *Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation.* McGill: Queen's University Press, 2009.