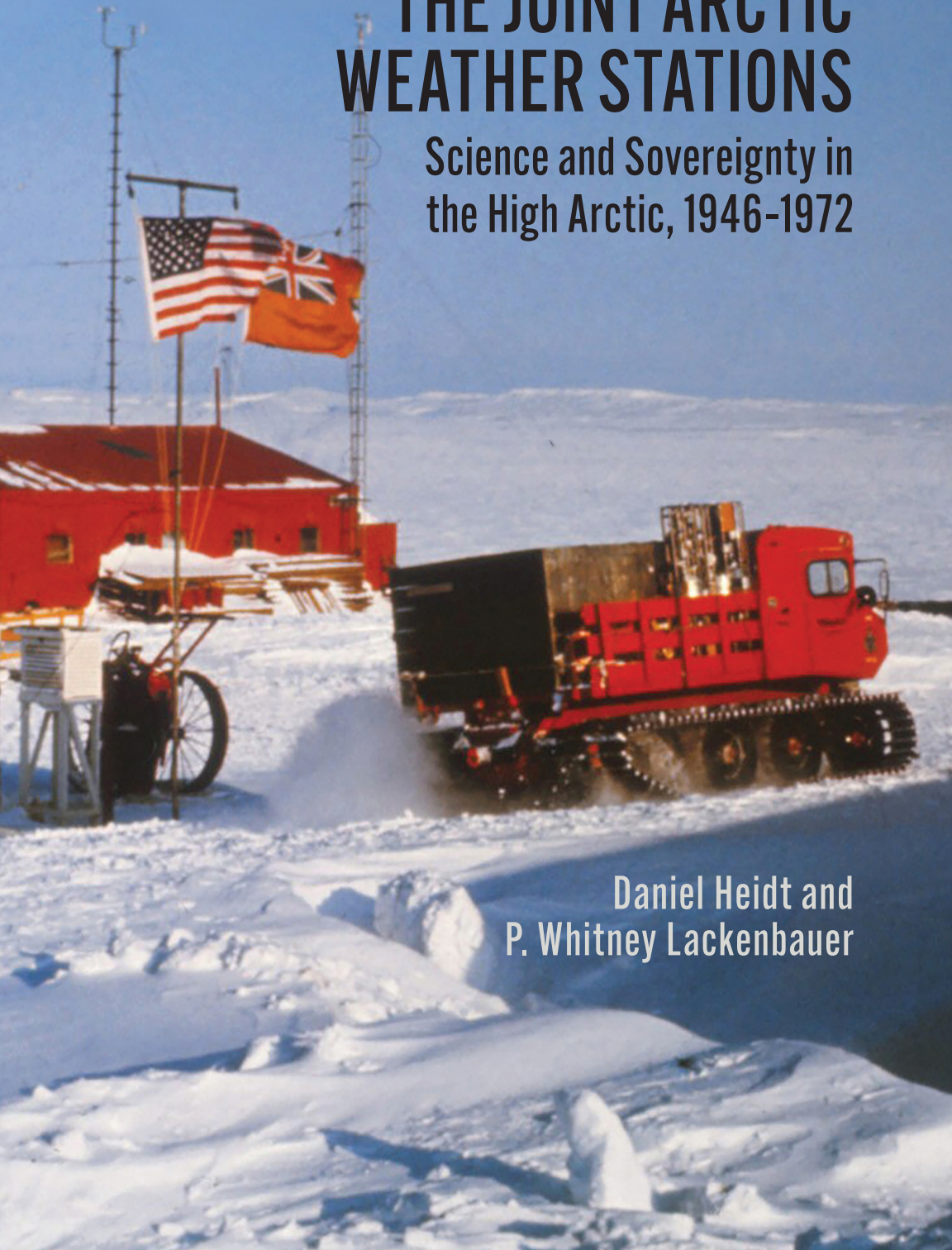
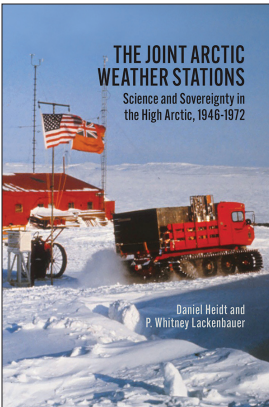


THE JOINT ARCTIC WEATHER STATIONS

Science and Sovereignty in
the High Arctic, 1946-1972



Daniel Heidt and
P. Whitney Lackenbauer



THE JOINT ARCTIC WEATHER STATIONS: SCIENCE AND SOVEREIGNTY IN THE HIGH ARCTIC, 1946-1972

by Daniel Heidt and P. Whitney Lackenbauer

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To the JAWS personnel who served their continent

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Acronyms

AAF	Army Air Forces
ABC	America-Britain-Canada
ACC	Air Coordinating Committee
acc.	accession
ACND	Advisory Committee on Northern Development
ADTIC	Arctic, Desert and Tropic Information Centre (USAAF)
AES	Atmospheric Environment Service
AINA	Arctic Institute of North America
Alta.	Alberta
ARCTOPS	Arctic Operations Study
ATC	Arctic Training Centre
BC	British Columbia
BMEWS	Ballistic Missile Early Warning System
BT	bathythermograph
c.	circa
C	Celsius
CAD	Canadian dollars
CAE	Canadian Arctic Expedition
CAF	Canadian Armed Forces
Canol	Canadian Oil
CBC	Canadian Broadcasting Corporation
CCGS	Canadian Coast Guard Ship
CDC	Cabinet Defence Committee
CFB	Canadian Forces Base
CFS	Canadian Forces Station
CGS	Canadian Government Ship
CMS	Canadian Meteorological Service
CNO	Chief of Naval Operations
Cong.	Congress
CRREL	Cold War Regions Research and Engineering Laboratory
CWC	Cabinet War Committee
D.C.	District of Columbia
DCASS	Documents on Canadian Arctic Sovereignty and Security

DCER	<i>Documents on Canadian External Relations</i>
DEA	Department of External Affairs
DEW Line	Distant Early Warning Line
DEXAF	Department of External Affairs
DFC	Distinguished Flying Cross
DHH	Directorate of History and Heritage
DMR	Department of Mines and Resources
DNANR	Department of Northern Affairs and National Resources
DND	Department of National Defence
DoT	Department of Transport (Canadian)
Dr.	Doctor
DRB	Defence Research Board
ed.	edition/editor
ESSA	U.S. Environmental Science Services Administration
ExO	Executive Officer
f.	file
F	Fahrenheit
Fig	Figure
F/L	Flight Lieutenant
F/O	Flying Officer
FRUS	<i>Foreign Relations of the United States</i>
Ft.	Fort
ft.	foot/feet
Gen.	General
GMT	Greenwich Mean Time
HAWS	High Arctic Weather Stations
HBC	Hudson's Bay Company
HMS	His/Her Majesty's Ship
Hon.	Honourable
H.R.	House of Representatives
hr	hour
IGY	International Geophysical Year
in.	inches
IPY	International Polar Year
JAWS	Joint Arctic Weather Stations
km	kilometres
K.P.	kitchen patrol/kitchen police
LAC	Library and Archives Canada

lbs.	pounds
LCM	landing craft, mechanized
LCN	landing craft, navigation
LCVP	landing craft, vehicle, personnel
Lieut./Lt.	Lieutenant
Lt. Col./LCol	Lieutenant-Colonel
m	metres
Maj.	Major
MANOBS	<i>Manual of Standard Procedures and Practices for Weather Observing and Reporting</i>
MCC	Military Co-Operation Committee (Canada-United States)
met techs	meteorological technicians
MG	Manuscript Group
mi	miles
MIT	Massachusetts Institute of Technology
MPH	miles per hour
MV	Motor vessel
N	North
NARA	National Archives and Records Administration
NATO	North Atlantic Treaty Organization
n.d.	no date
no.	number
NORAD	North American Air Defence Command
NWT	Northwest Territories
OIC	officer in charge
Op	Operation
Ops. Bldg.	Operations Building
PBM	patrol bomber
PBY	patrol bomber (Consolidated Aircraft Co.)
PC	Privy Council
PCSP	Polar Continental Shelf Project
PEARL	Polar Environment Atmospheric Research Laboratory
pibal	pilot balloon
PISO	no pilot balloon observation, snowing
PIWI	no pilot balloon observation, high or gusty surface wind
PJBD	Permanent Joint Board on Defence
P.Q.	Province of Quebec
pt.	part

QTC	Qikiqtani Truth Commission
RAOB	Rawinsonde Observation
RAWIN	Rawinsonde
RCAF	Royal Canadian Air Force
RCAP	Royal Commission on Aboriginal Peoples
RCMP	Royal Canadian Mounted Police
RCN	Royal Canadian Navy
RCNR	Royal Canadian Naval Reserve
ret'd	retired
Rev.	Reverend
rev.	revised
RG	Record Group
SCR	Signal Corps Radio
SIPRE	Snow, Ice and Permafrost Research Establishment
S/L	Squadron Leader
SS	Steamship
SSEA	Secretary of State for External Affairs
SSHRC	Social Sciences and Humanities Research Council
temp.	temperature
TF	Task Force
trans.	translated
UK	United Kingdom
US / USA	United States of America
USAAF	United States Army Air Forces
USAF	United States Air Force
USCGS	United States Coast Guard Ship
USD	United States dollars
USN	United States Navy
USS	United States Ship
USSEA	Under-Secretary of State for External Affairs
USSR	Union of Soviet Socialist Republics
USWB	United States Weather Bureau
vol.	volume
W	West
WO2	Warrant Officer Second Class

Introduction

Cold waves, the periodic surge of Arctic masses into the main west-east flow of air in the temperate latitudes, emphasize the indispensable need of the meteorologist for data from Canada's remote northland. A day-by-day knowledge of changes in the Arctic is vital to the interpretation of changes in more temperate latitudes. The advancement of his profession and of the science depend to a large extent on an increased understanding of arctic meteorology.

Andrew Thomson (1948)¹

As controller of the meteorological division at Canada's Department of Transport (DoT), Andrew Thomson recognized the critical importance of Arctic data to meteorology and its myriad applications in the early Cold War world. Advancements during the Second World War turned Canada's northern reaches into an emerging — and essential — scientific frontier. "Almost a quarter of the Arctic cap is Canadian territory, an area second only to that controlled by the U.S.S.R.," he continued. "Canada thus carries an international obligation to roll back the meteorological frontiers of the Arctic, for the free exchange of weather data between nations of the northern hemisphere is no longer a courtesy but a scientific necessity."² This required precise instruments and the application of modern practices and methods that conformed to national and global standards. Gathering data in the High Arctic, however, would entail more than simply using

known techniques in a distant hinterland. It would necessitate improvisation, innovation, and adaptation to local conditions.

Meteorological technicians Monte Poindexter and Lowell Demond left the Eureka station barracks at 09:00 on a typical morning in January 1958. Round-the-clock winter darkness meant that the American and the Canadian walked across the station grounds with only artificial light to guide their path to the Inflation and Rawinsonde buildings. The weather was calm, with a light wind adding more snow to the already impressive drifts encroaching on the station's structures. Nevertheless, frigid temperatures complicated every task. While Poindexter readied the equipment that would track the radiosonde's flight and receive its telemetry and prepared the flight's balloon, Demond organized the radiosonde instrument package in a heated shed where temperatures hovered around freezing. When both men were ready, Demond released the balloon outside of the shed and hurried into the heated first floor of the rawinsonde building. Then, he began writing down the numbers Poindexter called out to him over the closed-circuit phone line. When the balloon burst after ascending to roughly 70,000 feet, the two men gathered on the first floor of the rawinsonde building to finish plotting their run, check for errors, and then encode their observations for transmission.

After completing this work, the duo returned to the rawinsonde building's radio room and passed their information on to John Gilbert, one of the station's radio operators. Using Morse code, Gilbert then transmitted this information to the Arctic weather program's hub station at Resolute. From there, the information was transmitted to Edmonton and then fed into teletype machines and disseminated to meteorological centres around the world, where staff aggregated the observations of dozens or hundreds of stations to produce daily or weekly forecasts. In turn, these forecasts informed bomber and interceptor forces, civilian pilots who wanted to avoid harsh weather, farmers who needed to know when they should begin planting or harvesting their crops, and urban dwellers deciding whether to bring their umbrella to work.³

Twice daily, for more than a quarter century, personnel at each of the five Joint Arctic Weather Stations (JAWS) repeated the upper air observations described in the anecdotal account above. These isolated stations in Canada's High Arctic, established by the American and Canadian civilian

weather bureaus in the decade after the Second World War, were jointly operated by both governments until the early 1970s. As transportation and communication hubs, the stations also opened the region to scientists and commercial resource surveys. The success of this binational scientific program throughout this period testifies to the commitment of the Canadian and American personnel who sailed, flew, or worked at the top of the world while navigating environmental, diplomatic, logistical, and interpersonal challenges so that both North America and the North Atlantic could benefit from accurate meteorological data.

Canada's Arctic Archipelago reaches north from mainland North America towards the North Pole. As early as 1906, Canadian explorer Albert Peter Low described the islands north of Lancaster Sound and Barrow Strait as a distinct geographical and geological region, including "the great islands of Ellesmere and North Devon, whose eastern sides front on Baffin bay and Smith sound; the Parry Islands — Cornwallis, Bathurst, Byam Martin, Melville, Eglinton and Prince Patrick — all on the north side of Barrow Strait; the Sverdrup Islands — Axel Heiberg, Ellef Ringnes, King Christian and North Cornwall — situated to the west of Ellesmere and to the north of the Parry islands."⁴ Geographer Andrew Taylor, who helped to establish the Joint Arctic Weather Stations on these remote islands, observed in 1964 that "the structural elements of the land are largely laid bare and human geography in the commonly accepted sense is non-existent."⁵ Lying literally "beyond the Inuit lands" (as the motto of the northernmost station in North America would later boast) until the High Arctic relocations of the 1950s,⁶ the High Arctic came to occupy a particular space in the minds of Canadian and American planners as a frontier of field science and geopolitics during the Cold War.

The Joint Arctic Weather Stations (JAWS), constructed at Resolute, Eureka, Mould Bay, Isachsen, and Alert between 1947 and 1950, were situated according to southern and global requirements but projected a pioneering and permanent scientific presence into Canada's High Arctic. This book provides the first systematic account of this binational program that profoundly shaped subsequent state activities and scientific inquiry in the Arctic Archipelago. Through this study, we seek to better understand the intersections between state planning and diplomacy, sovereignty, and

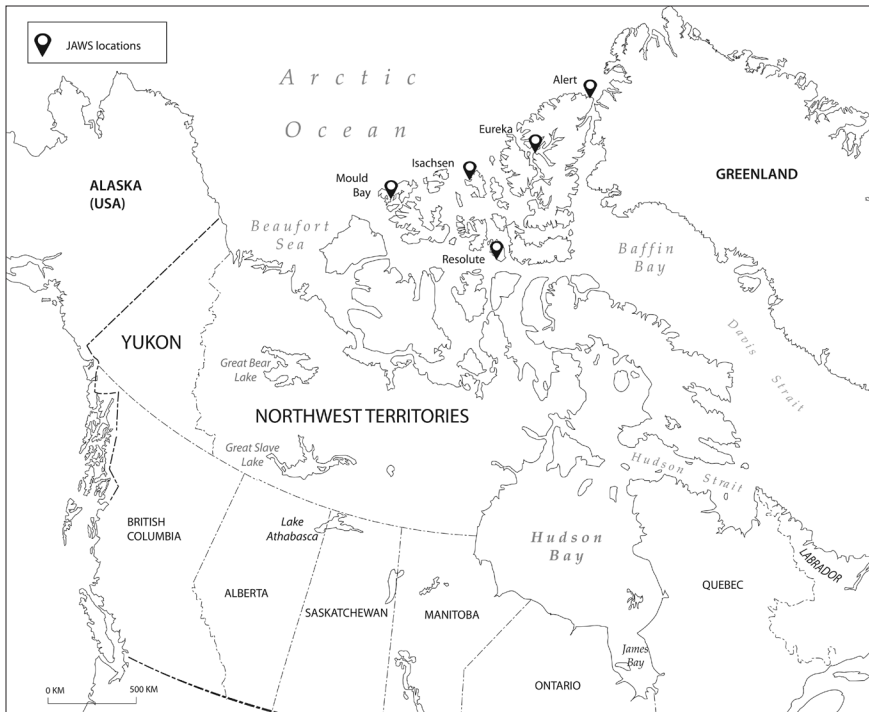


FIGURE 0-1. The Joint Arctic Weather Stations. Jennifer Arthur-Lackenbauer

science during the Cold War. We are equally intrigued by the people and practices at the stations, their adaptations to local environmental realities, and how these realities influenced each country's Arctic policies. Accordingly, we explore how the joint stations became *places* — distinct historical geographies with particular environmental and cultural characteristics. By exploring the full duration of the JAWS program on various scales, this book invites a reconsideration of traditional assessments of the program, explores Canadian-American relations beyond the corridors of high-level diplomacy, and reveals a particular binational approach to collaborative polar science in the North American Arctic.

From a state perspective, the JAWS program came at a moment when senior civilian and military decision-makers sought to transform relations between people and Arctic environments. In the wake of a global war that

projected into the North American Arctic for the first time, politicians and senior civil servants recognized that science was strategic. Access to reliable, continuous, and recently collected weather data from the High Arctic would facilitate global transportation networks, economic development, and national defence. Previously considered the remote realm of Inuit, the fur trader, the Mountie, and the missionary, the North American High Arctic now became vital meteorological and scientific space: not for local Arctic consumption and use, but to observe, record, and transmit weather data for southern forecasters discerning global weather patterns. As Chief of the United States Weather Bureau (USWB) Francis W. Reichelderfer noted straightforwardly when testifying to Congress in 1946, “reports from the Arctic Basin would help very much in weather forecasting.”⁷ Our intention is not to explore how this locally-generated knowledge was dis-embedded, de-territorialized, and globalized into generalizable meteorological data.⁸ Instead, we seek to understand why weather data was sought from specific sites in the High Arctic, how the stations were created and sustained, how relationships were structured, and how this joint program shaped — and was shaped by — broad geostrategic considerations, national interests, departmental and scientific priorities, and particular Arctic environments.

At its core, this book grapples with canonical questions about the interaction of science and place in isolated stations.⁹ “Place is essential to the generation of *knowledge*,” David Livingstone reminds us. “It is no less significant in its *consumption*.”¹⁰ As he explains, historical geographies of science must interrogate the transmission and transformation of social relations and cultures of practitioners within varied local contexts. “Spatial arrangements and social practices are intricately interconnected, indeed are reciprocally constituted,” he suggests. “Spaces are *produced* as well as *occupied*.”¹¹ For a quarter century, teams comprised of four Canadians and four Americans made surface observations, flew weather balloons, ate, slept, and passed the time at the remote satellite stations for a year or more with only tenuous transportation and communication linkages to the outside world. Their jobs were arduous. The struggles of some Canadian and American personnel to attempt to conquer and, when that failed, adapt to harsh Arctic environments reveal both the limits of Western Cold War technology and the persistent power of the seasonal cycle in Northern life.

Personnel learned “on the job” how to work in extreme conditions, since neither the USWB nor the DoT provided significant Arctic training. In learning to live and work side by side, these men (the weather stations were only operated by men during the JAWS program) also negotiated the delicate terrain of Canadian-American relations. Furthermore, station personnel increasingly learned to work as hosts by making their airstrips, communications facilities, and accommodations hubs for scientists studying other more distant parts of the archipelago. Before departing the stations at the ends of their tours, these personnel passed on lessons learned to their replacements, perpetuating local cultures, leadership styles, and the importance of adhering to seasonal cycles.

While scholars have offered various interpretations of the negotiation and early establishment of the Joint Arctic Weather Stations, the program as a whole has attracted little scholarly attention. As early as 1954, R.W. Rae of the Defence Research Board of Canada touted it as “a splendid example of international cooperation” that generated “extensive meteorological and other scientific data” available to researchers around the world.¹² Similarly, in a study written in the 1970s and published only recently, historian Gordon W. Smith assessed the JAWS program “as one of the most important and successful examples of U.S.-Canadian joint endeavour in northern regions,” offering “a striking illustration of successful international cooperation and collaboration.”¹³ In 1978, geographer William C. Wonders concluded that “the Joint Arctic Weather Stations programme was imaginative, venturesome and expensive at the time it was launched, which proved to be one of the most valuable investments made by the Canadian Government. It more than lived up to its expectations in its meteorological and climatological returns. It made it possible for a far-flung programme of even wider scientific value to be implemented.” These stations, serving as “anchor points” for exploration and development in the High Arctic, had a profound influence on the region. In his short overview, Wonders observed that, despite the JAWS program’s myriad contributions to science and its role in facilitating the transformation of the Canadian North, “surprisingly little note has been taken of it following the initial interest in the venture ... [and] some fuller recognition is overdue.”¹⁴ This book takes up his call four decades later.

The State: Looking Down on JAWS

The JAWS program must be understood within the context of state expansion into polar exploration and science during the mid-twentieth century. During the preceding century, Europeans and North Americans “explored” the Arctic, claiming territory on behalf of their patron states, with research conducted on a transient, individual basis, with limited funding. “The heroic, expedition-based style of Arctic science, dominant in the first decades of the twentieth century, gave way to a systematic, long-term, strategic and largely state-funded model of research,” an eminent group of historians of Arctic science recently observed.¹⁵ This was an international trend towards more complex, coordinated, and permanent scientific footprints in the far north, motivated by a range of economic, political, military, and social factors. While the Soviet Union had a robust Arctic research program during the interwar years, the West lagged behind. After the Second World War imprinted the critical importance of Arctic meteorological information for military operations as well as weather forecasting more broadly, Canada, the United States, and the Nordic countries dramatically expanded their investments in an Arctic presence featuring permanent scientific research stations.¹⁶ A similar burst of activity occurred in Antarctica, where isolation and extreme natural conditions required innovative logistics, communications, and engineering to construct and resupply permanent stations.¹⁷ The JAWS program thus fits within a larger pattern of Arctic states investing in permanent infrastructure to support polar science, providing a window into this period of transition that both complements and challenges existing studies.

The JAWS case has also factored prominently in the Canadian historiography on Arctic sovereignty and security vis-à-vis the United States — a dominant approach to understanding Canada’s Arctic interests that reflects the country’s longstanding preoccupation with territorial ownership and control. Intersecting with the primordial debate about the Canadian-American relationship *writ large*, the interplay between Arctic sovereignty and security has precipitated two main schools of thought debating the costs and benefits of bilateral cooperation, compromise, and alleged coercion. During the Second World War, American-inspired (and largely American-built) defence projects in Northwestern Canada generated

official anxieties in Ottawa about potential sovereignty threats posed by the United States as it undertook bold action in the name of continental defence.¹⁸ As the war progressed, American officials acknowledged that they had to respect their northern neighbour's chronic insecurities about sovereignty and ensure that their activities did not prejudice or undermine Canadian interests. Accordingly, Canada emerged from the war with its northern sovereignty intact, and senior decision-makers in Ottawa learned valuable lessons about the need to monitor and, ideally, actively participate in American-sponsored activities in Canada's Far North.¹⁹

The Arctic, as the most likely attack route between the strategic bomber forces of the United States and the Soviet Union, came into its own as a strategic theatre during the Cold War. Arctic defences became inextricably linked to American security and, almost immediately after the Second World War ended, the US military began to push for access to Canada's Arctic to build airfields and weather stations. Canadian officials grew apprehensive and cautious in authorizing new installations in the Arctic, and journalists began to talk about a looming sovereignty crisis. The sheer preponderance of American material and personnel unnerved many Canadians then and several historians since, who cite this process as evidence of American willingness to encroach on Canadian sovereignty to achieve US security objectives.²⁰ Historian Shelagh Grant emphasizes that "paper guarantees' did not always translate into practice" as Americans violated Canadian laws or diplomatic agreements. Accordingly, she concludes that the result was "a compromise: optimum security with minimal, but perceived unavoidable loss of sovereignty."²¹ A second school of scholarly interpretation highlights the close cooperative nature of these joint defence projects, contending that Canadian and American Arctic interests were generally compatible and that bilateral cooperation ultimately bolstered Canadian security and sovereignty interests. Quiet diplomacy and practical, bilateral problem solving allayed most of the Arctic "crisis" concerns that arose.²²

Both of these schools of thought have mobilized the JAWS program as an example of the intersections between Cold War militarization, science, sovereignty, and geostrategic interests in the Arctic. Historical geographer Matthew Farish has studied extensively how the American and Canadian militaries employed scientific research and engineering to afford personnel

many of the comforts enjoyed further south and to convert hostile Arctic “wilderness” environments into a legible “frontier” that could, through “calm rationality,” be integrated into strategic frameworks.²³ Building on these ideas, a recent study of American Cold War science in Greenland concludes that “the U.S. military ‘colonized’ geophysical research in the Arctic, which increasingly became subject to military directions, culture, and rules.” The physical environmental sciences, including meteorology, acted as a “gateway” to the Arctic by facilitating military control and extending political control into foreign states.²⁴ Several historians suggest that Ottawa was “ever mindful of the importance of North American continental defense for Canadian security,” when consenting to the construction and operation of weather and radar stations in its Arctic. They also recognize that Canadian leaders “continued to view sovereignty and natural resources as crucial Arctic issues” and employed scientific research to legitimize their claims.²⁵ Given that Canada’s northern status was integral to its national self-image, historian of science Trevor Levere observed that it was natural for Canada to continue to see Arctic science as a tool “to establish and extend that sovereignty.”²⁶

The JAWS story suggests a need to distinguish between the militarization of Cold War science, which implies a co-opting of civilian- or academic-driven inquiry,²⁷ and the role of militaries in *supporting* science. As Roger L. Geiger notes, “how these issues are evaluated depends considerably upon where one chooses to look.”²⁸ Few scholars, to date, have considered the civil motivations and inputs to the implementation and operation of the JAWS network. Instead, because the JAWS project was made possible by massive, modern military logistics, most scholars have assumed that JAWS was a military/defence project rather than a civilian weather project that produced data of obvious interest to militaries — alongside a plethora of civilian audiences. While military aircraft and naval vessels played prominent roles in the establishment and resupply of the stations, JAWS should not be understood as a primarily military program. Instead, we shift the focus to emphasize how modern military technology and logistics helped to extend and broaden the tentacles of state-supported civilian research, facilitating the collection of weather observations, as well as the establishment of transportation and communication hubs for other — generally civilian — scientific inquiries.

Experiencing JAWS: Views from Below

As noted earlier, scholars who have assessed the JAWS program have typically focused on high-level policy and government planning through security and sovereignty lenses.²⁹ During our research, we quickly realized that a fixation on senior decision-making overlooks significant dynamics in the actual *operation* of the JAWS program, in addition to what experiences in the field tell us about high-level assumptions and concerns over time.³⁰ Expert planners who conceived of the joint program and oversaw much of the negotiations and construction preparations had a particular way of seeing the world, and this book explores how their understandings of the North shaped the conception, negotiation, and planning stages of JAWS. It also tests how power dynamics played out at the stations. Given that JAWS was a joint Canada-US initiative, how did a shared command structure, with binational leadership, actually work in practice at isolated stations? Did the US, as a superpower, exercise *de facto* control of the program? How well informed were southern politicians and planners of local developments, and did their (mis)understandings influence government policies?

Remoteness, confinement, and Arctic environments are core variables in the JAWS story. Farish reminds us that “the ‘how’ of the Cold War is inextricable from its ‘where.’” Broad views of geopolitics and scientific inquiry must be interrogated alongside “the finer perspectives” of “bodies moving across ‘hostile’ terrain.” His work, and that of other recent polar scholars, tends to emphasize the *transiency* of non-Indigenous military and civilian personnel *traversing* the landscape, passing through field exercises or camps, training centres, or laboratories in their quest to make the Arctic legible and useful.³¹ While scientists who used the JAWS stations as regional hubs to access field sites certainly fit this description, it does not adequately capture the sense of *place* that JAWS personnel created and experienced.

We emphasize that the lives of JAWS personnel must be positioned *within* Arctic spaces, where men were intensely and intimately engaged with local Arctic environments. Given the isolation and potential for “cab-in fever” among station personnel, leadership and fellowship were integral to successful station cultures. “The importance of ensuring a balanced

team, promoting harmony by only taking ‘good chaps’, is easily visible in discussions of polar expeditions and mountaineering trips,” historian of science Vanessa Heggie observes, “but is far less considered in connection with scientific research teams.”³² Science and technology scholars frequently acknowledge that “field scientists often depend on local assistants whose knowledge of and commitment to the goals of research are partial at best,”³³ but (with the notable exception of their analysis of amateur contributions to scientific knowledge³⁴) they rarely investigate how diverse practitioners affect and shape the collection of scientific data, station cultures, and other aspects of station life.

Rather than producing a triumphalist narrative about the ability of states to project and implement “modern” plans that promised to negate local environmental conditions, we are fascinated by the limitations imposed by environmental constraints, distance and isolation, and human reactions to these realities. Without ready access to Indigenous knowledge holders given JAWS’ remote locations far removed from Inuit communities (at least until Inuit families were relocated to Resolute Bay and Ellesmere Island in the 1950s), the stations’ personnel had to overcome challenges through their own observations and responses to the environment. As oral histories and archival research reveal, station cultures were shaped by everything from particular scientific practices to seasonal cycles to ways of knowing and behaving within these environments. Station personnel grappled with preconceptions, southern requirements, inadequate equipment, and environmental realities to produce local knowledge — relating to both scientific and everyday life — that successive teams accumulated and passed on to their replacements. While implicit, the four domains of community life identified by Sharon Traweek in her landmark ethnographic study of high energy physicist communities frame our analysis: ecology (the group’s means of subsistence, the environment that supports it, and the tools and other artifacts used by the group); the social organization (how the group structures itself); developmental cycle (how the group transmits to novices the skills, values, and knowledge that constitute a sensible, competent person); and cosmology (the group’s system of knowledge, skills, and beliefs). By providing a “thick description”³⁵ of everyday station life and exploring how mundane tasks influenced the program’s development, this book follows the examples of P. Wenzel Geissler and

Ann Kelly in analyzing remote stations as “sites of scientific work, beacons of political power and spaces of everyday life ... enmeshed in the routine and rhythms of everyday domestic life, and in longer cycles of habitation, wear, and repair.”³⁶

To accomplish these diverse goals, we adopt a mixed methodology. Government archives in Canada and the United States yielded rich material on the official purpose, planning, resupply, and operation of the JAWS stations. These records are also essential to understanding the diplomatic exchanges between Ottawa and Washington, as well as inter-service and interdepartmental negotiations, consultation, and cooperation that took place throughout the duration of the program. They reveal comparatively little, however, about the day-to-day operation of the stations, leading us to augment our resource base with station logs, official reports from archives across North America, popular media stories, and unpublished personal memoirs. We also rely heavily upon oral histories — what James C. Scott appropriately identifies as “hidden transcripts”³⁷ — of former JAWS employees to understand the program as a “lived” experience. By putting these diverse sources into dialogue with each other and with scholarship concerning Canadian-American relations, the environment, field science, and isolation, this history of the JAWS program corrects misperceptions and yields fresh insights into how station personnel perceived the High Arctic and forged a distinctive community dedicated to collecting and disseminating data in support of scientific knowledge.

In some respects, the JAWS story may seem anachronistic or unfashionable, focusing on all-male, non-Indigenous scientific outposts in the Canadian Arctic. In the Canadian case, nearly all academic scholarship (including much of our own work) now focuses on themes related to state-imposed colonial systems on Indigenous peoples in their homeland. By contrast, the JAWS case study points to the production and habitation of the High Arctic as a North American space largely outside of the politics of Indigenous-Settler relations. By looking at weather stations populated by *qallunaat* (non-Inuit), it deviates from Ken Coates’ observation that “Northern regions are generally characterized by tensions between indigenous and non-indigenous peoples.”³⁸ While we expected to find more interaction between weather station personnel and Inuit, the latter are conspicuously absent in the archival record and oral histories of

the stations. Accordingly, this “thick” description of JAWS suggests that examining the heterogeneity of cultural geographies in the Circumpolar North and the Canadian Arctic³⁹ can help to explain the production of space and place in specific times and contexts.

In their work on Antarctic colonialism, Christy Collis and Quentin Stevens suggest that:

Antarctica is a unique space: it lacks indigenous inhabitants. Hence, unlike every other colonial space, it is not defined through invasion and loss; in Antarctica ‘colonialism did not have to be a “dirty” word.’ The popularity of intercultural exploitation as a focus for colonial and postcolonial studies can blind us to the fact that intercultural relations are not always the defining aspects or the spatial function of a colony.... Antarctica’s lack of indigenes does not, therefore, render Antarctic colonies any less colonial; rather, it signals a defining and a unique aspect of Antarctic colonial spatialities.... Antarctic stations are colonial spatialities of territorial control, science, and possession, but not of dispossession. What we are looking at are unique, contemporary forms of modern colonial spatiality.⁴⁰

Many of these assumptions and themes seem to resonate with the Joint Arctic Weather Stations story — perhaps even calling into question the inherent “Antarctic exceptionalism” implicit in most scholarship on polar colonialism and scientific practice. This Arctic case study might also be framed as a work of critical geopolitics, not simply seeing space “as a neutral, universally legible entity over which various states struggle” but, as Klaus Dodds tells us, as a “contest to give spaces specific meaning.”⁴¹ While there are elements of a “contest” in parts of the story that follows, our research suggests that complementary rather than competing spatialities also explain the enduring collaboration between Canada and the US in the JAWS program.

Overview of the Book

Chapter 1 provides a broad historical overview to introduce readers to the phases of exploration in what became Canada's High Arctic, the evolving science of meteorology, and the emergence of the Arctic as a strategic frontier. The applications of reliable weather knowledge grew with the development of aviation, advances in communication technology, and the extension of observing networks (both surface and upper air) into more remote regions. The Second World War brought to the fore the need for longer-range and more accurate weather forecasts, drawing upon past weather data as well as the daily collection and evaluation of surface and upper air weather observations from around the globe — including the High Arctic. The war also led to the formalization of the Canada-United States military partnership, while arousing concerns in Canadian circles about the implications of American continental defence agendas for Canadian sovereignty.

Early negotiations embodied Canada's postwar anxieties of dealing with a superpower interested in the northern approaches to North America. Chapter 2 reexamines the place of JAWS within the bilateral negotiations immediately following the end of the Second World War. The received version of the origins of JAWS is that this was an American continental defence program foisted upon the Canadians, who eventually acquiesced and placed what was essentially a military program under "civilian cover."⁴² Charles Hubbard, the primary promoter of the Arctic weather station program, has been portrayed as "an ambitious, self-confident engineer and polar explorer seeking a new postwar role" who "lacked an appreciation of smaller states' sovereignty, which was vital to understanding ... Canada's desire to control its Arctic territory."⁴³ Our reassessment reveals a different understanding of Hubbard and his vision. The USWB conceived the JAWS program as a component of a postwar effort to gather sufficient meteorological observations for producing accurate long-term continental weather forecasts. The same forecasts were, naturally, also of interest to the American military after the Second World War as both superpowers increasingly looked to the Arctic as a potential future theatre of war. Hubbard and the USWB recognized that the emerging continental security concerns were a window of opportunity to secure military support for several programs — including JAWS. This strategy backfired, at least

temporarily. While it helped the USWB to secure funding from Congress for the stations, the strategy also subsumed the civil stations within broader American-Canadian continental defence talks. Canada, trying to fit the weather stations into its broader science, sovereignty, and security considerations, mistook American pressures that were informed by budgetary, security, and logistical imperatives: it worried that the weather stations were a prelude to much larger military projects in its Arctic. Prime Minister William Lyon Mackenzie King and his cabinet colleagues insisted on treating the joint weather station proposal as a defence project among several others. It is ironic that Canadian politicians, however anxious to promote the civilian side of JAWS in public messaging, did not fully grasp its civilian nature in private. The USWB and the Canadian DoT, however, envisioned the program as a civilian enterprise supported logistically by the armed services, with sweeping civil and military benefits. By securitizing and politicizing what the Americans saw as a primarily civilian endeavour, the Canadians delayed the implementation of the JAWS program.

On 4 March 1947, cabinet minister C.D. Howe publicly announced that the Canadian government planned to establish nine Arctic weather stations in three years “with the assistance of the USWB.” This spin on bilateral plans was misleading. Although JAWS was a “joint” program, and the Canadian and American meteorological departments would each supply half of the personnel to operate each station, the US military shouldered nearly all of the responsibility for building and supplying the weather stations at the onset. At the time, Canada lacked the resources to contribute meaningfully to this work, and instead satisfied itself with assembling teams of observers from interested government departments who reported on the best techniques and technologies for the coming expansion of Canada’s Arctic infrastructure.

Paper plans and aspirations were one thing. Implementing the program in the High Arctic was another. Chapters 3 and 4 examine developments during the construction of the stations and their initial operation (1947 to 1950). The planning, establishment, and operation of the first stations fell to Hubbard’s oversight, as director of the USWB’s Arctic Operations Project, and to D.C. Archibald of the Meteorological Branch of Canada’s Department of Transport. In April 1947, men and equipment were airlifted from Thule to Slidre Fiord on southwestern Ellesmere Island

to build a satellite station (Eureka). That year, as chapter 3 recounts, heavy ice foiled summer plans to establish the main station at Winter Harbour on Melville Island, and American Naval Task Force 68 had to satisfice with a more accessible site at Resolute Bay on Cornwallis Island.

Resolute became the main and largest station, serving as a hub for the construction and resupply of outlying satellite stations as well as collecting and relaying to the south weather information that it received from the other stations. Chapter 4 charts the establishment of three additional satellite stations at Mould Bay on Prince Patrick Island, Isachsen on Ellef Ringnes Island, and Alert on Ellesmere Island, as well as resupply operations from 1948–50. Despite minor oversights, missteps, and miscommunications on both sides that resurrected high-level concerns about sovereignty, officials derived important lessons from these naval and air missions and applied these learnings to subsequent resupply activities, setting the course for smooth operational relationships. Although Hubbard lost his life in the crash of a Royal Canadian Air Force (RCAF) Lancaster on 31 July 1950, his general vision for JAWS became a reality.

The funding to construct the five additional stations initially envisaged did not materialize after 1950. Instead, the JAWS network shifted to a purely operational phase. Consistency, sustainability, and the facilitation of further scientific research on the archipelago, punctuated by occasional technological or capacity improvements, propelled the program forward. Because a chronological narrative of the five stations would be repetitive and redundant, the remainder of the book adopts thematic lenses to characterize the diverse experiences of JAWS personnel and their scientific practices, explain the successes of the program, and situate its achievements in broader contexts.

The joint nature of the program required each country to provide half of every station's personnel. Chapter 5 examines which staff/workers/technicians the stations needed to operate effectively and the motivations and networks that led volunteers to answer the call. In so doing, it reveals a shift from an initial reliance on heroic-era approaches⁴⁴ to more modern advertisement- and departmental-based recruiting initiatives. We explain why Canadians and Americans volunteered to work at these northern outposts, and the qualities and skillsets that the USWB and DoT sought and cultivated to fill specific positions within the stations. Different

understandings about the Arctic and Antarctica explain why DoT and the USWB provided less elaborate training regimes than those offered to personnel bound for Antarctica. In so doing, the chapter establishes the groundwork for subsequent analysis of how the backgrounds of personnel shaped station operations and cultures.

Recent research on the history of field research and scientific cultures has benefitted from attempts to situate scientific inquiry in specific places. While laboratories are designed to be “placeless” settings where scientists can control environmental variables that would otherwise corrupt the results of experiments,⁴⁵ field scientists are exposed to the elements and cannot control or compensate for all environmental conditions. Along these lines, chapter 6 examines the stations as scientific places, showing why and how meteorological technicians and other station personnel fought to maintain their extensive observation regime under all weather conditions. Although most scholarly studies of field science focus on university-trained scientists, our work considers the place and culture of technicians in accumulating field science data.⁴⁶ Unlike visiting scientists who often came to the stations aspiring to explain environmental phenomena by performing experiments designed to overcome the elements, JAWS personnel expected to collect their scientific observations by applying southern ideals and improvising locally-developed adaptations in light of local conditions and exigencies that complicated or disrupted standard practices.⁴⁷ As “a domus of a very particular kind,” historians Wenzel Geissler and Ann Kelly note, isolated field stations produce “zones of shared living between humans and landscape, ... triggering new and unpredictable forms of contact between humans and their surroundings” that speak “to a mode of domestication that is premised not on control but cohabitation.”⁴⁸ Through adaptation and persistence, JAWS personnel established bastions of scientific culture in the Canadian High Arctic where meteorological observations — the program’s *raison d’être* — shaped the daily rhythm of work and play.

Most of the stations also hosted small posts to gather ionospheric, seismic, or other observations. Given their locations, they also facilitated access to Arctic “wilderness,” thus serving as “bridgeheads into the unknown” for visiting scientists,⁴⁹ including those from the Polar Continental Shelf Project (PCSP). Chapter 6 explores how transient scientists taxed

station resources and led JAWS personnel to differentiate themselves from their guests, while also welcoming the companionship of scientists who offered relief from routines and new voices to engage.

Despite the high modernist aspirations of the programme's founders to mobilize technology to overcome Arctic environments, environmental realities ultimately constrained activities at and around the stations. Radically different in character and duration from temperate areas, the seasons in the High Arctic fundamentally influence the lives of humans in the region. Although there has been extensive research on how Indigenous peoples followed (and continue to follow) seasonal cycles, polar scholars seldom interrogate the pervasive impact that seasonal changes had on station activities and typically confine their discussions to winter and work seasons. In the process, spring and fall are often amalgamated into a busy summer season of activity when southern construction crews and scientists buzz around the stations. Consequently, the ways that all four seasons shaped construction, hobbies, resupply, and other aspects of station life remain underappreciated.

By observing a full cycle of routine annual activities, chapter 7 presents a more fulsome picture of the wide range of actions associated with life at JAWS stations and how these were shaped by environmental realities. Seasonal conditions determined patterns of resupply, for example, with the winter and shoulder seasons imposing physical limits on when ships and aircraft could reach the stations. The number of visiting scientists and other visitors peaked during summer, creating a bustle not seen during the rest of the year. The performance of essential tasks, from waste disposal practices to water collection, reflected the seasonal cycle. Even construction, a task often associated with summer, had to be differentiated and timed to coincide with optimal environmental conditions during the spring, summer, and fall.

This chapter also differentiates between the hub station and its satellites, reinforcing the importance of specific places and the danger of over-homogenizing the JAWS experience. Resolute boasted the most developed airport and the most extensive suite of communications equipment, which afforded personnel stationed there a degree of connectivity to the south that was unavailable at the other stations. Furthermore, Resolute and Eureka were resupplied via sealift and airlift while the remaining

stations continued to be resupplied by air. Landing and communications facilities at Resolute also led other federal departments to construct their own hub facilities, which created infrastructure that contrasted dramatically with the comparatively “remote” satellite stations. Aside from the occasional addition of a few scientists, the satellite stations lacked this broader community atmosphere, and they consequently developed distinct cultures. Furthermore, Resolute was the only station with a neighbouring Inuit community after the High Arctic relocations began in 1953 — although this had surprisingly little impact on the JAWS program.

After examining the types of individuals who ran the weather stations, their work, and seasonal adaptations, we investigate how Canadian and American personnel coped on a daily basis in these isolated and confined stations — and with each other. Men seeking to escape from irritating co-workers could only walk a few kilometres from camp (and then return), take up a hobby, or go to another room. While isolation and confinement were more intense at the satellite stations than at Resolute, our research indicates that nearly all personnel struggled against these stresses, exhibiting tell-tale symptoms including fatigue, anger, sadness, and even depression. Social scientists have studied these symptoms among Antarctic personnel and contend that leaders cannot rely on military-style regimentation and discipline to manage struggling personnel.⁵⁰ Therefore, chapter 8 leverages wider polar research to frame and analyze the strategies that JAWS personnel adopted to live and work together. By exploring pastimes, diets, hobbies, gender, sexuality, and leadership, this chapter explains how the vast majority of personnel cohabited these remote and confined outposts with few altercations. By investigating stress management techniques and command structures, this chapter also demonstrates that the stations reflected a thoroughly *civilian* character, thus belying suggestions that the stations were a “civilian cover” for American military goals. The evidence also reveals that close cooperation between Canadian and American leaders at the stations and in stakeholder departments was predicated on mutual respect and ensured that sovereignty concerns did not impede the effective functioning of these scientific outposts.

In hindsight, it is surprising that many politicians and senior bureaucrats in Ottawa (obviously not attuned to the successful working relationship forged by American and Canadian JAWS personnel on the ground)

remained suspicious of the American presence at the joint stations and its concomitant implications for Canadian Arctic sovereignty. During the 1950s, government officials contemplated “Canadianizing” the logistical support and personnel associated with the JAWS project. Chapter 9 highlights the varied perspectives that informed these debates and analyzes when and why political pressures for Canada to assume responsibility for American contributions succeeded or failed. In the end, the United States did not withdraw from the JAWS program until the early 1970s with the final flag lowering ceremony at Resolute in 1972. Since that time, historians, commentators, and several former JAWS personnel assumed that Canada terminated American involvement in response to the Canadian nationalist reaction to the voyages of the SS *Manhattan* oil tanker through the Northwest Passage in 1969–70. This chapter proves that USWB budget constraints, rather than Canadian sovereignty concerns or pressures, led the Americans to withdraw from what they considered to be a highly successful joint program.

For Poindexter, Demond, and Gilbert, playing their respective roles at the Eureka station in January 1958, all of this future remained unknown. Instead, their preoccupations were intensely local: trekking out into the cold to complete their daily routines, encoding and transmitting their observations south, keeping their station in top condition, and busying themselves with hobbies to relieve the emotional weight of isolation and confinement. Their interactions with the environment generally required adapting to local conditions rather than trying to conquer the environment. Most JAWS personnel gleaned these insights from reading about Inuit lifeways and past Arctic explorers. Their very presence in a remote outpost in the High Arctic was enabled by more than a century of exploration that had slowly revealed the outlines of the archipelago extending from the North American mainland into the Arctic Ocean. It was also spurred by advances in the science of meteorology, tightening Canada-US relations during the Second World War, and a perceived urgency to gather Arctic weather data to serve the postwar world. In this distant place, just 1,100 km south of the North Pole, JAWS personnel were not only collecting valuable information on the Arctic environment — they were also being shaped by it.

Background: The Long Build-Up

The science of meteorology, particularly that phase dealing with weather prediction, has been advanced only as communications facilities have permitted the rapid collection of simultaneous weather observations from larger and larger portions of the earth's surface and upper atmosphere.

Irving Krick (1945)¹

Far to the north of our country lies an archipelago of gigantic islands comprising an area half as large as the United States, separated from continental America by wide bays and narrow straits, bounded on the east by Baffin Bay and the adjacent shores of Greenland and on the north by the Arctic Ocean. A century ago the famous Franklin expedition was lost in the heart of that vast archipelago, and in subsequent decades many explorers went in search of survivors or vestiges that would tell of their fate. Consequently the archipelago is remarkably well mapped for so large and inaccessible a region, but still its intricate coastlines are so extensive and so remote that their geography is but crudely delineated, while the interior is largely unknown. This great land of islands might have been of vital importance in World War II; it may yet be a key to the prevention of World War III.

Alexander Forbes (1953)²

Today, Inuit Nunangat — the Inuit homeland in Arctic Canada — encompasses the entirety of Canada’s Queen Elizabeth Islands. The historical record (both oral and archaeological) of human habitation, however, reveals that the human presence in the High Arctic region reflected a process of expansion and contraction in response to changing climatic conditions. Anthropologist George Wenzel has consolidated data from palaeoclimatology, physical oceanography, biology, and archaeology to characterize how two major past climatic shifts — the Neo-Atlantic Period (also known as the Medieval Warm Period), ca. 1000–1300 CE, and the Neo-Boreal Period (or Little Ice Age), which lasted from ca. 1550 to 1850 — influenced Inuit material subsistence and cultural adaptation. During the Neo-Atlantic Period, warming temperatures across the North American Arctic reduced annual sea ice coverage and produced prolonged periods of open water during the summer. Thule people (ancestors of modern Inuit), with centuries of whale-hunting expertise, spread eastward more than 8,000 km from what is now Alaska to the Canadian High Arctic and Greenland to pursue bowhead whales and other migratory marine mammals that entered newly-accessible High Arctic waters. The Thule rapidly displaced the people who Inuit remember as Tuniit and who archaeologists refer to as the late Palaeo-Eskimo or Dorset culture, which had occupied most of the Canadian North and Greenland for nearly 2,000 years. This dramatic human migration brought technological adaptations such as the bow and arrow, dog sled, *umiaq* (whaling boat), *qayaq*, and semi-subterranean whalebone and boulder dwellings to the High Arctic islands.³

The significant cooling of the High Arctic during the Little Ice Age ultimately forced Inuit to withdraw from the northernmost islands in the North American Arctic Archipelago. As the length of ice-free waters in summer shrank and bowhead whales ceased travelling to the High Arctic, Inuit lost access to large supplies of food, fuel, housing, and sled materials. Smaller, extended family encampments living in tents and snowhouses (“igloos”) replaced larger Thule villages as Inuit became less sedentary. By 1600, Inuit had abandoned the High Arctic islands in pursuit of seasonally-available smaller game (primarily caribou in summer, ringed seals at their breathing holes in winter, and Arctic char in the spring and autumn) as well as walrus, beluga whales, and narwhal in more southern regions with less severe climatic conditions. Thus, when European

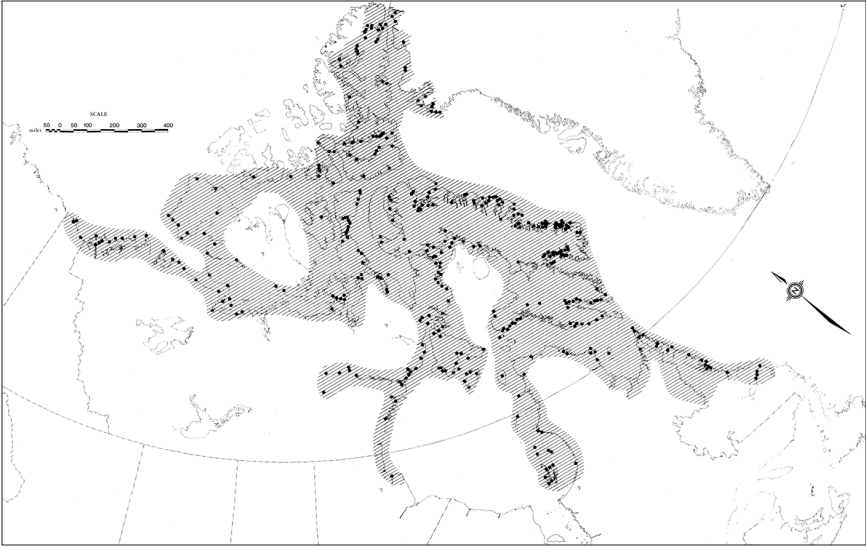


FIGURE 1-1. Thule site locations and presumptive land use. Based on the *Report of the Inuit Land Use and Occupancy Project*, vol.1 (1976). Jennifer Arthur-Lackenbauer based on Inuit Land Use and Occupancy Project (Queen’s Printer, 1976).

explorers seeking the Northwest Passage ventured into the northern North American Arctic from the seventeenth century onwards, they met Inuit in Greenland but not in the archipelago north of Lancaster Sound, Parry Channel, and M’Clure Strait. Indigenous peoples’ climate-related adjustments had led them to migrate southward, leaving the High Arctic islands uninhabited except for periodic hunting trips undertaken by Inughuit across Davis Strait and Inuit from the southern Arctic islands.⁴

European polar explorers were drawn to the “New World” Arctic in the sixteenth century not to exploit its riches but to pass through it as a commercial route to elsewhere. Their search for a Northwest Passage to the Orient treated the Arctic not as a *place* of inherent value but as a transient *space* — an obstacle to be circumvented. Nevertheless, their voyages opened up a new frontier to the mental maps of Europe. In 1576, Sir Martin Frobisher sailed across the southern end of Davis Strait and “discovered” the bay on western Baffin Island that bears his name. John Davis pushed further north eleven years later, reaching about 73°N before

returning south and mapping his namesake strait that would lead his successors into the islands of the archipelago. Over the next century, most British efforts to find a Northwest Passage concentrated further south in Hudson Bay. Nonetheless, the 1616 expedition led by Robert Bylot and William Baffin sailed as far north as 78°N, exploring and naming Smith, Jones, and Lancaster Sounds, and completing the delineation of Baffin Bay's shoreline.⁵

The early history of meteorological observations in the North American Arctic closely parallels this history of exploration. When Europeans encountered what they perceived to be a "hostile environment," they noted the severe weather and ice conditions with which they contended. The pantheon of explorers from Frobisher onward contributed to the early meteorological knowledge of the Arctic, recording weather observations at brief intervals depending upon the route they took and the duration of their stay. These observations not only added to heroic depictions of their voyages, they also slowly contributed to understandings of the Arctic climate, mainly of the archipelagic waters and the coasts and inlets of the islands themselves.⁶

In the broader Canadian context, these expeditionary narratives were supplemented by those produced in fixed locations. In French and British North America, garrison soldiers, traders, and missionaries noted the weather in diaries, letters, and official reports. "The first Europeans who came to Canada, whether to explore and conquer, to teach and Christianize, or to trade and settle, learned the meteorology and climatology of Canada by hard experience," summarized Morley Thomas, the foremost historian of Canadian meteorology. Borrowing from Indigenous knowledge, immigrants to northern North America adapted their diet, clothing, buildings, customs, and habits to the new climate.⁷

This was particularly true of the Hudson's Bay Company (HBC). The Company's 1670 charter included a provision to search for a Northwest Passage, but its practical focus on the subarctic fur trade meant that such forays were half-hearted (and even counterproductive to its corporate strategy). For more than a century, none of the HBC personnel ventured into the Arctic Archipelago, an area that lay beyond their vision of a transcontinental commercial empire; however, the establishment of permanent posts and forts along Hudson and James Bays produced some of the first

systematic weather data from the North American Arctic. During the eighteenth century, personnel based at these remote outposts of the Empire compiled meteorological registers that contributed more to longitudinal climate study than the fragmentary records produced by European explorers to that time. “When obtainable,” Thomas noted, “these data were doubtless of value to others planning expeditions and forays into a generally unknown country.”⁸

With the dawn of the nineteenth century came a new wave of British exploration in the North American Arctic. After the Royal Navy prevailed at the great naval battle of Trafalgar in 1805, thus securing supremacy over sea lanes of communication, it sought new ways to expend its energies after 1815. Charting a navigable Northwest Passage would increase British power and world commerce, as well as serving several additional purposes. Historian Hugh Wallace summarized:

National prestige would be served if Great Britain completed the quest, and harmed if some other nation did so. Russia was already a competitor in the Arctic and the United States might be increasingly so. Naval service amidst arctic snows would be good for the national character. It would also give a new officer class an avenue to promotion. And there was also widening geographic and scientific interest.⁹

Whalers’ reports fed a hypothesis that the ice barrier in the Arctic was shrinking, which dovetailed with Admiralty interests. It entrusted John Ross with an 1818 deep sea expedition to sail around the extreme north-eastern coast of America to Bering Strait, noting the currents, tides, and state of ice and magnetism, and collecting specimens relating to the natural sciences. The purpose was no longer discovery in itself, but systematic surveying and knowledge building as well.¹⁰

Explorers revealed the path through the Arctic islands in haltering fashion. Commander John Ross’s controversial 1818 voyage rediscovered Jones and Lancaster Sounds but did not examine them, owing to Ross’s mistaken declaration that they were inlets enclosed by mountains. Lieutenant William Parry’s subsequent voyage, which reached farther west than any other expedition originating in the Atlantic during that century,

considerably extended geographical knowledge of what would later be named the southern group of the Queen Elizabeth Islands. In mid-May 1819, he pressed through the pack ice of Baffin Bay and landed on Bylot Island. “Sir James Lancaster’s Sound was now open to the westward of us,” he noted, “and the experience of our former voyage had given us reason to believe that the best two months in the year for the navigation of these seas were yet to come.”¹¹ After tracing the southern coast of Devon Island, the *Hecla* and the *Griper* rounded Beechey Island, noted Wellington Channel to the north, and proceeded westward into Barrow Strait. On September 6, Parry crossed the 110th meridian (an achievement that secured his crew a reward of five thousand pounds from British parliament) and continued to make slow progress along the coast of Melville Island before stopping at 112°51W. Given “the incredible rapidity with which the young ice formed,” Parry turned back to settle in at Winter Harbour for the frozen season. From this hub, Parry led a small party on a two-week exploration of the island the following spring.¹²

Parry’s expedition was exploratory and scientific, with the Admiralty placing a higher priority on the latter than previously. Through the winter of 1819–20, the officers and crew made detailed magnetic and meteorological observations. These activities tested the limits of their instruments — and their bodies. On 29 November, for example, the mercury used in the artificial horizon froze into a solid mass at -36°F (-38°C) after four hours’ exposure in open air.¹³ During their stay, crew members recorded air temperatures every two hours, discovering that the amplitude of the diurnal (daily) variation in temperature was barely perceptible in January and largest in April.¹⁴ That month, Captain Edward Sabine, Parry’s science officer, tested the effects of solar radiation by suspending an exact pair of mercurial thermometers with unprotected bulbs on a line, one exposed to the sun and the other in shade, six or eight inches above the snow at about noon. Conducting science of this sort required accepting the rigours of the northern environment. The wind posed the biggest challenge. Even during “the most intense degree of cold marked by the spirit thermometer during our stay in Winter Harbour, not the slightest inconvenience was suffered from exposure to the open air, by a person well clothed, as long as the weather was perfectly calm,” Parry noted. When people walked into even the lightest wind, however, “a smarting

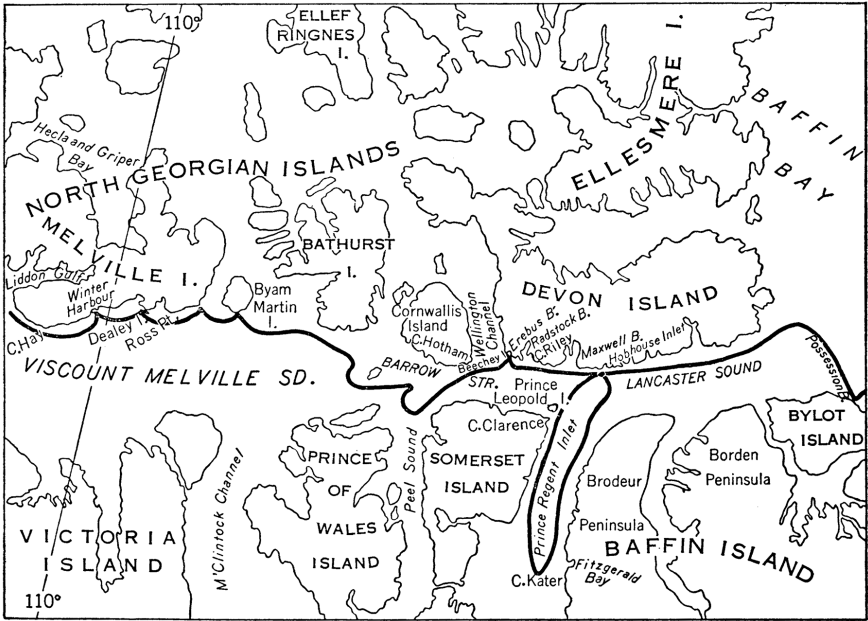


FIGURE 1-2. High Arctic voyages of Lieut. W.E. Parry, Royal Navy, 1819–20. Andrew Taylor, *The Queen Elizabeth Islands* (Queen’s Printer, 1955).

sensation was experienced all over the face, accompanied by a pain in the middle of the forehead, which soon became rather severe.”¹⁵

On August 1 the following year, Parry’s ships weighed anchor and tried to push west and finish the previous year’s attempt at the Passage. Stymied by heavy ice, he conceded by August 10 that “there was something peculiar about the southwest extremity of Melville Island, which made the icy sea there extremely unfavourable to navigation, and which seemed likely to bid defiance to all our efforts to proceed much further to the westward in this parallel of latitude.” His expedition made it as far as 113°48W before returning eastward toward England. During his voyage, he had explored and named Devon, Cornwallis, Bathurst, Byam Martin, and Melville Islands. Parry’s first voyage, which proved him to be the leading ice navigator of his generation, “was the apex of his accomplishments in the Arctic Archipelago,” polar expert Andrew Taylor concluded. “He had penetrated westward into the unknown region a distance of 630 miles

to M'Clure Strait, and had carried out surveys along the great sounds as to create a geodetic network upon which all subsequent discoveries in the region were based. Sailing west through more than 30 degrees of longitude, Parry had made the Northwest Passage a more tantalizing goal than it ever had been before." The explorer's recommendation that future expeditions should concentrate on routes in lower latitudes, along the continental coastline where possible, "set the pattern of marine exploration for the Canadian Arctic for the next quarter century."¹⁶ Parry's later voyages contributed less to the map of the Arctic but continued to add meteorological knowledge. For example, he and Rev. George Fisher recorded the first known upper-air observations in the Canadian Arctic in 1822–23.¹⁷

By mid-century, the principal arguments for further Arctic exploration were scientific rather than political or military. An Arctic sea route to Asia remained commercially unappealing given the existing state of icebreaking technology (although whaling in Arctic waters would soon attract American and British ships), but naval officers could make meaningful contributions to astronomical and geophysical sciences. The *Admiralty Manual of Scientific Enquiry* highlighted the importance of keeping a detailed and systematic "meteorological register," noting the readings of weather instruments at regular hours throughout the day as well as "occasional and remarkable phenomena." This register, "steadily and perseveringly kept throughout the whole of every voyage," supported "the development of the great laws of this science." The navy was well suited for this work. Historian Trevor Levere explained that:

What did matter, apart from the disciplined cooperation of the observers, was a good set of instruments, and the knowledge of how to use them. The instruments included a good barometer, appropriately suspended, with an attached thermometer; a delicate and precise reference thermometer, against which to check other thermometers, among them a self-registering thermometer (e.g. Six's), and a thermometer for solar radiation, having its bulb blackened with India ink; hygrometers, of which the best and sturdiest type used two thermometers, one with a dry bulb, the other being wet; a rain

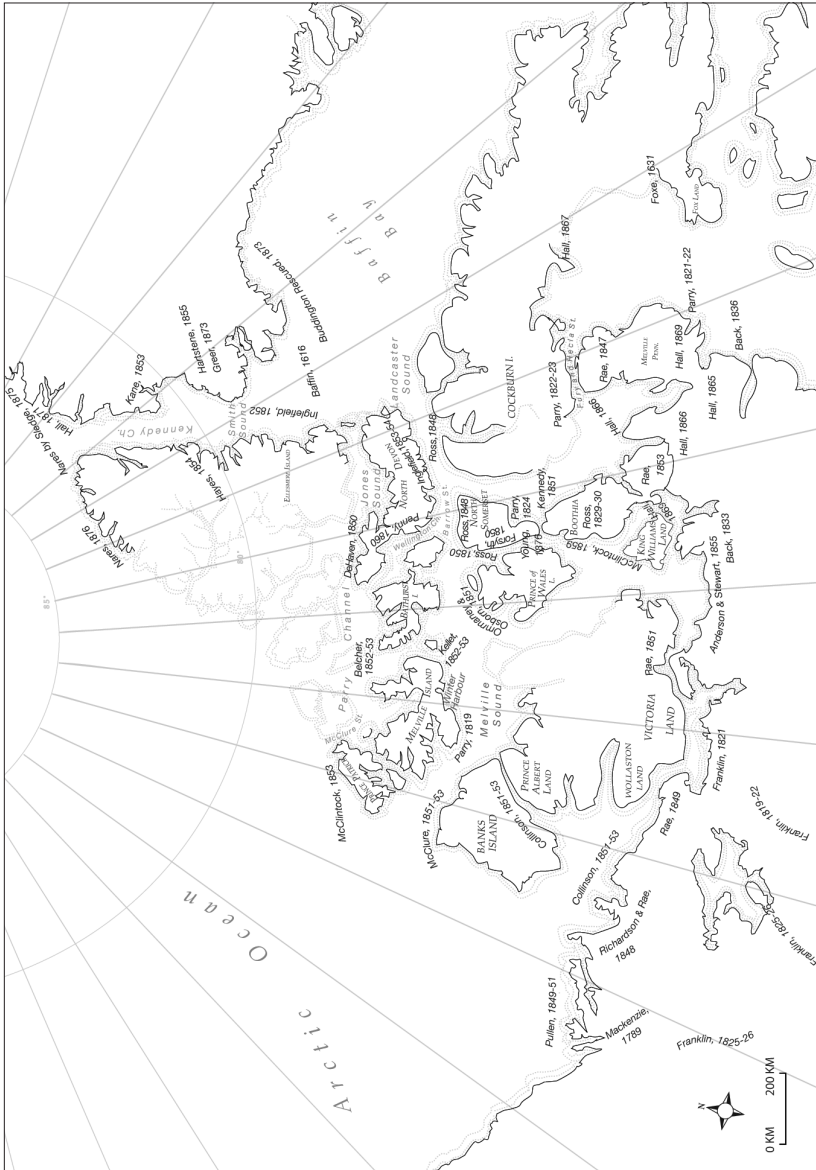
gauge; an anemometer ... and actinometers, for occasional use to measure solar radiation.

Arctic navigators and explorers faithfully recorded this data during their expeditions. Although inadequate to predict weather, these observations fit with “the quintessentially Humboldtian character of meteorology, its conformity to early Victorian norms of Baconian science, and its ready involvement of the disciplined amateur.”¹⁸

Sir John Franklin’s ill-fated attempt to conquer the Northwest Passage in 1845, and the subsequent searches to determine what happened to an expedition that seemed to vanish from the face of the Earth, unveiled much more of the North American Arctic map. Historian William Morrison questions why Franklin and his crew mounted an expedition that sought to conquer the Arctic environment rather than adapt to it. “The ships carried all sorts of modern amenities: a library, fine china for the officers, steam radiators, and so forth,” he highlights. “What the crew lacked, however, were the means of survival that the Inuit had developed: they had no skin clothing, no sleds, no dogs, and they had no Native people with them to hunt seals and other animals.”¹⁹ In his brilliant study of British exploration during the mid-nineteenth century, Hugh Wallace observed:

as exploration had advanced towards the centre of the North American Arctic it had been thrown out of focus. Normally, discovery vessels were not only a means of finding new lands but were also surveyors’ platforms and scientific laboratories. Now, however, ice and the archipelago in the central Arctic had forced a separation of these two elements, placing marine discovery and marine surveying in conflict. The navy had ignored the possibility that the prompt and realistic way to find a passage might be to send to the Arctic a scouting party by land or small vessels to test and sail it. Instead, the Franklin expedition had gone into the Arctic in the manner of hydrographers, land surveyors, military map readers, or even settlers, not of discoverers — and the results had matched the method. The party had surveyed a Northwest Passage, not discovered it; they had seen it, but

FIGURE 1-3. Exploration in the North American High Arctic to 1880. Note that many of the Queen Elizabeth Islands remained uncharted. Jennifer Arthur-Lackenbauer



not reported it — so news had not been conveyed to London. Indeed, now it was necessary both to find the discoverers and also, so far as possible, what it was that they had found.²⁰

The search expeditions criss-crossed the waters at the heart of the archipelago by ship and sledge, filling in much of the Arctic map. For example, when Captain Henry Kellett's ships settled in for winter quarters at Dealy Island, at the entrance to Bridport Inlet (after ice blocked their access to Winter Harbour in August 1852), they used this as a base for spring journeys by sledge. Captain Francis Leopold M'Clintock's epic 105-day, 1,408-mile trip in April 1853 traversed Melville Island and led him to Prince Patrick Island where his party gorged on muskox, covering 768 miles of previously undiscovered coastline.²¹ HBC factor Dr. John Rae, during his lengthy journeys along the mainland coast from 1845–54, recorded observations of temperature, air pressure, wind, weather, cloud cover, ice thickness, and solar radiation at hourly (or other consistent) intervals for eight months to twenty-seven months at a time.²² This accumulation of scientific knowledge left a lasting legacy, and the expeditions searching for Franklin ultimately uncovered half of the Canadian Arctic and three Northwest Passages.²³

The Franklin search also internationalized activities in the North American Arctic. Americans turned their primary focus to the path to the North Pole. Dr. Elisha Kent Kane's 1853–55 expedition, sponsored by the US Navy, sought the answer to Franklin's fate by pushing northward to the "open sea" along the west coast of Greenland, pressing deep into Kennedy Channel before ice and scurvy forced their retreat. Dr. Isaac Hayes sought "to complete the survey of the north coasts of Greenland and Grinnell Land" in 1860–61, crossing the Greenland ice cap before working his way up the Ellesmere Island coast to Lady Franklin Bay (81°35N at his calculation), the "most northern land that has ever been reached."²⁴ After the British, exhausted by the Franklin search, ceased their Arctic exploration efforts, American Captain Charles Francis Hall sailed north from Washington on the reconditioned steam-tug *Polaris*, reaching 82°11N at the northern entrance to Robeson Channel in 1871.²⁵ The quest for the North Pole would continue to entice Americans to the

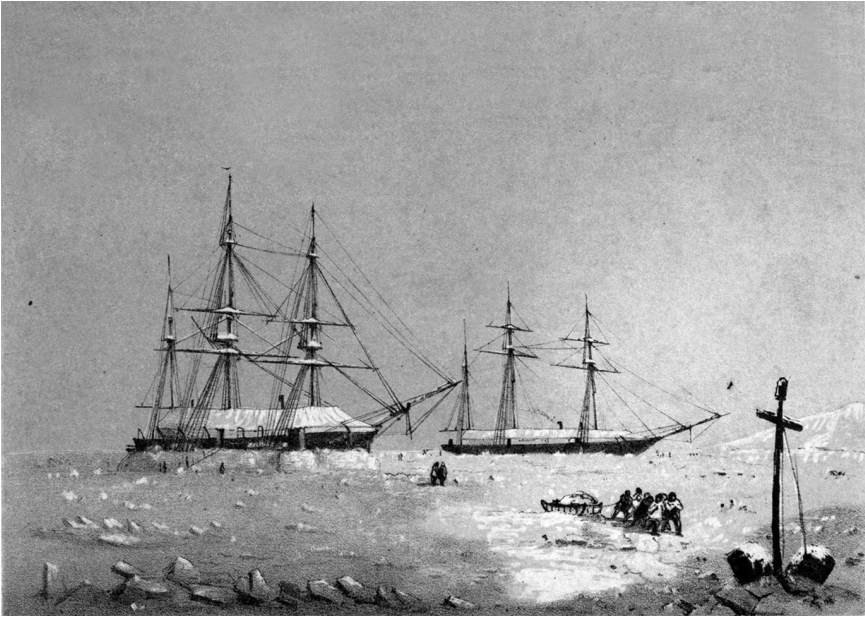


FIGURE 1-4. HMS *Resolute* and *Intrepid* in winter quarters, Melville Island, 1852. National Maritime Museum, Greenwich, London.

northernmost reaches of North America through the turn of the century, seeking prestige and, by extension, clarifying cartographic and scientific understandings of the continent.

Meteorology as Science in Nineteenth-Century North America

The development of meteorology as a science went hand-in-hand with instruments capable of numerically describing elements of the weather that emerged during the scientific revolution of the seventeenth century. Although people had determined wind direction and recorded precipitation for centuries, the thermometer, barometer, hygrometer, as well as wind speed and direction indicators were essential tools to collect data and bring scientific respectability to the field. Technological innovations, such as the visual and electromagnetic telegraphs of the nineteenth century, eventually facilitated the transmission of synoptic data from dispersed collection points to a centralized bureau where it could be collated

to predict storms. This played an important role in the development of meteorological theory and synoptic weather charts. By the late nineteenth century, scientists used kites, balloons, and eventually “balloonsondes” (small coal-gas-fired balloons carrying self-registering thermometers and barometers) to gather upper altitude data on a more frequent basis. Meteorologists recognized moving air masses as carriers of local weather, with information about wind speed and direction, pressure, temperature, and humidity used for weather forecasting elsewhere. Nevertheless, meteorology failed to produce the mathematical precision and predictability of “exact sciences,” and “farmers continued to have more confidence in the Farmer’s Almanac.”²⁶

Along with its territorial expansion, the United States produced more formal networks and systems for collecting weather data. During the colonial era, individual, isolated diarists kept local weather and climate records. This changed as scientific societies, college professors, and federal officials recognized the value in systematically collecting statistics from across their expanding country. The General Land Office began amassing precipitation and temperature records at local offices across the country in 1817, and military posts began recording observations two years later. In 1841, the Patent Office organized volunteer “weather correspondents” to pass along systematic observations. A typical observer, armed with a thermometer, wind vane, and rain gauge recorded surface weather conditions and reported them by mail at the end of each month. This system did not provide current weather data, but it did facilitate retrospective inquiries into storm patterns and the development of theories about atmospheric dynamics. The Smithsonian Institution, created in 1846, began collecting telegraphic reports of simultaneous observations using standardized forms and schedules in 1857; it supplied calibrated instruments to some observers, and its first secretary, science professor Joseph Henry, used this system to prepare weather maps and forecasts. This service continued until the outbreak of the Civil War, which interrupted the system for a decade.²⁷

A similar (but more modest) shift towards systematic observations occurred in Southern Canada in the nineteenth century. Various observers gathered and cited weather data to encourage emigration from Europe and stimulate agricultural development on the Canadian frontier. The Toronto Magnetic and Meteorological Observatory, the first official weather station,

began taking terrestrial magnetism and weather observations in the early winter of 1839–40. In 1853, the observational program passed from the British Ordnance Department to the Province of Canada, which in turn delegated responsibility to the University of Toronto. Private observing stations (including at senior county grammar schools across Upper Canada) built up the climatological record in British North America. The central collection of data began in 1863 when the Toronto observatory collected the first outside climatological report and thus began ongoing data collection, processing, and archiving work. Soon after Confederation, George Templeman Kingston, the first Professor of Meteorology and Director of the Toronto observatory, noted that there were few meteorological observers in the new country, “there was no true description of the climatology of the country and the existing agencies were inadequate to remedy the situation.”²⁸ He promoted a broader “Canadian contingent” of weather observers that could make a more robust contribution to the “common intellectual property” about meteorology — a burden placed on each country “according to the opportunities afforded by its geographical position and physical peculiarities.”²⁹

The United States had its geographical and physical peculiarities, as well as its internal political ones. The bitter Civil War experience transformed the country into “a shaped and disciplined nation,” aware of the need for a culture of organization, planning, and control through national networks. These ideals influenced its evolving approach to meteorology. Early in 1870, Congress turned to the US Army Signal Service, which had created an extensive communications network during the war, to operate a national storm warning and telegraphic weather service.³⁰ The service soon grew beyond simply issuing storm warnings to assist navigation to meeting public demands for climatological data, weather forecasting to support commerce and agriculture, and the dissemination of current weather information. Military and commercial telegraph networks linked the weather service to Washington, D.C., binding the country together, while connecting it to the rest of the world.³¹

The development of these transcontinental networks had transnational effects. Morley Thomas observed that these American developments pushed the Canadian government to action. In 1871, the cabinet authorized the creation of the Meteorological Service of Canada under

the direction of the Department of Marine and Fisheries to maintain a network of observation stations and to issue storm warnings. Lacking trained scientists and sufficient funding, the Canadian weather service did not prepare weather forecasts in its early years. Professor Kingston hoped to amass observational data from stations or observatories in Montreal, Quebec City, Saint John, and Halifax for at least five years before publishing forecasts. This contrasted with the situation south of the border, where the US weather service established an operational forecasting system immediately. Accordingly, Kingston arranged for synoptic weather observations in southern Ontario, and forwarded these telegraphic reports to Washington beginning in 1872. In return, he received daily data from American stations as well as the US Signal Service's predictions of storm warnings for Canada, which he then relayed to cities and ports. Thus began the continuous, daily exchange of weather data between Canada and the United States.³²

While weather patterns (and meteorology) transcended the national border, Canadian nationalists used climatology and other natural sciences to bolster arguments for northwestern expansion. "Victorian science, in particular, transformed British North Americans' vision of the land they inhabited," historian Suzanne Zeller notes. "It broadened their horizons and emboldened their expectations, breeding confidence in the potential future of a transcontinental nation designed to emulate the rapid industrial and material progress of Great Britain and the United States."³³ Meteorology contributed to a growing sense of Canadian manifest destiny, helping to "create the intellectual climate which made such ideas appear sensible and perhaps even inevitable," and tied settlers into a scientific network with Canada at the core.³⁴ In 1876 and 1877, the Canadian service issued its first storm warning and general forecast. The Toronto hub telegraphed daily probabilities to large cities and towns across the country, which were displayed in local post offices and telegraph offices, shown in "conspicuous places in shipping ports," and printed in newspapers (a method of dissemination that continued until the Second World War). As the Canadian Pacific Railway pushed westward (with its accompanying strand of telegraphic lines), weather, climatological, and precipitation reporting stations began sending information eastward. By early 1905, the

Meteorological Service of Canada boasted 374 reporting stations, thirty-four of which telegraphed reports twice a day to Toronto.³⁵

Meteorology and Arctic Stations

The North American Arctic remained beyond the practical reach of nineteenth century nation-building programs. Russia, fearful of losing its American holdings to Britain without compensation in a future conflict, sold Alaska to the United States in 1867. The purchase, championed by Secretary of State William Henry Seward, was controversial. To critics, “Seward’s Folly” squandered an admittedly paltry \$7.2 million on useless wasteland (twice the size of Texas) that would require much larger annual administrative burdens in the future. Supporters pointed to northern resources and future economic benefits — a prescient prediction proven in the twentieth century.³⁶ The confederation of British North America that same year created the Dominion of Canada, whose aspirational motto proclaimed that the country would extend “from sea to sea.” In 1869, the HBC surrendered its vast territories (Rupert’s Land and the Northwest Territory) to Great Britain, and Canada accepted them the following year. While visionaries of a transcontinental empire in the north connected the Atlantic to the Pacific, they did not yet realize the significance of a third ocean — the Arctic Ocean — to the north.

The full extent of Canada’s dominion, moreover, was unclear — particularly the northern limits of the territory it inherited from the HBC. The status of the islands north of the Canadian mainland became a source of considerable concern because of two innocent requests for concessions of Arctic territory in 1874: one was made by a British subject to establish temporary fishing buildings and the other by an American for a mining operation. After extensive deliberations, the British approved an order-in-council on 31 July 1880 stating that “all British territories and possessions in North America, and the islands adjacent to such territories and possessions which are not already included in the Dominion of Canada, should (with the exception of the Colony of Newfoundland and its dependencies) be annexed to and form part of the said Dominion.” By this act, Britain gifted to Canada whatever territories or territorial rights it had in the Arctic archipelago. The completeness of Britain’s own title at that time, and the extent of its territories, remained questionable.

“The Imperial Government did not know what they were transferring,” Canadian associate archivist Hensley R. Holmden quipped in 1921, “and on the other hand the Canadian Government had no idea what they were receiving.”³⁷ Fortunately for Canada, no foreign state raised questions about the transfers — or made firm claims to the unoccupied islands. For its part, Canada — hesitant to take steps “for the good government of the country until some influx of the population or other circumstance shall occur” — did little to consolidate its administrative or practical control over the region for the next fifteen years.³⁸

While foreign explorers continued to explore the Arctic archipelago after the Franklin searches (with all the competitive aspects to exploration and scientific work that such voyages entailed), a new current of transnational interest in geomagnetism and other scientific questions requiring systematic and standardized investigation encouraged nascent international cooperation.³⁹ Eight nations cooperated in the First International Polar Year (IPY) in 1882–83, the first organized effort to make synoptic meteorological observations based on a clear sampling protocol and high-quality, well-calibrated instruments. Arctic scientists set up fifteen data collection points around the Arctic rim to record systematic and simultaneous geophysical observations over an extended period, thus building a database useful for studying the Arctic environment.⁴⁰ Three of these Arctic stations were organized in the Canadian North. Canada and Great Britain jointly managed the station at Fort Rae on Great Slave Lake, and a German party studied weather conditions at Kingua Fjord in Cumberland Sound, Baffin Island.⁴¹ Finally, US Army Lieutenant Adolphus W. Greely commanded a twenty-five-man scientific expedition that established a meteorological base at Fort Conger (Lady Franklin Bay) on the northern coast of Ellesmere Island and achieved a new northern record of 83°24N. When his party was forced to retreat after its second winter, Greely took copies of his condensed meteorological observations of barometric pressure, air temperature, wind, clouds, and weather conditions in three tin boxes (fifty pounds each) in lieu of extra rations — thus ensuring the expedition’s scientific legacy, although only seven men survived the ordeal. Greely went on to preside over the Signal Corps when it transferred the US weather service to the civilian

Department of Agriculture, where it became an independent scientific organization free from military regulations, in 1891.⁴²

Scandinavian initiatives filled in the Arctic map around the turn of the century.⁴³ Finnish-Swedish explorer-scientist Adolf Erik Nordenskiöld achieved the first complete crossing of the Northeast Passage along the northern coast of Eurasia in 1878–79, and Norwegian explorer Fridtjof Nansen drifted across the Arctic Ocean onboard the *Fram* from 1893–96. Then Captain Otto Sverdrup led the *Fram* on a scientific expedition to northwest Greenland and into Canadian waters from 1898–1902, over-wintering amongst Inuit, surveying the coasts of Ellesmere, Axel Heiberg, and Amund and Ellef Ringnes Islands, and recording weather and other scientific observations at locations along the way. During Norwegian Roald Amundsen’s successful navigation of the Northwest Passage between the Canadian mainland and the southern archipelagic islands in 1904–06, engineer Peter Ristvedt conducted nearly two years of continuous meteorological observations from Gjoa Haven. This contributed significantly to climatological knowledge about the central Arctic. Like the other data, however, this information was not collected simultaneously with other expeditions, and this lack of coordinated data gathering limited the value of the observations for understanding the climatology of the Canadian Arctic more generally.⁴⁴

The United States established its footprint in the region during the so-called “American era” in Arctic exploration, concentrating their efforts on “the royal road to the North Pole” along the western coast of Greenland in the late nineteenth century.⁴⁵ “The transformation of the Arctic from an arena for heroic adventures to a northern Mediterranean Sea had begun with American expeditions at the turn of the century,” historian Nancy Fogelson suggests. American interest grew when Robert E. Peary extended his 1898 Greenland expedition to Ellesmere Island and repatriated papers belonging to the abandoned American IPY base at Fort Conger. Two years later, Peary extensively surveyed west Grinnell Land (Ellesmere) before mapping northern Greenland. Although the US War Department boasted that Peary should acquire Greenland “by right of conquest,” it made no such statement about Ellesmere. For his part, Peary had his eyes on being the first man to the North Pole — an accomplishment that would realize America’s “manifest duty and privilege.” He fell short in 1903, but he

managed to map Ellesmere's northern coast and sighted new islands that, "if confirmed, would add to the list of American prizes."⁴⁶

Fortunately for Canada, the United States never claimed these "prizes." Although the young dominion's gaze was fixated on the "new north-west passage" linking the Atlantic to the Pacific by a transcontinental railroad, Ottawa launched its first Arctic expeditions in the 1880s. The earliest surveys were more concerned with navigational conditions than meteorology, but accompanying observers recorded conditions at various sites along the northernmost parts of the Canadian mainland and its southernmost Arctic islands. During the voyages of the *Neptune* into Hudson Strait and Bay in 1884–85 and 1886, for example, meteorologists maintained weather stations at several points during the two intervening winters.⁴⁷ Canada's gradual "program of action," historian Gordon W. Smith explained, was "rather limited but nonetheless designed to solidify and consolidate Canadian sovereignty over the territories in question."⁴⁸ As North West Mounted Police outpost stations expanded to Herschel Island, the District of Mackenzie, and eventually as far north as Fullerton Harbour in Hudson Bay in 1904, the government took advantage of this official presence to collect meteorological data. It also sought similar data from fur trading posts and missions to accumulate a broader climatic picture of the Canadian North.⁴⁹

Ambiguity remained about how far Canada actually extended to the north, prompting state efforts to clarify its High Arctic claims. The chief astronomer of Canada admitted in 1905 that "Canada's title to some at least of the northern islands is imperfect."⁵⁰ Simply drawing lines along Canada's east and west coasts and extending them up to the North Pole, thus delineating a "sector claim" to the Arctic, seemed an attractive and inexpensive option — even if it did not have a firm basis in international law. The origins of this idea are well documented.⁵¹ On 20 February 1907, Senator Pascal Poirier presented a motion to the Senate asserting that "the time has come for Canada to make a formal declaration of possession of the *lands and islands* [emphasis added] situated in the north of the Dominion, and extending to the North Pole." Poirier asserted that Canada, as successor to the rights of the HBC, could claim as its territory all of the islands lying between 141°W and 60°W longitude up to the Pole.

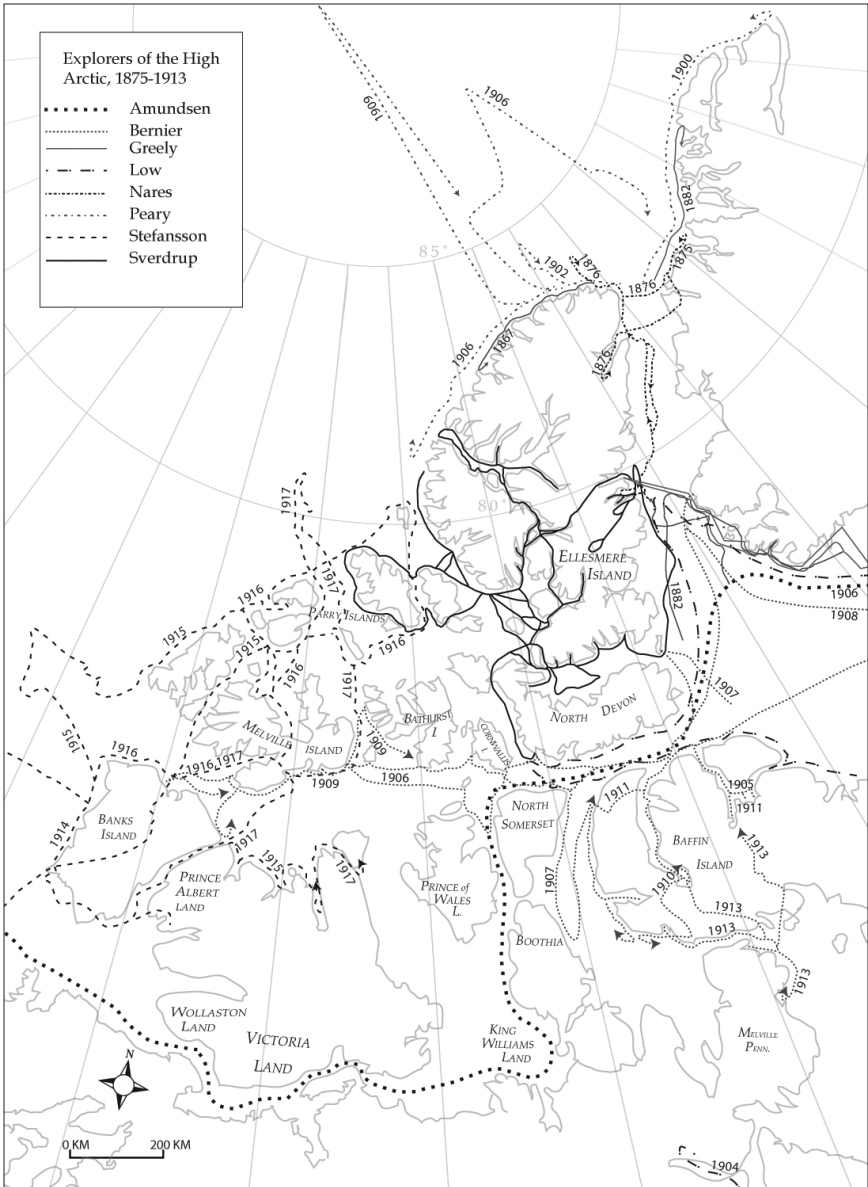


FIGURE 1-5. Exploration in the North American High Arctic, 1875–1913. Jennifer Arthur-Lackebauer

He referred to a meeting of the Arctic Club in New York the previous year, attended by Canadian Captain Joseph-Elzéar Bernier, where:

it was proposed and agreed — and this is not a novel affair — that in future partition of northern lands, a country whose possession today goes up to the Arctic regions, will have a right, or should have a right, or has a right to all the lands that are to be found in the waters between a line extending from its eastern extremity north, and another line extending from the western extremity north. All the lands between the two lines up to the north pole should belong and do belong to the country whose territory abuts up there.⁵²

Although the speech has assumed great significance, Senator Poirier's motion was neither seconded nor debated, and Canada did not incorporate the sector principle in statute, but it proceeded, "by a series of semi-official and official actions and pronouncements, to stake out a sector claim."⁵³

In the first decade of the twentieth century, Canadian explorers William Wakeham, Albert Peter Low, and Joseph-Elzéar Bernier — mentioned above — patrolled the waters of Hudson Bay and the Arctic islands, imposing licences upon Scottish and American whalers, collecting customs duties, conducting scientific research, and performing ceremonies of possession to assert national sovereignty. For his part, Bernier zealously planted the Canadian flag at every landing he made on the Arctic islands until 1 July 1909, when he revived the idea of a Canadian sector by installing a plaque on Melville Island taking sweeping possession of the "whole Arctic Archipelago lying to the north of America from long. 60°W to 141°W up to latitude 90°N."⁵⁴ Although this dubious act may have done little to perfect Canada's claim to the archipelago in international law, it served as an important symbol in national sovereignty narratives. Bernier's ship also served as a moving platform to collect weather data over an expanding area, thus contributing to scientific knowledge concurrent to its primary sovereignty role.⁵⁵

The First World War and its immediate aftermath were marked by a general lapse in northern activity, but a clear exception was Manitoba-born Vilhjalmur Stefansson's two-pronged Canadian Arctic Expedition,



FIGURE 1-6. Captain Joseph-Elzéar Bernier and his team at Winter Harbour, Melville Island, 1 July 1909. LAC, MIKAN 3652544.

which operated in the western Arctic from 1913 to 1918. The last of the “old-fashioned expeditions,” the main purpose of Stefansson’s northern party was to “discover new land along the 141st Meridian” and to map the edge of the continental shelf in the Beaufort basin. In the end, the intrepid explorer discovered and took possession of several islands for Canada, adding several thousand square kilometres to the country’s territory, while clarifying cartographically ambiguous ones such as Prince Patrick Island.⁵⁶ He also brought back some of the first meteorological information from the western Arctic. The leader of the southern “scientific” party, Dr. Rudolph Martin Anderson, had devoted time in Washington and the Dominion Meteorological Bureau in Toronto prior to leaving for the Arctic to learn formal techniques of magnetic and meteorological observation. William Laird McKinlay, a teacher of mathematics and science in Glasgow, served as the expedition’s magnetician and meteorologist. Despite the southern party’s vast scientific achievements, Stefansson’s tireless self-promotion and geographical discoveries attracted the most

popular attention. Stefansson sought to recast the image of a *Friendly Arctic* — a resource-rich region that Canada could not retain simply by colouring it “red in Atlases published in Canada.” He preached the gospel of effective occupation, with science playing a vital part in demonstrating national interest and control.⁵⁷

The character of Arctic exploration changed rapidly and dramatically after the First World War, transitioning from an emphasis on new geographical discovery to scientific exploration. Furthermore, as meteorologist Svenn Orvig notes, “permanent settlements began to grow and, with the introduction of radio and aircraft, it became possible and necessary to exchange weather information on a routine basis.” Observational networks expanded alongside the establishment of new settlements, police outposts, and radio stations in the Canadian North, although not to the uninhabited sections of the Far North.⁵⁸ Nevertheless, theoretical innovations in the interwar years, based on mathematical modelling and new demands for accurate weather forecasts associated with the advent of the air age, heightened the demand for reliable data.⁵⁹

Weather, the Great War, and the Air Age

By the end of the nineteenth century, meteorologists still struggled to discern laws of atmospheric behaviour that governed weather patterns, and many compiled climatic averages rather than building analytical models to predict current weather trends. Accordingly, at the start of the Great War, forecasting methods remained simple, linear extrapolations of existing atmospheric pressure systems. Although radio allowed ships to transmit observations, thus synchronizing ocean and overland data on upper atmospheric conditions, the general forecasts seldom extended beyond twenty-four-hour periods. The exigencies of war and technological innovation encouraged the “militarization” of climatology and local meteorology. Forecasts for air operations advanced beyond surface weather predictions to include cloud thickness and amount, upper air winds, and temperatures. Nevertheless, a major gap remained between the desire for long-range forecasts based on climatic data to support strategic planning and actual operational forecasts useful to execute specific missions.⁶⁰

Wartime lessons highlighted the importance of meteorological data. Historian Robert Marc Friedman observes that “wartime experience had

taught meteorologists that, to be effective for aviation, forecasts had to be much more geographically precise and detailed than traditional predictions and had to emphasize the short-term changes of weather conditions two to six hours in advance.⁶¹ Relevant forecasting for aviation depended upon rapid communications with airfields, which wartime advances in telephone and wireless telegraphy facilitated. Furthermore, militaries required timely, all-weather information about winds, atmospheric temperature, pressure, and humidity at various altitudes across wide areas to produce reliable synoptic weather maps. This led to increased government funding for meteorologists, but also civilian pressures emanating from the agricultural and transportation sectors, which sought more accurate forecasting. The US Signal Corps recruited the famed physicist Robert A. Millikan during the war to lead a new “Army Meteorological and Aerological Service.” Working collaboratively with the civilian weather bureau in the Department of Agriculture and European colleagues, these military meteorologists pioneered the new fields of aviation meteorology, “battlefield climatology,” and local forecasting. By war’s end, several hundred American officers and enlisted men had received meteorological training.⁶²

Technological innovation played a pivotal role in modernizing atmospheric science. At the end of the war, most measurements were still made from the ground or using balloons and kites at low altitudes. Airplanes offered a platform to conduct observations, but they embodied an obvious contradiction because their safe use depended upon the results of the information that they were supposed to collect. The invention of wireless telegraph (radio) helped to solve this dilemma and led to a natural evolution in meteorological instrumentation. Marconi had succeeded in transmitting radio signals across the Atlantic in 1901, but radio was not practically applied to meteorology until after the First World War. Balloons had proven an ideal platform to collect synoptic data for decades, but they were limited because it took several days to retrieve released balloon-sondes and return them to a central bureau. Radio telemetry offered an obvious solution to this time-delay problem. The booming hobby of amateur radio not only propelled technological innovation after the war, but also made vacuum tubes and other components commercially available at a reasonable cost. This encouraged pioneering researchers to create the

first radiosondes: balloon-borne instruments that wirelessly transmitted atmospheric data to a receiver-recorder on the ground.⁶³

The radiosonde was the necessary breakthrough. This device, consisting of a small box with temperature, humidity, pressure instruments, as well as a miniature transmitter, is carried aloft by a large gas-filled balloon and is returned to the ground by parachute after the balloon bursts. While airborne, instruments measure the weather elements and the radio transmits the data to a ground receiving station. The *RAOBs* (the records from the radiosonde) are therefore available for immediate use, providing systematic and reliable data on upper-air conditions.⁶⁴ During the 1930s, the US and Canadian weather services (and those of almost every industrialized nation) adopted this practical tool, which contributed more than anything else to the systematization of weather observations. Historians at the Smithsonian Institution concluded:

Thanks to data provided by the radiosonde from a range of altitudes, synoptic weather maps were vastly improved. These data, in turn, provided the means to generate timely, accurate forecasts based upon the motion and evolution of the air masses. As radiosonde technology and data collection improved in the 1940s, scientific meteorology finally matured. Deterministic modeling of the atmosphere, based upon the physical laws of gas dynamics and heat transfer, although appropriate, had long been considered futile because measurements on a sufficiently large scale and at high enough resolution to establish initial conditions for the equations could not be made. The availability of large amounts of data from radiosondes and the emergence of electronic computers in the late 1940s helped to forge a new branch of science in practical modeling of the atmosphere. Modeling, together with skillful interpretation of data, has promoted a steady improvement in our understanding of the atmosphere and its dynamics.⁶⁵

The radiosonde greatly improved the accuracy of weather forecasting, with direct benefits to agriculture and aeronautics, and laid the foundation for modern analog telemetry systems.⁶⁶

Technological innovation was matched by theoretical innovation in atmospheric science beginning in the early 1920s. At the end of the First World War, Scandinavian researchers (led by Vilhelm Bjerknes) devised a new conceptual foundation that became known as the Bergen School of Meteorology. Their theoretical work on air masses, fronts, polar fronts, and evolutionary cyclones provided the first comprehensive science of weather. “The special forecasting goals arising from the onset of commercial aviation, the rapid exchanges of weather data and predictions afforded by advances in wireless telegraphy, and the new cyclone model combined to form a single perspective for meteorological discourse,” Friedman explains. These innovative models owed much to the Great War, both materially (forecasting systems were possible because of communication networks developed during the war) and discursively.⁶⁷ The Bergen school appropriated the language of “fronts,” describing how polar and equatorial air attacked and counterattacked, their clash a “battle line” (*kamplinje*) or “battlefront” (*kampfront*) around the hemisphere:

We have before us a struggle between a warm and a cold air current. The warm is victorious to the east of the centre. Here it rises up over the cold, and approaches in this way a step towards its goal, the pole. The cold air, which is pressed hard, escapes to the west, in order suddenly to make a sharp turn towards the south, and attacks the warm air in the flank: it penetrates under it as a cold West wind.⁶⁸

The idea of a polar front (the boundary separating warming tropical air from cold polar air in the mid-latitudes and thus affecting global weather patterns), in particular, laid the foundation for major innovations in practical weather forecasting.⁶⁹ Thus, the field of long-range forecasting began to take shape, particularly in Russia, Germany, and America, with applied air mass and frontal analysis and an extension of the observational nets to the upper air.⁷⁰

Translating these conceptual developments into improved forecasting demanded more meteorological data from the Arctic. Dr. George Simpson, the director of the British Meteorological Office of the Air Ministry, observed in 1929 that most scientific work had been a by-product of quests

for the Pole. “If scientific work is to continue in polar regions it must now be for its own sake,” he explained, citing in particular the “great blank from 20°, more or less around the north pole,” which “every meteorologist” dreamed of filling up. To identify and address this gap, he laid down three propositions:

1. Our knowledge of polar meteorology is such that little further advance can be made by spasmodic meteorological observations;
2. We need observations taken simultaneously in all parts of the polar regions, so that the actual conditions existing at any one time over the whole polar region can be studied in detail;
3. We need observations at a few representative positions, which will give unbroken records extending over many years.⁷¹

Most of the meteorological stations established in the Arctic in the nineteenth and early twentieth centuries took reports for climatological records. Without reliable communications, they could not be transmitted south in a timely manner to use for synoptic purposes. Accordingly, expanded meteorological capacity directly correlated with technological innovation and improved communication systems. “The period of modern meteorological observations can be said to date from the introduction of the radio in the North,” Andrew Thomson later noted. The primary purpose of the Northwest Territories and Yukon Radio System — the first chain of government wireless stations in the territorial north, which began operations in 1925 — was to gather and transmit meteorological data for the Canadian Meteorological Division. By 1941, major HBC trading posts in the Northwest Territories also had short-wave key and telephone transmitters, while flying and mining companies had radio equipment. This communication network allowed personnel of the Meteorological Division, the Royal Canadian Corps of Signals, the Radio Telegraph Branch of the Department of Marine and Fisheries, the Royal Canadian

Mounted Police, HBC factors, missionaries, and employees of commercial and mining companies to pass along observations.⁷²

The main driver of this demand was a growing sense of “air-mindedness”: national excitement about the prospects for aviation, based on its capacity to push back the “veil of ignorance” that had previously obscured the North.⁷³ Dramatic advances in aviation technology during the Great War and in the interwar years propelled interest in and access to the region; developing safe and reliable northern air routes further required aerial surveys, accurate mapping, climatology studies, and meteorological data.⁷⁴ Visionaries such as Royal Canadian Air Force (RCAF) squadron leader Robert A. Logan anticipated the role of aircraft in orderly Arctic development, while American air power advocate Billy Mitchell emphasized how aviation amplified the strategic importance of the region, famously describing before the US House Committee on Military Affairs that Alaska was now “the most important strategic place in the world.”⁷⁵ Vilhjalmur Stefansson popularized a similar, albeit civilian and commercial vision through his proclamations of a commercial “polar Mediterranean.” Because the Arctic offered the shortest potential air routes between the largest cities in the world, he touted that Canada could become a great power if it (as part of the British Empire) controlled and exploited the region.⁷⁶ RCAF pilots began the enormous task of aerial photography to support mapping the entire North, and Army Survey Establishment cartographers helped to make the North legible for the extension of state control and development.⁷⁷ The RCAF also conducted the first aerial ice reconnaissance in Davis and Hudson Straits in 1927–28, studying ice, weather, and navigation conditions along the new grain route from Churchill on Hudson Bay to the ports of Europe.⁷⁸

Aviation also reshaped expectations and practices of modern Arctic exploration, holding out the possibility that the airplane offered a mechanical solution to the longstanding problem of polar transportation.⁷⁹ “For aviation, the 1920s and 30s were decades of glamor, accelerating technology, and — most of all — personalities,” historian Patrick Hughes summarizes. The US Weather Bureau initiated daily national flying weather forecasts for the army and the postal service in 1919. In the years ahead, well-publicized cross-country flights and transatlantic attempts immortalized fliers such as Charles Lindbergh and Wiley Post, and added to

the clamour for weather information and special observation stations near airways.⁸⁰ In due course, aviators cast their attention northward in hopes of conquering hostile Arctic environments. For example, the American Geographical Society sponsored Australian Hubert Wilkins' expeditions of 1926–28 from Barrow, Alaska, over the Arctic Basin, to Spitsbergen (Svalbard). “Long-distance flying in the Arctic is not more hazardous than long-distance flying in other regions,” he suggested in his contribution to *Problems of Polar Research*. Although he failed to discover any new Arctic lands, he made important meteorological observations during his flight over Ellesmere and dismissed the idea of a hypothetical “Crocker Land” supposedly lying to the west of it.⁸¹ “By raising its passengers above the obstacles of the Arctic ice and thereby fundamentally redefining the relationship between the explorer and the environment,” historian Marianne Cronin observes, “it seemed as if aircraft had eliminated the danger and hardship that formed the heart of heroic exploration.”⁸²

Arctic aviators took to the skies at a time of lingering Canadian concern about sovereignty and increased Canadian government activity in the North. The immediate postwar catalyst for action was Danish explorer Knud Rasmussen's alleged denial of Canadian sovereignty over Ellesmere Island, and the Danish government's apparent endorsement of his stance. Stefansson, in an early articulation of a “use it or lose it” doctrine, urged that if Canada did not occupy the northern islands of the archipelago it might lose them. Stefansson sought to organize an expedition for this purpose, but it did not materialize. “Fear about what Denmark might do in the archipelago was gradually replaced by concern over what Canada herself ought to do,” Smith observed, leading the government to institute ship patrols of the eastern Arctic in the old tradition of Low and Bernier, now on an annual basis, and to expand the Mounted Police permanent presence along the Arctic coast and on the Arctic Islands, beginning with new posts at Pond Inlet on Baffin Island and Craig Harbour on Ellesmere Island in 1922.⁸³ As the Canadian government took action to solidify its Arctic claims, however, other countries lost interest in pursuing their own. Denmark let the issue of Ellesmere Island drop and, at least tacitly, accepted Canadian sovereignty. Lingering questions about Norwegian claims to the Sverdrup Islands surfaced in 1924, but Norway formally recognized Canadian sovereignty over the Sverdrup Islands in 1930.⁸⁴

Canada remained wary about the United States' interests in the North American Arctic, given the power asymmetry between the two countries. Although American-sponsored expeditions "were less attempts to claim territory than to reaffirm that the United States intended to continue to consider territory it crossed or explored as open area," Fogelson observes that "by insisting on equal access throughout the Arctic, the United States hoped to deter other countries from establishing spheres of influence."⁸⁵ American newspapermen and international lawyers persisted in asking embarrassing questions about Canada's Arctic sovereignty, leading Ottawa officials to anticipate possible conflict with the United States. The controversy surrounding the US Navy-sponsored Byrd-MacMillan Expedition in 1925 was the clearest case. American explorer Donald B. MacMillan failed to secure the necessary permits from Canada before entering the archipelago to conduct scientific experiments, and then lied about it to the crew of the Canadian Eastern Arctic Patrol. Facing weather and mechanical problems, the Americans now faced a political storm. Canadian authorities submitted an official protest to the American government that, in turn, formally requested a permit. Subsequent American expeditions fulfilled the proper licencing requirements and, from this point onward, the US government avoided publicly appearing to challenge Canada's sovereignty over the Arctic islands.⁸⁶

The tempo of American Arctic exploration activity declined in the 1930s, pushing to the back burner any lingering suspicions about whether the United States accepted all of Canada's Arctic claims for the time being. In March 1933, V. Kenneth Johnston argued optimistically in the *Canadian Historical Review* that foreign claims in Canada's Arctic archipelago had disappeared and that Canada's own claim had been established.⁸⁷ The Permanent Court of International Justice's decision in the Eastern Greenland case between Norway and Denmark the following month indicated lessened requirements for sovereignty over remote, inaccessible, thinly settled, or even uninhabited territories.⁸⁸ Nevertheless, the judicial nature of polar sovereignty remained ambiguous, and the United States' Hughes Doctrine insisted that proclamations, transient visits, temporary outposts, and symbolic acts of control were insufficient bases for a state to claim sovereignty over polar territory. The contrast between this approach and Canada's "sector principle" could not have been starker.⁸⁹

Although the Great Depression put a damper on sovereignty-related activity in the North American Arctic, the future opportunities for air transport in opening the region remained apparent — as did the reliance of aviation upon science. In 1928 the Meteorological Service of Canada’s central office in Toronto set up an aviation section, which demanded reliable weather data to produce forecasts based on the latest scientific methods.⁹⁰ The director of the Service, Sir Robert Frederic Stupart, lobbied for Arctic stations that would produce regular weather observations, rather than merely collecting climatological data.⁹¹ The network of observing stations slowly expanded into northern Canada, particularly west of Hudson Bay and up to the Arctic coast (see fig. 1-7).⁹² Nevertheless, accumulating useful weather data from the region remained problematic. Different stations, unevenly scattered across the country’s vast northern territories, often made their observations at different times of the day. Observations of humidity during the winter months, using dry- and wet-bulb thermometers, proved unreliable. (The bulb of a wet-bulb thermometer is dipped in water and the resulting evaporation or sublimation around the bulb generally produces a cooler result that is used to determine dew point, relative humidity, and vapour pressure.) Andrew Thomson recalled that the difficulty in transporting mercurial barometers to the North, coupled with “the lack of communications for long periods, rendered the establishment of satisfactory pressure stations, especially in the early days, almost impossible. Errors were not known until data were received many months after observations.” Personnel changes, untrained observers, delays in replacing broken instruments, and the lack of inspections by headquarters staff compounded problems.⁹³ Furthermore, the Arctic Archipelago remained “a large blank spot on the weather maps,” but the cost and effort required to secure information from this remote space would remain prohibitive until another world war reshaped the geostrategic significance of the region.⁹⁴

With lowered demand for meteorological services during the Depression, senior officials in the Meteorological Service focused their energies — and limited resources — on training, research, and development. This paid off, Thomas argued, and “by the end of the decade an excellent foundation had been laid upon which the Service would be able to respond to the tremendous demands to be placed upon it by commercial and military aviation.” Improvements in weather forecasting required

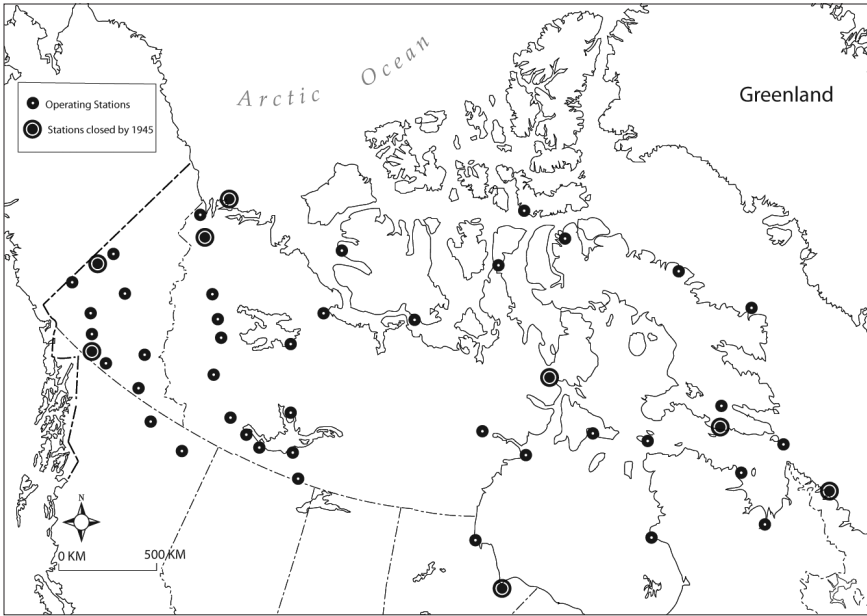


FIGURE 1-7. Dating from the 1880s, a series of meteorological stations were progressively opened in the Arctic. Some, such as Lake Harbour, operated for a few decades before being closed. Most, however, continued to gather observations to create a continuous dataset. Jennifer Arthur-Lackenbauer

improved awareness of new air mass analysis theories and their adaptation to North American conditions. In this context, the Meteorological Service recruited Andrew Thomson, a Canadian with experience in New Zealand and the South Pacific, to head up its Physics Division in 1932. Several young Canadians pursued graduate studies in the United States and Europe, where they were exposed to international innovations in meteorological science. In partnership with the weather service, the University of Toronto developed a graduate program in meteorology, which adapted European theories to North American weather. In the ensuing years, these developments fostered a cadre of professionals who had ample opportunity to test and refine their modern methods during the Second World War.⁹⁵

In Canada, weather services were a civilian endeavour. Reflecting the close relationship between meteorology and aviation, the Meteorological

Service of Canada became the Meteorological Division of the Air Services Branch of the new Department of Transport in November 1936. (The Royal Canadian Air Force did not perceive the need for a regular, full-time meteorological service, and did not request regular forecasts and professional services for their units until 1938.)⁹⁶ In the United States, the 1926 Air Commerce Act — “the legislative cornerstone for the development of commercial aviation in America” — vested the US Weather Bureau with responsibility for weather services to civilian aviation, leading to a dramatic expansion of the Bureau and its services.⁹⁷ Francis Wilton Reichelderfer, a longstanding naval aerographer (meteorologist) and officer who was a strong proponent of the Bergen School of meteorology, left the US Navy to take the helm of the Weather Bureau in 1938. Given his deep knowledge of aviation meteorology, he was an ardent proponent of advanced scientific methods of forecasting and recognized the need for worldwide weather services.⁹⁸ By 1939 forecasters had telegraphic data available from 275 observing stations in North America, 135 of which were Canadian (compared to 70 in 1930).⁹⁹

When the clouds of war gathered in Europe in the late 1930s, reciprocal defence pledges meant that continental collaboration in civilian pursuits, such as meteorology,¹⁰⁰ were now complemented by closer bilateral collaboration in continental defence. “We as good neighbors are true friends,” American President Franklin D. Roosevelt assured Canadians in 1938. He promised that the United States would “not stand idly by” if any foreign power threatened Canadian territory. The Monroe Doctrine of 1823, which pledged that the US would respond to any external aggression in the Western Hemisphere, extended north as well as south. Even Canada’s Prime Minister William Lyon Mackenzie King, wary of foreign commitments that could divide a country with a complicated array of national, imperial, and continental allegiances, welcomed this promise. Size dictated that the Americans would assume primary responsibility for continental defence, and geography tied Canada’s security to that of its southern neighbour. For his part, Mackenzie King declared that Canada also had its obligations as a friendly neighbour and would ensure that no enemy forces would ever pass through the dominion on their way to the United States. These were easy promises to make while the likelihood of invasion remained remote. When war broke out, strategic thinkers assumed that

the Arctic was a natural defensive barrier. “On the Dominion’s northern territories those two famous servants of the Czar, Generals January and February, mount guard for the Canadian people all year round,” historian C.P. Stacey wrote in his 1940 study of Canadian defence policy. Aircraft could make the Arctic and subarctic regions more strategically significant, he concluded, but hardly constituted an immediate, practical threat to or through the region.¹⁰¹

The Second World War, Meteorology, and a New Northern Focus

“Modern meteorology really came of age during the Second World War,” official US Weather Bureau historian Patrick Hughes observes. Soon after the war began, it “became obvious that success in this war, more than in any previous war in history, would often depend on whose side the weather was on.”¹⁰² The science of weather forecasting had particular importance for air operations. Air force historian Jonas Jonasson explained:

Just as a ground commander must know the terrain over which his troops and supplies move, so did the successful air commander of World War II depend upon uninterrupted and fresh intelligence regarding the atmospheric “terrain” in which his forces operated. The vertical dimension of his three-dimensional battlefield was no less significant than its length and breadth. Atmospheric conditions thousands of feet above the ground determined the pathways open to his aircraft, and weather hundreds of miles away could be of greater military significance than a storm over his own headquarters. For this indispensable information the air commander relied on the delicate instruments and skilled personnel of his weather services. By the end of the war those services had come almost to be taken for granted, so much so that little thought was any longer given to the near-miracle they represented.¹⁰³

This truly global war touched the remotest outposts of the planet, arousing new interest in the North American Arctic and drawing it into the web of militarism.

The onset of war in September 1939 presented challenges for the Canadian Meteorological Division. Already overstretched to accommodate commercial aviation needs, the military now called upon it to provide weather services for Royal Canadian Air Force and Royal Canadian Navy operations off the east coast. When Prime Minister William Lyon Mackenzie King outlined his “limited liability” war effort the following year, its heavy emphasis on the British Commonwealth Air Training Plan as Canada’s primary contribution to the Allied war effort meant that a much larger cohort of professional meteorologists was needed to train air crews, analyze weather maps, generate local forecasts, and brief pilots. Rather than developing its own cadre of forecasters, as originally planned, the RCAF continued to rely on civilian “metmen” (meteorological technicians) and meteorologists in the Meteorological Division to meet its needs throughout the war.¹⁰⁴ While the former specialize in gathering meteorological observations, the latter focus on the science of meteorological analysis and forecasting.

In September 1939, Reichelderfer ran into his friend John Patterson, the director of the Canadian Meteorological Service, in a hallway at the US Weather Bureau headquarters in Washington. Canada was at war while the United States remained officially neutral, and this situation forced adaptations. Canada would no longer broadcast its weather reports in the “clear,” meaning they would be encoded and provided to the Americans for official use only. In turn, managing this sensitive information forced the US to better coordinate civilian and military weather activities. Its weather services were dispersed, with civilian and military elements, compared to the civilian Canadian system. In 1940, the US government transferred the Weather Bureau to the Department of Commerce, which held responsibility for aviation expenditures — a reflection of the disproportionate appropriation to aviation matters compared to agriculture or any other economic activity.¹⁰⁵ While the Bureau remained the primary agency for collecting and disseminating meteorological information between the wars, the US Army and Navy had maintained “skeletal weather organizations” that could be quickly recruited to strength in wartime.¹⁰⁶ These armed services, which established weather centres in Washington in 1940, formed the Interdepartmental Committee on Meteorological Defence Plans with the US Weather Bureau the following year. By early

1942, it evolved into the Joint Meteorological Committee of the US Joint Chiefs of Staff, with Reichelderfer playing a prominent role.¹⁰⁷

The war proved to be a watershed in Canada-US relations, leading Canada down the “forked road” towards enhanced continental integration, and a watershed in bilateral engagement with the Canadian Arctic. Neither country was eager to look “down north.” The US Signal Corps Meteorological Service, never with more than eleven officers during the interwar years, did not have a single station in Alaska. But as the winds of war in Europe and Asia gained strength in 1939, the United States Navy began building operating bases in Alaska to defend its isolated, rugged coastline and stationed its first weather unit in its northernmost territory. The Pacific remained comparatively quiet for two years, however, while the military storm brewed in Europe and bombers flew from Newfoundland to Britain to help stem the Nazi tide at the English Channel. With Britain’s survival in doubt, Prime Minister King and President Roosevelt signed the Ogdensburg Agreement in August 1940, establishing a bilateral Permanent Joint Board on Defence to oversee the defence of both nations. The United States also tightened its military cooperation with Britain when it reached the landmark Lend-Lease agreement in March 1941, formalizing its official aid to the Allies and securing ninety-nine-year leases to air and naval bases in Newfoundland. From this point, the US assumed responsibility for ferrying its own planes and materiel to Britain. American weather personnel arrived at Gander, Newfoundland, to work alongside Canadian personnel on anti-submarine patrols. “Within two months they were turning out synoptic maps of the North Atlantic,” the US official history noted, and Gander became “the nucleus of a weather net that reached from North America to the British Isles.”¹⁰⁸

This transatlantic path included Arctic stepping-stones. Two renowned Arctic specialists, the “fiery and voluble” geologist William H. Hobbs and aviation expert Bernt Balchen, lobbied the State, Navy, and War Departments to expand the North Atlantic air route through the Arctic.¹⁰⁹ The region boasted few air facilities, and maps still included large areas of “either blank spaces or indefinite dotted outlines of rivers, lakes, and even long stretches of coastline.”¹¹⁰ Nevertheless, strategists and defence planners began to assimilate the North American Arctic into their mental maps of the wartime world. Historian Shelagh Grant aptly observes

that there were really two “Arctics” involved: first, the treeless barrens of the High Arctic (Greenland, the Canadian archipelago, its adjacent mainland, and Ungava), and second, the subarctic regions of northern Quebec, Alaska, the Yukon, and the upper Mackenzie Valley.¹¹¹ In both areas, the Americans built an expanding network of weather stations in remote and sparsely populated areas. These were not envisaged as independent projects, but as supporting elements in larger military developments. New airports (generally doubling as weather stations, recording, reporting, and forecasting local weather conditions) served an ever-increasing stream of aircraft being ferried to Britain and the Soviet Union. “When flying the northern route became a routine operation,” William Carlson observed, “much of the credit belonged to the weathermen.”¹¹²

The northeastern route created the impetus to build weather installations in or near the North Atlantic. These projects fit with the development of the massive subarctic airbase at Goose Bay, Labrador in 1941, and the prospect of a Greenland-Iceland route to Britain that avoided the ubiquitous fog off the Newfoundland coast. Although the United States opposed Canada’s “imperialist” plans for Greenland, it assumed responsibility for the Danish colony in April of that year and the US Army Air Forces (the new name of the Air Corps in June 1941) established a base command there.¹¹³ Commander Donald MacMillan came out of retirement to lead an American task force that set up an airfield and weather station at Narsarsuak on the southern tip of the island, followed by another at Søndre Strømfjord (Kangerlussuaq) on the west coast. All told, the US established thirteen weather stations in Greenland during the war. Concurrently, the Americans secured Canadian consent to build “Crystal” stations at Fort Chimo (Kuujuuaq), Frobisher Bay (Iqaluit), and Padloping Island as radio, weather, and emergency outposts. All had favourable locations to observe the movement of polar air masses, thus contributing to improved weather forecasting and safer air operations.¹¹⁴

The arduous experience of building stations in remote Arctic regions anticipated postwar challenges even further north. The situation in the summer of 1942, when a convoy of cargo ships and trawlers carrying men, equipment, and supplies set out for Fort Chimo, Frobisher Bay, and Southampton Island, was a case in point. Air force Lieutenant-Colonel Alexander Forbes and veteran explorer Captain Bob Bartlett led the way,

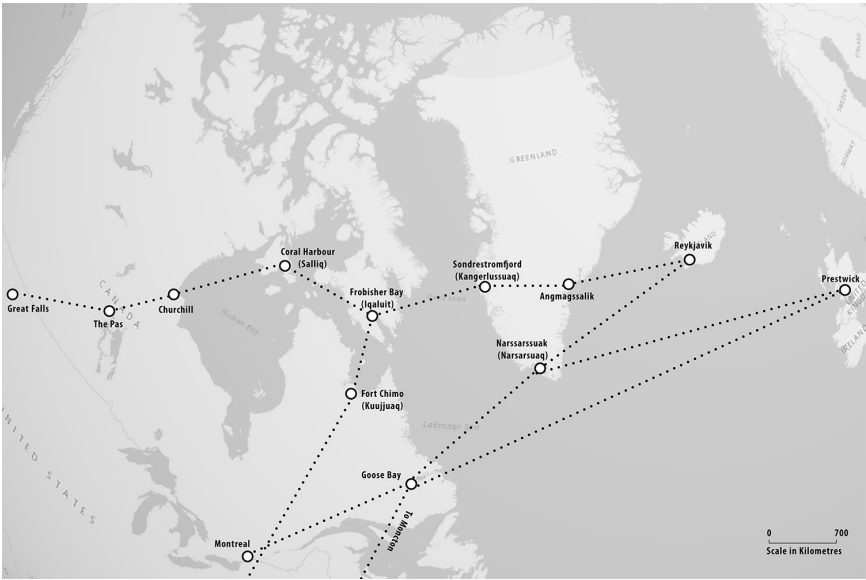


FIGURE 1-8. North Atlantic Air Routes during the Second World War. Jennifer Arthur-Lackenbauer

charting the waters of Frobisher Bay and then transferring the men and equipment from a temporary station on Crowell Island to a permanent location near the mouth of the Sylvia Grinnell River. Unfortunately, a German U-boat sunk one of the cargo ships off Labrador, thus delaying the flotilla. It finally arrived in August, importing 350 men, building materials, and heavy construction equipment to what had been, up to that point, a temporary fishing spot for the Inuit of southern Baffin Island. By October, the Americans had built a prefabricated village, including barracks, officers' quarters, a hospital, general store, mess hall, generator stations, assorted hangers, and warehouse facilities, and bulldozers were hard at work clearing the runway.¹¹⁵ The weather officers and men posted to these remote strands in the North Atlantic weather web faced their own set of challenges, given their lack of contact with the outside world for long periods, as well as extreme weather that affected housing and equipment designed for use in more temperate climates.¹¹⁶ When close to existing (or emerging) Indigenous communities, these facilities also

served as sites of cross-cultural contact.¹¹⁷ The scale of human impact in the eastern Canadian Arctic, however, was small compared to that left by the mega-projects in the Northwest.

The meteorological story in the northwestern corner of Canada was largely connected to the establishment of the Northwest Staging Route for aircraft flying between the continental United States and Alaska. By September 1941, aircrews could rely upon a series of airfields to navigate the main route from Edmonton to Whitehorse.¹¹⁸ Once the US entered the war, however, it found the situation insufficient. After the Japanese invaded the Aleutian Islands in April 1942, the Americans kicked their Alaskan defence projects into overdrive.¹¹⁹ Worried by the prospect that the enemy could cut off the sea link between Alaska and the lower forty-eight states, the United States hastily constructed the Alcan (Alaska) Highway — a herculean construction feat — with Canadian consent.¹²⁰ It roughly followed the route of the Northwest Staging Route, which General H.H. “Hap” Arnold was intent to convert into “the handle of a two-pronged pitchfork that would prod the Axis.” The two countries signed a revised agreement whereby Canada would pay for the airfields and other permanent infrastructure that served its long-term interests, with the US paying for all extensions and improvements that exceeded Canada’s postwar requirements. Carlson concluded that “it was a generous arrangement on the part of the United States, but the Canadians had never shown any desire to make unjustified profits out of joint efforts.... After some of the red tape was cut by conferences and directives, Canadian efforts began to make themselves known.”¹²¹

Although the Canadian Meteorological Division posted meteorological technicians and assistant observers to the existing airports along the Northwest Staging Route, it was still constrained by civil service hiring regulations and did not have the capacity to meet the growing demand. Initially, the US Weather Bureau assisted by loaning weather observers who were flown in and out of the Canadian stations by the RCAF. Soon the United States Army Air Forces (USAAF) decided to post its own meteorological staff at all airports that it used, and it received permission to open and operate several dozen supplemental observing stations throughout the Northwest, complete with communication facilities. Other stations served the Canadian Oil (Canol) project, launched in 1942 to build

a pipeline from Norman Wells to Whitehorse that would provide Alaska with a secure energy supply if the enemy managed to cut off sea access. That summer, the USAAF militarized all of its activities along the staging route (and the last American civilian meteorological personnel withdrew from Canada)¹²² and set up the 16th Weather Squadron, responsible for the Pacific Northwest of both the US and Canada.¹²³

Weather station personnel comprised a tiny percentage of the more than 40,000 American military personnel who worked on the wartime projects in the Canadian Northwest — three times the prewar population of the region.¹²⁴ In due course, this foreign presence generated serious sovereignty concerns in Ottawa. Although Prime Minister King had allowed the Americans onto Canadian soil with few constraints, he was always suspicious of their intentions. As early as March 1942, King told British High Commissioner Malcolm MacDonald that the Alaska Highway “was less intended for protection against the Japanese than as one of the fingers of the hand which America is placing more or less over the whole of the Western hemisphere.”¹²⁵ Yet, at this stage, the prime minister did not deem the situation serious enough to assert more Canadian control. However, when “northern nationalists” like MacDonald reported ominous developments in 1943 that apparently threatened to undermine Canadian sovereignty, the government shook its “fit of absence of mind” and took an increasingly assertive course of action.¹²⁶ King’s government appointed Brigadier W.W. Foster as a special commissioner to oversee the defence projects in the northwest, blocked some American initiatives to build more roads and air-staging routes, and secured assurances that the American troops would depart from the North after the war. Furthermore, the Canadians made plans to buy back from the United States those facilities and installations that were already built or in progress in the North.¹²⁷

The Americans welcomed Foster’s appointment and agreed (or at least complied) with Canada’s requests — an indication that their allegedly pernicious designs for Canada’s North had been overblown (and still are in much of the historiography).¹²⁸ Although impatient with and often frustrated by Canadian rejections or delays in approving what Americans considered to be vital wartime projects, officials in Washington acknowledged that they had to respect their northern neighbour’s interests — and its chronic insecurities. A State Department intelligence report, produced in

1942, suggested that “Canada has always suffered from an inferiority complex about her southern neighbour” and was envious of the “wealth and vast scale of American enterprise and industry.” Another study concluded that the average Canadian had a “conservative mind” that sought to avoid “dramatic pronouncements” and foreign policy commitments. Bilateral cooperation was possible, “as long as Americans are careful to remember the susceptibilities and sensitiveness of a small, but proud people.”¹²⁹ These principles would guide postwar relations as well.

Despite the Americans’ willingness to modify or confirm earlier agreements to accommodate Canada’s sovereignty concerns,¹³⁰ Canadian officials remained nervous about the vast network of American-controlled weather stations that extended into remote and sparsely populated areas. During a meeting at RCAF headquarters in late January 1944, for example, officers indicated that Canada was “prepared to accept full responsibility for the provision of meteorological facilities within her borders” and recommended that “Canada be responsible for providing and operating all installations which are an essential part of the general meteorological system of Canada or which Canada intends to retain after the War.” Not only would the Americans have to obtain permission for any stations on Canadian soil, the minutes reiterated, but the US should be limited to installing and operating “supplementary meteorological facilities only.”¹³¹ In short, given the heightened importance that the Canadian North would play in postwar aviation, senior officials emphasized that any expansion of weather services in the region should fall under Canadian control “to avoid any possible future difficulties with the United States.”¹³² The Cabinet War Committee concurred and began to move in this direction as the context of the war allowed.

As the tide of the war changed in 1944 and the perceived threat to North America declined precipitously, the US Army Air Forces sought to reduce the number of airfields that it maintained in the Canadian North, as well as related meteorological activities. It abandoned the Canol project, transferring several stations to the Canadian Meteorological Division and the Royal Canadian Corps of Signals and closing others. By 1945, the Canadian civilian weather service assumed control of most other USAAF stations and facilities that it deemed necessary for peacetime operations. Other stations were closed when the Allies abandoned particular air

routes. The Americans reduced their sprawling wartime presence to a small footprint at war's end, and Canada secured full ownership of all permanent facilities on its territory by purchasing them from the United States. The Americans also agreed that, prior to initiating any project on or over Canadian territory, they needed to secure the Canadian government's approval. The ownership of permanent facilities passed into Canadian hands, and negotiations with the United States yielded various provisions indicating that Canada needed to be consulted and agreements reached before activities could be undertaken on or over its territory.¹³³

Despite persistent Canadian concerns about their northern sovereignty, the wartime experience suggested that senior-level American officials did not harbour any surreptitious desires to permanently take over Canada's northlands. The future, however, remained uncertain, and questions remained unanswered. In February 1944, J.G. Wright, a member of the Northwest Territories Administration, had noted that "it is the far [northern] and western islands, which are reached by our administration mostly in theory, where our claims to sovereignty are most likely to be questioned." Wright observed that Russia had strengthened its claims to its Arctic possessions by establishing scientific and weather stations in the area and suggested that Canada might do the same. Such a course fell "outside the scope of the existing U.S. weather stations [in northern Canada], which are all in regions where no one is likely to question our sovereignty."¹³⁴ Malcolm MacDonald, a consummate prognosticator of concern about Canada's Arctic sovereignty, observed that the Americans now "treated ... with indifference the obstacles which Nature — whose sovereignty in the Arctic is even more supreme than that of the Canadian Government — put in their way."¹³⁵ Thus, while the Government of Canada had never invested in permanent scientific installations in the High Arctic, expanding American interest in this isolated region generated new pressures to take some form of action.

"It may be said that meteorological observations have kept pace with geographical exploration," Andrew Thomson noted soon after the war. Explorers had already "discovered" most of the islands of Canada's Arctic Archipelago by the late nineteenth and early twentieth centuries, but the larger question of what practical use they might be to Canada remained

open to debate. The perceived need to conscript them into the continental science and security web after the war reflected technological and theoretical advances in the first half of the twentieth century, as well as the rise of aviation and concomitant demand for meteorological services:

The maintenance of an arctic network of meteorological stations is exacting and expensive. Nevertheless, it must be not only continued but expanded. The consensus of meteorological opinion the world over holds that in the arctic data lies the clue to both more accurate short-range forecasts and to the development of long-range forecasting techniques. To this must be added a recent requirement for meteorological services to new trans-arctic air-routes. The responsibilities of Canada in this connection are definite and unavoidable — it may be safely said that her meteorological eyes are and will be turned to the Arctic for several years to come.¹³⁶

Synoptic data, obtained simultaneously over a wide area that provided a comprehensive portrait of the state of the atmosphere and could be used for more reliable global weather forecasting, thus supported transcontinental science imperatives as well as continental security considerations associated with aviation in the atomic age.

By the spring of 1945, the US Army Air Forces operated about 900 weather stations, more than two-thirds of which were outside of the continental United States.¹³⁷ Having shed its interwar isolationism and emerging from the war as a global superpower, the US needed access to long-range weather forecasting over much wider areas. “The weather requirements for a war in the foreseeable future will be different from those of World War II,” American meteorologist and inventor Irving P. Krick explained in December of that year. “Even from a defensive point of view data from the world is essential if adequate policing by the Air Forces is to be accomplished.” The “strategic bombing of small pin-point targets by piloted aircraft, and the occupation of enemy territory almost solely by airborne armies” would necessitate forecasts of cloud thickness at the target area, icing in the clouds, and winds at altitude. In the atomic age, wars might not last long enough to require collecting ongoing data over enemy

territory, but militaries needed to anticipate any contingency.¹³⁸ The Arctic now assumed a significant role given the likely trajectory of flights and missiles over the North Pole, but equally important was the influence of Arctic weather systems on global systems.

Improved knowledge about the polar air mass, which shaped atmospheric circulations in the Northern Hemisphere, was essential to produce accurate three-dimensional forecasting and long-range projections (geographical and temporal). National and international long-range air operations would depend upon such meteorological research. In the civilian realm, improved weather forecasting would bring a host of national economic benefits — from farming to industry — and local Arctic observations and forecasts would lay the foundation for the development of the great Arctic circle route envisaged by Stefansson. For military planners, the Second World War had demonstrated the strategic utility of air power and how modern methods of transportation, communication, construction, and subsistence could support the collection of data from isolated northern areas. Wartime exigencies demanded urgent action rather than the careful contemplation of long-term meteorological research programs. The facilities established by the US Army Air Forces and the Canadian weather service “provided a network of bases for northward progress,” a wartime report noted, “but there still remains a vast area beyond the arctic circle which is as yet meteorologically unexplored.”¹³⁹

If wartime imperatives during the war had pushed American meteorologists, and thus the Canadians, on a northward march into the archipelago, to even contemplate extending meteorological networks into its farthest reaches required a deep faith in the ability of modern technology to overcome some of the harshest environmental conditions on the planet. Whereas prewar explorers and bush pilots had opened the North on a modest scale, wartime advances in technology, logistics, and communications opened possibilities for an unprecedented degree of development. “Because of the war, the United States had developed the capability to construct bases almost anywhere in the world, and this was not an opportunity to be missed before that knowledge was gone,” geographer Peter Johnson recalls. To provide aircraft to build and supply remote stations that could not be serviced by ship, American planners soon “adapted lessons learned in the Pacific and Europe in transporting men and equipment to open up

the north.”¹⁴⁰ People who had participated in the development of the war-time air routes through the Arctic, and celebrated their conquest of a hostile environment, also acknowledged that the region’s relevance remained only partially understood. “It was an important war for the knowledge of the Arctic that we gained,” Colonel Bernt Balchen, the author of *War Below Zero*, noted:

Some day our whole conception of geography will be changed; the earth itself will be rolled over on its side, and the spindle of the globe will run, not from Pole to Pole, but from one side of the Equator to the other. Then the Arctic will be the very center of our new world; and across Greenland and northern Canada and Alaska will run the commercial airways from New York to London, from San Francisco to Moscow to India.¹⁴¹

To begin realizing the possibilities of this “new world,” with its civilian and military benefits, senior officials in Washington would need to convince their Canadian counterparts that the project was both feasible and respectful of Canadian sovereignty. The primary promoter of this vision was Charles John Hubbard.

Negotiating JAWS, 1945-47

A great gap exists in the network of Arctic aviation facilities, including weather, magnetic, and ionospheric stations, air navigational aids, communications and air fields; that this gap extends from Spitzbergen westward over most of Greenland, the Canadian Islands, and the Arctic Ocean to Siberia, and results in a serious lack of knowledge for interpolating meteorological data across the polar area, for forecasting the southward surge of cold Arctic air masses, for the preparation of suitable aeronautical charts, for the study and prediction of radio conditions, and generally for safeguarding air operations.

... I have now been directed to reaffirm and stress the interest of my Government in this program and to urge upon the Canadian Government the necessity of proceeding without delay toward the establishment in the northern areas of this hemisphere of adequate meteorological and other reporting stations.

US Ambassador Ray Atherton (1946)¹

Ambassador Atherton's appeal to the Canadian government in late 1946 revealed a sense of urgency to address what US meteorologists saw as a critical deficit: weather data from Canada's High Arctic, a region that

remained “meteorologically unexplored.” Data collected from the still hypothetical stations in this remote region would fill a major void, facilitating international civil flights over the Pole as well as long-range military operations in support of continental defence. Furthermore, weather observations on Canada’s northern islands would bring direct benefits to North Americans more generally, aiding “farming, construction, transportation merchandizing, and many other activities, as well as the every day life of the individual,” according to one report. While the North American allies had no systematic data of atmospheric conditions in their far north, the Soviet Union — which was quickly emerging as their chief postwar competitor ideologically and militarily — had already established an estimated 137 meteorological stations north of the Arctic Circle. Nordic states also had modestly expanded their meteorological footprint in their high north.² The US government had already secured congressional support to fund its plans, thanks largely to the indefatigable Charles Hubbard. What remained was securing the consent and cooperation of the Canadians who claimed the islands upon which the stations would be built, but who remained worried that their American allies might not respect this sovereignty.

Lieutenant-Colonel Charles Hubbard had proven instrumental in selling this vision to the US government — and in generating apprehension in Ottawa. Born into a wealthy family in Kansas City in 1902, one report suggested that “his boyhood was that of any other Midwestern American boy, until the age of 14 when he broke the pattern by going on an expedition to Labrador with the Grenfell mission. The adventure created a passion for exploration he was never able to overcome.” After returning from Labrador, he attended Harvard University, where he captained the football team and joined the Harvard crew. In his senior year, he won the Francis H. Burr award for his balanced leadership, scholarship, and athletics. With honours in arts and engineering degrees in hand, “he attempted to lead an eventless professional life as a civil engineer,” but the lure of the Arctic proved too strong. He listed his official occupation in the decade before the start of the Second World War as explorer and freelance writer. In 1931, for example, he was a cartographer and aviator on the Forbes-Grenfell North Labrador Expedition. Over the next three years, he owned and captained the expedition ship, combining cartography with

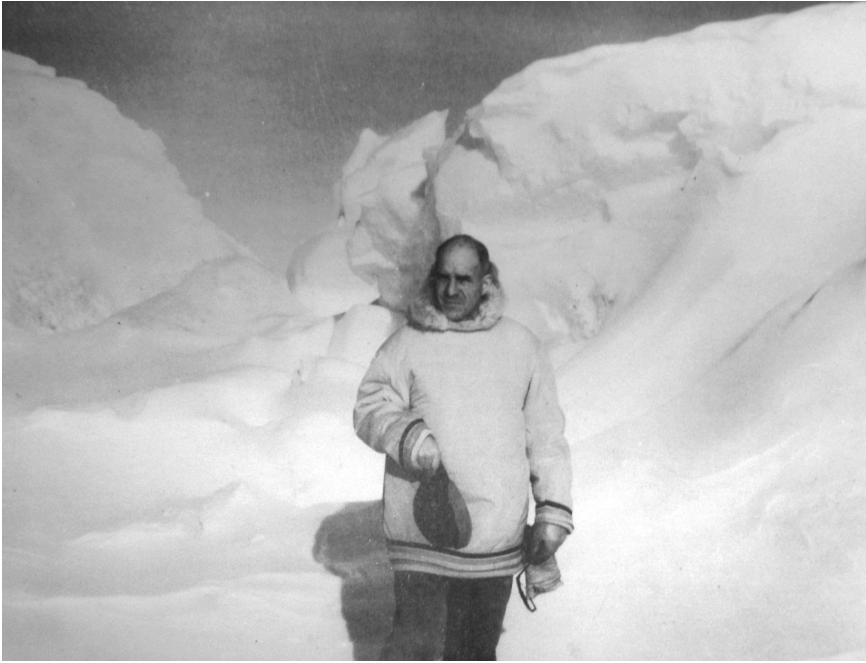


FIGURE 2-1. Charles Hubbard at Alert, spring 1950. NARA, RG XPOLA, Entry 17, Charles Hubbard Papers, Box 5, File Report on Airlift Operations, Spring 1950.

meteorological and oceanographic observations. He then sailed south in 1936 and 1937, taking his small schooner to the Galapagos Islands on a special assignment for *Liberty Magazine*. For the next three years Hubbard wrote extensively for national magazines in the US and lectured on his adventures.³ “He could think and plan and write and speak — and thus could translate his ideas efficiently to the many people whose support was necessary,” his wife Harriet recounted. He was a trained architect and engineer, “one of the most skillful, patient and ingenious mechanics, a first class carpenter” and draughtsman, with years of experience in flying, sailing, and outdoor living.⁴

Hubbard’s experience in the Arctic and other remote regions attracted the attention of the US military during the Second World War, given the global scale of the conflict. In light of his explorations and his amphibious background, defence officials deliberated whether he would better serve

the army or the navy. He ultimately served both. Hubbard entered the US Navy as a lieutenant commander in the Naval Reserve in January 1941. That September, the Army “borrowed” him to serve as a special assistant to General Henry H. “Hap” Arnold, the commanding general of Air Transport Command, to oversee the development of aviation facilities in the Arctic. In three weeks, he organized an expedition to establish three Crystal stations in the eastern Canadian Arctic, amassing supplies, radio equipment, and meteorological instruments to load onto the fleet of eight trawlers. On their northward course, the military commander of the expedition came to appreciate Hubbard’s seafaring and Arctic knowledge, and tasked him to take one ship ahead of the fleet to locate a site for Crystal Three — the most northern base. “It was an adventurous project, for the journey was long, the east coast of Baffin Island was wild, uncharted, and almost unknown, and the season was so late,” Alexander Forbes recounted. After picking the location and sounding (measuring the depth of) the passage, Hubbard retrieved two other ships and guided them to Padloping Island. The units discharged their cargos, built the base, and pulled out “just in time, for by early November the waters were closed in the grip of winter.”⁵ The following year he was at it again, borrowed by the US Army Air Forces (USAAF) Ferry Command to oversee the resupply of the stations, plan their expansion, and discern problems including the location of runways, station leadership, communications, equipment shortages, cargo discharge, and local ice conditions.⁶

By this point, Hubbard had joined the Army Air Forces as a lieutenant-colonel. Since the USAAF had assumed responsibility for the Arctic installations from the US Navy, he moved laterally across the services to continue his work. Having established the first weather stations in Labrador, Baffin Island, and Greenland, he grew disenchanted when the Army cancelled plans for thirty northern weather stations and then shut down the processing centre that he had organized and commanded to train and equip Arctic teams.⁷ “Charlie was at heart a one man army,” his wife noted, and he became disillusioned with his opportunities in Air Transport Command. For example, he was tasked to develop a Search and Rescue Service for the world-wide flight routes of Air Transport Command — “an outgrowth of the many lost planes on the Arctic air routes and also

of the end of the development of the Arctic as the war took a more southern turn” — but this was “limited to writing a few regulations.”⁸

Behind the scenes during the winter of 1943–44, however, Hubbard was hatching a much bolder plan: a line of weather stations across the North American Arctic. Every night in his study, after completing his military duties for the day, he poured over Sears Roebuck catalogues to determine the weight and cost of the necessary equipment. He studied Arctic maps, “scrutinized all the army and navy material on building bases and supplying them,” and read every Arctic book he could find. He discussed his ideas with an aerologist in the US Navy who provided information on the latest scientific equipment. “Charlie came to the conclusion that neither he nor anybody else really knew how to build a first class scientific station in the arctic,” his wife explained. “His idea was that the only good stations were small, very neatly and accurately engineered (to meet the weight and size limitations of air transportation) with materials and plans that had never been fully investigated, and staffed with hand-picked personnel.” When he pitched a tentative plan to his air force colleagues, they were unimpressed. Confident in the Arctic’s importance — and cognizant of an opportunity to carve a niche for himself that would serve him in postwar civilian life — Hubbard persevered in his research.⁹

In August 1944, Hubbard articulated his emerging vision for the High Arctic stations in the *Saturday Evening Post*. “The top of the world has two things we desperately need — information about our own weather, and short transportation routes to other lands,” he proclaimed. Meteorological knowledge, in particular, was the Arctic’s primary resource to contribute to the modern world:

Strictly speaking, it is the meteorology of the far north rather than the plain weather which interests us. Though we still have a great deal to learn about the science of our envelope of atmosphere, its application to our modern life is increasingly obvious. The air seems likely to become even more important than the oceans as a medium of transportation. In the present war, reliable weather anticipation may be decisive on land and sea and air. If we are planning either a transocean flight or a Sunday-school picnic, forecasts control our normal activities

in a thousand different ways. They help the farmer protect his crops and the builder choose auspicious days to dig foundations for a new house.

The US Weather Bureau estimated that its services were worth more than a billion dollars in national income. “We cannot change the weather,” Hubbard observed, “but if we know what is to happen far enough in advance, we are able to take precautions against floods and hurricanes and blizzards.”¹⁰ To this, one could add precautions against transpolar aerial attacks — a future concern as long as America’s wartime alliance with the Soviet Union against the Axis Powers remained intact.

Hubbard saw his plans for a string of weather stations, spaced five hundred miles apart across the Canadian Arctic islands and Greenland, as a service to humanity (and especially North Americans) made possible by modern technology. This would be a vast improvement over the lacunae of information that existed in 1944, and data collected four times daily would be “synchronized with meteorological reports from all over the world.” Prefabricated buildings, carried north by transport aircraft, would accommodate intrepid weather observers and their modern accoutrements. “The technical apparatus [at the stations] will include weather instruments, a hydrogen generator for inflating balloons for upper-air observations, and a reliable radio station,” Hubbard envisioned. The latter would be vital. “The marvelously compact and efficient radio instruments built for aircraft may be adapted to a ground installation by the erection of antennae on sectional masts of plywood tubing,” and personnel in remote regions would feed “weather facts ... into our domestic teletype circuits at home within an hour of the time of observation.”¹¹

Radio would also connect these Arctic denizens to civilization down south. “The radio takes the place of the family telephone, with perhaps an hour or so a week of visiting with friends thousands of miles to the south,” Hubbard envisaged. In his view, modern methods and equipment removed the barriers to “outfitting and supplying a group of men or even a family for a prolonged stay in very high latitudes.” Careful planning, “mixed with a dash of courage,” could overcome any obstacles. Like Vilhjalmur Stefansson, Hubbard painted the portrait of a “friendly Arctic,” not the bitter, dangerous, perpetually cold realm of polar explorers. The airplane

had shifted the equation. Whereas McClintock had taken twenty-seven “agonizing” months to make a round trip to the magnetic north pole, it was now accomplished in a single day. “Instead of the great adventure which it used to be,” Hubbard insisted, “arctic travel has become simply a technical specialty — a trade rather than an art.” In his promotional pitch, he claimed that airborne hazards were no more severe in the Arctic than elsewhere during the four months of “good working weather” each year. Coupled with radio and modern diets, he trumpeted that a technological revolution had “completely changed the picture of arctic living. In the past it was a desperate adventure to winter north of the Arctic Circle. Today it is possible to keep in touch with civilization and enjoy most of the usual comforts of home.”¹²

Prospects of trans-polar commercial aviation were likely to grow in the postwar world, so Hubbard insisted that an Arctic weather network was required immediately to lay the essential groundwork. Tapping into popular conceptions of frontier progress more generally, he reminded Americans that it would be “putting the cart before the horse to think of the airways first, since weather knowledge must precede the selection of airways, just as geographical knowledge must precede the building of a railroad.” It was only logical to select weather stations along potential air routes of the future — like a strategic outpost in Peary Land (along the northern coast of Greenland), lying “almost exactly halfway on the Great-Circle route between the centers of America and Russia.” The Russians had already developed a weather station program far beyond anything in North America, boasting “well over 100 observation points above the Arctic Circle, strung along the Siberian coast and on all the outlying islands, even the most northerly Crown Prince Rudolf Island in Franz Joseph Land, 1,000 miles north of the Circle.” By contrast, the Americans, Canadians, and Danes could plot “just one weather symbol” in their fifteen-hundred-mile stretch of the circumpolar north. Pilots who visited the Soviet Union during the war noted that their investment in Arctic meteorology was “paying handsome dividends,” helping to explain the successes of the Russian armies and air force on the eastern front. The Soviet-style “business of arctic development” was something to emulate.¹³

To do so required a wholesale change in the North American mindset about the polar region. “We must stop thinking of it as a white hell,”

Hubbard noted. “A measure of courage, perhaps, is required to appreciate the beauty of the arctic, but to those who are not afraid of solitude, nor of themselves, it is very beautiful indeed.” Wartime developments in Alaska and Greenland had exposed men to “the real north” and encouraged them to overcome their fears. Consequently, he anticipated few problems recruiting personnel for “the first small network of arctic outposts,” which would expand over time to “full-fledged airway-navigation points like lighthouses around the polar sea.” Modest initial buildings would soon be relegated to storehouses or workshops, replaced by:

a new residence with a white picket fence and a red roof... There will be room for a family or two and a few Eskimo servants. On a near-by hill, the tall towers of the radio will stand as sentinels on the new highways of the air. Some of us will someday look down from the cabin of a transport passing overhead. We may marvel, at first, at the smallness of a single house in the savage expanse of mountains and icefields. In the long night, the lights of the windows will show far against the purple snow — the lights of American progress.

Given this idealistic and racialized depiction — an Arctic suburb sustained by the marvels of modern technology and Indigenous servants— Hubbard concluded authoritatively that the cost would be “very small compared to the value of the results obtained.”¹⁴

Financing this ambitious program as either a private or public initiative would require support. Hubbard needed time and money to interrogate the problems of building and operating weather stations in the High Arctic, so he approached Dr. Karl Taylor Compton of the Massachusetts Institute of Technology (MIT) and Dr. Isaiah Bowman of Johns Hopkins University, who headed up a new Research Board of National Security in the National Academy of Sciences. With half of the Board’s membership comprised of Army and Navy personnel, Hubbard could count on military support and “the highest caliber of scientific support” for his studies of specialized techniques, equipment, and supplies to establish and maintain meteorological and scientific research stations in the High Arctic.¹⁵ The most immediate interest was weather data, Hubbard explained, but

a robust Arctic program would also yield scientific insights into areas such as radio propagation, ionospheric conditions, terrestrial magnetism, oceanography, and geology. The Russians demonstrated that they could maintain Arctic stations in the highest latitudes, and northern operations by the US and its allies during the war yielded “valuable practical experiences.” Planners acknowledged, however, that “many specialized operational problems [remain] to be solved before a reliable network of arctic stations can safely be undertaken in the western hemisphere.”¹⁶

Hubbard secured a research fellowship at the Massachusetts Institute of Technology (MIT) and set up the ARCTOPS (Arctic Operations) Project focusing on the logistical nightmare of resupplying and operating the stations year-round in treacherous (and still largely unknown) Arctic conditions. He also looked for additional support. In the fall of 1944, he discussed his work with several Canadian members of the newly-formed Arctic Institute of North America (AINA). They responded favourably — a positive indication given that he considered official Canadian approval essential to a project involving Canadian territory — but did not contribute money. Hubbard also approached commercial airlines, emphasizing that polar air routes would soon become a reality, but quickly learned that they were not interested in funding stations with an “over-all value” rather than a specific one that would appeal to private shareholders.¹⁷ Accordingly, he focused his energies that winter on eliciting public support.

As Hubbard’s proposal began to work its way through the labyrinth of Washington policy-making, he found strong support in civilian and military corridors. Dr. Francis W. Reichelderfer, the Chief of the US Weather Bureau and one of the first American disciples of the Bergen school of meteorology, had been a quick convert to the plan for fresh Arctic data — and immediately recognized that “it was too extensive and important to be anything but a government project.”¹⁸ Through the Joint Meteorological Committee, Reichelderfer shared Hubbard’s vision with the Army and Navy. “They will make use of the reports that the Weather Bureau gets of the Arctic,” the weather bureau chief later noted when testifying before the US House Committee on Agriculture, “and the Weather Bureau will be sure it is equipped and staffed to give the meteorological information required for all meteorological purposes in this country.”¹⁹ The Arctic Subcommittee of the Air Coordinating Committee (comprised of the

FIGURE 2-2. Dr. Francis W. Reichelderfer laying the cornerstone for a new USWB building in 1940. Courtesy of the Family of Thomas D. Whitely (National Oceanic and Atmospheric Administration).



assistant secretaries of State, War, Navy, and Commerce, and the chair of the Civil Aeronautics Board) set to work exploring how these stations would serve civil and military interests. In the end, they left the project to Hubbard to shepherd through the political fields of Washington. “In view of the problems of reconversion,” Hubbard claimed, “the

Weather Bureau and Army and Navy had so many problems on their hands that they very largely left to me the attempt to bring this whole program to some sort of accomplishment.”²⁰

Given that several planned stations would be based on Canadian territory, Colonel Hubbard also took it upon himself as an individual — rather than as an officially-sanctioned US government emissary — to pitch his plans to the Canadians. Armed with a head full of ideas and a stubborn sense of hope, Hubbard entered the Canadian Embassy in Washington on 2 March 1945 (three days before he was due to release from the US military²¹) to meet with ambassador Lester B. Pearson and his first secretary, Escott Reid. Hubbard argued that Canada and the US lagged behind the Russians in meteorology and in northern studies more generally. With the limited weather data available, it was impossible to forecast more than twenty-four hours in advance within a reasonable margin of error. Implementing his Arctic weather station plan would generate precise data

that forecasters could use to produce a pressure map. This was the key to unlocking the Arctic's weather secrets, with continental implications: an improved economy, better civil aviation, and more effective defence. The plan would only cost three to four million dollars for construction, followed by an annual upkeep of about a million dollars. Hubbard concluded his pitch by indicating that the US government soon would approach the Canadians with a formal request to proceed.²² He wanted to share his plans before word leaked through other channels, which he worried would generate undue Canadian suspicion or worry.

For their part, Pearson and Reid had already learned of Hubbard's plans for weather stations after he had discussed them with the Arctic Institute of North America (AINA) the previous fall. Pearson pointed out to Hubbard that officials in Ottawa would be hesitant to allow the US to build and operate meteorological stations in Canada's Arctic, unless they fell under Canadian control or that of an international organization in which Canada shared authority. It was a fairly innocuous statement, in line with the actions that King's government had taken to reassume control of American wartime activities in the Northwest. In response, Hubbard made an unfortunate mistake. Annoyed by the Canadians' apparent lack of enthusiasm, he suggested that the US still harboured "some doubt ... as to the extent of [Canadian] sovereignty over some of these Arctic districts north of Canada."²³ Whether he made his comment with ignorance of the sensitive chord it would strike in the Canadians or intended it as a threat, Hubbard had erred politically.

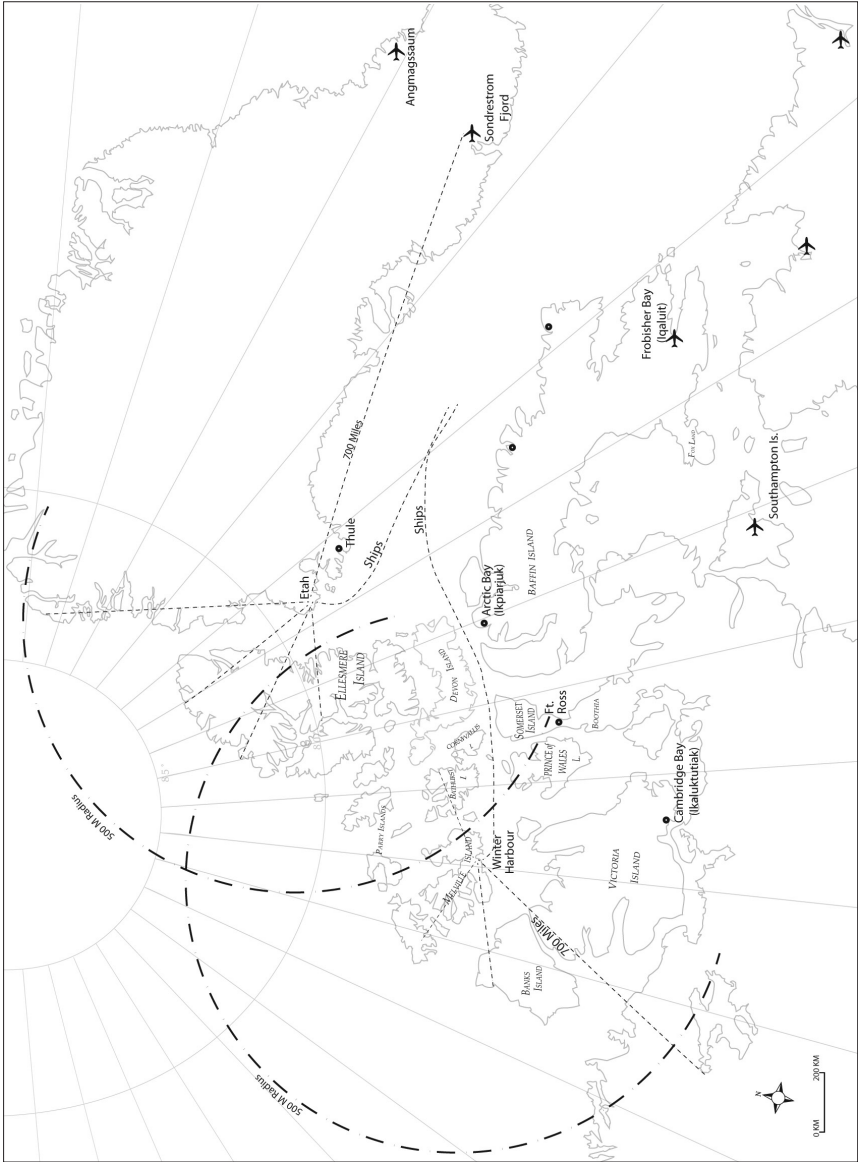
Raising sovereignty questions was the wrong way to coax the Canadians into accepting his weather station plans.²⁴ The Canadians quickly circled their wagons. External Affairs questioned several high-ranking officers with the USAAF Arctic, Desert and Tropic Information Center (ADTIC) about the plan, who suggested that officials should take Hubbard's proposals "with — to put it mildly — a certain amount of reserve" and discounted his statements about Canadian sovereignty.²⁵ "I gather that Hubbard is far from being persona grata to the Arctic experts of that organization who, in fact, managed some months ago to forestall his assignment work with them," foreign service officer R.M. Macdonnell, the secretary to the Canadian section of the Permanent Joint Board on Defence (PJBD), informed Pearson.²⁶ Meanwhile, Charles Camsell, the deputy minister

of Mines and Resources in Ottawa, played down Hubbard's comments, noting that the US War Department released at least three wartime publications that referred "repeatedly to the islands north of the Canadian mainland as 'the Canadian archipelago.'"²⁷ In short, Hubbard's views were personal — and not to be misconstrued as an official American position.²⁸

Despite raising hackles in Ottawa, Hubbard — now officially a civilian angling for a "good way to make a living"²⁹ — was making significant headway in Washington to secure political support for his program. He found a willing and powerful ally in Senator Owen Brewster, the conservative Republican from Maine. Hubbard convinced the senator that his weather station program was affordable and that the Arctic was not the impenetrable place that popular mythology held it to be. With Brewster's backing, Hubbard took the lead in drafting a bill in March 1945 that dealt "exclusively with the question of arctic operations, thereby separating it from the broad angles of general Weather Bureau duties and allowing sponsorship of this particular subject." Bill S.765 provided the Chief of the Weather Bureau, under the direction of the Secretary of Commerce, with the authority to develop an Arctic weather network. After working in an explicit statement about international cooperation at Hubbard's suggestion, Brewster introduced the proposed legislation to develop "an international basic meteorological reporting network in the Arctic region of the Western hemisphere" in the Senate.³⁰ On 29 October 1945 it passed the weather stations bill and referred it to the House of Representatives as a companion bill (H.R. 4611).

With the legislative process underway and his persistence finally paying off, Hubbard continued to work with ARCTOPS scientists and engineers at MIT. The project's approaches and summary report seemed to offer a quintessential example of the burgeoning military-industrial-academic complex in the United States. Past research by explorers or scientists during the First International Polar Year had procured few results compared to the immense resources invested, the ARCTOPS report asserted. "Penetration of the arctic on a reliable and permanent basis only became a practical possibility since the development of the transport airplane." Now armed with "modern methods for transportation, communications, construction and subsistence" that had been developed during the Second World War, "the problems of arctic operation shall become an engineer's

FIGURE 2-3.
 ARCTOPS
 project
 operations
 map, with
 Winter
 Harbour as a
 hub station
 (c. 1945).
 Jennifer
 Arthur-
 Lackenbauer



specialty instead of an explorer's adventure." The report ignored the importance of place to construction and operations by instead evaluating the needs of an "average station under average conditions." Approximately ten stations, including two transportation hubs which could be reached via ships during the summer, would be established at Winter Harbour, Melville Island, and Etah or Thule, Greenland. Ice-strengthened vessels rather than "big ice breakers" would supply these points. As knowledge of maritime conditions improved, ARCTOPS experts speculated that the vessels might even reach the satellite stations, thus saving the program considerable funds. In the meantime, aircraft would relay supplies from the hubs to the satellite stations. Spring landings by ski, wheeled aircraft on ice strips, as well as summer sea-born landings by flying boats were initially envisioned. No flights were planned during the dark period, although the report contemplated limited flights via moonlight and artificial runway lighting once the stations were fully established.³¹

The ARCTOPS report insisted that the recruitment of suitable American personnel would not be a problem. Remote service had proven "attractive to many men" during the war, and the authors saw little need for any "extensive" training for men to thrive in an Arctic environment. Maintaining morale at the hub stations would "not be difficult," and ARCTOPS officials reported that it might even become "desirable" for women to join men at the stations once operations became routine. By comparison, sustaining morale at the satellite stations would be a challenge during dark periods, but heavy work schedules, recreation, and plentiful and familiar food would help to achieve this goal.³²

As Hubbard's plans came together in Washington, he was careful to keep the Canadians in the loop. He informed Pearson in April 1945 that the weather station bill was now before Congress and updated Canada's ambassador about ARCTOPS research. Because he was "anxious to maintain an informal connection with responsible Canadian individuals," Hubbard proposed forming an advisory committee for his weather station program — an independent committee without any connection to the State Department.³³ Pearson, however, was unwilling to engage in unofficial diplomacy with Hubbard and advised the American Arctic advocate to contact the Arctic Institute of North America for assistance.³⁴ The Department of External Affairs kept a sharp eye on the legislation as it crept through

Congress, and insisted that all Canadian “departments should be on the alert to pick up as much information as possible about U.S. intentions.”³⁵ After all, Hubbard and his plan now had powerful backers.

Finding Funding

Although a civilian initiative, the Arctic weather station proposal gained additional support in official Washington circles as the international situation drew strategic attention northward. The wartime alliance between the Western allies and the Soviet Union began to unravel and suspicions grew as soon as the Second World War drew to a close. When Igor Gouzenko, a cipher clerk at the Soviet embassy in Ottawa, defected on 11 September 1945 with evidence of an extensive spy network reaching into the Department of External Affairs, the Allies’ atomic program, and the bureaucracies of its senior allies, a discouraged Prime Minister King conceded that “if there is another war, it will come against America by way of Canada from Russia.”³⁶ Although some Canadian analysts urged the West to adopt a more conciliatory approach to the Soviets,³⁷ most echoed their American counterparts in stressing the growing imperative to bolster continental security. Led by American strategist A.D. de Seversky, defence analysts replaced their Mercator projections with polar projection maps. Looking at the world from the perspective of the North Pole, the United States’ proximity to the Soviet Union became strikingly obvious. Given technological advances in long-range strategic bombing during the war, Stefansson’s interwar idea of the Arctic becoming the world’s “new Mediterranean” no longer seemed far-fetched either commercially or militarily.³⁸ Was the region becoming North America’s Achilles’ heel? Although the Soviet Union possessed a small strategic bomber force and no aircraft capable of returning from a bombing mission to the continental US, American military strategists and the press obsessed over the idea of enemy planes sweeping over the Pole to launch raids on the industrial heartland. On 5 December 1945 General Hap Arnold, the retiring Commanding General of the USAAF, declared publicly and unequivocally that the Arctic would be the heart of any new global conflict.³⁹

This was unwelcome news for Prime Minister Mackenzie King. After spending millions of dollars to “Canadianize” American installations from the Second World War, he was loath to permit the US military to

re-establish itself in his country's Arctic since he feared that the presence of foreign nationals could be used to undermine Canada's claims to the region. At the time, Allied governments were slashing their defence budgets and demobilizing large portions of their militaries, and there was little agreement about the urgency of mounting new peacetime defences. Although the Soviet Union did not yet possess the atomic bomb or aircraft capable of striking the US heartland and returning to the USSR, a growing number of American and Canadian experts began to consider how their militaries could defend the continent against such a threat. While the Americans pledged to continue protecting North America, the old ABC (America-Britain-Canada) defence agreement from the Second World War was not suitable for countering a surprise conflict over the Arctic rather than Europe. A new continental defence plan and a new Canadian-American agreement were needed. Learning from early wartime oversights, King was not interested in accepting American defence proposals piecemeal and insisted that an umbrella agreement be struck at the highest levels to limit the threat to Canadian sovereignty.

Meanwhile, the House Committee on Agriculture in Washington investigated the weather station bill. "Never before has the security of this Nation been so dependent upon scientific research and development," Representative Margaret Chase Smith (R-Maine), the sponsor of the bill, noted at its 22 January 1946 meeting. "Never before has investment in the field of science been so imperative. Any scientific program for the fuller development of our assets will be incomplete if it does not include Arctic research and study." Reichelderfer, no stranger to exploiting national security imperatives to further his own agenda, told the congressional hearing considering the program's funding that "it is very essential from a defense point of view to have full coverage of reports of weather likely to have a bearing on our theatre of operations." Overall, however, the Weather Bureau chief's testimony emphasized the civilian economic and industrial benefits of the proposed program, which he believed would start with five to six American-built Arctic stations and would stimulate "other countries to do their share by establishing stations under their own flags in their own parts of the Arctic." The economic benefits of the proposed program could exceed a billion dollars each year. An example he gave related to drying raisins, which could be protected from rainfall but this was

expensive and disruptive, and farmers only protected their drying crops when warned of widespread rains in thirty-six-hour forecasts. Reliable forecasting was key. On one occasion, USWB forecasters incorrectly forecast a light rain for Fresno, California. The region's farmers lost \$12 million in the ensuing heavy rainfall. Building a network of polar weather stations would improve predictive capacity across North America. "Without the information from the Arctic," Reichelderfer concluded, "we are lacking some of the data necessary to do weather forecasting in a more quantitative and scientific manner."⁴⁰ Recognizing that the program involved sites within the territorial limits of other countries, he highlighted the importance of securing their cooperation and permission. Because he enjoyed a close relationship with Canadian Meteorological Division director John Patterson, and in light of the close wartime collaboration between the two countries, the weather bureau chief had "every reason to believe that the Canadians would agree to any reasonable arrangement for us to establish and maintain stations at points that would be of benefit to them but which they cannot establish and maintain under present circumstances."⁴¹

Hubbard also appeared before the House Committee and offered similarly balanced testimony. Like Reichelderfer, he emphasized the civilian benefits of long-range forecasting for American life, from farming, to construction, to transportation, to merchandising. For an estimated \$200,000 per station, he planned to build up capacity from "an absolute minimum establishment in the first year, performing a minimum function," to full operations within a three- or four-year window. He even quoted a supporting letter from the Secretary of the Navy, James Forrestal, suggesting that the proposed stations were "primarily intended to aid in the development of civil and commercial air transportation and, if enacted, would have no direct bearing upon the steps which may be taken by the military services in the interests of national defense."⁴²

Hubbard also recognized the imperative of armed forces logistical support. In a detailed January 1946 report, he had outlined possible Arctic operations that spring and summer, providing detailed specifications for buildings, transportation requirements, operational timetables, and personnel. According to his plans, the Weather Bureau would depend upon the Army and Navy for transportation and supplies, and thus required their "full approval" to implement the civilian program. Hubbard's primary

objectives that spring were reconnaissance flights and exploration, establishing a base in the western Arctic (on Banks or Melville Island), and setting up a fuel cache and aviation facilities at Thule. Accordingly, he encouraged US officials to approach Canada and Denmark for approvals as soon as possible — but he recommended that the US should retain responsibility for the entire project. The Canadians would insist on participating for “national prestige,” and he envisaged sovereignty guarantees to allay their concerns. Nevertheless, he sought to confine Canada’s contribution to a few personnel or bush pilots, given that the US had the practical capabilities to build and operate the stations — and would accrue the greatest benefit from them.⁴³

Hubbard’s and Reichelderfer’s arguments were persuasive. On 12 February 1946 the House of Representatives passed Public Law 296, authorizing the Weather Bureau to “improve the weather forecasting service of the United States and to promote safety and efficiency in civil air navigation to the highest possible degree” by constructing and operating weather stations in cooperation with the meteorological services of other countries.⁴⁴ Hubbard’s wife recalled:

The need for the stations was wholly justified, in Charlie’s opinion and to those interested in meteorology, by their scientific possibilities. The fact, however, that the so-called defense interest of the U.S. also fitted the project very well was responsible for the relative ease with which the legislation setting up the stations was passed. Also there was no air or sea power on the continent except the U.S. Air Force and the U.S. Navy which had the capacity in planes and ships and men to take care of the transportation for the project. However, the possibility of doing a good job on the stations with a free hand was entirely due to the U.S. Weather Bureau, which, having no previous history in the area and no tables of allowances, requirements, and regulations etc. as have the armed forces, gave Charlie a free hand and also the most solid and substantial support.⁴⁵

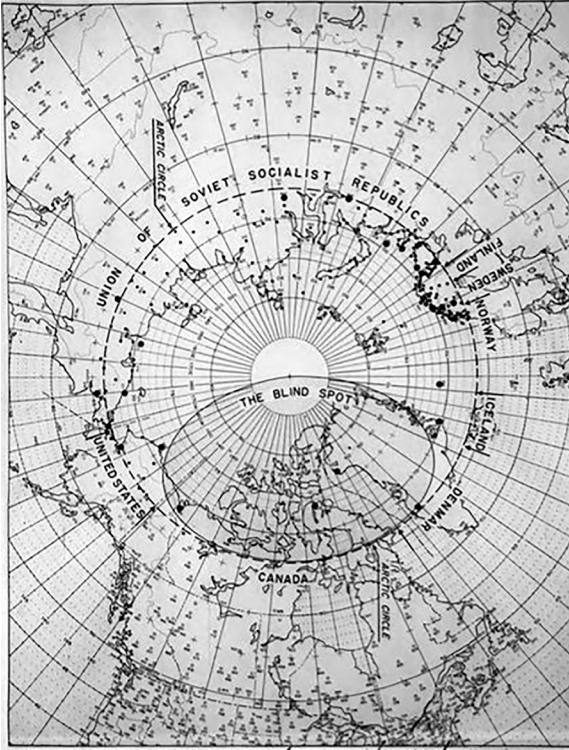


FIGURE 2-4. This US Weather Bureau map illustrates the higher density of weather stations in southern Canada and the continental United States compared to the “blind spot” in surveillance and scientific data above the North American Arctic Archipelago. USWB, “Station Density—North of 66° N. LAT.,” 22 November 1946. LAC, RG 25, vol. 3347, f. 9061-A-40. © Government of Canada. Reproduced with the permission of Library and Archives Canada (2021).

With its special Arctic weather station allocation for the 1946–47 fiscal year in hand, the Weather Bureau formally hired Hubbard as a special consultant beginning in April 1946. He laid out three plans: one to construct all the stations in one year, another over three years, and another over five. He was alarmed when USWB officials chose the first option, and worked feverishly in the spring of 1946 to finalize plans, procure supplies and equipment, and find appropriate personnel.⁴⁶ The window would be tight to actually build the stations that summer and the following spring — presuming that the international partners came onboard.

Accordingly, Lewis Clark, the counselor at the US Embassy in Ottawa, officially presented his government’s weather station proposal to the Canadian government on 1 May 1946. According to American plans, the first station would be established that summer with a staff of twenty. It would serve as the administrative hub for three smaller, satellite weather

stations set up in the spring and summer of 1947, each with a maximum staff of ten. The memorandum emphasized that the meteorological and economic value of the stations would benefit both governments. Given also the significance of Arctic weather information to continental security, the Americans asked that the proposal be treated with “the utmost concern.”⁴⁷

The American proposal also assumed that, while the United States was prepared to build the stations independently, the Canadian government would seek to retain control of these establishments on its territory. In this light, the Americans made two suggestions: that the US establish and assist in maintaining stations under Canadian control, or that Canada construct, operate, and maintain the stations independently. Most importantly, Clark “emphasized that his government wished to work out a programme on a fully cooperative basis and had no thought of interfering in any way with Canadian sovereignty.”⁴⁸ To finalize details, the Americans suggested a meeting of the key officials from both countries in mid-May. To the Americans, the scope of the project was perfectly reasonable and by insisting that it did not impinge upon sovereignty — Canada’s most glaring sensitivity — they anticipated a quick and favourable decision.

Canadian Concerns

A few days after the Americans submitted their official weather station proposal, an unfortunate development rendered some Canadian officials less confident that the US would respect their Arctic claims. General Guy V. Henry, the senior American military member of the PJBD, sent the US Air Coordinating Committee’s December report to his Canadian counterpart, General Andrew McNaughton, on 30 April 1946, seeking the old scientist’s feedback on its technical suggestions.⁴⁹ McNaughton promptly forwarded the thick American report to R.M. Macdonnell, who circulated it around Ottawa on 6 May. It proved to be a bombshell, feeding Canadian paranoia about sovereignty by commenting on potential “undiscovered” islands far north of the Canadian mainland. Although offering a final verdict that strongly emphasized the importance of bilateral cooperation and Canadian consent, the report ruminated on a range of subjects from airbases in Alaska to possible circumpolar flight routes, emphasizing the gap in aviation facilities from Greenland, across the “Canadian islands,”

to Alaska. This piqued Macdonnell's interest, especially the recommendation that American reconnaissance flights look for undiscovered Arctic islands upon which to establish weather stations. The main source of concern related to the "unexplored" area north of Prince Patrick Island and west of Grant Land (Ellesmere) which fell within Canada's "sector" but which might contain undiscovered islands that could serve as platforms for weather stations and communications near the North Pole.⁵⁰ Could the US claim any newly-discovered lands and proceed to set up installations on them without Canadian consent?⁵¹ "Arctic problems are coming more and more to the forefront," Macdonnell observed, "and it can be anticipated that within the next few years there will be extensive programmes of northern exploration and development in which the United States will either be participating with Canada or will have been given permission to act independently."⁵²

Broader contextual considerations added stress to internal Canadian deliberations on the proposed US weather station program. After several months considering guiding concepts and principles for postwar continental defence, the cabinet met to consider the PJBD's Recommendation 35, which called for close collaboration between the Canadian and American armed forces, including the right of transit and joint manoeuvres, but offered little reassurance that visiting American forces would respect Canadian Arctic sovereignty. A nervous King told his cabinet that he "believed the long range policy of the Americans was to absorb Canada," and that "they were already in one way or another building up military strength in the North of Canada." Based on these fears, they deferred a decision.⁵³ Concurrently, the Canada-United States Military Co-Operation Committee (MCC) — composed mainly of PJBD members and other military planners — developed a "Basic Security Plan" based on a near-worst case scenario of an existential aerial threat to North America by 1950. To combat this exaggerated threat, the MCC proposed the construction of a vast air warning radar network around much of North America, including a new one stretching along the Arctic coastline from Alaska, across the Northwest Territories, to Newfoundland. Extensive communications networks and meteorological stations would be needed for hundreds of interceptors to reach their targets.⁵⁴ Was the civilian weather station program a foot in the door toward whole scale militarization of Canada's North? The

thought of tiny, American-controlled stations popping up in areas that few Canadians had even visited, flying the stars and stripes, raised understandable worries in this broader context.

The Americans had their chance to weigh in when Canadian officials convened a joint conference on May 17 in Ottawa to discuss the weather station proposal. The American contingent included representatives from the US Weather Bureau, Army, Army Air Forces, Navy, and State Department, while their Canadian counterparts came from the Meteorological Service, External Affairs, the service departments, Transport, Mines and Resources, and the Northwest Territories (NWT) Administration. The Americans were excited about the meeting⁵⁵ and tried to convince the Canadians to sign on to the plan that they believed was “necessary to improve weather forecasting in the United States, Canada and the North Atlantic area generally for domestic purposes,” and that would also support continental security, bringing benefits “to international civil aviation and to the world generally.”⁵⁶ Hubbard, now officially part of the US Weather Bureau, delivered his usual spiel on the benefits of the stations and implored the Canadians to “strike, while the iron is hot.”⁵⁷ Having secured \$365,000 for the current fiscal year, he hoped to establish an experimental “beach-head” station at Winter Harbour on Melville Island in 1946, followed by stations on Banks Island, Prince Patrick Island, and the west side of Ellesmere or Axel Heiberg Island early the next year. While Canadian officials outside of the meteorological service and the military tended to weigh costs and benefits through a sovereignty lens, Hubbard looked through a budgetary one:

The American Navy has offered to lay down all supplies and equipment at both Thule and Winter Harbour this summer and the Air Force has agreed to do the necessary flying including the installation and servicing of the advance stations. The Congress Bill authorizing the United States Weather Bureau to seek the co-operation of foreign governments in the establishing of weather stations did not provide any funds. However, there are some funds available in several appropriations during the present fiscal year and for the early part of 1947. After that the future is uncertain. The American authorities

are anxious to use the available funds now when they exist. This is the reason for the urgency in deciding the issue at this time. The American Navy is ready to operate this season and put in the supplies and the Army Air Force is ready to start at once on reconnaissance flights to determine suitable locations. All supplies for this expedition must be ready by July 1, hence the reason for haste.⁵⁸

The American air force representative at the meeting, Lieutenant Colonel F.W. Hallagan, informed the Canadians that the USAAF commander was so interested in the project that he granted it equivalent priority to Operation Crossroads, the test of atomic weapons at Bikini Atoll. Accordingly, Lewis Clark argued for a quick decision, reminding the Canadians that “the international political situation at the present time is important. Those on the other side of the Arctic are very active. Because of this we can get funds at the present time and later this may not be possible.”⁵⁹

The Americans believed the meeting went extremely well. The Canadians had agreed that the proposed weather stations were necessary — even if they needed “a little time to study the matter.”⁶⁰ Although Hubbard lamented that the Canadians had not approved his scheme right away, given that he had only forty-five days to procure all the necessary equipment, he was certain that consent would be forthcoming. In anticipation, he set about organizing the mission to construct the stations with Air Transport Command, Strategic Air Command, and the Navy, and amassing requisite supplies and construction materials.⁶¹ Support offered by various branches of the Canadian military, which concurred on the stations’ relevance to continental defence, also bolstered American optimism.⁶²

Canadian civil servants, however, continued to harbour mixed feelings about the proposal. In a closed “Canadian session” immediately following the meeting with the Americans, J.G. Wright, the acting superintendent of the eastern Arctic, worried that “most of these stations were going to areas where our claims on the basis of actual occupation are very weak.” Given that the Americans did not accept the sector principle, the NWT Council emphasized that Canadians should operate any permanent facilities on their national soil. “Canada recently spent some \$31,000,000

... to extinguish any American rights” in the North, Wright highlighted, so it seemed unwise to contemplate allowing the Americans to operate the weather stations independently on Canadian soil. The US could pay for the project, but Canadians should provide the personnel and operate the stations. For his part, RCAF Group Captain Douglas Bradshaw “hoped that the project would not be turned down on the basis of the sovereignty question,” given the acute need for these stations to support air activity “in view of the rather disturbing [international] political situation at the present time.” Andrew Thomson of the Meteorological Service also hoped that the project would proceed, even though he doubted Canada could locate sufficient qualified technicians to run the proposed stations.⁶³

Sovereignty, Security, and Science

After receiving the US Air Coordinating Committee’s December report through PJBD channels, the Canadian Cabinet Defence Committee had commissioned its own study on Arctic sovereignty issues. Written by Vice Chief of the General Staff D.C. Spry, the Canadian report also conflated the weather station proposal with “other US proposals in relation to defence” and suggested that Canada’s sovereignty claims in the “Canadian sector” were “at best somewhat tenuous and weak.” Overlooking official activities to assert sovereignty in the interwar years, Spry suggested that a lack of effective occupation, settlement, or development weakened Canada’s position. “The fact that these claims have not been seriously challenged in the past does not mean that this fortunate situation will continue indefinitely into the future,” he opined. Ignoring traditional Inuit hunting on the archipelago, Spry deduced that “these regions represented little but empty space, and their very isolation preserved them from any significant intrusion.” Given their newfound strategic importance, he worried that “hitherto unknown islands may be discovered within the Canadian sector by a foreign power, and claim laid to them by right of discovery and primary occupation.” Although Spry conceded that the US “tacitly acknowledges Canadian sovereignty over ... discovered islands,” he stressed that:

it is of great importance that Canada should carefully safeguard her sovereignty in the Arctic at all points and at all times, lest the acceptance of an initial infringement of her

sovereignty invalidate her entire claim, and open the way to the intrusion of foreign interests of a nature which might create an ultimate threat to national security. At the same time it should not be forgotten that the Canadian Arctic is an integral part of the North American continent and her exclusive claims to sovereignty must be fitted into the overall requirements of continental security and defence. This Arctic area is considered as vital to the United States as a defence frontier as to Canada, and its military security requires closely coordinated action.⁶⁴

Spry did not advocate closing the Canadian frontier to the Americans. Instead, he recommended allowing access while balancing the twin imperatives of sovereignty and regional security. “The problem is thus seen to devolve into finding a suitable *modus operandi*,” he suggested. “This must permit the granting of essential facilities and rights to the United States without any consequent infringement of Canadian sovereignty of a nature which would give an opening to another power (not associated with Canada in the defence of the North American continent) to make similar demands.” The ideal solution — Canada providing all the essential facilities itself — was beyond the country’s available resources. The working solution lay in joint projects, where Canada retained full title and control over the facilities while the Americans helped to build, equip, and operate them. In the case of the weather stations, “considerable” US personnel and resources would be necessary to set them up, but Spry pushed for an escalating Canadian contribution until their personnel eventually outnumbered the Americans.⁶⁵ Even this relatively “modest” pragmatic solution, Macdonnell cautioned, was “likely to involve heavy expenditures which will increase as the years go by unless the international situation improves.”⁶⁶

Balancing sovereignty concerns, effective control, bilateral goodwill, and fiscal constraints proved difficult. Roy Gibson, the deputy commissioner of the NWT, anticipated that the stations would lead to more scientific study than had ever been undertaken in the North American Arctic: magnetic observations, astronomic studies, oceanography, geology, air photography, and other hydrographic and geodetic work. If the Americans

were at the helm, these well-publicized activities would reveal to the world just how active they were in the Canadian Arctic — and how little the Canadians were doing. He also warned that the Americans would not confine their activities to meteorology: they had a habit of squeezing as much information and activity out of their foreign facilities as possible.⁶⁷ “This looks like one of those defence (?) projects that looks as though we are getting everything for nothing in the beginning,” Gibson remarked; “and then we wake up after awhile to find that the US Senate has turned everything upside down and the US diplomats are back again to ask us to pay for work we could have done better and cheaper ourselves.”⁶⁸ He suggested that Canadians operate and supply the stations without American involvement, but the meteorological service again rebuked this idealistic notion when it noted that Canada simply did not have enough personnel or equipment to run the stations alone.⁶⁹

Aware of the divergent opinions between Canadian federal departments, the Department of External Affairs contemplated different courses of action in a report for the Cabinet Defence Committee on May 30. The American plan had obvious advantages for Canada: it would supply meteorological information required for civilian aviation and future military exercises in the Far North; it would serve as a base for science in a region about which little was known; and Canadian occupation of these areas would “forestall encroachment by foreign powers.” If the United States implemented the program independently it could diminish or endanger Canadian territorial claims, and the huge price tag for Canada to proceed independently made that option unattractive. Simply refusing to cooperate would elicit a strong American backlash and, in a worst-case scenario, might force unilateral American action. Given US budgetary pressures, deferring a decision until a joint planning group could go over plans and set specific parameters would likely delay implementation even though there was “active interest in the area.” External Affairs recommended a middle course: give the Americans immediate approval to carry out the program as a joint project involving as many Canadian experts as were available by July 15. Even if this was a “token number” for 1946, it would justify Canadian demands for equal representation the following year. “Such a compromise proposal would not involve Canada in as much expense as the assumption of entire responsibility for the programme, but

would safeguard the Canadian interest,” the memo explained. It would also create time for the Department of Transport to find and train skilled weather station personnel, and allow the armed forces to determine how they could best contribute ships and aircraft to “increase Canadian participation without assuming liability for a greater share of the expenses than we could reasonably bear.”⁷⁰

The advice from External Affairs also addressed the concerns of Mines and Resources by inserting a series of stipulations designed to protect Canadian interests. Canada would own and control the stations, with the US building them and providing equipment without acquiring any vested interest in or financial claim to the facilities. Furthermore, Canadians would replace American personnel as soon as possible, the two countries would share annual operating costs, and foreign scientists would adhere to Canadian laws. Finally, Canada would retain the right to downscale or shut down the stations if the US withdrew. While Mines and Resources lobbied for a clear American statement that the stations would not affect Canadian sovereignty, External Affairs disagreed. “The United States has repeatedly given the oral assurance that Canadian sovereignty is not, and will not, be questioned because of the establishment of these stations,” the legal division noted. By extension, the department deemed it “unwise to insist on a formal assurance of respect for Canadian sovereignty in this area at this time lest it give any indication of doubt on our side of the validity of our claim to any part of the undeveloped lands in the Canadian sector.”⁷¹

Although senior civil servants in Ottawa seemed to reach a consensus to authorize a joint Arctic weather program with the US, it was ultimately a political decision. Unwilling to commit with the prime minister away in England, the Cabinet Defence Committee deferred its decision on 12 June 1946.⁷² Hubbard grew increasingly anxious, lest he miss the narrow window of opportunity to begin construction during the short Arctic summer,⁷³ and he prodded the US government to re-apply pressure through various channels to try to expedite Canadian approval for his plans.⁷⁴ The War, Navy, and State Departments reiterated that these civilian stations were necessary for continental security,⁷⁵ but Canadian diplomats preached restraint. Pearson asked the War Department to “not press us too hard with urgent requests for quick action in the field of

defence in the North,” explaining that these developments might seem small to Americans, but to Canadians were “matters of great importance, strategically and politically.”⁷⁶ The civilian weather station program was imbricated with this broader defence agenda.

Prime Minister King returned from England on June 19 to face the weather stations issue. The real prospect of a Soviet war of conquest had loomed large in his discussions with key British politicians, who supported a Canadian bilateral defence agreement with the Americans.⁷⁷ While King understood the magnitude of the situation, he refused to rush into a decision without taking careful steps to protect his country’s interests — and his legacy. While most senior Canadian civil servants urged immediate acceptance of the US weather station proposal, he refused to consider it separately from the broader questions of continental defence. Accordingly, King and his ministers decided at the June 27 cabinet meeting to deny the American request to start the JAWS program that summer,⁷⁸ insisting that the Canadians required more time to formulate a coherent continental defence policy and to consider the extent of their country’s participation in the weather station project specifically. Their hands would not be forced, and King refused to untangle the civilian weather station program from the panoply of security projects that had implications for Arctic sovereignty.⁷⁹

The Americans had ratcheted up the pressure on the Canadians, but with little desired effect. R.M. Macdonnell informed a disappointed Lewis Clark about the Canadian decision over the telephone, indicating that “it would be necessary to await further progress in joint defence planning, while so far as civil aspects are concerned, there is a need for careful study of Canadian needs and capabilities.”⁸⁰ Internally, however, R.A.J. (Bob) Phillips (an official with the External Affairs division covering US affairs) reported “indications of developments not calculated to increase Canadian confidence in the intentions of some US officials. Some irresponsible enthusiasts in lower levels in Washington were known to have made ill-considered remarks about the possibility of raising the Stars and Stripes in unoccupied Arctic territory.” Canadian officials were well aware that Hubbard was busy collecting vast amounts of material for the project and stockpiling supplies in Boston, even before Canada approved the project.⁸¹ They were also aware that the US Weather Bureau had started to

recruit personnel for the project in early June,⁸² and that the recruitment letter made no mention of cooperation with Canada. Recruitment materials even suggested that American personnel would be allowed to bring wives and children with them into the Canadian Arctic as early as 1947.⁸³

These activities could be read to suggest American optimism in light of signals from Canadian officials, arrogance in assuming that the Canadians would sign on to their weather station program, or (if one was conspiratorially minded) nefarious intentions that the US would proceed with or without Canadian consent. Reflecting back and defending her husband's reputation, Harriet Hubbard explained his predicament. The US Weather Bureau had to establish stations on foreign lands, but "the rightful owners thereof look with alarm and distaste" on what they perceived to be the "Americans taking for granted that whatever they want to do there is going to be okay." The process presented an intractable dilemma. "No one in the U.S. can deal with a foreign government unless he is entitled to by law. So first you have to pass the law even if it deals with building some stations on a foreign land, before you can talk to the foreign government. But meanwhile they have been looking with alarm at your Congress passing laws about what shall be on their land without consulting them. This is what happened with Canada, and it is only fair to admit that the Canadians were justified though the impasse was inevitable."⁸⁴

For his part, Reichelderfer deemed Canada's refusal to be "extremely serious." He placed "a heavy burden of responsibility on Canada" for embarrassing him and the USAAF in light of the considerable funds they had already invested in preparations. The Canadians seemed to think the project could easily be delayed, but Reichelderfer worried that the planners would never again secure the same fortuitous combination of funds, naval ships, and personnel.⁸⁵ The next day, he urged the Secretary of State to encourage the Canadians to reconsider. His friends in the Canadian Meteorological Service had assured him the project would be approved. Was there something the Americans could do to coax the Canadians into accepting the project? Could the State Department ask officials in External Affairs what they wanted out of it? Maybe frank discussions could be held in which the Canadians told the Americans exactly why they disapproved of the project and how the situation could be fixed? Perhaps some further assurances on Canadian sovereignty questions might convince them?⁸⁶

Graham Parsons from the Division of British Commonwealth Affairs in the State Department took a calmer and more reflective view of events. General Dwight D. Eisenhower and the War Department placed strategic emphasis on the Far North, which had precipitated a flood of military requests which went “way beyond anything which Canada has been willing or felt it necessary to do with the United Kingdom [never mind the US] in peacetime.” With this in mind, Parsons warned his US colleagues that it was “extremely unwise to force Canada to accept any US activity on Canadian soil in peacetime that is not absolutely indispensable in the view of our highest authorities.” If the Americans did not aggressively push the Canadians, he was sure they would sign on for the weather stations program in due course.⁸⁷ He preached the virtues of patience. Canadian meteorological and military authorities strongly endorsed the program and “were as disappointed as Dr. Reichelderfer” with the cabinet decision. They needed time to build political support. American urgency stemmed from the availability of funds and transportation, but Embassy staff in Ottawa had heard “through the grapevine” that Canadian Arctic experts remained unconvinced by Hubbard’s plan and feared an embarrassing failure. Postponing the whole operation until the following year would provide time to develop more robust plans. Furthermore, the Americans had taken six months to wrap their heads around plans for the operation; the Canadians had barely been given a month to consider their interests.⁸⁸ The State Department concluded that Canadian interest lay in the construction of the stations and that their northern neighbours would be better positioned to contribute to the program the following year — with potential relief to the American taxpayer.⁸⁹

Despite overzealous Canadian media coverage in late June alleging an American “ultimatum” on Arctic defence issues,⁹⁰ American officials subsequently avoided pressure tactics and hoped to make the best of a disappointing situation. The Canadian government had quashed weather station plans for 1946, but the Canadian Chiefs of Staff still approved US naval operations in northern Canadian territorial waters for that summer and authorized aircraft with US Weather Bureau observers to survey potential Canadian locations for future consideration.⁹¹ This dovetailed with plans for a weather station at Thule, Greenland, which American officials had pitched to Denmark in April. In contrast to the Canadian situation,

the State Department secured Danish permission a month later for the US Weather Bureau to cooperatively manage a civilian installation at Thule, Greenland, under an American official-in-charge. The Danes promised to assign eleven personnel to the station (an equal number to the Americans) as well as housing and supplies, while the US would fund the installation and equipment.⁹² With the naval task group proceeding from Boston to Greenland, the USWB deliberated whether it should “gamble” on future Canadian approval and send building materials and stores to Thule, which could later be used in the Canadian Arctic. Canadian officials refused to predict what their government’s views might be in the future, and it fell to the American authorities to decide whether to retain their supplies in the US or ship them to Greenland.⁹³ They took the gamble, and it eventually paid off.

Operation Nanook (1946)

Hubbard, now officially designated Chief of the USWB’s Arctic Operations Project, had worked hard to secure essential materiel and logistical support from the US armed services to implement his weather station plans. His 1946 Arctic program, adjusted at the last minute in light of the Canadian decision, now had two principal objectives: establishing a weather station at Thule with Danish participation, and examining local conditions and potential transportation problems associated with proposed weather station sites “in Canadian territory.” Strategic Air Command, which fell under the US Army, had procured and delivered most of the necessary weather station supplies in the short time between congressional approval and the departure of the US Navy ships.⁹⁴ The Navy provided surface and air transportation through Task Force 68 as part of its Operation Nanook (a designation that Canada would have preferred to avoid because of its military connotation), as well as construction material, equipment, and supplies for the Greenland station and a potential station on a nearby Canadian island that, Hubbard hoped, would be approved in due course. Accordingly, Canada’s refusal to permit the construction of a station at Winter Harbour that summer had little practical impact on the Navy’s operational plan — including the landing of Marines for training and equipment testing on the Devon Island ice cap.⁹⁵

In early July, a five-ship American naval task force (including two cargo vessels, an aircraft tender with three long-range flying boats, an ice-breaker, and an ice-strengthened ship) left Boston for a site on the southern shore of North Star Bay in Wolstenholme Fjord, two miles away from the Greenlandic Inuit village of Thule. No one had informed the community's residents that American forces would call there that summer, prompting confusion when the flotilla arrived in the harbour on 22 July. When the county chairman received formal notification of Danish authority to proceed with the weather station a few days later, Hubbard personally oversaw onshore operations. With "a streak of good weather," the operations at Thule "shifted into high gear" by the end of the month. He recorded:

The ALCONA and BELTRAMI kept their boats running at full speed from ship to shore, loaded down with Weather Bureau and Army Air Forces equipment which would transform this small piece of Greenland into a modern weather station. Walrus Beach sprang to life with the unfamiliar grunting and roaring of tractors and bulldozers, the cracking and whipping of cranes, and the clanking of heavily loaded Athey wagons. Here we were seeing the start of the first of what was hoped to become a complete chain of well equipped modern weather stations spread out over the whole North American Arctic. Dreary work was in store for the men who would man those stations, but the results of their work, which would be more accurate predictions of weather for the ... continent and the Atlantic Ocean, ... will contribute a great deal to the better world we hope to have in the future.⁹⁶

While the Navy discharged cargo on the beach, ship personnel and construction crews helped build a camp of Quonset huts and prefabricated barracks. A combined meteorological observatory and radio station soon emerged with auxiliary instrument shelters, storage facilities, and living quarters for US and Danish personnel. The US Army Air Forces helped by airdropping additional supplies and inaugurating air mail service, while the US Army Corps of Engineers built an airstrip to facilitate monthly mail deliveries and the emergency evacuation of personnel. Hubbard

heaped praise on the armed forces, recognizing that the civilian project could not have been completed without military support.⁹⁷

Concurrent to the construction program at Thule, the Americans surveyed the northern islands of the Canadian archipelago for possible weather station sites. The day that the task force arrived in Thule, for example, a naval PBM flying boat completed a reconnaissance of Devon Island, and five days later undertook another one of the Grant Land coastline along northwestern Ellesmere Island. With twenty-four-hour daylight, these air operations proved invaluable for exploring and photographing uncharted areas, as well as for reconnaissance. Near the end of Operation Nanook in early September, aircraft from Thule flew the first reconnaissance of Eureka Sound and found open water. Pans and small fragments of ice, making up less than ten percent of the surface, would present little potential problem to an icebreaker. Furthermore, the landscape surrounding the sound was enticing. Although the land rose to several thousand feet, it was more propitious for a weather station than the mountainous terrain that dominated eastern Ellesmere and Axel Heiberg Island. Nansen Sound had more snow and extreme weather, the rugged Grant Land coast offered no suitable location, and the coast of Axel Heiberg was very flat — and potentially “soft and treacherous” in the summer months.⁹⁸ This intelligence, fed back to decision-makers in Washington, would influence the form and pace of development to come.

Maritime operations also tested the feasibility of constructing and maintaining weather stations by sealift. Although the ice pack at the entrance to Robeson Channel blocked the US Coast Guard icebreaker *Northwind*'s quest to reach a highest latitude, it managed to cover 480 miles on its northbound course in a mere three and a half days. Subsequently returning south and charting a westward course into Canada's Arctic Archipelago, the ship completed a successful reconnaissance voyage to Winter Harbour, Melville Island, and through to Cape Hay at the entrance of M'Clure Strait before “old, rugged, and thick” ice floes blocked its progress on September 2.⁹⁹ Accordingly, the American observers concluded that “it would have been quite possible, and not unduly hazardous, to have taken a standard cargo vessel to Winter Harbor” that year, and noted that the USWB could reasonably expect to build a weather station on Melville Island in due course. Even if ships could not expect such favourable ice

conditions every year, officials decided that the attractiveness of the land around the harbour for a station and airstrip made it ideal. They recommended building the main station there by sealift the following summer — presuming that Canada would assent to the operation in the coming months.¹⁰⁰

By all accounts, Operation Nanook was a complete success. “Within a few weeks, an existing airstrip at Thule had been repaired and enlarged, and a new regular weather station with ample storage space had been constructed,” historian Matthias Heymann describes.¹⁰¹ The Danish meteorological team arrived at Thule on September 5 with their housing and supplies. With their American counterparts, they immediately began to take surface and upper air observations and passed these along to the USWB in Washington. The last task force ships departed five days later, and Hubbard returned to Washington ahead of schedule. He was optimistic that, having proven the feasibility of his concept and accommodated the Canadian government’s demand for more time to deliberate, Ottawa’s approval would soon come. “Canadian observers present during the 1946 activities were in every way cooperative,” he concluded, “and supported a hope that satisfactory participation agreements can be found to permit the extension of an arctic weather station network on Canadian territory in the future.”¹⁰²

The five Canadian observers who participated in Operation Nanook were less enamoured with the experience than Hubbard intimated. Everyone concurred that the Americans behaved responsibly in carrying out their surveys of the archipelago and adhered carefully to Canadian guidelines,¹⁰³ so no one condemned the American activities. They noted, however, that some American military personnel seemed reticent to cooperate fully with their Canadian counterparts. Lieutenant W.E. Widdows of the Royal Canadian Navy (RCN) reported that “the Observers were treated with courtesy, but on the whole it was felt that they were considered merely as passengers. Information was never volunteered, and when given as a result of a direct question, seemed to be with reluctance.”¹⁰⁴ Another RCN observer complained that the Americans often refused to discuss operational matters with the Canadians and even forbade the Canadians from entering the navigation bridge. The Americans

considered the observers, who acted as the eyes and ears of the Canadian government, to be “very much in the way.”¹⁰⁵

Compromise and Cooperation

The political climate in Canada remained tepid, and sensationalist media coverage did not help the situation. Leaks from a senior Canadian official led journalist Kenneth Wilson to publish an article on July 20 in the *Financial Post* declaring: “Ottawa Scotches U.S. Plan to Man Weather Bases in Canadian Arctic.” Referencing “two particular sources” of inexorable American pressure to build up the “defensive machinery of the continent” — officials promoting “a big chain of weather bases in the Arctic” and “U.S. army and naval officials who view with alarm the fact that there is presently no effective defense of their northern boundary” — Wilson linked the weather station program with an “Atomic Age ‘Maginot Line’” that the US allegedly desired to stretch across the Canadian Arctic. A few weeks earlier, the reporter had warned Canadians that the government had received “a virulent ultimatum from the United States, calling on Canada to fortify her northern frontier” through a series of air bases that “would mean that Canada, in effect, abdicated sovereignty” in the region. After bringing this into public light, he noted that “apparently the government decided it would ‘take no chances’ on this U.S.-sponsored [weather station] project.” Nevertheless, “behind this swift and decisive action” Wilson discerned “a disturbing pattern of U.S. zeal and Canadian laxity in respect of northern and Arctic development.” While Canada refused to fund meteorological activities in its Arctic because of “indifferent interest and no imaginative leadership at higher Canadian levels,” Wilson asserted that the Americans willingly “pour in untold amounts of money and scientific brains and equipment for work like this — irrespective of national boundaries or the ‘sovereignty principle.’” Because the US refused to accept Canada’s “sector principle,” could it really be trusted to respect Arctic “territories claimed by Canada”?¹⁰⁶ An accompanying editorial urged Canada to take independent action. In light of the “very considerable pressures ... on Canada by the United States” for Arctic defence projects, it concluded that “the moral is clear: Canada must quickly get a policy of her own for developing the North or someone else may insist on doing it for us.”¹⁰⁷ While intended to stimulate Canadian action, these

articles (and others in *Maclean's* and various Canadian newspapers) raised worries in Washington that certain "interests" were looking to sabotage the Canadian-American defence relationship as a whole.¹⁰⁸

Through the fall of 1946, the Americans attempted to assuage Canadian concerns. The PJBD, for example, redrafted its 35th Recommendation to affirm that both countries retained the right to supervise all military projects undertaken within their territory, and denied that these activities would compromise each other's sovereignty.¹⁰⁹ For its part, the USWB reaffirmed that its interest was in reliable weather data — not in controlling stations in the Canadian Arctic. "Our primary purpose in planning the program is to obtain the daily meteorological reports that are essential to our forecasting services in this country," Reichelderfer explained to Parsons in the State Department in early September. "It makes little difference to us as to the source of the reports that if they are adequate as to areal [*sic*] coverage, contents, and regularity." In Reichelderfer's eyes, the nationality of the observers procuring the data was immaterial — his bureau's new proposal officially confirmed that it would be satisfied if the Canadian government operated the stations. The enabling legislation authorized the USWB to "promote cooperation of other countries" interested in an Arctic weather network, and its plans for 1947 could accommodate Canadian involvement. The Canadian Meteorological Service wanted to cooperate in the program, and Reichelderfer suggested that securing these civil and scientific goals would be more easily achieved if the "emphasis on military aspects" of the program was discontinued.¹¹⁰ The State Department duly communicated his message to the Canadians, including an offer to travel to Ottawa to initiate technical discussions, and the Canadian Interdepartmental Committee on Meteorology reopened the weather station file for its careful consideration.¹¹¹

The State Department, keen to smooth out any ruffled Canadian feathers, immediately elicited a revised plan from Hubbard and Reichelderfer. Hubbard's new multi-year proposal updated his earlier pitch: establish stations at Eureka Sound in the spring of 1947 and at Winter Harbour that summer, and select exact locations for stations at Banks Island and Borden Island or Isachsen that would be built the following spring. Earlier proposals had stated that the US government would prefer to establish, operate, and maintain the stations themselves. The new plan explicitly welcomed

Canadian participation, envisaging a joint project from the onset and reinforcing that the USWB was “interested only in the procurement of data” and was “not concerned with the nationality of the observers.” The fact that the Weather Bureau had already amassed 90% of the materials needed to install and operate the stations, as well as the capability of US Navy and Army icebreakers, cargo ships, and aircraft to provide economical transportation and logistical support, meant that Canada’s initial contribution could be “token” and limited to providing some station staff. It could gradually assume responsibility for the stations at a later date. Armed with experience gleaned from Thule and the reconnaissance of Canadian territory the previous summer, Reichelderfer felt confident that these new plans were both reliable and saleable to his counterparts in Ottawa.¹¹²

The revised Weather Bureau proposal emphasized the civilian and scientific objectives of the weather stations, not as a disingenuous form of “civilian cover” but as an honest reflection of the program’s intent. For the past year, the defence and civilian aspects of the project had been conflated (particularly in Canadian circles), creating confusion and suspicion. Reichelderfer admitted that the weather and scientific data collected by the proposed stations had “both civilian and military” value, but he insisted that the “civilian and scientific nature of our objectives” should be emphasized.¹¹³ The military’s interest in the stations justified Army Air Forces and Navy “exercises” to establish the stations, but Hubbard and Reichelderfer clarified that the actual civilian operation of the weather stations was distinct from the military’s transportation and logistical support. “Canada may display a desire to combine her military programs with the proposed civilian weather station project,” Hubbard acknowledged, but he believed that the “United States should continue to urge a separation of the Civilian [*sic*] and military planning, including physical separation of contemplated facilities in so far as practicable.”¹¹⁴

The Canadian Department of Transport shared a similar view. It lamented the lack of knowledge about visibility, fog formation, cloud cover, icing hazards, frost formation, and atmospheric circulation in the Canadian Arctic. What limited data it had on High Arctic conditions were derived largely from reports by historic expeditions, most of which had occurred during the summer months. Accordingly, the Interdepartmental Committee on Meteorology recommended in October that the two

countries should work together to set up three large stations in the summer of 1947 and smaller satellite stations in due course. Recognizing that the Americans had already amassed a lot of supplies for the program, including tractors, clothing, food, and all items needed to maintain the stations for fifteen months, these technical and subject matter experts also emphasized that cooperation with the Americans seemed both obvious and desirable.¹¹⁵ R.M. Macdonnell told T.A. Stone, the *Chargé d’Affaires* at the Canadian Embassy in Washington, that many Canadian officials were now leaning towards a joint Canadian-American program and would make their decision soon,¹¹⁶ and Stone relayed this information to an enthusiastic Graham Parsons at the State Department.¹¹⁷

Given the Canadian prime minister’s earlier reticence, translating the weather station plans into reality required bilateral agreement at the highest political levels.¹¹⁸ Despite Hubbard’s and Reichelderfer’s efforts to dissuade Ottawa officials from perceiving the proposed High Arctic stations as a military endeavour, King continued to view the program through a continental defence lens.¹¹⁹ What Canada needed from the Americans was a guarantee that they would not try to protect the northern approaches by leaving Canada out of the picture. King’s message to the cabinet, once again, was to buy time and proceed with caution. It was not a choice between security or sovereignty. The solution had to offer both.

The prime minister’s delay tactics worked. US Secretary of State Dean Acheson pressured President Harry S. Truman to bring King onto the same page about continental defence during a meeting at the White House on 28 October 1946, but the president limited himself to specific issues such as expanding the American presence at Goose Bay and the imperative of establishing weather stations on the archipelago, rather than discussing a basic defence plan. King refused to budge, only agreeing with Truman’s suggestion for further high-level diplomatic discussions. The next day, the White House transmitted a message summarizing these points and encouraging Canada to approve the PJBD’s re-drafted 35th Recommendation (which had been renumbered to become the 36th Recommendation). In response, the cabinet extended an “olive branch” to their American counterparts by agreeing to do so.¹²⁰ This decision laid the groundwork for landmark meetings on 16 and 17 December 1946, when senior Canadian and American officials met at the Château Laurier hotel immediately east

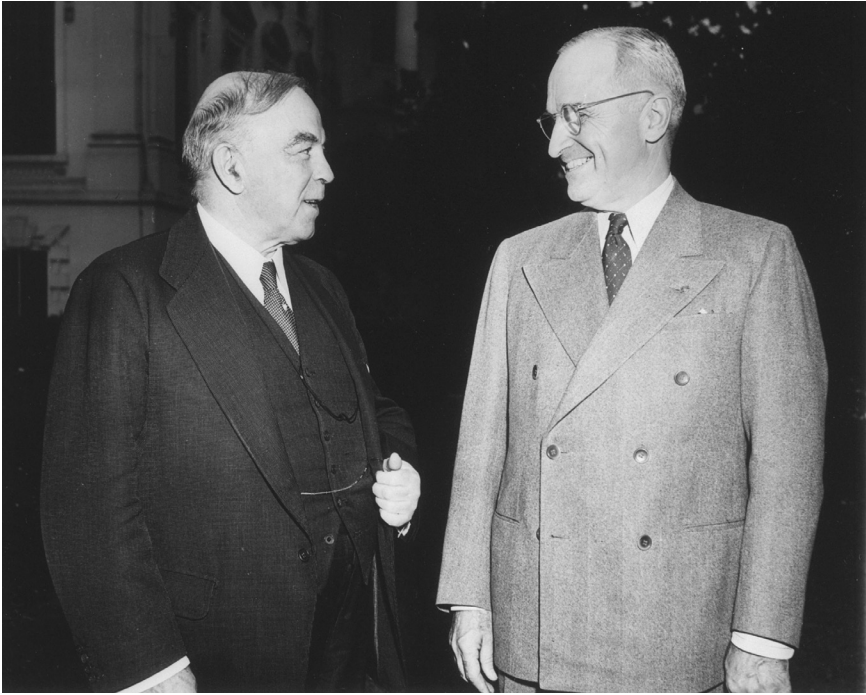


FIGURE 2-5. Prime Minister Mackenzie King (left) and United States President Harry S. Truman (right) at the White House on 28 October 1946. LAC, MIKAN 3193184.

of Parliament Hill in Ottawa. The meeting was kept as secret as possible, with military officials arriving at the hotel in their civilian clothes to avoid attracting attention. Here the allies hashed out a deal on bilateral defence cooperation that satisfied American security concerns without sacrificing Canada's national interests. The Americans conducted the meeting in a friendly and informal manner, having sent senior policy-makers for the occasion (including Russian expert George Kennan).¹²¹ Canadian officials observed that the Americans did not attempt to "present demands or to insist on certain things being done,"¹²² but made a reasonable case and allowed their Canadian counterparts to draw their own conclusions. "Far from being in an excitable or panicky frame of mind, the Americans had shown themselves very cool, level headed and realistic," a Canadian report noted.¹²³

At this high-level diplomatic meeting (which did not include representatives from the USWB or DoT), participants framed the weather stations within broad discussions of continental defence. Here the Canadians learned that the Americans did not want to dash into grandiose air defence schemes, nor were they interested in questioning Canadian sovereignty in the Arctic. Canadian officials, still worried that increased military activity in the Arctic would be perceived by Canadian voters — and Soviet officials — as unnecessarily “provocative,” suggested that these political problems could be avoided by, at least initially, developing Arctic defence projects under a “civilian ‘cover.’”¹²⁴ Although correctly identifying the Department of Transport as the Canadian agency responsible for the weather stations (not the military), and seeing nothing harmful about the collection of meteorological data, Ottawa mandarins continued to lump the civilian project in with defence ones. The joint civilian weather stations were thus associated with a perceived need to minimize defence objectives and “stress the civil benefits that can be anticipated from improving our knowledge of northern conditions and making the resources of those regions more available for general use.”¹²⁵

The Americans responded deftly to what must have seemed a bizarre request, given that the joint weather station plan was led by the civilian weather bureau. Accordingly, they framed Ottawa’s concerns as “primarily a Canadian problem,” but conceded “that such ‘cover’ could probably be provided in certain cases.”¹²⁶ The High Arctic weather stations were a convenient way to placate Canadian concerns, given that Hubbard and Reichelderfer had largely justified their proposed program on its civil benefits. The continental defence rationale brought needed support for their plans, but did not shape them. After all, the data would be shared internationally — including with the Russians. As long as the Canadian government consented to the construction of the weather stations and several modest defence projects in the Arctic, the Americans expressed little concern whether Canadian cabinet ministers believed that USWB and DoT management of the weather stations was a ruse to conceal “military” intentions. They knew better.

By all accounts, representatives from both countries emerged from the December meeting satisfied. “The smoke has cleared away from our recent meeting here and the scene is much clearer,” American ambassador

Ray Atherton wrote to Jack Hickerson. On the American side, “those who did not know Canada enlarged their horizon a great deal and will be more cooperative team-mates in the future.” Pearson believed that this quieter tempo was the outcome of six months of stalling on the Canadian side.¹²⁷ King gloated that “the Americans had come around to his own way of thinking,” and the US was pleased to have Canada “sign on” to the general principle of joint defence cooperation, especially in the North.¹²⁸ By respecting Canadian insecurities about sovereignty and security, the Americans made the price of defence cooperation significantly easier to bear. Given the threshold that King had set for re-evaluating the Americans’ weather station proposal, this bilateral breakthrough laid the essential groundwork for much-anticipated progress.

Reaching an Agreement

Substantive developments flowed quickly from this general agreement. On 16 January 1947, the Canadian Cabinet Defence Committee approved the final version of PJBD Recommendation 36, which laid out the basic principles for defence cooperation and provided explicit assurance that the United States did not seek to undermine Canada’s sovereignty in the Arctic (though it also avoided affirming or rejecting the sector principle). Instead, it pragmatically pledged that all defence projects would remain under the control of the host country, no permanent rights would be granted to visiting forces, and both countries would study each project individually and approve all public statements about the defence projects.¹²⁹ These “safeguarding principles” were “immaterial from the standpoint of United States interests” and in no way devalued the recommendation from an American perspective.¹³⁰ King announced the recommendation in Parliament the next month and most journalists, convinced that these principles of bilateral defence cooperation protected Canada’s interests, responded favourably.¹³¹

These principles fit with the substance of the revised USWB weather station proposal drafted the previous fall, which the Canadian government had now had ample time to scrutinize. Accordingly, after all the fuss and delay, the cabinet approved the Joint Arctic Weather Station project with little fanfare on January 28 — and proposed a more ambitious program than the Americans had contemplated.¹³² On February 13, Lester



FIGURE 2-6. Canada's Proposed Weather Station Plan, 1946. It envisioned the establishment of stations at Winter Harbour, Cape Kellett, and Grant Land in 1947; Barrow Strait, Cambridge Bay, Prince Patrick Island, or Borden Island in 1948; and the Sverdrup Islands, Simpson Peninsula, and Bache Peninsula in 1949. Jennifer Arthur-Lackenbauer

Pearson informed US Ambassador Atherton that Canadian officials wanted to establish nine stations across the central and western Arctic over the next three years (see figure 2-6). “In carrying out this programme the Canadian Government wishes to work in the closest possible collaboration with the United States Government,” Pearson explained, and he invited the Americans to “share in the establishment and maintenance” — a clever twist to allow Ottawa to claim the program as its own. The Canadians proposed that each country provide half the personnel for each station under a Canadian officer-in-charge, with the Americans retaining no rights to any permanent installations. To sort out the final details, the Canadian government proposed a meeting of technical experts a week later.¹³³ The USWB, which had been pushing for months for such a meeting, agreed immediately.

Historian David Bercuson observed that, by the end of 1947, Canada had established the principle of its Arctic sovereignty and the US reaffirmed this principle each time a joint defence-related project was initiated by seeking permission for operations in Canada. “Through trial and error, Canada established the policies and procedures by which it safeguarded its interests and protected its sovereignty while still satisfying the defense needs of its superpower partner,” he suggested. “In effect, Canadian control over the far north was systematically challenged for the first time since Canada had acquired the region, and, in effect, Canada’s claim to the far north emerged stronger than ever. Given the stakes involved, it was a remarkable success.”¹³⁴

While Bercuson is correct in highlighting Canada’s successful defence of its Arctic interests, his intimation that the United States had “systematically challenged” its control over the region is open to debate. This was a perception held by certain “northern nationalists,” who nervously looked at continental defence projects as a threat to Canada’s Arctic sovereignty and persistently worried about American intentions.¹³⁵ As the case of JAWS reveals, these proved to be misperceptions with strong political implications. While many Canadian civil servants and senior military officers were prepared to support the US Weather Bureau’s Arctic weather station plan, with additional conditions to safeguard Canada’s national interests, the prime minister rejected their advice in mid-1946 and delayed the project, refusing to consider a civilian weather station

proposal separate from broader questions about bilateral defence relations. Canadian historians have viewed the weather station debate as a prime example of US defence interests provoking Canadian sovereignty concerns. However, this interpretation downplays Charles Hubbard's vision and the US Weather Bureau's driving role in the American plans and, mirroring Prime Minister King's view, conflates civilian and military interests.

Several Canadian historians have overlooked or dismissed as a sham the civilian justification for the Joint Arctic Weather Station program, asserting that it was a "military project" from the onset.¹³⁶ To push through his agenda, Hubbard certainly had to secure the support of the US armed services. He also conceded, in early 1946, that "it seems probable that the considerations of national security which lie behind the authorization for an Arctic weather network are of more immediate concern than the procurement of meteorological data for civilian purposes."¹³⁷ But the continental defence agenda was not the primary conceptual driver for Hubbard's plans — however important it became for the civilian weather bureau in securing budgetary and logistical support. The US Army and Navy were involved in construction and resupply, but the actual operation of the stations — which generated comparatively little sovereignty concern and thus has not attracted the interest of Canadian scholars — was unabashedly civilian. Ironically, what Prime Minister King ultimately felt that he needed to pitch under "civilian cover" did not require such "cover" at all in American eyes. It *was* a civilian program at its core, albeit one that also had practical benefits for defence.

When unveiling the plan to the public in early 1947, Pearson suggested that it was "eminently desirable to emphasize the routine and civilian aspects of this extension of our weather station facilities." Accordingly, he recommended that Clarence Decatur Howe, the Minister of Trade and Commerce, issue the news release.¹³⁸ Thus, despite Prime Minister King's unwillingness to consider the Arctic weather station program outside of continental defence deliberations over the preceding six months, Canadian public messaging ultimately aligned with and emphasized the USWB's continuous message: that this was a civilian endeavour. Accordingly, Howe stood up in the House of Commons on March 4 to announce that nine weather stations would be built over the next three years in the Canadian archipelago and would operate for at least five years — enough

time to assess the joint program's value. Noting that Canada's climate and weather are affected more by the Arctic than any other point on the compass, Howe described the beneficial role weather stations would play in agriculture, lumber, transportation, and the opening of transpolar air routes. Since the Soviet Union boasted many weather stations on its side of the Arctic, Howe indicated Canada's desire to work with the USSR and the other polar countries in exchanging meteorological data. This message — which reinforced the vision articulated by Hubbard, Reichelderfer, and Wilkins — affirmed that this civilian program might actually promote circumpolar cooperation.¹³⁹ Finally, Howe commented on how important the stations would be for US long-range forecasting. Under this pretext, the Americans would be permitted to assist in the construction of the stations, which would always remain under Canadian control. "Until sufficient technically qualified Canadian-trained personnel are available," Howe explained, the United States would provide "technical personnel" to work alongside Canadians.¹⁴⁰ Having thus appropriated the American-conceived project as an ostensibly Canadian-led joint initiative, at least for political messaging, the Canadians were clearly on board.

It had been a long road, but prolonged bilateral negotiations had finally paid off. Although Hubbard and Reichelderfer had warned their Canadian colleagues that blocking weather station plans for 1946 (when they had confirmed resources) could spoil the entire program, their fears were misplaced. The United States ultimately funded a multi-year development plan, and the initial disappointment surrounding the Canadian delay gave way to improved plans and greater efficiencies. "We had such a head of steam at the time that it seemed like a crushing blow when the Canadians, by wishing to go more slowly, limited the first summer's operations to landing supplies in Greenland ... and to exploration work in northern waters," Harriet Hubbard recalled. The delay allowed the Weather Bureau to draw upon practical lessons learned rather than the "experimental conclusions" reached through the ARCTOPS program at MIT. "As a result of having more time, every succeeding station had been better engineered and better built than the ones preceding."¹⁴¹ Hubbard remained at the helm and, by early 1947, had both the resources and the Canadian authorization to implement his vision.

Situating the First Stations, 1947-48

As a result of studies made by Canadian officials, which took into consideration the views of the United States authorities, the Canadian Government has approved a plan for the establishment of a number of weather stations in the Arctic during the years 1947, 1948 and 1949. ... In carrying out this programme the Canadian Government wishes to work in the closest possible cooperation with the United States Government.

Lester B. Pearson for Secretary of State for External Affairs
(1947)¹

With the long-awaited Canadian cabinet approval in hand, technical experts met in Ottawa on 25–26 February 1947 to flesh out the details about the weather station program. Eight Americans representing the weather bureau, army, navy, air force, coast guard, and State Department arrived to reach a detailed agreement on the division of responsibilities to build and sustain the stations, to prepare schedules, and to determine transportation needs. They did not oppose Canada's proposed plan for nine stations, but Hubbard and the USWB insisted that available transport and supply would dictate the pace. Similarly, the Americans presumed that technical experts could adjust the precise locations of the stations based on operating problems and reconnaissance data gleaned from the field.²

The officials first deliberated on the location of the main base. Dr. Francis Reichelderfer recommended Winter Harbour. This site on Melville Island had lived up to its name for Parry in 1819–20 and Bernier in 1908–09, RCMP staff sergeant Henry Larsen had called there during his east-west transit of the Northwest Passage in 1944, and the US ice-breaker *Northwind* visited it two years later. Lieutenant-Colonel Graham Rowley of the Canadian Defence Research Board, who had extensive experience as an archaeologist in the eastern Arctic in the late 1930s and had commanded the advance party of Exercise Musk Ox³ in 1946 before retiring from the Canadian Army, thought that they should consider other possibilities — a prescient suggestion, as subsequent events would prove. Hubbard, however, dismissed the options of Bridport Inlet, Skene Bay, and Dealy Island because they did not clear of ice or had poor beaches, and he insisted that Winter Harbour remained the best choice. The group concurred. Andrew Thomson of the Canadian Meteorological Service lobbied to have the next station built at Cape Kellett on Banks Island, given its favourable conditions for an airstrip, fine harbour, and accessibility by schooner from Aklavik. Hubbard, however, doubted that large ships could reach Cape Kellett regularly, and indicated that the US would not be able to supply this potential site in 1947. Everyone agreed to postpone the Banks Island station for at least one year. Instead, Hubbard made a successful pitch to establish a satellite station at Eureka Sound on the west coast of Ellesmere Island as soon as possible. There, the terrain and weather were better suited than the north coast of Ellesmere or Axel Heiberg Islands. Hubbard had successfully gambled on eventual Canadian consent, so all of the supplies needed to establish the satellite station already waited at Thule and the countries agreed to quickly assemble their civilian contingent for Eureka by mid-April — less than two months away.⁴

The officials also agreed to general guidelines on personnel and infrastructure. Canada would contribute the officer-in-charge (OIC) and half the personnel (including their clothing, pay, and subsistence) at each station, as well as a Royal Canadian Mounted Police (RCMP) representative at the main station. As suggested in earlier proposals, all permanent installations at the stations and adjacent airstrips would remain Canadian property (thus allaying possible sovereignty concerns). The United States would provide the other half of the personnel and would cover the bulk

of the costs, including “temporary” buildings, meteorological equipment, transportation, fuel, and supplies. The executive officer, as the senior American at each station, would oversee American staff subject to the Canadian OIC’s policies and would report to the US Weather Bureau on technical matters. The two weather departments also agreed to consult closely on rates of pay to avoid generating resentment along national lines — although officials acknowledged that, in practice, standardization would be difficult because the weather services in each country determined their own salary rates.⁵

The ambitious weather station program required multi-year planning, but senior officials were reluctant to get ahead of themselves before gaining some experience. Andrew Thomson recommended periodic assessments and a bilateral decision, after five years, about whether the joint initiative should continue. Reichelderfer agreed, and tentatively approved the plan for stations in 1948–49. The Americans would continue to stockpile supplies and identify potential sites for future stations, but the USWB officially deferred any long-term commitment until it had implemented and assessed the stations at Eureka and Winter Harbour.⁶ While officials from both countries drafted a formal exchange of notes after the meeting, and repeatedly revised these drafts in subsequent correspondence, they ended up basing the actual implementation on the informal agreement reached in February 1947.⁷

The absence of a formal diplomatic instrument did not mean that Canada treated the program, or its potential sovereignty implications, lightly. Officials, particularly in the Department of Mines and Resources and the Northwest Territories Administration, carefully considered how Canada could maintain control over activities in the region without spending millions of dollars.⁸ Convincing the Americans to comply with Canadian regulations was a direct and obvious way. In March 1947, David M. Johnson (the head of the third political division responsible for American and Far Eastern Affairs at External Affairs and the secretary of the Canadian section of the PJBD) reminded the US Embassy about the rules and regulations that all American personnel involved in Arctic operations would be expected to follow. The *Game Laws of the Arctic Preserve* forbade all but Indigenous people from hunting in the Arctic Islands Game Preserve, which the Canadian government had expanded in 1942 to

cover the entire eastern Arctic. Accordingly, no one would be authorized to carry auto-loading rifles or automatic pistols into the territories. The *Archaeological Sites Ordinance of the Northwest Territories Administration* stipulated that no visitor could excavate a site or take relics from the Canadian Arctic without a licence from the territorial commissioner. Finally, the *Scientists and Explorers Ordinance* stipulated that all scientists needed special permission from the territorial commissioner and had to make available all of their research to the Canadian government.⁹ Most importantly, Ottawa insisted that Canadian observers would accompany all American missions and projects to serve as the government's "eyes" on the ground.¹⁰

With these understandings in place, the US and Canadian weather services were on a solid footing to launch the Joint Arctic Weather Stations. The Canadian-imposed delay in 1946 had meant additional time for Hubbard and his colleagues on both sides of the border to conduct research and analyze the results of the construction and operation of the station at Thule. This yielded better plans and better materials for the Canadian program. Nevertheless, modern planners, backed by scientific assumptions, icebreakers, airplanes, and complex logistical streams, still faced the practical environmental challenges of operating in the Arctic. Realities on the ground and in the waters of the archipelago would force decision-makers to reshape their plans and even their conceptual mapping of where, when, and how human activities could be accomplished. Practical experience demonstrated what was possible in the Arctic — and what was not. Thus, while establishing the first weather stations in the northern archipelago laid the physical infrastructure for science and for future expansion, activities and relationships on the ground — far removed from the comforts and predictability of southern North American life — exposed the human strains of operating at isolated sites.

Planners had identified relevant *spaces*. Now weather station personnel needed to create viable *places* to carry out their meteorological mission. Hubbard and his Weather Bureau colleagues carefully reminded their Canadian colleagues that they had to be flexible about specific locations. Preliminary survey data from explorers and previous scientific expeditions helped planners identify potential sites, but everyone recognized the limited knowledge about the islands in the far north. Preliminary air

and sea reconnaissance conducted the previous summer had already led the USWB to shift some of its plans and priorities given that these isolated stations would be completely dependent on aerial and naval resupply.¹¹ Geographer Peter Johnson, who in 1950 served as an American airstrip mechanic at one of the weather stations, explained that the main stations had to be “located on coasts expected to be open during the summer, so that the bulk of their supplies as well as those for the satellite stations could be brought by sea.” The satellite stations were also to be located along the coast but would be less dependent upon sealift: early plans anticipated that aircraft would deliver equipment and supplies in the spring and would drop supplies by parachute in other seasons.¹² To establish these smaller stations, aircrews needed a smooth strip of ice on which to land pioneering crews, equipment, and construction materials. The sites also needed to have the proper exposure to allow station staff to take reliable and appropriate weather readings. Equally important, the personnel needed access to fresh water, ideally from a deep pond or stream, and icebergs or two-year-old pack ice from which the salt had leached. Finally, planners looked for nearby stretches of land suitable for a permanent, “emergency” airstrip that could accommodate airplanes in the summer and fall when there was no solid ice upon which to land.¹³ Slidre Fiord, along the eastern shore of Eureka Sound, served as a test bed for these criteria.

Slidre Fiord (Eureka Sound), Ellesmere Island, 80°15'N., 86°11'W.

Plans to build a station in the Eureka Sound area of southwestern Ellesmere Island had taken general form in 1946. By the time Hubbard had learned that Canada had delayed its decision about the JAWS program, the Americans had already loaded the equipment and supplies destined for Eureka on ships. Consequently, the American task force carried them to Thule and stored them in anticipation of a 1947 spring operation. Once the Canadian government approved the weather station program, Hubbard needed to confirm a specific site. On 25 March 1947, the US Army Air Forces flew a second reconnaissance of the full length of Eureka Sound at low altitude, deciding upon a location at Slidre Bay on the northern end. Bold headlands protected the entrance to the fiord, which boasted “perfectly smooth” ice through its long, narrow reaches. Low, rolling country surrounded it, including a large flat area in a broad valley that could

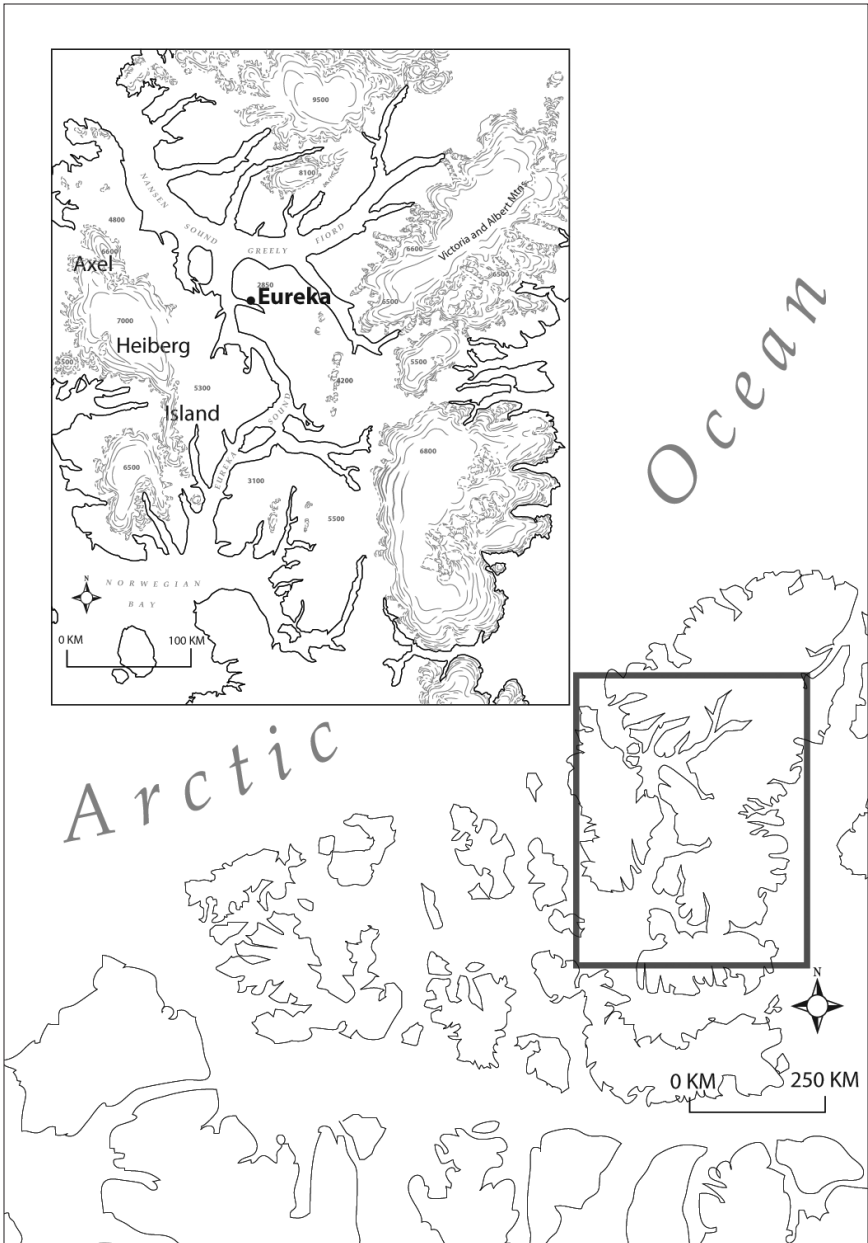


FIGURE 3-1. Ellesmere Island and Slide Fiord (the site of the Eureka station). Jennifer Arthur-Lackenbauer

accommodate an airstrip. The crew identified several potential camp locations near the shore, fed by two rivers and somewhat protected from the prevailing northwesterly winds.¹⁴

This vista, facilitated by airplanes, opened up new possibilities for the area. While ships had frequently visited the southeast coast of Ellesmere Island, the same could not be said of the west. Although nineteenth- and early-twentieth-century explorers found evidence of an historic Inuit migration from Baffin Island to northern Greenland via Ellesmere, Inughuit (northern Greenlandic Inuit) only periodically visited the island after 1860. These “foreign” hunting trips aroused sovereignty concerns in Ottawa for a short time after the First World War, but Denmark was actually the first foreign state to confirm Canadian sovereignty over Ellesmere in 1921. From 1900–02 members of Sverdrup’s expedition had traced the western coastline of the island which A.P. Low claimed for Canada two years later. Remote RCMP stations at Craig Harbour (1922–25 and 1933–40) and Bache Peninsula (1926–33) provided for “effective occupation” on an island without any other year-round human inhabitants before the Second World War. The Mounties’ epic sledge patrols through the Queen Elizabeth Islands led them through Eureka Sound, but they had no intention of establishing a post at such a remote location seldom visited by anyone. Consequently, the weather services’ decision to set up a small, permanent station at Slidre Fiord significantly changed the human geography of Ellesmere.¹⁵ Given the isolation and arduous conditions, the site also required a staff with the right mix of personality, skills, and adaptability.

Canada and the US knew that they needed to have station staff ready for mid-April, so Thomson and Hubbard wasted little time securing appropriate individuals. The Canadian selected as officer in charge, Justin (Jud) Courtney, accepted his assignment on 1 March 1947. The twenty-seven-year-old native of St. John’s, Newfoundland, was married with one child and another on the way when he left his home in Toronto for the twelve-month posting in the far north. “It was a job, and I wasn’t particularly happy about being away from my family,” he recalled six decades later. “But it was one of those things I had to do.”¹⁶ Unlike the American staff whom the USWB recruited specifically for the Arctic stations, the Canadian meteorological division simply assigned men from their regular weather service. At their headquarters at 315 Bloor Street West in Toronto,

the section chief and controller familiarized Courtney with the project before sending him to meet with the Arctic section of the USWB. “The Section staff were very courteous and helpful,” Courtney reported, “and did everything possible to present a complete and accurate picture of the work already accomplished and the work to be undertaken.”¹⁷

The main Canadian spearheading the project within the Meteorological Service was Andrew (Andy) Thomson. Born in Owen Sound, Ontario in 1893, he graduated with a physics degree from the University of Toronto in 1915 and completed his master’s degree the following year. For the next sixteen years, his interest in meteorology took him to work in Brazil, Germany, Washington, and the South Pacific. He maintained this international outlook even after he joined the Meteorological Service of Canada in 1932, recognizing that weather forecasting required professionalism and global engagement. Thomson planned Canada’s participation in the 1932–33 International Polar Year and played an instrumental role in establishing the first graduate program in meteorology at the University of Toronto. When the Meteorological Division moved to the Department of Transport (DoT) in 1936, he became its Assistant Controller and oversaw the planning and the administration of weather services to support continental and transatlantic civil aviation. During the Second World War, Thomson managed Canada’s expanding meteorological staff that served military aviation. Promoted to Controller of the Meteorological Division in 1946, he reorganized the department, oversaw its postwar expansion, and enjoyed his status amongst a small group of world experts who reconstructed international meteorology.¹⁸ In this role, he also scrutinized Hubbard’s plans and took charge of the selection of Canadian personnel for the Joint Arctic Weather Stations.

At the February 1947 meeting, senior officials had decided that the US would supply a radio technician, a cook, and a weather observer, as well as four men for temporary duty during the construction phase. Three Americans at Thule immediately volunteered, including John Trinko, who noted that this left “no need for outside recruitment.”¹⁹ Canada would provide two “met techs” (meteorological technicians, including Courtney) and a radio operator.²⁰ Given the short notice, the Canadians actually selected for the jobs had little time to get their personal affairs in order prior to leaving, and no time to get to know one another in advance. They



FIGURE 3-2. Andrew Thomson (undated photo). National Film Board.

had to form bonds as a group in the Arctic. On April 5, Courtney and the Canadian members of the advance station staff arrived in Thule, where they met with their American counterparts (including executive officer Per Stoen of Omaha, Nebraska). They quickly toured that facility, learning what they could from the air base staff about equipment and best practices. But there was little time to probe deeper. The aircrews were anxious to proceed with the Eureka airlift at a quicker pace than even J. Glenn Dyer, Hubbard's Weather Bureau assistant overseeing the operation, thought was sustainable, but he adjusted plans to meet their wishes.²¹ They delivered.

The creation of Eureka would serve as a template for subsequent satellite stations, revealing both successes and shortcomings in executing an audacious and hastily organized operation. On Easter Sunday, April 7, a C-47 aircraft flew the 360 miles from Thule to Slidre Bay carrying a light load of emergency food and equipment as well as four passengers: the

air task force commander, Charles Hubbard, the advanced station commander, and the executive officer. After landing on the sea ice at 11:02 am, Hubbard, Courtney, and Stoen quickly agreed upon a site on the north shore, just east of a large stream flowing from the valley. The pilots and task force commander studied landing conditions, and everyone concurred that the ice adjacent to the site could accommodate fully-loaded aircraft. (To be sure, Courtney tasted the ice to confirm that it was fresh-water, indicating that it was multi-year ice and thus solid as concrete.) The landing party marked the site with a snow cairn and, within forty minutes, re-boarded the aircraft for Thule with their choice confirmed.²²

The next day, US Strategic Air Command provided a Troop Carrier Command task force of three aircraft to deliver five members of the station crew and four loads of cargo to Slidre Bay. The temperature was -42°F (-41°C) and the wind was blowing when Courtney and his colleagues arrived and set up temporary shelter for a midday meal. No one was excited at the prospect of sleeping in small, inadequate tents, so Courtney's plan to build a prefabricated Jamesway hut with its insulated roof "met with instant and unanimous approval." By 7:30 pm, the staff had erected and heated the building, prepared hot meals, and set up the radio equipment. The next morning, they advised Thule to begin the air supply operations.²³

So began an endless cycle of airlift operations that strained the small station staff over the following week. At Thule, air crews quickly loaded cargo onto aircraft — particularly the C-82 Packet, which made wheeled landings on the ice (eighty inches thick) twice daily. The staff hauled the supplies from the landing strip to the campsite using a tractor and sleds. "Airlifting operations went faster and better than could have been hoped," Courtney noted in his diary on April 15. Ideal weather, smooth ice, and excellent radio conditions explained the success. All told, the spring of 1947 airlift delivered 110 tons of food, fuel, and consumable stores — enough to sustain the station crew for more than a year.²⁴

Unfortunately, the boxes of supplies and equipment arrived in a chaotic state. The simple task of locating all of the necessary instruments, instruction manuals, and equipment for surface and air observations required a herculean effort by two of the men who had to sort through mountains of unmarked boxes. In many cases, equipment that appeared on the supply lists never arrived. Given that construction plans for the



FIGURE 3-3. Personnel erecting the Jamesway hut on their first day at Eureka, 8 April 1947. John Trinko family collection. Published with permission of the Trinko family.

Canadian stations had hung in abeyance for many months, Thule staff had simply pilfered items for their own use during the winter rather than repairing or replacing their own equipment, never thinking to note their removal, requisition replacements, or maintain any inventory. As a result, the large chests supposedly containing all of the tools required to establish the station arrived “completely gutted” of everything useful. The radio transmitters arrived in unusable condition and without the usual tools to get them running, but the radio technician managed to get them

operating “in about a week of tedious and maddening work” thanks to his past experience, ingenuity, and “rather unorthodox and unusual test procedures.”²⁵

This situation also inhibited the local weather program. For more than a week, personnel searched for essential equipment only to discover that much of it had not arrived. Equally frustrating, no one had sent instruction manuals or forms to record and plot the specified observations. Courtney found most of the necessary instruments for synoptic observations, and the crew set up this equipment temporarily. Without weather code manuals, however, they had to try to “recall from memory the synoptic code and the various tables for individual code elements.” Only Courtney and the radio operator had taken these observations before, and it was impractical to obtain the complete instructions and tables by radio from Thule. Courtney recalled as much as he could, asked Thule for help by radio when appropriate, and muddled through. The ensuing chaos deeply upset the American executive officer, who had gone to great lengths to arrange the loads in priority order only to have his plans scuttled before departure from Greenland. In the months ahead, searches to find material wasted hours and even days, compounded confusion, and delayed progress.²⁶

The high tempo of work took its toll on the six permanent staff at the fledgling station. Courtney, as the officer in charge, had administrative and technical responsibility for construction activities at Eureka Sound. Although he had never suggested any length of workday, he noted in late April that since their arrival the personnel had worked fourteen-hour days, outdoors, and in cold temperatures. This reflected the initial excitement of setting up a new station in unique circumstances, but there were also signs of overwork and exhaustion in the form of petty irritations and even arguments over insignificant details. Observing that “enthusiasm was outrunning physical endurance and brought on a storm of protest,” Courtney decided to relax the work schedule to eight hours, choosing an indirect path by personally rising later and quitting work earlier each day. Everyone “thoroughly and universally criticized” his “delinquencies,” but within a few days the protests ceased and “human nature won out.” The staff adjusted to a more reasonable pace, and the OIC insisted that they take Sundays off during the early construction phase.²⁷



FIGURE 3-4. Eureka's first crew. Back row, left to right: Per Stöen, Thom Sheret, Jud Courtney. Front row, left to right: Murray Dean, Bob Tyrer, John Trinko. April 1947. John Trinko family collection. Published with permission of the Trinko family.

Because equipment shortages prevented the staff from beginning their full-scale weather observation program, they invested their energies in construction. For the first few months, the men lived in Jamesway huts — prefabricated units of 16' x 16' (which were expandable in 8' increments) consisting of insulated plywood floor panels that supported semicircular ribs covered with a heavily insulated, waterproof skin. The staff used one hut as their main living quarters, another as a kitchen, a third for storage, and a fourth for a latrine and storage. They also erected a Quonset hut (a precursor of the Jamesway with a metal roof that was not specifically designed for the Arctic) with six cubicles for personnel, a kitchen and dining room, and radio and meteorological offices. They initially planned to build it during the summer, when they would not have to overcome rock-hard,

frozen ground, but Courtney decided that there was no point idling. At this stage, “the novelty of pioneering in the set up of a new station” had worn off, so he decided to “tighten up on organization and supervise the various projects a little more stringently to avoid half measures” which would undoubtedly create problems later. “In all cases personnel showed good sense and a spirit of cooperation rarely encountered elsewhere,” Courtney applauded, indicating that his leadership style was effective and appropriate.²⁸

A USWB official inspecting the Eureka site in April highlighted the positive relations between the American and Canadian personnel during the construction phase.²⁹ The OIC was responsible for overall station operations and Courtney exercised jurisdiction over the American personnel through the executive officer (ExO), who was appointed by the Weather Bureau to represent its interests, maintain cooperation with the Canadian personnel, as well as account for American supplies and equipment. To fulfill his responsibilities, the ExO could communicate with the USWB at any time, but to reaffirm the “jointness” of the program (and that the Canadian OIC was in charge), both officials signed off on all official letters and reports.³⁰ In practice, this command and control relationship ran smoothly at Eureka. The Canadian Department of Transport, which oversaw the meteorological service, recognized that there was no hope of replacing the Americans in the near future — and noted the advantages of their involvement at Eureka. After all, the US possessed the supplies and transportation that made the project possible — and their willingness to pay for it was obviously greater with American personnel serving directly at the stations.³¹

Human interactions with animals proved to be more worrisome. The crew encountered a pack of eleven wolves almost immediately after their arrival, which interrupted building routines and forced them to take safety precautions. When the wolves snatched at papers and packing materials within fifty yards of the campsite, Courtney ordered that the staff move their supplies as close to their building as possible. He wanted to avoid giving the animals “a first taste of dried food from the camp,” knowing from personal experience at Norman Wells that this would lead to continuous raids, slashed and torn clothing and tents, and the loss of valuable items (often inedible) that wolves tended to steal. Courtney also worried

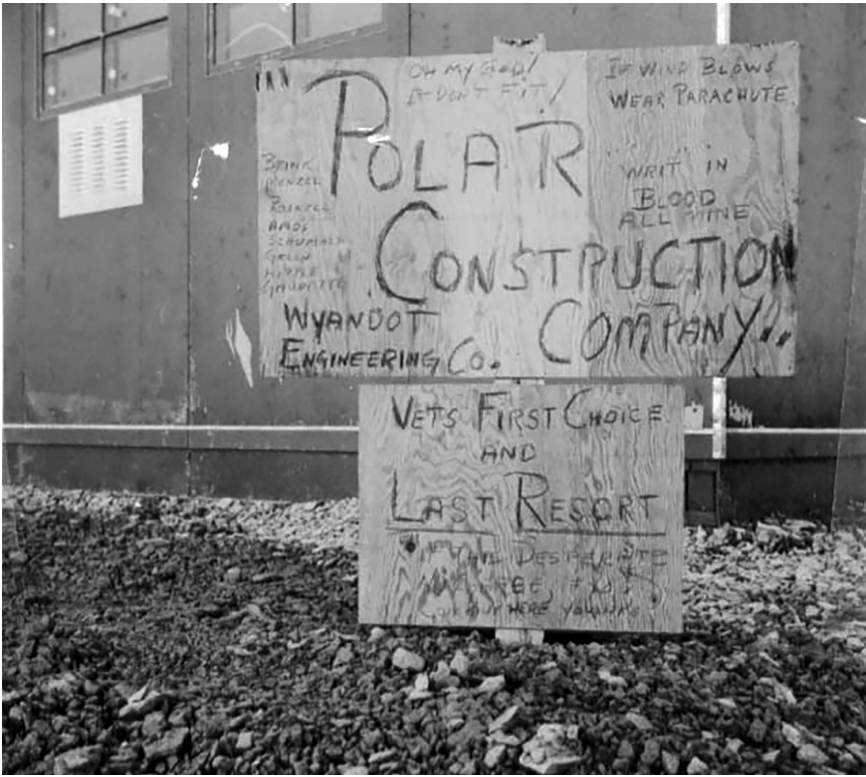


FIGURE 3-5. Signs announcing the “Polar Construction” team’s work at Eureka during Task Force 68 in 1947. Notes include “Vets first choice and last resort,” “Wyandot Engineering Co.,” and “Oh my God! It don’t fit!” Taylor report on TF 68 in NARA, RG 27, entry 5, Box 12, File Report of Task Force 68.

that these wolves posed a danger to personnel: these pack animals were “large and powerful, nearly as big as a small, newfoundland dog,” and he warned the staff not to get within striking distance of them.³² Three huskies arrived at the camp with the staff, but by late April wolves had already destroyed two that ran away.³³

After the spring ice melted to a point where it could no longer support aircraft, resupply or emergency evacuation would depend upon a reliable land airstrip. To build one, C-54 aircraft delivered two small tractors, a roller, harrow, grader, and hydraulic pan to Eureka — a harrowing experience given that neither the plane nor the station had the unloading



FIGURE 3-6. The initial Eureka site in late 1947 or early 1948. The original Jamesway hut is on the far left, with a Canadian pre-fab building alongside. To the right is another Jamesway hut “leaning” on the Quonset Operations quarters; behind is the inflation shelter. John Trinko family collection. Published with permission of the Trinko family.

facilities to manage the job. Much to the chagrin of the air crew, the staff improvised a solution. They moved the heavy equipment to the back of the parked plane, then people walked towards the back until it became tail-heavy and fell to the ground, where a pile of mattresses and comforters had been stacked to break the fall. Once the plane’s tail rested on the ground, the crew blocked the nosewheel with a sled and boxes. They used the tractor to drag each piece of equipment down an improvised ramp, held up by fuel oil barrels, while station staff guided it with ropes and crowbars. These precarious improvisations endangered men, aircraft, and equipment. Fortunately, no mishaps or damage occurred.³⁴

With this equipment, it took four men all thirty days of July to clear boulders and grade the dried silty soil on a level stretch of ground, about five miles from the station. The construction crew lived and worked at the site, while the two remaining staff carried on the radiosonde and communications program at the main station. By the fall, the men had levelled

a 4,000-foot-long winter airstrip and with “nearly unlimited” approaches from the south, they had room to expand as required.³⁵

The Eureka station had to balance this construction work with its core function of gathering weather data. In late May, an aircraft delivered most of the missing radiosonde equipment and supplies for the upper air program. Accordingly, the station officially inaugurated synoptic weather observations on June 1 and one radiosonde flight each day. Initially, the Canadian staff members with previous training did the work and Courtney held training sessions for the US staff every evening after they finished that day’s construction tasks. He found it difficult to hold the Americans’ attention; the men were tired and “not at all kindly disposed toward this perversion of their few hours of leisure time each day.” Accordingly, the burden of regular weather and radio work remained with the trained Canadian personnel. When news came that the sea supply would arrive in early August (much earlier than Courtney had anticipated), everyone agreed to intensify their training efforts. The ice had gone out of Slidre Bay on July 10, and the impending arrival of visitors, additional equipment and buildings, fresh supplies, and two more staff added incentive for the station to present a professional face.³⁶

Task Force 68 Ventures North

On 7 May 1947, the American Chief of Naval Operations stood up Task Force 68 — or, as it was popularly known, Operation Nanook II. Its basic mission for that summer was to provide logistical support to the USWB in establishing a main station at Winter Harbour on Melville Island, installing an automatic weather reporting station along Lancaster Sound, and re-supplying the existing stations at Thule and Slidre Fiord (Eureka).³⁷ Actual planning began when high-ranking US Army officers, naval officers with previous Arctic and Antarctic experience during Operations Nanook and Highjump, and Weather Bureau officials convened in Washington about a week later.

Canadian Lieutenant-Colonel (ret’d) James Donald Cleghorn, whom Hubbard had requested to serve as the officer in charge for the main station to be built that summer,³⁸ also attended. Cleghorn, an ornithologist and associate curator at the Redpath Museum at McGill University in Montreal before the war, had been originally commissioned in the Black

Watch (Royal Highland Regiment) of Canada. He had wartime experience commanding Canadian and American troops in isolated conditions as the former base commander at Camp Churchill.³⁹ He had also been responsible for maintaining the moving force during Exercise Musk Ox in 1946, managing discipline, accommodation, and rations.⁴⁰ Based on this experience, Hubbard had tried to secure Cleghorn to lead the Canadians during his proposed Arctic mission the previous year (and Cleghorn was willing to do so), but the Canadian Army refused to release him despite the best efforts of the Canadian Meteorological Service.⁴¹ In early 1947, however, Cleghorn managed his release from the military so that he could head up the station planned for Melville Island where, in addition to his other duties, he expected to study the local fauna and collect bird and mammal specimens for the National Museum of Canada.⁴²

The general discussion at the Operation Nanook II planning meeting, Cleghorn recalled, assumed that the Navy task force would reach Winter Harbour “without the slightest doubt.” Beforehand, however, he had discussed the plans with the venerable Arctic explorer Sir Hubert Wilkins, who warned him “that our chances of reaching Winter Harbour in 1947 were slim indeed owing to the already known fact that the Western Arctic had just experienced one of the coldest winters on record and that ice conditions on Viscount Melville Sound and the adjacent seas would probably be severe.” When Cleghorn raised this at the meeting and advised the group to consider alternative sites, his concerns were dismissed. “So convinced were those present that nothing could stop the new and powerful icebreaker USS *Edisto* and her ability to lead the convoy through,” he noted, “that my suggestion was received in silence.”⁴³

The planning team, however, was resolved to improve on the experience it had gained earlier in the year in setting up Eureka. The group sent to Ellesmere Island under Courtney’s leadership had been hastily assembled. Although the Canadian Meteorological Service still had to “scrounge” to find suitably trained personnel, Cleghorn’s team would be fully staffed and equipped.⁴⁴ Sixteen men would serve with him at the main station: seven other Canadians, eight Americans, and an RCMP constable.⁴⁵ They would bring ample equipment and supplies for the new station (as well as permanent buildings for Eureka), including tractors, heavy airstrip graders, power generators, prefabricated housing, fuel oil,

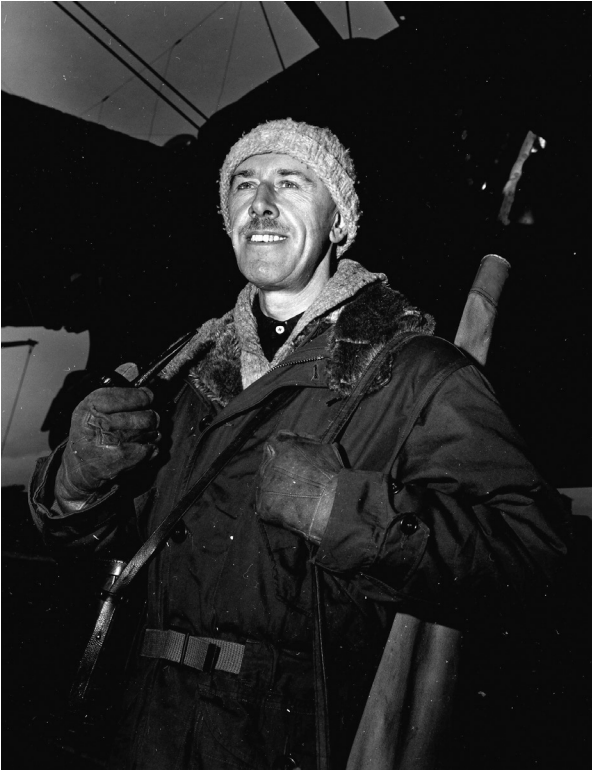


FIGURE 3-7. J.D. Cleghorn in 1946. University of Manitoba Archives, Andrew Taylor Collection, Photo No. 616001, 27 August 47. PC110, Box 3, Folder 14.

clothing, food and emergency rations, as well as meteorological and other scientific equipment — enough materiel for the station to operate for at least two years without further resupply.⁴⁶ Logistic planners invested tremendous effort in marking the shipments in various colours and numbers to show their destination and classification.⁴⁷ The well-oiled American gears were turning, and there was little room for Canadian officials to interject once the plans had been set. On June 13, Cleghorn informed J.G. Wright, the superintendent for the eastern Arctic and the secretary of the NWT Council, “that he gained the impression from the general attitude of certain high-ranking U.S Service personnel (not civilian) that the establishment of these weather stations was largely a U.S matter and that Canadians were being taken along largely as matter of courtesy.”²⁴⁸

The naval flotilla would head north under American flags. On 1 July 1947, Captain Robert S. Quackenbush, Jr., who had been the executive

officer of the Navy's Antarctic operation Highjump the previous winter, took command of Task Force 68 and its three ships. USS *Edisto* (AG-89), a Wind-class icebreaker, was loaded at Boston Navy Yard. Onboard were two aircraft: a Grumman amphibian J2F-6 aircraft and a Bell HTL-1 helicopter. USS *Wyandot* (AKA-92), a 10,000-ton cargo ship, was loaded at Sea Warren, New Jersey, before heading to Boston. USS *Whitewood* (AG-129), a small, 2,000-ton wooden cargo vessel with limited icebreaking capability (used mainly for survey work), sailed out from Norfolk.⁴⁹ On July 10, Captain Quackenbush hoisted his broad command pennant in *Edisto* signalling the start of the mission. The ships' departures were staggered based on their relative speeds. *Whitewood*, the slowest of the ships, left from Boston on July 15 and *Edisto* followed two days later. From the onset, Cleghorn was determined to ensure that the Canadians were not overlooked. "As soon as he embarked on the American icebreaker ... he wanted to raise the Union Jack," Patrick McTaggart-Cowan of the Canadian weather service recalled. The Americans were not impressed.⁵⁰

One of the men recruited to participate in Task Force 68 was twenty-nine-year-old William Gerrish (Gerry) Metcalf, whose personal logs (penned to his wife Elizabeth) provide an intimate glance at the operation. Metcalf joined the Woods Hole Oceanographic Institution (a private institute in Massachusetts) as a physical oceanographer after demobilizing from the navy at the end of the Pacific War. After serving for four months in Antarctica as oceanographer and staff scientific liaison officer during Highjump, he returned to the institute uncertain about his job security and thus agreed to participate in the Arctic expedition as an ice and bathythermograph (BT) observer.⁵¹ Onboard *Edisto*, conditions were cramped — a reflection of the tremendous interest in the Arctic voyage. In contrast to Metcalf's Antarctic operations, where he had shared a two-man cabin, there was:

a whole gang of us down in a bunk room just below the Ward Room. There are about 8 or 10 triple decker bunks with narrow clothing lockers nearby and a "head" with 5 toilets, 5 wash basins and 2 showers in an adjoining compartment. There is an odd collection of characters living in this hole — oceanographers, Fish and Wildlife personnel, a Naval Intelligence

Officer, some Canadian observers (Air Force, Navy and Department of Transportation) and even a couple of ship's officers for whom there isn't enough space in regular cabins. About the nicest thing that can be said for the set-up is that it is just about amidships so the pitching in rough weather is somewhat subdued.⁵²

Cleghorn echoed similar concerns about the quartering and handling of civilian personnel, who were "treated as enlisted men or naval ratings and quartered in the most crowded and unpleasant section" of the naval ship.⁵³

Edisto dropped anchor at Thule on July 23. Captain Quackenbush and his entourage visited the weather station and the Danish settlement, and were joined by Charles Hubbard when he arrived by aircraft that evening. There they plotted the next steps. They knew little about ice conditions in the Canadian archipelago, and poor weather inhibited reconnaissance flights until the following day. Poor weather also prevented contact with *Wyandot*, whose departure from Boston had been delayed by a fire in one of its diesel generators. Once it arrived, *Wyandot* and US army engineers completed the resupply of the Thule weather station in only seventeen hours (not the anticipated three to five days), allowing the task force to proceed to the next phase of its operations.⁵⁴

The next stop was Devon Island. *Edisto* and *Wyandot* had a difficult crossing: rough seas, poor visibility, and 30–40 knot winds from the south-east. By radar, they made landfall on Cape Warrender on the morning of July 27. *Edisto* proceeded into Dundas Harbour and laid anchor, while *Wyandot* remained outside to await better weather. Captain Quackenbush, Hubbard, and three other officials went ashore to confer with the two RCMP constables stationed at what was, at that point, Canada's northernmost detachment. Based on the Mounties' advice, Hubbard decided to set up an automatic weather station near the RCMP post, where the police could service it periodically, rather than his planned location on Beechey Island (where it would be inaccessible during the winter).⁵⁵ The next morning, a US Marine Corps detachment landed on Canadian soil with "their amphibious and fully tracked tank-like vehicles for experimental work on the Devon ice-cap," Cleghorn observed. Working in continuous daylight, he and the other civilian personnel bound for Winter Harbour helped the



FIGURE 3-8. *Edisto* after its transfer to the US Coast Guard in 1965. US Coast Guard.

Marines set up the automated station before venturing further into the archipelago to set up their own manned station.⁵⁶

Their weather station colleagues at Eureka anxiously awaited the arrival of the naval mission, having cleaned up their camp, cleared the beaches, and built an icebox to accommodate their much-anticipated supply of meat. The voyage there proved more onerous than anyone expected. On July 31, *Edisto* made its first attempt to get through the ice at Viscount Melville Sound. It pushed to near Byam Martin Island before heavy ice stymied its advance. Then tragedy struck when one of the helicopter crew walked into a tail rotor. Plagued by fog and poor visibility, *Edisto* rendezvoused with the other two ships at Dundas Harbour and sent the injured airman to *Wyandot*. When he died on August 3, the crew onboard the ship had to clear out the starboard deck refrigerator to receive his body. While *Wyandot* lay at anchor for two days, Cleghorn escorted civilian personnel ashore to visit the glacier and local peaks on Devon Island, get some exercise, and marvel at the views across Lancaster Sound to Bylot and Baffin

Islands. The ship then returned to Thule, waiting for ice conditions to improve so they could push towards Winter Harbour.⁵⁷

In the meantime, Captain Quackenbush ordered *Edisto* to escort *Whitewood* to Slidre Bay to resupply the Eureka weather station. The latest reconnaissance reported slack ice (broken ice floating on quiet water) through Jones Sound and Norwegian Bay to Eureka Sound, but heavy pack ice blocked the route just west of Graham Island. This experiment proved the difficulties and perils of trying to tow or escort a cargo ship in High Arctic conditions. On August 7, the pack ice seriously damaged *Whitewood's* steering engine, propeller, and bow sheathing, forcing her to retreat to the open water in Jones Sound, transfer eighty-four tons of supplies for Slidre Fiord to *Edisto*, and head back to Boston for repairs. Without *Whitewood* holding it back, the icebreaker successfully crossed eastern Norwegian Bay the following day and found Eureka Sound nearly ice free. It became the first ship to transit these waters.⁵⁸

The Eureka weather station, cut off from outside contact for months, jubilantly greeted the ship's arrival when it came into view early on August 9. Station OIC Justin Courtney hoped that his staff would be freed of all but essential duties while *Edisto* was at anchor. The lieutenant in charge of the beach party obliged, telling Courtney that his shore party would handle the offloading and the station staff would only be in the way. The USWB representative on the ground protested that this would look bad. Courtney promptly went over his head and convinced Hubbard that a mere "show of working" served no one's interests. After all, "the excitement of the boat's arrival, the opportunity to obtain personal supplies, forward mail, see a movie, take showers and talk to ship's personnel and passengers ... rendered station personnel virtually useless for any work." Accordingly, the Eureka staff observed "holiday routine" until the ship left (meaning no duties except weather and radio work), which their OIC considered wise given the circumstances. "The station personnel have been occupied full time since April on arduous duty, with little time for recreation and no opportunity to enjoy the amenities the ship provided," Courtney explained. The commodore of the task force and the ship's crew extended full privileges to station personnel, who took full advantage of the recreational facilities and canteen. The unloading operation took two days in total — a hectic time for the Army and Navy work parties, but a

short holiday for the Eureka staff that “did inestimable good for the morale of the station generally.”⁵⁹

The resupply improved the local situation. Two additional men arrived, as did a rawinsonde apparatus with shelter, a balloon inflation shed, helium, and a prefabricated wooden accommodation building. As a result, Courtney offered nightly training until September 18, when the staff began rawinsonde ascents. At Hubbard’s request, *Edisto* handed its amphibious M-29 Cargo Carrier tractor (“weasel”) over to the station — a particularly useful asset that allowed staff to travel to the airstrip to prepare it for incoming aircraft in the months ahead. Finally, while the icebreaker was at station, RCMP Constable Harry Hampton Aimé swore in Courtney as postmaster. The Eureka post office began operating as the northernmost post office in Canada on 10 August 1947, reaffirming that the site was Canadian through postage stamps and postmarks — even if the mail was irregular and carried by American ships and aircraft.⁶⁰

With the Eureka resupply complete, the task force resumed its mission to transport men and materials to Winter Harbour. Ice conditions continued to pose serious problems, despite the support of modern aircraft. Specially adapted B-17 bombers based in Thule flew long-range ice reconnaissance patrols to help the task force commander, but by the time Quackenbush received their information on the ice pack, conditions had often changed. The helicopter on *Edisto* proved invaluable, scouting to identify leads as the ships gingerly picked their way through the ice.⁶¹ Cleghorn, observing progress onboard *Wyandot*, acknowledged the difficult conditions but criticized his ship commander’s timidity. Unlike Quackenbush on *Edisto*, Commander E.C. Folger, Jr.’s previous experience had been with destroyers in temperate climates. He had never ventured into northern waters, and neither he nor any of his crew knew enough about ice conditions to navigate “moments of indecision or danger.” While *Edisto*’s company had Antarctic experience, it was not always in a position to help the cargo ship. Cleghorn observed that, onboard *Wyandot*, “it soon became apparent that this understandable tension and lack of confidence was spreading to the ship’s company while the civilian personnel, whose morale was anything but good owing to their cramped quarters and their treatment as service personnel, were further affected by this undercurrent of feeling.”⁶²

In this frustrating context, Hubbard began to explore his options. When aerial reconnaissance revealed that the route to Melville Island remained choked with impassable ice, he decided to lead a scientific party to survey conditions at Resolute Bay. *Edisto* arrived off the bay at 7:00 am on August 16, but could not launch any aircraft or boats because of heavy fog and drifting ice. When helicopters finally managed to take Cleghorn and Hubbard to identify potential sites for a weather station and airstrip, they decided that the conditions were favourable “except that the country appeared uncomfortably barren.” So the ship headed off to gauge the conditions in Melville Sound, grinding through ice pack continuously choked with ice fragments in heavy fog. On August 17, the engine room reported “striking a stump of ice,” followed by “excessive vibration of the port shaft at full speed.” In a polynya (an area of open water surrounded by sea ice), a dive crew noted that two-thirds of a blade of the port propeller had broken off, reducing the ship’s icebreaking power by fifty percent. With reduced manoeuvrability, and amidst worry that the ship would not have the power to return to open water again, the captain decided to retreat to Resolute. A twisted propeller shaft on one side and broken blade on the other left *Edisto* in no shape to operate in heavy pack ice.⁶³ Planners had not considered the ships failing to reach Melville Island, but after two unsuccessful attempts Hubbard accepted that he needed to contemplate an alternate plan.⁶⁴

On August 22, the task force commander called a meeting to discuss options. Time was running out if they hoped to establish a weather station that season. Major Wayne McAlpine, the commanding officer of the 809th Engineer Aviation Battalion who was responsible for airstrip construction, reported that the site at Resolute Bay was the best he had yet seen. Yet the US Weather Bureau remained hesitant. They wanted the station as far west as possible and did not want to settle on Cornwallis Island until they had exhausted all other options. Hubbard agreed to abandon his hopes to establish the main station at Winter Harbour only if the next reconnaissance flight, scheduled for August 25, “showed 100% possibility” that they could not get there through open water. Otherwise, he would decide on an alternate site by August 28.⁶⁵

Hopes were repeatedly raised and then dashed. *Edisto* sailed to Freemans Cove on Bathurst Island and, after extensive helicopter reces,

Hubbard and Cleghorn became enamoured with a potential site. “We were all delighted with the sheer beauty of the place in contrast with the rocky barrens of Resolute Bay,” the Canadian noted. Major McAlpine was the spoiler, however, insisting that the soft ground and lack of gravel would not support an airstrip.⁶⁶ Then a long-range reconnaissance flight indicated nearly ice-free waters through to Winter Harbour. Quackenbush had high hopes as the icebreaker headed westward into Melville Sound on August 25, but the task force commander’s optimism soon faded. Near midnight, the crippled icebreaker “ran into broken pack ice along with an old enemy — fog.” Unable to skirt the ice by heading north, and stymied by poor visibility, heavy snow, and strong winds, *Edisto* anchored off Bathurst Island. The ship made a fourth and final attempt to reach Winter Harbour late on August 27, hoping that strong winds had cleared a path through the ice. By 04:15 the next morning, a band of heavy pack ice approximately ten miles wide prevented *Edisto* from breaking westward into Melville Sound. Without full power, the ship proved helpless in the face of the heavy floes and could not safely escort and deliver the *Wyandot* and its precious cargo to the intended destination.⁶⁷

Despite persistent efforts to reach Winter Harbour, ice conditions had defeated the task force. Hubbard was reconciled to the choice of Resolute Bay by this point, recognizing that he would have to satisfice if he wanted a station built that year. The Canadian government remained unconvinced, however, passing a message through the US Weather Bureau instructing the task force to survey sites on Beechey Island and the southwest coast of Devon Island. Hubbard reported back that Resolute was the most feasible.⁶⁸ Although the USWB officials would have preferred a main station further west, they reconciled themselves to Cornwallis Island. “A B-17 [reconnaissance] plane flew to Winter Harbour and reported that we could get through ‘in a rowboat,’” Metcalf noted on August 29. “But the Commodore and the Weather Bureau people have decided that Resolute Bay is the place, and it is time to get started on the task of building the base, so we will start unloading tomorrow. If we had only come to that conclusion when we first looked at this place, we would be on our way home by now, but I suppose they had to give Winter Harbour a fair trial.”⁶⁹ The senior officials’ hesitancy in selecting Resolute, however, seriously delayed the engineers. Major Andrew Taylor of the Royal Canadian Engineers (whose

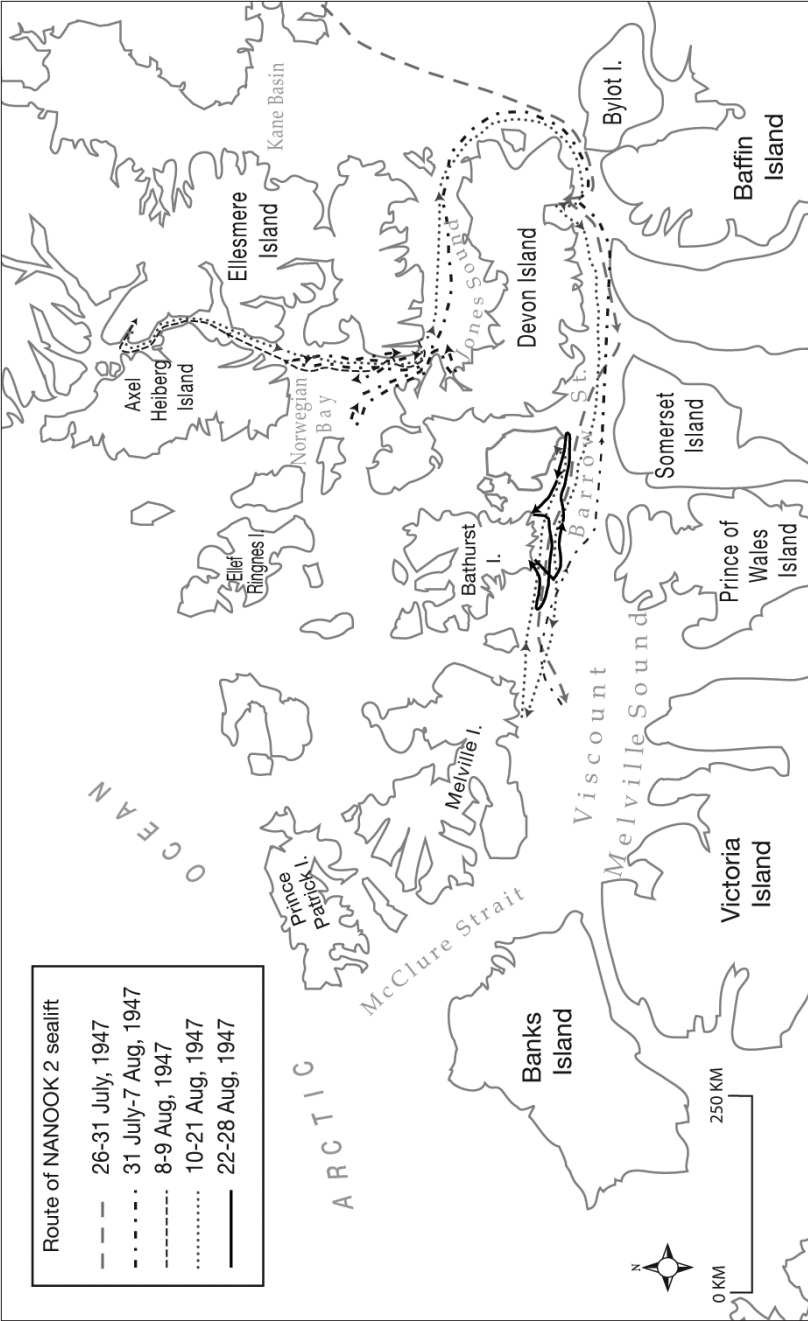


FIGURE 3-9. Track of USS *Edisto* (AG/89) during Task Force 68, 26 July–28 August 1947. Jennifer Arthur-Lackenbauer

FIGURE 3-10.
Resolute
Bay under
construction
following the
season's first
snowfall, 10
September 1947.
United
States Navy
Department.



polar experience included commanding the British wartime Operation Tabarin in Antarctica) noted that, if they had started a week earlier, they would have made significant progress before the frost set in.⁷⁰

Resolute, Cornwallis Island, 74°70'N., 94°54'W.

The Resolute Bay site was an attractive alternative to Winter Harbour for several reasons. First, it boasted a longer stretch of ground with excellent approaches upon which to build an airfield. The stable terrain offered abundant gravel for construction, and the station site lay a quarter mile from the beach and 1,500 feet east of a freshwater lake. Furthermore, cargo ships could expect access to the protected harbour even in difficult ice years. Good sloping, gravel landing beaches added to its appeal. “In being forced to accept this alternate site,” the official report noted, “it is not felt that the Weather Bureau’s program ... has suffered, but rather

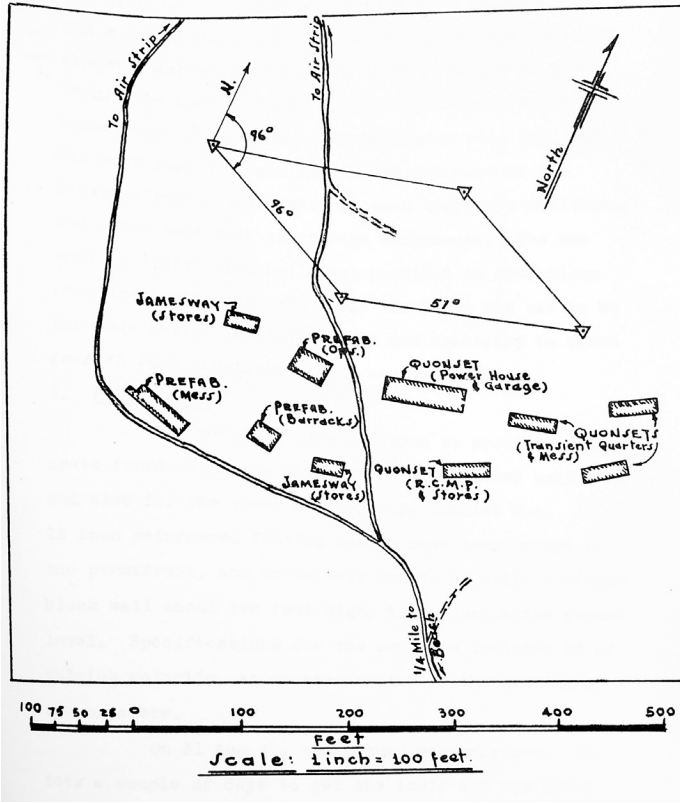


FIGURE 3-11.
Resolute site map, 1947.
NARA, RG
27, Entry 5,
Box 8, File
Navy Reports
- Confidential.

it has been furthered by the acquisition of a strategic and valuable base station.”⁷¹

The weather services formally approved the new location on August 29. Two days later, crews began hastily unloading the ships and pounding stakes into the ground. With winter looming and ice threatening to force out the ships, eight LCMs (fifty-foot landing barges) shuttled cargo from *Wyandot*, anchored about a mile offshore, to the beach around the clock. “It is late enough in the season so that the sun now sets around 10 at night and rises around 5 in the morning, so it gets fairly dark at night, but they have large portable generators and floodlights which keep things as bright as day ashore,” Metcalf observed. “Wonderful people, these Americans. When they set out to do something of this sort, they do it on a grand

scale!”⁷² Two crews working twelve-hour shifts discharged 3,500 tons of cargo, including 200,000 gallons of gasoline, in less than a week.⁷³

Although logisticians had carefully classified the cargo in Boston before the ships headed north, the disorganized state of the offloaded crates at Resolute mirrored the problems encountered at Eureka earlier in the year. “I am sure it will sound absurd,” Cleghorn recalled, “but we worked throughout the entire period of cargo discharge without a manifest showing exactly what was loaded, and therefore, what we could expect to find at the discharge and supply points.” On the ground, the station personnel discovered that many of the boxes did not contain the items they were supposed to, while some contained no markings at all. Fresh fruit and vegetables came ashore before heated warehouse space was built, and 90% of this food was destroyed by frost.⁷⁴

The state of the war surplus equipment that arrived also bred frustrations, forcing work crews to compete for limited resources to complete beaching operations, station construction, and airstrip preparations. As soon as heavy equipment arrived onshore, crews quickly uncrated and fitted it together — and detected problems. “The mechanical difficulties encountered at Resolute Bay were not attributable to either the latitude or weather conditions,” Major Taylor observed. The American engineers were convinced that the Army had sloughed off old equipment on the JAWS project because it was being written off. Except for the graders, shovels, scrapers, and “rooter,” all of the equipment sent northward was used — and well worn. Much of it was in poor condition and pieces had to be cannibalized for machines to operate. One tractor arrived with a broken track, another with bolts of the flywheel sheared off, and another with a plugged radiator that was caked in old, frozen grease. Mechanics worked until September 13 to get all of the tractors into serviceable condition, while the four cargo trucks shipped north, in continuous demand, broke down repeatedly.⁷⁵ Cleghorn cited this as a prime example of planners’ inattention to detail. Rather than building the camp, the majority of the US Army engineers worked to assemble construction machinery that was supposed to have been shipped ready for immediate service. Consequently, unskilled naval ratings from the two ships were conscripted to set up the prefabricated buildings “at the very last minute, and under severe handicaps.” As a result, the structures

were “not too well done”⁷⁶ — with unfortunate implications for the personnel that winter.

While mechanics made the best of a frustrating situation, weather station staff and military personnel erected station buildings and began work on an airstrip. Given the limited knowledge of installing foundations for permanently heated buildings in the Canadian Arctic — a problem given the active layer of earth which thaws in summer and re-freezes in winter — the staff had to improvise. Permafrost forced them to dispense with plans to pour cement foundations, so they successfully experimented with “floating” gravel pads that would act as insulators to prevent the thawing of permafrost and provide easy bedding for foundation sills. As temperatures dropped below freezing and snow began to fall, however, progress slowed. Nevertheless, the crews managed to erect the outer shells of three prefabricated wooden houses, five Quonsets, and several Jamesway huts by September 12.⁷⁷ Concurrently, eighty-four engineers with the USAAF’s 809th Aviation Battalion worked around the clock on a 10,000-foot airstrip about five kilometres north of the main station. There was little vegetation, and earth movers had little difficulty crumbling the brittle, yellow limestone plates covering the surface. The direr problem was frost, which immediately penetrated the ground on September 1 and continued to reach deeper each day. By September 10 the ground was completely frozen to the permafrost 18–24 inches below the surface. The engineers struggled with this reality. “Carryall scrapers would ride, wheels turning freely, on the cutting blade,” Major Taylor reported. The rooter was used to break the frozen ground into 1- to 2-foot wide clods before the scrapers would handle it. The engineers realized that they could not complete the grading before winter set in, and had to content themselves with smoothing out the existing shingle surface.⁷⁸ After the task force departed, forty officers and men with the army engineers continued this work, remaining in Resolute until October 26.⁷⁹

The rest of the army and navy personnel had rushed their jobs to completion, anxious to return south. After weeks of uncertainty (and nearly two months after leaving Boston), rumours abounded about when the ships would depart. “This fool ship is becoming the center of 101 little intrigues,” Metcalf noted in his personal log on September 6. “The long wait and the uncertainty as to what will happen next seems to be effecting

everyone. The Staff and the Ship's Officers are at sword's points over the most childish things. The Exec and Lt. Russell have descended to writing each other hostile memoranda on every subject from Communications to table manners!" They would not even sit together for meals. The ship crews were disappointed with the lack of mail service "and dozens of other picayune things."⁸⁰ For his part, Cleghorn had created tensions with naval officers when he overstepped his authority as game warden and threatened to report two American scientists to the game commissioner for taking wildlife specimens. RCMP Constable Harry Aimé tried to soothe matters, but he found that the American officers were cooler to Canadian requests for information after Cleghorn had irritated their hosts on the ship. Aimé preferred to avoid making an issue out of matters unless he deemed them serious, while Cleghorn had no qualms about persistently complaining despite the highly-charged atmosphere.⁸¹

Speculation of when the ships should depart soon ended. None of the ships were set up to overwinter in the Arctic, and their tasking ordered them to return south when weather or ice conditions rendered further operations "unprofitable."⁸² A calm, cold night produced a film of slush over the entire bay by the morning of September 11. "Winter is at our throats," Metcalf noted. Although less than an inch thick, the slush got into the raw water strainers of the landing craft and threatened to block them. Warmer daytime temperatures and a slight breeze melted the ice for daytime operations, but "a really calm night and a sharp cold snap could put the small boats out of commission in a hurry."⁸³ Operating at the edge of winter, the navy was desperate to get away before being blocked by ice floes. Two days later, the Canadian and American weather station personnel moved ashore to occupy their newly built quarters. That afternoon, Hubbard, Quackenbush, and Cleghorn presided over a flag-raising ceremony with speeches and tributes to the achievements, and the naval task force steamed out of Resolute Bay just after midnight. (They were prepared to leave on Friday the 13th, but they did not leave until early the next morning because of "naval superstition.")⁸⁴ Cleghorn recorded that "at 1845 hours the two ships ... passed from view behind Cape Hotham, leaving behind seventeen civilians of the weather station staff and forty officers and men of US Army Engineers." He promptly changed the station over to Central Standard Time and put the latrines into commission.⁸⁵

The hasty departure left problems in its wake. Insufficient time and warehouse space prevented the crews from storing all the supplies indoors. Blizzards soon covered the outdoor caches with deep, hard snowdrifts which concealed their location and their contents. Furthermore, faulty packaging failed to protect some food and supplies from sea water, rain, and snow. The station consequently faced shortages of many items during its first winter of operation. Trying to take an inventory of the satellite stores that fall proved “an unhappy experience as well as a waste of time,” given that the staff had no list of what the supply dumps contained. “We decided that it would be unwise to open the boxes to see what they held,” Cleghorn explained, “for fear that the drifting snow would leak in and spoil the contents.”⁸⁶

Amidst ongoing construction, station staff tried to establish a routine. On September 5, Canadian meteorologist R.W. Rae had set up USWB maximum and minimum thermometers in an improvised thermoscreen and kept a daily record of temperature extremes, as well as brief daily weather notes later compiled into a monthly report.⁸⁷ The RCMP post was set up on September 16, and the next day Cleghorn drafted and discussed local station rules and regulations with a full meeting of the station staff. Camp fatigue parties washed dishes, disposed of garbage, drew water, and filled latrines and oil stoves. An army truck drove away the first inquisitive polar bear that approached the station. When it returned a few days later and broke into food boxes, Cleghorn was forced to shoot it. With the freshwater ice now nine inches thick, the entire station staff cut and stacked 3,000 blocks at the station to carry them through the winter.⁸⁸

On October 1, Cleghorn offered a positive appraisal of the local situation. The airstrip was 6,400 feet long, full electrical power had been turned on in all of the buildings, and Rae had set up the meteorological equipment and planned to start taking regular synoptic observations about October 10 and pilot balloon observations a few days later. “We have no personnel problems,” he told Andrew Thomson, the controller in Toronto. “Everybody is pulling his own weight and relations between the Americans and ourselves are on a very cordial basis. There have been minor misunderstandings and some differences of opinion on both sides, but these are to be expected in any normal operation of this kind. I blame

the prolonged strain and overwork, rather than any personal animosity for any small outburst of temperament in the past.”⁸⁹

Less than two weeks later, Cleghorn reported the first signs of trouble. Although the staff made steady progress “in all branches of our work,” Cleghorn reported that the station personnel, both American and Canadian, did not “like to be tied down by a set of rules and regulations.” The American executive officer and chief mechanic objected strongly to the “no smoking” rule in the powerhouse and garage, insisting that a man had a right to smoke at his place of work. Cleghorn rescinded his order for “the sake of peace,” but he was concerned about this violation of the fire prevention plan — even though the men insisted that they would be careful. When the OIC drew up a set of rules and presented them at a staff meeting, “they were accepted in silence, although they were simple and pretty local in character, dealing with such matters as mealtimes, conservation of fresh water, use of vehicles and warnings to personnel about such things as crossing unsafe ice, or undertaking lone hikes into the surrounding country.” Cleghorn removed them from the station notice board when he heard whispers that this constituted undue strictness and “regimentation.” The former army officer remained conscious of his military background, and “tried very hard to live that part of his past down” given that the station represented a very different “time and place” than his previous postings. He tried to dismiss the “touchiness” as a carryover of the difficult voyage and the “unhappy confusion” before the ships departed, and reassured his superiors that “we have shaped up a new course, and everyone is trying very hard to readjust and put up a good showing.”⁹⁰

A few months later, Cleghorn painted a more pessimistic picture. Even before they had set sail from Boston, the former military officer had been skeptical about the group’s lack of experience and the lack of instruction they had received on duties and conditions of Arctic service. His fears were confirmed on the ground:

From the start it was painfully evident that the majority were more interested in the higher salaries offered than in any other prospect. With one, or perhaps two, exceptions, no one was the least bit inspired by the prospect of going north to do important work. There wasn’t the slightest trace of the

“expedition spirit” evident in anyone, and the most difficult aspect that had to be faced was their unwillingness to do any work other than that which the individual had been hired to do, and the uncooperative and even hostile attitude shown when I had to round them up to do essential work connected with the handling of supplies, or camp and household duties, and a similar attitude when I asked for strict adherence to station rules and regulations.

Loose organization, inadequate equipment and supplies, and long work-days heightened confusion, frustration, and ultimately resentment. Unhappiness reigned, Cleghorn concluded, because the personnel recruited for the station “had not realized, and were quite unprepared, to face the isolation from the rest of humanity, from customary relations and usual scenes that life at an Arctic post involves.”⁹¹

By this point, Cleghorn’s perspective on the US contingent had shifted profoundly. He had considerable background experience dealing with American civilian and service personnel, and suggested that he had “always been able to get along with them at all times.” This group was “entirely different” from any he had previously encountered:

In my opinion they resented being placed under Canadian command, and having to abide by a set of uncompromising station rules, regulations and the laws and ordinances of the Territories. I remember hearing one of them say that they were afraid of losing their identity, and no amount of reasoning on my part of the international aspect and co-operative effort of the project seemed to make the slightest difference to this manner of thinking. I showed no discrimination whatsoever in my dealings with them, and international relationship remained on a high level, but it was this sort of thing that kept me at a high nervous pitch and convinced me that my task would have been far happier and less complicated had the expedition been entirely Canadian from beginning to end.⁹²

Cleghorn recognized that “American participation, material aid, and good will” was essential to the program. He also believed that the Americans were arrogant, suffered from a host of administrative and technical problems that plagued planning and execution, and rejected Canadian authority. The confusing lines of command and control — with Navy, Army, and Weather Bureau supervisors all controlling specific aspects of the project, and often failing to solicit a Canadian opinion — made the situation impossible in the former military officer’s eyes.

RCMP Constable Harry Aimé, a detached observer, concluded that Cleghorn embodied the real problem. He did not fit in with the station team, openly criticized those around him, and was a “busy-body” who injected himself in others’ affairs. “A dreamer, he was likely to be found reading about polar exploration, including Scott’s trek to the South Pole,” Aimé recounted in his memoirs. Cleghorn “fantasized that if Resolute Bay had to be abandoned, we would all trek to Dundas Harbour,” more than 370 km away. Given the lack of RCMP facilities at Dundas, the constable noted, this was “a most unrealistic idea.” But Cleghorn seemed aloof from the realities of life at a small, civilian station. “Almost every day there were tensions and, if none arose, Cleghorn would create some. He just wasn’t suited for northern isolation.”⁹³

Tragic incidents compounded morale problems at Resolute that fall. First, a polar bear severely mauled Edwin (Ted) Gibbon, a Canadian radio operator, within the camp area in the blustery, grey morning of October 24. He had gone outside to notify Cleghorn, who was sleeping in the dormitory on the other side of the mess hall, of an incoming flight. “As I walked towards the mess hall, ... out of the corner of my eye, I saw the bear charging toward me on all fours,” Gibbon later recounted. He tried to dart behind a sled, but the bear cut him off with a blow to the head. In a semi-conscious state, Gibbon recalled looking up at the bear’s face. “He had his paws around the back of my neck and seemed to be trying to break it.” As they wrestled, Gibbon shoved his arm into the bear’s mouth to prevent it from biting him. The cook heard his screams and rallied Cleghorn out of bed, who promptly grabbed the station rifle and shot the bear. “Lucky for me the American army doctor was still at the camp,” Gibbon explained. “He sewed me up. He said he didn’t bother counting the stitches, there were so many. He found that there were teeth and claw



FIGURE 3-12. Gibbon being attacked by a polar bear. The painter may have been US Executive Officer William A. Robinson, and the painting was apparently based on a sketch drawn by an eyewitness shortly after the attack (24 October 1947). The original painting still hangs at Resolute Bay. Whitney Lackenbauer Collection.

marks all over my head and neck and arms.” Two days later, the victim was evacuated out on a flight with the departing army engineers and recuperated in a hospital in Montreal before returning to his hometown of Port Arthur, Ontario.⁹⁴ Cleghorn concluded that this situation “showed how totally unprepared [the station personnel] were to receive the full impact of wilderness living.” Although he had warned everyone about polar bears wandering near camp, no one had believed an attack possible.⁹⁵ The cook, traumatized by the event and haunted by “visions of how a big bear would sink its teeth into his long thin neck,” took a handful of sleeping pills and slipped into a four-hour “coma” before two of the boys managed to shake him out of it. It was several days before he resumed cooking for the crew.⁹⁶

The second major accident occurred on December 7 when Lorne Manion, a young Canadian met tech from Saskatchewan, was electrocuted in his room. Climbing into a double bunk bed late one evening after

his work shift, Constable Aimé recounted how Manion “gripped the steel frame and at the same time rubbed his moist back against an open ceiling furnace duct.” The bed was in contact with an open electrical outlet, causing the duct to short from the opposite side of the building, sending an electrical shock of 220 volts through Manion and killing him instantly. Aimé held a coroner’s inquest, which confirmed that inadequate electrical supplies and careless installation of wiring and fixtures had caused Manion’s death. “No one could be blamed for the tragedy — the staff were not electricians — nor were they aware of the dangers,” he noted. Morale sank and distrust grew amongst station staff, who believed that the entire program was built on similar, dangerous foundations. Cleghorn did little to reassure them, his credibility now eroded beyond repair. “Cleghorn began his evidence [before the coroner’s inquest] by relating the books he was reading at the time,” Aimé recalled. “I instructed him that only the facts were required, not his opinions or assumptions. The staff was ecstatic. For once, Cleghorn was not in the driver’s seat.”⁹⁷

By this point, Cleghorn had failed as a leader. “I had hoped that once the ships sailed for the United States and we were left on our own resources we would become one united group, but such was not to be,” he confessed. “Small cliques were forming, there were hurt feelings and misunderstandings all around until I could see there was nothing more I could do to restore their confidence, since the leadership I offered was not acceptable to them in any form, and was even resented.” Despite his previous experience in managing a remote base, Cleghorn had enough of *Resolute*. He spoke with Constable Aimé, who strongly advised him to resign. On December 12, he radioed a message from the Arctic station to Andrew Thomson, his supervisor in Toronto. “Imperative that I report to you in person regarding entire situation here,” Cleghorn communicated. “Urgency demands travelling aircraft due here twentieth and total weight seven hundred pounds.” Thomson was “shocked” to receive the message, which gave no clear reason why Cleghorn felt it “imperative” to abandon his post. Cleghorn’s forwarding letter simply stated that he had to head south “to clear up some of the misunderstandings, improve our methods and aid in the welfare of those serving in the north.” The reference to 700 lbs., however, implied that the officer in charge had taken all of his personal belongings with him and did not intend to return to *Resolute*.

Cleghorn's lengthier reply, which documented his experiences that fall, insisted that he faced a "very threatening" situation at the station. "I am sure that had I remained for another month, violence, in some form or another, would have broken out, since I had absorbed all the nonsense and abuse that I was prepared to take under the circumstances and I decided that it was going to stop then and there," he explained. "Having made this decision, I had two courses left open to me, and I chose the rational one."⁹⁸

Cleghorn boarded a B-17 aircraft for Goose Bay on December 23. It was a near fatal choice. The following day, the plane got lost, ran out of fuel, and crashed on Dyke Lake 270 miles northwest of Goose Bay. Cleghorn's Arctic experience proved valuable in establishing a campsite, building a lean-to, and preparing austere meals from emergency kits while the survivors waited for search teams to find them. Two days later, Cleghorn and the other men were evacuated to Goose Bay and hospitalized. Work of salvaging mail, supplies, records, and Manion's body took twelve days.⁹⁹

Safely ensconced in the comforts of Southern Canada by mid-January 1948, Cleghorn authored a dizzying array of recommendations to improve the weather station program. He criticized everything from the .30-06 hard point ammunition supplied to the station, which would not have stopped a polar bear unless cleanly shot through the heart, to the overly lavish American procurement system. He did not think that pillow cases, electric grills, and fresh turkey were essential to the well-being of station staff. "It is true that a little luxury now and then is a morale builder," Cleghorn conceded, "but for a long pull under northern conditions, adequate bedding and good wholesome fare and lots of it is more to the point." Creature comforts became expectations, leading individuals to complain "when the bed sheets provided are unbleached cotton instead of linen."¹⁰⁰ Cleghorn also called on Canadian and American officials to more carefully select and screen applicants serving at isolated Arctic stations:

Applicants should be volunteers and single men between the ages of 25-35 years. Youthfulness, physical strength, and the desire for adventure are important attributes, but some of them may have to be sacrificed somewhat unless a leavening of good common sense and a willingness to accept responsibility is present in full measure as well. He must be mentally

and physically fit, and his medical examination report should reveal a close scrutiny to detail in both spheres before he is considered. The Arctic is no place to nurse an old wound or to forget the consequence of an act of bad judgment. He should be self-sufficient, but of the extroverted type of personality. An applicant must be told exactly what is expected of him — his mandatory duties and otherwise. He should be made fully aware of all the phases of Arctic life, its isolation, climatic conditions, its joys as well as its dangers. He should be told there are, theoretically speaking, two Arctics — the high Arctic of the weather stations, and the one which he has heard and read, ... the Arctic of the trading posts, the natives and their hunting camps. The two are quite different[:] one already has its community life, interest, and colour[:] the other is what you make it.¹⁰¹

Although Cleghorn likely considered himself to be the “experienced Canadian” well-suited to assume liaison responsibilities with the US Weather Bureau and ensure that the program followed a more cooperative and efficient course, he had retreated from a difficult situation at Resolute.

Cleghorn’s superiors, undoubtedly disappointed with his performance, did not avail themselves of his offer. The Deputy Commissioner of the NWT, R.A. Gibson, met with the RCMP commissioner on 6 January 1948 and learned that “he had been advised confidentially by his representative at Cornwallis Island that Colonel Cleghorn ... was unable to measure up to his responsibilities [as senior officer], whereas the Americans sent an outstanding officer who is a natural leader. Colonel Cleghorn consulted the policeman to see what he should do and the policeman advised him to seek a recall.” When Cleghorn passed through Ottawa a few days later, he paid a visit to J.G. Wright in the NWT office and offered his perspective. “He said the weather station staff had been under strict naval supervision on the way north & were ‘fed up,’” Wright recounted. When they learned that “an ex-military man” would be in charge of the station, “they immediately resented him. There was a lot of insubordination against his camp rules,” and after Manion was accidentally electrocuted, “all blamed [Cleghorn] for not seeing to it that the wiring of the U.S. Army engineers

had been properly done!” Perceiving his position to be “impossible,” Cleghorn asked to be recalled.¹⁰² Senior officials obliged. “He turned out to be a disaster,” Patrick McTaggart-Cowan reminisced. Cleghorn had to be replaced or “he would have endangered the project.”¹⁰³

The weather station at Resolute survived Cleghorn’s abrupt departure. R.W. (Bill) Rae, the resident meteorologist and senior Canadian, assumed the OIC role at the station for the next two years.¹⁰⁴ Where Cleghorn had failed, Rae succeeded. His account of living conditions at Resolute, reprinted in the *Christian Science Monitor* in early May 1948, indicated a vastly improved situation. The station staff kept busy and interpersonal relations were generally free of friction. “There is always plenty of work to be done and the amount of spare time left over for hobbies or recreation is relatively small,” Rae noted. Given space limitations, table tennis proved an ideal form of indoor recreation. “The entire set is homemade except for the Ping-Pong balls, which I begged from the United States-Danish weather station at Thule,” Rae described. “We are presently in the midst of a hectic handicap tournament for the table tennis championship of Cornwallis Island. The winner not only receives five chocolate bars, but what is more important, is excused from helping with the dishes for two days.”¹⁰⁵

The improved situation at Resolute in the winter of 1948 mirrored the working culture environment prevailing at Thule and showed the importance of solid leadership. When *Los Angeles Times* reporter Magruder Dobie visited the Greenlandic hub, he marvelled at the daily routine — and the importance of having an intelligent and experienced leader who understood the nature of his assignment. Dobie held up Ed Goodale — a “ruddy-faced, easy-going” polar veteran whom Hubbard had hand-picked as the station chief to get things going at Thule — as a prime example. “Bossing a group of heterogeneous civilians, many of whom are not temperamentally suited for this life, is a difficult challenge,” the reporter observed. “If this were a military station, Ed would be commanding officer and his orders would be backed by the long, strong arm of military law. But, as a civil servant, he has no ready-made authority.” Although he sat at the head of the dinner table, enjoyed a single room, and did not have to do “K. P.” (“kitchen patrol,” the slang for kitchen clean-up duties), Goodale did not wear insignia boasting his rank, “and no one would dream of

calling him ‘sir.’” If a staff member suffered from depression, Goodale avoided “strong-arm remedies.” Instead, his recourse was “kindness and consideration.” After all, cold and darkness brought mental stress. “The Danes call it ‘morkepip’ and even the Eskimos are susceptible,” Goodale explained. “But you can fight it off if you’re tough-minded.” Everyone at the station succumbed to bouts of depression — the solution lay in learning “to squeeze the maximum enjoyment from the simplest pleasures.”¹⁰⁶ Creating the right conditions for ordinary, predictable routines proved a key recipe for success at an isolated outpost.

The Eureka station also enjoyed a harmonious environment in late 1947 and early 1948. The staff settled into the new wooden prefabricated accommodation building, which represented a vast improvement over the original, temporary huts. With the station on a full operational basis by early October, Courtney had turned his attention to preparations for the dark period. He kept everyone busy between regular scheduled weather and radio operations so that days would pass quickly. He assembled his staff to remind them to stay alert — animals could surprise them in the dark. The crew installed lighting in all buildings as the daylight waned, completed an inventory of all supplies, and caught up on narrative reports of weather observations. During the dark period, personnel also had to travel across Eureka Sound when there was a full moon each month to gather the winter and spring water supply.¹⁰⁷

Courtney valued the physical exercise required to complete these tasks because they disrupted the lethargy that set in during the long dark period. Planners had put little thought into the station’s recreational facilities. Most activities at the stations (particularly photography) were for outdoor use in daylight. By the time the weather bureau began to ship books by aircraft in December, the staff had already exhausted the technical library. The station’s amateur radio equipment was inadequate, and “the social value of cards and other games in gathering a group together... is lost.” Courtney reported that the station’s personnel wanted access to “interesting and instructive pastimes, ones that add to physical or mental stature.” He recommended a large library, a good radio receiver and parts for amateurs, and a darkroom kit.¹⁰⁸

These recommendations marked the shift from *creating* the stations to actually *inhabiting* them on a permanent basis. The pioneering crews

had established the footprint and proven that the stations could be operated successfully. Courtney and others, in suggesting a litany of improved buildings, scientific equipment, supplies, and clothing, were laying the groundwork for a persistent presence that would transform the stations into permanent hubs fit to facilitate continuous scientific observations.

The United States had not just assisted with the establishment of the weather stations, as official Canadian statements insisted — it had clearly led the construction phase. The early planning and construction bore the unmistakable imprint of Charles Hubbard, the director of the Arctic Operations Project of the USWB. The US Navy, Army, and Army Air Forces, playing pivotal roles in transporting men and materiel to the remote locations, had established the weather stations. Although some commentators later depicted the JAWS program as yet another case of the United States simply imposing its will on a junior partner, the leading role that the Americans played in the physical construction and supply of the first stations instead reflected Canadian limitations in personnel and in maritime and air logistics at that time. “The founding of the Joint Arctic Weather Stations was unique and is still unique in the world’s history of the development of meteorology,” Patrick McTaggart-Cowan of the Canadian Meteorological Service later explained. “When it started, we in Canada really had no Arctic ice-breaking capabilities at all. The Americans did. We both wanted the stations in the Arctic for sound, scientific reasons.” Both countries benefitted from working together, with Canadians centrally involved in the final selection and actual operation of the stations, with a Canadian in charge of each and an American as deputy.¹⁰⁹

Actually implementing the designs for the JAWS program proved the need to adapt to High Arctic realities, while testing assumptions that plans conceived in the south could simply be imposed on the North. The task force that travelled north in August 1947 carried a general plan to build a main weather station in the centre of the Canadian Arctic Archipelago. Initial reconnaissance conducted the year before had led planners to select and draw up complete plans for a station at Winter Harbour on Melville Island. In this case, however, the marvels of modern planning and technology could not overcome local conditions. Ice conditions prevented the task force from reaching Melville Island, forcing substantive readjustments.

This experience taught US officials about the limitations that environmental conditions still posed on ships and aircraft operating in the Arctic. “Pack ice for many years has been a menace to surface ships and continues to cause great damage,” the commander of Task Force 68 observed. “This operation, despite its modern equipment and trained personnel, suffered ship damage ... similar to that experienced during Operation Highjump [in Antarctica].”¹¹⁰ The challenging operational environment in Canada’s Arctic demanded acceptance that, even when armed with modern ships and planes, planners could not assume they would be able to “conquer” the Arctic and simply impose their will through blunt force.

The early experiences of station crews also yielded important lessons, highlighting the importance of careful planning to supply isolated stations that could not be visited easily — and the need to improvise locally when equipment did not arrive or was in poor condition. Station personnel quickly identified the physical and psychological stresses of adapting to often unpredictable Arctic conditions. Environmental realities directly influenced the form and pace of development. Although station staff living in permanent buildings did not face the same physical challenges as explorers travelling long distances on the land and living in ships, tents, or snowhouses, hazards remained: from polar bears to hastily constructed buildings to extreme weather. Furthermore, isolation from the rest of the world remained a stark reality, however much modern communication and transportation provided unprecedented connections to the south.

The human dimensions of leadership — from personality to style, to accepting the unique physical environment in which the stations were situated — proved instrumental to creating and sustaining functional stations. Jud Courtney demonstrated how a leader with appropriate traits and temperament could overcome adversity and achieve success. Conscientious, agreeable, and sensitive to the needs of his men, he proved well-suited for adaptive functioning in an isolated and confined environment. He ensured that the personnel at Eureka did not succumb to boredom and found ways to motivate them without resorting to his “command” authority. This modelled Hubbard’s philosophy (as his wife described it):

The reasons Charlie had for wishing always to keep the stations on a civilian basis were that his experience with the Crystal bases led him to believe that only small, hand-picked groups could operate with maximum efficiency in the arctic. Though this has been practically speaking a great difficulty, Charlie's stations are a whole lot better than the large, cumbersome groups the armed forces are likely to have operating in the arctic.¹¹¹

The military provided vital construction and logistical support to JAWS, but USWB and Canadian Department of Transport staffs affirmed the network's civil character. The involvement of these civil organizations was not a case of "civilian cover" for the militarization of the Arctic, as several historians allege.¹¹² Psychologists note that "personnel in polar work group settings ... need to be socially skilled, and traits that might be adaptive in one situation and with a particular group might not be adaptive in other groups or situations."¹¹³ The case of Lieutenant-Colonel (ret'd) J.D. Cleghorn, whom Hubbard had specifically recruited to oversee the establishment of the main weather station based on his wartime background working at a joint facility, proved that an autocratic military mindset did not suit the JAWS environment. His failures demonstrated the necessity of flexible leadership at remote outposts. Although Andrew Thomson later suggested that Cleghorn "didn't have the northern qualifications" that the meteorological service believed he had,¹¹⁴ a more appropriate assessment might be that he did not have the *right* qualifications or traits to successfully lead a *civilian* weather station. Cleghorn failed to command the respect of his civilian colleagues during the beginning stages of establishing the station, to serve as a role model sensitive to the needs of his team members, and to communicate his goals effectively. His subordinates resented his authority and refused to accept his personality characteristics, leading to interpersonal conflict, tension, and an erosion of group cohesion. With the station personnel feeling increasingly insecure in the wake of a polar bear mauling and an electrocution at the station, Cleghorn lost all credibility by late fall and abandoned his post. By contrast, Rae, his successor, proved more adept at managing interpersonal relations and social

dynamics, and worked with the station staff to produce a positive work and living environment.

After retreating to southern Canada, Cleghorn raised concerns about American behaviour at the stations, suggesting that bilateral friction had permeated relationships on the ground. Concerns about American belligerence also persisted in some official circles in Ottawa. Trevor Lloyd, the chief of the newly-formed Geographical Bureau at Mines and Resources, had actively lobbied the government to take more effective control of northern defence projects during the Second World War. After the war ended, he assumed the mantle of muckraking Arctic explorer-pundit Vilhjalmur Stefansson and British High Commissioner Malcolm MacDonald in decrying foreign activities that could undermine Canadian sovereignty in the region.¹¹⁵ On 22 December 1947, Lloyd submitted a scathing report to the new Canadian Advisory Committee on Northern Development (ACND)¹¹⁶ insisting that the United States repeatedly violated Canada's authority in the Arctic. He insinuated that, in the case of the weather stations, the US Weather Bureau attempted to make all of the important decisions independently. He criticized the Americans for disregarding the rules about publicizing Arctic activities and for building airfields without permission. Furthermore, he accused American forces of ignoring Canadian wishes and refusing to accept its control and authority. In turn, Lloyd chastised the Canadian government for not doing enough to regulate particular American activities in the region.¹¹⁷ He offered a dismal, even conspiratorial, view of American activities in the North.

Most senior Canadian officials recognized that Lloyd's report was excessively biased and only partially true. RCAF Group Captain W.W. Bean dismissed the memorandum as a simple attempt "to show that the US is, in some clandestine fashion, attempting to carry out a lot of projects in Canadian territory without obtaining proper authority." Bean effectively countered most of Lloyd's accusations, demonstrating how the report exaggerated the US role in picking sites for the weather stations and the number of personnel it posted to these stations. The US military wanted to establish more airfields in the Arctic, but these sites fell under the original JAWS agreement and did not represent an attempt by the Americans to "put one over" on the Canadians.¹¹⁸ At the first meeting of the ACND in Ottawa on 2 February 1948, both Arnold Heeney and Lester Pearson

commented that they did not discern any underlying American design to carry out activities in the Arctic without Canadian government approval.¹¹⁹ According to these civil servants, problems arose from poor coordination and communication in Ottawa and Washington, not a grand American conspiracy, and senior US officials always fixed their mistakes.¹²⁰ The high-level Canadian debate on Arctic sovereignty was far from settled, however, and anxieties would persist in some corridors throughout the life of the JAWS program.

At the stations themselves, however, the bilateral relationship proved overwhelmingly cordial. “Since [the Resolute] station is staffed jointly by Canadians and Americans, it represents an interesting example of a practical application of the good-neighbour policy,” a reporter touted in May 1948. “Both groups had to adapt themselves somewhat to the other’s point of view, for the procedures in the various phases of the station operating program are a combination of both Canadian and American practices.” All told, Canadian R.W. Rae reassured the program directors down south that “the degree of cooperation between the two groups has been excellent.”¹²¹ The senior weather bureau officials in Washington and Ottawa got the message. McTaggart-Cowan explained in a 1983 interview that “between Dr. Reichelderfer ... and John Patterson and then Andrew Thomson and then myself, we kept on top of the little bits of friction” like the “trials and tribulations” surrounding Cleghorn. “It was a marvelous example of good partnership in international cooperation.”¹²²

With the hub of Resolute in place, it was now time to expand the number of spokes. Accordingly, reconnaissance flights set out in March 1948 to select sites for two more “satellite” weather stations.

Finishing the Network, 1948-50

And what is it going to mean, all this? Well, it's obvious that we'll never be able to forecast the world's weather satisfactorily so long as we have that great blank space around the Pole. ... You remember that bad winter in Britain last year? Well if Isachsen and Mould Bay had been working then we might have been able to warn you about it, and – just as important – we might have been able to tell you when it was going to end.

Andrew Thomson (1948)¹

In May 1948, Andrew Thomson, the controller of the Canadian Meteorological Service, recounted to listeners of the British Broadcasting Corporation the details of his recent trip to the Joint Arctic Weather Stations. The US Air Force (USAF) plane had first set down at Resolute, the main weather station with “a joint staff of Canadian and United States meteorologists working happily together.” They lived comfortably in insulated, prefabricated houses heated by oil stoves while the temperature outside plummeted to minus fifty. The station staff worked long hours each day, seven days a week, but during their leisure time they played checkers, cribbage, and chess. They enjoyed their extensive library and radio receivers, and Thomson found it surprising that they preferred classical music to anything else. “The food and cooking are first-class,” he described. “There was all one could eat of the best beef and pork — not out of a tin, but fresh frozen — and it came to the table as choice as if it had just been bought

from a butcher store. For Sunday dinner there was a twenty-pound roast turkey on the table, with four or five fried chickens. The only things they miss are lettuce and fresh vegetables.”²

Thomson also insisted that the meteorological work was first class. The station provided regular surface weather reports of temperature, pressure, and wind, as well as twice-daily observations of temperature and humidity in the atmosphere to 60,000 feet. The radio controllers sent these reports to Edmonton. Within ninety minutes they were received in New York, London, and Moscow — evidence that by filling in “that great blank space around the Pole,” the Joint Arctic Weather Stations contributed to better weather forecasting the world over.³

When the weather lifted, bringing a sunny morning on 13 April, the USAF flew Thomson to Isachsen, an even more isolated outpost 330 miles from Resolute across broad channels of Arctic ice and islands with low hills. They landed on a bumpy strip of thick ice, only 750 miles from the North Pole. “All around were rolling hills, covered with swirling white snow that glistened in the sunshine,” Thomson described. “It was a most beautiful sight.” Piles of food and supplies and rows of oil drums dotted the ice. Air crews had already flown 75 tons of cargo from Resolute and planned to double that amount in the upcoming week. This would allow the new JAWS station, then taking shape, to be self-sustaining for a year. Richard Jones, the Canadian OIC (officer in charge), explained that the -17° weather was the mildest they had encountered since they had settled in ten days before. The station crew had spent their first few nights in a small nylon tent before moving into a larger canvas-covered house heated by an oil stove. Before the end of June they hoped to erect their permanent house. In the meantime, they were playing their intended role as gatherers of weather data and had started transmitting readings to the world.⁴

The establishment of the first stations at Resolute and Eureka represented the initial JAWS footprint in the Canadian Arctic Archipelago. The next phase involved building two stations in the western part of the archipelago. During the previous summer, the US Navy had brought up the initial supplies for the new stations, from prefabricated building materials to non-perishable food to bulldozers. According to plans, large military aircraft would conduct reconnaissance flights in April and May 1948 to identify specific sites on “the Isachsen Land portion of Ellef

Ringnes Island, and the southern portion of Prince Patrick Island,” before airlifting 150 tons of supplies from Resolute to each of the new sites. At this time in the year, temperatures remained low enough to ensure thick ice while continuous daylight was assured and favourable flying weather usually prevailed.⁵

The new construction and resupply operations that spring faced several unanticipated challenges. Unfortunately, the land runway built at Resolute in 1947 was unusable after being buried in up to ten feet of snow. Eighteen-inch ridges of gravel along both sides of the strip, left by the initial construction crew, created long, high drifts that became heavily compacted by the winds. In response, the station crew worked diligently to plow a temporary airstrip on the lake ice near the main camp, which supported continuous air operations throughout April. The Atlantic Division of the US Air Force’s Air Transport Command assigned nine aircraft to the operation, with supporting equipment that included snow removal machinery, aircraft heaters, maintenance parts, temporary shelters, food, and Arctic supplies. Approximately one hundred military personnel, joined by twenty-five civilians, flew to Resolute to accomplish this mission.⁶ It was a massive undertaking for the High Arctic at that time.

The visitors to Resolute were also overwhelmed by the huge snowdrifts that engulfed the supply dumps and camp area. “Large drifts as high as the tops of the buildings had formed in the lee of each structure,” Charles Hubbard and J. Glenn Dyer observed. “As an example, the storage and RCMP quonset hut was buried to the very top so that one could walk over the roof. Constable Aimé reached his quarters through a snow tunnel some 30 feet long.” While paths had been cleared between some buildings, they climbed over “drifts which were so hard that tractors could be driven over them without breaking through.” This posed a serious problem when crews tried to recover boxes and equipment for the new stations from the supply dumps. Heavy shovelling, unanticipated in the original workload plans, strained both morale and schedules. Some supplies were recovered by probing the snow with iron rods, while other items could not be located at all. Other essential items (particularly clothing and knives) had been pilfered.⁷

This frustrating situation compounded ongoing confusion over supplies more generally. To compensate for the shortages in the satellite

stations' stocks, and especially food, the crews drew heavily from the Resolute station's supplies. This meant that the station personnel had to do without some items until the snow melted and the original supplies slated for the satellite stations could be found. In other cases, particularly with respect to medical supplies and clothing, emergency shipments had to be flown up from the United States. Self-reliance at the satellite stations depended upon them. "With the added problem of concealment by snow it is inevitable that the new satellites will be bothered by shortages," Hubbard and Dyer conceded. They did not consider the situation to be critical, however, because "all major components were checked, and miscellaneous supplies were provided in generous quantities which will permit improvisation." Eureka had persevered through a similar situation the year before with "inconvenience but without hazard to the security of the camp nor its principal scientific functions."⁸ Adapting, improvising, and coping with material constraints would fall to the station personnel and their leadership.

To construct the new stations in the western archipelago, Hubbard again reached out to his wartime contacts, appealing to their Arctic interests and encouraging them to join in the next great Arctic experiment. "Perhaps you have heard through the 'Mukluk Telegraph' that there is a big project about to start in the Arctic," he messaged Willie Knutsen, who had been released from the US Army Air Forces at the end of the war. "I cannot tell you what it is, but I think you can guess. Can you make yourself available in the near future?" Knutsen tried to refuse, having just converted a desanctified church in Rockport, Massachusetts into a home for his wife and three children. Although he had already missed his children's births because of work and worried about the impact of another absence on his wife's mental health, he conceded to Hubbard's repeated appeals and went to Washington as a civilian officer with the JAWS program.⁹ Financial exigencies convinced American Alan Innes-Taylor, another of Hubbard's recruits, to return north as the executive officer for the station planned on Ellef Ringnes Island. By March 1948, the three men found themselves boarding an aircraft in Frobisher heading to Resolute, before venturing onward to remote points beyond to expand the weather station network.¹⁰

Isachsen, Ellef Ringnes Island, 78°46'40' N., 103°31'40' W.

Alan Innes-Taylor had extensive knowledge of polar life. Born in Berkhamsted, England, at the turn of the century, his family emigrated to the United States in 1906 and then on to Canada in 1908. He served as a pilot with the Royal Flying Corps from 1917–18, and after a few years working as a farmer and surveyor he joined the Royal Northwest Mounted Police in 1921. He had served for five years as a constable in northern British Columbia and the Yukon before working in the mines at Keno and then as a purser on a steamship running between Whitehorse and Dawson. This northern experience qualified him to join the first and second Byrd Antarctic expeditions, the first as a dog driver and the second as the lead of all field operations. He planned a systematic field science program that demonstrated the shift away from previous generations of simple geographical exploration. After the outbreak of war, Innes-Taylor volunteered to serve with the Canadian Armed Forces. Feeling personally humiliated when no one replied to his letters or telegrams, he was commissioned by a special act of Congress as a captain in the US Army Air Forces. For his first assignment he commanded Task Force 4998a, setting up search and rescue stations on the Greenland Ice Cap and along the east coast of the island in 1942–43. “He liked the Danes, he liked the Eskimos, he liked the climate and the country,” Arctic explorer and popular pundit Vilhjalmur Stefansson later noted. The following year, Innes-Taylor commanded the Arctic Training Group at Camp Buckley in Colorado. Ultimately promoted to the rank of lieutenant-colonel in 1944, he commanded the Alaska Division of the Arctic Training Group at Chip Lake, near Edmonton, Alberta before finishing his military career by training the Lovat Scouts (intended to invade Norway) in mountain warfare and Arctic survival at Jasper, Alberta in 1946.¹¹

Innes-Taylor’s early postwar optimism (and his enthusiasm for Canada) soon dissipated. After his discharge from the military, he and his wife leased 1,200 acres in the Canadian Rockies and set up a beaver ranch, supplementing this unique form of farming by guiding canoe and big game hunting trips on the Athabasca River. “We had a heavenly place in real wilderness country” only accessible by horse or air, he recalled. “We built a big log house and settled down to what we thought was a lifetime



FIGURE 4-1. Alan Innes-Taylor at Isachsen, 1948. Yukon Archives, Alan Innes-Taylor fonds, 2011/45, file 318 #4.

doing the sort of thing we had always wanted.” Two years later, they were bankrupt. Innes-Taylor managed to secure several paid lectures in the United States and “finally made it to Washington” with his wife. When the US Weather Bureau contacted him with the possibility of establishing the station at Isachsen, he leapt at the opportunity.¹²

Self-educated and interested in devising practical solutions to applied research problems in Arctic survival, Innes-Taylor did his homework before heading up to Isachsen. He corresponded with the venerable explorer Stefansson, who had camped near the proposed station site three decades earlier.¹³ He also asked Charles Hubbard to inquire with the Canadians whether the station staff could take two muskox, two caribou, and ten geese to compensate for the lack of fresh meat during the summer months. To balance the local ecosystem, Innes-Taylor proposed killing one wolf for each large animal. Canadian authorities refused the request, upholding their strict game regulations in the Arctic, but the exchange revealed that

the American executive officer was proactive and creative in seeking ways to ameliorate living conditions for his staff.¹⁴

Heading from Washington to Goose Bay, then on to Thule and Resolute, Innes-Taylor spent three weeks with his staff at the station on Cornwallis Island prior to setting up their new post at Isachsen. He was unimpressed with Hubbard. “The planning has been bad, and I am apt at this moment to say that Hubbard is a dangerous man to have planning Arctic projects,” Innes-Taylor reported to Stefansson. “He seems to have plenty of hair brained ideas which other people will listen to. But never having wintered in the Arctic he really doesn’t know. He was in Resolute for three weeks and I had to cross him pretty hard.” He griped about the poorly designed and “comfortless” wartime equipment, the starch-heavy (and low-fat) diet, and medical stores with tonnes of delousing powder and gas casualty outfits that were obviously intended for tropical environments.¹⁵ Innes-Taylor’s previous expertise in planning polar field expeditions made him a credible critic — although he obviously carried a solid chip on his shoulder.

The station staff established a toehold in early spring 1948. Officials in the national capitals (none of whom had visited the site) had hoped to find a suitable location on the southern side of the western peninsula, which offered greater possibility of icebreaker access, but reconnaissance flights over Ellef Ringnes Island in late March discovered better building conditions in the north.¹⁶ The best site proved to be an unnamed bay just east of Deer Bay, with sufficient open ground to permit appropriate weather observations, hills to accommodate the main station buildings, and potential sources of fresh water. The first party of three men and camping supplies arrived at the site on 2 April 1948, establishing an initial camp near the end of the ice runway on the bay. Blowing snow and poor flying conditions prevented the next airplanes from landing for two days.¹⁷ Richard Jones, the officer in charge (still recovering from an earlier illness at Westover), selected a knoll upon which to build a prefabricated hut. At the foot of the hill flowed a considerable stream that would supply fresh water in summer and ice in the fall. Otherwise, Innes-Taylor reported that the sea ice was so old it could be melted and the water drunk.¹⁸ Later assessments by station staff proved that water supply was a more persistent problem at Isachsen than the site selectors had anticipated.

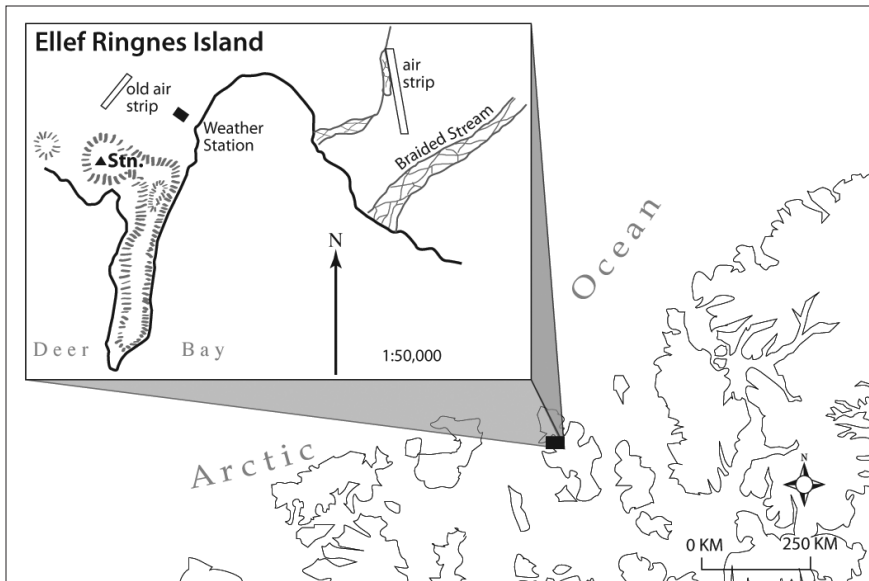


FIGURE 4-2. Isachsen site map, 1947. Jennifer Arthur-Lackenbauer

By the time Andrew Thomson visited the site on 13 April 1948, the station staff of six (plus a temporary American mechanic to build the air-strip) had settled in two Jamesway huts. The crew offloaded the 12,200 lbs. of building materials from a C-54 aircraft in twenty-five minutes, before heading back to Resolute to collect another load and return later in the day if the weather cooperated. The station staff made every effort to learn from previous experiences, carefully assigning the supplies to appropriate places in the storage dumps so that they could be readily shifted to the top of the knoll. Jones also planned to build the permanent prefabricated house as soon as all the materials arrived from Resolute, at which point they would complete the permanent installations and begin the radio-sonde program. The arrival of two huskies and four puppies the previous day “had added very much to the liveliness of the community,” and Jones reported high morale and no nationalistic tensions.¹⁹

Innes-Taylor, however, grew increasingly dismayed. His private correspondence revealed a strong anti-Canadian bias. “This area and many others have been entirely neglected” since the Canadian Arctic Expedition

had visited it three decades before, he told Stefansson, “and that even today the best we can do is stick up a weather station and to hell with finding out something about the country. I get sick when I think of it and I get particularly annoyed at the slow ponderous expansion of the Arctic by the Canadians. They don’t deserve to have it.”²⁰ Innes-Taylor also appealed to Lincoln Washburn, the American-born executive director of the Arctic Institute of North America in Montreal, to “see if you can’t stir up the sleepy Canadians to putting some good scientists up here to do a job.” The Canadians at Isachsen were not even meteorologists: “just dull fellows who know how to read machines, and send balloons up, and who ... have no interest in anything except the dull mechanics of their job, and count the days until they can go back to Toronto or Swift Current or wherever they come from.” After “taxiing” scientists and geologists around the world for a quarter century, Innes-Taylor’s visits to remote regions had filled him with fascination and exhilaration. “I never lose the joy of something new and the recording of it,” he noted. “But when I get to one of these new areas with a group of school boys who lack even a faint glimmering of imagination, THAT MAKES ME SICK AND SAD TOO.” If Washburn could not “stir up” the Canadians to recruit more adventurous candidates, Innes-Taylor wanted him to convince the Canadians to allow the Americans to “send up a good man or two.”²¹

Innes-Taylor’s strong opinions reflected a broader disappointment with modern methods of Arctic exploration. As an obvious disciple of Stefansson and other “heroic age” explorers, Innes-Taylor and his laments about the weather station program bore a strong undercurrent of anti-modernism. Writing for the Arctic Institute of North America’s new magazine *Arctic* soon after he arrived at Isachsen, he noted:

Here we were then, in this new land with a great mass of supplies; food of all kinds, an airborne tractor, sleds, clothing, three dogs — one ancient male, a pregnant bitch and a six weeks old pup; Jamesway huts, a prefabricated timber house, linoleum, chemical toilets, radios of assorted kinds, electric generator, medical stores, silex coffee makers, trail equipment of one kind or another, kerosene, motor fuel, aviation gas, diesel fuel, lubricating oils, unleaded gas and coal, a complete



FIGURE 4-3. USAF C-54 landing at Isachsen, 1950. NARA, RG XPOLA, Entry 17, Charles Hubbard Papers, Box 5, File Report on Airlift Operations, Spring 1950.

set of weather-recording instruments, hydrogen-making apparatus, lumber, beaver board, winch, antenna masts, stoves, paint, nails, tools, ice cutting saws, dynamite, Very pistols [flare guns], an ice-cream mixer and a library of twelve books. This was to take care of us, to make life easier and more comfortable, so that we could do our weather observing.²²

Unfortunately, the station personnel displayed “little excitement over being in a new country never before explored and about which little is known.” Innes-Taylor pondered why this was:

Man and his machines? Man and his gadget thinking? Man in his desire to explore, at the mercy of his machines? Amidst the mound of supplies, the man had forgotten that this land had not changed; it remained the same as when Sverdrup and Stefansson charted its coast. The great and beautiful clouds still swept over it, the blizzards still hit the mountains and roared into the valleys, the pinched vegetation was still soft

and glorious in the summertime. The landfast ice still clung to the shores as though to defy the ice breakers. The great stillness was still here. It would never change. Only man had changed. He had harnessed himself to the machine, and somehow the machine seemed a little tawdry, a little out of place, a little futile and dirty. Nothing was simple any more [*sic*]. There was comfort of a sort, but not the hominess of a snow house. There were typewriters, but gone was the effort of writing what one saw and felt with the barehand. Nobody sang, nobody whistled, it was a grim job. Only the land, misty in the drifting snow or brilliant under the high sun, remained the same. This would never change. There would always be that spiritual aloneness to be found here, but it was too simple, too basic; it was no longer what man desired. He had arrived here forty years after discovery, a stranger and an intruder in a strange land he would never understand.²³

Involved in a spiritless, modern experiment, the executive officer felt that his crew remained insulated and disengaged from the vibrant, majestic land.

In his official correspondence to Thomson in Toronto, however, Innes-Taylor acknowledged that the staff had made significant progress. From April 3–24, aircraft (mainly C-54s) had carried 338,086 pounds (169 tons) to Isachsen in thirty loads. Morale remained high — although people felt fatigued by this point. They had completed the operations building, set up the weather instrumentation, and took synoptics for the previous ten days. They planned next to tackle the warehouse, garage, hydrogen shelter, and permanent housing building. In the meantime, they still lived on the beach in two Jamesway huts (one of which would remain as an emergency building if their permanent building burned down). They had moved all of the equipment off the bay and into dumps — just in advance of the snow, which proceeded to bury everything and required daily digging. “There is no indication of summer,” the executive officer quipped. The temperature had risen since the airlift, but the weather had worsened. As they settled in, so too did the desolation and remoteness of their surroundings:

This is a strange and at times beautiful country pervaded with a stillness like death and at others roaring with the wind, but always lifeless. We have seen not a sign of life other than the track of a Leming [*sic*] and a fox. I suspect that we will see little game, although there is considerable vegetation in the valleys, grasses, mosses etc. The sea ice in this area is landfast and of great age, the only open water existing where rivers of some size flow into the sea.

Innes-Taylor suspected that parts of the area retained sea or lake ice upon which aircraft could land throughout the year, and he highly doubted that an icebreaker could reach Isachsen. “We shall probably remain an air service Station,” he noted.²⁴ Time proved him right.

Mould Bay, Prince Patrick Island, 76°14'16"N., 119°20'28'W.

The station planned for Prince Patrick Island, about 500 miles west of Resolute Bay, would be even more isolated than Innes-Taylor's outpost on Ellef Ringnes. Its primary attractiveness lay in its geographical location as the westernmost of Canada's High Arctic islands. Historically icebound for the entire year, few non-Indigenous people had set foot on the island prior to 1948. Lieutenant George Mechem, of Captain Francis Leopold McClintock's 1853 expedition, had touched the southwest point and “explored” the island by spyglass, noting the “almost insurmountable” pack ice surrounding the flat, dreary, barren landscape, and McClintock himself had mapped the western coast by sledge.²⁵ Vilhjalmur Stefansson corrected and completed the mapping of the island sixty-two years later — a challenge given the snow and ice blanketing “the gentle seaward slope of the land, obscuring the actual shoreline, and foggy weather obscuring everything else.”²⁶ Sir Hubert Wilkins navigated a Consolidated PBV flying boat that landed on the southeastern side of Prince Patrick while searching for six lost Russian aviators in 1937, but he did not remain there for long during his last major Arctic adventure.²⁷ For all intents and purposes, this little-explored territory remained one of the most inaccessible corners of the dominion.

Aerial reconnaissance of the island began on 23 March 1948. Crews tried to examine Green Bay but turbulence prevented them from

completing a careful survey, and they proceeded down the west side of Mould Bay without success. Hubbard's long-time friend Willie Knutsen, selected by the USWB to serve as executive officer at the Prince Patrick Island station, joined the search on March 30. Staging at Resolute, they took off in a C-47 cargo plane on ski-wheels with a C-54 escort, passing over "the full length of rugged, rumpled Melville Island."²⁸ Knutsen recalled the anticipation surrounding the first landing:

We flew over Mould Bay, found a frozen lake that looked landable, and made our historic approach. Our stomachs were in knots as we wondered if the snow would be hiding boulders. The ground was coming up fast. We hit the lake with a hard bump, and then a series of more rapid, jarring bumps seemed to squash my insides, and I was afraid my teeth would lose their fillings. The pounding seemed to go on forever. We made the landing, of course, but it was a lousy place to land! And so we five Americans and two Canadians were the first men to land on Prince Patrick Island. I took unapologetic advantage of my position as mission leader, and was the first to step onto the island.²⁹

Knutsen promptly went to high ground to survey for a landing field. Before he could pass along his report, the aircraft with Hubbard onboard decided to land. It touched down hard, kicking up a cloud of snow. The crew and passengers emerged unscathed, but the landing damaged the nose wheel. The pilot shut down the engines and quickly removed the fuel lines before they froze and cracked — something that the pilot of the previous plane forgot to do, with inevitable results. Knutsen and the crew spent the night in tents, awaiting the arrival of a new oil hose for the C-47 the next day. Knutsen used the opportunity to examine the area around the lake, which would have been satisfactory except, he noted, for the heavy snow accumulation that would have plagued flight operations on an ongoing basis.

A third reconnaissance mission on April 5 identified a suitable site on the east side of Mould Bay, about fifteen miles from the Crozier Channel. The sea ice could accommodate a C-54 aircraft landing on wheels, and "the adjacent land areas were excellent for weather station construction,

FIGURE 4-4. Willie Knutsen, 1944. From Willie Knutsen and Will C. Knutsen, *Arctic Sun on My Path*, 2005.



consisting of hard gravel ridges bounding a broad low valley with extensive delta at the mouth.”³⁰ With the site selected, the US Air Force flew Canadian OIC Paul Chorney, radio operator Patrick McKay, and Knutsen to Mould Bay on April 11. The three men established a temporary camp, then opened radio communications that same evening with Resolute and Isachsen.

Because the airstrip ended nearly a mile from the site selected for the station, the men urgently requested a caterpillar tractor and sled so that they could haul cargo and improve a taxiway to get aircraft closer to the camp site.³¹ It arrived in dramatic fashion, with the plane slamming to a stop in deep snow, breaking the chains holding the bulldozer, and sending the machine crashing into the cockpit wall. The crew again emerged uninjured but shaken. “After the plane was gone, and there were only three of us left there, that wonderful arctic silence descended on us,” Knutsen recalled. “McKay and Chorney were good arctic mates. The awesome stillness and the knowledge that we might as well be on the moon did not disturb them. In fact, they said they were having a ball!”³² They set to work improving the landing strip on the ice by pulling a large wooden beam across the runway to scrape off the loose snow. “Then began the ‘Prince Patrick Airlift,’” the executive officer recounted. “A process of C-54’s, buttressed with one C-82 (Packet), poured supplies into Prince Patrick so fast we could hardly keep them classified and the perishables



FIGURE 4-5. Mould Bay site map, 1947. Jennifer Arthur-Lackenbauer

and instruments under cover.” The formal establishment at Mould Bay had identical staff numbers to Isachsen: three Canadians, three Americans, and an additional US mechanic to assist temporarily with building an air-strip. The seven men quickly built a Jamesway hut to store their inventory of essential supplies.³³ Thirty-two flights carried 170 tons of supplies into Mould Bay by April 25 without incident.³⁴

Unforeseen events, however, confused the local situation. McKay, the Canadian radioman, narrowly averted disaster when he knocked over a Coleman stove and burned down his nylon tent. Fortunately, his radio equipment survived. Knutsen, however, who had intended on a thirteen-month posting, was not as fortunate. He strained himself lifting a

cook stove into the main hut on 19 April. He tried to conceal the injury from everyone except the OIC (Paul Chorney), but his situation did not improve. Against his protests, his comrades called in a plane to evacuate him for treatment. On May 29 a ski plane glided in from Thule and took him out. "I nearly wept, being forced to leave so many months before my contract was up," he confessed.³⁵ Consequently, the station operated without an executive officer for the first year — there was not enough time to send a replacement before the ice strip became unusable. Station construction proceeded unabated, however, and Mould Bay carried on a full weather observing program from June onward.³⁶

Resupplying the Stations: The Trials of Task Force 80³⁷

While crews were building the satellite stations at Isachsen and Mould Bay, officials from Canada and the United States met in Washington to plan that summer's naval mission. Task Force 80 would resupply the weather stations at Thule, Resolute, Slidre Bay, Deer Bay, and Mould Bay and land the necessary materials to build planned stations at Winter Harbour on Melville Island and another on the northeast coast of Ellesmere Island.³⁸ In addition, the Americans hoped to resolve ice issues, unreliable charts, compass errors, and the lack of celestial fixes (for navigation).³⁹ The commander, Captain George Dufek, had extensive experience in the polar regions having commanded Operation Nanook in 1946 and then the Eastern Group (Task Group 68.3) during Operation Highjump in Antarctica in the winter of 1946–47.⁴⁰ Dufek realized that the 1948 mission called for far more than the ability to operate effectively in Arctic conditions. He would also have to navigate through difficult political issues — particularly Canadian sensitivities over participation in continental defence.⁴¹

The most pressing concerns revolved around the questions of sovereignty, control, and publicity. Although the Americans believed that they understood the issues and, "after numerous difficulties and altercations, finally have found effective answers," they still had to be careful "to ensure that small oversights do not occur to mar present friendly relations."⁴² Planning documents reflected the spirit of cooperation and accommodation between the two countries. The operational plan quoted a speech by Canadian Minister of External Affairs Louis St-Laurent on 29 April 1948, which set the tenor for the broader continental relationship. "One source

of whatever difficulties we have with our good neighbour is a flattering, if at times trifle embarrassing, tendency on their part to consider us so much as one of themselves that, with the best intentions, they occasionally forget we are as sensitive as any nation about having control over our own affairs,” St-Laurent noted. The operational plan reiterated the Canadian regulations that the USN had to follow during the mission, and senior American officials pledged to respect the conditions and rules.⁴³

Canadian officials remained vigilant when monitoring actual American activities. They had not regulated the previous naval operations heavily, asking the Americans neither to disclose the routes they would take nor to provide information on specific scientific studies. This changed in 1948. Now they sought, in advance, a “full picture” of the training, research and development projects, and scientific work the Americans hoped to accomplish, and scrutinized flight plans to ensure that they did not conduct unauthorized overflights over Canadian territory.⁴⁴ They also urged their American counterparts to be more vigilant in controlling publicity and curbing stories perpetuating incorrect or exaggerated ideas about joint activities in the North.⁴⁵ Furthermore, a larger contingent of Canadian observers (eighteen in total) than in previous years would participate in the upcoming mission, gaining first-hand knowledge about the High Arctic and ensuring that the dominion’s interests were represented and protected.⁴⁶

The growing interest of a few overzealous Canadians — particularly Trevor Lloyd, the head of the Geographical Bureau of the Department of Mines and Resources — also anticipated and portended bilateral friction. Determining the locations for future JAWS stations (and the routes to reach them) would likely result in important geographical discoveries, so Deputy Minister and NWT Commissioner Hugh Keenleyside wanted Lloyd involved in the deliberations.⁴⁷ A “northern nationalist” who constantly worried about Canada’s sovereignty in the North, Lloyd had already alienated himself from Canadian military and diplomatic circles when he badgered them for information about bilateral defence arrangements that fell beyond his bureau’s mandate,⁴⁸ and then “endangered the machinery for the exchange of reports and other material between the Services of the two countries” by going directly to the Americans for information.⁴⁹ While senior officials at Mines and Resources continued to support Lloyd

and his actions, the military establishment in both countries grew increasingly distrustful of him and his entire organization. The US Navy singled out all the personnel from Mines and Resources for security checks and “special going over,”⁵⁰ but they could not prevent Lloyd from carefully scrutinizing the Arctic mission. His colleagues participating in the task force, particularly Tom Weir, kept him apprised of progress and reported any questionable or worrisome activities. Despite all of the precautions taken during the planning stage, there was plenty to report.

The ships set sail from Boston on July 15–16, resupplying Thule before the two icebreakers set their course for northern Ellesmere Island at the end of the month. Here they would cache equipment so that work crews could build a runway on the sea ice the following spring to bring in the tons of supplies, equipment, and materiel needed to establish another satellite weather station.⁵¹ Loose and scattered floe ice delayed progress, and heavy fog led to damages to the icebreakers. Captain Albani Chouinard, the senior Department of Transport observer and a retired icebreaker captain with extensive Arctic experience, was appalled by the “abuse to the ship and equipment” wrought by the crew’s inexperience. “They wouldn’t listen,” he confessed to Constable Aimé later, “so I just went and got drunk.”⁵²

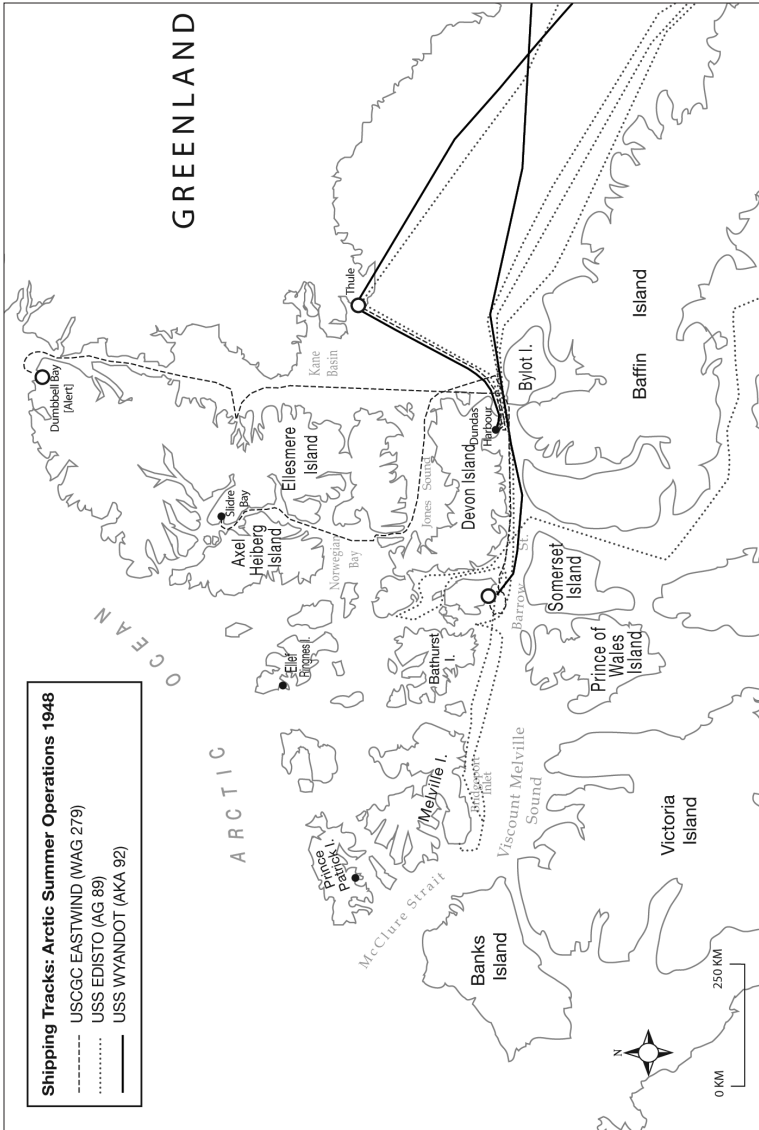
Edisto anchored off Cape Sheridan on August 2, near where Sir George Nares had wintered with HMS *Alert* during the British Arctic Expedition of 1875–76 and where Peary wintered during his attempts to reach the North Pole in 1907 and 1910. Heavy ice conditions inhibited plans to continue up the coast to Cape Columbia so, continuing a common trend, the men on the spot were forced to search out an alternate site given the realities on the ground. Previous reconnaissance flights had identified a potential location between Dumbbell Bay and the Dumbbell Lakes, a few kilometres to the northwest.⁵³ While the icebreaker lay at anchor in the bay, Hubbard and a Canadian representative selected the future site for the station. Although the mountainous terrain of Ellesmere generally posed a serious challenge to planners, the landscape inland from Dumbbell Bay had a relatively low relief and the United States mountain range was distant enough that it did not unduly disrupt weather patterns. Seaborne access would be limited to icebreakers in favourable conditions, but the lakes in the area offered fresh water and would also serve as backup airstrips if

the ice on Dumbbell Bay was overly rough. Finally, part of Cape Belknap was level enough to build an airstrip in due course.⁵⁴

With the location settled, *Edisto* started to offload a cache of heavy tractors, huts, fuel, and field rations on August 2. Although several men were stranded at the site after ice threatened the ships, prompting a frenzied retreat to Black Point, they were retrieved and the final stores of construction supplies and equipment offloaded two days later. With their mission on the northern end of Ellesmere Island complete, the ships slowly pushed northward into the Lincoln Sea. Damage and all, the icebreakers eventually reached 82° 34' N, farther north than any previous surface vessel navigating under its own power (rather than drifting in pack ice).⁵⁵ Maritime history had been made in the Canadian Arctic — by an American icebreaker.

Completing the weather station resupply mission thus fell to USS *Eastwind* and *Wyandot*, which had travelled alone to Resolute Bay. Here the coast guard icebreaker rejoined the supply ship and began the long process of offloading supplies on August 13 — an effort complicated by ice lodged in the bay. Although *Eastwind* headed for the station at Slidre Bay a few days later, it returned after an urgent message from the transport ship saying it was caught in the ice and being driven to shore. The icebreaker returned to Resolute as fast as possible, discovering that the cargo ship had managed to escape the ice but not without sustaining damage to its propeller blades, causing vibrations throughout the ship and a significant loss of speed. Undeterred by this near disaster, the task force made another attempt to unload the supplies for Resolute on August 20. Heavy ice again rolled into the bay, stymied all progress, stranded forty men on the beach, and almost crushed a landing craft. Once more ice threatened *Wyandot* and the icebreaker had to tow it clear. Still unable to finish unloading supplies at Resolute, *Eastwind* left once more for the station at Slidre Bay (Eureka) on August 25 and reached the site three days later. It landed supplies there without incident (the first part of the resupply operation to go as planned), completing its task in only twenty-three hours. The next afternoon the icebreaker headed back to Resolute, rendezvousing with the newly returned *Edisto* on September 2. Though the unloading of supplies was continuously upset by drifting ice in the bay, by September 4 all materials had been transported to shore and Task Force 80 dispersed.⁵⁶

FIGURE 4-6.
Task Force 80
(1948) map.
Jennifer Arthur-
Lackenbauer



On the way home, *Eastwind* navigated Fury and Hecla Strait, the first vessel ever to do so, thus opening “a new route to the northern Canadian Arctic.”⁵⁷

On the operational level, the cruise of Task Force 80 had been a success. Beyond simply resupplying the weather stations, the hydrographic, geodetic, and oceanographic information gathered during the mission corrected Arctic navigational charts. But the Americans had been at the helm, and this continued to worry some Canadian officials. *Edisto*'s achievement of a new record for “highest north” showed the effectiveness of American icebreakers — and highlighted Canada's inability to operate independently in the region, let alone control activities within it.

Given lingering sovereignty concerns in Ottawa, perceived indiscretions continued to generate alarm and over-sensitivity. Canada's consent to the expedition had stipulated that the US commanders would have to seek official approval before they changed their proposed routes.⁵⁸ Captain Dufek's subsequent decision to return via transiting Fury and Hecla Strait therefore upset Canadian officials — and proved the shortcomings of an informal approach to planning and operations. Although Dufek notified the senior Canadian task force observer, critics accused him of failing to inform the Canadian government directly.⁵⁹ This alleged breach of protocol, indicating Canada's lack of direct control over Arctic activities, prompted Ottawa officials to ensure that Americans on future naval operations did not undertake “excursions into areas that are quite irrelevant to the weather station programme.”⁶⁰ The Canadian ambassador in Washington passed along a stern message to the US Navy that deviating from established plans would jeopardize Canadian approval for subsequent projects.⁶¹ More careful investigation revealed that the situation was not as clear as some Canadian officials believed,⁶² and Hubbard insisted that the expedition had passed through Fury and Hecla Strait at the suggestion of the ranking Canadian naval representative on board (and with Canadian Navy approval). The Canadian complaint, Hubbard alleged, reflected the attitude of Trevor Lloyd more than anything else.⁶³

Lloyd remained a committed defender of Canadian interests in Ottawa whenever he believed the Americans acted without permission. When Charles Hubbard discovered a cairn erected by American explorer Robert Peary in 1906 and took a whisky bottle full of historical documents

from it onto *Eastwind*, Captain Dufek asked the senior Canadian observer, Commander Thomas Fife, to open the bottle and review the papers.⁶⁴ Fearing American retaliation if he demanded custody of these documents, Fife told another observer to present the Americans with a copy of the Canadian *Ordinance Respecting the Protection and Care of Archaeological Sites*,⁶⁵ and left any formal action to senior officials in the nations' capitals. Lloyd, kept well informed by observers on the ships, pressed the issue in Ottawa, believing that he had finally secured hard evidence of tangible American indiscretion.⁶⁶ Senior decision-makers, however, took every step to ensure the mission faded in the public's memory. The Under-Secretary for External Affairs explained that the authorities in Ottawa "wanted the Mission to drop into obscurity,"⁶⁷ including Minister of National Defence Brooke Claxton who instructed that "everyone ... forget about the Sea Supply Mission."⁶⁸ Deflecting attention away from Arctic projects would have the dual benefit of reducing public anxiety about the extent of American activities in the region and avoiding any further strain in Canada's relations with the Soviet Union.⁶⁹

Maintaining control over media coverage proved a Canadian pre-occupation. Prior to Task Force 80's departure, Canada insisted that the countries only issue joint press releases at the beginning and at the end of the mission and that officials rigidly adhere to the publicity directives for joint defence projects. Although it would be impossible for Canada to suppress news that the American "ships went further afield than did that of the British explorer Nares (who went much further himself by sled),"⁷⁰ Ottawa sought to make the extraordinary feat as ordinary as possible in the final press release. As soon as the expedition returned to Boston, however, leaked information began to find its way into the newspapers, including a front-page story in the *New York Times*. Furthermore, US government sources intimated that the Truman administration wanted to release more details on the expedition but Ottawa would not allow it.⁷¹ The Canadian government looked like it was hiding something from the public, thus deepening suspicions about American defence activities in the Arctic.⁷² Charles Hubbard was the main source of the press leaks, and his "mania for publicity" and blatant breach of protocol also upset the Americans.⁷³ Infelicitous media coverage irritated bilateral relations, but clear-headed

Canadian officials recognized that there was no American conspiracy to undermine the dominion's position in the Arctic.

Early Life at the Stations

Whereas Lloyd had seen American indiscretions everywhere, Canadian and American personnel at the stations generally got along well. In his March 1949 handover report identifying problems at Isachsen, Executive Officer Alan Innes-Taylor noted that “there have been no difficulties of any kind” regarding foreign relations — a welcome relief to Andrew Thomson, who received more questions from his Canadian superiors about the bilateral relationship than any other topic.⁷⁴ On a personal level, however, Innes-Taylor harboured deep-seated prejudices and his frustrations towards Canada festered at the isolated weather outpost. “I would never take a Canadian on any Expedition unless I knew him well and had seen him in action,” Innes-Taylor told Stefansson in November 1948. “They live in a country which has an Arctic empire, but they know less about it than an American schoolboy.” He generalized that Canadians were temperamentally unsuited to Arctic work, lacking enthusiasm, adaptability, and (with the exception of the few people who actually lived in the North) mental and physical toughness. Although he claimed to retain his love for the Canadian North and its people, he declared that he could “no longer struggle against the awful inertia which lies like a pall over the whole country when it comes to development of their great north land; and so long as I live I shall continue to drive that point home on every occasion.” By this point, he had shaken “the dust of [Canada] from my feet and when I get home shall become an American citizen.”⁷⁵

At the core, Innes-Taylor remained convinced that the stations represented a missed opportunity for expanded scientific knowledge. Both governments had invested tremendous money in the JAWS program, which he assumed would reap dividends in weather data. When it came to the exploration of Ellef Ringnes Island, however, the impact was negligible. Aircraft proved useful for basic mapping and quick transport, but not detailed, substantive work to get to know the actual environment. “The botanical, biological, geological angle ... is not being done,” he complained in a private letter to Stefansson in November 1948:

Here is a station with 7 men, comfortable quarters, electric light, ... and excellent food. Good beds, radios, etc. We are doing weather but what else? Absolutely nothing. This station could house at least three more men, who could do some really valuable work, but it [isn't] being done. We are discouraged from going more than five miles from the station, although I must admit I have exceeded it many times. The policy is dictated by Arm Chair Arctic Experts at Toronto and Washington who have never wintered in the Arctic and who keep on continually harping on the heroic adventurous story book conception of the country. We end up having too much materially and too little exploratory.... All these lads want to do with one exception is eat well, live well, and do their weather observations which do not take up more than 4 hours of their day. So they are bored and count the days until they leave.⁷⁶

During the summer season at Isachsen, mobility was constrained: the entire area was “a sea of mud.”⁷⁷ When the winter set in and mobility was possible, only two of the seven men walked more than 300 yards daily. When Innes-Taylor had brought in nineteen “plump and delicious” ptarmigan in late August — their first fresh meat since May — the men ate the birds reluctantly and did not like them. He was appalled. “I would[n't] give hell room for a carload of this type of man,” he complained. “I’m afraid there are many of them in these days of press the button everything.”⁷⁸

The first year at the station brought its share of hardships. The Canadian OIC at Isachsen, who was unable to overcome serious medical problems, displayed few leadership qualities. He had difficulty motivating the crew, so work progressed too slowly for his executive officer. “It is a little difficult to understand the men,” Innes-Taylor admitted. “They get up when they please ... and generally behave like spoiled children.”⁷⁹ In an isolated station, everyone needed to pull their weight — and accept unpredictability. Even basic contact with the outside world through air mail drops proved unreliable. By late November 1948, the station personnel were busy planning for Christmas, writing letters, making cards — and anticipating a mail drop. When flights failed to arrive week after week, morale sagged. “No mail. Nothing to read. Talk about run-out,” Innes-Taylor noted on 10

January 1949. From his frustrating vantage point at the station, he speculated on the cause: old aircraft, improper winterization, inexperienced crew, and a lack of “drive behind the mission.” A thirteenth attempt finally delivered the mail on February 24 — and fortunately eleven of twelve chutes opened.⁸⁰

Some things could be controlled, however, and Innes-Taylor reported that deplorable living habits both reflected and perpetuated poor morale at Isachsen. The living room, dining room, and kitchen were habitually messy, and “little thought was given to helping our good natured cook keep the place clean and one man cannot do it all.” The men tossed cigarette butts on the floor or left them to burn holes in the bookshelves. “There were times when the interior looked quite sordid and certainly most depressing,” the executive officer admitted. If every man did his part, the station would be easy to maintain — but not when one or two men had to pick up constantly for the other five. Innes-Taylor was also appalled by the dirty language that matched the physical filth. “Most men swear at times, but the filthy blasphemous language which has flowed from the mouths of three of the men in a constant stream hardly makes for good morale,” he reported. In a small station in particular, it was essential for men “to show consideration for the other fellow.”⁸¹ When men failed to display basic respect for others, such as failing to do their chores, they placed an unfair burden on their colleagues.⁸²

Innes-Taylor’s reports failed to disclose, but his private papers reveal, an undercurrent of humour and a burgeoning station culture rooted in a shared sense of isolation, confinement, identity, and resilience. A quirky manifestation of personnel enduring such hardship appeared in a home-made booklet on the “Arctic Male” written by “The Skipper” at Isachsen in late 1948. “Dedicated to The Arctic Experts in the fond Hope that they may freeze in Hell,” this irreverent, sarcastic, and colourful artefact shows how station personnel perceived their lack of agency and distance from the south. It also suggests that the crew had already formed a distinct station culture, represented by what the author called (with his tongue in cheek) “The Arctic Male Society” — an exclusive order in Isachsen clearly separate from “The Arctic Experts” who ran the program from Ottawa and Washington south. This was the time of year when yearning for the south

was at its peak, and the personnel had settled into their winter routine — thus giving them time for such creative pursuits. The narrative began:

Once upon a time there was a weather station on Isachsen Land, away in the Arctic near the North Pole.

On this station were Seven men waiting for the Christmas mail. They had been waiting a long time.

A long way off, many thousands of miles away in the cities of Washington and Toronto there were a group of Arctic Experts. These men had devoted a lifetime to sitting on their fat rumps — giving orders in a loud and vulgar voice and reading Buck Rogers, Superman and a few Arctic books. Some of them had even appeared on the Radio and on occasion had appeared on the famous show “It Pays To Be Ignorant.”

They were all known as Bureaucrats but had recently coined a new word for themselves[,] “Polarcrats.” As one bright Isachsenite glibly remarked “Sounds too much like Polecats and boy — how they stink.”

These Arctic experts were strong on Protocol & White Papers, but a little short on fur lined under wear [*sic*] and frozen Noses.

From Time to Time they were in the habit of making wild dashes in an Aircraft to the Headquarters Base in the Arctic at Resolute Bay. Immediately [after] they arrived they would scream for a mike and get on the air to all the stations —

Arctic Expert: Calling all Stations — Come in Isachsen

Isachsen: Mad Dog calling Resolute — You are loud and virile

Arctic Expert: How are things up your way — Thomas says Hello[,] Hubbard says Hello — We are sending you a new Tractor[,] nineteen Thermometers and a Kiddie Car on the Spring Airlift. We know what you

fellows want and we'll get it, if we have to go to Harry [Truman]

Isachsen: What about the mail?

Arctic Expert: As soon as I return to Washington we will hold a conference to see what can be done. You fellows [mustn't] be impatient. After all, we promised you an airmail once a month, and that was only a campaign promise. Also remember there is still 120 shopping days to Christmas. Be brave — Think of Peary — Think of Franklin — Think of Greely — You too may be an Arctic Expert some day.

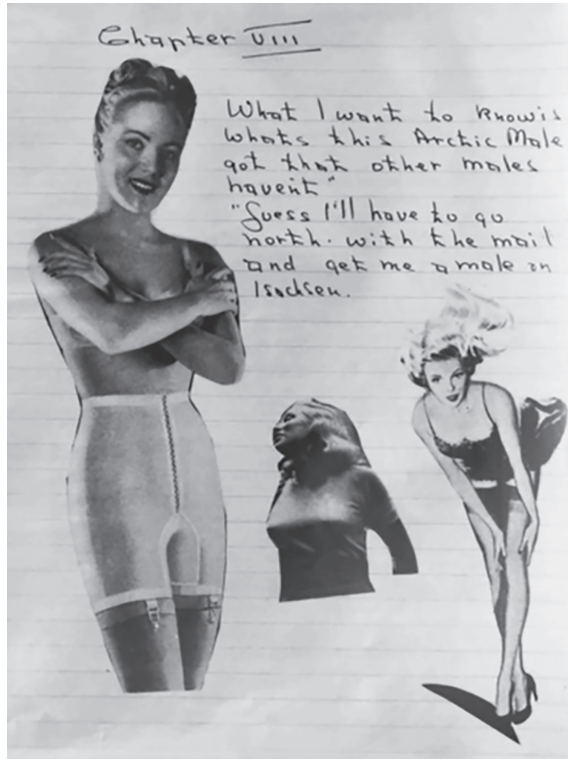
Isachsen: But we haven't had any mail in a year and Christmas is coming.

Arctic Expert: The static is getting bad — I cannot hear you — Your signal is weak and impotent — My plane is taking off in an hour. I must get back to conferences. Remember we are with you every foot of the way.

The invented dialogue continued in the pages ahead, complemented by cartoons and silly images cut out of magazines.⁸³

The booklet was intended to be humorous, but the author's fixation on various themes is telling. Operating out of a distant metropole, an "Arctic Expert" is defined as "an individual who never having lived in the Arctic knows more about how to live there than the Eskimo, or one who having lived for short periods of time in the Arctic knows all about it, or one who having lived a long time in the Arctic is sure that he has learnt all there is to know." In the fictitious narrative, the "Polarcrats" and "Arctic Experts" had no real sense of the conditions or needs at an isolated outpost, yet had power over whether the men at the station received their coveted Christmas mail. In this fantasy, Congressional hearings are held to solve the dilemma of getting the mail to "these heroic men" at Isachsen. State officials are self-glorifying buffoons, dressed in formal suits and seeking career advancement. The artefact is filled with photo

FIGURE 4-7. A page from the “Arctic Male,” produced by the station personnel at Isachsen in 1948. Yukon Archives, Alan Innes-Taylor collection, MSS 508, acc. 2011/45, f. 2.



clippings of beautiful women, with captions dreaming of them wanting to head up to Isachsen “with the mail and get me a male in Isachsen,” or seeking to comfort “these poor dear boys, so cold and lonesome.” The longing for female companionship is unambiguous, reinforcing prevalent gender stereotypes at the time, but the document simultaneously mocks and bemoans the “virility” and “manliness” of a crew far removed from such comforts who were “impotent” to change their plight. It served as a good-natured way of venting frustration, as well as promoting small group cohesion and distinctiveness.⁸⁴

Individual personalities, not nationality, created most of the tension at the stations. The hardship of isolation and the boredom brought out the best and worst in the personnel. When Captain Albani Chouinard, a Canadian naval observer with the 1948 resupply mission, visited Resolute Bay he “found a very poor set-up ashore. After a few enquiries we found that they had trouble during the winter. The people on the station are

not congenial, housing is poorly situated and very badly kept. One of the Department of Transport radio operators who is stationed at Resolute Bay, is a Union man and this has created ill feeling amongst the others.”⁸⁵ There were also similar interpersonal challenges at Isachsen. While *Collier’s* magazine would later glamorize the sensational but outdated masculine bravado of another station member, Willis (Bill) “Blowtorch” Morgan, his actual contributions were less constructive. The magazine described him as an Oklahoman “famous throughout the Far North for his ingenuity, especially with the blowtorch which, carried in his belt at all times, he uses to perform mechanical miracles.”⁸⁶ Léo Lafranchise, who arrived at Isachsen as the new OIC in fall 1949, was less enamoured with “Blowtorch.” Lafranchise observed “the ruin and destruction [Morgan] accomplished with his blowtorch, his lack of knowledge for the equipment and irresponsible action at Isachsen in 1949 where he left 95% of the equipment unserviceable. Because of his charm or big mouth plus his knowledge on how to make home-brew,” Morgan divided the camp staff, and fist fights were “prevalent.”⁸⁷

Such tensions did not, however, hinder the program’s maturation. When Chouinard visited Eureka Sound, for example, he found everything under perfect control and clean, complete with well-dressed weather bureau personnel in splendid spirits. No complaints existed between the Canadians and Americans, only “good cooperation and feelings.”⁸⁸ A similar sentiment prevailed internationally. Although the United States had already invested millions of dollars in the weather stations, State Department officials did not believe the two countries needed to negotiate a formal agreement. Hubbard sought more certainty from a Weather Bureau standpoint, hoping that fixed arrangements would prompt future procurement decisions. Budgetary limitations in early 1949 had precluded the USWB from building a station at Melville Island for two years (and it would never be built), and these constraints forced Hubbard to narrow his main effort to consolidating the facilities at Isachsen, Mould Bay, and the yet-to-be-built station at Alert. During the initial period of operation, everyone had been prepared to accept improvised methods and make-shift accommodations. Hubbard therefore concentrated on improving the “permanency” of these facilities, and this compromise helped him to secure support for a five-year joint plan between the USWB and the

Canadian Meteorological Division.⁸⁹ The existing arrangement, where conclusions reached at an annual meeting between each country's major contributing departments formed the basis for the following year's work agreement, served all parties' interests just fine. Such comparatively informal yet close collaborations would characterize the working cultures between personnel at the stations as well as between bureaucrats further south.

Adapting to the Environment

Other challenges, however, were beyond anyone's control, forcing adaptation. Each winter, the stations were isolated from southern assistance. The darkness that persisted through most of the lunar cycle, in addition to the extreme cold, made winter the most challenging time to land at the stations. From 1947 to 1949, some pilots persevered against these challenges and made dark period landings at the satellite stations. These flights were usually timed to coincide with a full moon but remained hazardous. One aircraft, for example, landed at Eureka on 23 December 1947. Although the weather was good, the weak moonlight fooled the pilot into believing that there was a hill at the south end of the runway, and he made "seven or eight" approaches before setting down.⁹⁰

After landing at these remote outposts, flight crews did not linger. On 23 February 1949 an American C-54 landed at the Eureka ice strip. Upon inspecting their aircraft, the crew discovered an 80-drop per minute gas leak in the starboard wing tank. Normally this rupture would have grounded the aircraft, but the station's diarist noted that the crew were "not very enthusiastic about Eureka's cold temperatures and are eager to leave as quickly as possible even though the gas leak also constitutes a great fire hazard." The engines started but the brakes had frozen. Station personnel placed Herman Nelson heaters near the brakes for twenty-minute intervals to no avail. Further inspection of the aircraft revealed that one of the engine's carburetors was "spilling gas by the quart." The plane's reluctant captain had to admit that the plane could not fly. The next day an American B-17 airdropped the necessary replacement parts, and the flight mechanic repaired the engine. The station and aircraft crew again heated the C-54's undercarriage with Herman Nelson heaters, but only three of the four wheels on the aircraft's main landing gear turned when the pilot



FIGURE 4-8. Changing an RCAF Lancaster's oil at Resolute Bay on 19 June 1950. LAC, DND fonds, a066234. © Government of Canada. Reproduced with the permission of Library and Archives Canada (2021).

applied throttle. Those assisting on the ground aborted a further taxiing attempt with “frantic waving and pointing” when another wheel blew and hung “limp and frozen in an odd shape.” The station diarist judged that most of the plane’s crew would have preferred “to brave the cold weather and crowded quarters of Eureka to flying in this sad and broken down airplane,” but the pilots decided otherwise. The crew piled in and, “with a gasoline leak of now over 100 drops per minute, with one of its right wheels flat, and with one of its left wheels frozen and dragging uselessly,” took off “without incident.”⁹¹

Warmer temperatures only partly alleviated aerial logistics challenges. When visibility improved and warmer temperatures eased mechanical

strain, the thawing active layer of permafrost rendered the initial and hastily-prepared “postage stamp” mud strips at the satellite stations extremely treacherous. During the spring of 1949, for example, a C-82 at Isachsen and a C-47 at Resolute crashed without loss of life, but had to be written off.⁹² Once they declared the planes inoperable, station personnel stripped the fuselages from both aircraft to use as warehouses. The ongoing reliance on mud strips “stretched our luck to the limit,” a 1950 USWB report concluded, convincing the USWB that more permanent land strips were necessary. The “limited equipment available and the small number of personnel who can be provided,” led the USWB and DoT to plan the construction of a “frozen” airstrip at each satellite station. “The basic plan,” a brief to the construction crews explained, was to “produce a level surface of soft material which will freeze smooth and which will resist heaving. In the summer it should be at least hard enough to carry a tractor so that the surface can be worked.”⁹³ The new strips were built on the existing sites or at new locations clear of major topographical features into which aircraft might crash in conditions of poor visibility, and laid out away from topographical features that would create snowdrifts. The brief explained that planners had “no intention of attempting to build a hard all-season strip” because “we cannot move any large quantity of fill any distance” or “dig hard material.”⁹⁴ It would be several years before dedicated station airstrip mechanics were able to build useful lengths of runway by adopting new techniques that avoided disturbing the permafrost and respected the seasonal cycles and local soil conditions.

The threat of fire at the stations created a persistent source of anxiety, given the station crews’ dependence on buildings and stores to survive in a depauperate environment where they did not have the skills or resources to otherwise subsist. Fires destroyed several buildings (Quonset hut and Jamesway) at Eureka on Christmas Day in 1948, after an overheated stove ignited oil that had dripped onto the floor. It started off small, but the fire raged out of control within a few minutes. With little water on hand and an outside temperature of -35°F (-37°C), the staff were helpless. The inferno destroyed the main mess building and garage, radio equipment, power generator, and weasel and tractor that the personnel used to haul supplies, ice, and fuel, thus placing the station in a precarious position. Using a small emergency radio transmitter powered with a hand crank, personnel still

managed to send out synoptic weather reports each day — but it took up to two and a half hours to complete a basic transmission. Rawinsonde ascents were even more challenging under the circumstances. Although the USAF offered to loan the station new generators and equipment that it had available at Goose Bay and arranged a special relief flight, the Eureka staff had to wait almost seven weeks when, owing to extreme cold, mechanical failures prevented airplanes from completing the resupply mission.⁹⁵

After two more close calls with malfunctioning Evanaire heaters at Eureka and a small fire at Resolute claimed another building and its contents in 1948–49, all stations implemented more rigorous fire prevention and protection measures. In addition to establishing fire-danger points with asbestos rock-board insulation and fire extinguishers, each station implemented twenty-four-hour fire watches.⁹⁶ This latter measure proved effective and allowed Isachsen's staff to avoid major fires in their living quarters and operations buildings after their Evanaire heaters blew back on four separate occasions. Each time, the man on watch immediately extinguished the blaze.⁹⁷ In short, experience yielded hard-learned lessons and best practices that improved safety and the weather station crews' confidence in their austere outposts.

Canadian Capabilities, Sovereignty, and the Resupply Missions of 1949-50

Although the Americans had asked for little Canadian assistance beyond the occasional chart or map during the previous resupply missions, the American dominance of the program's resupply missions began to shift in 1949. In early March the State Department indicated that, owing to the demands of the Berlin airlift, the USAF would be unable to carry supplies to the proposed site for a new weather station, now named Alert, on the northern tip of Ellesmere Island.⁹⁸ The Soviets had blockaded Berlin, and the US committed most of its heavy transport aircraft to keeping the city supplied from June 1948 to May 1949. In addition, the US icebreaker *Eastwind* collided with a merchant ship, sustaining serious damage and rendering it unable to support that summer's Arctic sea supply mission. Canadian and American officials nevertheless agreed on the importance of establishing the station at Alert as soon as possible, but neither country

possessed the icebreaker capacity to pick up the slack for this voyage to the extreme north of the Arctic Archipelago.⁹⁹

Once in motion, the 1949 naval mission went relatively smoothly. Stevedores loaded fuel, food, building materials, and scientific equipment onto the icebreaker *Edisto* and the cargo ship *Wyandot* at Davisville, Rhode Island. The ships then stopped at Halifax to take on additional RCAF equipment and supplies for Resolute. When they arrived at Resolute Bay, ice conditions forced the ships to wait offshore. On August 23, winds finally cleared ice from the bay and unloading proceeded efficiently. Planners had drawn upon previous experience to improve the process. To speed up the handling of bulk fuel oil, for example, the icebreaker pumped it directly into 4,000-gallon tanks on the landing craft, which ferried it onshore. On the beach, personnel pumped the fuel into empty drums. To assist with sea supply operations, planners recruited six Canadian university students to check supplies and equipment (and repacked them as necessary) before departure. Once in Resolute, they ensured that station supplies made it to proper warehouses, and that work crews cached supplies destined for the satellite stations in well-marked, segregated caches near the lake, where personnel could conveniently access them for the spring airlift. When the ships departed the weather station hub on August 29, four of the students volunteered to stay behind to help erect two new prefabricated buildings before the onset of winter. Thanks to these students' contributions, the station boasted a warehouse and a power garage by the time they flew south in late September.¹⁰⁰

During this voyage, the Americans also tried to enhance bilateral relations with their Canadian partners by ensuring that they did not repeat previous mistakes. Charles Hubbard went ashore at Radstock Bay and discovered two wooden mallet heads, which he showed to J.W. Burton in hopes that he could take them home as souvenirs. The previous summer, no one had rebuked him when he violated the NWT archaeological ordinance by removing artefacts. This time, Burton explained to Hubbard that no one could disturb any site of historical importance or remove any artefact without a permit from the Canadian government. Hubbard denied any knowledge of the ordinance, insisted that he did not want to breach any Canadian regulation, and immediately turned over the mallets to Burton. When Burton recounted the event in Ottawa, he concluded that

“Canadian Sovereignty has been recognized by an Official of the United States Government.”¹⁰¹ A few months later, after Canadian experts decided that the mallets bore little historical value, they handed them back to Hubbard. Because the Americans had complied with Canadian law and respected Canadian sovereignty, the matter was settled soberly and positively.¹⁰²

As planning for the 1950 mission progressed through the following spring, the close relationship between the Canadian and American planners was even clearer. Many of these men had worked together for years at this point, and they handled the planning in an efficient and friendly manner, quietly managing controversial topics with confidence and understanding. For example, when Hubbard spoke to Burton privately about retrieving some old meteorological instruments from the ill-fated Greely expedition at Fort Conger on northeastern Ellesmere Island, he knew to secure Canadian permission in advance.¹⁰³ Ottawa officials readily supported Hubbard’s formal request, and Burton touted Hubbard’s “wide field of experience” and his keen interest in “sound Arctic exploration, development, and research.” More pragmatically, Hubbard and the USWB had shared Arctic data with Canadian officials over the past year, and Burton anticipated that the American would “be of considerable assistance in future years” when the Arctic Division planned exploration projects of its own.¹⁰⁴ Unfortunately, fate had something else in store for Charles Hubbard.

Alert, Ellesmere Island, 82°30′06″N., 62°19′47″W.

In early 1950, newspaper readers learned about the long-awaited establishment of the fifth Joint Arctic Weather Station at Alert. “Spearing their way deeper into the Arctic than man has ever permanently established himself before,” John Dalrymple reported in the *Ottawa Journal*, “the technicians will ‘drop’ the base from the air.”¹⁰⁵ The facility would become the “most northerly scientific post in the world,” lying 1° north and 350 miles west of the northernmost Danish meteorological station at Independence Fjord in Greenland.¹⁰⁶ The cache of heavy equipment, fuel, and field rations delivered to the site in August 1948 remained undisturbed. Although the 1949 summer sea lift did not reach these far northern waters, the Americans had stockpiled another 321 tons of supplies and materials (mostly diesel

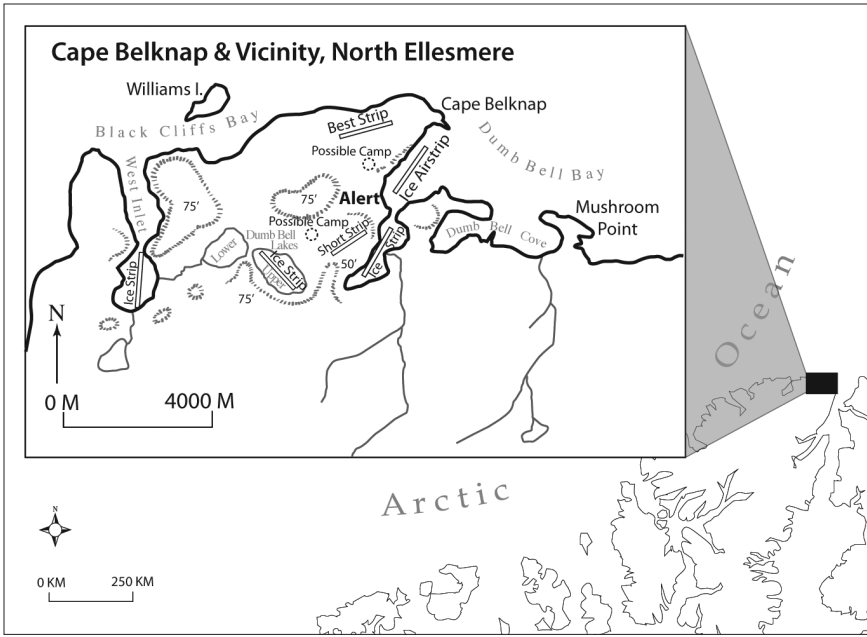


FIGURE 4-9. Map of the northeastern coast of Ellesmere Island, 1950. Jennifer Arthur-Lackenbauer

oil and gasoline) for Alert at Thule.¹⁰⁷ The raw materials were in place. People would make the station a reality.

Planners acknowledged that the success of a station at the northern tip of Ellesmere Island depended upon setting appropriate personnel requirements and selecting the right people. Original plans envisaged a starting crew of eight men, two of whom would return south after the first summer. The delays in establishing the station, however, meant that some men recruited in 1949 were no longer available and had to be replaced. Lessons from the past year also led planners to bolster the permanent contingent at satellite stations to eight personnel: four upper air observers, two radio operators, one cook, and one mechanic. Furthermore, construction mistakes and tragedies at the other satellite stations led decision-makers to supplement this staff with four temporary employees: a carpenter and a three-person airstrip construction and maintenance crew. Given the

planned station's extreme latitude, planners stressed the importance of experienced leadership to the station's success. For the task, the Department of Transport selected Léo Lafranchise, who had set up the weather station at Baker Lake and restored smooth operations at Isachsen as OIC.¹⁰⁸

Peter Johnson, Jr., who participated in the construction of Alert as a labourer, has carefully documented the origins of the station. Johnson was a senior major in geology who, prior to signing up for the JAWS program, had worked for the Geological Survey in Alaska in 1949 and served with the United States Coast Guard near the end of the Second World War. He had "no formal training" but had taken some Arctic-related programs at Dartmouth College, including one on Arctic survival that had piqued his interest in the North. He also had read extensively about Arctic exploration, so he "was aware of a lot of the things that could go wrong, and how to avoid them." He also anticipated what he would be expected to do at the station and some of the skills he would need to have. He later recalled that his father was able to arrange for "a crash course for a week or ten days on the types of bulldozers I knew were up there; and that was a life-saving experience!" The Canadian Department of Transport provided no additional training but this crash course, combined with his past experiences and education, sufficed. "I suppose I was as well prepared as I could be," he later recalled, "and I was certainly better prepared than a lot of other people up there."¹⁰⁹

By 3 April 1950, the personnel assigned to Alert had gathered in Thule. Six days later, on Easter Sunday, an advance party flew to Dumbbell Bay on a USAF ski-wheel C-47 plane to prepare an ice runway. "The snow-covered surface of Dumbbell Bay had been packed by the wind into ridges, which made the landing very rough," Johnson recounted. "The temperature was -46°C; the cache on the small peninsula midway along the western side of the bay was drifted in and needed to be dug out. A lightweight dog sled had been brought to man-haul a reliable engine preheater (in case the one at the cache proved unserviceable), tent, meat, radio, batteries for radio and tractor, emergency supplies, and an aircraft altimeter. The sled collapsed from the weight of its load and manhandling in deep snow." Despite these challenging conditions, the men erected a Jamesway hut on top of a knoll, set up bunks and an oil space heater, and sent up a weather balloon with a wire to serve as an aircraft beacon antenna. "Blowtorch"



FIGURE 4-10. Erecting the walls of Alert's operations building, 13 May 1950. Peter Johnson Collection.

Morgan, now the senior airstrip mechanic, recovered the T-9 bulldozer that had been cached at the site two years earlier and laid out a runway on the bay. Apart from one radio technician who maintained continuous radio watch in a tent, the advance party cleared snow “around the clock.” By April 14, they had carved out a kilometre-long runway and, with their fuel supply for the tractor waning, awaited the main airlift.¹¹⁰

On the ground, a power struggle tested the mettle of the officer in charge, Léo Lafranchise. Given the binational command structure, some American staff harboured mistaken assumptions that they should be reporting to the ExO, not the Canadian OIC. This was a manageable issue, but individual personalities compounded tensions. The Canadian official was formally in charge of construction at the camp site and airstrip, but “Blowtorch” Morgan tried to impress upon the others “that he was an expert of the North and that he was in charge.” When a DC-4 carrying Hubbard and Archibald subsequently landed on this ice strip, Archibald convened a meeting with his superiors to set things straight.

The supervisors immediately agreed that Lafranchise was in charge and, when Morgan was invited into the room, Hubbard “was fast to make a decision and he didn’t mince his words,” insisting that all of the men had to comply with the OIC’s direction or face consequences.¹¹¹

Lafranchise was similarly decisive when a Canadian carpenter, J.W. Scovil, also “believed that he was the foreman.” Lafranchise recalled that “it took a lot of patience on my part not to boil over” and he continued to work on the problem for some time. When the OIC learned that a Consolidated PBY “Canso” flying boat would arrive in August, however, he took decisive action by securing permission from DoT to send the in-subordinate carpenter out on this aircraft. After Scovil departed, other station personnel apologized to Lafranchise for having fallen under the influence of Scovil and Morgan and for not cooperating.¹¹²

Still, the situation remained less than ideal. Had Lafranchise driven the men too hard, leading some of them to doubt his leadership? “He is not a leader and it is only through his own efforts that so much has been accomplished,” J.D. Lee of the RCMP reported. “Instead of giving an order and seeing the order was carried out, the O.I.C. would give an order and then do the work himself, with the result that very little discipline existed.”¹¹³ Although Johnson was critical in his diary about the OIC’s zeal, he later recognized that Lafranchise “understood that this was not a game or holiday and that there was work to be done, and if it was not done people would pay a great price.” The OIC “was more aware than anybody how tenuous the actual situation was; that we were beyond reach of any assistance and how quickly the seasons can change and how things that needed to be done can no longer be done.”¹¹⁴ Lafranchise, picking up the slack where necessary, placed a priority on getting the job done and led by example. The men delivered. The six men who remained in camp erected a second Jamesway hut for sleeping quarters and converted the original building into a kitchen, dining room, radio room, and operations centre. They also worked continuously on the ice runway so that it could safely accommodate the USAF’s C-54s and the RCAF’s North Stars carrying maximum loads. “The monotony of pushing snow to lengthen the runway ended as the frequency of aircraft arrivals began to increase,” Johnson recalled, “and once the runway was ready, aircraft flew around the clock, weather permitting.” The men “snatched” either sleep or food between

arrivals. On average, 20–30 tons were delivered each day. “Food, stoves, panels for prefabricated buildings, spare parts, meteorological equipment, radio towers, furniture and lumber ... were placed in piles according to category,” Johnson explained. “Whenever there was a lull in the airlift, they were hauled away from the bay and up the hill to the plain where the station was to be built.” After the fire at Eureka, they followed guidelines stipulating that these caches be well separated. By the time the airlift ended on May 2, 308 tons had been delivered to the station. Now that the last of the station crew had arrived, Johnson reminisced how “the balloon holding up the aircraft beacon antenna was shot down, stillness settled on the camp and everybody had their first uninterrupted sleep since the beginning of the airlift.”¹¹⁵

With the airlift complete, the station settled into a new routine. The officer in charge set construction priorities and daily schedules. “Twelve-hour days were the norm, but Saturday evenings and Sundays were free time,” Johnson explained. “Initially, everybody, aside from the cook, turned his hand to whatever manual tasks had to be done. Later, after most of the heavy labour and basic construction had been completed, those with technical skills needed for normal operation of the station spent proportionately more of their time setting up equipment or preparing facilities for those jobs.”¹¹⁶ By the middle of May the bright orange operations building was erected, establishing the foundation for permanent living quarters once air temperatures rose above freezing. Southern scientists bombarded the station with requests for measurements of ice, snow, and auroral activity, while the station crew reciprocated with “a steady stream of small (almost daily) orders for parts and materials lost or damaged in transit.”¹¹⁷

The situation still demanded ongoing improvisation. Planners had dedicated considerable energy to ensuring that essential materials were delivered, given the challenges experienced when building the previous stations, but many items still failed to arrive: “parts of buildings, the airborne grader, the hot water tank for the station washing machine, plumbing materials, paint, the station barber kit and cartridges for the Canadian rifles, among other things.” Usually, station personnel did not know that these things were missing until they failed to turn up in the caches. Shortages required adaptation and self-sufficiency. “Everyone was doing something all the time,” Johnson recalled, so “you just ate when you felt

like it.” When the new station cook finally arrived in the spring, he had “almost no experience cooking” and could do little more than “open cans” and heat whatever was in them. Nevertheless, he was “a good plumber, and a good guy, and that was very helpful.”¹¹⁸

Securing water also required some ingenuity. During the coldest months, the station crew collected fresh water from small floes of multi-year ice that had frozen in at the mouth of the bay. When the sea ice was no longer safe to traverse on a tractor, they drew water from one of the Dumbbell Lakes southwest of the camp. Rather than drilling a new hole every time they needed water, they improvised by filling a hole with gasoline and then burning it off so that water could be pumped out. “It was a simple but effective system,” Johnson recalled, “and served until the lake ice melted in the summer.” As the ice melted in July, crews began hauling larger quantities of water from the lake to the operations building using a tank trailer. Even this task, however, could be precarious: on one occasion the driver of the weasel went through the ice, fortunately close to shore. The vehicle and driver were recovered quickly and were soon back in service. The incident, Johnson later noted, served as a reminder “that in that environment nothing should be taken for granted.”¹¹⁹

By summer, station life improved considerably. Meals were served in the mess hall within the operations building. The buildings had electricity. “The space, light, proper furniture and separation of functions in the eating and lounge areas of the operations building, although simple and basic, provided a much appreciated luxury compared with the cramped quarters of the previous two months,” Johnson recalled. “There was even a small library, the contents of which suggested somebody had ordered several metres of books from a secondhand [*sic*] bookstore.” The station also sported a darkroom, equipping personnel to take up various scientific projects and amateur photography.¹²⁰

The three members of the airstrip crew toiled a separate existence from the others. Living out of a tent and eventually a Jamesway hut, they established “Little Alert” or “North Alert” at the south end of what became the gravel airstrip on Cape Belknap. It became “a popular watering hole,” Johnson recalled, “and a gathering could be expected Saturday nights and occasionally other nights of the week, thanks to a small but effective still that had been set up there. Needless to say, the smell of the mash, made of

dehydrated potatoes, corn meal, sugar, yeast and water, permeated everything in the hut." The alcoholic concoctions were considered harmless until "production approached demand" and one of the crew imbibed too much. "The OIC put an abrupt stop to the production of both the home brew and moonshine," he noted. "They were not missed."¹²¹

By early June, Johnson and the other workers had brought 500 metres of runway up to grade, but it remained unlevelled. On other stretches of land, "where the mat-like growth of low but sparse tundra vegetation had been cleared of snow, plants such as purple saxifrage began to bloom," he observed. Construction destroyed this thin cover at the airstrip, which meant that after the snow melted and the surface dried, tractors kicked up enough dust to block visibility across the runway and strong winds produced frequent dust storms. "In one instance, a cloud of fine soil, estimated to be more than 150m high, whirled off across the pack ice," Johnson recounted. "The airstrip crew, whose water supply was a fuel drum of water and who bathed in a hand basin, quickly became the dirtiest and most unkempt members on the station and took a lot of kidding whenever they appeared at the main camp." The environment took its toll on the machinery. Work on the airstrip ground came to a halt when both bulldozers and the scraper at Alert broke down from incessant use and limited maintenance. Hubbard and his deputy, J. Glenn Dyer, who directed the resupply of the satellite stations, tracked down spare parts that an RCAF Lancaster, conducting ice reconnaissance out of Thule, would airdrop to Alert.¹²²

Just after noon on July 31, the Lancaster arrived over the weather station. After passing over to chart progress on the airstrip, the plane turned to approach the station from the east to drop its payload. The parachute, however, fouled the aircraft's elevator and the Lancaster plunged to the ground. It exploded about 450 metres west of the main station. "For a moment everybody was shocked into immobility," Johnson recalled. "Then they started running toward the column of smoke from which flames, flares and other minor explosions were now coming." No one onboard the airplane survived. Snow began to fall, and the RCMP at Resolute authorized the station crew to cover the bodies and erect snow fences to keep foxes away from the charred remains.¹²³ Among the nine victims was Charles Hubbard.¹²⁴



FIGURE 4-11. Station personnel approach the crash site, 31 July 1950. Pete Johnson Collection.

On August 3, the RCAF sent a Canso flying boat north to investigate the crash and retrieve the victims' bodies. Although the crew planned to leave within a few hours, the plane's starter failed. By the time it was repaired, ice and fog trapped it in the bay. When it tried to depart five days later, the wind turned, and the aircraft plunged through some loose ice. Fortunately no one was injured, but the plane was badly damaged. Although repaired and operable within a week, the delay forced the station staff to bury the Canadians alongside Hubbard, whose family asked that he be interred at Alert. His gravesite, near the northern end of the airstrip, overlooked Cape Belknap and the Arctic Ocean.¹²⁵

To investigate the crash, USS *Edisto* and USCGS *Eastwind* left Thule early on August 1. Once again, the passage to northern Ellesmere proved hazardous. Similar to years past, *Edisto* sustained ice damage to its starboard propeller and had to retreat. *Eastwind* had to proceed to Alert alone.



FIGURE 4-12. The funeral ceremony at Alert, 10 August 1950. Pete Johnson Collection.

On August 10, the ship's crew and the station staff held a joint military funeral for the victims, convened by a US Navy chaplain. The Canadian and US personnel aboard the icebreaker had made Union Jacks with which they draped the coffins of the Canadian victims. An American flag adorned Hubbard's. The name of each victim was inscribed on each flag, which were delivered to the next of kin down south. A line of white crosses with name plates marked the graves at Alert.¹²⁶ Hubbard's grave, surrounded by a small white picket fence, remained a solemn testament to the perils of Arctic operations — even in the modern era.

Life went on at the stations in the wake of this tragedy. At Alert, the station crew found the spark plugs for their vehicles amidst the charred wreckage, installed them in the tractor, and resumed work on the runway. *Eastwind* offloaded its precious cargo, including another bulldozer, a large scraper, and a towed grader.¹²⁷ This new equipment sped up construction, and a 1,350-metre runway was serviceable with a hard, dry, smooth surface by August 24. By the end of the month, the station crew completed the dome-like rawinsonde shelter and staff began to operate the upper-air measuring and recording systems. In early September most of the airstrip construction crew departed, a thin cover of ice formed over the bay, and station life became increasingly routine. Synoptic weather observations, made three times daily since July, were complemented by rawinsonde flights and pilot balloon observations. "Ice was cut and stored by the

buildings to be used for water during the winter,” Johnson reminisced. “The foxes had settled under the Quonset hut, and wolves began to visit the compound, only to be chased away.”¹²⁸ These Arctic denizens would have to share their homeland with people now permanently residing at Alert. The human footprint would be small, however, and the specific faces would change. Johnson and most of the original crew left that fall for the south, their replacements picking up where they had left off.

By 1950, the initial JAWS construction phase was complete. What had started out as a plan for nine stations ended up producing five. A sixth weather station, built and operated by Canadians at Sachs Harbour on Banks Island, was often associated with the JAWS network but was formally apart from it. Plans for the extension of the High Arctic network to other locations (particularly Bridport Inlet) did not last. By the early 1950s, continued Canadian and American budget pressures forestalled further construction, and the system of stations shifted decisively into their operational phase. The logistics stream that fed JAWS was Atlantic-oriented, at least by sea, rendering unattractive any ideas about establishing other meteorological outposts in the remote northwestern reaches of the High Arctic. Journalists reported that each station cost about \$200,000 to build, not including the “colossal transportation costs” incurred by the US Navy and Air Force. Sources revealed that the US and Canada shared the total cost at an 8:1 ratio.¹²⁹

Canadians did not, however, allow this preponderance of American resources to compromise their control of the Arctic. The Americans arrived with a “can do” attitude and came to respect Canada’s sovereignty concerns, as an August 1948 memorandum from the American section of the PJBD to James Forrestal encapsulated:

Bearing in mind that the Canadians are extraordinarily sensitive about their sovereignty and independence and as they live, so to speak, under the constant shadow of the ‘Colossus to the South’ such Canadian apprehensions have been inevitable. It has therefore behoved the United States to act with the utmost circumspection and restraint... On the whole, the U.S. record...is good.¹³⁰

Critics in the 1940s took aim at the Canadian government's inability to "Canadianize" the Arctic weather stations within the first few years of their existence, as have historians in retrospect.¹³¹ They blame Ottawa for its unwillingness to devote the time and money needed to assume full responsibility for the program. Several factors, however, contributed to the government's response. First, the Canadian Meteorological Service lacked the personnel to operate the stations independently. It considered continuing the operation of its stations along the Atlantic and Pacific coasts and assuming control of American-run sites in the northeastern Arctic and Subarctic — which completely lacked a Canadian presence — far more important than taking similar action at the jointly-run Arctic stations.¹³² When it took over the northeast stations from 1948–50, limited availability of personnel precluded fully "Canadianizing" the Arctic weather stations.¹³³

Furthermore, as Ottawa's sovereignty anxieties abated, so too did a sense of urgency to Canadianize the JAWS program. By 1948, the Americans had incontrovertibly recognized Canada's sovereignty over the High Arctic islands, the stations ran well under joint staffs, and Canadians commanded them. The Canadians were vigilant about formalized route planning and best practices for American resupply operations, and the Americans dutifully followed Canadian direction. Most American personnel at the stations harboured no ill-feelings towards their Canadian counterparts, and those who did (such as Innes-Taylor) generally reserved these thoughts to their private letters and diaries. Able Canadian leaders such as Lafranchise and increasingly savvy American leaders such as Hubbard managed the rare outspoken individuals who refused to comply with Canadian authority. In addition to this increasingly strong compliance with Canadian wishes, the US provided sophisticated equipment that Canada lacked, and these considerations made it difficult for Canada to contemplate assuming responsibility for the stations.¹³⁴ In short, there was little impetus for the Canadianization of the weather stations once American diplomats, planners, and personnel proved that they posed no threat to Canada's terrestrial sovereignty.

Historians are divided when analyzing Hubbard's zeal for promoting the High Arctic weather station program. Matthias Heymann recently argued that Hubbard "complicat[ed] the situation ... in promoting new

US-established weather stations in Canada and Greenland, although he was neither a meteorologist nor a scientist, but an ambitious, self-confident engineer and polar explorer seeking a new postwar role ... [who] lacked an appreciation of smaller states' sovereignty."¹³⁵ On one level, this damning indictment recognizes Hubbard's unyielding tendency to promote himself and his projects. On the other hand, is it fair to summarily dismiss a person with ideas, political connections, and influence who conceived and fought to implement a bold vision to enhance Western meteorological knowledge and forecasting? Shortly after Hubbard's death, his widow recounted that "Charlie adored [those whom] he called 'his boys' and I believe they all respected and liked him. He felt, generally, that good personal relationships are the most valuable things in life, and it was easy for me to see that he had really inspired some of the people who worked with him, to do marvels through his trust and confidence in their ability to do their very best under the most trying conditions."¹³⁶ Cultivating the necessary relationships to make these stations a reality had not been easy. Hubbard clearly blundered when he initially pitched the stations to Lester Pearson and Escott Reid. Yet, did he not learn from his mistakes and treat the Canadians as partners, despite Canada's modest initial contributions to the program?

With the construction phase complete, the stations moved into their operations phase. Despite the installation of northern amenities, life at the stations was no picnic. Hubbard's 1946 vision of a "new residence with a white picket fence and a red roof" never materialized, and JAWS personnel learned how to work with — rather than attempting to overcome — the natural elements. As station crews improvised and adapted to their surroundings, the cycle of activity at the JAWS stations settled into more of a routine. "How the north has changed," Knutsen told *National Geographic* readers in October 1949. "Yet in the vast reaches between the few places where men have brought their civilization skills to bear, the north actually hasn't changed at all."¹³⁷ These small scientific installations proved that "you could live in the north," Johnson recalled. Though Innes-Taylor expressed disappointment with the scientific activities, most applauded the stations' quick undertaking of meteorological observations and recognized that the diverse scientific undertakings Innes-Taylor desired would begin once the stations were properly organized. The early crews

were “pioneers in the sense that they went where no one had been before,” Johnson described — a statement true with respect to a Euro-American presence in the High Arctic. “They built settlements, even though they were very small.” They established hubs from which scientists would set out to “discover what was in the North.”¹³⁸

A year after the fatal crash of the RCAF Lancaster at Alert, a final sentence on the monument and plaque erected over Hubbard’s grave proclaims: “The task in which they gave their lives continues.” Hubbard had initiated the JAWS project and oversaw much of its planning as well as the construction phase, but it would fall to others to build on this legacy by creating lasting places that would produce historical meteorological datasets and provide logistical support to diverse field science expeditions. To suggest, as Heymann does, that “the USA would almost certainly have established weather stations throughout the postwar Arctic even had Hubbard never been born” unfairly discounts the latter’s pioneering contributions.¹³⁹ Like the embryonic outposts that housed the crews, interpersonal best practices were still being established and would require a few years to mature into full-fledged station cultures. Personnel would have to be recruited and managed. Cultivating amicable binational relations would require constant attention in the national capitals down south, and at each station. Resupply efforts would have to continue and grow with the stations themselves.

Securing personnel who had the right skills and personalities to work in these harsh conditions and complex situations would not be easy. Every year, the stations required new personnel ready to meet these challenges. Finding individuals willing to answer the call would prove to be one of the program’s greatest challenges.

Who Did the Stations Need... and Who Did They Get?

The program is an adventure on the northern frontier beyond the continent. Arctic assignments can justly be rated among the toughest Government positions anywhere in the world today.

US Department of Commerce and US Weather Bureau,
“Assignment: Arctic” (1961)¹

In the 9 May 1948 issue of the *Los Angeles Times*, reporter Magruder Dobie posed a simple and timeless question to married American women: “What would you do if your husband came home tonight and announced he had signed up for a year of lonely duty in an Arctic weather station near the North Pole?” Thanks to the Joint Arctic Weather Stations, this scenario was not as far-fetched as some readers might have expected. Mrs. John Ciganek, “an attractive Brunette” in Arlington, Virginia, had already lost her husband to northern service:

Naturally, she couldn’t understand why he wanted to go. He had a steady, well-paying job as [a] radio operator at the Washington National Airport, a few minutes’ drive from their new home. Why in the world give up all the pleasures and comforts of home to hibernate in the Arctic with seven or eight strangers for an entire year? No week ends [*sic*],

holidays or vacations; mail once a month; movies, a rare treat; the nearest doctor hundreds of miles away. Continuous night lasts for four months, and sometimes the temperature drops to 40 below.

Her husband, “a cheerful, articulate, 37-year-old ex-Navy submariner,” pointed to the positive aspects of service. “The food is good. You can save money,” he explained. “Besides, I’ve always been restless. I get tired of one place.” Dobie could accept that sentiment — but few people went “to the extreme of joining the Eskimos.”² Little did the reporter know that some Americans were actually stationed beyond the northernmost Inuit settlement at that time.

Seeking more answers, the journalist visited the US Weather Bureau offices and learned that there was no shortage of volunteers. Most had not been North, but a sample of their responses to the basic question of “Why do you want to go to the Arctic?” was revealing:

1. An ex-Marine, still suffering from malaria contracted on Guadalcanal: “I’ve knocked around for better or worse most of my life, but always with some definite purpose in mind: to better myself and the human race. This job seems to offer both opportunities.”
2. Delivery truck driver: “I want to feel my work is important, that I’m doing something that’s worth all my effort and time.”
3. Merchant Marine cook: “Since I was a kid, I’ve liked solitude. I can take companionship or leave it alone.”
4. Coal miner: “My financial status is not so good, as there have been nothing but strikes since my Army discharge. If accepted for this duty, I can get cash for my 1940 car.”
5. Sales clerk: “I want adventure; not the exciting adventure you see in the movies, but the bleak, desolate kind that can only be realized by the achievement of important tasks.”

Dobie believed that the sales clerk's motivation captured the purest motivation to volunteer. "The trouble with my set-up; there's not enough of 'me' in it," the man complained to the US Weather Bureau. "I eat breakfast at the drugstore, let the streetcar operator get me to work. At night I sit back and let the radio comedians try to make me laugh, or pay to be amused at the movies. I can look back on almost any day without finding one event that really made me feel I was at all important." He acknowledged that the Arctic would be tough, and he welcomed the challenge.³

What skillsets and personality traits did the stations actually need to operate effectively? A training orientation package from 1960 (with nearly identical wording to a 1946 version) noted that:

It is not essential for personnel to have had previous Polar experience. Insofar as possible, each station complement will include one or two men with experience adequate for the security of camps, Arctic training of other personnel, and general supervision of Arctic activities. A knowledge of cold climate conditions, or at least of the conditions of rugged camp life, is desirable and preference will be given to such applications when all other qualifications are equal.⁴

This chapter delves into what motivated individuals to volunteer to work in the Arctic for one to two years at a time with little southern contact. It explores the networks and initiatives that the DoT and USWB used to recruit volunteers, and their varied successes at securing sufficient personnel. It also explains the division of work at the stations, the training for each position, and why many JAWS personnel received little instruction prior to departing for the High Arctic. As science ethnographers suggest (and subsequent chapters of this book demonstrate), the backgrounds of JAWS personnel shaped the collection of scientific data, the development of station cultures, and the maintenance of sovereignty at the stations.⁵

Incentives, Positions, and Recruitment

The motivations to go North described by Dobie in his *Los Angeles Times* article contrast starkly with those detailed and analyzed by scholars seeking to understand why university-trained scientists visited the Arctic to

perform research during the early Cold War. While Arctic explorers in the interwar period continued to be attracted by the region's ruggedness and adventure, field scientists who worked in the circumpolar North after the Second World War attempted to use aviation and other technologies to literally and figuratively rise above their environments and systematically survey landscapes in much the same manner as other scientists did in laboratories to control variables that would otherwise compromise their results.⁶ Traversing space also became a geopolitical act, charged with sovereignty implications.⁷ Field scientists thus cultivated "anti-hero" images, describing "adventures as misadventures" that were the result of "incompetence."⁸

JAWS personnel did not self-identify as scientists, in the sense that they did not interpret the data that they collected using scientific methods to generalize, theorize, or otherwise advance knowledge. The stations' weather observers were meteorological technicians ("met techs") who were trained at government-run schools, rather than universities, over months rather than years. Moreover, the other positions at the remote stations were largely filled by tradespeople. Lacking academic careers to advance in southern environments, most JAWS recruits went North seeking wealth and adventure. Such motivations were not new to the Arctic, of course, and were staples of the fur trade and gold rush eras.⁹ The JAWS network was one of the few places on earth where individuals could still feel like "pioneers," and a USWB briefing on the program described the stations as an "adventure on the northern frontier beyond the continent."¹⁰ Don Shanks, for example, had been interested in exploration and particularly Arctic exploration since his teenage years, and when he completed high school he wanted to go to the far north. Writing from Fredericton, New Brunswick he contacted the Hudson's Bay Company in Winnipeg, Manitoba and asked if Arctic postings were available. The HBC did not have any openings, but the company suggested Shanks contact the federal government. He did, and he subsequently arrived at Isachsen in April 1962.¹¹

Don Ware, who was the OIC (officer in charge) at Mould Bay from 1957–58, best summarized the motivations of many former JAWS personnel when he explained that "it was an adventure that paid well."¹² This fits a longstanding trope: the Canadian North, since the era of the Klondike

Gold Rush, has tended to be “a place to make a killing, not a living,” historians William Morrison and Ken Coates observe.¹³ In the early 1950s, Canadian JAWS personnel were employees of the Department of Transport who received a standard salary, a “Northern Allowance,” as well as overtime pay for fourteen hours of their fifty-four-hour work week and any additional seasonal work.¹⁴ The pay for US personnel was even more generous. In addition to their higher base salaries in 1947, Americans received a \$100 per month bonus for each month served outside the United States, plus an additional \$100 per month “winter-night bonus” from November to February.¹⁵ Room and board at the stations was free or (later) provided at nominal cost, and spending opportunities were almost non-existent, so most positions allowed JAWS personnel to return south with immense “nest eggs” to spend.¹⁶

Since the USWB operated in a country with roughly ten times Canada’s population, and given its responsibility for American continental as well as Arctic and Antarctic stations, the USWB’s separate Polar Operations Projects office actively recruited personnel specifically for polar work. The organization’s 1946 recruitment circular explained that “the development of airplanes, radios, and other modern techniques” made Arctic transportation and living “practical.” Despite these advancements, the circular emphasized that “this program is a pioneer adventure” to “regions practically unknown and unexplored, and all except one will be further north than the habitations even of the Eskimos.” The isolation, dark season, and lack of airfields that could operate year-round for much of the program forced “many hardships” upon station personnel. “For considerable periods,” it warned, “life may be dull and monotonous.” Personnel would work long hours and had to be willing to “give a hand in any work other than that which may be specifically assigned to him as his day-to-day job, including hard physical labour and KP.” As Bob Pearson, who worked as a met tech at Eureka, Alert, and Resolute Bay during the early 1950s later summarized, everyone needed to be a “jack of all trades and master of one.”¹⁷

The circular concluded that “the ability to work hard, to cooperate enthusiastically in the work of the stations, and to keep on for a long period without relief is essential to success in the Arctic Project.”¹⁸ Interested American applicants to the USWB had to disclose, in writing, details about their marital, family, and financial situations. Applicants also had

to get a physical exam and, if selected for a post, they also underwent a second examination at USWB expense. Finally, the applicants had to explain why they wanted to go to the Arctic. This final question, the recruitment guide stressed, was mandatory.¹⁹ Polar experience was not required. Although the 1946 USWB recruitment literature wanted to find men with experience or knowledge of cold climates and “rugged camp life,” it only envisioned allocating “one or two men” with Arctic experience to each station. This limited allotment, the department believed, would adequately cover security requirements, facilitate training of other personnel, and provide experienced oversight of activities.²⁰ None of these American recruitment requirements and descriptions changed during the JAWS program.²¹

Howard Wessbecher’s experience offers a case in point. Born in Brooklyn, New York in 1925, he served in the Pacific theatre during the Second World War, completed a degree in forestry at Montana State University in 1951, and secured a job with the USWB as a meteorological aide that November. After four months of plotting weather maps all day in Washington as data came off the national circuit, he saw a job posting at the office calling for individuals to head to the Arctic as part of the Arctic Operations Project. He filled in the requisite paperwork and was accepted immediately. “If you were warm, they would take you,” he recalled. Although Wessbecher felt unqualified when he flew north the following year, “it was a learn on the job situation and we had a number of people that were obviously not meant for that sort of environment.” Nevertheless, “some survived reasonably well, which I think I did too.”²²

Canada’s DoT used a less direct approach. Its personnel and financial resources were frequently strained, and it consequently struggled to find enough personnel to fill its quota for the remote joint weather stations. JAWS accounted for approximately one-sixth of Canada’s Upper Air Observation stations in 1958, and the Department of Transport preferred to treat a posting to the Arctic as an entrée into a career at more attractive, southern locations.²³ Another recruitment pamphlet from the early 1960s similarly situated Arctic service within a career based at more accessible locales.²⁴ The approach successfully attracted the attention of individuals who might not have otherwise considered working in the region. During the mid-1960s, for example, Bruce Weaver noticed an advertisement

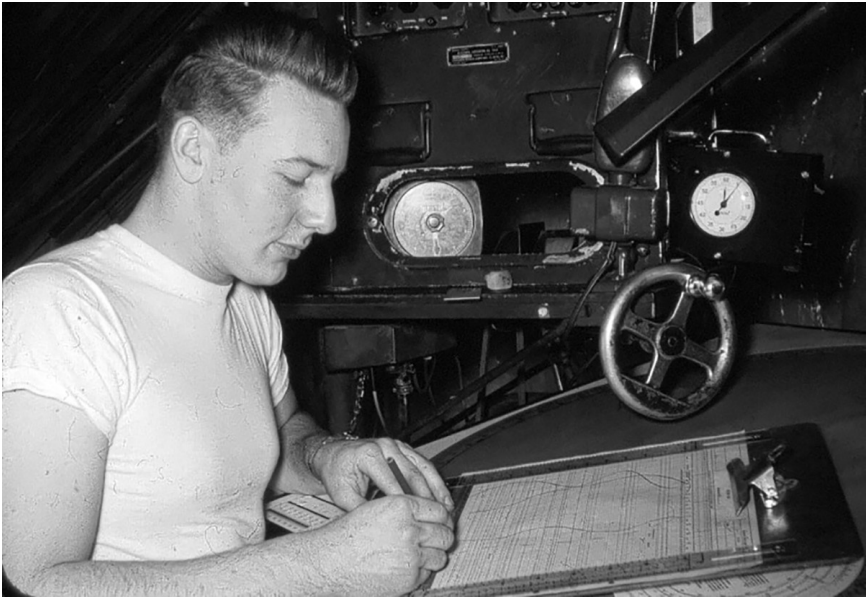


FIGURE 5-1. Lowell Demond at Eureka's RAWIN (radiosonde tracking) station, 1956. Lowell Demond Collection.

calling for applications to the Canadian civil service. After applying, he learned of the need for meteorological technicians and agreed to take the necessary training. At the time, he now admits, “I had no idea what I was getting into.”²⁵ It was during this training (described below) that Weaver, like most other met techs, learned that the majority of new graduates from the Canadian program served for one to two years at an isolated station before moving to more southern posts.

DoT was occasionally able to be more direct when it received applications from men interested in Arctic adventure. Lowell Demond grew up in rural Nova Scotia and wanted to get out of town. He moved to Toronto and tried to save enough money to go to university by working for Canadian Pacific. “One day,” he later recalled, “a newspaper arrived with a supplement. And in the supplement was a picture of an icebreaker.” Demond quickly realized that “there’s a whole area here that I didn’t really investigate” when contemplating his career options. Grabbing his pen, Demond wrote a letter to Minister of Northern Affairs and National

Resources Bob Winters, a fellow Nova Scotian, asking him if there were any opportunities to work in the Arctic. While he did not receive a reply from Winters, he did get a phone call from the Meteorological Division of the Department of Transport in Toronto asking if he would be interested in an interview. After expressing his interest in going to the Arctic, the interviewer offered to pay Demond to train to become a meteorological technician.²⁶

Met techs constituted the largest group of JAWS personnel, with both Canada and the United States sending at least two to each station. These men (no women were assigned to the stations until after the JAWS program ended in 1972) were responsible for carrying out the station's primary purpose: collecting meteorological observations. They conducted the twice-daily upper air observations using radiosonde or rawinsonde flights, plotted the results, and encoded their observations for transmission south. In addition, they conducted some of the surface observations, performed pilot balloon (PIBAL) flights (a smaller and simpler type of balloon observation described in more detail in chapter 6), and trained radio operators to conduct part of the work. At some stations, such as Mould Bay, met techs were also responsible for running seismic observation equipment.

Two met techs almost always undertook the additional duties of OIC and ExO (executive officer). Officers in charge were responsible for the "overall administration of the station, the safety and security of the personnel and station, the scientific programme with transmission of data, the preparation of reports, records and recommendations for improvement of station facilities and the maintenance of morale and discipline on the station."²⁷ Thus, the OIC was responsible if their station sent bad meteorological data south. If someone was injured, the OIC had to see to their care or arrange evacuation. In short, Canadian OICs bore responsibility for overseeing the station's overall well-being, the scientific observations, and the maintenance of Canadian sovereignty at and around their station.²⁸ Resolute's OIC also occasionally went to the satellite stations as DoT's representative to resolve major problems. The OIC was the highest paid Canadian at each station, making up to \$4,200 (CAD) a year in 1952 — but only \$300 of this pay was for assuming these critical additional duties.²⁹

DoT preferred appointing OICs, such as Don Shanks (Isachsen 1962–63, Eureka OIC 1963–64), who had proven their abilities and character for at least a year at other Arctic stations or at isolated subarctic locations like Goose Bay. However, since older met techs were rarely interested in leaving their families, the leadership role fell to younger professionals who were usually in their twenties.³⁰ Thomson explained in a 1956 memorandum that:

it is difficult to make the position of O.I.C. at these remote stations attractive to men of high calibre and the necessary experience. There are serious drawbacks involved in accepting such a position, e.g., delay in setting up a home, or risk of breaking up a home already established, [or] the insecurity in not knowing where the next posting will be on return from isolation (an important consideration if a man has already established a home).³¹

The relative youth of OICs also stemmed from DoT pay scales that only provided the station leaders with modest pay increases. R.W. Rae, who served as Resolute's OIC from December 1947 to September 1949 and subsequently led the Arctic Weather Section of the Canadian DoT Meteorological Division during the program's early development, considered this paltry sum "hardly adequate in view of the responsibility of this position."³² Although DoT pay scales improved, they never matched the American rates, thus limiting the comparative attractiveness of assuming ultimate responsibility for each station. Furthermore, potential Canadian recruits hesitated at the two-year contracts that DoT required until the late 1950s. Two years was "a big bite to take off," American Monte Poindexter later described, and few Americans (who served on one-year contracts) envied their early Canadian counterparts.³³ For all of these reasons, JAWS personnel were often led by OICs who were young, free of familial obligations, and eager for adventure in the Canadian Arctic.

ExOs were the senior Americans at each station. Like most American personnel, they tended to be "about a generation" older than their Canadian counterparts.³⁴ Indeed, many of the Americans were in their second careers, having retired from the military. Like OICs, American ExOs were

usually met techs. According to R.W. Rae's "Five Year Report" on the JAWS program, an ExO was "responsible for the administration and welfare of the US personnel and accountability of US property. He is also responsible for amicable international relationships of his US subordinates with Canadians and Canadian authorities. He supervises the operation and maintenance of mechanical equipment, including radio transmitters and radiosonde equipment. At regular intervals he submits reports and recommendations to the Chief of the Arctic Operations Project of the U.S. Weather Bureau."³⁵ As the senior American representative on Canada's Arctic Archipelago, Resolute's ExO also coordinated the airlift and sealift to the satellite stations and was responsible for overseeing all American personnel in the program.³⁶

Like DoT, the USWB used the past experiences of its personnel to select JAWS ExOs. The pursuit of adventure, coupled with high pay, led most ExOs to volunteer for Arctic service. An ExO in 1953 could make \$7,540 (USD) a year, and many of these men returned home and used the money to pay for a university education, purchase new homes, or start a small business.³⁷ As Bill Pogerman (Eureka ExO 1952) explained to Bill Davidson of *Collier's* magazine, "I'll come out of this with at least \$5,000. It would take me 10 years to save \$5,000 in the States. So it's worth a year's hardship to get enough money to start yourself off in some business."³⁸

Howard Wessbecher worked at the Resolute station as a supply clerk from April 1952 to March 1953, sorting and tracking the supplies for the JAWS network. After completing this tour, he took two weeks leave and visited his parents in Missoula, Montana, before committing to return to the High Arctic as the ExO at Alert for a year. The financial enticements made it highly attractive for American volunteers who:

got fairly decent wages, plus a ... \$200 bonus. We got \$100 bonus for every month you stayed up there and you got an extra \$100 for four months during the dark period. Whereas the poor Canadians, because it was Canadian territory, it was part of their country and they were just assigned to it like Weather Bureau people in the United States are assigned down to Arizona ... [or] Louisiana.... But up there, the Canadians assigned to Resolute Bay, for instance, were totally isolated from their

family and had to put in a year or two or three, whatever was determined. So there was a little bit of bitterness there on the part of the Canadians.³⁹

After Alert, Wessbecher transferred directly to Resolute without any vacation. “At that time it was just too hard to go out and see civilization, the girls and everything else, and then come back to isolation.” He enjoyed his role partnering with the OIC in “a cooperative management which worked out pretty well. ... It wasn’t military so there were none of those hard and fast lines of authority. It was mostly persuasion.”⁴⁰

Radio operators were the JAWS program’s communications professionals. Until the late 1960s, when transmission equipment was increasingly automated and radio operator positions were gradually phased out, these men worked in twelve-hour shifts in or around each station’s operations building. They were responsible for transmitting weather observation data, helping station personnel connect with people in the south, and sending and receiving messages. The operators at the satellite stations could not, and were not, required to maintain continuous watch in the radio room. Instead, they monitored the airwaves at pre-arranged times and whenever aircraft approached for landing. Radio operators at the satellite stations devoted the remainder of their time to surface weather observations and other work around the station. At Alert, these additional duties included communicating local weather conditions to overflying aircraft heading to or from Europe. Resolute’s role as a communications hub meant that its radio operators had to pass along the satellite stations’ observation data to Edmonton and assist with communications during all sealifts and airlifts. Before long, Resolute required two radio operators to be on call night and day. A third chair was available in Resolute’s radio room for dedicated communications with the sealift vessels during the summer.⁴¹

At the beginning of the JAWS program, the United States supplied nearly all of the radio equipment. Consequently, Canada’s Department of Transport considered it important to have American operators at each station.⁴² By late 1952, however, DoT began to aggressively replace American radio operators with Canadian personnel.⁴³ This move fit with the Canadianization agenda discussed at length in chapter 9. During

the mid-1950s, however, this process was briefly jeopardized by DoT's comparatively low wages. In 1956, the Federal Electric Company paid approximately three times a DoT radio operator's wage to its employees on the Distant Early Warning (DEW) Line, thus forcing the Canadian department to increase its pay scale.⁴⁴ Because these competitive wages exceeded its normal rates, DoT subsequently hired radio operators on contract. This precluded JAWS service as a gateway for operators to start permanent careers with DoT, and again emphasized that financial motivations led most personnel to head north.⁴⁵

Cooks were often the most difficult JAWS personnel to recruit. Their responsibilities included providing all of the station's meals, ensuring that dietary requirements were met, recording food consumption, and assisting with the preparation of orders for the resupply.⁴⁶ Finding a cook with this breadth of knowledge who was willing to work six or six and a half days a week for a year at a time in the isolation of the Canadian Archipelago was a serious challenge. In the early years, the DoT northern allowance for cooks was utterly inadequate to attract the necessary talent. According to R.W. Rae, "every other individual on the station receives a northern allowance nearly four times the one that is paid to Canadian cooks."⁴⁷ Although they received a \$300 per year "recruitment allowance" to address some of the shortfall, Canadian cooks were the lowest paid of all JAWS personnel during the 1950s.⁴⁸ Consequently, nearly all station cooks were Americans who could make over \$5,000 a year during the same period.⁴⁹ DoT pay improved by the 1960s, and this attracted some Canadian cooks to the stations,⁵⁰ but after the radio operator positions were "Canadianized" the presence of American cooks helped to maintain an equal number of personnel from each country at each station.

The vast majority of JAWS station mechanics also were Americans owing to the heavy reliance on American equipment. DoT tried to recruit mechanics during the early years, but the department's comparatively low wages again contributed to poor results.⁵¹ The number and type of station mechanics changed over time. Every station had a chief and a general/station mechanic who operated and maintained the station's tractors, forklifts, and gasoline and diesel engines. They were also responsible for maintaining the station's utilities, including fuel, water, trash, and waste disposal.⁵² During the 1950s, airstrip ("strip") mechanics also resided at



FIGURE 5-2. Strip mechanic Hubert L. “Cougar” Dewey preparing a dynamite charge at Mould Bay, 1956. Lowell Demond Collection.

each satellite station during the non-winter months. These groups of two to four men spent most of their time constructing land airstrips and maintaining the earthmovers used for their work.⁵³ Once the airfields were constructed, a smaller number of strip mechanics intermittently visited the stations for shorter periods during the 1960s to maintain the airstrips. Finally,

electronics technicians also maintained each station’s diverse observation and communication equipment. At first, these technicians only worked at the stations for a few hurried days, but by the early- to mid-1960s they occupied permanent positions at each station.⁵⁴ This shift, one American memorandum explained, was caused by the “trend towards automation” of weather observations. The reliable operation of the increasingly capable and complex observation and communication equipment at each station could only be ensured by technicians who “underst[oo]d how the equipment works,” how it responded to “various types of weather conditions,” and who undertook “preventative maintenance.”⁵⁵

Training

Given the professional specializations described above, the isolation of the JAWS network, and the intense self-reliance that resulted, it is surprising how little training the program's personnel received before going north. For most of the station's positions, DoT and the USWB recruited individuals who had already developed the requisite professional skillsets. Radio operator applicants needed to present credentials that were granted by at least one of the countries before they were sent north. Canadian radio operators could earn their Second Class Certificate⁵⁶ at radio schools across the country. Radio operator William (Bill) Stadnyk grew up in Moose Jaw, Saskatchewan and trained for one year at the city's technical school to earn his commercial radio operator certificate. The curriculum included how to send and receive Morse code. They also had to develop competencies in operating and maintaining marine transmitters and receivers, as well as direction finding equipment. Upon receiving his certificate, Stadnyk was hired by DoT in 1962 and sent to Ottawa for training in air/ground and weather observing procedures.⁵⁷

The rules were not always rigid. John Gilbert of Brantford, Ontario had wanted to be a radio operator since his early teens. Two of his uncles worked as stewards aboard ocean liners, and Gilbert wanted to follow their example and gain experience by working as a ship radio operator. He was stuck, however, at the rank of licenced amateur radio operator. When he was eighteen, his mother suggested: "why don't you write to whoever sends radio operators on board ships and see if you can get training." DoT's form letter reply stated that there were no openings, but his mother encouraged him to apply again. This time, John took the train to DoT's regional office in Toronto where he met Dave Ewart and explained that he wanted to be a radio operator. "Flabbergasted," Ewart left to consult with his fellow managers only to return with a question: would Gilbert mind taking a competency test? If the licenced amateur operator could pass the professional test, Ewart promised to let him become a radio operator. To Ewart's surprise, Gilbert passed and, true to his promise, he enrolled John with other new recruits in the surface weather observation course at Malton, Ontario.⁵⁸ In an American example, Bob Pearson passed an eleven-month radio operator training course at Scott Field, Illinois in the summer of



FIGURE 5-3. John Gilbert in Eureka's radio room, winter 1957-58. John Gilbert Collection.

1947, worked at the American BW8 station in Greenland while serving with the USAAF, and was twice approached by Hubbard to join the JAWS program. Lacking a Canadian commercial radio licence, Pearson was grandfathered into the Canadian standards. The requirements for other positions, such as cooks and general station mechanics, were even less formal as previous “experience,” instead of certificates, was sought.⁵⁹

Met techs, however, had to undergo formal training in both countries. In Canada, students first had to pass a three-month surface observation course. Initially, this course was based at Malton, but DoT moved the course to Ottawa in 1960. The four-month program taught students how to observe weather conditions — including temperature, wind speed and direction, humidity, and cloud cover — from the ground. They also learned how to plot and encode their results. Top students from the surface course had the option of continuing to the upper air course. From 1953–59, a few students took this course in Edmonton, Alberta, with most attending a school on Toronto Island, Ontario. After 1959, DoT centralized its upper air course in Scarborough, Ontario. In this advanced

four-month course, students learned how to produce hydrogen, conduct radiosonde flights as well as PIBAL flights, and record, check, and encode their observations for transmission. They also had to pass a test on the operation of seismometers, including “basic theory, and the maintenance, changing of charts, photographic development, interpretation and reporting of seismic events” in case seismology knowledge was required at an isolated posting.⁶⁰ The program was demanding, and David Tidbury estimated that about half of all candidates dropped out.⁶¹ Those who passed this second course became upper air met techs with a pay grade two levels above those who just had the surface weather training. Both courses were taught by staffs of senior experienced surface and upper air observers.⁶²

The USWB training program was more decentralized than its Canadian counterpart. Most of its meteorological technicians trained at the upper air station that was closest to their point of recruitment. For this local training method, the USWB distributed standardized workbooks and exercises to aid instruction.⁶³ Ken Moulton, for example, went to the USWB upper air station at the Greensboro, North Carolina airport for three months of training in 1953 after agreeing to serve as Eureka’s next ExO. Moulton was the only trainee. His curriculum focused on surface, pilot balloon, and radiosonde observations. “After a very short time ... I was assigned to a shift and quickly became a member of the team,” he recalled. “By the time I left Greensboro, I had worked periods of time with three different shifts.”⁶⁴

These Canadian and American met tech training regimes had their limitations. The vast majority of JAWS personnel received no formalized instruction about working or surviving in the Arctic. The sole exceptions were USWB met techs who were trained during the 1960s. While the USWB’s 1961 Arctic recruitment booklet contended that “it is not essential for personnel to have had previous Polar experience,” the Bureau recognized that its met techs required some cold weather training.⁶⁵ Accordingly, the USWB’s Polar Operations Project created a small special polar training program in 1961 by constructing its own facility in Sterling, Virginia.⁶⁶ Although the warm Virginian weather bore no resemblance to polar conditions, the trainees who attended the school nevertheless received more cold weather instruction than their Canadian counterparts. The Training Center had examples of the equipment that American met

techs would encounter at Arctic stations, and students learned various skills including hydrogen generation, balloon releases, plotting their data, how to conduct PIBAL flights and radiation observations, as well as how to gather sea ice and snow samples for the American Snow, Ice and Permafrost Research Establishment (SIPRE). Trainees also learned Canadian procedures, equipment, measurements, and forms.

Even with this training, many graduates were ill-prepared for the unique challenges of polar operations. According to Paul Adams, the Polar Operations training program “subsisted on a starvation budget for several years,” and some of its equipment and buildings were barely adequate. Moreover, the four-week program was designed to refresh the skills of polar recruits with previous met tech training, but the Center regularly received raw recruits. In 1964, for example, Adams noted that ten of the sixteen met tech attendees “had no previous radiosonde experience or training.” These individuals received an additional two weeks of preliminary surface and upper air observation training, but this paled in comparison to lengthier USWB and DoT training regimes, and only served as an “indoctrination course.” Consequently, Adams concluded that it would “never be possible to completely train the available personnel in ALL the many things required to be known when arriving at a field station and attempting to immediately pick up the work load [*sic*] from the persons being relieved.”⁶⁷

Aside from extensive fire prevention training, Canadian JAWS recruits did not receive any formal preparation for the Arctic environment.⁶⁸ By the 1960s, however, enterprising trainees had access to an informal source of Arctic education. Some of the Canadian upper air observation instructors at Scarborough were JAWS veterans, and they willingly shared stories and photos of the stations. These insights amounted to little more than a handful of helpful anecdotes, and their “lessons learned” were never part of the course curriculum,⁶⁹ but this did not bother most JAWS recruits. Don Shanks recognizes that expectations are different today, but he had not felt unprepared for the Arctic: “as an ex-boy scout I was looking forward to this, I knew I could take care of myself. I did not think that I was missing that [survival training] at all.”⁷⁰ In his interview, Bill Nemeth (Resolute 1952, Isachsen OIC 1953–54) commented that being raised in northern Alberta was sufficient preparation for JAWS: “I knew what 40

below was, and I knew what a blizzard was, I knew what darkness was.”⁷¹ For these men, working at a JAWS station would be an adventure that built upon lived experience — not something gleaned from lectures or a textbook.

It is surprising that OICs, given their duty to protect Canadian sovereignty at and around their stations, received little more than an instructional memo or oral reminder in advance of leading their binational team. Melvin Hagglund, for example, counselled OICs and ExOs during an inspection tour in 1955 to accept “the importance of mutual discussions and agreement on various projects before decisions which might be controversial are made.”⁷² C.G. Goodbrand and Pat McTaggart-Cowan, from DoT, also noted in 1963 that “co-ordination with the Executive Officer in all phases of the operation of the Joint Station is very necessary, as harmony depends entirely upon intelligent co-operation of the Officers concerned.” Towards this end, Goodbrand instructed OICs and ExOs to share all official correspondence so that they did not end up pursuing conflicting agendas.⁷³

Instead of extensive training, DoT relied on OICs’ previous Arctic experiences to provide them with the requisite leadership skills. John Melvin, who had previously worked at Port Harrison (Inukjuak) for two years and Fort Smith for one year as a met tech, became OIC of Eureka from 1951–52. When asked decades later if he had received any training for his additional duties as OIC, he replied that “they took me for what I’d already done.”⁷⁴ Former Eureka OIC Don Shanks (1962–64) quipped that “anyone who had spent 2 years in the Arctic was automatically qualified” for the position.⁷⁵ According to Andrew Thomson, DoT preferred to select:

those who have been on similar stations for a year or more and have showed more than ordinary ability. These men have the advantage of being familiarized with the particular problems involved and have their specialized rawinsonde technique well in hand and consequently can give more time to other phases of station administration.⁷⁶

It became standard practice for outgoing OICs to remain at the stations for approximately one week after their replacements arrived to furnish

briefing papers, tour the station, and familiarize their replacements with station routines. This practice seemed inadequate to some planners, and Thomson unsuccessfully recommended in 1956 that OICs receive “some formal training” preceding their service.⁷⁷

American ExOs, who were responsible for overseeing American personnel and equipment at each station, received slightly more instruction than their Canadian counterparts. Extensive archival research and oral interviews failed to uncover any direct evidence of the USWB training its ExOs on how to navigate the program’s delicate power structure during the 1940s and 1950s. It appears that the USWB simply instructed its leaders to recognize that they were running a station on foreign soil and gave them wide latitude to navigate local and national concerns. Limited evidence from a similar USWB program with Denmark in Greenland, where the joint weather station was much less integrated and a Danish official was the ExO, confirms this practice. When informing Edward E. Goodale of his assignment to be the officer in charge of the USWB weather station at Thule in 1946, Francis W. Reichelderfer emphasized the “importance of maintaining harmonious relationships with the Danish residents and local population.” The Chief of the Weather Bureau also instructed the recruit to consult his “manual of instructions” for additional information on USWB policies.⁷⁸ JAWS ExOs likely received similarly brief and vague written instructions that left them free to work with the Canadians however they thought best.

The USWB acknowledged that it needed to expand its instruction to ExOs by the 1960s. A 1963 briefing advised a new ExO to tolerate “occasional incursions into what you consider your areas of responsibility, and, being human, you are likely to reciprocate, however innocently.” The USWB considered the ExO and OIC to have “equal status,” but also recognized that “for practical purposes, [the OIC] is in charge of the station” and encouraged deference. Neither official, it warned, should make an important decision without first consulting his counterpart. If the OIC left the station, “even briefly,” another Canadian (rather than the ExO) would temporarily assume the OIC’s duties. Should a disagreement arise that the OIC and ExO could not resolve themselves, they were to request a decision from the central offices of the USWB and DoT. If an immediate decision was necessary, the memo instructed ExOs to accept the OIC’s preference

until “the South” responded. Command conflicts, however, were extremely rare, and the briefing concluded that “in all probability you will find the OIC just another guy trying to get his job done to the best of his ability.”⁷⁹ Ultimately, the briefing still encouraged ExOs to rely on their personal judgement when working in Canada.

Sovereignty Concerns

Internal American training briefs, however, could not assuage all sovereignty concerns in Canadian government and media circles. Throughout the JAWS program, the United States maintained strong personnel, equipment, and supply footprints at each of the isolated stations over which Ottawa could only exert influence with great effort. Editorialists such as the *Ottawa Citizen’s* Peter Inglis warned that “some Canadians feel that the Americans are inclined to be proprietary about Canada’s Arctic. This may be the result of a misunderstanding of the lead which the United States took in getting the weather stations established in the first place and of the natural impatience of the American character.”⁸⁰ Reporter Michael Barkway of the *Financial Post* was more direct. “As a token of Canadian sovereignty,” he told his readers, “the senior Canadian officer at each post was nominally in command. But Canadian control was more titular than real: because we were not the people doing the work.”⁸¹

Despite the successful Canadian-American relationship forged by DoT and USWB personnel at the stations, some Canadian officials continued to worry about their country’s ability to control operations at these binational installations. The relative youth of Canadian OICs compared to their American ExOs, in addition to their lack of experience and ambiguous command over American personnel, led several prominent Canadian bureaucrats to worry that overbearing American ExOs might dominate the joint stations. In 1952, Bob Phillips complained that the DoT suffered “continual difficulties” recruiting OICs and had to make twenty-one- or twenty-two-year-old men the “senior Canadian official in thousands of square miles of Canadian territory.” In addition to their age, he worried that the unusual command structure of the JAWS program, which “on paper ... is a good means of protecting Canadian sovereignty with a minimum expenditure of manpower,” was, in practice, vulnerable to abuse.⁸² He explained that:

there were separate channels to Toronto and to Washington for the officer in charge and for the executive officer. The officer in charge does not, in practice, have complete control over the U.S. members of his staff since they can naturally have recourse to the executive officer.... The most serious objection to the present system of command is that, as one O.I.C. puts it, too much depends on personalities. If the Canadian O.I.C. is unable to agree with the U.S. Executive Officer, there may be a station divided against itself. If the O.I.C. for a moment loses his personal initiative or the respect of every member of the detachment, the real control of the station can pass on to the executive officer. The possibilities for playing off the O.I.C. and the executive officer — even if unconsciously done — are obvious. This is not the situation in a normal military detachment where the second-in-command is clearly subordinate. The U.S. executive officer may, on some occasions, be more experienced, more senior in his service and older than the Canadian O.I.C., and he always receives a much higher salary.⁸³

Phillips and R.W. Rae were willing to let the system prove itself because they believed that the “careful selection of staff and good luck” would allow the system to function effectively.⁸⁴ Concerns persisted nonetheless. After nearly a decade of operations, Andrew Thomson still worried in 1956 that the young Canadian OICs might lose control at the stations because they held the same bureaucratic rank as other Canadian personnel, earned less money than the Canadian radio operators or American personnel, and consequently held “a position which does not command sufficient respect.”⁸⁵ Present-day polar social scientists also warn against placing young, comparatively inexperienced individuals into leadership positions at isolated stations.⁸⁶

Who had the “Right Stuff”?

Determining who was best suited for maintaining a stable and diplomatically acceptable culture at the stations proved complicated. While working as Isachsen’s ExO from 1952–53, Paul Goree struggled with difficult personnel and told his southern superiors that “many of our problems of

personnel relations could be prevented by a more careful screening of applicants for Arctic positions. Particular attention should be given to personality. True, experience is important too, however, there is ample time for learning and doing the work here but a person must already know how to live with others before coming north.⁸⁷ Given the minimum one-year tours, the isolation of the stations, and the extreme environmental conditions, the USWB and DoT were both keenly aware of the need to screen applicants carefully. Past polar experts evaluated candidates according to three broad criteria: skillsets, emotional stability, and social compatibility.⁸⁸ Skillsets were the easiest criteria to recognize and screen, but were not necessarily the most important qualifications for living and thriving at the stations — as Donald Cleghorn’s experience at Resolute demonstrated.

Discerning the specific mix of personality traits that constituted the “right stuff” was more of an art than a science. The field of polar psychology, as it is now called, did not exist until after the International Geophysical Year (IGY, 1957–58), and research that would lead to formal psychological testing remained at an embryonic stage.⁸⁹ In the late 1940s, insights from the “heroic” explorer age still provided guidance into managing what R.E. Strange and W.J. Klein later dubbed “winter-over syndrome,” including depression, hostility, sleep disturbance, and impaired cognition.⁹⁰ Accordingly, JAWS program directors in Washington and Ottawa initially considered men with extensive polar backgrounds to be the most qualified “experts” for screening potential JAWS personnel. Drawing on personal experiences and observations from past polar expeditions, they selected individuals who could cope with these symptoms and who possessed the “ability to live together in confined spaces and to tolerate or to modify minor idiosyncrasies.”⁹¹ Charles Hubbard’s screening criteria, his widow Harriet later explained, embodied elements of the heroic tradition:

Charlie’s theory was that at least half the people who want to go to the Arctic are crazy, and of the other half only a very few are qualified, especially in skill and personality. He also thought that a man should learn his trade in the States, where he could have the benefit of thorough training and experience, and that he could much more easily acquire the Arctic angle on life through being in the Arctic than he could skills

— for instance, in repairing Diesel engines. He always wanted one experienced arctic man on each station, but for the rest he wanted skill and personality.⁹²

Methods to determine the right personality traits remained impressionistic. For instance, when Chicago's John Trinko volunteered to work at the Thule weather station in 1946 (and subsequently worked at Eureka from 1947–48), the famous explorer Sir Hubert Wilkins interviewed him. At first, Wilkins tried to talk Trinko out of volunteering by emphasizing the many hardships of northern life, including the lack of mail, and pressed for details of Trinko's past. When Trinko remained unswayed, Wilkins confessed his strategy: "We do not want a man who is running away from a divorce or romance or suchlike, [who] would sit there and brood by himself — we need someone who has an outgoing personality, who will be part of the group and exchange stories with the others."⁹³ Similarly, both DoT and USWB staff relied heavily on experience (rather than social science) to develop selection criteria,⁹⁴ and these interview methodologies remained unchallenged for over a decade. In 1956, for example, when a doctor performed a physical and psychological evaluation of prospective radio technician John Gilbert, he used a short set of the questions that resembled the explorers' lists.⁹⁵

The persistence of these traditional and impressionistic screening systems into the late 1950s must be understood within a circumpolar context. Only in 1955, after an American became paranoid and had to be sedated at a base on the Antarctic mainland, did concerted state-sponsored polar psychology research begin in earnest. During the IGY from 1957–58, when twelve countries established more than forty Antarctic stations (and populated them with thousands of military personnel, scientists, and technicians), psychologists began to systematically study polar isolation and confinement. Within a few years, these studies documented the physical and psychological stresses experienced by wintering-over personnel, and tried to predict the suitability of new candidates for polar service by comparing variables such as age, education, occupational status, and extraversion. In subsequent decades, psychologists, psychiatrists, anthropologists, and physicians from various countries honed their ability to predict an

individual's emotional stability and social compatibility through ongoing testing and research.⁹⁶

These advancements, however, did not substantially influence JAWS personnel selection processes. While American volunteers overwintering in Antarctica underwent mandatory screening during and after the IGY,⁹⁷ individuals bound for the Canadian Arctic did not undergo similar scrutiny for several reasons. First, the USWB only contributed some of the personnel who worked in the Antarctic, and the screening may have been mandated by another department or organizing body that was not involved in the JAWS program. The USWB also distinguished between the Antarctic and High Arctic environments. At the South Pole, intense winter storms still preclude landings for all but the most extreme emergencies, thus isolating stations for nearly half of the year. Aircraft, however, could airdrop supplies to the Joint Arctic Weather Stations year-round and, even during the 1950s, could land at the stations during the spring and fall months (see chapter 7). Indeed, Eric Gunderson of the US Navy Medical Neuropsychiatric Research Unit contended that the Antarctic fundamentally differed from the Arctic because it lacked “indigenous populations ... [as well as] industrial or commercial enterprise, and has much more severe environmental conditions ... [that produced] different types of psychological and behavioural problems.”⁹⁸

As the polar explorers initially involved in selection processes aged and their availability declined, DoT increasingly relied on medical doctors or departmental personnel to assess the suitability of prospective candidates for service at High Arctic stations. The screening process itself, however, appears to have remained impressionistic and unstandardized. Moreover, approved personnel received no formal instruction on how to prepare for the isolation that they were about to endure.⁹⁹ At least one prominent Canadian became concerned about the persistence of these traditional screening methods. In 1960, J.S. Willis (the General Superintendent of Northern Health Services at Indian and Northern Health Services, Department of National Health and Welfare), who was familiar with some of the initial IGY polar psychology studies, repeatedly called for the implementation of academically-proven screening processes for Canadian Arctic service in an article for Canada's *Medical Services Journal*. “One would expect that some agency would long since have

worked out criteria by which to judge prospective northern personnel and would have devised tests or special interviewing techniques to weed out those likely to prove unfit,” he complained. “Little of this kind of thing appears to have been done.” The interview methods employed in Canada did not ask “scientific questions” or provide “ways of measuring the suitability of the applicant.” Consequently, the process “remained very much an art rather than a science.”¹⁰⁰

Willis contended that modernity represented an obstacle and offered a solution to the successful operation of Arctic stations. Adopting a romanticized notion of Inuit life, he commented:

One might well ask why the Eskimo, living a native way of life without many comforts or much variety of entertainment, spending a large portion of his time engaged in activities designed simply to keep him alive, lives such a serene and happy life? Is it not because his life is a simple one, because he has never invented for himself a rat-race, because he has not put too much emphasis on time and space relationships, because he is resigned to the hazards of his existence and if sickness, hunger, or mortality come, can accept them? This is the compass of his imagination.

The “average” Canadian “is not an Eskimo,” Willis continued. “Whether or not he likes it, he is running on his treadmill and is seeking greater heights of bliss.” Willis acknowledged that there were many Canadians “who have been able to avoid the treadmill or see it as an evil machine, who have developed inner resources against the pressures of modern life” and who “actually begin to feel ill at ease in the south.” The challenge was to develop screening techniques to “ensure that square southern pegs are not squeezed into round northern holes.”¹⁰¹

The Canadian state was aware of this research but did not act upon it in the years immediately following Willis’s lobbying.¹⁰² “The laws of supply and demand have usually determined that a man willing to go to the north was going to go to the north anyway, whether or not he was wholly fit, because nobody else was available,” Willis lamented.¹⁰³ DoT was chronically short of suitable JAWS personnel, and these recruitment challenges

left little incentive to dispense with screening methods rooted in the traditions of the heroic era of polar exploration.

Getting There

After volunteers applied to their country's respective recruitment programs, passed their physicals, and completed any required training in southern locales, the JAWS recruits were ready to head north to their new places of work. Most new personnel travelled to the weather stations in March or early April with the spring resupply airlift to relieve overwintering predecessors. In the early years, most spent days crossing Canada and the United States by train to reach the airlift rally point at Churchill, Manitoba. By the early 1960s the departure hub shifted west to CFB Namao in Alberta.¹⁰⁴ From these staging points, JAWS recruits boarded military transport aircraft and flew north. These flights sometimes provided an early taste of the realities of Arctic life. When John Gilbert flew north on the spring airlift, he spent two days in the Churchill mess hall waiting for the thermometer to rise above -50°C (-58°F) — the lowest temperature at which the aircraft could safely operate. After anxious waiting, the pilot entered the building and told Gilbert that the temperature had risen to -49°C (-56°F). They departed five minutes later.¹⁰⁵ When a window of opportunity opened, there was no time to waste.

JAWS personnel generally rode with the cargo on military transport aircraft. The trip was uncomfortable, but most expected to encounter such ruggedness during their Arctic tour and forgot their discomfort when they peered out the window. R.A.J. (Bob) Phillips, who visited Resolute in 1952, captured the fascination that many newcomers expressed as the vast northern landscapes passed below them:

There need be no monotony in Arctic flight. The steady roar of the engines is so overpowering that all other sounds are excluded and the noise itself is like silence. The form is bold in the infinitely gentle curves losing themselves on a far horizon, or in the jagged rock thrusts of a barren hilltop, or in the blue scratches of cracking ice. The colour is subtle. There are no sharp contrasts, only an endless blending of gently varying pastel shades on a luminous canvas. There are no jarring



FIGURE 5-4. Personnel sitting among the cargo while in transit during 1953. Note that several of the travellers are wearing suits. Bill Nemeth Collection.

blotches, only a sense of untouched cleanliness. Though it stretches ceaselessly the picture changes constantly. It is like watching the flames in a slowly burning fire. Although the substance changes little, the forms are infinitely varied. The fascination is the same.¹⁰⁶

After flying for several hours, the satellite stations came into view and a passenger's sense of expanse shifted to one of isolation. When Lowell

Demond arrived over Mould Bay in 1956, his pilot circled the station a few times to allow his passenger to survey his new home. Demond noted that “there were around 12 or 13 buildings ... and he [the pilot] said ‘that’s what she looks like. I can’t imagine why anyone wants to spend a year in a place like this. I like tall buildings, tall trees, and tall women, and there’s none of those down there...’ He was right.”¹⁰⁷

Gilbert had a similar reaction upon his arrival at Eureka in April 1956. After spending one month at Resolute, he was sent to Eureka to relieve an evacuated radio operator. Upon arriving at the station where he would spend most of the next two years, he saw “about eight buildings that were almost completely snowed under.” He recalled his initial impression: “someone must have been playing a practical joke on us.”¹⁰⁸ But it was no joke. This small constellation of buildings on Canada’s northernmost island would be his home for the next twenty months, serving as a hub to gather local scientific data that would bolster knowledge of the High Arctic and global environmental systems.

Science at the Stations

The Joint Arctic Weather Stations are serving a two fold purpose, primarily as Arctic Observatories and secondly as advanced bases for scientific expeditions operating in the Queen Elizabeth Islands. It is gratifying to both Weather Services that the facilities and services provided at these stations are becoming ever more useful in the advancement of science.

Patrick McTaggart-Cowan (1963)¹

The Joint Arctic Weather Stations were primarily established to produce meteorological observations and to serve as bases for additional field science research. When outlining his weather station plans in early 1946, Charles Hubbard anticipated that “the establishment of meteorological stations will provide habitations, channels, communications, and transportation which will make it possible for us to penetrate the Arctic for other purposes.” By laying the essential groundwork for Arctic activities, he felt “that probably in the long run the aggregate of all the scientific research that might be pursued may ... represent the greatest benefit of the entire program.”²

When Alan Innes-Taylor arrived at Isachsen two years later, he immediately noted the area’s scientific value beyond meteorology. “It stirs my imagination and at the same time annoys me to think that man has neglected it for thirty years and then when he gets at it [he] doesn’t do a well rounded scientific job,” he reported, urging the Canadian government to

send two field scientists to the station to conduct geological and botanical research.³ Although Innes-Taylor left Isachsen more bitter than when he had arrived, this fervent proponent of an integrated Arctic science policy would have been pleased had he taken stock of the program in the decades that followed.⁴

Only a few years later, in 1953, Canadian External Affairs Minister Lester Pearson expounded upon how the network expanded science's vision into "Canada's Northern Horizon." The Arctic "is now a vital area of both defense and development," he suggested. He cited JAWS as a prime example of how "the northern frontier is being slowly but steadily rolled back, ... not only from our concern for defense, but also from our determination to deepen and extend our knowledge of its economic and scientific secrets." Although he was initially apprehensive about the joint program and continued to promote Canadianization behind the scenes, Pearson now touted that "it was natural and sensible that the weather station program should become a cooperative venture," with meteorologists from both Canada and the US combining efforts "to get better observations from the far north which is the source of so much of our weather." The scientific benefits did not end there. He explained:

The five new stations established in the northern Arctic since 1947 have also had great significance for scientists who have no connection with their primary function. The stations are laboratories for experts of every kind who come up for a week, a month or a season for field work and then return to their offices and laboratories in the south. Before the stations were established, this field work in the Arctic was enormously more difficult because of the lack of bases and the lack of transportation. Now the large aircraft which fly up on the spring resupply mission are filled with a varied assortment of men and equipment. A scientist from the Dominion Observatory travels from place to place with a little box which tells him much about the shape of the earth; a geodesist bearing cases of fragile and complicated equipment establishes fixed points astronomically in order to make Navigational charts and maps more accurate. A scientist from the Department

of Agriculture spends a summer looking for insects; another, from the National Museum of Canada, is concerned with Arctic plants. Men in these fields of study return year after year to increase the knowledge of Arctic phenomena. But there are also special projects, such as research into the *auroa borealis* and the characteristics of permafrost, which have now become practicable with the establishment of the new permanent communities.⁵

Scholars regularly highlight the importance of JAWS infrastructure as scientific hubs in the High Arctic for southern field scientists and, in due course, surveyors of mineral and petroleum resources. This focus on visiting scientists, at the expense of their hosts, however, reveals comparatively little about the impact that these expeditions had on station resources, crews, and cultures.⁶ The professional backgrounds of JAWS personnel, as well as their year-round Arctic residency, distinguished them from more transitory visiting scientists, and the station's inhabitants clearly differentiated themselves from these visitors. They generally welcomed new faces to the stations and did their best to assist visiting field parties with time, space, and resources — even though the additional requirements imposed by this hospitality taxed the stations and their crews.

Meteorological observations, however, remained the network's primary focus and the foundation of station life and culture. As historians Tina Loo and Meg Stanley note in their study of how local knowledge generates and flows in postwar development projects, plans and processes designed from afar required adjustment and modification once materials and practices “reacted in place and in real time.” They also show how “place created and recreated practice.”⁷ Inspired by Sharon Traweek's work on cultural anthropology and the sociology of science, this chapter situates the JAWS community of scientific practitioners in their “domus” field stations, detailing what the men at the stations actually did, how they generated knowledge, as well as how place, professional backgrounds, and motivations contributed to local cultures that impacted scientific practices.⁸ To date, historians of science investigating the production of knowledge have primarily focused on the collaboration and conflicts between two groups: scientists and amateurs.⁹ Although a few scholars have begun

to investigate technicians — one of the many categories of contributors between these two extremes — the diverse ways that this group reflects and shapes scientific knowledge and practice remain largely unexplored.¹⁰ While field technicians embraced scientific objectivity and understood the importance of sound methodology, their careers did not rise or fall by developing new environmental insights. Unlike Arctic field scientists in the 1950s and 1960s who tried to advance their disciplines' stature by attempting to turn the Arctic into a laboratory-like environment where they could conduct controlled experiments,¹¹ JAWS technicians experienced no such pressure. Instead, they were “observers” who cultivated professionalism by accurately collecting synoptic data for scientists. Positioning technicians at remote field stations was especially efficient because it enabled comparatively costly scientists to focus on analyzing the incoming data.

Meteorological technicians — simply known as “met techs” — knew that southern meteorologists in North America and Europe used the data they collected to predict weather and to guide pilots crossing the Atlantic Ocean. Residing in the Arctic for a year or more, met techs helped to establish a scientific culture that differed from that imported by transient field scientists during their seasonal visits. Given the significant role the data they gathered played in forecasting, met techs emphasized precision, consistency, the importance of controlling variables whenever possible, and the timely transmission of their findings to southern meteorological centres. In contrast to the resupply efforts where participants generally adapted to seasonal environmental forces (see chapter 7), JAWS observers went to extreme lengths and endured hardships to conduct meteorological observations on schedule — almost regardless of the local weather conditions. Their daily routines consequently reflected a combination of established Western scientific methods, common sense, and acquired local knowledge — the latter accrued without the benefit of Indigenous people to guide them using traditional ecological knowledge or Inuit *Qaujimaqatuqangit*.¹²

This dedication to collecting data in harsh conditions, however, had its limits. Local knowledge could be learned as well as forgotten, and technicians at the remote outposts lacked some of the insights of their scientist counterparts. Historian Vanessa Heggie explains that “field sites are often depicted as parts of hierarchical relationships, usually framed

as centre-periphery,” with information flows depicted “as unilateral, with data collection in the field feeding into more and more centralized, abstract and metropolitan sites.”¹³ Geissler and Kelly note that “through the day-to-day work of the field research, the global can be experienced and acted upon in any number of ways.”¹⁴ For the JAWS network, the tyranny of distance, isolation, and extreme polar conditions forced planners to provide field staff with agency and space to innovate and adapt international meteorological observation requirements to local conditions. When the analytic utility of certain observations came into doubt, JAWS personnel hesitated to continue braving the harsh local conditions. Within the JAWS program, planners were initially frustrated by the hesitancy of its personnel but, as Ted Binnema argues when discussing Hudson’s Bay Company scientific networks from the eighteenth century, those requesting the services of field observers soon “understood the difference between networks peopled by grudgingly compliant subordinates, and those populated by men who thought of themselves as ardent and valued partners in research.” Applying social intelligence and empathy generally led to stronger networks and more dedicated supporters.¹⁵ JAWS planners, rediscovering this lesson, soon found that active dialogue with JAWS personnel was critical to obtaining the observations desired by southern scientists.

The Meteorological Program

The Canadian Interdepartmental Committee on Meteorology’s recommendation in 1945 to set up the JAWS program for its initial five-year term stated two main purposes. First, officials anticipated that the stations would accumulate sufficient surface and upper air meteorological data to indicate the feasibility of scheduled air operations in the Arctic. Second, meteorologists would use the data for “extending the reliability of the forecast period from a few days to possibly a month.”¹⁶ The data required to fulfill these goals dictated the daily routine. Changes to local and international observation timing led to several adjustments to the stations’ synoptic schedules in the decades that followed, but the types of meteorological observations undertaken remained consistent.

Met techs came to the stations with several months of intense observation training and prided themselves on overcoming harsh conditions on a regular basis to perform synoptic observations. In the early 1960s, an

anonymous “Alert Poet” composed a “Northern Weather Station Prayer” that summarized the challenges that observers faced:

Mighty Maker of this Earth
Creator of the Universe
Could you change your ice cold plan?
Do away with the Arctic land?
It’s dismal cold and windy too!
Good for What? of How? or Who?
We try to solve your master Scheme,
of wind and snow in a weather theme.
We send the info to the south,
By way of key and word of mouth.

What earthly good can all this be,
We can’t decipher what we see.
Can’t you shed a little light,
Let us plot to our delight.
The answer that we seek and need,
Is What? and How? and Who? Indeed!¹⁷

Like all other Canadian weather observers, JAWS personnel followed the regulations set out in the *Manual of Standard Procedures and Practices for Weather Observing and Reporting (MANOBS)*. This bible of Canadian meteorological procedure contained instructions for day and night observations; it also aligned Canadian synoptic observation procedures with international standards. Following its timetables also ensured that forecasting or climatic models considered JAWS observations alongside data from the rest of the continent or globe. The extreme environmental conditions of the archipelago, however, sometimes pushed these regulations and the men who followed them to the limit.

Most JAWS observers worked twelve-hour shifts, seven days a week, and each station’s daily routine revolved around the surface and upper air observations. Because these observations often overlapped, radio operators conducted most of the surface synoptic observations at the satellite stations in between other tasks. These radio operators also assisted with

pilot balloon (PIBAL) flights. Met techs undertook some of the surface observations but were mainly responsible for the PIBAL and “radiosonde” balloon flights. OICs and ExOs scheduled all other station work — be it maintenance, clearing the airstrip, repainting, rebuilding, moving supplies, or emptying urinals and drums used as toilets — around the collection of these important meteorological observations.

Surface Observations

Satellite station personnel took eight daily surface observations at three-hour intervals, timed to start simultaneously at all the JAWS stations. Radio observers or met techs also took shorter hourly surface observations when the stations expected incoming aircraft. Given its high aviation traffic and larger staff, the Resolute station conducted regular hourly programs throughout the year.¹⁸

In the early 1950s, the first observations for a new day at the satellite stations began at 0215 GMT. Before consulting any instruments, the observer walked to a predetermined place where the entire sky was visible to record the type(s), number, height, and direction of movement of the clouds. He also determined the proportion of cloud cover by mentally dividing the sky in halves and then estimating the amount of cloud in each half by tenths. During the dark period, observers made the same observations by monitoring the visibility of stars or using a ceiling projector (a searchlight operated remotely by a person indoors that shot a high intensity beam of light into the sky).¹⁹

Observers also recorded the *cloud ceiling* height. If there was cloud cover during daylight hours, they usually made these measurements by visual estimation or by launching a small ceiling or slightly larger PIBAL balloon. The neoprene balloons for these ascents were usually red, though they also came in white and black to facilitate visibility against different coloured skies. During the dark period, JAWS personnel enhanced the visibility of these flights by attaching a light source to the balloon. *Vertical visibility*, which measured the distance that observers could peer into this medium, was a less precise measurement, but the information was still critical to pilots who would need to fly through cloud cover.²⁰ Another method to determine the cloud ceiling and vertical visibility involved placing a ceiling projector at a known distance from an alidade to triangulate

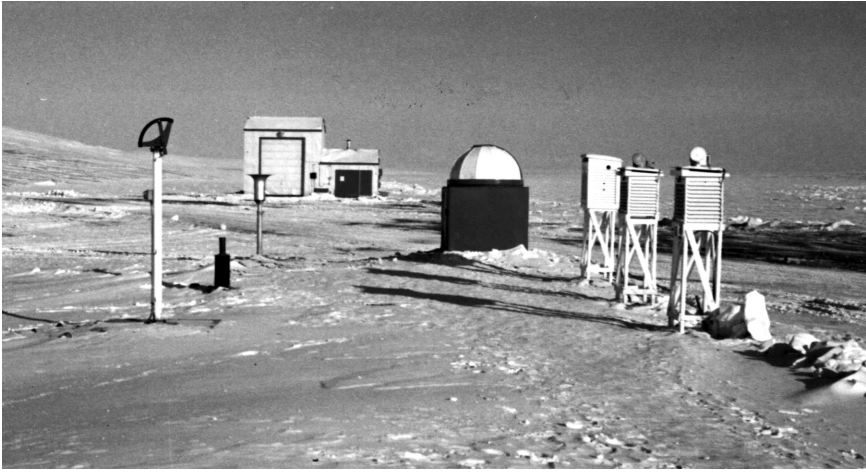


FIGURE 6-1. Most of Eureka's meteorological equipment, circa 1960s. On the right are the surface instrument shelters. An alidade for cloud height measurement is on the left. The large upside-down cone is the snow-gauge. The theodolite station with its rotatable dome is in the middle. The station's hydrogen production building and inflation garage are in the background. LAC (Winnipeg) Acc 2004-01213-7 AES Photographic Records of Arctic Weather Stations, Box 2, File Eureka ND.

height. Limited vertical visibility could also be determined by noting the brightness of the stars.²¹ The popularity of these methods varied at each station and with each rotation of personnel.

In addition, these observers had to determine *horizontal visibility* during their surface observations. During daylight, this metric was determined by looking at pre-selected landmarks or items at various distances along the horizon. When it was dark, observers estimated horizontal visibility by looking at a light mounted on the top of the antenna mast or some other consistent light source. In unusual circumstances, one could observe whether the beam of light immediately above the ceiling projector was visible in order to approximate horizontal visibility.²² Before proceeding, the observer recorded the present weather conditions according to the *MANOBS* definitions.²³

Next, the observer turned his attention to the surface instrumentation located inside the cotton region screen instrument shelter (an American version of the Stevenson screen). The box's slatted walls sheltered the

instruments from exposure to precipitation and direct solar radiation while allowing outside air to circulate through the enclosure. To foster consistent measurements across Canada, every box's base was 3 feet 9 inches above the ground and was positioned with its opening facing north. Even though cotton region screens sheltered surface instruments at each station, the extreme environmental conditions forced JAWS personnel to take several extra measures to ensure accurate readings. During severe storms, blowing snow would build up around the walls, or inside the structure itself, creating a layer of insulation that inhibited ventilation which caused the thermometers to produce skewed readings. Although personnel could cover the shelter with canvas during a storm to prevent it from filling with snow, this reduced the free circulation of air and thus affected the readings, so it was not recommended for stations like Isachsen that regularly faced high winds. Instead, personnel removed the floorboards from the shelter and constructed a special shelf for the temperature instruments.²⁴

To avoid contaminating the results with human body warmth, observers approached the screens from the leeward side, held their breath, opened the box, and — keeping as much distance as possible — quickly noted the readings of the dry- and wet-bulb thermometers (the latter thermometer is covered by a cotton sock coated with a thin layer of ice), as well as the maximum and minimum temperatures recorded on separate, self-registering thermometers.²⁵ Only after recording these measurements could the observers take a new breath.

Even these additional measures were not always sufficient to ensure reliable readings. When temperatures dropped below -12°C (-10°F), the sock on the wet-bulb thermometer was useless and had to be removed. Instead, personnel had to approach the instrument shelter fifteen minutes before the scheduled observation, dip the wet-bulb thermometer directly into clean cold water to create an ice coating on it, return the thermometer, and then wait for the thermometers to stabilize before taking the measurements. Similarly, if frost had to be wiped from the thermometers, observers had to follow the same fifteen-minute rule to ensure reliable readings. When the temperature dropped below -39°C (-38°F) during the coldest months mercury-filled thermometers froze, so the stations switched to alcohol or mercury-thallium alloy thermometers.²⁶



FIGURE 6-2. The inside of one of the cotton region screens shows the dry- and wet-bulb thermometers as well as a ventilation blower assembly. The horizontal mercury maximum-reading and the slightly tilted alcohol minimum-reading thermometers are above the blower. John Gilbert Collection.

Once an observer finished recording the thermometer readings he checked for precipitation. A rain gauge provided a reliable reading of rainfall, but snowfall was much more difficult to determine. Under normal conditions, each weather station set aside a flat area that was sheltered from the wind where personnel could take a series of snow thickness measurements, average them, and then sweep the snow away. On the archipelago, where drifting snow is endemic, it was “often difficult to tell whether snow is actually falling or not,” R.W. Rae explained in 1952.²⁷ A decade later the use of snow-gauges, which did a better job of preventing drifting from skewing the results, partially resolved this issue. Even then, observers still reserved another sheltered area to try to ascertain accumulation, and ultimately had to draw upon their local experience to estimate how much of the snow was precipitation and how much had been picked up by the wind.²⁸

The remaining observations concerned wind and atmospheric pressure. After checking the weathervane to determine its direction, the observer monitored the station's anemometer for one minute to ascertain windspeeds and record the average. Finally, the observer noted the barometric pressure and recorded separate corrective figures that considered the station's altitude, as well as the most recently observed temperatures.²⁹ Once these readings were complete and recorded, the observer resumed other work until his shift ended or the time arrived for the next observation.

Upper Air Observations

To observe, rapidly transmit, and accumulate upper air data that could be used by meteorologists and climatologists from around the world to predict continental weather patterns, JAWS met techs worked diligently to successfully release balloons at internationally established time intervals, obtain the maximum possible altitudes, and secure reliable data.³⁰ The mainstay of upper air observations was the radiosonde, a device containing temperature, humidity, pressure instruments, and a transmitter enclosed within a single box attached to a weather balloon. These ascents became rawinsonde (RAWIN) flights if the observers also extracted wind speed and direction for various altitudes by following the device's directional movements using a manual or automatic tracking antenna.³¹ Regardless of the equipment used, station personnel colloquially referred to these balloon ascents as "radiosonde" flights. During the 1950s, each station released a radiosonde at 0300 and 1500 GMT.³² Almost from the outset, the Alert, Eureka, and Resolute stations also possessed radio direction-finding rawinsonde equipment to track the radiosonde transmitter, regardless of cloud cover.³³ The exclusive reliance of the other two stations on aerial resupply explains why Mould Bay lacked rawinsonde capabilities until September 1953 and Isachsen until September 1954.³⁴

Preparing, releasing, tracking, and encoding the data from the upper air flight required roughly two to three hours and two personnel (more if the first attempt at an instrument launch failed or if the attempt failed to attain minimum altitude requirements). One of the RAWIN observers (the "wind observer") began his preparations for the "run" by going into the observation dome and turning on the receiver to warm it up. He then turned the directional antenna to face where the surface winds would

push the balloon shortly after launch. Next, he walked to the inflation building and began to secure the buoyant gas that would fill the balloon. Particularities of place significantly shaped these preparations. Each station received helium tanks as a backup gas supply during the winter when hydrogen production was most failure-prone, or for quick second releases. The noble gas was used sparingly at the stations, however, because the weight of the helium tanks made them “hellishly expensive” to airlift.³⁵

Consequently, the stations used hydrogen produced on-site from a chemical reaction for nearly all their balloon flights. The stations’ hydrogen buildings were small and detached (for safety reasons), but sufficient to house the gas generator — a boxy device shaped like a concrete mixer. Through an opening on the top of the tilted generator, the met tech deposited (in order) water, aluminum chips, and a caustic soda charge. Because purity was unimportant and water was so laborious to obtain during the winter months at the satellite stations, personnel sometimes reused bath or dishwater for this procedure. After capping the top, the technician spun the cylinder to mix the chemicals and water, and then ran “like hell! If she [the generator] doesn’t blow, you have hydrogen.”³⁶

Accidents did happen. Lowell Demond recalled an incident at Mould Bay in 1956 when he put the aluminum chips and caustic soda into “the lunar lander” — his description of the generator — followed by a bucket of water. “I had failed to notice the valve from the water tank to the generator was opened, until the monster began to breath,” he recounted. “I kicked the clean-out valve open and took off toward the airstrip. When I was about 100 feet from the inflation shack the safety valve blew. It was a strange load of debris which spewed across the tundra that day!” He recalled that the ceilings of the inflation buildings at Mould Bay and Eureka also bore the residue of past “massive splashing” above the high-pressure generators.³⁷

Station personnel and southern planners took several measures to prevent such incidents and improve safety. Upper air observers’ gear was designed to resist static buildup, but JAWS personnel nevertheless touched a grounded metal plate as they entered the hydrogen building to discharge any build-up that might ignite the explosive gas.³⁸ The same personnel also initially left the inflation sheds unheated to avoid any accidental explosions. These sheds consequently became bitterly cold and personnel at Alert

during the early years sarcastically nicknamed their structure the “hell hole.”³⁹ By 1953, each satellite station received new, low-pressure hydrogen generators, which, as their name suggests, diminished the threat of accidental rapid overpressure and violent releases. When the air temperature dipped below freezing, however, water often froze in the line and valve that linked the reservoir to the generating chamber, and thereby stopped the reaction entirely. Diligent cleaning helped to solve the problem, as did starting with heated reaction water and storing the most frost-prone parts in the heated rawinsonde or operations buildings between runs.⁴⁰ Shortly thereafter, station personnel secured permission to construct a small heating shed several feet away that pumped hot water mixed with antifreeze into the hydrogen and inflation buildings. As long as the hydrogen building’s doors were not left ajar for more than a few seconds, this heat kept the building’s interior temperature near the freezing point.⁴¹ Despite these safety and environmental improvements, some personnel continued to prefer the high-pressure generator. According to Vaughn Rockney, Chief of the USWB’s Observations Section in 1957, “Isachsen and Mould Bay much preferred the low-pressure generator and wanted nothing to do with the high-pressure type. At Alert, the opposite was true. However, all of the stations appeared to have the problem of hydrogen generation in Arctic temperatures well in hand.”⁴² Regardless of the hydrogen production device, the RAWIN observer used a hose to slowly inflate the latex balloon with the gas until the balloon filled most of the room.

JAWS personnel continued to use these hydrogen-generating systems into the 1960s. The leftover caustic sludge, which personnel typically dumped behind the hydrogen building or deposited in a nearby pit, built up over the years. By 1965, all of the stations received electrolyzers, offering a much safer and environmentally-friendly method for producing hydrogen.⁴³ Thereafter, hydrogen production became more mundane.

While the RAWIN man prepared the balloon, the rawinsonde (RAOB) observer selected a radiosonde unit from storage and warmed up the RAOB receiving equipment. He then retrieved a battery from the sealed storage can and immersed the power unit in water. Next, he checked that all of the RAOB’s instruments were properly connected to the transponder and performed a sensitivity check on the station’s recorder. He then installed the battery in the radiosonde and placed the completed instrument

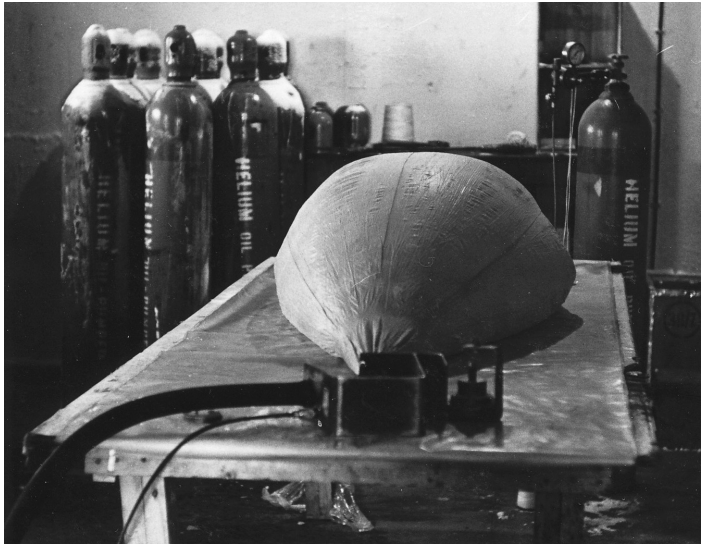


FIGURE 6-3. Preparing and launching a balloon was a multi-step process. All of the stations produced their own hydrogen. The photo (Top) shows the comparable low-pressure hydrogen generator at Sachs Harbour. Note the caustic soda splashes against the wall. LAC Winnipeg, Acc 2004-01213-7, file Low Pressure hydrogen generator - SACHS HARBOUR. (Bottom) After the chemical reaction, the RAWIN man inflated the balloon. Jim Jung Collection.



(Top) The crew then opened the inflation shed's doors and attached the instruments. Alan Faller Collection.



(Bottom) When all of the instruments were ready, the rawinsonde observer launched the balloon. LAC Winnipeg, Acc 2004-01213-7 AES Photographic Records of Arctic Weather Stations, Box 1, File Eureka.

in a “check box.” After leaving the radiosonde in the box for five minutes, he turned on the RAOB recorder to establish a baseline and determine whether it matched the checkbox’s own instrumentation and verified that all of the instruments’ subsystems were working as expected. After confirming that they were, the observer then removed the radiosonde from the box and placed it in a surface instrument shelter with a hole cut in the bottom to accommodate the device’s antenna (allowing the device to acclimatize to surface weather conditions). During the summer this acclimatization from indoor to outdoor temperatures was sometimes unnecessary, but during the winter it could require a half hour or more to adjust. In the meantime, the RAOB observer went inside the observation building to sharpen pencils and prepare paper charts for the flight.⁴⁴

With the preparations complete, the RAOB observer then returned to the inflation building, opened the doors, and waited for his RAWIN counterpart to step outside from the nearby dome atop the rawinsonde building to flash the “launch” light. Most of the time, launching the balloon was simple. The launcher let out the balloon until the chord was taut, and then released the radiosonde. Winter storms could make this a difficult and dangerous activity. While serving as the RAWIN operator at Eureka in the mid-1950s, Lowell Demond recalled one particularly violent night:

I flashed the light to Bob Frank [the RAOB observer] for at least four or five minutes and he couldn’t see it because of the blowing snow. The wind was blowing directly toward the dome from the inflation building, I would guess at least 70+ MPH. I didn’t see Bob release the balloon, but I heard the loud “SMACK” when the instrument hit the dome about two feet from where I was standing. If that would have hit me, you fellows would have had to plant me. The end result was a second release.⁴⁵

With the balloon released, the “run” began. The RAWIN observer re-entered the unheated dome, which was made of plastic to permit the free transmission of radio waves. Then, during the 1950s, he assumed his seat on the American SCR-658 “radio theodolite.” To track the balloon’s path and receive the radiosonde’s temperature, humidity, and pressure readings,



FIGURE 6-4. The rawinsonde building at Mould Bay in the mid-1950s. Note the light on the left side of the porch. Jim Jung Collection.

the RAWIN observer had to closely follow the balloon with the radio array that he moved himself by turning two handwheels.⁴⁶ The RAOB operator, seated at a station a floor below, monitored the radiosonde's readings. Most runs lasted approximately one hour. As the balloon ascended, the atmosphere thinned, and the balloon expanded to a diameter of thirteen to twenty feet before bursting.⁴⁷ The balloon had to reach a minimum of 100 millibars (approximately 50,000 feet) or a second launch was required. Most launches easily surpassed this minimum, and met techs followed the balloon until it attained its maximum height.⁴⁸

In order to expedite post-run data processing, some RAWIN and RAOB operators swapped information as the flight progressed. Rockney observed the process during his September 1957 tour of the stations:

The job of completing the rawin as quickly as possible, when only two men are available to make the observation, requires two particular techniques. First, the man working the raob must begin to supply height data to the man at the rawin mount as quickly as such data can be computed. This means,

FIGURE 6-5. The SCR-658 “radio theodolite” inside each JAWS RAWIN dome was the same as the setup shown here at Sachs Harbour. Note the large pad on the observer’s lap to mark down the minute-by-minute direction information used to determine upper wind directions. Environment Canada.



for example, that as soon as a few minutes of record have been obtained, the adiabatic chart must be plotted and the height data computed so that the rawin operator can begin calculations of the horizontal distances as soon as possible. Second, a plotting board must be located at the SCR-658 mount so that the rawin operator can work up the rawin while the sounding is progressing. At Alert, for example, where I watched a rawinsonde observation that went to 9 millibars, the rawin operator came down from the dome when the balloon burst, lacking only the last few minutes of height data to complete the entire rawin.⁴⁹



FIGURE 6-6. The radioonde room at Eureka, n.d. The flight's readouts arrived at the chart recorder on the left, and the met techs are processing data from the run. LAC Winnipeg, RG 93, Acc 2004-01213-7, Box 2, File Eureka, n.d.

Not all observation teams practiced this method, however, as some preferred to share their data after the run terminated.⁵⁰

With the flight complete, the RAWIN and RAOB operators rejoined on the first floor of the rawinsonde building to check their work for errors and to finish plotting the run. Here the two met techs encoded the data from their run so that it could be transmitted south. This process converted the data into a series of five-figure groups that could be more easily transmitted via Morse code. It took about half an hour to encode the observations. The met techs then walked the coded messages to the radio room.⁵¹

This upper air workflow continued throughout the JAWS program, although several technological advancements shortened or eliminated certain portions of the work. Between 1960 and 1962, an electronics technician (with the assistance of station personnel) swapped each of the

station's SCR-658s for the GMD-1: a radio theodolite that automatically tracked the radiosonde, thus removing human error from the tracking process. It also had a wider angle of tracking (6 degrees vs. 15), allowing observers to track the balloon to even higher altitudes. Automation also permitted the RAWIN observer to monitor paper tape readouts in the comfort of the observation room, alongside his RAOB counterpart.⁵²

The transmission of each flight's observations underwent a similar transformation. The timely transmission of the gathered data was crucial to forecasters. Initially, radio operators at the satellite stations transmitted their surface and upper air observations by Morse code to Resolute. This hub station called each satellite station (as well as Sachs Harbour) at appointed times each day to receive the data. If the satellite station was not ready to transmit, it had to wait until all the other stations completed their transmissions. The length of the transmission varied with the duration of the radiosonde's flight, but it usually required ten to fifteen minutes to complete. In the early years of the program, Resolute's radio operators then relayed the entire set of observations in Morse code to Edmonton. The process proved reliable, achieving nearly 90% consistency. Beginning in 1958, the stations gradually received radio teletype machines that enabled met techs to assume more and more responsibility for transmitting their observations.⁵³ Within a half hour of receiving the coded observations from the stations, Edmonton's radio operators put the observations on teletype circuits that quickly fed the information to civilian and military forecast centres across Canada, the United States, and Europe, which entered the data onto maps and passed them on to their respective forecasters.⁵⁴

Station personnel also employed smaller and simpler flights to conduct meteorological observations that used less sophisticated tracking tools and methods. Although pilot balloons were sometimes used to determine cloud ceilings for surface observations, their main purpose was to measure wind currents in the upper atmosphere. In the 1950s, most JAWS launched PIBALs within a half hour of 0900 and 2100 GMT each day.⁵⁵ One individual worked in the "comfortable, warm" observation building at the plotting table, listening to a second individual who sat outside manually tracking the balloon with a theodolite — a scoped device used to monitor an object's spatial direction by following its vertical and horizontal (azimuth) movements — and calling out the readings every minute

when a buzzer sounded until the balloon was obscured by clouds, burst, or disappeared from sight.⁵⁶ After noting the vertical and azimuth angles as well as the duration of the flight, the observer then re-entered the rawinsonde building to plot the course of the balloon and to determine the wind's speed and direction throughout the balloon's ascent.⁵⁷ Although PIBALs were not as revealing as radiosondes, they were less expensive, simpler to prepare, and provided upper air wind direction and speed data. Furthermore, PIBALs provided a simple means to check the accuracy of radiosonde flights.

The Arctic environment often hampered this additional type of balloon flight. During the late summer and early fall, low cloud cover limited the number of occasions when observers could obtain data over 3,000 feet. In the winter dark period, PIBALs were even more difficult to complete. The extreme cold sometimes froze and burst the balloons before they reached a satisfactory altitude, requiring a second launch.⁵⁸ Tracking the balloon with a theodolite during the dark period also necessitated attaching either a candle inside a paper lantern or a water-activated battery to the PIBAL balloon. Griff Toole, who worked as a radio operator in 1950 under Alert's typically calm wind conditions, remembered this comparatively primitive candle system working quite well. On the station's occasional windy days, he recalled watching "the balloon and candle do a couple of full double loops right after release and still not catch fire." The candles sometimes went out prematurely, but it was still the station's preferred illumination method during his tenure.⁵⁹ Other observers, such as Don Ware (who worked at the more consistently windy Mould Bay), found both methods to be futile because the candle's flame expired and the battery tended to freeze after ascending only a few thousand feet.⁶⁰

Regardless of the lighting technology employed, tracking PIBALs as they rose through the night sky remained difficult. From time to time, the observer would note three or four identical azimuth and elevation readings before realizing that he had lost the PIBAL and had instead fixed on a star. "This always brought about a few curses," Demond recalled, and required a second release if the balloon had not attained the required minimum altitude.⁶¹ John Gilbert claimed that "PIBALs were the toughest job of all" his duties at the stations.⁶² The theodolite at each station was not designed for Arctic use, so personnel had to manipulate the metallic instrument

FIGURE 6-7. The PIBAL dome at Isachsen in 1953. Despite the dome, the unheated space meant that PIBALs remained among the least-liked observations that station personnel had to conduct. Bill Nemeth Collection.



with their bare hands in extreme cold. Furthermore, the observer's breath frosted the theodolite in frigid conditions. Michael Young, the OIC at Isachsen, complained in 1952 that "the observer is forced to continually be wiping off one part or another of the theodolite while attempting to follow the balloon. This is especially vexing in regard to the azimuth [horizontal] reading as the glass covering the numbers is sunken a little and only vigorous rubbing with the bare hand will clear off the frost long enough to make a proper reading."⁶³ This exposure of the observer's bare hands to the cold air and metallic theodolite was often painful.⁶⁴ Even after each station received, by the 1950s, a fibreglass dome that was designed to protect the observer from the wind while he took theodolite readings through a slit, the continued exposure to the elements and the lack of a heater did little to resolve the frosting issues. The dome, moreover, had to be manually turned like an observatory to follow the PIBAL, and observers often had to wrestle it into position when it froze to its mountings during the colder parts of the winter.⁶⁵ "It was not the most pleasant observation I had to take," Don Ware concluded sarcastically.⁶⁶

Additional Scientific Observations at the Joint Arctic Weather Stations

Although the meteorological program represented the primary focus of a station's scientific observations, JAWS personnel regularly performed additional work for other scientists, government departments, and agencies. Some of these projects were confined to a single station, while others were performed at several or all of the stations. Through these contributions, station personnel identified themselves as members of a broader scientific community working to produce expert knowledge. These purposeful activities also provided personnel with a welcome opportunity to diversify their routines and skills, enhance their sense of reliability and trustworthiness, and embed the JAWS cultures and personnel in scientific exchange networks beyond the weather services that paid their salaries.

The JAWS scientific observation program included the first synoptic records of sea ice and snow conditions in the Canadian High Arctic, collected for the American Snow, Ice and Permafrost Research Establishment (SIPRE) and the National Research Council of Canada. Founded in 1949 by the US Army Corps of Engineers, SIPRE and its successor, the Cold Regions Research and Engineering Laboratory (CRREL), collected snow and ice information from the polar regions to better understand how the military could operate in polar environmental conditions.⁶⁷ Once the ice was thick enough to permit safe passage, JAWS personnel were supposed to determine its thickness on the first and fifteenth of each month.⁶⁸ To do so, teams of two initially used special long-handled chisels to cut holes in the ice — an arduous task when the latter was several feet thick. In 1949, a Resolute crew improvised a measuring device consisting of a 9-foot length of 3-inch pipe which they embedded in the ice. They then filled the pipe with fuel oil, displacing the water so that it did not freeze. They then rigged 3/8-inch pipe as a measuring rod.⁶⁹ In 1951, personnel at Isachsen also experimented with cutting steps down into the ice, but the drilling method ultimately prevailed.⁷⁰

A few JAWS personnel found the ice work interesting, but most found the work unappealing. At Isachsen in 1951, for example, OIC Vlad Jelinek led the station on a full schedule of observations and Jelinek personally reported at length about his plans to compare ice thickness under snowdrifts

with a spot that station staff would artificially keep clear with a bulldozer.⁷¹ For most personnel, however, these observations remained one of the least-liked in their station's regimen. "The job of cutting a hole in the ice to measure it's [*sic*] thickness at this time of year becomes quite a chore," Isachsen OIC Michael Young wrote in April 1953:

Since the ice has passed the four foot mark[,] usually the three Radiosonde men and the Mechanic do the chipping. It has been found that the ice chisels sent in last spring are very poor for the job. The holes go so deep that it is usually cut about four feet long and about two to three feet wide at the top so as to allow a little swinging room when standing in the hole. A sharp pickaxe is used to chip the ice and a large pail to bail out the holeful [*sic*] of ice after a few lusty swings. Anyone who thinks you don't sweat at forty below zero should swing a pickaxe through five feet of ice once in a while. What a job as winter goes on becoming colder and colder. It usually takes three or four hours to do the ice cutting after the five foot level of thickness is accumulated which falls early February.⁷²

By the 1960s, the effort required to obtain ice thickness observations eased considerably. JAWS personnel deployed new kits consisting of a 40-inch-long auger bit that snapped onto a carpenter's hand-brace turning tool to drill a small hole through the sea ice. A cloth measuring tape with a steel bar was then dropped through the hole and the tape was pulled up till the steel bar caught on the ice at the bottom of the hole.⁷³

Snow observations, which JAWS personnel began conducting for SIPRE in 1952, were less tiring but equally frustrating. Each snow collection kit included a triple beam balance, a balance tube, five sample tubes, a hand lens, a plastic crystal cup, a thermometer, a metal cutting plate, a black spool of thread, observation forms, and a manual.⁷⁴ Station staff were supposed to conduct observations each week during the snow season, twice a month beginning in December for the rest of the dark period, and resume weekly observations in March until the end of the snow season.⁷⁵ Observations required one to two hours to complete. As Derek Challis (Alert OIC 1958–59) recalls, the observations:



FIGURE 6-8. A SIPRE snow kit in use. One observer later recalled that station personnel “called it by a lot of other names that are unprintable.” Jim Jung Collection.

entailed digging a trench in snow cover to expose a profile of snow down to ground. Identify and measure thickness of the different snow layers. Insert the thermometers and measure temp. of each layer. Measure the density of each layer. This is the killer. Sprinkle snow flakes (granules) from each layer onto the metal plate to record shape and size. Can you imagine doing one of these observations at 40 or so below, on your hands and knees, with a flashlight and a breeze blowing[?]⁷⁶

Indeed, personnel so disliked the work that Challis threatened to assign the job to met techs who posted the highest upper air error count.⁷⁷ The development of simplified snow survey kits eased these efforts by the 1960s.⁷⁸

Some of the additional observations collected at the joint stations required specially designed and constructed facilities. The seismic building was a “scientific vault ... buried into the hillside so that it was basically

underground,” Mould Bay geophysicist David Weston explained. The seismic instruments were “set on concrete piers built down into the permafrost so that they could accurately record any seismic motion from anywhere around the world.”⁷⁹ Each neighbouring JAWS compound provided the seismic stations with electrical power, vehicle support, recreation, and food for one geophysicist.⁸⁰ JAWS met techs were trained to operate the seismometers for short periods, but geophysicists from the Dominion Observatory best handled each building’s long-term operation. Because these geophysicists lived with JAWS personnel at Mould Bay and Alert for a year at a time, and because the geophysicists regularly assisted with station maintenance and participated in base activities, they were deeply integrated into the life and culture of the hosting satellite stations.⁸¹

None of the JAWS stations were located in major earthquake zones, yet it was “almost impossible to exaggerate the importance” of the data the JAWS seismic stations collected, because their readings could be used to triangulate events with any other two stations in the Northern Hemisphere.⁸² Mould Bay’s observations were particularly valuable, Weston explained, because it was one of the “quietest” seismic stations in the world. Far from avalanches, oil drilling, aircraft landings, and highway traffic that reduced the sensitivity of seismometers, this low background noise allowed Mould Bay to measure movements as small as 1/76,000th of 1/10th of a millimetre. Consequently, “when events were too small to be recorded anywhere else, people [seismologists] were very interested in what Mould Bay was able to record.”⁸³

Resolute also hosted an ionospheric research station and a magnetic research station beginning in the summer of 1948. At extremely high latitudes, the proximity of the magnetic north pole makes traditional compasses ineffective. By the same token, geoelectric storms (solar flares and solar mass ejections) can trigger communication blackouts at the poles that sometimes last for days. The joint stations’ locations made them ideal places to collect data that civilian and military departments could use to determine how to navigate and communicate in the region, as well as how these conditions could complicate detecting incoming Soviet bombers.⁸⁴ When the American military approached the Canadian government about constructing these observatories in the North, however, the Americans “gracefully” accepted the insistence of the Department of Transport and

the Defence Research Board (DRB) that “observations of this kind were considered to be solely a Canadian responsibility.”⁸⁵ Historian Edward Jones-Imhotep notes that the program subsequently contributed to “key national aims: territorial and epistemic sovereignty, northern development, international cooperation, distinction, identity, and influence vis-à-vis Britain and the United States.”⁸⁶ Constructed in 1948, these observatories were purpose-built. The ionospheric station had its own engine room, covered passage, storeroom, laboratory, and accommodations for up to seven observers. The magnetic observatory was built entirely from wood and other non-magnetic materials. The area immediately surrounding the magnetic observatory was also kept clear of all materials and vehicles.⁸⁷ In 1961, the Canadian government expanded its network of magnetic observatories to Mould Bay and Alert. To save costs and ease operational requirements, Canada constructed the new seismic and magnetic observatories as separate units that shared heating and other resources.⁸⁸

Science Hubs

Although the JAWS network was built to provide meteorological observations, the stations served as ready hubs for diverse field research on the archipelago. During the early years of the program, southern planners carefully managed which researchers had the opportunity to benefit from the remote stations’ limited resources. Station resources were very limited, and the spring resupply required most of their guest accommodations. Consequently, each satellite station could only host two additional transient visitors.⁸⁹ Indeed, for much of their existence, the satellite stations were more like transit hubs than operation support bases, and visiting science teams, though welcomed, had to be largely self-reliant.

Most science research programs did not construct their own buildings at the stations, and visiting scientists had to limit their reliance on local resources and contribute to the JAWS operations. Dr. John Tener, for example, visited Eureka to study muskox biology and ecology during the spring and summer of 1951. The station provided him “with a Jamesway hut, washing, laundry and library facilities, and food, and radio schedules when we were in the field.”⁹⁰ In return, he assisted with various tasks, such as helping the mechanic to remove an engine from the station weasel and baking cakes.⁹¹

Visiting parties who planned to work at the stations were warned against relying on the JAWS personnel who were already preoccupied with meteorological, communication, or construction work. When the Los Angeles County Museum secured permission from the Canadian government to kill one muskox bull, two cows, and a calf to be stuffed for a display in 1959, they inquired whether JAWS personnel would be available to assist with skinning, butchering, and packing the animals. Dyer's response was clear:

There will be about 12 to 14 employees at the Eureka Station during the time of your visit. It is not very likely that any of these individuals could afford much time to assist you in your work, because of their prior duties and scheduled observational work. It might be possible, however, to locally make arrangements for one or two of the men to double up on routine duties, allowing possibly one or two to assist you for short periods. Such arrangements for doubling up work would, of course, have to be acceptable to the individuals involved and in no case would it have any deleterious affect [*sic*] on the routine operations of the station and observational program.⁹²

In the end, Eureka only provided "a few pieces of camping equipment" and the use of the station's weasel.⁹³

Larger field parties that utilized the stations were also generally "self-supporting."⁹⁴ In 1959, McGill University (an academic hub for Arctic scientific research) commissioned an expedition headed by glaciologist Fritz Müller and George Jacobsen of Canada's Tower Company to select a site on Axel Heiberg Island for long-term geographic study. Eureka provided the ideal jump-off point for the expedition, serving as a base for the chartered flights used to select a research site and as a relay point for radio communications. The following year, when McGill began construction of the new research station (which became the McGill Arctic Research Station or MARS), JAWS personnel helped to unload materials from CGS *D'Iberville*, provided "refreshments" when the construction crew of twenty-two arrived in May 1960, and allowed the visitors to use the station bulldozer to dig out their cache. The self-sufficient McGill crew

brought their own tents and meals, but they relied on the weather station to relay their communications to the south and to meet aircraft throughout the summer.⁹⁵ Without this assistance, geographer William Wonders wrote, “most” of the expedition’s research “would have been severely handicapped if not impossible.”⁹⁶

Additional scientific observations peaked at the High Arctic weather stations during the United Nations’ International Geophysical Year (IGY) from 1 July 1957 through 31 December 1958. Two previous polar years (in 1882–83 and 1932–33) had established the feasibility and utility of international cooperation in polar studies, and the 1957–58 IGY research program grew to encompass eleven earth sciences, including geomagnetism, meteorology, seismology, aurora activity, and solar activity, with a special emphasis on the earth’s polar regions. Sixty-seven countries participated in the vast research and data-sharing program,⁹⁷ and more than ninety research stations across Canada participated. Every day, Resolute, Eureka, and Alert each flew one “very high” rawinsonde balloon, and Resolute launched an additional rawinsonde (bringing its daily total to four). Beyond this expanded meteorological program, several JAWS stations hosted other research programs, such as new 12x12-foot buildings at Resolute and Alert to support ozone and solar radiation monitoring. The National Research Council also constructed a 100-foot tower at Resolute to monitor vertical temperature gradients.⁹⁸

These additional activities strained the JAWS program’s human resources. Resolute received a few more met techs to undertake the additional upper air flights, but coordinating the activities of eight to ten extra personnel who were coming and going from the south was a “bit of a nightmare” according to the station’s senior meteorological technician Archie Asbridge. When the IGY program ended in 1959, Resolute’s met techs “breathe[d] a sigh of relief.” Although Canada sent two scientists to Alert and Resolute to manage the ozone and temperature gradient monitoring programs during the IGY, its decision to continue these programs after it ended forced the scientists to train Asbridge to continue their work. Maintaining the temperature gradient tower program, which was gradually phased out in succeeding years, required unusually strong courage. Asbridge recalled:

One task was to calibrate the thermopiles [devices that convert thermal energy into electrical energy] on the 100' tower. The process was done by immersing the thermopiles in a pail of water containing copious chunks of ice. This wasn't too difficult at the 10' level but became an onerous and somewhat risky business at the 100' level. Fortunately, the tower dimensions were such that it was possible to climb to the top inside the framework and [Anatol] Rutenburg [a visiting physicist] had rigged up a rope and pulley system anchored on the top. So it was possible to hoist up the ice bucket from ground level before starting the climb. The major problem was that the thermopile was on the end of a boom that extended six feet from the top of the tower. To get around this dilemma, Rutenburg's solution had been to anchor a very sturdy plank about 10 inches wide and 3 inches thick on which I very gingerly inched myself along with the ice bucket towards the thermopile. The plank was previously used by Rutenburg and he was at least as heavy as I was so I felt confident wearing a safety belt but I refused to look down to the ground.⁹⁹

The IGY was not the only reason JAWS personnel undertook additional observations. For extra pay, JAWS personnel sometimes “moonlighted” by carrying out auxiliary research programs at the stations. Neither Canadian nor American personnel were permitted to undertake this work without permission from their headquarters because “there is a very strong tendency for extracurricular work to sometimes pre-empt and often interfere with the primary duties.”¹⁰⁰ David Weston, for example, took on the operation of an “all-sky camera” throughout the dark period at Mould Bay from 1970–72 for the Geophysical Institute of the University of Alaska. The camera, designed to record the aurora borealis, took a picture approximately once every minute. “I was never involved in the data-reduction or conclusions of this work,” Weston recalled. “I was merely a carbon life-form on the ground in a remote location whose responsibility it was to change the film, keep the dome cleared of snow, and maintain the equipment.”¹⁰¹



FIGURE 6-9. David Weston in front of Mould Bay's all-sky camera during the early 1970s. David Weston Collection.

Despite the successful use of the JAWS network as sites for additional sensors or bases for largely self-sustaining field parties, southern planners recognized at an early stage that expanding the JAWS program's support infrastructure would facilitate the dramatic expansion of scientific research on the archipelago. This desire to expand northern science infrastructure conformed with an international postwar and decolonization shift that increasingly privileged science over exploration as a means to justify sovereignty claims.¹⁰² In November 1952, Robert Sykes advocated developing the stations on a "cellular" basis by constructing semi-separate "plants" that included their own housing, kitchens, and mess halls. "Thus a unit would come in, quarter and ration themselves, obtain certain assistance from the station, including power and, of course, a number of personal services." Such autonomy, Sykes believed, would ensure that the day-to-day routine of JAWS personnel "would not be so disrupted by the addition of personnel, as so often seems to be the case now."¹⁰³

Resolute's facilities were the first to expand. To project its operating capabilities into the High Arctic, the RCAF took advantage of the existing airfield at Resolute Bay and opened its own base in 1949, which quickly expanded to house over 200 Canadian personnel during the summer months. All of this growth produced redundant capabilities and "consolidation" — as it became known — reduced operating costs by eliminating duplicate supply and communications facilities, and ensured the immediate availability of meteorological data for RCAF operations. The Canadian government chose to close the original weather station in 1953 and moved the entire enterprise to the new RCAF base, two and a half miles away. Under this arrangement, the RCAF OIC oversaw the entire base and the airstrip, leaving the weather station OIC to supervise JAWS operations.¹⁰⁴ Thereafter, the Canadians at Resolute dwarfed the tiny American contingent attached to the weather station, and this shift alleviated some of the concerns in Ottawa about the presence of American personnel in the High Arctic.¹⁰⁵

All of the stations shared some common characteristics, but local conditions also fostered unique station subcultures. Resolute's status as a transportation and communication hub made it unique. Its personnel appreciated amenities such as running water and a septic system, which the other stations initially lacked.¹⁰⁶ By the mid-1950s, a janitor cleaned parts of the JAWS station frequented by transients, and personnel had access to a nurse at the nearby military station.¹⁰⁷ Archie Asbridge, who transferred from Isachsen to become senior met tech at Resolute in 1958, recalled how:

Living and working at the Resolute Bay weather station in the late 1950's [*sic*] was a breeze by comparison with a tour of duty at one of the very isolated stations such as Mould Bay, Alert, Eureka and Isachsen. To begin with there was frequent contact with the outside world, namely the weekly military flights from southern Canada carrying fresh provisions and mail. After working at the isolated Isachsen station for seven months I'll never forget the absolute pleasure at being able to walk into the Resolute military cook shack and order a breakfast of "three eggs over easy with bacon and hash-brown spuds" knowing that the eggs were really fresh and the bacon

had not been living in an underground reefer at an isolated station for several months.

Asbridge also enjoyed interacting with the much broader array of fifty RCAF and twenty DoT personnel who worked at Resolute. Despite its many amenities, however, Resolute remained “one of the worst places to launch a balloon in inclement weather,” Asbridge recalled. Overhead wires limited where the met techs could release balloons, and JAWS personnel bore “the brunt of many admonitions and foul language after we had torn down the complex fire alarm wires inter-connecting the station buildings.”¹⁰⁸

A less integrated relationship between DoT, the USWB, and the Canadian military developed at Alert. The formation of the North Atlantic Treaty Organization (NATO) in 1949 and the outbreak of the Korean War in 1950 highlighted the imperative of collecting signals intelligence from the USSR. The RCAF took advantage of the existing JAWS airstrip and operating infrastructure at Alert to establish a one-hut signal intelligence unit 500 yards north of the weather station. This listening post, which was closer to Moscow than Ottawa, proved effective and the Canadian Army assumed command of the wireless station three years later. The Signals Corps continued to expand its facility at Alert in the ensuing decades,¹⁰⁹ and personnel at the military and weather stations co-existed separately and amicably for just over two decades, loaning vehicles and other equipment to each other, inviting each other to parties, and cooperating during the resupply season.¹¹⁰

Given their close proximity to military installations, Resolute and Alert eventually received mail every other week as well as fresh produce much more regularly than the other stations, and this accessibility reduced the sense of isolation at those places.¹¹¹ These conveniences also brought additional responsibilities for JAWS personnel. Because Resolute was the hub for the resupply, its OIC spent much of his summer preparing meteorological forecasts, while the ExO supervised the unloading of the sealift and the reloading of transport aircraft bound for the satellite stations. When this logistical work proved too complex and extensive for the ExO to manage alone, the USWB sent a “storekeeper” to Resolute to sort the supplies for each of the stations.¹¹²

Isachsen and Mould Bay were the most isolated of the High Arctic stations. Environmental conditions compounded the remoteness, leading a climate severity index to identify Isachsen as the least hospitable place in Canada to live.¹¹³ Although both of these stations hosted the Polar Continental Shelf Project (PCSP) (see below), they attracted substantially fewer transient scientists than Eureka or Resolute. At first, old structures were simply re-tasked to accommodate visitors. Isachsen and Mould Bay could house up to eight additional “permanent” (or sixteen temporary) residents by 1959, while Eureka had room for ten. Scientific parties numbering “more than a few men” were still instructed to bring a cook to assist the resident JAWS cook with feeding the extra mouths. Even with these supports in place, accessing the satellite stations proved difficult. Visiting strip mechanics and construction personnel typically occupied four to six of these beds during the construction season, leaving room to host no more than two scientific guests in certain years.¹¹⁴

Visiting scientists’ access to each station’s equipment and personnel continued to be strictly limited through the 1960s, and all “tourists” were warned to be as “self-sufficient” as possible when operating away from the stations.¹¹⁵ At the same time, DoT continued to expand guest accommodations at the satellite stations. Heavy traffic led to the construction of additional dormitories at Alert in 1961 and the rebuilding of Eureka in 1963. Mould Bay and Isachsen, however, were still generally limited to accommodating no more than two visiting scientists. DoT planned to construct additional storage facilities at all of the stations, and dormitories at both Mould Bay and Isachsen in 1962, so that all of the stations would be capable of supporting at least twenty “scientific and exploration personnel.” Even these plans suffered delays, and it appears that limited airlift resources, in addition to the increased use of Mould Bay by PCSP scientists, delayed the construction of its new facilities until at least 1968.¹¹⁶

The PCSP developed too early to benefit from most of these infrastructure improvements, and it severely taxed Isachsen’s resources when leveraging it as a support base.¹¹⁷ Created in 1958 to conduct “hydrographic, oceanography, geophysical, and biological studies of the entire Canadian Polar Continental Shelf and, if it is so desired later, the Canadian Arctic Basin,”¹¹⁸ the PCSP (run by the Canadian Department of Energy, Mines and Resources) sought to address the acute lack of knowledge

about Canada's continental shelf at a time of heightened geostrategic and resource interest in the polar basin. The Soviet launch of *Sputnik* signalled the dawn of the satellite era and highlighted the need to learn more about the earth's gravity at the poles. When these concerns were coupled with nuclear-powered submarines and questions about maritime sovereignty in Arctic waters, the continental shelf became an important area for further field science research.¹¹⁹ The 1957 United Nations conference on the Law of the Sea confirmed that all coastal states had "the rights to mineral and other resources on their continental shelves as far as 200 miles off shore," but Canada knew "virtually nothing" about the extent of its polar shelf and its resources.¹²⁰ The PCSP, as an innovative commitment to polar field science launched during the International Geophysical Year (1957–58), not only enabled sustained research but also resonated with the Canadian political nationalism promoted by Prime Minister John Diefenbaker in his "Northern Vision."¹²¹

PCSP scientists spent most of their time in the field studying the continental shelf as a series of "research blocks,"¹²² but the project required a staging base as well as accommodations for transient scientists. As the only locations with buildings and airstrips on the northwest edge of the archipelago, the JAWS stations were the logical transportation hubs for the program,¹²³ with Resolute serving as the PCSP hub and Isachsen (1959–63) and Mould Bay (1964–68) as its main bases. By 1959, the program's heavy reliance on Resolute had motivated W.E. van Steenburgh, the chairman of the ACND Scientific Research Subcommittee, to exclaim that "during the past ten years Resolute has become the most important scientific station north of 60°N in Canada."¹²⁴

Scholars Richard Powell and Stephen Bocking have analyzed the PCSP's research activities *from* these stations, but the program's impact *on* Isachsen and Mould Bay has received little attention. Given the rush to field the PCSP, it is not surprising that the project "severely strained" Isachsen's limited resources, and the introduction of weekly mail carried by PCSP aircraft could not compensate for these challenges.¹²⁵ The two satellite stations were only designed to accommodate fifteen individuals, and the addition of the usual strip mechanics as well as the unusual despatching of telecom, construction, and twelve to eighteen PCSP personnel brought the station's total population to forty-five during July

and August.¹²⁶ During the summer of 1960, for example, Isachsen's cook complained that the PCSP personnel used the hot water that he required to wash dirty dishes. Lounge furniture also suffered from the additional traffic, and the JAWS washing machine and dryer required repairs because they were "inadequate for such a large crew" of both PCSP and JAWS personnel. Consequently, OIC M.A. MacAulay and ExO W.V. Greco insisted that the PCSP "install their own washing facilities" at the station.¹²⁷

The PCSP laboured hard to rectify this problem in succeeding years and gradually managed to reduce its reliance on JAWS facilities. Laundry remained a problem in 1961 and the PCSP continued to rely on the station's airfield, radio operators, accommodations, and garage. In return, however, PCSP personnel were told to do "their equitable share of general camp maintenance duties, such as garbage and water haul, snow removal, and fire hazard inspection[s]."¹²⁸ The situation improved the following year. Having established its own camp near the Isachsen weather station, the PCSP stationed a caretaker there throughout the winter who was well liked by JAWS personnel and "volunteered his help on many occasions in the performance of station duties."¹²⁹ That spring, the JAWS complex accommodated up to twenty PCSP personnel while the camp was open for operations. The PCSP continued to use JAWS radiomen to send up to ten messages a week south, and used the station's power, water supply, and darkroom, but these requirements did not significantly strain Isachsen's human and material resources.¹³⁰

Mould Bay benefitted from the lessons learned at Isachsen. The PCSP's shift to the more westerly base was planned several years in advance and, in 1963, the Canadian government constructed a separate mess and recreation building, garage, and other non-permanent structures at the station.¹³¹ Support for the PCSP resembled that provided at Isachsen in 1962 and included use of the station's tractors, forklifts, darkroom, communications facilities, and airstrip.¹³² A similar list of requirements from 1968 suggests that the PCSP had a comparatively minimal impact on JAWS resources at Mould Bay by that time.¹³³

Private companies also used the stations' land strips to explore natural resources on the Arctic Archipelago. Government surveying during the 1940s and 1950s confirmed the high probability of oil and mineral resources in the region, and a few companies drilled unsuccessful wells during

the early 1960s. However, the discovery in 1968 of massive oil reserves in Prudhoe Bay, Alaska, bolstered demand for further oil exploration using the joint stations as staging points, which the JAWS program supported in various ways. First, Resolute's size and location made it the ideal hub for commercial airlift and sealift operations, and two oil companies established a general supply base there in 1970. Its airport also served as a hub for regular flights for extraction companies sending personnel to or from sites all over the archipelago.¹³⁴ In addition, several of the sites served as "anchor points" for exploration activities by allowing aircraft and ships to land company equipment at the stations and transport it via tractor train or helicopter to research or drilling sites.¹³⁵ The stations also offered weather data to aircrews operating in the High Arctic.¹³⁶ JAWS personnel generally welcomed this traffic, which brought additional connections with the south and temporary guests who helped to relieve the monotony of station life.

Scientific Cultures

The presence of PCSP personnel, visiting scientific teams, and individual scientists contributed to the scientific culture that characterized each joint station. Despite the stations' resource and capacity limitations, as well as their different training backgrounds, JAWS personnel (especially met techs) felt a sense of camaraderie with the transient scientists at their stations. Station personnel often talked with these new arrivals about the Arctic, science, and other subjects of interest over dinner or a drink. "It was an interesting intellectual environment," David Oldridge remembered, "because most of the people [JAWS personnel] there were fairly educated ... maybe not with degrees, but at least able to converse with people with degrees. We had scientists coming in: geologists and even astrophysicists."¹³⁷ JAWS personnel were keenly interested in their guests' research. Bruce Weaver, for example, befriended seismologist Walter Piche:

I remember him trying to do triangulation when we had [detected] what was obviously a nuclear blast. He showed it to me on the photographic paper and said "lets see if we can figure out where this is" We talked to the other stations by HAM radio and took a map and laid some lines down and said "un

hunn,” central China. And then we waited. I guess it was about two weeks later that the government announced [that China had detonated another of its early atomic devices]. So we were sort of sitting there not wanting to say anything until it was officially announced.¹³⁸

Although trained to operate the seismograph, Weaver could not interpret the results. He, like other JAWS personnel, appreciated the analytical skills of visiting scientists who shared insights about the practical applications of the data being generated at the stations.

Despite their shared experiences, scientists and JAWS observers acknowledged their different professional and transitory statuses. Practical jokes highlighted their different occupations in a jovial spirit. In the mid-1950s, a visiting scientist ran into the Resolute station and announced: “hey there’s a couple of bear[s]” by the shore. The station’s personnel leapt into action. As Howard Wessbecher recounts:

we always had rifles on the station because of the bears so here about 12 guys jump up, grab rifles and start advancing which was about 500–600 ft. from where we were in the lounge down at the beach. Start advancing toward these two bears and we could definitely see them.... Polar bears in the wild are kinda yellow, they’re not pure white ... and we could see the yellow tinge to the fur. We could see the black eyes and so they’re blasting away. Twelve of us. It was like a frontal squad, moving, blasting away. We got down there.... We couldn’t figure out why those bears didn’t drop. And we weren’t missing them, we knew that....We had a couple of 15,000 gallon oil tanks off to one side and I kept eyeballing the ladder going up them and I thought, that’s what I’m heading for if those bears charged. Got down there and it turned out he’d made them out of snow and had sprinkled them with farina and put coal — we used coal for heat. He had made the eyes out of that and those bears were totally riddled. They were riddled!

It was not long before the station's personnel got even with the prankster. The transient scientist was an ornithologist who collected bird eggs, Wessbecher recalled, "so we took some chicken eggs and painted little brown dots all over them and laid them out there and kind of helped him find them and he came back all excited because he had found these weird eggs he couldn't identify."¹³⁹

JAWS personnel also created their own brand of scientific culture that blended investigative values with observer training and embodied experiences from working at the stations. Both the USWB and DoT emphasized the importance of accurate readings.¹⁴⁰ JAWS meteorological observers rarely needed such encouragement. "We were always trying to be extremely accurate with everything we did ... on the meteorological end of it," Lowell Demond remembered. An error would be quickly picked up "by meteorologists down south, who plotted the weather data from all of the stations on a single map" and reported inconsistencies. Professional pride meant that "you just didn't want that to happen." Station personnel understood how their observations contributed to forecasting and the importance of creating a permanent record of environmental conditions for future scientists. "We felt that that was very beneficial to forecasting, to aviation," Demond recalled, "but we also believed that some of the work that we were doing, for example ice and snow observations ... was going into climatology and it was going to be there as a permanent record ... and that would be significant."¹⁴¹

Even under harsh conditions, met techs thus went to extreme lengths to launch their balloons. "We were proving that people could do work in harsh conditions on an on-going basis with pretty good regularity," Weaver later explained.¹⁴² At Alert, consistently low wind speeds made balloon releases easy¹⁴³ compared to Isachsen, where high winds regularly endangered upper air observations by violently pushing launched balloons sideways, pulverizing the instrument package on the ground.¹⁴⁴ Over time, the teams developed different techniques to ensure successful results in high winds. The most common solution was the two-person launch. Wessbecher explained how one person walked downwind with the radiosonde and, when his partner released the balloon, ran further downwind with the radiosonde until the balloon carried its cargo aloft. "Sometimes we tried two, three releases and I'd say ... less than 5% of

the time we didn't make it" and had to concede that "hey, we can't get her up."¹⁴⁵ One JAWS poet, who signed his name "DW," captured the focus and dedication of these runners:

I think that I shall never see,
A release as lovely or as free:
To run along, to feel the breeze,
To hold the string with supple ease.
A look of triumph on my face,
I hold the prize, I run the race.
At proper time, tho wind does blow,
To clear the way, and let it go.
To watch it rise, ahh crafty fox:
To watch my pal run with the box.
Then smile upon my face is lit,
Cause he fell in the caustic pit.¹⁴⁶

In one extreme case, personnel at Isachsen launched five balloons because the first four "burst upon hitting the sides of the door on the way out" under heavy winds.¹⁴⁷ Weaver bragged that during his fourteen months as a met tech at Mould Bay from 1965–66, he and his fellow observers missed only two upper air flights due to weather out of a total of 730 launches.¹⁴⁸

There were exceptions to this precision culture. The USWB and DoT checked the observations closely, and each station received monthly accuracy reports. OICs or senior met techs also checked all upper air observation report hard copies with a red pen before they were sent south on airlifts. All of the stations frequently achieved perfect scores.¹⁴⁹ An acceptable average count was three errors per station per month, but at some stations during the early and mid-1960s the error counts crept to ten, and by the mid-1960s they were sometimes closer to twenty. The problem was not exclusive to the JAWS program; by the mid-1960s most Canadian upper air stations committed an average of 21.2 errors per month. The error count was exaggerated by vague criteria that failed to distinguish between "serious errors" and "trivial ones" that did not affect forecasting, but the problem had to be rectified.¹⁵⁰ At Resolute, the senior met tech introduced a "stringent program of checking," and all of the met techs were soon

engaged in “healthy competition with one another, each endeavouring to succeed in obtaining the highest sounding and the lowest error count.”¹⁵¹ Similarly, the outgoing ExO at Alert, David Thornton, reported that “thorough checking and re-checking have been the rule for all personnel and the results are now showing up. Pride in the work is increasing continually.”¹⁵² Although error counts still occasionally spiked, they were repeatedly brought back to within acceptable limits.¹⁵³

JAWS observers were also innovative. To protect latex radiosonde balloons against puncturing or stretching during release in high winds, met techs at Resolute devised a “shroud” to protect the balloon. The danger of static from the friction of the balloon rubbing against the shroud meant that it could only be used with helium-filled balloons, which initially limited their use to Resolute (where the use of helium started in 1952). The following year, the satellite stations received limited quantities of helium to quickly inflate balloons when necessary, and personnel promptly adopted the shroud to improve launch performance in high-wind conditions. Isachsen ExO John Llewellyn noted “with satisfaction” in his December 1965 monthly report that his team had “never failed to get a balloon and instrument aloft.”¹⁵⁴

JAWS personnel also experimented to improve the low burst altitudes of their flights during the dark period, when extreme cold at high altitudes made the balloons brittle and caused them to burst prematurely. Although heating the balloon before expansion helped, the altitudes that these balloons attained remained unsatisfactory. Met techs at Eureka began experimenting with alternative treatments in the early 1950s by soaking the balloons in diesel oil, which coagulates into a honey-like consistency at low temperatures. Specific procedures varied over time and from station to station, but observers achieved flights as high as seven millibars (111,000 feet) during the winter months after “conditioning” their balloons.¹⁵⁵ One inspector objected to these practices during his 1967 tour because “the diesel fuel would rub off on a person’s clothes and before long the odor would permeate all of the living quarters and would additionally be another fire hazard.”¹⁵⁶ These warnings do not appear to have had any lasting effect, however. JAWS personnel continued to express excitement when their diesel-soaked balloons achieved higher altitudes in the early 1970s,



FIGURE 6-10. The “shroud” in use at Mould Bay in 1959. LAC Winnipeg, Acc 2004-01213-7 AES Photographic Records of Arctic Weather Stations, Box 2, File Mould Bay Picture Album.

and a few JAWS veterans may have exported this practice to US Antarctic weather stations.¹⁵⁷

Despite their dedication to accuracy and consistency, JAWS met techs did not always follow the instructions or wishes of distant weather bureau officials, particularly when station personnel did not understand the significance of the observation programs. Eureka’s archival record and oral histories reveal, for example, how southern planners struggled to convince JAWS personnel at all of the stations to persist with synoptic PIBAL flights, which they were supposed to conduct twice per day. JAWS personnel generally completed these flights until 1957, when a rumour that the Canadian Meteorological Service no longer used these reports began to circulate. (This assumption may have arisen because the daily rawinsonde flights collected the same data without personnel needing to operate a freezing

theodolite.) As uncertainty grew about the value of the flights, more and more observation reports listed “PISO” (“no pilot balloon observation, snowing”) and “PIWI” (“no pilot balloon observation, high or gusty surface wind”). The USWB and DoT reacted by refuting “in no uncertain terms” the rumour that they no longer valued PIBALs and insisted that the reports remained essential. Accordingly, Eureka’s personnel resumed their “100% record, no matter what the weather!” Other stations followed suit, but divergent perceptions about the usefulness of PIBALs did not end there. Don Shanks noted that PIBALs were rare at Isachsen and Eureka during his tenure from 1962–65,¹⁵⁸ and Larry Petznick (Isachsen’s OIC from 1964–65) reported that all station personnel continued “to question the value of Pibal observations” and wondered “if the usage [*sic*] and end results from Pibals are worth the amount of time and work put into them.” Petznick assured DoT and the US Weather Bureau that “the Pibal program continues to slog on,”¹⁵⁹ but it was not long before the stations ceased these PIBAL flights as part of a synoptic program.¹⁶⁰

The meteorological services’ more active responses to similar concerns about snow and ice observations demonstrated how respect for on-the-ground perceptions and effective communication could overcome station workers’ doubts. The frequency of SIPRE observations at the stations ebbed and flowed. In 1953, Thomson conceded that “the regularity of ice thickness reports from the Joint Arctic Weather Stations would improve if the back-breaking labour involved in chopping an ice hole were minimized.”¹⁶¹ Despite a few attempts to train JAWS personnel during the 1950s, personnel rotations eroded local appreciation of the value of SIPRE work.¹⁶² In November 1960, Eureka’s OIC R.J. Grauman described his team’s frustrations:

Snow observations appear to be about nine tenths guess work. An observation made ten feet from another would give completely different results. This is a very miserable job, especially when the wind is blowing and the temperature is low. Personnel have never been told what value these observations are, and it is felt that masses of data are being collected to keep a staff of filing experts busy. Frozen hands and fingers, and noses and ears seem to be the only reward for these observations.

If value of work were pointed out to observer, observations would be made with more regularity and diligence, such ... is the attitude toward ice thickness observations now.¹⁶³

This time, senior officials responded more thoughtfully. Despite privately believing that Grauman's remarks "would not have been included in a letter from a mature individual,"¹⁶⁴ the director of Canada's Meteorological Branch informed the men at Eureka that the "SIPRE observations are required by the US Army Engineers and the information thus obtained is proving of great value." The ice thickness measurements, for example, were used to produce tables "which remove the guess work" when determining whether it was safe for an aircraft to land on a particular ice strip at a given place and time of year.¹⁶⁵ The data that the men collected also helped scientists better understand the cycle of ice formation from freeze-up to break-up, including accretion rates for new ice forming each year. The results were mixed and some gaps persisted, but station personnel persevered with the snow and ice observations. Don Shanks, who worked as a met tech at Isachsen from 1962–63 and then served as the OIC at Eureka the following year, noted the variations. Isachsen conducted regular snow and ice observations, while Eureka did not have a snow kit and only conducted a half-dozen ice thickness measurements.¹⁶⁶ The detailed response, however, helped remove northern doubts about the value of the practice, and weather station personnel continued to conduct snow and ice monitoring into the 1970s.¹⁶⁷

The dual purpose of the stations as hubs and meteorological observation sites influenced station cultures. JAWS personnel were immersed in science. The importance of consistency and accuracy permeated their culture of observation. Met techs went to extreme lengths to develop the localized knowledge and strategies necessary to launch balloons according to internationally-standardized schedules. As the PIBAL and SIPRE programs demonstrate, however, a basic understanding of the value of these activities proved essential to keep observers motivated. When station personnel doubted the utility of their work, simple commands from southern officials were inadequate motivators over the long term. Maintaining robust support for unpopular observations at the isolated stations required

dialogue, and it was critical for southern officials to repeatedly explain why JAWS personnel needed to endure physical hardships to complete these tasks.

Acquiring “common sense” field knowledge required more than a few weeks’ stay in the Arctic, and JAWS station personnel developed a strong group identity based upon common experiences and amassed expertise. Despite differentiating themselves from scientists, most met techs and other station personnel embraced their station’s dual roles as logistical hubs for government and corporate research on subjects ranging from geology to zoology. The flurry of activity and insights that scientist visitors brought to the stations provided a welcome break from the monotony of station life. As installations that conducted direct research and served as sites of general logistical support for other environmental science, the weather stations were hubs for creating expeditionary *spaces* as well as inhabited *places*.¹⁶⁸ Despite their dedication to undertaking meteorological observations in prohibitively difficult conditions, the station personnel knew their limits — particularly when the seasonal cycle dictated the tempo of station life beyond synoptic scientific observations.

The Seasonal Cycle

Although surprising changes have taken place in man's methods of adapting himself to the Arctic environment, the changes which have occurred in the Arctic itself in the past few hundred years are insignificant. Polar bears may still be seen roaming the icy wastes near the weather stations. The long winter night and corresponding summer daylight are still as fascinating to Arctic visitors as in years past. Accounts of weather phenomena, storms, blowing snow, low temperatures and so on reported in the journals of the 19th century explorers would apply equally well today. The scenery still consists of snow-covered wastes in winter and bleak looking terrain in summer.

R.W. (Bill) Rae (c. 1958)¹

“The High Arctic conjures thoughts of bleak, frozen, snow-covered landscapes, or wind-driven snow over endless ice,” D.W. Buss of the Atmospheric Environment Service (AES) wrote in the 1971 edition of the *AES Bulletin*.² From October to April, average monthly temperatures in the region stayed well below freezing. “If we define winter as the period from the time that the snow first stays on the ground until the time that the ground is again snow-free, winter lasts from the beginning of September to the end of June in the Arctic Archipelago,” Rae noted. “This leaves only the months of July and August for spring, summer, and fall.”³ The ice-filled polar sea ensured

that the air remained cool even during July, the warmest month, when the temperature usually averaged 40°F (4.4°C).

The seasonal cycle of the Joint Arctic Weather Station program rotated through four seasons that bore little resemblance to their southern counterparts. The mean annual temperature in Toronto was 45°F (7°C); in Eureka it was -3°F (-19°C). “The criteria used for defining the seasons in temperate latitudes are not entirely satisfactory for arctic regions,” geographer Moira Dunbar and Arctic navigator Keith R. Greenaway explained. “Reports by arctic travellers in the past reveal a wide difference of opinion as to the length of the seasons and even as to their number, ranging from the idea, still current among many laymen, of one season of eternal snow, to the now more generally accepted pattern of four seasons.”⁴ Nevertheless, “humans have always been obliged to accommodate to the region’s distinctive seasonal cycles,” historian Lyle Dick observes. “Each season presents its own challenges and opportunities.”⁵

Few histories of the Arctic interrogate the ways that seasonal cycles shaped non-Indigenous life in the North. Historians Kevin Lynch and Andrew Stuhl suggest that analyzing environments invites the question: “what time is this place?”⁶ Framing the history of the JAWS program around the archipelago’s four seasons, and particularly how these shaped transportation and communications given the technologies available in the 1940s to 1970s, reveals a tension between modern aspirations and an acceptance of place. JAWS personnel and the southern planners endeavoured to use transportation technologies to shorten or eliminate the stations’ seasonal isolation. Sunlight, for example, was sometimes more important than weather, as station personnel worked to shorten winter from both ends. Their efforts were largely successful, but forging sturdy southern connections required many more years than anticipated and always suffered irregularities that a simple winter/non-winter dichotomy does not capture. Focusing on the seasonal cycle also reveals a second side to this lived experience. JAWS personnel, who lived at the stations year-round, internalized their remoteness and learned to accept and adapt their behaviours, ultimately accepting seasonal environmental rhythms to make the stations thrive.

Emerging from Winter

JAWS personnel emerged from the stations when the sun's glow peaked over the horizon for the first time in late February or early March, bringing twilight and portending the end of the dark season. Even though the "spring sun" was only visible for part of the day, and temperatures hardly exceeded winter lows, personnel began preparing for the approaching airlift — the key activity that would reconnect the stations with the outside world.⁷

The initial rush to construct airstrips near the stations had ended badly. By 1950, most were in poor shape, forcing several satellite stations to temporarily revert to constructing seasonal airstrips on the ice — a lengthy and arduous task. In 1952 at Isachsen, for example, the preparatory work began in mid-February when station personnel started monitoring the ice's thickness and structural integrity, noting the location, size, and type of snowdrifts located on or near the previous year's strip, and proposing design improvements. The snowdrifts, which could rise to be over ten feet tall, were critical to estimating when to begin clearing the strip and how best to keep the area around it free of new drifts. After making "test cuts" with a tractor and observing any resulting drifts, personnel at Isachsen proceeded with constructing the ice strip while maintaining the station's meteorological observations — a work schedule that stretched the station's human resources to the limit. The station diarist recorded on 13 March 1952:

A rough plan of operations for the strip-clearing period was set up this evening and met with general approval. Bill [mechanic] and Gordon [met tech] are to devote all their time to tractor driving, weather permitting, with Jim [cook], John [radio operator] and Toney [ExO] providing relief. Steve [OIC] and Toney will make all raob and pibal observations, Steve taking over all the gas-making to allow Toney to be at the strip during the afternoon. Steve will make Gordon's morning raobs, and Toney the evening ones, with the free one of the pair doing the pibal for that time. John will be free for a good part of the afternoon for relief work, and Jim can spend



FIGURE 7-1. Clearing an ice strip at Resolute Bay, 1950. Alan Faller Collection.

some of his mornings at the strip. In this way the two steady drivers ought to have time enough for warm-up periods in the strip shack, while the relief drivers will be able to accomplish their regular chores as well.⁸

The station began operating according to this temporary re-division of labour the following week. Depending on the conditions and mechanical problems, the ice strip work required one or two weeks to complete. During the spring of 1952, operators at Isachsen put on several layers of the heaviest clothes they owned before climbing into the tractors' open cabs to work in temperatures that rarely rose above -20°F (-29°C). Tractor operators minimized their misery by driving in patterns that put their backs to the wind while scraping the surface. The work was tough; higher drifts "repeatedly" stopped the tractors and it took multiple passes to clear them. To worsen matters, hardly a day went by without something breaking on one of the snow-moving vehicles, and crews had to frequently



FIGURE 7-2. Transferring personnel at Alert with the “sacred cow” weasel tractor, 1954 or 1955. Frank Adams family collection.

detour back to the station to make repairs. This work continued each day until the clearing of a strip was complete on 25 March. The team then hitched scrapers, graders, and rollers to their tractors and smoothed out the runway and aircraft parking area before marking the end of the runway with punctured drums. They spent the next week preparing the station for the arrival of the first aircraft, which included preparing guest accommodations for incoming seasonal workers and scientific teams.⁹ Land strips, when properly constructed, were much more reliable than ice strips,¹⁰ and when they were finally available year-round at the satellite stations in the early 1960s, station personnel had to clear them of snow in April before airstrip (“strip”) mechanics arrived to maintain these surfaces during the spring, summer, and fall.¹¹

Spring

Spring in the Arctic is “wonderful,” Norwegian meteorologist and oceanographer Harald Ulrik Sverdrup noted in 1935. “At no other time are the

colours of the sky as beautiful as they are in spring, nor the snow a more splendid white.”¹² According to Moira Dunbar and Keith Greenaway, spring on the archipelago began in May when increasingly frequent but less intense frontal activity brought warmer temperatures. The consequent rise in cloud coverage and snowfall attained a secondary maximum in some parts of the Arctic.¹³ Rather than wait for these less-than-ideal flight conditions to arrive, the USAF and RCAF undertook the so-called “spring” airlift at the end of the winter in April or early May. This period was the “logical time of the year” for the operation because the skies were “usually clear” and the winds were “light.”¹⁴ It also offered some daylight, temperatures averaged between -20°F (-29°C) and 15°F (-9°C), and melting did not yet compromise ice and land strips.¹⁵

Air transport was needed to bring everything (except water) to the satellite stations during the spring. Materials essential to operations and everyday life — everything “from radio parts through meteorological balloons, phonograph records, extra clothing, tractor parts, diesel fuel oil, orange juice, road scrapers, magazines, sacked coal, flour, ink, lumber, bulldozers, cement, breakfast cereals, stove parts, electric generating sets, gasoline, powdered milk, earth-moving equipment”¹⁶ — were ordered up to two years in advance, then transported by sea to Resolute and Thule the year before they were sent to the satellite stations. The aerial operation to move these goods to their final satellite station destinations typically required most of April.¹⁷ Resolute, the hub station, boasted a year-round airstrip that the RCAF operated and maintained from 1950–64 before the Civil Aviation Branch of DoT took it over. It served as the jumping-off point for aerial resupply of Isachsen, Mould Bay, and Eureka,¹⁸ with the US Air Force base at Thule providing additional support for the resupply of Alert (which was subsequently dubbed Operation Boxtop after the RCAF “Canadianized” it in 1956).¹⁹

During the spring resupply, the OIC oversaw a satellite station’s overall operations (including the meteorological program) while the ExO supervised resupply activities. When an aircraft landed at the satellite stations, waiting station personnel unloaded the cargo as quickly as possible. This unloading took precedence over storage, and all non-perishable goods were left in semi-organized groupings to be systematically stowed in the coming weeks and months.²⁰ Unlike Eureka and Resolute, which received



FIGURE 7-3. The RCAF station at Resolute Bay in 1964. Jim Jung Collection.

their bulk fuel during the annual summer sealift, Mould Bay, Isachsen, and Alert received fuel via spring airlift in hundreds of 45-gallon drums during the 1950s. (The following decade, C-130 Hercules aircraft used rubber bladders and pumps to move the fuel from the fuel farms at Resolute and Thule to large permanent tanks installed at the satellite stations.)

The spring airlift also brought replacement personnel to relieve men who had overwintered. Some new arrivals did not like what they saw. When he was working at Alert in 1969, for example, David Weston recalled one occasion when station personnel unloaded an aircraft, met the individual who would replace an outgoing colleague, refuelled the aircraft, and watched it depart before driving to the station to unpack and read their long-awaited mail. Only when everyone re-congregated at dinner did the OIC notice that the new addition to the station team was nowhere to be found. After scouring the base and airfield, the station radioed the southbound aircraft and learned that the replacement was still on board. “The guy got off the plane, took one look around at the barren landscape, said ‘this is where I came to?, not for me man,’ got back on the



FIGURE 7-4. Transporting plywood and luggage at the same time from aircraft at the “Mould Bay International Airport” using a tractor and sledges, 1956 or 1957. Jim Jung Collection.

plane and left,” Weston surmised.²¹ On the other hand, station personnel who had overwintered were eager to leave. In one case, John Gilbert (Resolute 1956, Eureka 1957–58) arrived and watched as his predecessor immediately boarded the aircraft and strapped in, even though the plane was not scheduled to depart for several hours.²²

Personnel slated to return to the south typically remained for up to a week to familiarize their replacements with the rigours of station life and work. “Where this is not possible, the new men are bewildered by the new problems which they face at these remote stations,” Inspector George Rabbitt wrote in the autumn of 1953.²³ Whatever the case, new arrivals had plenty to learn. A radio operator, for example, needed to inspect his equipment and gather “verbal history from the old-time members of the station” before he would be adequately prepared to diagnose future equipment failures.²⁴ Radio operators were also responsible for conducting some of each satellite station’s surface observations, and the USWB’s failure to train these men in basic techniques before they headed north necessitated

a crash course on-site at the stations. Bob Pearson recalled having to “pick it up in a hurry” during two or three hours of meteorological training after arriving at Eureka in 1949.²⁵

The need for on-the-job training continued through the 1960s. “A lot of it was lore passed down from one [person] to another; you learned that stuff as you do it,” David Oldridge recalled.²⁶ The transition was intense. Bill Stadnyk (Radio Operator, Resolute Bay, 1963–64) recalled how outgoing personnel “didn’t have much time to train new Operators because the departing personnel were eager to leave — some on the same flight the Trainee came in on! Training was often abbreviated and ... it was then up to you to do it the next day!”²⁷ Incoming OICs, in the few days before their predecessors departed, also needed to learn about the station’s rhythms, routines, equipment problems, and the many challenges that came with working in cold weather.²⁸ Nonetheless, personnel at Mould Bay noted how new arrivals “slip into the way of things quite easily, and in a very short time it is not unusual to hear one speak of enjoying the life up here, even with its shortcomings.”²⁹

Keeping up with the airlift and subsequent sealift also heightened the need for seasonal labourers. Ottawa relocated four Inuit families from Inukjuak to the Resolute area in 1953 (see chapter 9),³⁰ which provided a new pool of workers to help offload supplies. Each spring, OICs at Resolute consulted with the local Royal Canadian Mounted Police (RCMP) officer who then hired at least five local Inuit to move fuel drums and other supplies around the base during peak supply periods.³¹ Station personnel welcomed and appreciated this assistance. A 1954 report commented that the Inuit workers “remained on the job as long as there was work to be done, and [they] worked at a steady pace which facilitated rapid movement of cargo which could only be man-handled.... They were agreeable and very easy to deal with.” The report recommended the continued employment of Inuit men in future airlift operations and discussed plans to train some Inuit to operate tractors, forklifts, and other mechanical equipment. Although these training plans were never implemented and Inuit were never hired as permanent JAWS employees, the temporary working relationship to support local resupply operations continued well into the 1960s.³²



FIGURE 7-5. Inuit were not passive observers during the sealift. Many men worked as shore hands, but the research for this book did not uncover any photographs of their contributions. LAC R184, RG12, Acc. 1982-241 NPC, Box 192, 1940, 3857, C 0346--C 0349 3858 OS 0059.

The spring airlift also brought temporary southern workers to the satellite stations. In the winter, it was easy to keep up with the forecast requirements for the few flights over the archipelago, but the resupply season increased the frequency of flights so dramatically that an additional forecaster was usually sent from Edmonton to Resolute to help the OIC keep up with the demand. As the airstrips improved and commercial flights over the archipelago increased, demand for these forecasts grew apace.³³ Even when the Resolute station added a second meteorologist to its staff during peak periods, David Strang (OIC Resolute 1962–63) warned his replacement that he could “expect to be very short on sleep on many occasions, due to the pressures of the forecast office” during the resupply season.³⁴



FIGURE 7-6. Lowell Demond having a dental exam at Eureka. The work required sufficient indoor space for the dentist to move around the patient and, in this case, the sole place large enough was a few feet from the washroom. Lowell Demond Collection.

As the resupply became more routine, DoT looked to short-term contract workers to assist with the loading and handling of cargo at Resolute. The program continued to hire between a half dozen and a dozen students to assist with resupply operations during the spring airlift and summer sealift. Most of these students worked at the hub station and occasionally helped with unloading at the satellite stations.³⁵ Each annual airlift also brought other professionals north, such as electronics technicians who typically took advantage of resupply flights to visit each station for half a week to service communications and meteorological equipment. This practice continued until the 1960s, when the increased reliance on automated equipment gradually led to the permanent stationing of an electronics technician at each station.³⁶

Spring airlifts also enabled a dentist to visit station personnel. Although recruits had to submit to a dental check-up before they went north, assessment standards were “very lax,” and the high sugar and canned good diets

of JAWS cuisine contributed to endemic dental problems. Understandably, the men looked forward to these visits.³⁷ For their part, dentists competed for the job as the three-week tour promised adventure and paid well.³⁸ Dr. Roy Hemmerich of Kitchener, Ontario volunteered for several tours in 1949, 1954, 1955, and 1956. The workload was intense: during one tour, he conducted over two hundred fillings and eight extractions. Nevertheless, as “an enthusiastic amateur photographer,” Hemmerich “thoroughly enjoyed his short tour of duty.”³⁹ If time permitted, the dentist visited each station — but this was rarely possible. Thanks to the high frequency of flights between the satellite stations and Resolute during the spring airlift, however, personnel serving at the satellite stations could hitch a ride to the hub to secure care. When dentists did reach the satellite stations, conditions were far from ideal. Although all stations had reliable power supplies, the dentists still used drills powered by pulleys at the isolated stations, and it was common for the next patient to “pump” the chords for his friend while awaiting their own examination.⁴⁰

An RCMP officer also typically visited the satellite stations during April or May to ensure that personnel were complying with Canadian laws. Usually they arrived on resupply aircraft, but they also ventured to the stations via dogsled in the 1950s with Inuit guides. Although the police usually arrived in good shape, there were exceptions. In one case, a police officer and Inuit special constable⁴¹ travelled thirteen days from the Craig Harbour RCMP detachment on southern Ellesmere Island to inspect Eureka. They “travelled light,” expecting to hunt along the way, but encountered no game and arrived at the station in a “state of near exhaustion.” After their arrival, the station provided the famished dogs with “all available tinned meats we can spare.” During their visits, constables exercised Canadian sovereignty by swearing-in new postmasters and game officers and searching the stations for illicit pelts. Station personnel were strictly forbidden to hunt, and killing wildlife was only permitted in self-defence. In the case of polar bears, the desirable pelts were confiscated to remove any incentive to kill the animals unnecessarily. The police remained at the stations for up to several weeks, using them as bases of operation to patrol further into the archipelago, where they flew the Canadian flag, observed wildlife, and patrolled for possible visits by Greenlandic Inughuit (which we discuss in chapter 9).⁴²

Given the central importance of aerial connectivity to the outside world, significant springtime activity focused on airstrips. A US Weather Bureau brief produced in 1950 cautioned strip mechanics that building new airfields was “not as easy as it may sound” because stations were built on or near “silty soils” that, when saturated with water from the spring and summer melt, created mud so thick that “tractors and vehicles cannot work in them.” Coarse sand, which could also be found on-site, would not “suck up water and heave,” so planners hoped that it would “freeze homogenously” to produce a robust land strip. Before proceeding with construction, strip mechanics were required to examine the existing and alternate sites, produce a “good photographic record” of physical features, and note surface water, permafrost, and local grade characteristics.⁴³

Once the sites were selected and construction began, airstrip crews had to accept the limitations imposed by their locations. First, mistakes in building the initial airstrips by deep scraping had destroyed the permafrost and produced heaving surfaces. “The surest way to keep the permafrost from thawing is not to destroy any of the insulation which originally covered it and to increase the thickness of this insulation by filling on top,” the Weather Bureau explained. To do so, strip mechanics had to resort to extraordinary measures that made use of local materials since fill could not be flown or sealifted to the site. Instead of deep grading, the airstrip teams skimmed the top three or four inches of large areas containing dry sand (and silt when sand was unavailable), which could only be revisited for more fill after the new surface had thawed and dried. This scraped soil was then used to fill holes and crown the airstrip’s surface to minimize standing water. The method also yielded “maximum ... vegetation,” the fibres of which supported the tractors, provided additional insulation for the permafrost, and froze into the strip to bolster its structural integrity.⁴⁴

Second, seasonal temperature fluctuations limited airstrip work to the brief period between early and mid-June, when the ground surface began to thaw and dry, and July when it became too muddy for heavy machinery. The trick was to “work as fast as you can in the early season,” running the station’s tractors “around the clock when the going is good,” the US Weather Bureau advised. Crews of three men sometimes worked twenty-hour days, rushing against time to complete their workplans. When the soil thawed too much to support the machinery in late spring, crews

worked on drainage around the airstrip or assisted with other construction projects around the station. Overall, the average “working season” for airstrips lasted no more than sixty days.⁴⁵

Owing to these constraints, the JAWS airstrip construction program took years to complete and required ongoing adaptations to specific local environments. To ensure safe air operations, the desired airstrip dimensions were 5,000 x 150 feet, but local conditions made this difficult to achieve in practice. Large aircraft could and did land at the stations using as little as 3,000 feet of runway, but this was “very close to the real danger line.”⁴⁶ By 1953 Alert boasted a 5,400 x 150-foot airstrip that required improved grading and drainage, Eureka’s airstrip measured 4,700 x 150 feet but remained “very rough” and required further “filing and grading,” the Mould Bay strip was 4,900 x 100 feet and required widening, while Isachsen’s airstrip measured only 2,700 x 150 feet.⁴⁷ At Mould Bay, muskeg (swampy, boggy conditions) reduced the size of the airstrip,⁴⁸ and the limited progress at Isachsen also reflected persistent local challenges. There, the best site available was located on a ridge north of the camp, and bad weather, coupled with the need to fill “severe longitudinal grades,” delayed progress. The latter station subsequently had to rely on an ice strip for its spring resupply and a less reliable airstrip for its fall resupply.⁴⁹

Before year-round airstrips were built at the satellite stations, tenuous access to the outside world after the ice strips were no longer usable in late spring forced station personnel to deal with health emergencies as best they could using the resources on-site. When Lowell Demond developed appendicitis at Mould Bay in July 1956, large portions of the still-unfinished landing strip had thawed and, despite the life-threatening nature of his condition, an air evacuation seemed excessively dangerous. After lingering in bed for nearly two weeks, one of his colleagues approached Demond and said “we’ve been talking it over a little bit and we’ve decided that we’ve been looking at the anatomy book and through the medicine cabinet and we won’t let you die here if you’re willing to let us try to remove your appendix.” The cook agreed to boil the surgical instruments. Demond decided that they should “just wait a little longer,” and his thoughts went to the cemetery plot overlooking the base where a young Inuk, who had died when visiting the station with her father, had been buried a couple of years earlier. “I genuinely believed that was where I was going to end up,”

Demond recalled. “I didn’t think it was going to be possible to get out of there.”⁵⁰ Fortunately, the crew of an ice-patrolling RCAF Lancaster took the risk of landing on the muddy strip and evacuated Demond to Thule, where a medical doctor removed his appendix.⁵¹

Ongoing improvements to the airstrips, which were lengthened and hardened over time to accommodate larger airframes, made scenarios such as medical evacuations during the shoulder seasons less worrisome. By the end of 1958, culverts had been added to divert water so that it did not saturate or erode the airstrips, thus allowing expansion of the runways at every station to approximately 5,000 x 150 feet (with the exception of Isachsen where the “somewhat rough and rolling” surface measured 4,400 x 130 feet).⁵² The following year, work crews lengthened the strips beyond 5,000 feet, widened them to 200 feet, and installed better lighting systems. This improved safety margins and allowed larger and heavier aircraft, like the much-vaunted C-130 Hercules that had recently entered RCAF service, to land. This new transport aircraft, larger than the C-119 and capable of lifting much heavier loads, was harder on runways and therefore required more durable landing surfaces.⁵³

Summer

The timing and duration of the JAWS summer season was similarly malleable. “High Arctic summers are a period of heightened activity for most of the region’s organisms,” historian Lyle Dick observes.⁵⁴ Depending on the station’s location, summer arrived early to mid-July and lasted until mid-to late August, bringing daytime highs consistently above freezing.⁵⁵ An “exceptionally hot sun” could elevate local temperatures to 67°F (19.4°C).⁵⁶ Although the new season brought some of the strongest winds and heaviest cloud cover to the archipelago,⁵⁷ warmer temperatures and reduced snow cover encouraged station personnel to perform extensive outdoor work between the end of the spring airlift in April and the end of August.

Warmer summer conditions made hiking a popular activity. When work schedules and the weather permitted, adventurous personnel ventured miles from their stations to enjoy the exotic environment and magnificent isolation. Hikers had to inform the OIC or ExO of their departure in advance; they travelled in pairs, or groups, accompanied by dogs and carrying a rifle in case they encountered wolves or polar bears.⁵⁸ Floyd

Wilson, a cook from Colorado who eventually worked at all of the stations during the 1950s, explained the appeal of the Arctic to his wife:

To you and I the Arctic presents a bleak picture at first acquaintance, but as a person becomes acquainted with it[, it] has many features of interest to replace mountains and trees. The sheer wilderness, and peacefulness is a powerful attraction once a person learns it. The quiet, and the isolation is soothing, and such sights as the Arctic moon is unforgettable.⁵⁹

Hikers walked the coastline, climbed nearby hills and glaciers, and sought out wildlife. On a particularly long thirteen-hour hike to Griffith Island — about ten miles across the ocean ice from Resolute Bay in 1950 — Alan Faller (on leave from his meteorology studies at the Massachusetts Institute of Technology to work at the station) and visiting scientist John Galt discovered a previously unknown cairn. Afterwards, Faller felt that he and his companion “were Arctic explorers, if only in a minor way.”⁶⁰ Other hikers collected fossils. These were usually small and scientifically inconsequential, but they occasionally made significant finds. In one case, a visiting geologist discovered a plesiosaur that was subsequently airlifted out by archaeologists.⁶¹

Most men carried cameras with them to document their surroundings. Encouraging station personnel to develop “an ‘outside interest’ has resulted in giving the Arctic the biggest number of amateur camera fiends on a per capita basis in the world,” Frank Lowe of the *Montreal Star* observed.⁶² Each station had a darkroom, and nearly everyone brought a camera north with them. The wildflowers that abounded for only a couple of months in the High Arctic were particularly striking. While filming a movie at Eureka, the Canadian National Film Board’s Dalton Muir “found [that] hardened Arctic weathermen would melt at the sight of delicate blossoms fighting for life during the summer’s perpetual daylight.... There are few who are not awed by reflecting on how seeds can be coaxed into life in a land where the permafrost recedes from only the top few inches of the soil.”⁶³

Personnel occasionally risked considerable peril to capture the perfect photograph of wildlife around the stations. Lowell Demond reminisced about his discovery of a muskox near Eureka:

I had read about them and we had found out, for example, that when they became very old they usually stayed near the water, so you'd find them in the small valleys, rather than being able to travel from the water up to the food on the hillside. So I came across this old Muskoxen in this area one time, and I went back to the station (I was probably a mile or so from the station), and I went back and told the guys there "look I found an old muskoxen in that valley and I got a picture of him and [asked] if you fellas would like to get a picture." The two airstrip mechanics were there and they said they would like to have a picture of it. And I said "well come with me and I'll show you where this Muskoxen is." So we went off to see it and sure enough we found him. Just when we got there he sort of backed into this little valley and a little canyon that was there in this valley One fellow had taken a rifle with him and said "well you get a picture of him ... I want a real close-up of that Muskox" and he said "... don't worry about it, because if he [the Muskox] comes after you or anything we'll shoot him." So I started and got up close. He had a Rolleiflex camera and you looked down into the lens and I was looking down in it and the image got larger and larger This Muskox gave me a bang and the camera went flying in the air and he hit me right on the wrists and my hands. I backed off quickly and I was very fortunate that he basically walked right back as fast as he could into that little crevice in the valley. So I looked for the other guys and they were running down the other side of the mountain and I wasn't far behind them.... It was just one of these stupid things you do.... We all did a few of them.⁶⁴

For others, vistas became permanently etched in their memories. "On the more sublime edge of life at Isachsen," Archie Asbridge remembered "sitting on top of a high rocky slope overlooking Dyer Bay a couple of miles from the weather station." On that day in mid-July 1958, he was "totally alone" except for "Boots," a station Husky:



FIGURE 7-7. John Gilbert observes Resolute from a distance in 1956. John Gilbert Collection.

The dog had followed me on my walk from the weather station. I was sitting upon a large rock that most likely had never been sat upon before. There is essentially no vegetation in that region of the arctic except for lichens and moss and if luck happens one might see a bird during the short summer, but not on that particular day. The sky was cloudless with a deep blue colour influenced by a high-pressure weather system that produced little or no wind to speak of. I sat in total silence for about ten minutes except for the sound of my own breathing and the lapping of the dog's tongue. There was a feeling of complete and unforgettable serenity. The silence was deafening.⁶⁵

The opportunity to immerse oneself in a vast and spectacular landscape, gazing over open tundra or seas that personnel knew were devoid of other human presence for hundreds if not thousands of kilometres, inspired awe and wonder. For Asbridge, it also brought a sense of tranquility, borne of

the knowledge that he could return to a station that offered refuge from the desolate, sublime geography around him.⁶⁶ The chance to slip away from the quotidian routine, if only for a few hours, could serve to fortify one's spirits and restore energy for station work.

Recreational time was limited by outdoor construction, maintenance, and resupply tasks. The construction season began in April or May, was most intense from June to August, and ended as late as possible in the early fall. During the height of summer, the work was so extensive and intense that one ExO expressed amazement at “just how much work, totally unrelated to the scientific function [of the stations], is carried on here.”⁶⁷ In 1959, for example, Alert ExO Monte Poindexter “was very busy making improvements on and around the station aided by any one and every one [*sic*] he could recruit.” That year's work included relocating the old inflation shelter, remodelling a 16 x 16-foot “shack” into transient accommodations for up to eight visitors, filling low spots around buildings to improve drainage across the entire station, and extending the aircraft parking area by thirty feet.⁶⁸ Everyone, permanent or transient, was expected to assist with work around the stations as long as it did not interfere with their assigned duties, and most individuals were willing to work overtime to take advantage of the warmer weather.⁶⁹ Alert's strip mechanics were instructed to “assist graciously” with the station's extensive building construction program in 1962 by hauling materials around the station when the station mechanic was unavailable.⁷⁰ Most transient personnel also volunteered for “household duties” to compensate for the additional messes created by their presence.⁷¹

The peak temperatures of summer also made it an ideal time for painting and other exterior improvements to the stations.⁷² In April 1953, R.W. Rae and Glenn Dyer, the Chief of the Arctic Project Division at the US Weather Bureau, inspected Eureka and were “dismayed at the mess around the camp area.”⁷³ The new OIC Fred Ayling and ExO Ken Moulton organized and led an extensive improvement effort that spanned the entire next summer. Station personnel repainted buildings, fixed plumbing fixtures, erected radio aerials, dug and stocked a new in-ground refrigerator (“reefer”), moved supplies to a new cache, and gathered garbage to be burned and/or deposited on the ice to drift into the bay and sink.⁷⁴



FIGURE 7-8. Installing the rawinsonde dome at Isachsen. Jim Jung Collection.

Station crews undertook other clean-up tasks during the summer season. The most frequently noted eyesores at the satellite stations were the drum caches. Reliable sea access to Resolute allowed the hub to receive bulk fuel transfers from ships to its tank farm by the early 1950s, with fuel then pumped into 45-gallon drums that ships carried to Eureka and aircraft flew to Mould Bay and Isachsen. (Aircraft also transported filled fuel drums to Alert from Thule.) At the satellite stations, the emptied containers were supposed to be inspected for damage and either cleaned or compacted before being returned to Resolute for reuse or disposal.⁷⁵ Nevertheless, empty drums rapidly accumulated at all the stations.⁷⁶ Installing fuel farms at the satellite stations in the early 1960s somewhat mitigated the problem, but JAWS program managers in the south saw little incentive to clean up the detritus and most remained on-site until Environment Canada implemented a systematic oil drum cleaning, crushing, and removal program in the 1980s.⁷⁷

Warm summer temperatures also contributed to the annual break-up of ice in the waters of the Arctic Archipelago. The major summer sea supply was essential to sustain the JAWS program, given the expense and difficulties in transporting large structures by air. After the establishment of Isachsen and Mould Bay by sealift in the 1940s, planners concluded that ships could not safely and reliably reach these outposts each year, so their supplies were sealifted to Resolute, stored, and then delivered to their final destinations during the subsequent fall airlift. At the other stations, however, preparations for the much-anticipated summer sealift meant a flurry of activity. Mechanics performed last-minute repairs to station vehicles, while other personnel readied drums for “backloading” onto the ships, made soundings in the bay, or built up the station’s jetty. Some years, station personnel prepared bases for new structures that sealift crew and equipment would position upon their arrival.⁷⁸

The scale of the JAWS sealift also entailed significant planning and organization in the south. When the US Navy initially ran the sealift, goods ordered up to two years in advance were stockpiled at the South Boston Annex of the Boston Naval Shipyard. After the Royal Canadian Navy assumed responsibility for sea-borne resupply in 1954, goods were stockpiled in Montreal. Over time, logistical and operational planners built on previous experiences and improved processes to ensure that cargo destined for the stations was properly packaged to survive voyages by sea and air. They also adopted colour codes to ensure that the right cargo arrived at each station. By 1953, George Rabbitt, who oversaw general procurement and supply for the US Weather Bureau’s Arctic Operations Project, reported that “after much trial and error we have found a good solution to packaging, processing and documenting our cargo with the desired result of having it delivered to our remote stations and with accurate records of both delivery and receipt.”⁷⁹

Refined practices improved the unloading and organizing of goods at the stations, but operations did not always unfold as planned. Sealifting supplies to the stations remained a complex operation requiring resolve, luck, and constant adaptation to local ice conditions, weather, and damage. Contingency plans for the satellite stations instructed captains to cache their loads at Thule for delivery the following year if they were unable to reach Eureka or Alert.⁸⁰ A case in point was in 1953 when the icebreakers

USS *Staten Island*, USCGC *Westwind*, and USCGC *Eastwind*, as well as the cargo vessel USS *Wyandot* and tanker USS *Nespelen*, encountered the worst ice conditions in the eastern Arctic since the program began. To make matters worse, dense fog around Resolute prevented long-range aerial ice reconnaissance, again proving that “the most carefully laid plans for aircraft employment” could fall victim to “the guns of Boreus [*sic*] Rex.” When *Westwind* and *Wyandot* neared Resolute Bay on August 8, they found it covered by an ice floe approximately one mile square and 3-5 feet thick. The resupply group attempted limited unloading from a distance, but ice and fog stymied their efforts for the remainder of the day. With no sign of improvement, they deployed a demolition party that placed twenty shaped charges and 90 lbs of dynamite on the flow — but the blast had “no immediate effect.” The next evening, a high flood tide helped break up the ice and the ships proceeded into the bay the following morning, where their landing craft “ice dozed” the bits from the anchoring area. Transferring the supplies then began in earnest, with various ships arriving, unloading, backloading spent station material to the ship, and then departing over the following week.⁸¹

Operational challenges persisted during this “routine” resupply mission. *Westwind* spent six days “battering through” 9/10 ice concentrations that threatened to block access to Eureka. Finally arriving at the satellite station on August 19, the crew found Slidre Bay to be ice-free and immediately began the “gruelling” task of unloading.⁸² With the station’s resupply completed three days later, the ship hosted a dinner and movies for station personnel, and then promptly departed that evening at 9:45 for Thule. Rejoining its “battle against the ice” at Graham Island, *Westwind* took three days to reach Hell Gate where it had to reverse engines, narrowly avoiding being run ashore by a one-mile-long floe that closed onto a beach with a “tremendous crushing and grinding.” The ship’s captain, keenly aware of the dangers and proceeding cautiously, was startled by how the “situation could change so rapidly” and repeatedly emphasized the need for “patience” in his after-action report.⁸³

Meanwhile, *Eastwind* left Thule en route to Alert on August 10, but it was forced to return to Greenland after losing two blades from its starboard propeller while battling heavy ice at Kane Basin the following day. The mantle then passed to *Staten Island*, which departed Thule for Alert

via Route Gardenia on August 17. Encountering heavy ice when entering Kennedy Channel on August 19, it lost ground by drifting twenty-two miles south before battling 10/10 coverage ice for the next three days. Extensive pressure within the floes frequently trapped the vessel. “On one occasion,” the after-action report noted, the ship was caught by one of these pressure areas and “suddenly popped out like a cork from a bottle and practically bounced over the next floe.” Conditions were so dismal that someone at Alert radioed *Staten Island* and, without the authorization of his superiors, told the ship’s radioman that there was a “good chance” that the vessel and its crew would be forced to winter there since Dumbbell Bay was “completely ice-filled.” Undeterred, *Staten Island* reached the outskirts of Alert at 3:30 am on August 27 and “commenced forcing an entrance into the harbour,” eventually anchoring 400 yards away from the loading site at 10:00 that evening. “Working furiously against time and adverse ice conditions,” the crews finished unloading by 11:30 pm the following day. Forgoing the traditional reception for station personnel, *Staten Island* departed for Thule a half hour later. In all, the icebreaker required twenty-one days to complete the round-trip voyage that planners had hoped could be accomplished in eleven days, arriving back at Thule on September 7 after the longest sealift voyage to that time. The ship’s captain and the commander of the naval squadron both recommended that, in future years, “icebreakers proceeding to Alert be prepared to winter.”⁸⁴

Although extreme, the difficulties experienced during the 1953 summer resupply were not unique. Inter-seasonal variability meant that planners could not predict local environmental conditions at the stations, forcing continuous adaptation. The following year, the Canadian icebreaker CGS *D’Iberville* struggled against unusually heavy ice before arriving at Eureka and ultimately failed to reach Alert as planned.⁸⁵ Indeed, the risks of shipping goods to Alert proved to be too high and officials discontinued the sealift to that destination altogether from 1956 onward.

The 1960 sealift to Resolute and Eureka also highlighted arduous conditions that required flexibility and adaptability. After departing Montreal in late July, the vessels of Nors 60 arrived at Resolute Bay between August 11 and 12, but could not begin unloading because Resolute Bay was 8/10 covered with heavy ice. While waiting for conditions to improve, crewmembers went ashore by helicopter and helped station personnel to

FIGURE 7-9. CGS *D'Iberville* photographed from the air while resupplying Eureka, 1957. Lowell Demond Collection.



perform mechanical maintenance and repairs on *Resolute's* barges, as well as scraping and painting the vessels' hulls and super-structures. On August 14, unloading finally commenced. The tanker *MV Irvingwood* began the multi-day process of pumping 815 short tons of avgas, 747 short tons of jet fuel, and 1,778 short tons of Arctic diesel into *Resolute's* tanks. Meanwhile, the other vessels deployed their heavy lifts and equipment and the Bay soon buzzed with four LCMs, one tug, six barges, and one motor launch shuttling supplies ashore. As supplies arrived on the beach, personnel had to unload and systematically stow the crates according to their storage requirements or destination. Over the next two and a half weeks, however, storms and ice conditions frequently complicated these activities. Gale force winds, for example, prevented any landings from August 17–20, while a similar storm halted operations from August 25–27. The continued presence of heavy ice compelled over half of the small vessels to unload their supplies at a northern beach, which had to be reloaded onto

vehicles and driven to the station over one and a half miles of roads that were in poor condition due to “record” heavy rains preceding the sealift’s arrival. From August 28–29, crews backloaded empty helium cylinders and other spent supplies from the north beach. Early the following morning two aircraft ferried the stevedores to Montreal and the remaining vessels weighed anchor. Concurrently, the vessels venturing to Eureka that same summer encountered “little or no ice” in Jones Sound, Hell Gate, or Norwegian Bay, and unloaded 144.5 short tons of cargo and 392 short tons of various fuels at the station in just over seventy-three hours with three barges.⁸⁶

While resupply ships were at anchor, unloading efforts consumed all personnel. The OIC remained responsible for the station’s overall operations, the ship captains commanded their vessels, the ExO oversaw unloading and caching ashore, and all other personnel assisted with these activities insofar as their jobs allowed. When landing craft reached the beach, ship and station personnel moved the cargo onto the station’s sleds, which were towed by tractors to the applicable storage buildings or “reefers” and “manhandled” into place. Speed was of the essence, as crews raced to complete the work before ice conditions changed for the worse. Sometimes a ship’s crew loaded the landing craft quicker than the shore-based crew could handle, forcing the latter to drive their sleds a short distance from the jetty, quickly unload the supplies to await proper storage at a later date, and then return to the shoreline for more.⁸⁷ When the sealift floated large objects ashore, such as new bulk fuel storage tanks, the ship’s crewmembers helped to move the structures into place.⁸⁸ During this feverish time, radio operators worked long hours to maintain ship-shore communications, and upper air observations were either maintained by a skeleton staff or briefly curtailed. In their spare moments, personnel read incoming mail and drafted quick responses to send out when the vessel departed.⁸⁹

The sealift continued to reverberate even after the ships left for the south. Station personnel spent several days properly storing supplies that had been hurriedly offloaded. At all of the satellite stations during the 1950s (including Mould Bay and Isachsen, which received goods by air-drop during the summer months), the men enjoyed fresh eggs, fruit, and vegetables — a welcome change from their typical diet of canned foods.

Since a station's "reefers" (underground storage cavities built into the permafrost⁹⁰) would spoil fresh goods and its electric refrigerators were small, personnel stored what they could in the kitchen or garages and consumed these foods as quickly as possible. At the dining table, station crews shared meals with newly-arrived permanent personnel and temporary staff assisting with construction projects.⁹¹

Station populations peaked during the summer, taxing each location's resources. The added people "put a strain on the day-to-day operations since the living quarters and messing facilities were barely acceptable for the normal eight bodies[,] let alone" additional summer workers and visiting scientists at the satellite stations, Asbridge recalled. He described cooks as the essential "catalyst for creating a harmonious crew in isolated living conditions,"⁹² and the added workload to satiate extra bodies at the stations took its toll. Cook Paul Reid, for example, recalled serving between fourteen and seventy people at a time during his six-month tour at Alert in 1963.⁹³ Although the JAWS program despatched assistants from the south to help out, some cooks buckled under the additional stress and had to be replaced.⁹⁴ At Mould Bay, Isachsen, and Eureka, where the population swings were less severe, station personnel took turns on "KP" by helping the cook to prepare meals and clean up afterwards.⁹⁵ Although the end of the summer would bring colder temperatures and portend the return of the dark season, it also anticipated a contraction in the number of men at the stations and a return to a more predictable routine.

Autumn

The sealift effectively marked the end of summer for the JAWS program. Autumn arrived in late August or early September and lasted until late September or early October, bringing a short and violent season of transition to the High Arctic. Air temperatures dropped, producing "almost continuous" fog and low stratus clouds over open water. During this brief season, winter pressure patterns began to form, and storms became less frequent but more intense. Cloud coverage, wind speeds, and snowfall all typically reached their annual apexes.⁹⁶ R.W. Rae recalled experiencing a particularly "destructive" storm at Resolute in September 1951:

The wind gradually picked up from the south-east to an average speed of 50–60 [miles per hour] with gusts up to 70 mi/hr. I went outdoors to see what damage was being done, and it shook me a little to see 4 ft by 8 ft sheets of ½ in. plywood flying through the air with the greatest of ease. The plywood pile had been sand-bagged, but apparently the top sheet had not been quite flush with the rest of the pile for the wind lifted it off, sandbags and all. After that the sheets were flipped off one by one like cards from a pack. Fortunately, none of the main buildings was hit by the larger airborne missiles, but the R.C.M.P. constables' outdoor latrine suffered a near-mortal blow. A square hit amidships would probably have sliced it in two. As if the wind were not enough, it began to rain — a hard, driving, splattering, freezing rain that plastered everything outdoors with a half inch of solid clear ice. The weight of the ice broke one of the antennae and crumpled the mast of our radar beacon. For a while there was such a crashing and banging that it seemed as if the world were coming to an end.⁹⁷

Between storms, station personnel braved worsening conditions to prepare the buildings for winter. They learned to guard against fires by checking and recharging all fire extinguishers, as well as cleaning oil stoves, pipes, and fuel lines. Autumn was also the ideal time to inspect buildings for cracks through which blowing snow would infiltrate during winter storms. Personnel also graded the grounds and prepared tractors and other machinery to operate in winter conditions.⁹⁸ Finally, the men “stored or battened down” remaining supplies in warehouses or the station's cache to prevent the sort of calamity that Rae had witnessed in 1951.⁹⁹

Some years, completing existing construction projects before winter became a major undertaking. In 1953, seven personnel at Eureka completed so many construction projects that they began referring to themselves as the “Eureka Construction Company.” Throughout late August and September, this group diligently worked on projects even though cold winds proved “a severe detriment to this outside labour.” Most of their structures turned out “quite well,” with a few exceptions: a water storage shed was “slightly out of ‘square,’” although comments about this

imperfection were greeted with cries of “‘rigours of the Arctic’ and ‘improvise,’ by the old hands.”¹⁰⁰ Eureka personnel undertook similar work in 1959, cleaning up the grounds and redecorating buildings so that the “difference in appearance should be quite obvious even to the most critical of inspecting personnel.”¹⁰¹

The return of cooler temperatures also made the ground sufficiently firm for strip mechanics to resume working on the satellite stations’ land-based airstrips. Occasionally, the freeze was rapid and complete, making the ground impossible to grade or compact together after only a few days. During the late 1940s airstrip crews had often missed this “short favorable period,” and strip mechanics were urged: “be ready for it and don’t miss it.”¹⁰² Experience soon showed that a willingness to conform working schedules to changing soil conditions paid dividends, as crews at Alert showed in 1953 when they managed to work on the airstrip for nearly four weeks between mid-August and mid-September.¹⁰³

The residents of Isachsen and Eureka also took advantage of colder temperatures to venture onto the hardening sea ice with a bulldozer and sleds to harvest portions of the nearest multi-year iceberg for their stations’ winter water supply. The age of the ice was important because fresh ice still contained sufficient salt to render it undrinkable. Each late autumn day, station personnel took turns braving the -20°F to -30°F (-29°C to -34°C) temperatures during the few hours of daylight to chip blocks from the berg. These bits were then loaded onto sleds, towed back to the station, and deposited in a cache where they could be easily removed during the winter and brought indoors to be melted. One note claimed that the Isachsen station required more than twenty-five tons of ice to get through the winter. Even after bulk water tanks were installed at the satellite stations in the mid-1950s, chronic water shortages meant that personnel continued to harvest ice during the fall until at least the end of the decade.¹⁰⁴

In the second half of September, when the airstrips fully refroze, aircrews and southern planners used the remaining daylight to conduct a brief fall airlift to the satellite stations. Although the scale of the spring airlift dwarfed its autumn counterpart, the landings during the pre-winter season remained an “extremely desirable”¹⁰⁵ time to bring equipment, food, and material to the stations. “It was a great feeling of ‘renewal’ to be able to eat a few mouthfuls of lettuce and tomatoes only to realize that this



FIGURE 7-10. Airlifts could be treacherous. This RCAF C-119's landing gear collapsed after it touched down just short of the runway in 1957. After extensive repairs it was flown out the following spring. Merlin MacAulay Collection.

delicacy would shortly become a dream for the next six months,” Asbridge remembered.¹⁰⁶ The high winds and low visibility sometimes created “marginal” flying conditions and aircrews occasionally had to return to Resolute or Thule with their stores aboard, but most flights managed to land.¹⁰⁷ The end of the season also meant a time for goodbyes. During the 1950s, when planners did not authorize dark period landings, the fall airlift represented the last opportunity for seasonal personnel such as strip mechanics and visiting scientists to depart, as well as a final opportunity to rotate year-round personnel in or out of the stations. One or two flights to each station by USAF or RCAF aircraft were typically sufficient to satisfy these requirements, although up to a dozen landings sometimes proved necessary.¹⁰⁸

When these flights arrived at the satellite stations, all available JAWS personnel were once again pressed to service unloading aircraft. This time, crews worked with even greater haste and precision; unlike the spring and summer, low temperatures and high snowdrifts would make it extremely



FIGURE 7-11. An RCAF North Star taking off at Mould Bay circa 1952. Environment Canada.

difficult to locate temporarily-placed stores in the winter. Akin to the spring airlift, each series of flights ended with a “clean-up” sortie that addressed each station’s last-minute resupply requirements. In the mid-1950s, journalist Ritchie Calder flew to Resolute in a Flying Boxcar (Fairchild C-119) for one such flight — “the last supply aircraft which would go into the High Arctic until the freeze-up restored ice-landing fields the following winter. This was the last occasion when the remote weather-stations ... would get supplies, so the aircraft’s load was an extraordinary collection of sundries, a sort of last-minute shopping bag, not only of provisions but bits of machinery and replacements” for the weather station staff.¹⁰⁹ Until the early 1960s, this landing also offered the final opportunity for personnel at the satellite stations to send and receive mail. The departure of these final flights was poignant, with Pete Johnson recalling how the stations fell “absolutely silent” as the aircraft disappeared over the horizon.¹¹⁰

Winter

As autumn yielded to winter, the stations reached their most isolated state. The longest season of the High Arctic year lasted from October to May, with temperatures reaching their annual lows in February. At Isachsen, which typically endured the worst weather of all of the stations, winter temperatures generally hovered between -13°F and -49°F (-25°C and -45°C) but could dip even lower.¹¹¹ Storms moderated in intensity and frequency, however, and precipitation decreased, but blowing snow created massive drifts around obstructions on the landscape.¹¹² Despite calmer conditions, the long Arctic nights and extreme cold made the stations particularly difficult to reach. The duration of the dark period depended on the station's latitude, but the sun did not rise above the horizon from approximately November to February.

Aside from the stations' electric lighting, the moon provided the only source of illumination because the JAWS network was too far north to experience the aurora borealis with any regularity.¹¹³ When the moon was full during the dark season, Rae noted that it did not set for several days. The sky turned a "deep bluish purple, the moon an orange yellow and the snow ... a ghostly white. The scene has a peculiar fascination, but it is a cold, frigid, unreal type of beauty."¹¹⁴ To many people who overwintered at the stations, the moon was "absolutely inspirational. It was like a grapefruit hanging there," Howard Wessbecher recalled. "You wanted to reach up and touch it, it was so clear."¹¹⁵

By 1950, JAWS planners determined that winter landings at the satellite stations were too dangerous, and each of these stations instead received their Christmas resupply via airdrop.¹¹⁶ Although this mode of delivery meant that wintering personnel at the satellite stations did not have to clear their runways of snow, dark period airdrops still required considerable preparation. Typically timed to coincide with the last full moon before Christmas, the flight could be scheduled to arrive anytime between the end of November to a day or two before Christmas. When the aircraft radioed that it was getting close to the station, personnel rode out to the designated drop zone, located a mile or more away from the stations on the ice to keep circling aircraft away from the surrounding topography. When station personnel arrived at the spot, they lit flare pots

or other receptacles filled with diesel and toilet paper in a pre-determined pattern to signal wind direction as well as a drop zone for the overflying aircrews. Aircraft required five or more passes to safely drop all of the baskets. According to documented airdrops, at least one chute typically failed to open, rendering presents or fresh food for Christmas dinner unsalvageable.¹¹⁷ Unlike most goods, aircrews free-dropped Christmas trees from their aircraft. (One tree, after losing 90% of its needles during its descent to Eureka in 1951, “landed upright in the snow,” leading the station diarist to joke that “one would believe at first glance that they had been growing ... for 20 yrs.”¹¹⁸) Sometimes the goods landed close to the drop zone, and on other occasions they landed over a mile away, forcing station personnel to comb the area in dark and cold conditions to find them before they vanished in the drifting snow.

When crews arrived back at the station, they brought the parcels inside the mess hall where the unwrapping began. Contents usually included the fixings for a turkey dinner, alcohol, fresh vegetables, and mail (including Christmas presents). For many personnel, the unpacking that followed the airdrop “was really Christmas day.” Lowell Demond, who had arrived back at Eureka in August 1956 after recovering from his appendectomy, described the event in a letter to his parents. The OIC, acting as postmaster, was responsible for receiving the mail, and eager personnel lined up to help him expedite the work. Soon, the panniers’ packaging and contents were so strewn about the operations building that “there wasn’t room to move around,” Demond recalled. After the parcels were unpacked and their contents distributed to their eager recipients, most of the station’s personnel retired to their respective rooms to pore over their new letters from home.¹¹⁹

In the days or weeks that followed the Christmas resupply, personnel decorated the tree and mess hall. The official celebrations, of course, did not come until December 25 when work duties were kept to a minimum. Several personnel contacted loved ones using phone patches (see chapter 8), while others sent and received Christmas greetings via Morse code.¹²⁰ Donning travel suits that most had not worn since arriving at the stations, the crew enjoyed a formal dinner and feast, “complete with cranberry sauce,” that the cook timed so that all personnel could partake.¹²¹ Camaraderie sometimes led to joking. At Mould Bay in 1954, for example,



FIGURE 7-12. Resolute's comparative accessibility sometimes allowed travelling shows led by celebrities like CBC's Tommy Hunter to visit the station during the holiday season. Christmas, 1959. Archie Asbridge Collection.

“surprise packages were given out in keeping with the holiday spirit. O. Pat Ucar received a box of shotgun shells (no doubt for his defence [as he had claimed to see wolves during the past months]), Norm Wahl received an old caribou hide, and the cook, McDade received a fine fedora hat ... his own.”¹²²

Resolute enjoyed more elaborate celebrations than the satellite stations. Even in the early 1950s, aircraft landed on its airstrip at least once per month during the winter.¹²³ Some years, Resolute even hosted guest entertainers — with mechanical and weather problems sometimes keeping them at the station longer than expected. In December 1962, for example, “a troupe of CBC entertainers” visited Resolute and provided a “most welcome diversion for all of us,” ExO Bruce Aikins recorded. The next day, however, the Hercules aircraft carrying the group developed landing gear problems, “so we were treated to a second show and dance.” The RCAF diverted a second C-130 from Christmas flights in the eastern Arctic to take the entertainers home, but it experienced engine trouble and had to divert to Namao for repairs. “A third plane summoned from Montreal

FIGURE 7-13. Christmas celebrations at the satellite stations were less elaborate than those at Resolute, but the festivities still featured all the trimmings, as these three photos from Mould Bay in the mid-1950s attest. Jim Jung Collection.





developed engine trouble en route and was forced to stop at Churchill,” Aikins recounted. “By this time weather conditions began to deteriorate and when the airlift plane came back from Namao it was unable to land here and flew on to Thule to wait out the blizzard. Temporary clearing on the fifth day permitted a landing at last, and the troupe was able to leave.” Station personnel unanimously agreed that the entertainers “qualified for overtime pay and northern allowance plus special commendations” for their endurance.¹²⁴

After the bustle of the holiday season, JAWS personnel settled into a winter routine in which station life slowed “to a walk.”¹²⁵ Howard Wessbecher recalled how “civilized problems” such as colds disappeared soon after the final aircraft had left and did not generally reappear until the following spring. With work and leisure almost entirely confined to indoor activities, schedules became less prone to disruption. To keep busy, personnel undertook work inside the buildings that they had side-lined during the summer’s busy outdoor schedule. “Soon after Christmas we



FIGURE 7-14. George Toney painting pocket bookshelves at Isachsen on 7 February 1952. LAC, RG 93, Acc 81-82-084, Box 18, File 6754-1291 pt 9.

found things getting very dull so we started to reconstruct the station,” Eureka radio operator John Gilbert recalled. Personnel “painted all the rooms, built cupboards, [and] remodeled the radio room.”¹²⁶ A few years later, a different team installed new floors, painted walls, and fixed doors in several buildings.¹²⁷ Other stations took similar care,¹²⁸ and smaller projects were also common.¹²⁹

Outdoor activities were extremely limited during the dark period and were generally confined to weather observations, measuring ice thickness on the bay, retrieving ice for drinking water, observing fire watches, and maintaining vehicles and diesel generators. Heading out of the stations for a walk could improve morale but entailed considerable risk, so station leaders either discouraged strolls around the buildings or airstrip or only

allowed them during full moons to reduce the chances of a person becoming disoriented in the dark. Polar bears also ventured closer to stations during the winter, reinforcing the importance of the “buddy system.” Personnel had to carry a gun and inform a “responsible party” of any plans beyond travelling from building to building, and men were forbidden from venturing more than three miles from the camp on foot. If they encountered problems, they were reminded that “the recognized distress signal consists of three shots in rapid succession.”¹³⁰ Resolute ionosphere station OIC Lloyd Cope, for example, “encouraged all who would to go walking on bright moonlit days, or at least when there was enough light to see down the barrels of their guns. It was not unusual to see as many as ten men walking among the frozen ‘growlers’ out on the bay, each with a loaded rifle in the event there was a bear around the corner.”¹³¹ Working on the northern edge of the continent’s Arctic meteorology network also left the satellite stations with little warning of approaching storms. During the winter of 1959–60, a sudden snowstorm left a party of Eureka hikers (who had disobeyed the OIC’s instructions to remain near the station) trapped outside for twelve hours. Fortunately, no one was injured.¹³²

Extreme temperatures and darkness also limited aircraft from reaching the satellite stations, heightening the sense of isolation. Station culture therefore included a healthy dose of caution and prudence. Bob Frank (OIC Eureka 1957–58) explained to a reporter that: “We were told ... if you have a problem during the [four-month-long] dark period, you’re on your own. We were reasonably cautious.”¹³³ Consequently, station leaders regularly warned personnel about the dangers of “carelessness,” and most personnel heeded the advice.¹³⁴ This isolation also encouraged a culture of self-reliance and improvisation. Lowell Demond, having survived appendicitis during the summer of 1956, subsequently developed an ingrown toenail the following March. When it failed to improve, Bob Frank consulted the station’s copy of *Gray’s Anatomy* and decided that removing the toenail was “nothing difficult.” Demond recounted how:

Bob announced we would simply use whiskey to freeze the toe, we would sterilize the tools with boiling water, Galen Olsen [the station mechanic] would pull a rag tightly around the toe to prevent bleeding and we would proceed. All I had to do

was agree I was seated on a lounge chair which had wide wooden arms. My left foot was raised on a low stool and Bob was seated on a chair behind my foot ... Olsen was standing to my left. Bob announced it was time to start the freezing process which was to be station whisky. He said it would be two drinks for the patient and one for the doctor. Somehow this got terribly mixed up, with the doctor getting much more than the patient. All of the tools had been boiled on the kitchen stove and laid out near Bob. Ole tied the tourniquet around the toe, Bob picked up the scalpel [and made the first incision]. Then he announced I should have another drink of whisky, which I did. Without hesitation, he picked up the needle nosed pliers which came from Ole's garage, applied them tightly to the front of my toenail and, pulling steadily upward, pulled it off. Then he bandaged the toe.... Then Bob announced, only one thing left to do. With that, he picked up the whiskey bottle and poured about a half cup right over the bandage. He claimed this was the way John Wayne treated a wound in the old western movies.¹³⁵

With professional medical attention inaccessible, self-reliance and improvisation such as this were essential. Over four decades later, a proud Bob Frank reminded Demond that his toe had not bothered him since.¹³⁶

Dark period landings at the satellite stations did not resume until the late 1950s, and several additional years passed before these landings became routine. The archival record concerning the phasing out of airdrops and reintroduction of dark period landings is fragmented and minutes of some pertinent meetings are missing, but existing evidence indicates that improved landing facilities at the satellite stations, the cooperation of JAWS personnel, and the tenacity of RCAF operators led to the gradual resumption of winter landings. The first recorded instance occurred at Mould Bay on 19 December 1959, when an RCAF aircraft arrived to collect Isachsen's mail (which had been air dropped at Mould Bay by mistake).¹³⁷ Two years later, an RCAF aircraft landed at Eureka and Isachsen. Neither of these stations had received fresh vegetables during their autumn clean-up flights,¹³⁸ and both urgently required electronics parts as

well as heavy and bulky spare parts that “could not be airdropped satisfactorily.”¹³⁹ RCAF crews told Resolute OIC B.A. Coulcher that dark period landings were possible as long as the weather was favourable and satellite airstrips were well lit and cleared of snow. Coulcher, in turn, hoped that “if such a plan is carried out successfully then perhaps serious consideration could be given to a repeat performance annually at approximately the same time. This naturally would be in keeping with the steady progress and growth now in vogue across Canada’s northland.”¹⁴⁰ When the day arrived and the aircraft landed at Eureka, the pilot told station OIC Vlad Jelinek that the runway was “very smooth and exceptionally well lit, better than airstrips down south.” Eureka personnel “definitely considered” the change a “welcome improvement,” and Jelinek hoped that Christmas landings would become an annual event.¹⁴¹ Southern planners remained more skeptical about the reliability of winter landings at the satellite stations than RCAF aircrews and JAWS personnel,¹⁴² and air drops continued until the mid-1960s when Atlas Air Services under Weldy Phipps provided year-round light aircraft resupply flights to Eureka, Isachsen, and Mould Bay on the improved airstrips.¹⁴³

Despite aeronautical advancements, station personnel continued to feel secluded and helpless when facing serious illness during the winter. In November 1965, for example, met tech Bert Formuziewich developed abdominal pains at Isachsen. Within a few days these pains became acute and, after checking for symptoms, his colleagues suspected appendicitis. Within half an hour, they relayed Formuziewich’s pulse, temperature, and other health indicators to southern physicians who instructed the station to prepare Formuziewich for evacuation. The expected aircraft did not arrive for nearly thirteen hours and the station’s personnel grew increasingly alarmed at their comrade’s deteriorating prospects:

Bert was doing reasonably well up until 4 am when his temperature began to rise suddenly and rapidly. His condition became progressively worse and we began to sweat. Up until about 2 hours before the plane got here the weather was excellent. But it began deteriorating until the time the aircraft was due. The wind had suddenly sprung up and was blowing snow quite badly. Also low clouds and fog were rapidly moving in.

The plane circled and made several attempts at landing for about 45 minutes. We had taken Bert up to the strip as soon as the aircraft came overhead. It all looked hopeless and with Bert beginning to go uncomfortably cold it was thought best to return to the station. With considerable foreboding, visions of laying Bert out on the kitchen table and sharpening up Joe's butcher knives — we came back to the Ops. Bldg. to learn the good news — the plane had made it down.¹⁴⁴

Although it was later confirmed that Formuziewich's appendix had burst at Isachsen, he received life-saving surgery at Thule, Greenland. Shaken by the incident, ExO John Llewellyn reflected on the event in his monthly report and wondered:

what would the outcome have been with another hours [*sic*] delay. What would have happened if Bert were not such a sturdy and healthy guy? The realization that such a long delay in getting one of us to medical attention had actually come about had a variety of affects [*sic*] on the Staff here at Isachsen. On some of us it was quite demoralizing. ... Others hopelessly accepted the situation as one that little [could] be done to alleviate. ... We did what we could for Bert here, using our meager knowledge of first aid for such ailments. The best we can manage at these isolated stations is to keep a person comfortable, warm and under sedation; requesting help from the outside hoping that it will get here in time.... No one here at Isachsen has an MD appended to his name.

Llewellyn took the unusual step of recommending in his Station Activity Report that the RCAF should base a C-130 at Resolute Bay so that the response time to reach Isachsen could be reduced from thirteen hours to four. "IS LIFE NOT SO DEAR?!?!?!" he asked rhetorically.¹⁴⁵ Canada's limited airlift resources made fulfilling this request unfeasible, and the continued challenge of flying in winter storms limited the effectiveness of forward positioning aircraft.

With limited opportunities to venture outside of their stations, the men longed throughout the winter for the return of the sun. Although the glow of an Arctic dawn preceded the sun's actual reappearance for several weeks, the anticipation led JAWS personnel to shift dinner table talk at the stations to what they would do when they shipped out.¹⁴⁶ In February 1952, the crew at Isachsen donned their "good trousers" for the first time since Christmas to determine whether they still fit. Others devoted evenings to packing, even though their departure remained months away.¹⁴⁷ David Weston, who served at Eureka, Alert, and Mould Bay during the late 1960s and early 1970s, recalled similar countdowns to departure.¹⁴⁸ The first sighting of the sun in late February or early March was a time of great celebration. "Even for the strongest, there is no more welcome sight than the reappearance of the sun in March," *Collier's* magazine described. "The men dance and sing and drink their meager supplies of beer and whisky. There is an exhilarating feeling of having triumphed over nature when you have emerged alive from the horror of constant night in the arctic."¹⁴⁹ For a few personnel, the moment was less sublime. Lowell Demond remembered one peer who, while observing the first sunrise of the new year outside, unzipped his pants and relieved himself. When he was finished, he remarked: "I went out to pee at sunrise and didn't finish until after sunset."¹⁵⁰

"As much as field stations are imagined as islands in geographical space," Wenzel Geissler and Ann Kelly observe, "they are seen as islands in time, where the temporalities of nature can prevail, in juxtaposition merely to most essential human rhythms of sleep and nature."¹⁵¹ As much as quotidian routine provided temporal benchmarks for JAWS personnel, they also conceptualized the passage of time through the High Arctic seasons, which dictated the tempo and forms of particular practices. Structured, synoptic scientific observations — the stations' *raison d'être* — had to be completed regardless of weather conditions and constraints, and the broad timing and form of major resupply operations, construction work, and visitors from the south passed each year with celestial regularity. But daily and inter-seasonal variability, unpredictable shifts in local conditions, technological fallibility, and the limitations of scientific knowledge meant that station personnel knew better than to plan anything in the

High Arctic with absolute certainty. As they rotated through the seasonal cycle, the men accepted and resisted environmental constraints. Wind, fog, the firmness of the permafrost, and the thickness of ice determined whether aircraft could land. Naval vessels trying to access the sites operated at the mercy of ice conditions. Summer saw a flurry of activity, as additional technicians and labourers came in to help accomplish key goals before the return of colder conditions and darkness closed the window of opportunity. When the last visitors and transient workers departed with the fall clean-up flight, station life was confined to the core group of overwintering JAWS personnel who adopted routines and rhythms of life suited to the coldest, darkest season.

In 1952, R.W. Rae reported that “the darkness alone is not especially trying; but the darkness, the cold, the isolation and the same faces around the dinner table day after day, are all ingredients of an insidious acid that eats away at the individual’s sense of humour.”¹⁵² Even when the dark period ended, other irritants that Rae noted could undermine station morale and inflame tempers year-round. Circumstances dictated that JAWS personnel had to learn to capitalize on the opportunities provided by each season in the High Arctic. Strip mechanics learned to wait for the right ground temperatures during the spring and fall before working on runways. Personnel at Isachsen and Eureka waited for the fall to harden the sea ice before harvesting icebergs for their winter water supply. They ate more canned goods during the winter when the stations were most isolated and caught up on interior improvements and repairs when bitter cold and wind constrained outdoor activities. Recreational activities also shifted with the seasons, as did concomitant interactions with flora and fauna.

The place of the stations — their spatiality — dictated that JAWS personnel learn how to work within, and take advantage of, the seasonal cycle. These accommodations allowed the program to succeed, creating safe and reliable scientific outposts on the edges of Canada’s Arctic Archipelago which, over time, supported additional scientific facilities and transient scientists at specific times of the year. Coping with these challenges, however, required more than technological advancements and a willingness to adapt to local environmental conditions. Developing successful scientific outposts also necessitated robust station cultures capable of negotiating isolation, confinement, and the program’s complex binational command structure.

Getting Along at the Top of the World

When a man cracks up in the Far North, he follows a pretty fixed pattern. First he argues constantly with his mates, then he avoids them, and finally he sits by himself just staring into space. The eventual outcome of this progression can be suicide. The outposts have had only one such case so far, mainly because the men have become trained to spot psychological weaknesses and if any symptoms show up in a new man, he is whisked out again before the last plane leaves in September.

Bill Davidson (1952)¹

Despite postwar technological advancements in transportation, communications, resupply, and logistics, the Joint Arctic Weather Stations remained remote places. Storms prevented aircraft from evacuating sick or injured comrades. Communications and fresh foods were limited. Station crews had to cope with local wildlife and interpersonal tensions with little hope of external supports. All of these challenges intensified during the winter months. Reflecting on this isolation, Monte Poindexter recalled watching the final fall airlift flight depart and noted: “once the aircraft is gone, you realize that you’re there, and that you’re not going anywhere. You sort of get used to it.”²

Getting “used to it” was often challenging. Coupled with the somatic practices of scientific data collection and the environmentally-imposed rhythms of the seasonal cycle, quotidian life at the stations produced a

particular kind of “domus” on Canada’s Arctic Archipelago. Coping with prolonged isolation and confinement within or near their station, JAWS personnel experienced many of the same stresses and symptoms as their counterparts at stations near the South Pole. During the long, dark winter, individuals who grew tired of seeing the same faces every day had few or no opportunities to meet new people. As co-habitants of small, self-contained stations, they had to find ways to co-exist. They also had to navigate the intricacies of a binational command structure that exemplified the “jointness” of the JAWS program, but also created a hierarchy that could foment divisions or even contests of authority between Canadian and American personnel.

Almost everyone at the stations — even those who were well suited to isolated life, and those who served multiple tours — struggled at times to cope with the demanding conditions and expectations. Winter was the most difficult period for JAWS personnel, bringing common “over-wintering” symptoms familiar to polar researchers: fatigue, weight gain, gastrointestinal complaints, rheumatic aches and pains, headaches, sleeping difficulties, reduced cognitive abilities, depression, anger, irritability, anxiety, and interpersonal conflict.³ Most people found ways to prevent these symptoms from impairing station operations⁴ and, on the rare occasions when individual coping strategies proved inadequate, the interventions of station leaders provide insights into how personnel managed to work and live together in a challenging and isolated environment.

Keeping Busy

Maintaining morale began with a long work week: everyone worked twelve-hour shifts. Eight personnel (and more as the stations grew in size and complexity) afforded sufficient capacity to make the station run without risking redundancy. JAWS veterans recalled that there was never a shortage of work. “You could stay busy 24 hours a day if you wanted to,” Howard Wessbecher explained.⁵ Met techs, for example, were not only responsible for the daily upper air observations, but also attended to their laundry, KP (kitchen), cleaning, and fire watch duties, maintained the camp, and processed new supplies.⁶ OICs and ExOs encouraged their men to undertake heavy schedules. The best way to “keep people safe and happy,” OIC Monte Poindexter summarized, “was to keep people busy.”⁷

The importance of staying busy blurred the line between work and play. The extensive “remodelling” of Eureka during the winters of the early and mid-1950s reflected the desire of JAWS personnel to keep busy during a period when outdoor activities were not possible, even when many of these interior jobs were optional. Station personnel had considerable flex-time, and this “freedom of the job, with no ‘pushing’ from their superiors” to do particular tasks at particular times, fostered an amicable work environment.⁸ When he was at Isachsen from 1953–54, Bill Nemeth recalled the cooperative attitude that was common to many stations:

We built new wash facilities inside the Operations Building. I remember everybody pitching in. If you could wield a hammer and saw and paintbrush, or whatever it was, you know. It just happened and I don’t think it was through any major organization that had to take place; we just agreed that if we’re going to be reasonably successful, and accomplish what we were sent there to do, we had to work together.⁹

Personnel regularly undertook this sort of work, even when it was ineligible for overtime pay.¹⁰

Breaking Up the Monotony

Busy work schedules were not enough to keep eight people fully occupied for up to a year at a time. The daily and weekly rhythms of scientific observations at the stations produced predictable, even monotonous, schedules that threatened to gnaw at station morale. Thus, JAWS personnel recognized that leisure time was “very necessary.”¹¹ Every station had a billiard and ping-pong table, skis, and a toboggan. Some men enrolled in correspondence courses, while others built models.¹² Poindexter recalled how one individual at Alert “spent time building various model ships, loading them with dynamite, and floating them in the bay to use them for target practice.”¹³ Mould Bay even briefly sported a “band” with station personnel playing the harmonica, jaw harp, and wooden sticks.¹⁴ Another station developed what *Collier’s* magazine’s Bill Davidson described as “a novel twist to the recreation problem. Among the observers was a judo expert, and night after night the men gathered in a gymnasium built in a tool shed



FIGURE 8-1. Personnel playing pool at Eureka, LAC Winnipeg, RG 93, Acc 2004-01213-7, Box 2, File Eureka, n.d.

to see who could toss each other highest in the air.”¹⁵ Cards, especially cribbage, were popular. Poker was also popular when the airlifts brought fresh players and money to the stations, but declined when “the rich got so much richer that the poor had not the means to continue playing.”¹⁶ J. Glenn Dyer and C.G. Goodbrand eventually banned all gambling in December 1963 because it led “to deterioration of personnel relations, and is often accompanied by substantial financial losses by those who can ill afford it.”¹⁷

Each station also had a library and, like people at other isolated posts around the world, the men took refuge in these volumes. “If you don’t lose yourself in reading up here,” Alert OIC John Lewis quipped to Davidson, “it’s easy to go off your rocker.”¹⁸ In the early years, most of the books were detective novels of the “who done it’ variety” and Isachsen OIC Verne Marsh complained that these became “very tiresome after the first dozen or so.”¹⁹ Margaret Oldenburg, a Minnesota philanthropist with a strong interest in the Arctic, eventually donated a larger diversity of books to



FIGURE 8-2. JAWS personnel reading at Isachsen during the winter of 1963–64. Jim Jung Collection.

each station library.²⁰ Magazines, on the other hand, only arrived a few times a year and were “looked through until their contents are practically memorized.”²¹ All of this reading led to vigorous debates among the men confined to the station. Writing for posterity, the compiler of a Mould Bay photo album recorded how “intense and varied discussions are always a favourite pastime with the station personnel. Topics range from the early boyhood of Genghis Khan to the collective theories of the late Dr. Albert Einstein. No country may claim immunity, and no political leader is safe from the intense verbal investigations and dissections of the gathered intelligencia [*sic*].”²² Radio operator Jim Varabioff told a journalist that “we’ve done so much reading we qualify as junior experts on everything. We discover atom bombs, nuclear fission, politics, and pin-up girls.” In the end, the men at the stations settled “everything but the pin-ups.”²³

Movies were scarce and treasured resources. At Eureka in 1952, for example, they were only available because Dyer brought them during his inspection station tour (and they followed him to the next station when

he departed). By the mid-1960s, Resolute received films every two weeks on its regular resupply flight. Even this steady stream did not satiate local cinematic appetites, and station personnel found novel ways to enjoy the films that were available. When men tired of a Marilyn Monroe film, for example, they played it backwards to amuse themselves.²⁴ The satellite stations had to make do with an even more limited selection of films delivered by the fall clean-up flight, and the overwintering crews did their best to maximize enjoyment from these precious reels during the dark period when there were fewer recreational alternatives. Personnel at Isachsen, for example, enjoyed their own version of “Saturday Night at the Movies” during the 1960s. “It is definitely money well spent by the administrative offices,” Isachsen ExO John Llewellyn noted in his October 1965 monthly report.

Most of the movies are very good selections and even the ones considered second rate, we get a big kick out of sitting back and hissing and booing etc. Movie nights at Isachsen are just like “down south.” At intermission there is a big mad rush to the tank room to stock up (not tank up) on candies from the large selection we received on airlift.²⁵

By the following March, the station had watched twenty-one of the twenty-three movies that they had received, and their ExO speculated that JAWS personnel “will not feel as great a need for the movies” with the return of daylight.²⁶ While there was likely some truth in this view, men serving at the satellite stations still considered movies to be a “luxury item” at the end of the 1960s.²⁷

Communications with distant loved ones are always critical to maintaining morale at isolated stations. Because aircraft only landed to retrieve mail from the satellite stations a few times each year during the 1950s, most personnel relied on amateur radio. Journalist Ritchie Calder observed during his visit to the stations that:

The other great diversion of the Arctic men is the “ham” radio. They have hundreds of friends, thousands of miles away in all parts of the world with whom they are on gossiping terms and

through whom they keep in touch with their own folks calling them up occasionally on the phone. The local “ham” picks up the signal and phones the relative or friend and switches them through. The walls of the weather stations are covered with call-signs of “ham” radios.²⁸

Southern operators such as Charlie Harris, Bret Fader, and Fred Bisset connected the remote stations with the wider world. The connection could either take the form of textual radiograms or phone patches (where southern operators coupled their receivers into phone lines to facilitate voice communication). “It would be impossible to do justice to the dozens of Amateurs who gave so much of their time to traffic handling and phone patches,” radio operator John Gilbert explains. “For many years they provided the only private link with the ‘outside’ world and virtually every human drama, from romance to bereavement, was acted out over these vital communications links. In a very real way they were the mail service, the telephone service and the news service.”²⁹

The most notable of these radio operators was J.S. (Stan) Surber of Peru, Indiana, who first contacted Alert in 1950. During their conversation, JAWS personnel asked him “if he would write down a couple of messages from men there and mail them to their families in the United States.” Surber agreed, and soon became known as “Stan the Man” for his willingness to send and receive messages from all the JAWS stations over W9NZZ. His job as a night train dispatcher allowed him to conduct five or six “gab sessions” with the stations each day between 8:00 a.m. and 4:00 p.m.³⁰ An early recipient of the insulin treatments developed by Sir Frederick Banting and Charles Best, Surber believed in giving back to society, insisted that the families only pay the postage fees for his services, and often hooked his radio to his phone line so that he could phone patch JAWS personnel through to their loved ones.³¹ The frequency of phone patch use varied from person to person. Floyd Wilson, for example, used Surber to schedule a weekly phone patch with his wife and to send her a radiogram at least once a week.³² Other individuals were more private and only made a handful of calls during the course of their postings, or avoided them after finding that southern contact rattled their emotions.³³ Although Surber often talked with station personnel and serviced phone



FIGURE 8-3. J.S. Surber at his living room amateur rig in May 1958. John Gilbert Collection.

patches, he relayed all textual messages by Morse code. The workload was often intense. In 1953, for example, he handled 12,000 radiograms: an average of thirty-three per day from JAWS and other northern stations.³⁴ Despite this load, Surber remained committed to the work for over a decade. Even when he contracted tuberculosis in 1959, he continued a more limited schedule “from his bedside.”³⁵ For this dedication, Surber received a USWB citation and the 1953 Edison Radio Amateur Award from the General Electric Company. The same ceremony also saw Surber’s wife presented with a special citation and wristwatch for being “the most understanding wife of the year.”³⁶

Radio communications between stations also helped to reduce the sense of isolation. Although some individuals had few family members to contact or were content to enjoy their surroundings and let the days pass without interruption, most eagerly sought information about life down south.³⁷ Resolute served as a hub for this small but emerging Arctic community. Throughout the 1950s, most Sundays included a weekly “round table” discussion via amateur radio between all of the stations, with

subjects ranging from station difficulties to the latest gossip about airlift dates or replacement personnel.³⁸ This amateur radio community sometimes extended beyond the JAWS network. On Christmas Day 1953, the weekly roundtable included men serving at far-flung posts in Arctic Bay, Britannia Lake (Dronning Louise Land, Greenland), and Fletcher's Ice Island (the T-3 ice station).³⁹ The practice sputtered in the mid-1960s⁴⁰ and the term "roundup" fell out of use, but Resolute OIC Norman McFarlane still emphasized the need for his station to hold weekly discussions with Isachsen to alleviate morale problems in 1965. In that case, "amateur radio was the only way to clear up misunderstandings which were held there concerning transport of mail and supplies."⁴¹

Communications could also bring bad news. During the dark period in 1952, one of Eureka's personnel received a letter from his wife stating that she was leaving him. The station member was understandably upset, and life at the station became "a living hell for him." His bad news also affected other personnel at the station. Floyd Wilson, Eureka's cook, wrote to his wife about the event at some length, suggesting that the woman in question "should be forced to live under these conditions for a year, then she would realize the sacrifice he was making for her." Wilson claimed that news from down south did not normally upset him, "but here we have to live with each other and his attitude is of course reflected on everyone."⁴²

Practical joking livened station verve and broke up routines. In 1953, Isachsen OIC Bill Nemeth and several friends pranked the station cook, Eugene Cerullo, who had only recently arrived and was still learning about the Arctic. Nemeth arranged for a southern "news" message to arrive at the radio room, which he then relayed to Cerullo via walkie-talkie:

Canadian officials have disclosed the greatest mass wildlife migration in Canadian history. The yearly migration consisting mainly of polar bear, Muskoxen and wolves has begun two weeks earlier than expected and hundreds of miles east of their usual migration path. Ptarmigan fliers report vast herds of Muskoxen[,] wolfpacks [*sic*] and numerous polar bears in the eastern arctic archipelago extended from Prince Patrick Island with the outer fringes of the migration overlapping Elefringness [*sic*] Island. Officials at the following weather

stations are being alerted to the imminent dangers involved in this unusual phenomenon. Mould Bay, Resolute Bay, Eureka Sound and Isachsen.

We will now have a personal interview with a polar bear captured at Mould Bay during the spring of 1951, and who has since been domesticated.⁴³

No one was safe from such pranks. Even the OICs were fair game. After returning to Eureka as OIC in 1963–64, Don Shanks recalled being targeted:

The crew were a bunch of pranksters and it seemed great fun for one of them to come into my room and swap out the regular light bulb in my floor lamp and replace it with a large photographic flash bulb having the same size screw base. I would groan and utter some epithet and hear the unrestrained laughter from several rooms down the hall. Then they would come howling to my open door — but I could not see them as I was still recovering from the flash in my face!⁴⁴

Occasionally such efforts at amusement shifted to the bizarre. In 1951, several of the personnel at Isachsen began obsessing about their thinning hair. In September, they used some fat from a recently killed polar bear as “hair restorer.” One of the personnel suffered burns to several fingers preparing the concoction and his peers had to relieve him of some of his duties “until his wounds heal[ed].”⁴⁵ By November, they adopted a new approach. According to the station’s diarist:

Perhaps to relieve monotony or possibly for the expressed reason of stimulating languid hair roots four of the personnel [at Isachsen] had their heads shorn of all thatching this evening, risking frost-bitten scalps and the jeering amusement of their fellows. Steve, as benefits his position in the camp hierarchy, began the trend a week ago, and a barbering session this evening brought the total polished polls up to five. The general opinion is that the contrast with the beards of varying vintages is unusual.⁴⁶



FIGURE 8-4. Isachsen's John Lessard and Jim Perry get a trimming from Steve Kalin and Bill Thrasher in the station's washroom, November 1951. LAC, RG 93, Acc 81-82-084, Box 18, File 6754-1291 Pt 9.

JAWS personnel also used celebrations to break up the monotony of station life. Scientist and historian Jack Stuster observes that it is important to mark the passage of time at isolated posts to emphasize hope and eventual departure.⁴⁷ The stations celebrated both the Canadian and American Thanksgivings with decadent meals that included turkey with “all trimmings and ... an after dinner drink or two.”⁴⁸ Christmas celebrations, discussed in chapter 7, were also a crucial part of the dark period. New Year's Eve parties, sunrise celebrations in February, and birthday parties throughout the year also broke up the drudgery and allowed personnel to mark the passage of time. So too did interactions with the non-human inhabitants of the stations.

Animals

In addition to working and living alongside their comrades, JAWS personnel interacted with nearby wildlife. Animals were sources of amusement, stress, and potential danger. Huskies, for example, were an integral part of JAWS life. Originally, planners in Washington and Ottawa had assumed that dogs would be unnecessary in the age of mechanization. The early polar bear mauling at Resolute served as a poignant reminder of why Inuit and early explorers relied on dogs as a form of “early warning” and protection against these marauding predators.⁴⁹ An original batch of twenty-five huskies from the Canadian War Assets Corporation were despatched to the stations to warn personnel of approaching wolves or polar bears and to provide companionship.⁵⁰ For most personnel, the dogs were welcome playmates and key distractions during the dark period,⁵¹ and a few individuals trained station dogs to pull sledges.⁵² During the Christmas airdrop, the dogs (raised above the treeline) also amused station crews by becoming “mighty interested” in the evergreen trees, “having never seen one before.”⁵³ Newborn puppies were an especially “great morale lifter for the gang.”⁵⁴

With no check other than disease to control their numbers, the dog population at each station grew rapidly, and it only took a few years for the dog populations to strain station food supplies. In 1952, the Canadian Department of Resources and Development instructed Resolute to destroy all but five of its dogs, and for the satellite stations to reduce their populations to two animals. Resolute’s crew appears to have followed the instruction, and Mould Bay’s personnel shot their oldest dog but refused to cull its remaining four animals. Meanwhile, Isachsen ExO George Toney planned to take one of the five dogs home, but his crew and that at Eureka refused to reduce their remaining populations, which stood at four and six respectively. Rae, recognizing the crews’ fondness for their dogs, recommended that no further instructions be issued “unless a law is passed limiting the dogs at each station to a specific number, and the RCMP is authorized to enforce the law.”⁵⁵

Instead, the dog population continued to expand. In 1953, Mould Bay housed five full-grown huskies and a litter of seven pups. NWT Commissioner H.A. Young consequently encouraged DoT’s Controller of

Meteorological Services, Andrew Thomson, to again instruct the OICs to keep in check their stations' dog populations after speculating that the animals might harm nearby ptarmigan nests or caribou herds, and expressing concern about a report of the dogs harassing muskox herds and killing a calf.⁵⁶ These concerns about wildlife, in addition to the problem of feeding so many animals, led the Canadian Department of Resources and Development to instruct each satellite station to destroy all but two male dogs in late December 1953. The following March, men at Eureka sent a telegram "request[ing] permission to keep dog population at a permanent level of three males and one female in interests of morale and safety of personnel. Guarantee that this level will be kept at station by personnel without any assistance from outside executioner.... Kindly confirm by this message that this arrangement will be satisfactory."⁵⁷ Thomson took the newly-created Department of Northern Affairs and National Resources (DNANR) to task for going over his head in issuing the edict. He admitted that the dogs had molested wildlife in the past, but doubted that they posed a future threat if station personnel controlled their numbers and kept the remainder well fed. Other incidents had recently left two of the stations with only two dogs each, and Thomson asserted that this was too low. Enforcing a two-dog, male-only policy would force the program to replace huskies by expensive airlifts, and since the dogs provided "the necessary companionship and protection" when station personnel carried out regular scientific observations half or three-quarters of a mile from the stations, he believed that a higher threshold of male and female animals was critical to station safety and morale. Thomson concluded his letter by insisting that DNANR could rely on the "integrity" of JAWS OICs and other personnel to enforce a higher and more reasonable population level.⁵⁸

DNANR accepted a compromise. The satellite stations each limited themselves to a maximum of three male dogs and received new dogs from the three male and one or two female dogs at Resolute. To ensure that these orders were carried out, Director F.G.J. Cunningham ordered the RCMP officer at Resolute to cooperate with the OIC to "dispose" of any "surplus dogs" at any of the Joint Arctic Weather Stations.⁵⁹ Thereafter, each installation kept two to three dogs. The ratio between male and female dogs was not strictly controlled, and litters sometimes resulted, but

disease and transfers of surplus animals to other stations maintained a stable population.

In addition to imported huskies, JAWS personnel interacted with wildlife near their stations. These encounters created spontaneous and, with rare exceptions, welcome distractions from the monotony of station life. John Trinko described his delight at seeing “Harvey Rabbits” (Arctic hares) hopping on their hind legs across the tundra.⁶⁰ The rare birds that overflowed or landed near the stations also fascinated personnel. Lowell Demond noted snowy owls, ducks, and geese, and was especially excited when he spotted a Greenland gyrfalcon that he knew from Shakespeare’s plays. Bruce Weaver had been an avid bird watcher and photographer prior to arriving at Mould Bay in 1965, and he continued these hobbies with gusto in the High Arctic. In fact, a PCSP team copied many of his bird photographs to compare with another wildlife survey from the mid-1940s.⁶¹

The Arctic fox garnered the most attention from station staff. “The fox,” Eureka OIC Frederick G. Ayling wrote for the *Christian Science Monitor*, “is a cute little animal the size of a large house cat, its bushy tail comprising half of its bulk. Were it not for the station dogs, it would soon become a real pet, for it is unusually inquisitive.”⁶² Personnel at Isachsen actually tamed a few foxes in 1951. Station diarist George Toney enjoyed working with strip mechanic Jim S. French to domesticate the animal and recorded their progress in detail. On September 4, he noted that:

the fox accepted food, nipping an occasional finger in his eagerness and anxiety. The larger morsels he took off up or down the bay shore, seemingly to bury. When the slices of meat were broken up, he ate them on the spot. All the while he was eating he kept watch on the hill where Pudge [a station dog] was sitting surveying the scene. The fox, although easily tempted, is shyer when two are present than with one person around, according to Frenchy. Even so, “Poochy” came directly up to the men when called and chirped at and remained sniffing the air and looking appealing even after the food ran out.⁶³



FIGURE 8-5. OIC Steve Kalin feeding an Arctic fox at Isachsen in 1951. LAC, RG 93, Acc 81-82 / 084, Box 18, File 6754-1291 Pt 9.

A few days later, “Frenchy” met the fox outside “and had the animal climbing all over him as he sat on the ground.”⁶⁴ A few months after that, station personnel delighted when a fox ventured into their kitchen several times for food.⁶⁵ At Alert during the early 1950s, men worked even harder to domesticate these wild animals. They allowed a skulk of Arctic foxes to build a den under one of the station’s quonset buildings. According to journalist Bill Davidson, “one of the foxes, named Igor, is so tame that he sits up and eats out of [OIC John] Lewis’s hand, like a dog.”⁶⁶

JAWS personnel extended most wildlife this sort of care. At Alert, for example, protecting the Arctic foxes from wolves became “a diversion ... co-equal with card playing, reading and radio listening.”⁶⁷ Hunting was strictly forbidden at the stations: only Inuit were allowed to kill seals or walrus while other animals, such as muskox, were off limits to everyone. Although a few personnel who grew up in rural settings hunted rabbits to satiate their curiosity about their comparative taste, such indiscretions were rare.⁶⁸

Station personnel distinguished between what they deemed to be threatening and non-threatening animals. They feared polar bears most of all. Canadian law strictly forbade hunting them, but men shot the bears when they believed that the creatures posed a direct threat. In the mid-1950s, RCMP Constable Ross Gibson flew to Alert to investigate one such case of ursacide, the killing of a polar bear. “Nanook, the bear, had come into the camp followed by his henchmen, a couple of wolves, the jackals of the Arctic[,] and Frank [Adams], one of the weather station men, had satisfied The Law that it was either his life or the bear’s,” reporter Ritchie Calder recounted. Under Arctic game regulations, however, non-Inuit could only kill a polar bear in self-defence. To acquit himself, Adams recounted how:

The bear ... came around the weather station. We could hear him prowling around our mess-hall and he got among our dogs and scared the wits out of them. He was chasing one of the huskies when one of the pups got loose and he was going to kill it. I had my gun and I was going to scare him and make him drop the pup. I made for the door — the cook was aback of me — and as I opened the door the bear was on a snowbank about thirty feet away. Before I could fire — and scare’m — he dropped the pup and made for us. With one bound he got on top of the bank in front of the mess-hall, with another bound he was off of it and with the third he was coming at me. So I fired — and fired to kill — because I hadn’t much option. I didn’t know a bear could move that fast. It was five feet away when I fired and even if I had tried, I couldn’t have got inside the door and slammed it against his weight. Then we went out and got the wolves.

The law prohibited Adams from keeping “his trophy,” however, and Gibson took the bear back to Resolute where it was given to Inuit to use as dog food.⁶⁹

Many JAWS personnel also considered wolves dangerous to the success of all other life on the islands — including that of humans — well into the 1960s. After all, most scientists still equated these predators with declining caribou populations which, mixed with longstanding stereotypes in the Western imagination, encouraged the killing of wolves as destructive, ruthless animals.⁷⁰ Station diarists at Eureka therefore initially described wolf encounters as “attacks” to be “staved off” or “fended off” by shooting the animals.⁷¹ Similarly, a 1959 memorandum from Eureka noted that wolves became “very bold” during the winter months, having killed eight of the station’s dogs in recent years and periodically threatening station personnel. In one instance, two wolves “attacked a station weasel (a vehicle) on the way from the airstrip area to the camp... Had this been a man walking,” the author noted, “he certainly would have had difficulty surviving.” The memorandum went on to request a scope rifle “to provide better marksmanship and protect the station from wolves.”⁷² There were more wolves in the vicinity of Eureka than elsewhere, but the other stations adopted similar attitudes. When two wolves approached Isachsen in August 1953, for example, three personnel boarded Isachsen’s motorized weasel and pursued the wolves for over a mile, shooting whenever they came into range.⁷³ “We killed a number of wolves,” Lowell Demond remembers, “and I look back on it with regret from the point of view that ... we didn’t really understand them... We sort of believed ... that these wolves were more dangerous than they actually are.”⁷⁴ Author Farley Mowat, whose 1963 book *Never Cry Wolf* (loosely based upon his experiences in the Keewatin region in the late 1940s) went a long way towards rehabilitating the reputation of the Arctic wolf, would have agreed wholeheartedly with Demond’s sentiments.⁷⁵

By the late 1960s, stories from JAWS personnel reflected changing popular and scientific attitudes towards Arctic wolves.⁷⁶ According to Alert’s OIC from 1968–69, Bob Plaseski, the “military wanted to shoot them all because they were ... around all the time,” but “if you waved your arms they generally went away.” As the regional game warden, Plaseski exercised practical jurisdiction in this matter, and only “a couple had to be

shot because they got too aggressive.” Even these confrontations were considered “unusual. Nobody wanted to shoot them but they had to be shot.”⁷⁷ David Oldridge also preferred to coexist with the wolves. Having observed these animals during his time at Alert during the mid-1960s, he ventured to Isachsen in 1969 and did not like the attention he received from one of its local predators. Instead of shooting the animal, however,

I took a broom handle, taped a knife to it making a spear; and I took a baseball bat. I took my spear and my baseball bat and went outside and had a confrontation with Mr. Alpha male wolf and once he realized that I wasn't backing down from him everything was fine. We just had to establish the hierarchy. After that he never bothered me, nor did any of his pack.⁷⁸

This gradual shift in perceptions about predatory wildlife around the stations mirrored the “rehabilitation of *canis lupus*” in Canada more generally — although there are no stories of JAWS residents resorting to eating mice, as Mowat allegedly did to prove his hypotheses about wolves’ dietary preferences. Station personnel preferred more conventional diets.

Food

“It is an axiom of the Arctic that good food is one of the most important factors in maintaining high morale,” J.J. Davis, USWB Chief of Polar Operations Project Personnel Management Division, observed in 1960.⁷⁹ Antarctic social scientists confirm this assessment. “The elevated importance of food under long-duration isolation and confinement,” cultural anthropologist Jack Stuster explains,

has several predictable effects, including increased eating by some, increased complaining about the food by others, and increased time spent in conversation during and following meals.... People who might eat only two meals a day each when at home show up for all three meals at a remote-duty station just for the social contact. They might not be hungry but eat to be sociable, or because there is little else to do.⁸⁰

Archie Asbridge identified the cook as “one of the most important persons” at the weather stations, given his role as a “catalyst for creating a harmonious crew in isolated living conditions provided that he presented appetizing meals.” Considering the limited provisions to which a cook had access, this was no easy feat.⁸¹

Most cooks dedicated themselves to satisfying voracious polar appetites. Despite the limited ingredients available at most of the stations and the lack of fresh meat or vegetables during certain parts of the year, most personnel raved about the meals. Bill Nemeth, the OIC at Isachsen from 1953–54, bragged that his cook “was top notch and ... could womp up anything you wanted.... Even on his days off, he’d come in and say ‘ok, what do you want?’ I called him my ‘magic chef.’ He could brighten your day anytime.”⁸² Many cooks enjoyed the challenge of sustaining high morale. Cook Paul Reid relished “the opportunity to innovate,” quickly learning how to bake pastries and experimenting with variations on old recipes. His biggest challenge was the station’s stove, whose uneven heat only offered three temperatures: “warm, hot, and bloody hot.”⁸³ To further diversify station cuisine, some cooks allowed other personnel to prepare special dishes including cornbread during the 1950s and, by the 1960s, Chinese fried rice, chow mein, Japanese tempura, and Italian pizza.⁸⁴ Several stations also produced their own ice cream.⁸⁵ As a result of these culinary efforts, many individuals recall gaining ten to twenty pounds during their postings in the High Arctic.⁸⁶

The importance of food afforded cooks “informal” influence at the stations. The OIC “ran the show,” but food could also be a powerful motivator. Paul Reid recalled an encounter with a strip mechanic named Albert from Ottawa, who shaved once a week and left his considerable stubble in the sink. Reid repeatedly asked the strip mechanic to clean it up to no avail. In frustration, the cook set up a “surprise” for his messy comrade:

he had shaved that morning and the sink was as grubby as always.... So I was cooking breakfast for guys and ... Albert was sitting there waiting for his because, of course, he knew that I knew what his regular order would be. Well he was waiting, and waiting, and waiting, and eventually he said “Well come on Paul, what is the problem?” I said “Albert, I am really very



FIGURE 8-6. Dinner at Isachsen, n.d. LAC Winnipeg, Acc 2004-01213-7 AES Photographic Records of Arctic Weather Stations, Box 1 – Eureka.

busy this morning and I am saving a bit of time because I'm going to clean the sink too." He sat there quietly, thinking that he was still going to get breakfast. Well I had no intention of letting it go that easily. So everybody was finished and had headed out for work, and there was Albert still waiting for his breakfast. I finally said, "Hey Albert, I'll make a deal with you. You clean the sink [and] I'll give you a good breakfast. Well off he went very reluctantly.... So that was an example of how the ... cook could leverage certain things in an isolated spot.⁸⁷

Not all cooks enjoyed such eminent stature. Their position was one of the hardest to fill, and the USWB and DoT occasionally had to settle for applicants with minimal qualifications. ExO William Greco reported that



FIGURE 8-7. Lindley L. Bradbury, Resolute's cook, with fresh biscuits in 1952. LAC Winnipeg, Acc 2004-01213-7 AES Photographic Records of Arctic Weather Stations, Box 1 – Eureka.

“there were many doubts” when Charles Neuner — a trained strip mechanic — arrived at Mould Bay to assume the duties of the station's cook. Neuner, however, proved effective, and Greco noted that “a majority of the station personnel” gained weight during his tenure.⁸⁸ A few cooks failed to meet the standard. One man who served at Isachsen during the early 1960s had peeled potatoes in France during the Second World War but had no other culinary experience or training. “We learned early on with his stay with us that he could wreck most things ... and he was forbidden to touch any of the fresh produce and meat that we got,” Don Shanks recalled. “He could open cans and do his thing with that, but he couldn't do anything more.” The same individual also baked “bricks” because he forgot to add key ingredients like baking powder and baking soda to his dough. When

this happened, the cook stormed out of the kitchen and threw his “bricks” into a “big steel sled outside, and 25 lbs of his cake reverberated throughout the whole camp.” Accordingly, the Isachsen crew “ate better” during the cook’s day off. In such situations, personnel “learned to love” what the cook prepared, filled the remaining gaps as best they could, and made the best of the difficult situation.⁸⁹

Ideally, all cooks took Sunday as a day of rest from this critical role, but this practice was not always viable. Most crews respected this rule by preparing their own meals during some or all of the day, but many of the men had limited cooking skills and left disarrayed kitchens in their wake. The need for quality meals, combined with the inability or unwillingness of other personnel to take care of the kitchen, drove some cooks to forgo their respite. For John R. Boyle, Isachsen’s cook from 1954–55, the decision to work seven days a week was not easy, as he explained in a letter to his superiors:

This is officially my day off — but of course I never can follow the policy to the letter.... Did you ever try to chew on a pork chop bone while you were the sole object of a beagle [hound’s] supplicant gaze. In short when John eats — everyone eats. If John wants a cup of coffee, be it A.M. or P.M. everyone is in — Knowing the futility of trying to dine in solitude I also prepare dinner and supper. But it isn’t all solicitude for the well being of these brats I have to mother that causes me to work overtime (no extra pay involved). Call it more of a defense measure. When you consider what a shambles these bastards would make of the kitchen, were they to forage for themselves, you can readily understand why I submit to them. A guy has to protect his interests.⁹⁰

All personnel worked long, hard hours, but the importance of good food and the incompetence of others meant that many JAWS cooks spent most of their time, every day of the week, in the kitchen.⁹¹

Alcohol and Drugs

At JAWS outposts, alcohol consumption varied from crew to crew. Some personnel believed the stations ran better without excessive drinking, and did not miss the absence of hard alcohol.⁹² Most OICs and ExOs, however, found that responsible alcohol consumption generally fostered morale and community.⁹³ Occasional get-togethers in the Arctic Circle Club or in staff rooms gave personnel a chance to relax. Rigid station work schedules and military policies on the base at Resolute deterred personnel from over-consuming.⁹⁴ From time to time, Monte Poindexter recalls, personnel were “grossly inebriated ... but it was only on their own time” and they were always “up for work the next day.”⁹⁵ The vast majority of JAWS personnel, moreover, had “other irons in the fire besides getting drunk” — activities that ensured alcohol “was not generally a problem.”⁹⁶

Alcohol was available from various sources. American personnel received a limited amount from the US Highway Patrol, who sent confiscated alcohol to remote American bases in boxes stamped “for medical use only.”⁹⁷ Some personnel also purchased their own alcohol before heading north, imported it from Thule, or received bottles from family and friends. The Canadian state also sometimes supplied alcohol. The RCAF, for example, dropped a large ration to redeem itself after sloppy piloting destroyed much of Isachsen’s 1952 Christmas airdrop. “Imagine our faces and exclamations,” the OIC noted in a subsequent report, when the crew opened a box containing eleven forty-ounce bottles of Seagram’s rye and another crate containing O’Keefe’s and Labatt’s beer.⁹⁸ At Resolute, beer was available at the Arctic Circle Club run by the RCAF. Furthermore, although few OICs and ExOs condoned the activity, the scent of “home” brewing or distilling was hard to miss at such small stations. When permitted, this practice could bring together USWB and DoT personnel. “Some of those Americans knew how to make good moonshine ... [because] they came from places where it was quite common,” Dave Oldridge reminisced.⁹⁹ During his stay at Mould Bay from 1956–57, USWB meteorological technician Monte Poindexter similarly acknowledged that several Canadians made “pretty good beer” using a pickle barrel and parts ordered from the Eaton’s catalogue, though he joked that he “never drank [from] the bottom” of the barrel.¹⁰⁰

Sometimes personal drinking problems predated service at the stations and occasionally contributed to unruly behaviour. While at Resolute in the early 1960s, radio operator Bill Stadnyk was socializing with a member of the RCAF at the Arctic Circle Club. Suddenly the fellow reached across the table, grabbed Stadnyk's shirt, and the "next thing I knew there was a large fist staring me in the face." Stadnyk managed to talk the man down, but the individual subsequently damaged a metal ski-doo with his fists and answered to his Commanding Officer the following day.¹⁰¹ So long as apparent alcoholism did not disrupt station operations, however, personnel were allowed to continue consuming.¹⁰² When the addiction inhibited people from performing their duties satisfactorily, however, they were sent out and did not complete their full tour of service.

Illicit drug use was less common. Each station's drug cabinet was padlocked and under strict control, but a few individuals managed to bypass these safeguards. During the late 1950s, one individual had to be sent home after accessing painkillers without permission.¹⁰³ On another occasion, Glenn Dyer refused to send additional morphine to Eureka after noting that the station's consumption did not match its reported medical emergencies.¹⁰⁴ For the most part, however, the presence of drugs and alcohol at the stations did not create serious problems or hinder official activities.

Sexuality

"Darts, reading, chess, skiing, record-playing, table tennis and other diversions" cannot compensate for the lack of female companionship at the stations, *National Geographic's* Andrew Brown insisted in 1955.¹⁰⁵ At Resolute, the neighbouring Inuit village provided occasional glances at the opposite sex but, while limited interaction between JAWS personnel and residents of the nearby community likely occurred, station officials and the RCMP strictly discouraged liaisons. The satellite stations were, with the rare exception of short-term female guests, completely homo-social environments until after the joint program ended in 1972.

Consequently, glimpses of non-Indigenous women were largely constrained to illustrations and dreams. The use of pin-ups and pornography to cope with sexual deprivation at isolated locales is well documented,¹⁰⁶ but the contestation of their use is less appreciated. Pin-ups from *Playboy*



FIGURE 8-8. Radio Operator Jim Jung running amateur radio equipment at Isachsen in August 1958. Note the pin-ups and amateur radio call sign cards on the wall, as well as the Morse code tap. Jim Jung Collection.

and other magazines adorned many personal quarters at the stations and sometimes hung in common rooms. On at least one occasion, Glenn Dyer felt the pin-ups were too prevalent. While he acknowledged that “some discretion may be allowed in placing decorations in private rooms of individuals,” he considered their placement in common spaces and the radio room to be “entirely inappropriate for a public building.” He consequently ordered American personnel to refrain from mounting posters outside of their quarters, but station crews ignored the edict and continued to adorn public spaces with pin-up posters.¹⁰⁷

Any form of prospective contact with women excited station crews. “Ignore the leers about the women,” journalist Ritchie Calder wrote after visiting the stations:

The nearest white woman was five hundred miles away in Cambridge Bay and the Eskimo women never came near the all-male service base. While I was there a sensational signal came through that a woman Wing-Commander was coming in for a tour of inspection. If a visitant from Mars had been announced it could not have caused more consternation and comment.

One of the Oldest Inhabitants — a young weatherman — said “And as she comes through that door, we will look right at her and say, ‘A woman, if my memory serves me right.’”

She did not come. So the only reminder of womankind which that exile would have for another year was the Hollywood pin-up girl above his typewriter.¹⁰⁸

Stations along the trans-Atlantic commercial flight route even took advantage of their location to converse with airline stewardesses as they flew overhead. “On one occasion a Stewardess from a Dutch KLM flight came on the frequency with a very pleasant voice,” Bill Stadnyk recalled of his time at Resolute Bay. “So I asked her if she would say hello to the boys down on the base. I then connected the air-ground frequency to the station intercom and she came on and said something like ‘Hello boys, I hope you’re all doing fine down there, wish you were up here with me.’” The station personnel relished such banter, however contrived. “We’d kinda ask her to lay it on pretty thick,” Stadnyk reminisced, “and she would do that.”¹⁰⁹

Eureka personnel also enjoyed these exchanges with overflying aircraft and even held a Miss Eureka “personality queen” contest. To enter, flight attendants who flew with the British Overseas Airways Corporation sent the station a letter wherein they described their travels to exotic parts of the world, hobbies, age, height, and hair colour. One described going



FIGURE 8-9. “Miss Eureka” Sue Curtis accepting a plaque presented by former Eureka technician Ron Girardin in front of the GPO Tower in London, England, 1969/70. Eureka weather station logs, Eureka.

to a “blue movie,” and another described “lying in the sun all day with nothing much to do [other] than down the occasional gin and tonic,” joking that it was probably best that the contestants were not “parading in swimming costumes or bikinis” for the station crew since it “might prove to be too much for such folk as yourselves who are virtually ‘womanless’ for such a long time!!” Several applicants included a photo of themselves. Ideally, each entrant also spoke with Eureka radio operators while flying overhead. Station personnel replied to several of the letters, and some personnel went even further. In 1969, Sue Curtis of British Airways won the contest, and twenty-five-year-old Ron Girardin made the trip to London, England and met Curtis at the GPO (now BT) Tower for a “blind date” where he presented her with a station plaque.¹¹⁰

Aware that radio contact was the closest that most of the men would come to interacting with women during their time at the stations, many JAWS personnel neglected their personal appearance. In a homosocial

environment, personal grooming became less important, bathing less frequent, and profanity more prevalent. On rare occasions when women visited the stations, they cleaned up their appearance. Lloyd Cope, the OIC of the ionospheric station at Resolute from 1949–50, found it:

most interesting to observe that change in men's psyche, when after not seeing, hearing, or looking at a female for a considerable length of time, they do funny things. The whole camp of men, some thirty or more, had learned that the USAF was coming in this particular week and part of their human cargo would be two nurses, enroute to Thule in Greenland. It was the talk of our community for days. Such sprucing up of person you wouldn't believe. Beards came off, hair got cut and the crowning glory was to see two of the men in ties as the plane landed.¹¹¹

A similar metamorphosis ensued when two nurses from Thule hitched a ride on a USAF transport to visit their former patient Lowell Demond who had returned to Eureka in 1957. He recalled that:

when this airplane came in we had advanced notice that there was going to be two women on that airplane, and the guys cleaned ... themselves up, changed their clothes, and there was sort of a pecking order that sort of arose to say hello to these girls and try to be friendly and ... the language habits really changed, I didn't hear anybody say anything off colour while they were here. When they left we reverted back to the way we were; to our primitive methods.¹¹²

Such "reversions" after the departure of female guests were common, but sometimes the impact from these visits had more longevity. In 1956, a medical flight from Whitehorse brought RCAF nurse Flight Officer M. Edna Poirier of Prince Edward Island to Mould Bay. During her half-hour stay, Poirier attended to her patient, briefly toured the station, consumed a cup of tea, and smoked a cigarette. After her departure, the men stopped one of their own from cleaning up the table. "Don't wash the cup," they



FIGURE 8-10. An RCAF nurse being welcomed to Isachsen by Canadian strip mechanic Harry Sevigny during the summer of 1958. Jim Jung Collection.

agreed. “Let’s save it, with the lipstick on it, and the cigarette.”¹¹³ The crew subsequently displayed these items in the station’s living room in a special display case built of wood, glass, and green velvet with the following inscription:

Thy Cup

On Sept. 1, 1956, 1700 hours, mountain standard time at Mould Bay, NWT, history was made by this cup which was used by the first woman ever to visit Prince Patrick Island.

Presented to Mould Bay weather station in remembrance of womanhood throughout the entire world by the staff of 1956.¹¹⁴

The statement was inaccurate. A few Inuit women had visited the Mould Bay station prior to Poirier. For example, Amagoalik, an Inuk from Resolute who guided a geologist working at Mould Bay, was accompanied by his wife and family during an expedition earlier that decade.¹¹⁵ Her presence evidently did not stir the same excitement amongst that station's personnel as Poirier's short visit.

At a time when Western Cold War cultural norms were obsessed with heteronormativity, concerns about homosexuality occasionally surfaced at the stations.¹¹⁶ In November 1952, the cook at Alert claimed to have witnessed one of the station's radio operators "playing with" the OIC's genitalia while the latter cut the radio operator's hair. "Both men were fully dressed at the time" and, while station personnel had suspected that the two men had been romantically involved for some time, none had witnessed additional contact.¹¹⁷ The station personnel discussed the matter among themselves for three weeks before contacting Toronto on December 9 (as homosexual contact between consenting men was still considered a criminal act). DoT sent two possible replacements for the accused, as well as Resolute's OIC to investigate. Resolute's OIC quickly determined that insufficient evidence existed to lay any charges. "Despite the inconclusive evidence," he reported, "the other six men indicated that they were convinced ... [that the accused] were homosexuals and that they intended to be aboard the departing aircraft if the two were not removed."¹¹⁸ Consequently, Resolute's OIC sent the two men to complete the remainder of their tour at larger stations further south. According to the report, they were removed from the stations "because of the potentially dangerous personnel problem which would exist if they remained."¹¹⁹ Since the allegations were never substantiated, the incident was not added to their DoT records. The official explanation for their transfer simply stated "personnel difficulties." Reflecting on the outcome, an official from the USWB commented that:

While guilt was not proven, the fact that the remaining five [*sic*] members of the staff were solidly arrayed against them lent credence to the fact that some grounds for suspicion existed. While I do not concur with the idea that, ordinarily, a person be removed from a position on the grounds of suspicion alone,

I feel that in a remote, isolated spot, such as Alert, where so few men must live and work in close harmony, such a situation might soon result in violence.¹²⁰

Thus, at the isolated Joint Arctic Weather Stations, sexuality was checked from without and within. Homosexuality was not accepted under any circumstances. Even heterosexuality was circumscribed. Personnel openly craved female companionship, but did so within accepted boundaries. Public actions such as piping a female stewardess's voice through the station loudspeakers or posting pin-up posters were commonplace. Even celebrating the transiency of a nurse with a display case was within acceptable mores. So long as station personnel stayed within these boundaries, their activities served as useful coping strategies and contributed to station morale.

Coping with Isolation

Despite the activities and distractions available to JAWS personnel, many struggled to cope with their isolated and confined conditions. As polar explorers and psychologists have long noted, minor idiosyncrasies or quibbles can become major irritants to personnel stationed at remote outposts.¹²¹ With so few individuals with whom to interact, unable to travel south owing to technological or budgetary limitations, and aware of chronic shortages of fresh recruits, everyone was encouraged to be friendly and to try to defuse altercations. Nevertheless, even the well-adjusted individuals suffered occasionally from confined conditions.

JAWS personnel were generally patient with each other's idiosyncrasies as long as they did not disrupt station life. Bob Plaseski, who served as a met tech at Resolute from 1967–68, and then as Alert's OIC the following year, remembered one mechanic who had no family and rotated between six-month postings at Alert and McMurdo Station in Antarctica. Plaseski praised the individual's ability to "fix almost anything," but admitted that he "found him a little squirrely."¹²² "The dark period was a very difficult experience for almost all of us," Lowell Demond recalled. "We found for example that we spent a lot of time sleeping... Some people would get fairly depressed and we sort of cared for each other ... and tried to be supportive whenever we could.... You would always try to be helpful and

always try to be friendly with someone else.”¹²³ John Gilbert agreed. “If we noticed anyone suffering ... we would let them work it through for a few hours and then jolly them out of it.”¹²⁴

Sometimes station crews found creative ways to correct what was considered to be abnormal behaviour. At Resolute during the late 1950s, for example, two individuals refused to do their laundry or take showers. After a while, Asbridge reminisced, “their presence was noticeable as soon as they entered a room,” so other station personnel took matters into their own hands. At first, the rest of the crew tried to intimate the imperative of cleaning by leaving soap in the offenders’ boots, but the two individuals failed to take the hint. A bolder, second attempt proved more successful. By using teletype paper, Resolute’s personnel produced large banners with six-inch text saying “BATH NIGHT AT RESOLUTE” and “LAUNDRY DAY AT RESOLUTE.” After a few “well-directed verbal quips,” the dirty personnel obliged their peers.¹²⁵

Although the vast majority of personnel selected for the JAWS program coped well with the strain and only exhibited minor stress symptoms, problems ensued when either the USWB or DoT sent ill individuals north. In December 1952, for example, Isachsen’s station cook was chronically oversleeping and failing to prepare meals on time. At first, the station’s ExO “put off saying anything to him in the hopes that he will straighten himself out.” When the situation did not improve by the new year, the OIC asked the ExO to approach the cook about keeping up with his duties. Thereafter, the meals were “more regular” but the quality became “very poor.” When approached again about his failure to empty the kitchen’s heaping garbage can, the cook refused, daring the ExO to “make him.” On February 15, the cook again overslept and refused to get up despite the ExO’s repeated attempts to wake him, so the station’s personnel had to prepare their own dinner. Later that evening, the cook insisted that he was ill with bronchitis. “The general opinion of everybody when this came up was that it was a feigned illness that he was putting on to cover up for his laziness,” the ExO remembered. “The reason we thought this was that he didn’t say anything about it to me when I called him.” The ExO radioed south and received instructions for the treatment of bronchitis, then moved the cook to a bunk in the mess hall so that he would not have to venture outside. In the coming weeks, the cook’s health did not

significantly improve, though he was “up and running in and out of doors watching the sunrise” on February 16. To his horror, the ExO subsequently learned that the cook was receiving a US Army pension for chronic bronchitis contracted while serving in Iceland during the Second World War. The cook claimed he had disclosed his condition to the USWB before coming north, but the ExO complained in his report that it “appears unreasonable that he would take a job in such an unfavorable climate. It also appears unreasonable that the Weather Bureau would send a man to an isolated station who is being pensioned for a chronic illness.” The rest of the station personnel continued to question the severity of the cook’s condition, which led to the latter quitting all kitchen work and spending most of his time in the barracks. This forced the station personnel to assume complete responsibility for meal preparations, and the cook took his meals in the mess hall after everyone else left.¹²⁶ The final outcome of these difficulties is not recorded in the archival record, but the example illustrates how prolonged illness strained relations at isolated stations with limited staffing.

Such incidents, while rare, also pointed to weaknesses in the JAWS personnel selection processes. Bruce Weaver remembers a new American met tech who arrived at Mould Bay in September 1965 and learned that he suffered from agoraphobia. The individual had been completely unaware of his condition, but “discovered it in a hurry. He literally could not make it down from the cookhouse to the bunkhouse. So he stayed in the cookhouse for thirty days until the ... October supply flight came in and he left on that.”¹²⁷ Due to the short-notice evacuation, Mould Bay had to operate without a fourth met tech that winter.

More heated altercations, though rare, strained camaraderie at the stations. In the mid-1960s, the exterior door to the Mould Bay barracks automatically slammed shut to ensure a tight seal. The rapid closure sent a gust of wind down the corridor causing all of the bedroom doors to jar loudly. Personnel were told to close the door slowly to prevent this disturbance. The seismologist, who slept in the JAWS barracks but kept different hours than the rest of the station, “often complained bitterly about” one individual who consistently woke him by allowing the door to slam. When this occurred one too many times, the otherwise even-tempered seismologist rushed from his room and, brandishing a fire axe, threatened

to attack the noisy offender. According to Weaver, the two yelled at each other for ten to fifteen minutes “and it was over. The two of them kept their distance from each other for the next month or so.”¹²⁸ In this case, station personnel resolved the matter without recourse to the OIC or ExO. Such self-regulation was typical and necessary for successful station operations. “The dynamic of the station crews allowed these things to sort of ebb and flow,” Don Shanks explained. “I think if you took a hard stand on this and try to regulate it out of existence I think you’d have failed at it.”¹²⁹

Leadership

While informal discipline was common, confrontations that required the OIC or ExO to intervene tested the relationships that station leaders cultivated with their subordinates. Personnel continued to rebuff leaders who, like Cleghorn at Resolute in 1947, tried to impose an authoritarian style on station culture. Another OIC, who went on to enjoy a lengthy JAWS career, infringed upon his frustrated ExO’s authority at Isachsen in 1959 and developed a reputation as a “perfectionist” among most of the station’s personnel. One individual even called him “autocratic.” A station inspector noted the OIC’s “meticulous” attention to detail but admitted that “this personality does not mix well with the others on the station” and that he had “completely withdrawn” from the social life of the camp. Upon reflection, even the OIC conceded that he struggled to get most of the station’s personnel to follow his orders.¹³⁰

Instead of establishing a strictly hierarchical command structure, “esteemed” leaders (as polar psychologist Paul Nelson describes them) adopted a “democratic” and personal leadership style that preserved impartiality. Successful leaders differ “most from unpopular leaders by exhibiting greater emotional control and adaptability and maintaining harmony within the group.”¹³¹ The most effective OICs and ExOs also developed a rapport with each individual at their stations and worked, ate, and relaxed with the rest of the personnel. They consulted on-site specialists about technical matters before making decisions, and all personnel expected to give input on general station policies. In short, effective leaders were good team builders. Bill Nemeth used this formula when serving as Isachsen’s OIC from 1953–54:

If there was anything that really needed to be done on a joint basis, we just sat down and hammered it out, and got the guys all together and said “this is what we have to do, what is the best way of doing it, and who is available to help?” And that pretty well handled it. The assignments were made, and no one I can remember ... had cause to say “gee I don’t like that assignment” ... because everyone pitched in.¹³²

Team unity and trust between station personnel and leaders also allowed for more authoritarian-style leadership during crises.¹³³ If leaders failed to intervene in these situations, disruptive behaviour was “often infectious.”¹³⁴ Yet, even in these situations, effective OICs and ExOs carefully avoided overstepping their authority by following the “kindness and consideration” examples shown by leaders like Ed Goodale at Thule in 1948.¹³⁵ Indeed, most station leaders recognized that they had few alternatives. Every position at the stations was critical to successful operations. Consequently, “if there was a personality problem you had to fix it,” Bob Plaseski explained, “because you knew that by shipping somebody south you wouldn’t probably get a replacement — you’d have to do without.”¹³⁶

A brief private reminder from the OIC or ExO usually resolved minor personality problems. Weaver recalled how his station leaders gently approached personnel to suggest that “it would help if you did your laundry periodically” or “take your turn cleaning.”¹³⁷ On other occasions, longer conversations were necessary. At Isachsen in 1953, the cook learned that his father had died during the Christmas season and subsequently showed signs of depression. Sensing his cook’s darkening mood, OIC Bill Nemeth took the time to talk with him one-on-one and helped the cook to put the situation back into perspective. Nemeth later recalled that, once personnel recognized that they could not leave and remembered that their duty was “short-term pain for long-term [financial] gain,” they settled into a routine and kept busy.¹³⁸

Sometimes these discussions could be hair-raising. One night at Eureka during the winter of 1963–64, OIC Don Shanks was in his bed when a Canadian radio operator ran into the barracks yelling “Shanks, Shanks, they’re gonna kill each other.” Rushing to the mess hall, Shanks found his cook and electronics technician eyeing each other in “dead

silence.” The tech was checking the clip on his .45 pistol while the cook was in the kitchen sharpening a butcher knife. Shanks sat down at the head of the kitchen table and asked: “so what’s going on guys?” They both gave him “the eyeball” but said nothing. Shanks told both of them that he knew what was going on and, turning to the electronics technician, said: “‘you’ve got to give me that gun.’ And within about three seconds he slid it across the table to me.” Removing the clip, Shanks turned to the cook and told him “‘you’re going to put the knife back on the chopping block aren’t you.’ And he did it with no words.” In hindsight, Shanks thinks that the electronics tech, who was the oldest man at the station, was relieved to escape a dangerous situation. “It had escalated beyond where he had thought it was going to go,” Shanks observed, “and here I was offering him an out.” The next day, Shanks and his ExO discussed these events and decided to watch the two men closely but not intervene unless there were further confrontations, thus allowing the two men to find their own way to coexist. For the remainder of the tour, the relationship between the two men was “strained,” but they did not exchange further harsh words and simply “kept their distance.”¹³⁹ Even in extreme circumstances, JAWS leaders avoided dictating resolutions whenever possible; calmly redirecting frustrated individuals into compliance offered a more attractive remedy that produced long-term peace and stability amongst men confined to an isolated outpost.

Occasionally, mental depression proved more destructive. Alone in his room during the week between Christmas and New Year’s in 1953, a drunken individual at Eureka (who was a known alcoholic) shot a hole in the roof with one of the station’s rifles. The OIC and ExO confiscated the weapon and helped the depressed individual back to a healthier mental state. In the end, Ken Moulton recalled, “he got through it, as we all did.”¹⁴⁰ In rare instances, such assistance was not rendered in time. When coming off duty, Richard Harrison, an American radio officer at Resolute, had a habit of going into the OIC’s bedroom and turning on the lights to wake him up. On 17 February 1952, Harrison entered the room to find a scene of carnage: the OIC had shot himself in the head. “Troubled with melancholy and lack of self-confidence,”¹⁴¹ the OIC had requested a transfer out but this had been rejected. The traumatized crew had to clean up the mess and prepare the body. When Howard Wessbecher arrived at

the station a few months later, he noted that the staff remained “totally jittery” and nervous as a consequence of the former OIC’s suicide.¹⁴² In a summary of the incident, Resolute’s ExO noted that “this tragedy grimly points out the paramount need of careful screening of personnel.... It also points out the need for a careful watch by responsible personnel for signs of mental breakdown.”¹⁴³

Achieving Goodale’s “kindness and consideration” equilibrium was not easy. Excessive tolerance or nagging by station leaders could harm their authority. In 1953, Isachsen’s ExO, for example, gathered snow for melting when his personnel refused to take their turn at the job. When discussing the issue in his regular reports, the ExO claimed that “more often than not the personnel at fault dislike being reminded” of their duties. He “found it easier to do this myself than [to] have to put up with the constant nagging and arguing which is my lot when the chore is not done. I have tried every means except force to get cooperation on this chore and although personnel say they are willing to do it they either forget when their turn is due or just don’t bother.”¹⁴⁴ Although additional reports confirm that at least two of Isachsen’s personnel that year proved disruptive and poorly suited to station life, the ExO’s example demonstrates how station leaders did not always manage to strike a delicate balance with all personnel under their charge to ensure smooth station operations.¹⁴⁵

Shared Command and Canadian Sovereignty

On the rare occasions when more decisive action was necessary, OICs and ExOs had to carefully navigate the complicated and overlapping binational command structure of the JAWS program. The OIC commanded the entire station and therefore focused on operations, drafted work schedules, and monitored Canadian personnel. The ExO bore responsibility for all American equipment and supplies at each site, as well as his country’s personnel. DoT’s ongoing struggle to recruit a sufficient number of individuals for its allotment of JAWS personnel forced it to deploy OICs who were often much younger and less experienced than their American counterparts, and this limitation led some prominent Canadian officials to worry that Americans might dominate the stations and compromise Canadian sovereignty in the High Arctic.

JAWS personnel naturally brought their national identities with them to the stations, and cultural differences occasionally created friction. In 1956, for example, Canadian and American personnel debated Britain's controversial involvement in the Suez Crisis. Such divisions were rare between citizens of closely allied countries.¹⁴⁶ Domestic politics created a few additional disagreements, though these were also infrequent. "Civil rights were just becoming understood," Weaver remembered from his time in the JAWS program during the mid-1960s. "We had a number of southerners who were adamant about Blacks," he recalled, "so there were times when that got quite testy."¹⁴⁷ According to a letter from Glenn Dyer to Eureka's ExO, another American at the station "openly voices disdain and antipathy for certain racial groups or individuals." Dyer instructed the station's ExO to maintain the "good will ... built up over the years" with Canada by confronting the individual, reminding him that he worked at an "international cooperative station," and instructing him to "curb his frequent declamations about ethnic groups."¹⁴⁸

Such tensions never threatened to undermine Canadian sovereignty in any way, and national identities did not factor heavily into everyday life at the isolated posts. Indeed, most JAWS personnel carefully avoided divisive subjects and focused on commonalities. "There are cliques," R.A.J. Phillips acknowledged in a draft article for *Foreign Affairs*, but station groups did not tend to divide between Canadians and Americans. Instead, the occasional cliques that developed typically formed along professional lines like radio operators or met observers.¹⁴⁹ JAWS personnel were ultimately "a bunch of like-minded people, regardless of nationality doing whatever work we were there to do," David Weston recalled.¹⁵⁰ Maintaining this common focus on getting the job done was usually sufficient impetus to move past any awkward moments arising from national differences.¹⁵¹

A small handful of JAWS leaders, however, ignored instructions to cooperate. When OICs and ExOs failed to respect their overlapping jurisdictions or misinterpreted their powers, clashes sometimes ensued. ExOs, for example, resented OICs who assumed that their responsibility for the "overall administration of the station" entitled them to oversee an ExO's areas of responsibility.¹⁵² When ExOs ignored their OICs, similar complications arose. R.G. Chapil, Eureka's OIC from 1960–61, had to overcome ageism when some American personnel complained that he "was young



FIGURE 8-11. JAWS personnel posing for a group photo at Eureka in 1959. Department of Transport.

enough to be the executive officers [*sic*] son.” His ExO did “not seem to have much knowledge on the operation” of the JAWS program and stubbornly clung to the idea that he was “in charge of the station.” Chapil responded to this challenge by “dig[ging] through station files time and time again” to document his own areas of jurisdiction. Through these means, the young OIC maintained his authority and asked the USWB to better instruct its personnel and, ideally, assign “younger” ExOs in the future.¹⁵³

Inexperience could nevertheless bring an OIC’s judgment into question. When a new Canadian OIC arrived at Alert late in the fall of 1954, he had not been fully briefed on his duties. After arriving, the ExO’s “strong personality and longer Arctic experience caused [the OIC] to agree too readily with his ExO’s ideas during early in the tour.” Consequently, station personnel gravitated toward the ExO for direction and leadership. “Aware of the situation, Alert’s OIC chose not to make an issue of it to ensure that no incidents would arise,” an official report lauded, “and the year passed smoothly” even though the OIC proved unwilling to counter some of the ExO’s decisions.¹⁵⁴

In moments of doubt, most American ExOs recognized that they were on foreign soil and remained mindful of Canadian authority. In 1964, for example, Resolute's comparatively new OIC dismissed a popular and talented Canadian met tech from the station for allegedly disrespecting authority figures. ExO Burton Goldenberg had considerably more experience after working at the station for a year and a half in addition to previously serving with the USWB in Antarctica, but he refused to intervene despite his personal doubts about the allegation.¹⁵⁵ In his judgement, the matter was "mostly Canadian. We [the United States] are involved only because we are here." Although station personnel sometimes created "uncomfortable" situations by encouraging Goldenberg to take sides in disputes, he assured concerned USWB officials that "I have always avoided partisanship. I realize the necessity of working with the OIC on a cordial basis[,] I have always done this, and will continue to do so in the future, regardless of my personal feelings."¹⁵⁶

Serious differences or power struggles between OICs and ExOs remained exceptional, and the joint command structure that underpinned the JAWS program proved overwhelmingly amicable and effective. In 1955, Canadian Deputy Minister of Transport J.R. Baldwin reported to the Department of External Affairs "that any differences experienced with the United States personnel have been of such a minor character that they could be considered as non-existent."¹⁵⁷ This spirit of cooperation persisted through to the end of the program. In monthly and semi-annual reports, OICs, ExOs, and station inspectors typically characterized cooperation between American and Canadian personnel as "excellent."¹⁵⁸ Indeed, an overwhelming preponderance of archival and oral evidence emphasizes "cooperative" or "harmonious" relations between station personnel, demonstrating that high-level concerns about power asymmetries and sovereignty were divorced from friendly and effectual cultures on the ground.¹⁵⁹

Although the OIC's authority flowed from his status as a Canadian official operating on Canadian soil, sovereignty was not a major component of station culture. Most Americans accepted Canadian sovereignty without question. "I was a pretty green young man at that time about things like that," Ken Moulton explains. "But I don't even recall that they [the USWB] talked to me about that before we went there, but I was certainly

aware that we were on ... Canadian soil, we were their guests really at the station.”¹⁶⁰ Former Canadian JAWS personnel offer similar recollections. When discussing his memories of the stations and Canadian sovereignty, Lowell Demond remembered having “some inkling ... but we were never versed in it.”¹⁶¹ As an OIC, Don Ware understood the importance of maintaining control, but he acknowledged that the primary purpose of the stations was to collect weather data for global forecasting. “Sovereignty never really came up,” he recalls; “certainly it was nothing we ever talked about.”¹⁶²

Ultimately, the vast majority of OICs and ExOs successfully navigated the intricate and sometimes overlapping command structure by respecting each other’s roles, establishing strong professional relationships, and consulting continuously on all matters of common interest. Bob Pearson, an American who served as a radio operator at nearly all of the stations during the early 1950s, noted that these leadership roles were well understood and well established. “We knew the OIC was in charge of the whole works,” he explained. “The ExO was there to handle any problems we had with the Weather Bureau.” If a more general problem arose, “the OIC would have handled it.”¹⁶³ Shanks, as OIC at Eureka from 1963–64, reached a similar understanding with an ExO who was more than twice his age. If American personnel thought something serious was wrong, they were to approach their ExO who “would either stop them or take the case ... to me. But you know,” he emphasized, interactions were “never ever that formal.”¹⁶⁴

Such close consultation and trust between station leaders remained common throughout the JAWS program. In one case, the cook at Alert struggled to cope with the isolation and became agitated each time someone complained about his cooking. At one point he went on strike and, brandishing a knife, barricaded himself in his room. Because the cook was American, the ExO intervened. Station OIC Bob Plaseski “assisted” his ExO by being present, but emphasized that “it was his staff, not mine.” The intervention helped for a time, but it eventually became clear to both station leaders that the cook was unable to find a better frame of mind. As the OIC, Plaseski decided that it was best to send the cook home and simply make do without those services for an indeterminate period. Throughout

the episode, the OIC and ExO consulted one another constantly, and Plaseski concluded that their division of responsibilities was “textbook.”¹⁶⁵

In 1958, R.W. (Bill) Rae wrote that:

The trials and hardships which Arctic explorers of old had to endure are almost beyond belief[;] the Arctic exacted a heavy toll on the daring few who ventured to probe its secrets. The operation of modern Arctic weather stations, however, does not resemble the enforced winterings of former Arctic explorers any more than a trans-continental flight resembles a trek across the prairies by ox-cart. Cold front-lined holds of sailing ships have been replaced by prefabricated insulated houses, heated by thermostatically-controlled oil burning furnaces. Flickering oil lamps have given way to diesel-generated electric power. The staples of Arctic diet are no longer tinned beef and lime juice but well balanced diets, including fresh meat and vegetables and, an added safety factor, vitamin pills.¹⁶⁶

Such descriptions of “effortless modernity,” Stephen Bocking observes, provided southern readers with familiar touchstones, offering reassurance that the physical and institutional infrastructure installed by Canada and the US made the High Arctic safe and liveable for JAWS personnel. Modern transportation systems and robust logistics allegedly overcame the harsh and challenging Arctic conditions endured by previous generations of explorer-scientists, and now afforded scientists the comforts of southern homes.¹⁶⁷

The men who actually worked at the stations recognized how their lives in the Arctic differed from those of the “heroic era” scientist-explorers who passed through the region, but they did not see their contributions as expressions of “effortless modernity.” By providing historical and empirical depth to our understanding of everyday experiences at these polar sites, this chapter offers further insights into the material and affective dimensions of station life.¹⁶⁸ The High Arctic weather stations, with the exception of Resolute, were hundreds of kilometres from other communities. Isolation and confinement created stresses similar to those experienced by personnel at Antarctic stations and encouraged similar coping strategies.

JAWS personnel worked long hours, pursued diverse hobbies to fill their free time, cherished station dogs, and appreciated good cooking. In these exclusively male environments, the crews posted pinups of women and enforced heterosexual norms. Overall, the tenuous aspects of life at the stations are striking because they reveal the limits of modernity's power to create safe and stable places for the collection of reliable data for scientific consumption.¹⁶⁹ Joking and gentle cajoling helped to buoy spirits and avoid depression. Personnel who felt lonely pursued additional connections via an Indiana radio operator and overflying stewardesses. Like their Antarctic counterparts, JAWS leaders adopted the gentle leadership styles that are necessary at isolated places, managing personality clashes and depressed crew as needed. Not all problems had satisfactory solutions, but most did, and stories about life at the stations reaffirm (as scholars Lawrence Palinkas and Peter Suedfeld remind us in general) that personnel working at isolated polar stations "can enjoy and benefit from an experience even though they also show signs of discomfort or psychological symptoms."¹⁷⁰

The stories also reveal a strong, collective sense of belonging at jointly-run stations cohabited by men from two countries. "In a small unit ... events of national and inter-nation[al] magnitude are reduced to a purely personal basis," American Bruce Aikins, the JAWS Administrative Officer in Resolute, explained in early 1963. "If the men with whom you work form their opinion of the Joint Arctic Weather Stations, the Weather Bureau and even the whole United States, based on their opinion of you, it becomes vital that your actions be considered carefully."¹⁷¹ In isolated stations operated by an equal complement of Canadians and Americans, the danger of the small teams dividing along national lines posed legitimate concerns. Both the US Weather Bureau and DoT believed that it was "essential that cooperation and [a] cordial relationship exist between staff members of both U.S. and Canada" to sustain good morale at the stations,¹⁷² and had no qualms about recalling personnel when individuals failed to work amicably with their "foreign" counterparts.¹⁷³ Such cases were rare, however, and oral histories and the archival record do not support the typical portrait of the Joint Arctic Weather Stations as locations of Canada-US tension and struggle. Historian Shelagh Grant, when framing the program as an example of the US government's duplicitous agenda

to usurp Canadian Arctic sovereignty, alleges that “officially, the ‘officer in charge’ was a Canadian; in practice there was also an American ‘executive officer’ unofficially in charge.”¹⁷⁴ Similarly, historian Stephen Bocking suggests that the JAWS “facilities [were] themselves the site of a contest of authority between Canada and the United States.”¹⁷⁵ Our systematic research reveals little empirical basis for these claims. The vast majority of American ExOs recognized the Canadian OIC’s authority, which reaffirmed the Canadian state’s presence and sovereignty. The successful bilateral relationships forged and sustained on the fringes of the Arctic Archipelago, however, did not stop Canadian journalists, politicians, and bureaucrats from worrying about their country’s Arctic sovereignty or from lobbying for their country to “Canadianize” the program.

Canadianization: Getting Out of Joint?

The joint Arctic weather stations have done much to make clear to the world Canadian sovereignty in the Arctic. The United States has recognized completely Canadian sovereignty over the territory by agreeing to all Canadian stipulations in operating those stations. Canadian hunting laws are obeyed, Canadian postage stamps are sold at the remotest stations, Canadian archaeological regulations are respected and carefully carried out by United States citizens.

Andrew Thomson (1959)¹

From the onset, the Canadian government had hoped and planned to assume full responsibility for the resupply and operation of the Joint Arctic Weather Stations in due course. When Minister of Reconstruction and Supply C.D. Howe announced the program in Parliament on 4 March 1947, he explained that American personnel would be “invaluable until sufficient technically qualified Canadian-trained personnel are available.”² As the early chapters showed, some public servants were keen to see this “Canadianization” happen immediately. When officials in Ottawa and Washington drafted the exchange of notes intended to govern the joint endeavour, Commissioner of the Northwest Territories Hugh Keenleyside expressed displeasure with Canada’s decision to contribute only half of each station’s personnel. “I am sure,” he declared in a note to Canadian ambassador Lester Pearson in Washington,

that our Government would not accept such a prospect with enthusiasm and would be likely to take a very dark view of any suggestion that the responsible Canadian authorities could not train a sufficient number of qualified technicians in less than five years. So far as this Department is concerned, we believe that it is quite possible to train the necessary Canadian personnel, and in a much shorter time than would seem to be envisaged in the draft note.... We also consider that such action should be taken.³

The Department of Transport — responsible for recruiting and training Canadian personnel to serve at the stations — disagreed with Keenleyside’s assessment. “Canadianizing” the High Arctic stations with entirely Canadian staff was unrealistic in the foreseeable future. After all, the department had already committed to Canadianizing eight American-operated stations in the northeastern Arctic, and the US provided significant funds, supplies, building materials, sophisticated meteorological equipment, and transportation capabilities to enable JAWS operations. Sustaining the US Weather Bureau’s “interest and ... ability to obtain appropriations would be greater if American personnel were at these stations.”⁴ After all, Congress would not let American personnel suffer shortages or undue hardships while working in the Canadian High Arctic. Accordingly, DoT refused to commit to a timetable for Canada to assume full responsibility, and George McIlraith, Howe’s parliamentary assistant, affirmed a few months later in June 1947 that the USWB would continue to supply half of JAWS personnel “until sufficiently trained Canadian staff are available.”⁵

Both Canada and the United States questioned the extent and form of American involvement in the JAWS program intermittently over the next twenty-five years of joint operations. Was Canadianization necessary or practical? Some Canadians fretted over whether a heavy reliance on American personnel, equipment, and transportation resources compromised Canada’s *de facto* (if not *de jure*) Arctic sovereignty. On the other hand, could Canada safely assume ongoing US support for a joint program? While the superpower had extensive resources at its disposal, it had to balance JAWS requirements with global commitments. Canadian

officials grappled with these questions, answering them differently depending upon their departmental affiliations, perceptions of vulnerabilities and capabilities, and shifting political contexts. Senior Canadian Meteorological Service and USWB officials stalwartly defended the joint program, touting it as a model of bilateral understanding and cooperation. Their message prevailed, effectively countering threat narratives in internal Canadian government circles — but it could never fully reverse the American-challenge-to-Canada’s-Arctic-sovereignty narrative in political, academic, and public discourse.

In retrospect, the conventional, dominant narrative that emphasizes the ongoing American threat to Canada’s Arctic sovereignty seems misplaced with respect to the JAWS story. While “sovereignty” animated the debate over Canadianization, the practical application of the concept saw Canada gradually assume responsibility for resupplying the stations in forms and at a pace that its growing capacity allowed. In the early years, “the United States carried out this task practically alone, with only token Canadian participation,” historian Gordon Smith observed. “As time went on, however, Canada took over an increasing share of the load, and eventually it became almost as completely a Canadian show as it had originally been American.”⁶ While day-to-day JAWS functions continued to play out through well-established joint engagement and shared responsibility at the station level, Canadian officials increasingly directed the larger operational theatre — a scenario welcomed by their American counterparts. When the full Canadianization of the stations occurred in the early 1970s, it was not at Canada’s behest but as a consequence of American parsimony and a recognition that, by this point, Canada could certainly manage and afford to run the stations on its own.

Conceptualizing Canadianization: Breaking the Ice

In the late 1940s, with the US bearing full practical responsibility for JAWS construction and resupply operations, Canadian politicians tended to link the civilian weather station project to the broader suite of expanding continental defence projects proposed and pursued by its superpower neighbour. Accordingly, fears of American security agendas overwhelming or undermining Canadian Arctic sovereignty featured prominently in most high-level discussions in Ottawa about the weather station program.⁷

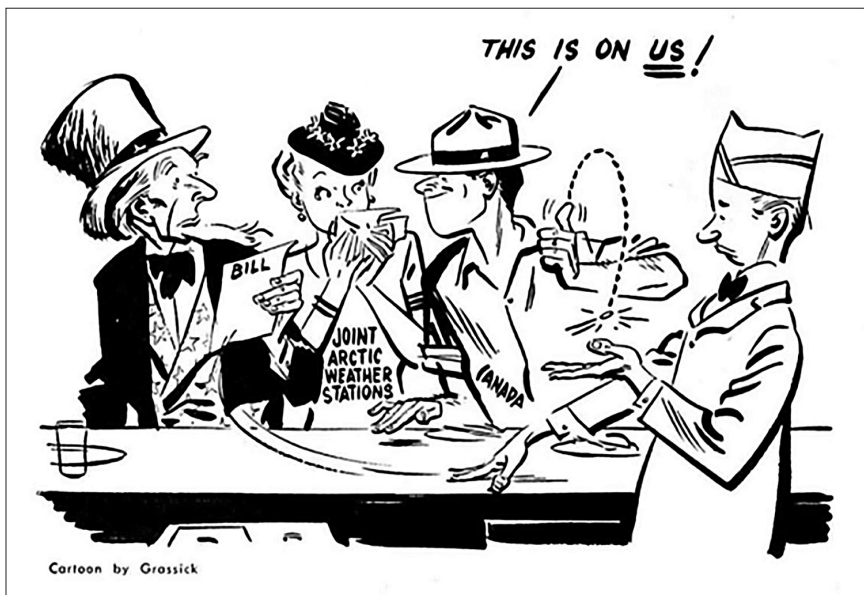


FIGURE 9-1. "If Uncle Sam pays most of the bills, is it tactful to take the credit?"
Maclean's, 1 March 1950.

Capability gaps limited Canada's options, particularly the inadequate Arctic icebreaking capacity that precluded Canadian vessels from contributing to sealifts. Without physical evidence of its participation in transporting materials to the weather stations, could Canada claim credibly that this was a "joint" project and that the US was not running the show?⁸ Capacity was "the key to the Arctic," an RCAF report on the 1948 sealift insisted. "Whatever the cost, the Canadian government must control this key to our Arctic Islands."⁹

In this context, Secretary to the Cabinet Arnold Heeney argued in the fall of 1948 that it was time to consider a "government policy of Canadianization" in the Arctic similar to that successfully implemented in the Northwest during the latter stages of the Second World War.¹⁰ Within months, the St-Laurent government adopted an official policy dedicated to discerning measures that would "keep the Canadian Arctic Canadian."¹¹ The central component of this strategy focused on greater Canadian involvement in resupplying JAWS, so the first priority was

procuring vessels.¹² Although the RCN and DoT began to construct new icebreakers in 1949, steel shortages and design changes hampered progress.¹³ This delay frustrated the US Navy which, far from seeking to cling to full operational control, eagerly anticipated Canadian capacity to relieve it of the JAWS sealift burden. That March, the USN requested that *N.B. McLean* carry supplies to the proposed Alert site on Ellesmere Island because its icebreakers faced competing priorities and required repairs. Despite the cries for “Canadianization” in official circles, DoT could not comply, prioritizing important icebreaker tasks to facilitate shipping in Hudson Bay as well as the St. Lawrence and Saguenay Rivers over a High Arctic mission.¹⁴

The archival record clearly indicates that there was no insidious plot by the US Navy to monopolize the JAWS sealift and build a rival claim to sovereignty over the High Arctic islands. US officials emphasized that the joint weather station program was in their “national interest” and should be expanded “to obtain even greater coverage throughout the Arctic.” Nevertheless, budgetary limitations, the lack of personnel and ships for Arctic work, as well as competing naval operations “of a higher priority” in the north Pacific strained American resources. Canada had to do more to help, the US Chief of Naval Operations told Reichelderfer in September 1949. “It appears that it would be advantageous to both the United States and Canada for Canada to assume complete responsibility for the present weather stations, particularly with regard to transportation activities, at the earliest practicable date, in order that available United States effort and funds be utilized for the establishment of additional weather stations in other critical areas.” Although the US Navy recognized that Canada did not have the capacity to contribute immediately to resupply efforts and thus agreed to provide American ships for the 1950 and 1951 operations, it refused to commit to efforts beyond that time.¹⁵

Each country’s contribution of half of each weather station’s staff was not the same as sharing an equitable burden overall. Reichelderfer emphasized that the USWB welcomed increased Canadian contributions to the joint stations, and he looked forward to Canadian and American “parity” in all aspects of JAWS activity. The Bureau chief also expected that Canada would assume full responsibility for the stations “at some future date,” but he cautioned that disproportionately high Canadian contributions might

erode Congressional support for American contributions to the joint program in the meantime. Accordingly, Reichelderfer urged his colleagues in Washington to continue contributing at least half of the program's budget and transport requirements, at least half of its resupply tonnage, and half of the station personnel until Canada could take over the entire program. He also recommended that the US military adopt a similar position regarding its involvement.¹⁶ In short, the archival record contains no indication of senior American officials intending to use the JAWS resupply missions to reinforce or expand their country's Arctic naval presence or capabilities in Canada's High Arctic.

For its part, the United States Air Force (USAF) had provided the airlift essential to build the network, and its role in aerial resupply dominated the early years of the program. Until 1949, the RCAF's four-engine transport fleet consisted primarily of Second World War-era aircraft, including converted Lancaster bombers. The following year, the RCAF's acquisition of several squadrons of Canadair North Stars allowed Canada to augment its participation in the JAWS airlift.¹⁷ The RCAF had established a small station at Resolute in 1949 to coordinate High Arctic operations, and it contributed one North Star to the 1950 spring airlift (thus allowing the USAF to deploy one fewer C-54 to the mission).¹⁸ Air Transport Command personnel posted to the fledgling military station shared similar experiences to their civilian comrades at the weather station, countering feelings of desolation, loneliness, and depression (particularly during the long, dark winter) by embracing "a regular Station routine." They also devoted their evenings to "playing cards, darts, table hockey," or reading, and trying "to preserve a healthy and cheerful attitude"¹⁹ — and interacted with their JAWS neighbours regularly. With its High Arctic hub in place, the RCAF contributed two North Star aircraft to support the 1951 spring airlift²⁰ and officially "assumed responsibility" for aerial resupply operations — but continued to "invite" USAF contributions and, in practice, remained heavily reliant on US support.²¹ The next year, the RCAF resupplied Mould Bay and Isachsen out of Resolute, while the USAF continued to fly aircraft to Alert and Eureka out of Thule. What had begun as a US-dominated resupply effort had transitioned to a truer joint partnership.

Ottawa's aspirations to "Canadianize" maritime resupply operations took longer to realize. In January 1952, the Canadian Secretary of State for



FIGURE 9-2. Canadian C-119's and North Stars at Resolute during the mid-1950s. The RCAF's acquisition of these aircraft types gave it the capacity to gradually Canadianize the JAWS airlift. Jim Jung Collection.

External Affairs was “pleased to extend an invitation to the United States to participate in the annual sea supply mission in the summer of 1952 and to enter Canadian waters and ports for that purpose.”²² In reality, neither of Canada’s new icebreakers was ready and the US had no choice except to spearhead the operation. “This rather typical and misleading sentence must have induced wry smiles on the faces of American officials,” Smith noted. “The plain truth was that, up to that time at least and apart from the presence of a few Canadian observers and scientists, American ‘participation’ had amounted to practically everything that was done, and without it there would have been no sea supply voyages.” The Canadian “invitation” revealed an “anxiety to preserve at least the outward appearance, or illusion, of Canadian leadership in these activities taking place on Canadian territory and to some extent in Canadian waters.”²³ Ottawa readied for a more significant contribution the following year when DoT planned the shakedown cruise of its new icebreaker, CGS *D’Iberville*,²⁴ and hoped to assume responsibility for the sea resupply of Resolute and Eureka, “thereby carrying the flag into the interior of the Archipelago” and relegating US operations to “the fringe” station at Alert.²⁵

The Stations, the DEW Line, and the ‘Delicate Balance of Manpower in the Northern Arctic’

Plans to gradually Canadianize JAWS resupply operations did not allay lingering sovereignty concerns in Ottawa, particularly as continental defence plans drew heightened attention to and interest in the Canadian Arctic in the early 1950s. The Soviets had the atomic bomb, the Korean War raged, and superpower tensions exacerbated popular anxieties about the security of North Americans. In late December 1952, R.A.J. Phillips, who held responsibility for the Arctic sovereignty “file” at the Privy Council Office, prepared a note on ten “unfortunate incidents” (all rather minor) involving the US in the Canadian Arctic in the previous three years, as well as a list of potential developments that could affect sovereignty policy. One related to possible US radar stations for the defence of Thule,

in the vicinity of the Joint Arctic Weather Stations at Alert, Eureka and/or Resolute. Resolute, with about 35 Canadians, has the largest Canadian community in the Arctic Archipelago. Alert and Eureka have seven Canadians between them. Each U.S. radar station would probably have about 200 US servicemen.... There is at least the possibility that the U.S. will ask to put a U.S. main radar station with between 100 and 200 men at Resolute.

Phillips, who had briefly visited the JAWS sites during an Arctic tour earlier that year, noted that “until now the main activity in that area has been the weather station program. We have maintained our tenuous position by providing half the staff.... Any new U.S. activity is bound to change the delicate balance of manpower in the northern Arctic.” During the Second World War, Canada had gone to great lengths to “preserve” its sovereignty in remote areas “where Canadians are out-numbered.” Although “the U.S. administration has been eminently reasonable during the past six years that we have been working together in the Arctic,” thus removing any worries about formal challenges, “*de facto* U.S. sovereignty” issues could embarrass the Canadian government. Phillips offered eleven proposals to

reduce the risk, the first of which was to completely take over the maintenance and operation of the joint weather stations.²⁶

These “potential” US radar stations in the High Arctic were never built, but the push to Canadianize JAWS reached new heights in the early 1950s. The Soviet Union — now possessing atomic weapons and a growing strategic bomber force — invited increasingly ambitious American proposals to deploy advanced detection systems in the Arctic and use the vast northern approaches to the continental heartland to afford a higher degree of “defence in depth.”²⁷ In late 1952, St-Laurent’s cabinet learned that the Americans would eventually want at least forty radar stations across the Arctic, which would require hundreds, if not thousands, of American personnel to construct and operate.²⁸ Canada had neither the resources nor the experience to mount its own polar watch independent of the US at such high latitudes, and joint participation in strategic air defence systems ensured a modicum of defence against unwanted American “help.”²⁹ Under Operation Counterchange (later renamed Operation Corrode), Canada permitted the United States to install an experimental radar station along the Western Canadian Arctic coastline in 1953, which served as a prototype for a line of sixty-three radar stations that ultimately formed the Distant Early Warning (DEW) Line.

US air defence studies left no doubt that the elaborate detection systems needed to warn of a transpolar Soviet bomber attack would require the construction of Arctic installations on an unprecedented scale.³⁰ The sheer magnitude of the mega-project made it intimidating and unique, but the JAWS experience — however modest by comparison — informed many aspects of DEW Line planning, from logistics to equipment to essential supports for personnel working at isolated posts. Malcolm Hubbard, the Assistant Director of Project Lincoln at MIT, noted that a tour of the five Joint Arctic Weather Stations by the Lincoln Summer Study Group served as a “major factor” in indicating the feasibility of a DEW Line in the far north. “Without the evidence of safe and satisfactory operation of stations on an economic budget by a small staff,” Hubbard told Reichelderfer, “we would have been forced to delay our tests for a much longer interval.” Hubbard also acknowledged Canadian sensitivities about Arctic projects — another analog between the JAWS and DEW Line programs.³¹

FIGURE 9-3.
The American and Canadian flags flying aside radar and communications equipment at the CAM-MAIN DEW Line radar site, Cambridge Bay, early 1960s. Canadian Forces Photographic Unit photo, PCN-1656.



Building the DEW Line would bring thousands of American personnel into the Arctic, resurrecting primordial Canadian worries about sovereignty. Secretary of State Lester Pearson adopted similar messaging as he had with respect to the High Arctic weather station proposal in 1946, insisting that Canada should assume full responsibility for building and operating the DEW Line — with no consideration to the exorbitant costs and personnel demands. This was completely unrealistic, but typical of Pearson’s narrow nationalist proclivities when it came to Arctic development.³² Other senior politicians, more attentive to material realities, declared their eagerness to Canadianize “as many activities in the Canadian north as possible.”³³ During Advisory Committee on Northern Development (ACND) meetings, the minister of Northern Affairs and National Resources, the commissioner of the RCMP, and representatives

from the Departments of Finance and External Affairs argued that the JAWS stations were located in the most “sensitive” areas for the maintenance of Canada’s sovereignty in the Arctic. As long as Americans constituted half of the staff, the stations were not achieving the kind of independent and effective occupation that some Canadian officials believed was necessary.³⁴ Canada did not have the resources to match the coming wave of American military activity in the Arctic, but it could achieve the impression of effective occupation if it assumed full responsibility for all civil programs before the DEW Line was completed.³⁵ Given that the JAWS program represented the largest single project on the archipelago, the ACND asked DoT to document the potential costs of taking over the weather stations.³⁶

The ensuing report explained how JAWS provided critical meteorological information to Canada, the US, and Europe for civil and military forecasting. It could not be allowed to falter. Recruitment of adequate personnel had proven “a serious problem,” and DoT would need to recruit an additional twenty-three employees (mainly met techs) to replace the American personnel if Canada wanted to assume full operational responsibility. This increased demand would be especially hard to satisfy, however, because the department had already committed to constructing and operating additional weather stations in other parts of the Canadian Arctic to improve NATO forecasting capabilities. Any delay in securing adequate staff for the High Arctic stations “would tend to reduce the observing program and this would carry with it serious penalties in loss of information.” Moreover, the JAWS installations still relied heavily on American equipment and supplies, and Canadianizing resupply would be a “slow process” requiring even more employees. Finally, Canada’s annual financial outlay for the project (\$200,000) would more than treble to at least \$675,000. The report did not end with a clear recommendation, but its tone strongly cautioned against rejecting American participation.³⁷

Considering this lopsided treatment of the issue, ACND Secretary Graham Rowley generated his own report making the case for Canadianization. While he readily acknowledged DoT’s reservations, the opening paragraph questioned whether Canadian sovereignty in the Arctic was secure. “Although the senior Canadian is in command of the station,” Rowley suggested, “the executive officer exercises complete

authority over the use of all technical equipment (which is United States property), and hence Canadian control is in practice incomplete.” Sole Canadian operation, and thus sole occupation of the sites, would allay “doubts [that] have been expressed as to the validity of our title in the archipelago.” Furthermore, could Canada count on the US remaining a reliable partner? If the Americans ever withdrew from the JAWS program on short notice, Canada’s northern development and ability to meet NATO meteorological requirements might be jeopardized. Ultimately, Rowley insisted that Canada needed to “build a growing corps of men, both civilian and service, who know the Arctic” if it aspired to “maintain and develop its position in the north.” In his assessment, barriers to Canadianization were difficult but not insurmountable. JAWS recruitment problems might be resolved by Canadianizing the stations over a period of up to eighteen months, and Inuit could be trained to “take over a part of the work.” Furthermore, if funding was a concern, did USWB financial contributions to Danish-operated weather stations in Greenland mean that the US might be willing to continue to pay for part of a Canadian-run program that yielded essential meteorological information?³⁸

ACND members considered both reports at the interdepartmental body’s thirteenth meeting on 23 November 1953, revealing persistent divisions within the Canadian civil service on the imperative for — or attractiveness of — Canadianization. Andrew Thomson, as controller of the Meteorological Service, communicated the USWB’s promise not to withdraw from the JAWS program “without giving adequate prior notice to Canada.” He also countered assertions that jointly-run stations jeopardized Canada’s sovereignty over the High Arctic, explaining that “effective occupation was demonstrated by the fact that the officers in charge at the stations were also postmasters, justices of the peace, and game wardens.” General Andrew McNaughton, the chairman of the Canadian section of the Permanent Joint Board on Defence (PJBD), similarly emphasized that Canadian control at the stations fully met sovereignty requirements. The program benefitted from American contributions, leading him to urge that Canadianization “be left in abeyance.”³⁹

In other circles, the pressure for Canadianization intensified. RCMP Commissioner L.H. Nicholson suggested that the cost of Canada taking over the joint program was “relatively small by present-day standards” and

that any equipment and recruitment problems could be overcome. The Department of Mines and Technical Surveys also argued that the stations should be operated by “Canada alone.” Continental defence imperatives loomed large over the entire exchange, and the chairman of the meeting, R.A.J. Phillips, highlighted that Canada “could not match the United States military operations in the north man for man and dollar for dollar.” To offset this asymmetry, he reiterated that Canada must assume responsibility for all “civilian operations in the north” as soon as possible.⁴⁰ The JAWS program, as the largest civilian endeavour in the High Arctic, was the obvious starting point.

All sides recognized that Canada’s limited resources precluded an immediate takeover, and successful Canadianization would come down to “a matter of timing.” The ACND drafted a memorandum to cabinet “recommending that Canada take over the complete operation of the joint weather stations as soon as time and resources permit,”⁴¹ which stressed effective occupation as well as a tradeoff between rising civil and defence costs. The joint stations stretched “some 800 miles North of Resolute and in all that distance the only substantial civil operation is carried out at least equally by the United States.” Canada could not afford to cover half the costs of Arctic defences against Soviet bombers, so it would have to compensate by taking greater responsibility for civilian projects. Accordingly, the memorandum recommended that the government approve, “in principle,” the Canadianization of JAWS “as soon as feasible,” and that “all necessary measures be taken” towards this end. It ended by proposing a Canadianization timetable that envisaged DoT assuming full responsibility for Mould Bay in September 1955, two other stations in 1956, and the final two the following year.⁴²

The end of the JAWS program’s first five-year term in late 1953 had also prompted discussions in Washington about a possible American pullout in the face of new budgetary restrictions. The USWB “reluctantly” considered balancing its books by withdrawing from three of the five Joint Arctic Weather Stations. Reichelderfer, however, sought supplementary support for the program “as a military requirement” from the Department of Defense — by now a typical tactic that he used to try to secure funding for civilian programs with essential applications for national defence. In a meeting between USWB, USAF, and State Department officials, the

weather bureau chief cast aside his previous insistence that the JAWS program be differentiated from contemporary military projects, now offering a revisionist narrative that the joint program initially had been cast as a “civilian operation” for “political reasons.” The PJBD had taken considerable interest in the JAWS program, he pointed out, and State Department officials lauded how “Canada had cooperated fully” with American requests and cautioned that an American withdrawal would harm US-Canada relations. They joined the chorus for continued joint operations, arguing that “the weather stations were much more vital for defence purposes now than when they were originally established in 1947.”⁴³

Far from seizing an opportunity to expand the American military’s influence in Canada’s High Arctic on the pretext of national or continental security, the USAF avoided making any new commitments to JAWS. Air Force representatives pointed out that Public Law 296 clearly authorized the USWB to construct and operate the joint stations as a “civilian program.” While the stations had “value to the military,” the network “had not been considered heretofore as a strictly military requirement.” They agreed begrudgingly to further study of the stations’ contributions to defence requirements,⁴⁴ but did not buy into Reichelderfer’s reimagining of JAWS to access Cold War military funding to support his weather programs.⁴⁵ Otherwise stated, the civilian program would not be repackaged under “military cover.”

The popular media in Canada continued to link the weather stations and continental defence, however, often with the goal of resurrecting sovereignty concerns. By the mid-1950s, Canadian officials were increasingly open to journalists joining resupply missions and visiting the stations in hopes that their stories would end any speculation about threatening American activities in Canada’s Arctic.⁴⁶ Predictably, official briefings to reporters emphasized Canadian contributions and most reporting reflected this cooperative message.⁴⁷ Some journalists, however, continued to depict JAWS as an example of Canada’s subservience to Washington and resisted Ottawa’s attempt to control the messaging.⁴⁸ For example, a Northern-themed issue of *Maclean’s* magazine in November 1954 contained a feature article by editor Ralph Allen that accused the St-Laurent government of “timidity, parsimony, indifference and sloth” in its Northern policies, holding up JAWS as a prime example of Ottawa’s failure

to prove that Arctic activities “really [were] our show again.”⁴⁹ Rather than doubling down on its attempts to vet stories for fear of public embarrassment, however, officials decided to ease restrictions on journalists. “There are no security problems,” Phillips insisted in November 1954:

We are anxious to encourage more journalists to visit the north and to provide more publicity on Arctic activities. The present arrangements for clearance and copy can easily become vexatious to the journalists and work to the detriment of the full and good publicity of the Meteorological Service. I should, therefore, like to propose that the requirement for international clearing of stories about the joint Arctic weather stations be discontinued.

Journalists would no longer require the special permission of the USWB and DoT to visit the stations, and so long as the writers did not discuss the RCAF base at Resolute, articles would no longer be vetted in both capitals.⁵⁰ This decision to “liberalise” publicity procedures⁵¹ reflected a growing Canadian confidence in the benefits of their joint endeavour with the Americans.

Thus, proposals to have Canada assume full responsibility for the High Arctic stations fizzled once again in the mid-1950s despite ongoing cabinet concerns about “effective occupation,” ardent appeals from the interdepartmental ACND, and media pressure to fully “Canadianize” JAWS. Instead, the stable bilateral working relationship continued, with officials from both countries renewing the arrangement on an annual/periodic basis without penning a more formal agreement.⁵² Writing in 1956, E.F. Gaskell of the Privy Council Office reflected on the program’s successful record:

As a general observation, I would say that the informal arrangements governing these activities constitute a rather unique situation. Here is a major project involving two countries and a very considerable capital investment flourishing after nearly ten years without having been authorized, in the first instance, by a formal Exchange of Notes. However

[unconventional] this may be, the informal agreement — for it is largely that — has paid ample dividends in productive activity.⁵³

Instead of unnecessarily complicating or undermining this pragmatic arrangement, St-Laurent's cabinet members — now much better versed on the issues after years of deliberations — focused on Canada assuming, “as soon as practicable,” full responsibility for both air and sea supply operations.⁵⁴ Although the US continued to support all five of the Joint Arctic Weather Stations, American military logistical support to the program decreased apace as Canada took on an expanding share of the resupply.

Having bolstered its Arctic shipping capacity by 1954, Canada could play a more direct role in maritime efforts. The year before, operations had followed the “usual pattern” of US ships replenishing the joint stations while Canadian ships supplied other Arctic posts.⁵⁵ In June 1954, a DoT press release highlighted that a Canadian convoy comprised of *D'Iberville*, *C.D. Howe*, *N.B. McLean*, two chartered vessels, and extensive landing vehicles, including an LCM landing craft, had resupplied all of the JAWS stations except Alert during Operation Nors'1.⁵⁶ Although Ottawa trumpeted the supply operation as a major achievement,⁵⁷ Howard Wessbecher, an American at Resolute, was unimpressed. “When the US came up,” he reminisced, “we [had] major ships — two, three major freighters with landing craft” to supply and sustain the stations. “When the Canadians came up, they had one little ... ice breaker with a little tiny life boat” carrying a minimal amount of supplies. “We used to kid up there and say ... the Canadians provided the joint and we, the US, provided the effort and the supplies.”⁵⁸ While the Canadian convoy may have exercised less ice-breaking might than previous US missions, Wessbecher's cynicism was increasingly misplaced. The ability to complete the practical job of resupply represented the real test, not the size of the vessels.

The RCAF also assumed responsibility for JAWS aerial resupply operations at a gradual but steady pace in the 1950s. By 1954, Canadian aircraft transported goods and equipment to Resolute, Mould Bay, and Isachsen,⁵⁹ while the USAF continued to do the same at Alert and Eureka (in whole or in part) until 1961.⁶⁰ “The spring and fall re-supply of the arctic bases ... has been handed over to squadrons equipped with C-119 freight-carriers,”



FIGURE 9-4. Canada's *D'Iberville* and landing craft resupplying Eureka (circa 1957). Lowell Demond Collection.

Flight Lieutenant J.D. Harvey described in the RCAF journal *The Roundel* in 1955. “Two [Air Transport Command] squadrons, No. 435 at Edmonton and No. 436 at Lachine, now join forces on the job. In the spring and fall of 1955 similar operations airlifted more than a million and a quarter pounds of all types of cargo” from Resolute.⁶¹ The American Air Force Base at Thule provided additional support for the resupply of Alert, which was subsequently dubbed Operation Boxtop after the RCAF began to “Canadianize” it in 1956.⁶² The new pattern of the RCAF leading and conducting aerial resupply “was generally followed thereafter with certain variations according to need,” Smith observed. “The U.S.A.F. continued to participate in the airlift as needed and according to circumstances, but little innovation turned out to be necessary as the years went by, and arrangements and procedure for the resupply tended to become rather standardized and routine.”⁶³

The High Arctic Relocations of Inuit: A Form of Canadianization?

In the early 1950s, the Canadian government began to awaken from its long period of “fit of absence of mind” (as Prime Minister Louis St-Laurent characterized it) about its North, propelled by Cold War military considerations and popular concerns about the fate of its Inuit citizens. The neglectful mentality that had led Ottawa to leave responsibilities for welfare and education to the Hudson’s Bay Company and missionaries⁶⁴ was no longer acceptable. The postwar introduction of family allowances, the increasing reliance of Inuit on imported technologies, and the crash of the fox fur market had changed Indigenous northerners’ relationships with the state. Government officials, increasingly aware of the encroachment of the modern world into the region, scrambled to address what they perceived as problems: the shortage of local food sources, a health crisis (which led to the evacuation of a large portion of the Inuit population to southern sanatoria to be treated for tuberculosis), and a failing traditional subsistence economy.⁶⁵

One government solution to the “Eskimo Problem,” as it was called at the time, was to relocate Inuit from places where game was dwindling to more abundant hunting grounds. In 1950, for example, the Arctic Division considered (and then rejected for budgetary reasons) the creation of an Inuit settlement near the Eureka weather station on Ellesmere Island. Instead, it authorized wildlife studies in the area, anticipating that “it will be necessary in the very near future to move a number of the Eskimos from their presently poor productive hunting grounds to more favourable locations.” Although the head of the division saw no reason to “stress any immediate requirement for Eskimos” to be relocated and noted that “in any mass movement of Eskimos we shall use more accessible areas first,” he noted that “if these Arctic weather stations prove to be a continuing project we may find it advisable to place one or two Eskimo families at certain stations.” Knowing more about local terrestrial and marine wildlife would help to make this determination.⁶⁶

Regular hunting trips by Greenlandic Inuit (Inughuit) to Ellesmere Island not only suggested that the High Arctic islands might be habitable, they also raised questions in Ottawa about sovereignty and “effective occupation.”⁶⁷ Although the Danish government had formally recognized



FIGURE 9-5. Inuit community at Resolute in March 1956. Gar Lunney National Film Board of Canada LAC, PA-191422.

Canada's ownership of the island in 1922 and had instructed Inughuit to observe Canadian laws,⁶⁸ the latter continued to cross over Smith Sound to hunt muskox. The Royal Canadian Mounted Police maintained a post at Craig Harbour on southeast Ellesmere from 1922–40 and another at Bache Peninsula on the east coast of the island from 1926–33⁶⁹ to assert official jurisdiction, but both were closed owing to resupply difficulties. With no perceived Danish threat to Canadian sovereignty to justify their reopening, the police had no permanent presence on the island until 1951 when it reopened the Craig Harbour post. The Canadian government let Inughuit continue with polar bear hunting, given that many of the men leading the hunting parties had previously worked for the RCMP at their

posts, and Eureka was situated along one of their main travel routes.⁷⁰ When Jim Migre, an American mechanic at Eureka, first alerted his peers to the two approaching dog teams in October 1952, the hyperbolic station diarist wrote that his peers, “thinking him bushed, reach[ed] for [a] straightjacket.” He was not suffering from High Arctic delusions: two men and one woman from Etah, Greenland, had been sent ahead by another dozen of their group of Inughuit who were camped on the Bache Peninsula. According to the station records, the Inughuit intended to make camp at nearby Lake Hazen in the spring. The trio stayed at the station for three days, during which time the “Eskimo girl prove[d] to be quite an adept housekeeper,” according to US Weather Bureau chief Glenn Dyer, who happened to be at the station during the fall airlift.⁷¹ The station gave the Inughuit family “a few surplus komatiks of food” when it departed.⁷²

Shelagh Grant suggests that this incident at Eureka was a strong catalyst for the Canadian federal government’s decision to embark on the High Arctic relocation program. Although the Department of External Affairs asked the Danish government to prevent crossings from Greenland without Canadian approval,⁷³ Greenlanders continued to visit parts of Ellesmere Island for seasonal hunting trips and even became familiar with the local RCMP constables. The sovereignty concern dissipated, however, when the Danish government promised to curtail any “illegal permanent migration” of Inughuit to the island.⁷⁴ At any rate, the 1952 encounter at Eureka in the JAWS context is particularly intriguing given its uniqueness: no other oral histories or archival records share stories of similar meetings. Aside from the occasional Canadian Inuit who passed through stations as aircraft personnel or as guides for the RCMP or scientists, JAWS personnel at Mould Bay, Isachsen, Eureka, and Alert never encountered Inuit.⁷⁵ Apart from a 1961 story of the Eureka station helping arrange the air rescue of a pregnant Inuk woman from Alexandra Fiord to Thule (where a medical doctor saved both her and the baby),⁷⁶ the Canadian archival records offered no insights into Indigenous peoples around these satellite stations. Furthermore, even though a few Inughuit had met JAWS personnel at Eureka, the site was never selected for a Canadian Inuit settlement, indicating that officials considered such a move to be unnecessary from a sovereignty standpoint.

Instead, the federal government's decision to send seven families (thirty-two people) from Port Harrison (Inukjuak) in northern Quebec to Craig Harbour and Resolute the following year has become the most notorious of these government-directed moves.⁷⁷ By the early 1950s, Canadians had access to reports that hundreds of Inuit were starving in the Keewatin Barrens and Ungava. This news sparked a popular and political reaction.⁷⁸ Canadians would not tolerate having their government stand back and allow northern citizens to starve to death. Was the solution to make people in desperate situations, where local resources could no longer sustain traditional livelihoods, dependents of the state, or to create opportunities to move them to other areas where they might enjoy a better quality of life? Officials faced this dilemma when confronted with reports of a growing Inuit population facing starvation along the eastern coast of Hudson Bay.⁷⁹

The details of the High Arctic relocations have been discussed elsewhere, although varied interpretations yield no consensus on government motivations.⁸⁰ Were the relocated Inuit “pawns of history” moved by officials for state sovereignty reasons or for “social reformist ideologies,” historian Alan Marcus asks, or “did they become victims of a humanitarian effort gone wrong”?⁸¹ Was the primary motive sovereignty (with Inuit serving as “human flagpoles”) or welfare and economic concerns?⁸² Aware that the conditions in the High Arctic were different than in northern Quebec, planners recruited three Inuit families from Pond Inlet on northern Baffin Island to help Inukjuammiut adjust to life in the High Arctic. The archival record suggests that the government's primary intent for the relocations was to relieve the pressures on game resources in northern Quebec and provide Inuit with a means to continue their hunting and trapping lifestyle. The plan was also, in part, “an experiment to determine how well Eskimos from southern areas could adapt themselves to conditions in the High Arctic.”⁸³ The physical remains of the Indigenous (Thule) dwellings near the Resolute weather station confirmed that, historically, the ancestors of Inuit had lived in the area, and optimistic reports speculated on the availability of sufficient marine life to sustain a small Inuit community.⁸⁴

The federal government's 2010 apology for the High Arctic relocations and unfulfilled promises associated therewith has officially embedded



FIGURE 9-6. Inuit woman and three children in winter clothes, Resolute Bay, NWT, March 1956. Gar Lunney National Film Board of Canada. LAC, K-3963.

this history as one of government failure.⁸⁵ At the time, however, federal advisory bodies such as the ACND and the Committee on Eskimo Affairs consistently looked to the relocations with optimism, seeing them as humanitarian “experiments” to improve Inuit welfare. The archival record does not support allegations that officials used Inuit as “human flagpoles” for sovereignty, and certainly does not sustain the misconception that this was the primary purpose behind them.⁸⁶ Indeed, rather than seeking an Inuit presence to bolster the Canadian presence at Resolute, the RCAF worried that Indigenous residents would become dependent

on the airbase.⁸⁷ Whereas Inuit relocated to Craig Harbour on Ellesmere Island were set up fifty kilometres away from the RCMP post to discourage loitering and “handouts,” the Qausuitturmiut (Resolute Inuit) settled just five kilometres from the RCAF station. Despite this close geographic proximity, the RCMP deliberately sought to segregate Inuit and *qallunaat* and limit interaction between base personnel and Inuit whenever possible, fearing that regular contact could lead to disease, social dislocations, and moral corruption. An RCAF Station Standing Order placed the Inuit village out of bounds “to all personnel except on business.”⁸⁸

Inuit oral histories recount how the relocatees found their first few years challenging in their new High Arctic settlements. The stories of plenty that convinced them to relocate were not easily reconciled with the poor variety of game and other foods in the High Arctic, where people faced extreme environmental conditions, colder temperatures, lack of wood, and (most significantly) three months of complete darkness.⁸⁹ At the time, however, the appraisals offered by local RCMP (who monitored and reported on the day-to-day activities of Inuit) and other government officials were more favourable and optimistic. While defence reports in the months after the first Inuit relocation worried that Qausuitturmiut had already become “more or less” wards of the RCAF detachment,⁹⁰ RCMP constables suggested that the relocated families were “living their native way of life, had little or no contact with the base, and were so happy in their new surroundings that they were already talking of having some of their relatives from Port Harrison” join them.⁹¹ Inuit men interacted with *qallunaat* on occasional hunting trips organized and chaperoned by the RCMP,⁹² who worked diligently to supervise any contact.

The issue of creating a diversified economic base for Northern Indigenous peoples represented a complicated challenge for the new Department of Northern Affairs and National Resources (DNANR). “Some new means of broadening the Eskimo income need not affect the traditional way of life significantly, and may indeed, capitalize on the skills of that life,” Minister Jean Lesage explained. There was no desire to impose a single model to which all Inuit should conform. In other cases, such as Inuit employment at weather stations, airfields, and radar posts, the nature of the work imposed “a complete break with traditional ways and entail[ed] sharp changes both in social organization and in standards

of living.” Denying Inuit the ability to participate in these projects would be “foolish,” Lesage asserted.⁹³ Guided by this logic, DNANR officials were interested in encouraging some Qausuitturmiut to take advantage of wage employment opportunities at the RCAF and weather stations, believing that casual employment would “not interfere greatly with the natives['] present way of life and will enable them to add to their income during seasons when they have little else to do.”⁹⁴ Subsequently, Qausuitturmiut worked seasonally as stevedores during resupply shipments, leaving them “sufficient time off for hunting throughout the year.”⁹⁵

The growing cluster of government buildings and the nearby Inuit village also drew national media attention to Resolute Bay as the country’s burgeoning High Arctic hub. Canadian reporter Ritchie Calder described the location as the “metropolis” of the Queen Elizabeth Islands when he visited the area in the mid-1950s. “Resolute was a smudge of exotic orange-paint on a snow-white canvas,” he recounted. The wrecks of seven aircraft surrounded the outpost, their “carcasses, ‘cannibalised’ of all working parts and fuselages left as store-rooms,” serving as grim “reminders of the hazards of servicing remote outposts of this kind.” The journalist noted that there were actually “three separate Resolutes — the Air-Force base and the weather-station adjoining it; the ionospheric station about 2½ miles away; and the Eskimo encampment, well out of the way and ‘out-of-bounds’ for civil and military personnel, except by dispensation of the Royal Canadian Mounted Police.”⁹⁶

It is difficult to disentangle interactions between weather station personnel and Inuit from those with the RCAF station. No Qausuitturmiut oral histories that we have heard or read refer directly to the weather station. Instead, memories often focus on relationships with the RCMP or experiences with RCAF personnel. Community members and academic commentators typically highlight negative dynamics such as abuse at the hands of police, Inuit accessing the garbage dump for food and building materials,⁹⁷ and problems with alcohol from the base (at least until Inuit were disallowed from buying liquor there in 1961).⁹⁸ The archival record offers little evidence of official Canadian intentions to coercively acculturate Qausuitturmiut into Western life, however, and federal civil servants expressed a desire to accommodate the many Inuit who wanted to maintain traditional lifestyles (although their creativity in finding ways

to support Inuit who wished to do so was wanting).⁹⁹ DNANR records suggest that, through a combination of modest wages earned from casual work, hunting, and trapping, Qausuitturmiut built a relatively stable local economy.¹⁰⁰ Indeed, the federal Eskimo Affairs Committee, an interdepartmental body that convened from 1952–62 to discuss Inuit policy, saw Resolute’s mixed economy as a model to emulate and suggested sending a “few more families from Port Harrison to Resolute Bay to meet a developing demand for causal labour” in 1955.¹⁰¹ Accordingly, the second phase of the High Arctic relocations sent another thirty-four people from northern Quebec to the community that year.¹⁰²

More generally, government assessments in the 1950s and early 1960s held up Resolute as a model of a successful Inuit relocation program. Administrator of the Arctic C.M. Bolger recommended in 1960 that the Craig Harbour/Grise Fiord experiment on Ellesmere Island should not be replicated; instead, he urged that “any new colonies ... should be [created] in the vicinity of established weather stations [at Eureka, Mould Bay, and Isachsen] ... as satellites of the Resolute Bay community.”¹⁰³ Thus, senior officials considered the successful JAWS construct — with Resolute as the hub supporting the more isolated satellite stations — as a potential model for future Inuit settlement in the High Arctic. Would this, in turn, bolster Canadian sovereignty? Although the archival record offers no indication that Inuit factored into Canadian officials’ sovereignty calculations in the early 1950s (which only appeared to consider non-Indigenous Canadians as evidence of “effective occupation”), by the following decade some civil servants began to recognize that “Canada’s first Arctic citizens” represented a basis for state sovereignty. In 1960, Northern Affairs officer Alex Stevenson emphasized employment prospects:

Some years ago, the D.O.T. gave tentative approval to considering employment of Eskimos at weather stations all over the Arctic, provided of course they had certain qualifications. No further action has been taken in this regard. No doubt the employment of Eskimos, particularly in the High Arctic, within the range of their capabilities would be a distinct advantage to D.O.T. and render a service to weather stations,

and again the matter of sovereignty would be another aspect of such employment.

One important factor to always keep in mind is that the Eskimos at Resolute Bay and Grise Fiord are an invaluable human resource in the northern economic development taking place on Cornwallis Island and the adjacent islands, and that other groups at several other points in this vast region might develop a similar importance. Then again, as already mentioned, the occupation of these northern islands by Canada's first Arctic citizens only enhances our claims to sovereignty of these regions.¹⁰⁴

Proposed plans to train and hire Inuit as non-seasonal weather station personnel were never implemented, however, and Canadian officials stuck with their established relationship with the US for another decade. Furthermore, the federal government officially ended Inuit relocations early in the 1960s, recognizing that scarce game resources in the High Arctic could not sustain a larger population, so no new Inuit "colonies" were established. Nonetheless, the Inuit community at Resolute grew modestly.¹⁰⁵ Housing, education, and social services encouraged closer alignment with southern Canadian political and societal expectations, and a local RCMP officer boasted that progress had revealed to Qausuitturmiut "the benefits and security which employment provided compared to the hardships encountered in their old way of life."¹⁰⁶ Such optimism was offset by problems of settlement living (including alcoholism, social deviancy, and externally-imposed governance) that challenged the developing community.¹⁰⁷

The 2013 Qikiqtani Truth Commission report on Resolute Bay suggests that "with the relocations, the RCAF base was no longer isolated" and "the installation played a major part in the history of the community."¹⁰⁸ Oral histories from weather station personnel and the JAWS archival record in Canada and the United States, however, paint a different picture. Although the government footprint at Resolute played a fundamental role in the shaping of the Inuit community there, it is remarkable how little the Inuit community factored into the culture of the weather station as documented in archives, letters, photograph collections, and

oral histories. While the Inuit community at Resolute was geographically close to the weather station, it was remote socially. Inuit are conspicuously absent from discussions of station isolation, and it seems that JAWS personnel generally heeded RCMP warnings against visiting the nearby Qausuitturmiut community. Oral histories recall how JAWS employees even had to go through the Mounties if they wanted to procure any soapstone souvenirs from local carvers.¹⁰⁹ Government officials in Ottawa continued to periodically circulate ideas amongst themselves about the benefits of training and hiring Inuit to operate the weather stations, but these never materialized. Apart from interactions during the annual sealift and seasonal gatherings, JAWS personnel and Qausuitturmiut appeared to inhabit separate worlds.¹¹⁰

Last Call for Canadianization

Canadian and American personnel at the stations continued to co-habit the same worlds, however, and senior officials mirrored the spirit of cooperation that governed station life in the late 1950s. The USWB worked diligently with its Canadian counterparts to avoid potential misunderstandings, with men like Glenn Dyer who recognized Ottawa's sensitivity about any potential indication that the Americans were losing interest in the joint program. The Canadian government considered the annual bilateral meeting, which it hosted to devise operational plans, to be a prestigious affair, with senior government officials (including Prime Minister Louis St-Laurent and two cabinet ministers) addressing the planning conference on separate occasions. Andrew Thomson regularly participated in the discussions, and official dinners and cocktails always accompanied the planning event. When senior USWB officials (including Reichelderfer) noted that JAWS planning had become routine and might be undertaken by lower-ranking officials (or even cancelled in favour of written exchanges), Dyer refused. He explained to the USWB chief that any suggestion of scrapping the conference or sending junior officials would lead the Canadians to surmise that "the Weather Bureau is not as enthusiastic or as interested in the Arctic activity as Canada would wish them to be." If Ottawa believed that an annual conference was necessary, Dyer insisted that the Americans had to be respectful and continue sending similarly high-ranking representatives.¹¹¹ Though a small gesture, the continuation

of the planning conferences affirmed a strong American commitment to the joint program. Furthermore, far from being an overbearing partner, the Americans went out of their way to satisfy and accommodate their Canadian partners.

By 1959, JAWS operations had fallen into a comfortable routine marked by predictable, binational cooperation. This allowed senior officials in Ottawa to focus diplomatic energies on larger developments that were dramatically changing the Canadian Arctic, particularly the DEW Line and Inuit communities forming around the radar stations.¹¹² The Canadian government dedicated its main Canadianization efforts to high-profile defence and resource development projects, with the RCAF assuming operational control of the DEW Line that year. Conservative Prime Minister John Diefenbaker, first elected in 1957 and re-elected with a resounding majority the following year, articulated a bold “Northern Vision” that generated national interest in northern development. While St-Laurent’s Liberal government had laid much of the groundwork for the “Arctic revolution” that followed,¹¹³ Canada’s North now had a champion at the helm of a Conservative government that promised to finally unlock the region’s economic potential. Although Diefenbaker’s accomplishments failed to match his rhetoric, his Northern Vision brought a new energy and fresh focus.¹¹⁴ The transition in government also invited his cabinet ministers to reconsider established paths charted by civil servants under the previous Liberal regime.¹¹⁵

Advocates for fully Canadianizing the Joint Arctic Weather Stations relied on the same political arguments that had led Canada to assume operational control of the DEW Line stations on Canadian territory. Northern Affairs Minister Alvin Hamilton, who was keen to expand Canada’s civil presence in the Arctic, wrote to his Transport counterpart in January 1959 to applaud the RCAF’s new responsibility for DEW Line operations while lamenting Canada’s limited “effective occupation and control” in the Arctic. Consequently, he insisted that Canada had to “assume complete control of all civil government responsibilities,” resurrecting old ideas that had been floated under the previous Liberal government and abandoned for pragmatic reasons.¹¹⁶ Hamilton amplified this alarmist tone in subsequent correspondence. The Americans had cooperated thus far, but he alleged that this had come “at the expense of our effective sovereignty.”

Ottawa had to bar the Americans from carrying out any function of government in the region, and the weather stations were “by far the most important government activity in this area.” To an outsider like Hamilton, the project’s relaxed routine seemed dangerous. He did not understand the collaborative relationship that allowed the JAWS program to run so smoothly and was unfamiliar with the formal and informal agreements that guided the program and the OICs’ effective control of each station. Instead, he saw dangers everywhere. “I have not the slightest doubt myself but that in the eyes, say, of the Soviet Union the joint stations are evidences of the United States’ occupation and that as such the present relationship acts contrary to the policy the government has decided on,” the minister suggested. “I think the arrangement could at some time be a source of embarrassment and I do not see any reason why this risk should be run.”¹¹⁷ Since Canada had always said it would assume full responsibility for the stations at the earliest opportunity, he assumed that “the United States would welcome any move on our part to take over what is so obviously a Canadian responsibility.”¹¹⁸

Transport Minister George Hees, relying heavily on Thomson for advice, rebuffed these contentions and furnished a positive narrative of how the JAWS relationship had evolved fortuitously for Canada. Although the US had played a “predominant” role when the stations were first established, Canada had gradually assumed more responsibilities and diluted the proportionality of the US contributions. Furthermore, continuing to leverage American resources in the High Arctic had allowed Canada to independently establish and operate several additional weather stations in the Arctic Archipelago.¹¹⁹ As a “highly integrated joint operation,” JAWS served as a source of “pride” that both countries’ weather services cited regularly. The US was proud of the relationship, “not because they believe they have any permanent rights in these stations but merely because ... the nature of the cooperation” was so unique and longstanding. If Canada “forced” the USWB to withdraw its personnel, it would upset this dynamic and deprive Canada of access to other American programs “which we could never hope to undertake ourselves because of manpower and financial limitation[s].” Furthermore, JAWS benefitted directly from USWB financial and personnel contributions. At a time when DoT sought additional federal funding to take over several Northern Canadian airstrips

FIGURE 9-7.
Monte Poindexter
outside Mould
Bay's customs and
immigration booth,
1956. Jim Jung
Collection.



operated by the United States, Hees argued that Canadianizing the JAWS program would squander limited resources for no apparent benefit, because the American presence at these stations posed “no threat to our Canadian sovereignty.”¹²⁰

Canadian Transport officials with the most intimate knowledge of the program insisted on the value of continued American involvement and the negative implications of a Canadian takeover. “The joint participation of these Joint Arctic Weather Stations, far from being a threat to Canadian sovereignty, on the contrary strengthens Canadian sovereignty, inasmuch as the United States recognizes Canadian laws and are meticulous to observe the regulations governing the Northwest Territories,” Thomson argued. “In effect, therefore, the presence of American staffs working

along with Canadian staffs serves to strengthen and establish very firmly Canadian sovereignty.¹²¹ Canada managed most of the resupply by this point and benefitted from priority access to specialized US equipment for upper air observations.¹²² Canada would accrue no benefit from ending what had become a strong symbol of bilateral cooperation. Hees took his department's advice and insisted that if Hamilton was worried about Canada's sovereignty, the country should spend more on airstrip operations, communications, ice reconnaissance, and marine patrols — all of which would have a “much more important bearing on aspects of Canadian sovereignty” than “Canadianizing” the JAWS program.¹²³

DoT's continued denial of an American sovereignty threat, along with its insistence that Canada benefitted materially from the JAWS partnership, helped to ward off further discussions about “Canadianization” for the next eight years. The countries had institutionalized their continental air defence relationship in the North American Air Defence Command (NORAD), the DEW Line had settled into another example of strong bilateral cooperation and respect, and Arctic security and sovereignty slipped to the political backburner.¹²⁴ In this context, even Canadian civil servants eased into a more casual attitude regarding JAWS diplomacy. External Affairs sent fewer representatives to the annual planning meetings because the proceedings had become “largely a matter of administration,”¹²⁵ and these meetings were shortened after the USWB asked for a tighter agenda that only included truly joint issues.¹²⁶ The DoT and RCAF coordinated and planned resupply activities in advance, and the bilateral meetings typically confirmed previous paths of cooperation rather than creating new ones.¹²⁷ Whereas participants in the ACND had discussed JAWS issues at length during the early 1950s, the weather stations were no longer reported upon in the 1960s (apart from expansion plans to accommodate the PCSP and other scientists, as well as support to commercial oil and gas exploration activities).¹²⁸ The JAWS program had settled into amicable routine, run by administrators in both Canada and the United States who enjoyed a longstanding trust relationship and practical approach to collaboration. By international standards, it was an exemplary case of bilateral cooperation. Dyer, writing to American physicist Dr. Dan McLachlan in 1963, expressed his frustration with Argentinians who, in his opinion, “tended to over-control [operational problems] and to be

much too formal, which tended to strangle the flow of needful management-type information.” In the same letter, he described the JAWS program as a “happier strain,” where there was “complete cooperation and very happy working conditions everywhere.”¹²⁹

On 17 February 1967, the American and Canadian delegates to the annual planning conference celebrated the JAWS program’s twentieth anniversary. They offered a moment of silence in tribute to Charles Hubbard and recalled the work of his equally enthusiastic Canadian counterpart, Andrew Thomson, in laying the program’s foundation. They hailed the JAWS program’s contributions to the world’s meteorological and scientific accomplishments and lamented the lack of media attention dedicated to these achievements. Dyer concluded the celebratory remarks by expressing his government’s desire that the two countries continue their close collaboration for years to come, reassuring his Canadian counterparts that the USWB remained “keenly interested in this most valuable source of data on Arctic meteorology.” Furthermore, “this programme had served a unique purpose in that it had demonstrated, most effectively, the results that might be achieved by friendly cooperation in a field of mutual interest.” Dyer extolled how the smooth functioning of the JAWS program “might well serve as a classic example for the inspiration of other agencies having a need to engage in cooperative activities of this kind.”¹³⁰

The End of a Bilateral Partnership

Ironically, this meeting in early 1967 marked the beginning of the end for American involvement in the Joint Arctic Weather Stations. The Canadians announced their intention for the RCAF to turn over responsibility for the aerial resupply of the stations to charter flights by Canadian commercial carriers the following year. This meant that the air force would no longer move equipment and goods from Montreal to Resolute “gratis” in support of the joint civilian program. The expectation that the US would shoulder a portion of this financial burden, in addition to new fuel costs at Resolute, would have increased the US Environmental Science Services Administration’s (ESSA) portion of the JAWS program’s costs by approximately \$40,000. When the ESSA budget suffered a “very serious cut” that year it had to make hard decisions about its global commitments, and the agency recommended that Canada either absorb the additional

costs or consider closing Isachsen so that both countries could support the remaining four joint stations.¹³¹

From its inception, the JAWS program had been susceptible to budget limitations and pressures. These factors now sealed the partnership's fate. Ottawa stepped in to cover the additional airlift expenses, but ESSA's resource problems worsened. In November 1969, the Americans hinted to the Canadians that they might have to end their involvement in the JAWS program. Glenn Dyer explained to D.C. Archibald of the Canadian Meteorological Service that President Richard Nixon had directed US agencies to reduce their assistance to "outside agencies." Although the US had not made a final decision about its further involvement in JAWS, Dyer noted that Archibald's offer to increase Canadian personnel contributions would help ESSA to "meet the Presidential directive."¹³² It was not enough, however, to save American involvement in the program.

In early 1970, ESSA decided to completely withdraw from the JAWS program to save \$600,000 (roughly 45% of program costs) annually.¹³³ Archibald and Dyer, both of whom had been involved in the project almost from its start, led discussions at a February meeting that committed to a gradual phase-out at a pace that Canada could maintain, while ensuring the uninterrupted flow of data from all five stations. The American terms of departure were generous and demonstrated the stations' continued value. Except for a D3 tractor, a few outdated electrical generators already slated for replacement, and the GMD-1 radio theodolites, all US equipment would remain at the stations after the Americans withdrew. The GMD-1s would be phased out over five years, with ESSA providing spare parts in the meantime so that Canada would have time to install replacements.¹³⁴

Contextual factors made this decision appear political, resurrecting orthodox assumptions about sovereignty concerns as the primary driver for Canada-US Arctic relations. In 1969–70, the American consortium Humble Oil sent the ice-strengthened tanker SS *Manhattan* through the Northwest Passage to determine if it could be used as a shipping route to transport oil and gas from the Beaufort Sea to the US Eastern seaboard. Although the ship's owners requested Canadian cooperation and assistance, the State Department would not accept Canada's sovereignty over the Passage or ask for permission to transit these waters, claiming

that it constituted an international strait.¹³⁵ International jurist and legal scholar Maxwell Cohen described the national crisis that resulted when Canadians felt “they were on the edge of another American ... [theft] of Canadian resources and rights which had to be dealt with at once by firm governmental action.”¹³⁶ This prompted policy action from Prime Minister Pierre Elliott Trudeau, whose “functional” approach to sovereignty included extending Canada’s territorial sea to twelve nautical miles. He passed the *Arctic Waters Pollution Prevention Act* and committed to increase Canada’s military presence in its Arctic.¹³⁷

When news leaked to the press that the US was withdrawing from JAWS, speculative stories assumed that Ottawa had forced the Americans out of the program as part of Trudeau’s attempt to assert Canada’s Arctic sovereignty more aggressively.¹³⁸ After more than two decades of successful bilateral and binational cooperation, a mistaken media narrative threatened to recast the joint program’s fate as a symbol of divergent national interests in the wake of *Manhattan*. Canadian and American officials alike expressed annoyance when some of their peers drew the wrong conclusions from the coincidental timing of the two Arctic events. Patrick McTaggart-Cowan, who had strongly defended American involvement in JAWS throughout his career, believed that the cooperative program had fallen prey to Canadian “ultra-nationals.”¹³⁹ Such beliefs were completely unfounded, Ottawa’s chronic insecurities about Arctic maritime sovereignty having nothing to do with the American decision to withdraw from the program. A draft briefing to President Richard Nixon in September 1970 confirmed explicitly that the pullout was “at the initiative of the U.S.A.”¹⁴⁰

The US Ambassador to Canada, Joseph W. Scott, offered a detailed justification for the American decision to the assistant secretary of state for European Affairs. The withdrawal was “based entirely upon the need of the U.S. Weather Bureau to trim its budget and reduce operations,” Scott noted. “It has recently been paying 45% of the cost of the program. Its share will be taken over by the Canadians, who will operate the network at the same level in the same way and provide, at no cost, all weather information obtained to the U.S. Weather Bureau” via the international data pool. In case any doubt remained, Scott categorically dismissed “speculative stories” in the Canadian media about Ottawa pushing the



FIGURE 9-8. OIC Brian Brown (left) and ExO Gary Davies (right) lowering the American flag at Isachsen for the last time in 1971. Brian Brown Collection.

United States out of the program. Any suggestion that the American withdrawal reflected a Canadian initiative was patently “untrue,” with the ambassador reiterating unequivocally that the decision had been made in Washington.¹⁴¹

In the ensuing years, both countries worked closely and cooperatively to ensure a smooth transition. Canada augmented its capacity to train upper air technicians and administrative staff, and to secure upper air instruments previously provided by the United States. Fourteen American upper met techs had to be replaced by Canadians: five in 1970 when they pulled out of Alert, four in 1971 when they left Isachsen and Mould Bay, and five in 1972 when the remaining American met techs withdrew from Eureka and Resolute. DoT also recruited extra cooks and equipment operators to fill the gaps left by departing American personnel.¹⁴²

During the transition period, the Meteorological Service of Canada moved from DoT to the newly-created Atmospheric Environment Service

(AES) within the Department of the Environment, which gradually assumed full responsibility for the JAWS network. By 31 October 1970, Canadians had successfully replaced all American personnel at the Alert weather station. The following year, the Canadians held a special luncheon to recognize the twenty-fifth anniversary of the program, and the two countries released a booklet celebrating JAWS as a “shining example of international co-operation for the advancement of science and the welfare of mankind.”¹⁴³ Alongside these laudatory tributes, the American withdrawal continued on schedule. The last US personnel to serve at Mould Bay and Isachsen departed with that year’s fall airlift. The following summer, a plane left Eureka with that station’s last American technician onboard.¹⁴⁴

Although the few remaining American JAWS personnel were not scheduled to depart Resolute until October 1972, an unexpected medical evacuation pulled forward the flag-lowering ceremony to August 27. US representatives Glenn Dyer and C.G. Goodbrand, who had been with the JAWS program since its early stages, flew to Resolute on RCAF aircraft via Trenton, Thule, and Alert. Meanwhile, E.R. Osborne, the Manager of Northern Airports, Central Region (representing DoT), and J.J. Labelle, the Regional Director, AES, took advantage of developing commercial northern transportation routes provided by Air Canada, Pacific Western Airlines, and Nordair to carry them to Resolute. Canadian representatives from the Department of Indian Affairs and Northern Development, the Department of National Health and Welfare, the Department of Public Works, the NWT territorial government, and the local judiciary also made the journey. Given the Arctic environment’s historic tendency to complicate JAWS transportation schedules, it was remarkable that everyone arrived on time. An unexpected problem threatened to foil the ceremony when “souvenir hunters” braved the twenty-four-hour daylight to steal the “Stars and Stripes” from the station’s flagpole on the evening of August 26. Given the imminent American withdrawal, the station did not have its usual stock of replacement standards, but it managed to find and fly the only American flag remaining at the Canadian base.¹⁴⁵

At 6:00 p.m. central standard time, dignitaries from the two countries, along with station personnel and photographers, gathered for a small outdoor ceremony. The weather was “exceptionally fine” with little wind, a bright sun, and temperatures near 40°F (4.4°C). Labelle chaired



FIGURE 9-9. Charlie Goodbrand speaking at the ceremony that ended American participation in the JAWS program, 26 August 1972. Ron McLaren Collection.

the proceedings and Osborne offered welcoming remarks, but the event focused on the American guests. In short speeches, Goodbrand celebrated the JAWS program's long history and Dyer paid tribute to successful Canadian-American cooperation. Local interest was "very high." While visiting dignitaries sat in chairs, station personnel and Qausuitturmiut stood, cameras in hand, as RCMP Constable R. Pollock lowered and then folded the American flag before formally handing it over to Dyer. The entire ceremony lasted a mere seventeen minutes. It was a fitting end: in the High Arctic, personnel at the weather stations had always been short on formalities.¹⁴⁶



FIGURE 9-10. Charlie Goodbrand (left) and a Canadian official looking on as a Canadian Mountie lowers the American flag at Resolute for the last time. 26 August 1972. Ron McLaren Collection.

Conclusions

Some 25 years ago, meteorologists of Canada and the United States completed plans to explore the mysteries of climate in the Canadian Arctic. Ever since then, the joint Arctic weather stations project has continued to furnish a shining example of international co-operation for the advancement of science and the welfare of mankind. Through an ideal sharing of planning, personnel, equipment and expenses, Canada and the United States have since maintained a permanent network of weather stations in the Canadian High Arctic.... The weather data collected continuously by these stations have increased greatly our knowledge of the circulation of the earth's atmosphere and thus helped extend the period of reliability for weather forecasts. This knowledge is of special importance to Canada, the United States, and the North Atlantic, where weather is dominated to a large extent by Arctic air-masses.

Meteorological Branch of the Ministry of Transport, "Joint Arctic Weather Stations: Twenty-Five Years" (1970)¹

From 1947–72, the Joint Arctic Weather Stations program played a transformational role in Canada's High Arctic, serving as a "source" of weather information that fed transnational scientific networks in the south and co-producing spaces and places that became familiar and useful to Canadians and Americans. "Though the physical environment remains

essentially the same,” geographer William C. Wonders observed in 1978, “knowledge of the area in many fields has been immensely expanded and man’s presence has been felt everywhere” owing to these “anchor points” in the Arctic Archipelago.² While historians typically limit their discussions of JAWS to early debates about Canadian sovereignty and American Cold War imperialism in the immediate postwar period,³ studying meteorological, scientific, political, sociological, and logistical dimensions of the program through its entire lifecycle reveals a richer, and revisionist, picture. Inspired by recent scholarship that brings into dialogue science, environmental history, and geopolitical narratives to reimagine the Cold War Arctic,⁴ this book encourages us to reconsider established narratives and widen our aperture consistent with the broad “environmental turn” in the historiography.⁵ Blending political, diplomatic, social, cultural, technological, and scientific history, we have documented how people who worked at the stations experienced JAWS and sought to “attach faces and names to ‘the state,’ to render a picture of its agents that is . . . textured and empathetic.”⁶ Considered in the context of scholarship that exposes how environmental science serves larger imperial projects,⁷ the JAWS story also analyzes how the investment of North American state resources in the co-production of Arctic knowledge also created built environments and symbolic spaces that represented spatial occupation and control.⁸ “So intertwined were Canada’s Arctic weather stations and national sovereignty issues that other nations watched carefully,” observe leading historians of Arctic science. In 1947, “halfway around the world, a classified briefing on this issue was handed to the foreign minister of Australia, another former British colony, underscoring its importance for international diplomacy.”⁹

JAWS and Cold War Imperialism, Sovereignty, and Militarization

“Before 1947, the Polar region, in the ‘attic’ of the North American continent, was a gap in the weather-picture,” journalist Ritchie Calder noted. “Then the Americans took the initiative,” with Charles Hubbard conceiving his “plan for a half-circle of weather-stations.”¹⁰ Although a superficial reading might suggest that JAWS represents a straightforward extension of Cold War military imperialism, given the involvement of the American (and later Canadian) militaries in constructing and resupplying the

isolated weather stations, a careful examination reveals how the stations were conceived and operated as civilian installations and that this imagining aligned with decades of civilian leadership of meteorological services in Canada and the United States. In the case of JAWS, Hubbard and his American and Canadian weather bureau colleagues used the military and the emerging Cold War in the 1940s as a means to a civilian end. Militaries certainly benefitted from these “islands of modernity” in the vast Arctic Archipelago and, at Resolute and Alert, Canada subsequently built air force and signals intelligence collection stations alongside the weather stations. Defence officials and personnel, however, never controlled or dominated the weather stations themselves. Indeed, as Donald Cleghorn discovered at Resolute in 1947, military-style discipline did not mesh with the fundamentally civilian cultures at JAWS. Accordingly, simply subordinating the program to the broader military-industrial-academic complex that emerged during the Cold War, however much the navy and air force shouldered the cost of implementing the JAWS program in its first decade, is distorting.

While the United States factors prominently in the historiography on Canada in the Cold War era, Canada factors remarkably little in American historiography on this period. Whether one frames the bilateral relationship as that of a subordinate “partner to behemoth,” as an expression of “ambivalent allies,” or as a bond between “premier partners,”¹¹ analysis must account for the asymmetry between a burgeoning superpower with global interests and influence, and that of a neighbouring “middle power” seeking to preserve its sovereignty and make “functional” contributions to the international order. When dealing with the US, Canadian diplomats had to walk a fine line when deciding how far to push the boundaries of international law and test American patience in their efforts to affirm Canada’s sovereignty. For the most part, Canadian decision-makers weighed the costs and benefits of a forceful assertion of sovereignty and landed on the side of caution.

The JAWS story highlights several key elements of the Canadian government’s Cold War Arctic strategy. Early negotiations reflected how officials in Ottawa worried that Canada’s sovereignty in the Arctic was, to use Hume Wrong’s apt phrase, “unchallenged, but not unchallengeable.”¹² After delays, Ottawa secured an informal arrangement that planned for a

Canadian to be in charge at each station, for an equal ratio of Canadians to Americans at each station, and for an “equal” funding contribution, thus ensuring “at least a large measure of basic control” over the program. Nevertheless, “the Joint Arctic Weather Stations were clearly the product of American rather than Canadian initiative and were established mainly by Americans, using American ships, planes, equipment, and supplies,” historian Gordon W. Smith noted. Canada’s dependence on the US for early air and maritime resupply made the network appear to be “largely an American operation.”¹³

Researching beyond the US-dominated planning and construction phases to encompass the operational stages of Arctic programs where the Canadian state was an increasingly “equal” partner produces a different narrative. There is no evidence to support portrayals of diabolical American motivations and ambitions to challenge or undermine Canadian sovereignty in the High Arctic, and rare cases of bilateral friction reflected low-level indiscretions and poor communications on both sides that were quickly overcome.¹⁴ In short, existing research emphasizing conflict over the JAWS program misses the most significant outcome: both sides learned lessons and devised workable solutions. Bilateral cooperation allowed Canada to professionalize its approach to Arctic operations and encouraged, in due course, investments in its own capacity, successfully enacting what historian John Woitkowitz describes as “a policy of firm and patient gradualism.”¹⁵ Ultimately, Canadian policy-makers balanced sovereignty interests with North American and broader geopolitical interests, and an underlying spirit of mutual respect with their American counterparts proved them right. Officials from both countries managed to steer a prudent and practical course that succeeded in furthering science and enhancing security, without compromising Canadian sovereignty.

In short, the JAWS experience suggests that the bilateral Arctic relationship during the Cold War was more healthy and reciprocally beneficial than many scholars acknowledge. Even though Canadian officials voiced periodic concerns about a perceived American *threat* to sovereignty, scholars should not simply accept the validity of these worries. When the US proved accommodating, Canadian officials weighed *risks* and eventually decided upon courses of action that effectively balanced needs, constraints, and opportunity costs. By 1959, US Weather Bureau

Polar Operations Division Head J. Glenn Dyer could boast that “we have enjoyed a most unusual relationship with our Canadian colleagues in this venture, which is perhaps not duplicated anywhere else in the world. Since 1947 we have jointly operated with Canada on a basis of complete understanding, cooperation and exchange of plans and views, this without any difficulties ever having arisen. We believe this is a very unusual record for such a far-flung international-type activity.”¹⁶ This sense of camaraderie and admiration was mirrored on both sides of the border. “The joint participation at the Joint Arctic Weather Stations, far from being a threat to Canadian sovereignty, on the contrary strengthens Canadian sovereignty, inasmuch as the United States recognizes Canadian laws and are meticulous to observe the regulations governing the Northwest Territories,” Canadian controller Andrew Thomson also observed in 1959. “In effect, therefore, the presence of American staffs working along with Canadian staffs serves to strengthen and establish very firmly Canadian sovereignty.”¹⁷ Historians know better than to take self-congratulatory official statements at face value. In the case of JAWS, however, the preponderance of available evidence supports the positive depiction.

The JAWS case also cautions historians about overgeneralizing American Cold War Arctic imperialism. For example, historian Matthias Heymann observes that “for both Canada and Denmark (overseeing Greenland), the weather station ‘problem’ illuminated the evolving postwar relationship between these smaller states and the USA, a superpower.”¹⁸ Juxtaposing the planning, construction, and operational phases of Thule with JAWS reveals that US desires to control and dominate strategic space were uneven across the Circumpolar North. Social scientists have documented extensive Danish and Inuit resistance to American imperialism in Greenland. Danish authorities recognized the scientific importance of the Thule weather station and insisted that it be jointly operated, but struggled to recruit half of the station’s complement. By 1951, the two countries signed a defence agreement recognizing Danish sovereignty over Greenland in return for “nearly unlimited authority to overfly Greenland’s territory,” but limited the foreign power’s ground presence to a few defence areas — including Thule.¹⁹ The US immediately mounted Operation Blue Jay, the secret construction at Thule of its largest overseas airbase which ultimately boasted a 10,000 x 200-foot runway, six



FIGURE 10-1. Thule base on 1 October 1953. Shelagh Grant Collection.

hangars for heavy bombers, defensive missiles and interceptor aircraft, nuclear weapons, and mid-air refuelling fleets to support Strategic Air Command's bombers during the 1950s and 1960s.²⁰

The Thule military facility also eclipsed the joint Danish-American civilian weather stations, which closed in 1952 when the Americans began conducting their own meteorological observations from facilities inside the base.²¹ Thule Air Force Base also became a hub for a host of other military initiatives including an American Ballistic Missile Early Warning System (BMEWS) site, as well as one of the Cold War's most extreme environmental experiments: Camp Century. Testing the feasibility of a US Army proposal to drill hundreds of kilometres of railway tunnels into Greenland's glaciers and reposition hundreds of intercontinental ballistic missiles to preserve the American atomic retaliatory capability, the Americans told Danish authorities that it was a "purely scientific research facility." The Americans began building this installation without obtaining

Danish approval and also ignored Denmark's official stance against nuclear activities in Greenland, claiming that the camp's nuclear reactor was an attempt to resolve energy requirements at isolated locations.²² In short, the weather station at Thule served as a beachhead for American Cold War military imperialism that ultimately expanded over much of Greenland.²³

None of the joint weather stations in the Canadian Arctic underwent similar transformations, attesting to Canada's pragmatic investment of resources and the respectful relationship that Canadian and American officials carefully cultivated around negotiating tables and at the stations themselves. The US Weather Bureau originally proposed to build and operate stations in Canada's High Arctic without contributions from the host country, yet American officials expressed no reservations when the Canadian Department of Transport instead decided to recruit and train its own met techs to contribute half of the upper air labour required at each station. By contrast, the Americans operated with little Danish oversight for decades in a "don't ask, don't tell" relationship with Copenhagen about Thule until 1968. The Canadian government was much more attentive. Ottawa initially held up the establishment of the High Arctic stations for over a year, resolving its sovereignty concerns before proceeding with the project. In the 1950s, US officials proposed expanding JAWS airstrips and facilities so that they could be used as forward operating bases for Strategic Air Command mid-air refuelling aircraft or as emergency landing strips for its bombers, but Ottawa gently rebuffed these overtures to limit the American military's presence on the Arctic Archipelago. There was no Thule-like takeover of JAWS, and "no local population had to give way to American rule" as happened at Thule. It also seems a poor example of the sweeping conclusion that the US used Arctic science as "a soft way to gain power and control without the use of force" and achieve "consensual hegemony."²⁴

Nonetheless, bilateral cooperation was imperfect. US personnel occasionally either ignored or accidentally overlooked Canadian laws or regulations during the construction and early operational phases, but most indiscretions occurred while new norms were being forged. When Canadian officials expressed their displeasure to their counterparts at the US Weather Bureau and State Department, the Americans promptly and collegially addressed their concerns and subsequently conformed to

Canadian requirements. “The Canadian Government was typically much more concerned about the observance of formalities and the requirements of protocol in connection with the weather stations” than their American counterparts, Smith observed. Canadian officials would remind Washington that the US “should therefore pay due heed to Canada’s role as host country and ultimate decision-maker about what was done within Canadian territory,” and the Americans respectfully obliged. “Apart from occasional instances of oversight or misunderstanding, ... the United States typically manifested complete willingness to meet Canada’s wishes regarding formalities connected with the weather stations, even in trifling matters such as the collection of a few samples of snow.”²⁵

Mutual attentiveness to each country’s needs and anxieties yielded a robust and congenial binational partnership. For the next quarter of a century, both JAWS partner countries shared administrative burdens, provided half of each station’s personnel, and shared financial costs. Over time, as Canadian capacity grew, the Royal Canadian Air Force, Royal Canadian Navy, and eventually civilian contractors assumed responsibility for re-supplying the stations. Towards the end of the program, Canada covered more than half of the project’s overall costs. When the US withdrew from the program in the early 1970s, austerity considerations, not sovereignty or high politics, drove the decision. The JAWS case study invites historians to make conceptual space for projects that generated official concerns at the onset, but that ultimately proved to be successful binational endeavours that confirmed, and even bolstered, Canadian sovereignty.

Scientific Colonies?

A colony is a self-contained, specialized settlement of a culture from somewhere else, a social machine constructed in a new landscape, the function of which is to render that landscape both familiar and useful.

Christy Collis and Quentin Stevens²⁶

The JAWS program intended to construct, use, and appropriate Arctic space — and the data generated within it — in the service of science, the attendant states, and broader societal applications of modern meteorology. In these respects, the program proved a resounding success. As planners expected, each station provided a full range of meteorological data for surface and upper air conditions, which were transmitted to the broader world. Forecasting centres throughout North America and Europe used meteorological observations from the High Arctic stations to prepare daily weather charts. The information was “especially useful in Canada and the United States for providing advance warning of severe outbreaks of Arctic air,” one report summarized. “These observations assist materially in the drawing of accurate Northern Hemisphere weather charts which are used by the U.S. Weather Bureau in the preparation of 5-day forecasts.” The long-term record of weather data produced at the stations also contributed to broader meteorological and climatological research, leading to modifications in meteorological concepts and improved forecasting. By 1952, officials noted that the High Arctic weather data revealed the need to revise the mean temperature and pressure charts produced five years earlier.²⁷ JAWS stations not only provided information that filled in what had been a “blank spot on Northern Hemispheric weather maps,”²⁸ they also enabled a wide range of scientific activities that fulfilled Hubbard’s vision to “provide habitations, channels, communications, and transportation which will make it possible for us to penetrate the Arctic for other purposes.”²⁹

While the stations were run by civilian weather bureaus rather than the US or Canadian militaries, the data collected certainly fit the criteria of *strategic* Arctic science: “systematic, long-term, strategic, and largely state funded” research on Arctic environments that served economic, geopolitical, and national security priorities.³⁰ Dramatic newspaper and magazine stories often compared and contrasted the men at the stations with the heroic, expedition-based scientist-explorers who had dominated Arctic science into the interwar period. However, the JAWS network bore more resemblance to Norwegian and Swedish research practices, which emphasized modernism and professionalism over nationalism and heroism,³¹ and to postwar Antarctic stations, than it did to previous Canadian examples. In this respect, although JAWS was a civilian program, it

anticipated and then paralleled dramatic military modernization projects that transformed the North American Arctic in the 1950s, particularly the Distant Early Warning (DEW) Line. In stark contrast to military installations, however, the information generated by JAWS teams was shared widely. “Information is relayed back to Edmonton and, by international code, to every weather service — including the Russians, whose reports from the other side of the world are available in the same way,” Ritchie Calder reported in the mid-1950s. “And so the weather bureaux throughout the world know ‘what’s cooking’ in the Arctic — weather which will be significant in their charts — weeks ahead.”³² Not only did synoptic weather data collected at the stations facilitate more reliable forecasting across North America, JAWS personnel also contributed systematic scientific observations in support of other sustained studies on the Arctic environment. As bases for research, the stations also allowed a wide range of strategic and resource science to extend further into Canada’s Arctic Archipelago, serving both state demands for utilitarian knowledge about the Arctic and growing commercial interest as well.³³

Rather than focusing on the uses of the data produced at or facilitated through the stations, this book provides a thick description of the ideas, cultures, technologies, and practices that JAWS personnel integrated to co-generate knowledge. It also highlights the centrality of logistics and resupply to sustaining viable “islands” or “colonies” of science in isolated polar regions, which preoccupied senior administrative officials in Ottawa and Washington, as well as the men serving at the stations themselves. Logistics and resupply operations were the sinews of Arctic science,³⁴ and both countries invested significant state resources to ensure that people and supplies were available so that these civilian stations could operate year-round. While modern transportation and supply chains made this possible, environmental and seasonal realities also dictated a general annual cycle that governed resupply and, in turn, shaped station life. Even with advanced “envirotechnical systems”³⁵ in place, achieving “environmental immunity”³⁶ was unrealistic, and actors on all scales — from the stations themselves to executive boardrooms in national capitals — needed to amass useful knowledge about the Arctic’s “rhythms, its extremes, and its variations”³⁷ to sustain functional scientific outposts in specific localities.



FIGURE 10-2. The environment posed a constant challenge to JAWS personnel. Here is Lowell Demond about to dig out the door at Mould Bay or Eureka during the 1950s. Lowell Demond Collection.

As this study shows, foregrounding the seasons and the environment need not “relegate human experiences and relationships to the background.”³⁸ Station crews took pride in their ability to conduct scientific measurements in harsh conditions, but always recognized the environment as final arbiter. The broader program, however, could not always afford to be adaptive and participants in it carefully picked their proverbial battles with nature. Collecting synoptic weather observations required strict adherence to rigid and internationally standardized schedules. Unlike resupply flights, postponement of a radiosonde run invalidated the data’s forecasting utility. Personnel had to cope with theodolites and other equipment designed for more temperate locales. Instead of bowing to these constraints, gathering data less often, and diminishing the network’s scientific value, personnel dedicated themselves to developing a local body of

knowledge that included procedures and devices that collectively enabled them to perform the observations on time in extremely harsh conditions. In so doing, JAWS personnel shared common cause with other crews working at weather stations around the world who also needed to develop local practices for taking measurements and “working around” their environment to “get the job done.”³⁹ By exercising flexibility in other parts of station life, the JAWS program and its staff ensured that they possessed the resources and energy to consistently deliver on their primary purpose: the timely collection of meteorological observations.

JAWS personnel, and particularly the met techs, cultivated a working scientific culture rooted in observation and documentation. The difference in the duration of the transiency of JAWS personnel, relative to the shorter stays of field scientists,⁴⁰ fostered additional adaptations that departing personnel shared with the next generation of incoming staff. While most scholars equate local knowledge in the Canadian Arctic with traditional Indigenous knowledge or Inuit Qaujimagatuqangit generated by peoples who have lived on particular lands and waters since time immemorial, the JAWS stations were built without the benefits of this knowledge, inviting a different question about how personnel succeeded despite their limited Arctic training. In his work on “high modernism,” James C. Scott insists that rational planning and universalist science failed to achieve desired results when planners overlooked the importance of “*mētis*” — the local or “practical knowledge” of place that allowed practitioners to modify procedures in response to unanticipated or changing circumstances.⁴¹ JAWS personnel constructed their own forms of local knowledge that were practical, aligned with international requirements, and based upon their corporeal practices, observations, and interactions with local environments. In this sense, meteorological science conducted at the stations was (as Steven Shapin observes of Western science more generally) “indelibly marked by the local and spatial circumstances of its making,” embodied in the people and instruments that produced it.⁴²

Scholars have shown how innovations in aviation and access to isolated stations such as JAWS influenced the professional and epistemic culture of southern-based government and academic scientists who studied the Arctic during the Cold War. Richard Powell explains how scientists associated with the PCSP hoped to use High Arctic sites to overcome nature’s

wrath and turn the Arctic into a “laboratory” where specific phenomena could be isolated and studied rather than observed — although he recognizes that the Arctic environment prevented this shift.⁴³ Similarly, Steven Bocking emphasizes scientists’ desire to use aviation to overcome nature so that Arctic experiments could conform “to the ideal represented by the laboratory.” This aspiration also failed, but airplanes operating out of support sites such as JAWS “provided an opportunity to bring data out of the north, so that interpretation could be conducted in a controlled, homogenous environment” down south. In so doing, the culture of Arctic science became “more tightly integrated” with its southern counterpart.⁴⁴

But the experiences of university-trained scientists who worked in the region for field seasons consisting of a few weeks or, at most, a few months, were substantively different from those of technicians overwintering in the High Arctic and conducting and recording observations year-round. Instead of attempting to advance their professional reputations by performing “experiments,” JAWS personnel focused on developing reliable procedures to perform synoptic observations over the course of decades. The data that JAWS generated certainly fed scientific analysis and meteorological forecasting in the south, but it was transmitted out daily by the stations for interpretation and application by others. Their modest roles in the larger scientific processes were grounded in the *domus* that they occupied *in* the Arctic, not as transients collecting scientific data *from* the Arctic.

By analyzing interpersonal relations, leadership, endurance and adaptiveness in harsh environments, and a willingness to innovate and endure hardship, this book identified cultural norms that enabled personnel to conduct synoptic observations on the Arctic Archipelago. While polar “spaces are given meaning in the imagination and represented and contested through discourse,” Christy Collis and Quentin Stevens note, “grasping their complex spatiality requires understanding the concrete materiality which people have produced there, and the ways in which this spatial materiality is interlinked with social processes and meanings.”⁴⁵ While jargony, this observation speaks to the limitations of confining assessments to how people *imagined* space and place. It calls for deeper exploration of how people produced Arctic spaces in physical form, such as buildings and airstrips, as well as how social infrastructure and the

human interactions within these spaces, and with surrounding physical environments, produced distinct Arctic places. In the case of JAWS, the very establishment of these weather stations prompted people to re-imagine the Canadian High Arctic as *useable* space. Weather data made the Arctic more *legible*, to use James C. Scott's idea: station operations made the Arctic more understandable, researchable, even quantifiable for scientists. As support hubs, JAWS made the isolated Queen Elizabeth Islands more accessible to outsiders. Personnel at the stations forged distinct cultures and made the stations into places of work, residence, and leisure. The joint program demonstrated that, with the support of modern logistics, even the remotest islands could become *livable* spaces.

Stations as Spaces and Places of Everyday Scientific Life

Although “most studies of everyday scientific life have been set in the laboratory,” Henrika Kuklick and Robert Kohler observe how practices in the field sciences yield equally rich insights as they “depend on the conditions of specific places, requiring considerable improvisation to cope with local exigencies.”⁴⁶ Given the particular High Arctic spaces that the Joint Arctic Weather Stations inhabited and the places that they produced, social relations and practices were intricately intertwined with environmental conditions, remoteness, and isolation. Both the Canadian and American governments hoped to select candidates whom they believed were the most innovative, cooperative, and capable of enduring prolonged isolation, far from home, without access to their regular social support systems.⁴⁷ Nonetheless, a lot of the men who volunteered to work at the stations had no substantive idea of where they were going, Peter Johnson later observed. “They knew nothing about the history of the area, whether people had been there before or not. They knew nothing of the conditions they were going to encounter, and by and large it didn't bother them. Their interests were either meteorological, or just having a job.”⁴⁸

Although some personnel arrived at the stations with prior polar experience, JAWS service was often their initial foray into Canada's Far North. Those who succeeded in their roles learned to embrace a lifestyle of self-direction, steady pace, and quiet that came with station life.⁴⁹ Modern communications and technology could help to smooth the peaks and troughs of activity in the annual cycle, but JAWS personnel accepted

(sometimes begrudgingly, often with simple resignation) that “nature” retained the power to shape their lives. Although the buildings provided refuge from the outside elements, the physical confinement circumscribed patterns of activity and behaviour in and around these scientific enclosures. Today, “there is no way they would send someone to a place like that and say they are going to leave them there for two years,” Lowell Demond stated in an interview.⁵⁰ Oral histories suggest that, whatever the hardships the men endured — or perhaps because of these challenges — many JAWS veterans considered their years at the stations as formative experiences in their lives.

Station-level reports, typically overlooked in studies fixated on national-level sovereignty deliberations, offer deep insight into how isolated stations functioned on the ground. In his elegantly crafted study on Antarctica, Tom Griffiths notes that reports from polar “station leaders over the years are a kind of meditation” on command and group dynamics, on imagining space and privacy, and on a host of other insights into the social life of isolated communities. “Has anyone ever studied them as a genre, as a compendium of practical advice,” he asks, “or are they trapped within the year of their accounting, each as discrete as an air bubble in its annual layer of snow?” If history serves as a “survival manual,” are we missing out on “the rich voice of experience” contained in the stories captured in these reports?⁵¹ We turn to these records not as a genre but as a source of rich insight into how knowledge, cultures, and spaces at isolated locations are generated, perpetuated, and challenged. Interviews with JAWS veterans also encouraged us to move beyond what Griffiths observes as “the limits of faceless, nameless, clinical accounts of deeply personal and cultural matters” in polar psychology studies. To support claims of “objectivity and rationality, ... real people are gutted and meaning ebbs away” in these studies, often leaving the reader with “mundane insights of meaningless generality... History, by contrast, spills over with illuminating, verifiable examples that you can argue with.”⁵²

The men inhabited distinct physical spaces as well as psychological environments — places of the mind. While southern historians fixate on the Arctic’s frigid temperatures and “hostile environment,”⁵³ the reports, diaries, and oral histories of the men who lived at the stations continuously stressed the centrality of isolation.⁵⁴ Archie Asbridge, who worked at

FIGURE 10-3.
Drilling a hole
in the ice outside
Isachsen to collect
water, 1964. Jim
Jung Collection.



Isachsen and Resolute in the late 1950s, likened the experience at the satellite stations to “submarine syndrome,” with long periods of interaction limited to a small group of people in a confined space.⁵⁵ Most found ways to endure, and even thrive, in their remote scientific enclaves. Journalist Ritchie Calder found, when visiting the stations in the mid-1950s, “a surprisingly well-adjusted group of men. Perhaps it is not surprising. Men do not choose such a life unless it temperamentally attracts them.” When asked why they chose this life, most gave a “frank and unromantic” reason: “the money is good.” The stations gave them a chance to “live hard and save hard,” building up their bank accounts to get married, buy houses, or finish university.⁵⁶ Driven by the challenge of conducting synoptic observations under extreme conditions, most proved to be dedicated and

innovative investigators and fulfilled their roles with pride and a sense of professionalism. “Nobody ever really loves the Arctic,” journalist Peter Inglis claimed in a 1952 story on the JAWS network, “but some of the old-timers become used to it to the point of grudging affection and say they feel out of place anywhere else.”⁵⁷ As a Canadian Meteorological Branch summary observed, “the High Arctic provides its own compensations, evidently, for many [JAWS personnel] have volunteered for additional tours of duty.”⁵⁸ Sometimes, these compensations were not enough. This book reveals occasions when isolation and confinement threatened to disrupt the stability of local cultures. Station crews resolved the resulting friction by supporting each other, and the rare occasions when these efforts failed reminded everyone to vigilantly contribute to the cultures that helped to make the stations possible.

Rather than distilling personal stories into datapoints (as do many studies that impose too much uniformity on field science and other activities in the North American Arctic),⁵⁹ this book is filled with anecdotes offering first-hand insights into how the men understood and remembered their experiences. In contrast with the questionnaire-based research that drives much of polar psychology,⁶⁰ we wanted to learn from their personal observations, their methods, their joys, and their frustrations as they articulated them in oral histories and station diaries. Resonant with the findings of Aspa Sarris and Neil Kirby in their survey of Antarctic stations, most JAWS personnel depicted their stations as “open, friendly, and participatory environments with constructive norms and behaviors, generally consistent with research that suggests that the Antarctic experience may be beneficial on people’s health and well-being rather than necessarily detrimental to psychological health.”⁶¹ Furthermore, the diverse evidence that we uncovered while researching this book confirms that “democratic” leadership, where leaders consulted with station staff before important decisions and undertook their share of station tasks, proved much more effective than dictatorial styles.⁶² With rare exception, the theoretically concurrent powers of the OIC and ExO worked well in practice. Despite initial concerns, Canadian personnel maintained, and American personnel respected, Canadian sovereignty under the JAWS command structure. Ultimately, however, the success of each station at any given time came down to each individual’s willingness to live and work side-by-side

everyday with a small group of peers. “I wonder sometimes myself what sort of personality I exuded that allowed me to get through all of that and live with those people,” Bob Plaseski pondered during an interview.⁶³

The conspicuous absence of Indigenous voices from this book differentiates it from most recent scholarship on the Canadian Arctic in the twentieth century. Despite occasional visits from Inuit passing by the satellite stations and the presence of an Inuit settlement near the weather station at Resolute, limited cross-cultural interaction meant that the stations did not fit the typical mold of “northern contact zones ... characterized by asymmetric power relations.”⁶⁴ On the one hand, this irregular contact reflected prevailing power relations in that Canadian officials decided not to adopt recommendations to populate the weather stations with full-time Inuit employees. Instead, both the seasonal work that Inuit performed during major air- and sealift operations at Resolute, as well as restricted contact between JAWS personnel and Qausuitturmiut, reflected wider power asymmetries between the state and the community. Furthermore, geographical and cultural distances meant that Inuit living in the small community at Grise Fiord on the Bache Peninsula did not visit Eureka with regularity, and the lack of Inuit settlements proximate to the other satellite stations precluded interactions there. It was telling that news stories during the 1950s described the extreme isolation of Alert as “too far north for the Eskimos.”⁶⁵

Such descriptions also mark the distinction between the movement-based patterns of Inuit (exemplified in Inughuit hunters from Greenland who frequented Ellesmere Island to hunt polar bears and muskox) and the fixed or “motionless” nature of the JAWS facilities.⁶⁶ Although archeological evidence near various JAWS sites revealed previous Thule and Inuit occupancy of the High Arctic, the absence of any *permanent* or *static* Indigenous presence in the region by the time Canadian and American officials mounted their air and sea voyages to select locations and establish the stations invoked the Western idea of *terra nullius*: that it was “nobody’s land” and thus available for occupation. This overlooked other forms of Indigenous use and occupancy. For example, historian Lyle Dick, in his masterful study of Ellesmere Island in the age of contact, reveals how Inughuit guides acquired direct experience in the High Arctic while enabling American and Danish expeditions to Ellesmere and Axel

Heiberg Islands in the late nineteenth and early twentieth centuries, and then while patrolling as special constables with the RCMP in the inter-war period. While the Mounties embarked on these periodic trips “across dangerous or unproductive terrain” to demonstrate Canadian sovereignty, Dick observed, Inughuit “pragmatic modes of thought told them it made sense only if it enabled them to hunt game or to learn more about the resources and opportunities for future utilization.”⁶⁷ What Canadian officials later deemed Inughuit “illegal” hunting of polar bear and muskox in the Arctic Archipelago (in contravention of the NWT Game Ordinance) practically applied to knowledge and experience in the persistent *movement* that animated Inuit life in Inuit Nunaat (their transnational homeland). As a Greenlandic hunter asked Samwillie Eliasialuk, an Inuk relocated to Ellesmere Island in 1953, “why do you carry so much dog food when animals are plentiful over here?”⁶⁸

Such logic would have been lost on most JAWS personnel for whom the Arctic land was not a source of sustenance. Their food and supplies were flown or shipped in, and their encounters with wildlife and forays into surrounding landscapes were fundamentally different than relationships that Inuit have in their homeland. JAWS personnel generally limited themselves to *observing* wildlife, not harvesting it. (Indeed, regulations prohibited them from hunting.) Connections with the south, not resources from and in the North, sustained the station personnel — materially, emotionally, and ideationally. Given these distinct worldviews and practices, it is unsurprising that the JAWS stations, as non-Indigenous scientific outposts, seemed to exist largely apart from the relationships that animate Inuit conceptualizations of Inuit Nunangat: their Canadian homeland. Accordingly, the program has left little imprint on Inuit history, even though the stations sit on lands now part of the Nunavut and Inuvialuit Land Claim Settlement Areas.⁶⁹

The stations left a more delible environmental footprint, both in terms of infrastructure and residual impacts of their operations. Environmental impact “wasn’t even a word in the dictionary” during the JAWS period, Bill Nemeth points out. Instead, he and other men working at the stations saw it as a simple “matter of surviving ... When you took a barrel of fuel up there you knew it had to be there otherwise you wouldn’t be there. When the fuel barrel emptied, there was no way of taking it out because

it couldn't be flown out, you stacked them up."⁷⁰ The stations existed to provide weather data for the economy down south to grow and flourish, and the spirit of environmentalism that animated future discussions about Arctic stewardship had yet to take hold of North Americans. Bob McDonald (OIC Resolute 1958–59) recalled that “we had ... absolutely no interest in environmental impact at all.”⁷¹ When the station at Alert experienced a fuel spill in the mid-1960s, David Oldridge “could see it was causing harm,”⁷² but the deleterious environmental impacts were simply ignored. Station personnel saw the “messy” drum caches as an aesthetic and logistics problem, not as pollution.⁷³ Track-ruts left by “joy rides” across the tundra lasted decades, and John Gilbert remembers many staff commenting about how long this destruction marked the High Arctic landscape.⁷⁴ In the early years, garbage and old tractors were left on the sea ice where they disappeared during the summer melt.⁷⁵ Other materials were left around the stations: Demond estimated that Eureka's cache of old electrical equipment, plywood boxes, and metal pieces stretched 200–300 feet.⁷⁶ The stations initially disposed of human waste in an environmentally insensitive manner, with latrines emptied into old fuel drums and hauled onto the bay ice until they dropped into the sea or the waste simply “dumped out near the beach and pushed to the bay by tractor.”⁷⁷ Scientific practices also left signatures on the environment. “Every met technician remembers the white blotch on the landscape” that they created “twice a day everyday” when they produced hydrogen for the balloons, Don Shanks described. The resulting sludge “was simply dumped on the ground,” and the inflation sheds were constructed on hills “so that the effluent would flow down and away from the building.”⁷⁸ In retrospect, most JAWS veterans regret that the program had not adopted more progressive environmental stewardship practices, reflecting a mental shift from “colonialism to environmentalism” that marks Arctic imaginaries more generally.⁷⁹ Better environmental practices would come in the “afterlife”⁸⁰ of JAWS as it morphed into the High Arctic Weather Stations (HAWS).

From JAWS to HAWS

In 1971, with the JAWS program slated to end the following year, the Canadian government transferred administrative responsibility for the stations from the Department of Transport to the Atmospheric Environment



FIGURE 10-4. The drum cache at Eureka, 1960. LAC Winn - AES Photos - Box 2 - Unofficial Report of Summer Activities - 1960.

Service (AES) under the newly created Department of the Environment. Owing to astute transition arrangements with the United States, the full onset of the Canadian-run High Arctic Weather Stations (HAWS) program at all of the former JAWS stations in 1972 had no practical impact on data collection, reinforcing how little nationality or “sovereignty” had influenced scientific practices on the ground. Oral histories suggest that “Canadianization” proved more of a whimper than a bang, and personnel turnover at the stations meant that, within a few years, no one remained from the JAWS period. Ron Huibers, who served as a met tech at Isachsen in 1975 and then as OIC of Eureka from 1987–88, recalled that HAWS staff made “very little mention of it, and if you didn’t know it, and you didn’t read some of the old materials on site,” there was little to acknowledge that the stations had been run jointly with the Americans only a few years before.⁸¹ Instead, this “changing of the guard” fostered a HAWS identity based on perceived distinctiveness. “We were the next phase,” explained

Rick Risbey, a met tech and later OIC of Mould Bay between 1974–76 and of Alert from 1977–78.⁸²

The lowering of the last American flag at Resolute in August 1972 brought a distinctive bureaucratic and identity break, but much of life at the High Arctic stations continued as it had since the 1950s. The transition to the HAWS period meant more continuity than change. Canadianization did not stop the sewage pipes from freezing and backing up.⁸³ Canadians who volunteered to serve at the High Arctic stations in the 1970s and 1980s continued to volunteer to go north for the same reasons as their predecessors from the 1950s and 1960s. Personnel were still drawn to the isolated stations by the promise of quick money, and continued to struggle with feelings of isolation. New technologies helped to bridge vast distances between personnel and their families, but also highlighted their physical separation. To succeed, leaders at the stations still needed to display the same qualities as they had since the beginning of JAWS, with authoritarian styles ill-suited to social stability at isolated civilian outposts. People who enrolled in the AES met tech training program knew they were likely bound for a year at an Arctic station. Fresh out of high school and the upper air program at Scarborough, Doug Munson went looking for adventure.⁸⁴ Others, like Risbey, sought out the simplicity of station life. Life was busy, but it was free of “distractions” such as “car payments, television, or girlfriends.”⁸⁵ Others wanted a secure career with the federal government and accepted a Northern posting with the attitude that “everybody has to do their time.”⁸⁶ For most people, however, money remained the main enticement. “In one year” as the OIC at Eureka, Dave Tidbury remembers, “I made enough to pay for the house” that he had down south.⁸⁷ When OICs tried to impose military-type discipline on HAWS personnel, they faced a “mini-revolt” — as happened at Mould Bay in 1976.⁸⁸ Scientists continued to visit the stations, and commercial interests leveraged the stations to undertake extensive surveys of High Arctic resources in the 1970s and 1980s. Government funding continued to dictate the number of operational stations, and budgetary pressures would ultimately determine their fate.

The employment of women at the HAWS brought the most noticeable change in station culture. Throughout the JAWS period, the stations were homosocial masculine spaces manifesting many “manly modern”



FIGURE 10-5. Heather Blain at Isachsen, 1976. Bob McInnes Collection.

characteristics described by historian Christopher Dummitt.⁸⁹ This culture ended when the AES assigned met tech graduates Heather Blain and Cheryl Leyten to Eureka in 1974. The station had been rebuilt recently and senior officials believed that comparatively high visitor traffic would help ensure their safety. The biggest problem that Blain remembers was the lack of a women's washroom, and the OIC's separate facility soon served this purpose. "There were some people that were ... ambivalent about the whole thing," she recalled, "but there wasn't [anyone] ... snarky or anything about it."⁹⁰ When asked about the change two years later, Joe Padehl of Eureka noted that "women improved the atmosphere at the station, because the men didn't let themselves go so much, but tried, out of respect, to maintain the same environment they would in the South."⁹¹ By the 1980s, women worked at most of the stations, breaking the outdated gender barrier once and for all.

Technological progress also helped to improve communications connecting the High Arctic Weather Stations to the outside world, further reducing their isolation. With the general simplification of radio

communications from point-to-point network Morse code to single side-band and the radio teletype, the satellite stations gradually substituted radio operators for additional met techs in the late 1960s who had trained in teletype duties.⁹² Station personnel continued to use phone patches until each station received a satellite phone connection.⁹³ Project Hurricane established a satellite receiving capability at Eureka and a microwave network linking Eureka to Alert in the early 1980s,⁹⁴ and when Mould Bay finally secured a satellite phone in April 1985 the station reported “an endless queue of people wanting to use it.”⁹⁵

JAWS personnel typically considered themselves “pioneers” throughout the 1950s and even into the 1960s. Station diaries from the HAWS period confirm improved access to amenities, the introduction of year-round landings, and improved communication technologies, but personnel at the stations still considered themselves to be “living on the edge.” “For those who went seriously North, you were into a completely different world from the one you grew up in,” Risbey recalled. “The weather was far more extreme than anything you had experienced before; the sun didn’t necessarily rise and set every day; your circle of familiar faces had disappeared, replaced by a few grizzled and unusual individuals who held your life in their hands, and virtually everything you saw, or experienced, was new.” Nevertheless, station personnel during the JAWS era “had things a hell of a lot tougher than we did,” Risbey stressed. “They were surviving on semi-annual mail drops and food drops. They were putting up with living conditions that were far tougher than what we had [available]. We had life pretty soft.”⁹⁶

This comparison was relative, of course. Storms continued to hamper medevac flights, and even monthly fresh produce and mail flights⁹⁷ did not eradicate the strains of isolation. By the mid-1970s, AES realized that full-year postings “took a toll on the human psyche” and limited them significantly over the next decade.⁹⁸ The constant rotation of station personnel kept the work environment fresh, but also reduced station efficiency. “Morale for the most part was not really high, not really low, we just kind of ran on a business type basis,” Risbey described. “You had a job to do, you got the job done.”⁹⁹ Like his JAWS predecessors, OIC Bob McInnes observed that “if people were busy, they were happy.”¹⁰⁰ In 1983, AES project officer D.J. Kahler reminded his superiors that HAWS personnel



FIGURE 10-6. Bob McInnes at Isachsen, 1976. Bob McInnes Collection.

exhibited “the same symptoms of isolation found throughout the arctic,” including boredom, alcoholism, moodiness, introversion, and even “dramatic releases of pent-up emotions through violent acts directed towards the employer or co-workers.”¹⁰¹ None of these symptoms would have surprised the men who had served during the JAWS era. David Tidbury read and studied the station logs that they had left, noting how “you could just appreciate ... the guys that went before you. And they were all sort of like heroes.”¹⁰²

Isolated stations “that continue to operate and grow ... are continuously built, changed and rebuilt, ruined and restored, and thus they are always also remains of the past, archives and traces, rather than sites at the cusp of scientific progress, moving ahead to futures of discovery,” Wenzel Geissler and Ann Kelly observe.¹⁰³ Just as the satellite stations and the hub at Rolute had evolved differently, the post-JAWS history of each station was unique — a testament to the complex spatiality of the network and the localized forms taken by scientific colonialism.¹⁰⁴ There was no single experience, no single site that epitomized the rest. While the Canadian



FIGURE 10-7. The Resolute weather station, 2016. Whitney Lackenbauer Collection.

government decided that some stations warranted renewal or expansion, others were abandoned and left to decay, their utility slipping from present to past, their material remnants left frozen in time and space.

Resolute, which boasted the largest station and the only JAWS site around which a permanent civilian community had grown, continued to develop as Canada's High Arctic hub. What began as a fledgling weather station, built because the preferred location had proven inaccessible in the summer of 1947, had expanded into a major regional airbase, an Inuit community, as well as a scientific, communication, and exploration hub. Transient scientists arrived in greater numbers during the HAWS period, propelled by the permanent establishment of the main Polar Continental Shelf Project (PCSP) building near the airfield in the 1960s and an oil exploration boom in the Queen Elizabeth Islands during the 1970s and early 1980s. The PCSP facilities and built-up industrial area at South Camp meant that the weather station played no role in housing visitors. While the weather station remained at its longstanding location near the airport, the community's permanent population moved to a new townsite about



FIGURE 10-8. Whitney Lackenbauer releasing a balloon at the Resolute weather station, 2016. Whitney Lackenbauer Collection.

three kilometres away on the eastern shore of Resolute Bay in the mid-1970s to accommodate better municipal services. “On a map, it appeared isolated as one of Canada’s most northerly communities, but in reality it was well connected through its airport and its popularity with the scientific community,” the Qikiqtani Truth Commission later reported.¹⁰⁵ Although the RCAF had turned over the airbase to the Department of Transport in 1964, the military expanded its presence (beyond the local Canadian Ranger patrol) when it opened the Canadian Armed Forces Arctic Training Centre (CAFATC) in 2013. The civilian weather station remains a distinct entity, operated by Environment and Climate Change Canada. Its personnel (including local Qausuitturmiut), now living off-site, still conduct daily weather observations and launch balloons as their predecessors have since 1947.

As the civilian station closest to the North Pole, Eureka also developed into a significant (albeit smaller) hub for High Arctic science. Its accommodation buildings were expanded to host visiting scientists from a wide variety of disciplines, as well as those working at the Polar Environment Atmospheric Research Laboratory (PEARL). The station also served as a jumping-off point for adventurers who arrived at the station each summer intent on reaching the North Pole. Former OIC David Tidbury recalled that “the coming and going of all of these visitors” made Eureka “a happening place.... We were more a hotel than a weather station” at times.¹⁰⁶ Reporter Katherine Harding observed that it was “no resort,” however, with a “heavy meat-locker-style door” serving as the main entrance to the staff barracks and “the cluster of snow-encrusted buildings teems with computers and high-tech meteorological gadgets.”¹⁰⁷ Environment and Climate Change Canada continues to staff a meteorological station at the site,¹⁰⁸ where curious, resident wolves still greet visitors just as they have since the original crew landed to build the station in 1947.

Budgetary constraints eventually prompted AES to close the separate weather station buildings at Alert and move meteorological operations into the Canadian Forces Station. Operating a small station with full amenities for less than ten people seemed redundant with a military installation with more than one hundred personnel located only a few miles away. When rumours of assimilating the civilian weather station into the military station reached Alert in 1976, HAWS personnel openly



FIGURE 10-9. Eureka, Nunavut, in 1998. ceedub13, Wikipedia Commons.

opposed the move. OIC Dave Tidbury noted that the new barracks at CFS Alert had “been built with the idea of the men being a) military and b) they are posted here on a six-month basis with a home base down south.” By contrast, HAWS personnel, like their JAWS predecessors, cultivated a more “homey” atmosphere that was not permissible at a Canadian Forces facility.¹⁰⁹ “The military are expected to have their rooms clean, however our ideas on clean and theirs may differ greatly,” OIC Rick Risbey noted two years later.¹¹⁰ Risbey later recalled how HAWS personnel visiting CFS Alert were “a bit of a novelty” because they were civilians subject to different rules. “Having hair down to the middle of your back made you sort of stand out in a crowd of guys who drove around with brush cuts and beards.”¹¹¹ HAWS personnel also considered their military neighbours to be more transient. “We have an identity,” Risbey concluded in a sharp memorandum appealing for the continuation of the status quo in 1978. “We are somebody. After the move, this is lost. It is our home, and

someone is going to destroy it to save money. Is it worth it?"¹¹² AES regional headquarters in Winnipeg decided that the cost savings were too attractive to resist, however, but it offered a modest compromise. Currently serving Alert HAWS staff finished their tours under the existing living arrangements, and all new personnel began their tours living at the military base. As OIC, Risbey was the last person to leave the standalone weather station in August 1978.¹¹³ Thereafter, AES became a "tenant" at Alert¹¹⁴ and Risbey's replacement, Brent Broughton, soon reported that the consolidation was a success.¹¹⁵

Even more drastic changes followed at the network's westernmost stations. By the turn of the new millennium, Isachsen and Mould Bay had returned to being uninhabited places. The AES decided to close Isachsen because of the immense costs of resupplying the station from the air, and because it was the least used by outside departments or scientists.¹¹⁶ The station suspended its upper air observations by mid-June 1978, and personnel spent the rest of their tours cannibalizing the station's equipment for the remaining stations.¹¹⁷ Mould Bay, for example, received its sister station's dump truck, two refrigerators, three ladders, and its movie projector.¹¹⁸ Isachsen officially closed on 19 September 1978 and an automated surface observation station began a more limited and inexpensive observation schedule.¹¹⁹ The wind, the snow, and the ice soon reclaimed the station, literally freezing the infrastructure in time. Books and magazines still adorn shelves inside the buildings, with trucks and bulldozers parked in garages as relics too expensive to fly south. The endless wind, which once chilled the spines of JAWS personnel, has now filled the long-vacated buildings which sit silent, the daily sound of human voices now but a distant memory.

Even with Alert's consolidation and Isachsen's closure, the HAWS program still cost AES \$3.5 million annually out of a total \$80 million budget to run Canada's entire weather station network.¹²⁰ This placed High Arctic operations under close scrutiny. Eureka and Resolute benefited by sharing resources with neighbouring government departments, but there were no partners to leverage when it came to revamping the Mould Bay station. After scaling back original construction plans, AES built a new two-storey "Ops" building at Mould Bay that contained the kitchen, communications equipment, lounge, and bedrooms in 1985.¹²¹ By 1990,



FIGURE 10-10. Isachsen in 2007, abandoned to the elements. Whitney Lackenbauer Collection.

however, the station's buildings were sinking into the permafrost, and its personnel seemed to operate in another era, preparing for aircraft landings by lining the runway with fireboxes and using a truck's lights to illuminate the far end. Exorbitant fuel costs, however, ultimately dictated the isolated station's fate. According to Mike Balshaw, AES Regional Director at the time, Mould Bay's "operating cost was so significant that it always stuck out like a sore thumb when it came to looking at the costs of the weather observing programs in Canada.... So when it came to closures you could close Mould Bay and save twenty stations down south."¹²² AES had hoped to keep the station open until a viable upper air automated station could be constructed, but budgetary considerations proved to be insurmountable and AES closed Mould Bay in 1997 to save an estimated \$1.5 million annually.¹²³ Unlike Isachsen, however, Mould Bay was "mothballed" with expectations that it could be reopened if the Canadian government wished to do so¹²⁴ — although conversations with scientists and government officials who have visited the site in the last decade suggest that the decrepit buildings are now beyond repair.

The closures of Isachsen and Mould Bay had scientific consequences. “Technologies like satellites and so on are not directly comparable with the standard technology for measuring upper atmosphere and surface conditions,” Balshaw notes. These orbiting observation points can only measure the “temperature of a layer” of atmosphere, and their vertical resolution is quite “coarse” when compared to the data gathered by upper air balloons. Satellite data aid forecasting, but Atlantic and Western Europe benefitted from the rigorously precise observations provided by Mould Bay’s extreme northwestern location. The dissimilarity of satellite and radiosonde data, moreover, limits scientists’ ability to combine the information and derive longer-term climactic observations. “A lot of countries,” Balshaw concludes,

define their international presence by their meteorological observations. African countries ... get a lot of international financial support ... to have meteorological observation programs because ... weather is global.... Canada may not have made some of the financial contributions to other aspects of the global survey system, but we always stood quite proudly in the international forum because we provide the high arctic observations between 60 and the north pole to the best of our ability and at considerable expense to the whole national program. From time to time that was gratefully acknowledged by other nations.¹²⁵

Ken Fluto, the former Regional Director of the AES Central Region of Environment Canada, agrees “there is something missing” that would improve forecasts, though he concedes that the costs required to operate stations like Mould Bay might not justify these empirical gains.¹²⁶

While making continuous contributions to weather forecasting, the JAWS and HAWS datasets are still being used to glean new insights. Climate change disproportionately impacts the polar regions, resulting in larger temperature swings that are melting ice, destroying wildlife habitats, and threatening Indigenous lifeways. Thanks to the JAWS network, “we have benchmarks to check global warming because of the measurements taken during this period,” Bob Plaseski, who served at Resolute and Alert from

1967–69, explains.¹²⁷ Each station ultimately produced between thirty years and three-quarters of a century of continuous surface and upper air observations that met, and continue to meet, international standards. One recent scientific study acknowledges that “the Eureka radiosonde dataset has informed weather research for over 50 years,”¹²⁸ and the JAWS/HAWS network also gathered comparable ice observations for shorter periods. Armed with these comprehensive datasets, scientists are analyzing long-term trends in temperature, precipitation, ice, and other environmental phenomena in Canada’s High Arctic that are helping global researchers to better understand the effects of climate change.¹²⁹ Robust scientific modeling can help to better anticipate future changes in the region, based upon a reliable dataset grounded in synoptic observations that extend back to the late 1940s. To this we owe credit not just to the visionaries such as Charles Hubbard, Francis Reichelderfer, and Andrew Thomson who initiated the JAWS program, but to the men like Monte Poindexter, Lowell Demond, and John Gilbert who actually gathered the data and produced distinctive scientific and social places at remote weather stations “on the edge of the world.”

Notes

NOTES TO INTRODUCTION

- 1 Andrew Thomson, "The Growth of Meteorological Knowledge of the Canadian Arctic," *Arctic* 1/1 (1948): 34.
- 2 Thomson, "Growth of Meteorological Knowledge," 34.
- 3 Lowell Demond interview. See also Kristine C. Harper, *Weather by the Numbers: The Genesis of Modern Meteorology* (Cambridge: MIT Press, 2012), 211.
- 4 Albert Peter Low, *Report on the Dominion Government expedition to Hudson Bay and the Arctic islands on board the DGS Neptune, 1903–1904* (Ottawa: Government Printing Bureau, 1906), 114. The Government of Canada named this relatively inaccessible and largely uninhabited group the Queen Elizabeth Islands in 1954.
- 5 Andrew Taylor, *Geographical Discovery and Exploration in the Queen Elizabeth Islands* (Ottawa: E. Cloutier, 1964), 2.
- 6 David R. Gray, *Alert, Beyond the Inuit Lands* (Ottawa: Borealis, 1997).
- 7 *Hearings Before the Committee on Agriculture, House of Representatives, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765), 22 January 1946, 6*, National Archives and Records Administration (NARA), RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous.
- 8 On the mobility and transformation of high modernist local knowledge, see Tina Loo and Meg Stanley, "An Environmental History of Progress: Damming the Peace and Columbia Rivers," *Canadian Historical Review* 92/3 (2011): 427; and David Livingstone, "The Spaces of Knowledge: Contributions Towards a Historical Geography of Science," *Environment and Planning D: Society and Space* 13/1 (1995): 5–34.
- 9 On this theme, see P. Wenzel Geissler and Ann Kelly, "A Home for Science: The Life and Times of Tropical and Polar Field Stations," *Social Studies of Science* 46/6 (2016): 797–808.
- 10 David Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2010), 11.
- 11 Livingstone, "Towards a Historical Geography of Science," 9, 11.
- 12 R.W. Rae, "Meteorological Activities in the Canadian Arctic," *Arctic* 7/3–4 (1954): 128.
- 13 Gordon W. Smith, "Weather Stations in the Canadian North and Sovereignty," *Journal of Military and Strategic Studies* 11/3 (2009): 63.

- 14 William C. Wonders, "The Joint Arctic Weather Stations (JAWS) in the Queen Elizabeth Islands," in *Essays on Meteorology and Climatology in Honour of Richmond W. Longley*, ed. K.D. Hage, R.W. Longley, and E.R. Reinelt (Edmonton: Department of Geography, University of Alberta, 1978), 399, 415.
- 15 Ronald Doel et al., "Strategic Arctic Science: National Interests in Building Natural Knowledge," *Journal of Historical Geography* 44 (2014): 60.
- 16 See, for example, Terence Armstrong, *The Russians in the Arctic: Aspects of Soviet Exploration and Exploitation of the Far North, 1937–57* (London: Methuen, 1958); Armstrong, "Meteorology in the Soviet Arctic, 1920–1945," *Polar Record* 5/37–38 (1949): 854–55; John C. Reed and Andreas G. Ronhovde, *Arctic Laboratory. A History (1947–1966) of the Naval Arctic Research Laboratory at Point Barrow, Alaska* (Montreal: Arctic Institute of North America Report AINA-TR-9, 1971); Elmer F. Clark, *Camp Century: Evolution of Concept and History of Design Construction and Performance* (Hanover: Cold Regions Research and Engineering Lab report no. CRREL-TR-174, 1965); A.M. Pennie, ed., *Defence Research Northern Laboratory 1947–1965* (Ottawa: Defence Research Board, 1966), copy at Department of National Defence (DND), Directorate of History and Heritage (DHH) file 110(1).003-D5; and Einar-Arne Drivenes, Harald Dag Jølle, and Ketil Zachariassen, eds., *Into the Ice: The History of Norway and the Polar Regions* (Oslo: Gyldendal akademisk, 2006).
- 17 See Gordon Elliott Fogg, *A History of Antarctic Science* (Cambridge: Cambridge University Press, 1992).
- 18 See, for example, Shelagh D. Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia Press, 1988); and Ken Coates and William R. Morrison, *The Alaska Highway in WWII: The US Army of Occupation in Canada's Northwest* (Norman: University of Oklahoma Press, 1992).
- 19 See, for example, P. Whitney Lackenbauer, "Right and Honourable: Mackenzie King, Canadian-American Bilateral Relations, and Canadian Sovereignty in the Northwest, 1943–1948," in *Mackenzie King: Citizenship and Community*, ed. John English, Ken McLaughlin, and P. Whitney Lackenbauer (Toronto: Robin Brass Studio, 2002), 151–68; P. Whitney Lackenbauer and Peter Kikkert, "The Dog in the Manger – and Letting Sleeping Dogs Lie: The United States, Canada and the Sector Principle, 1924–1955," in *The Arctic Ocean: Essays in Honour of Donat Pharand*, ed. Suzanne Lalonde and Ted McDorman (Leiden: Brill, 2014), 216–39.
- 20 See, for example, Donald Creighton, *The Forked Road: Canada 1939–1957* (Toronto: McClelland & Stewart, 1976); Grant, *Sovereignty or Security?* and, less directly, her *Polar Imperative* (Vancouver: Douglas & McIntyre, 2010); Bernd Horn, "Gateway to Invasion or the Curse of Geography? The Canadian Arctic and the Question of Security, 1939–1999," in *Forging a Nation: Perspectives on the Canadian Military Experience*, ed. Bernd Horn (St. Catharines: Vanwell, 2002), 307–34; and Adam Lajeunesse, "The True North As Long As It's Free: The Canadian Policy Deficit 1945–1985" (unpublished master's thesis, University of Calgary, 2007), 25.
- 21 Grant, *Sovereignty or Security?*, 241, 243.
- 22 See, for example, David Bercuson, "Continental Defense and Arctic Sovereignty, 1945–50: Solving the Canadian Dilemma," in *The Cold War and Defense*, ed. Keith Neilson and Ronald Haycock (New York: Praeger, 1990), 153–70; Elizabeth Elliot-Meisel, *Arctic Diplomacy: Canada and the United States in the Northwest Passage* (New York: Peter Lang, 1998); Ken Coates, P. Whitney Lackenbauer, Bill Morrison, and Greg Poelzer, *Arctic Front: Defending Canada in the Far North* (Toronto: Thomas Allen, 2008); P. Whitney Lackenbauer and Peter Kikkert, "Setting an Arctic Course:

- Task Force 80 and Canadian Control in the Arctic, 1948,” *The Northern Mariner* 21/4 (October 2011): 327–58; Kikkert, “Constructing a Role: The Royal Canadian Air Force in the Arctic, 1945–1953,” in *De-Icing Required: The Canadian Air Force’s Experience in the Arctic*, ed. P. Whitney Lackenbauer and William March (Trenton: Canadian Forces Air Warfare Centre, 2012), 17–30; Daniel Heidt, “Clenched in the JAWS of America? Canadian Sovereignty and the Joint Arctic Weather Stations, 1946–1972,” in *Canada and Arctic Sovereignty and Security: Historical Perspectives*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2011), 145–70; and Lackenbauer and Kikkert, “Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945–68,” in *In the National Interest: Canadian Foreign Policy and the Department of Foreign Affairs and International Trade, 1909–2009*, ed. Greg Donaghy and Michael Carroll (Calgary: University of Calgary Press, 2011), 101–20.
- 23 Matthew Farish, “Frontier Engineering: From the Globe to the Body in the Cold War Arctic,” *Canadian Geographer* 50/2 (2006): 177–96, and his important book *The Contours of America’s Cold War* (Minneapolis: University of Minnesota Press, 2010). See also Farish, “The Lab and the Land: Overcoming the Arctic in Cold War Alaska,” *Isis* 104/1 (2013): 1–29; Jonathan Turner, “Politics and Defence Research in the Cold War,” *Scientia Canadensis* 35/1–2 (2012): 39–63; and Andrew Iarocci, “Opening the North: Technology and Training at the Fort Churchill Joint Services Experimental Testing Station, 1946–64,” *Canadian Army Journal* 10/4 (2008): 74–95.
- 24 Matthias Heymann et al., “Exploring Greenland: Science and Technology in Cold War Settings,” *Scientia Canadensis* 33/2 (2010): 11–14. On US and Greenland during the Cold War, see Ronald Doel, Kristine Harper, and Matthias Heymann, eds., *Exploring Greenland: Cold War Science and Technology on Ice* (New York: Springer, 2016), and Janet Martin-Nielsen, *Eismitte in the Scientific Imagination: Knowledge and Politics at the Center of Greenland* (New York: Springer, 2013).
- 25 Doel et al., “Strategic Arctic Science,” 71.
- 26 Trevor H. Levere, *Science and the Canadian Arctic: A Century of Exploration, 1818–1918* (Cambridge: Cambridge University Press, 2004), 1.
- 27 Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia University Press, 1993); Henry A. Giroux, *University in Chains: Confronting the Military-Industrial-Academic Complex* (New York: Routledge, 2015); P. Forman, “Behind Quantum Electronics: National Security as Basis for Physical Research in the United States, 1940–1960,” *Historical Studies in the Physical and Biological Sciences* 18/1 (1987): 149–229; James R. Fleming, “Distorted Support: Pathologies of Weather Warfare,” in *Science in Uniform, Uniforms in Science*, ed. Margaret Vining and Barton Hatcher (Lanham, MD: Smithsonian National Museum of American History, 2007) 49–59.
- 28 Roger L. Geiger, “Universities, and National Defense, 1945–1970,” *Osiris* 7 (1992): 28.
- 29 For examples that situate the JAWS program in senior Canadian-American deliberations about continental defence cooperation during the late 1940s and early 1950s, see: Grant, *Sovereignty or Security?*, 174; Grant, *Polar Imperative*, 302; Bercuson, “Continental Defense and Arctic Sovereignty,” 153–70; and John Woitkowitz, “Making Sense of the Arctic: US-Canadian Foreign and Defense Relations and the Establishment of JAWS and the DEW Line, 1944–1957” (unpublished PhD diss., University of Calgary, 2018).
- 30 “Traditional forms of social and political analysis, which are mostly structuralist in derivation, tend to analyze political power in terms of institutions rather than practices,” anthropologist Hugh Gusterson observed. It is therefore critical to move

- beyond high politics by adopting a cultural perspective to understand the logical, ideological, and emotional underpinnings of the Cold War. Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War* (Berkeley: University of California Press, 1996), 5.
- 31 Farish, "Frontier Engineering," 177, 180. See also Stephen Bocking, "Science and Spaces in the Northern Environment," *Environmental History* 12/4 (2007): 867–94; Stephen Bocking, "A Disciplined Geography: Aviation, Science, and the Cold War in northern Canada, 1945–1960," *Technology and Culture* 50/2 (2009): 265–90; Michael Bravo and Sverker Sörlin, eds., *Narrating the Arctic: A Cultural History of Nordic Scientific Practices* (Canton: Science History Publications, 2002); 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* 39/8 (2007): 1794–1811; Powell, *Studying Arctic Fields: Cultures, Practices, and Environmental Sciences* (Montreal & Kingston: McGill-Queen's University Press, 2017); and Stephen Bocking and Daniel Heidt, eds., *Cold Science: Environmental Knowledge in the North American Arctic during the Cold War* (London: Routledge, 2019).
- 32 Vanessa Heggie, "Higher and Colder: The Success and Failure of Boundaries in High Altitude and Antarctic Research Stations," *Social Studies of Science* 46/6 (2016): 822.
- 33 Henrika Kuklick and Robert E. Kohler, "Introduction," *Osiris* 11 (1996): 6.
- 34 See for example: W. Patrick McCray, "Amateur Scientists, the International Geophysical Year, and the Ambitions of Fred Whipple," *Isis* 4/4 (December 2006): 634–58; and Thomas R. Williams, "Getting Organized: A History of Amateur Astronomy in the United States" (unpublished PhD diss., Rice University, 2000).
- 35 Sharon Traweeck, *Beamtimes and Lifetimes: The World of High Energy Physicists* (Cambridge: Harvard University Press, 2009), 7, 9.
- 36 Geissler and Kelly, "Home for Science," 798. Heggie describes a "field laboratory" as "a physical structure primarily intended for the indoor practice of science, while a 'field station' is a broader designation that may include domestic space, support structures and multiple individual laboratory spaces. 'Field site' is reserved to indicate the surroundings of the stations and laboratories, including the outdoor spaces in which scientific work is conducted." Heggie, "Higher and Colder," 810.
- 37 James C. Scott, *Domination and the Arts of Resistance: Hidden Transcripts* (New Haven: Yale University Press, 1990), xii.
- 38 Ken Coates, "The Rediscovery of the North: Towards a Conceptual Framework for the Study of Northern/Remote Regions," *Northern Review* 12/13 (1994): 15–43. On the historiography of the North, see also Ken Coates and William Morrison, "The New North in Canadian History and Historiography," *History Compass* 6/2 (2008): 639–58; and Kerry Abel and Kenneth Coates, eds., *Northern Visions: New Perspectives on the North in Canadian History* (Peterborough: Broadview Press, 2001).
- 39 Christy Collis, "Mawson and Mirnyy Stations: The Spatiality of the Australian Antarctic Territory, 1954–61," *Australian Geographer* 38/2 (2007): 218.
- 40 Christy Collis and Quentin Stevens, "Cold Colonies: Antarctic Spatialities at Mawson and McMurdo Stations," *Cultural Geographies* 14/2 (2007): 237.
- 41 Klaus Dodds, *Geopolitics in Antarctica: Views from the Southern Ocean Rim* (Chichester: John Wiley, 1997), xiv. See also Gearóid Ó Tuathail, *Critical Geopolitics: The Politics of Writing Global Space* (Minneapolis: University of Minnesota Press, 1996); Simon Dalby, "Critical Geopolitics: Discourse, Difference and Dissent," *Environment and Planning D: Society and Space* 9 (1991): 261–83; and Collis, "Mawson and Mirnyy Stations," 215–31.

- 42 See, for example, Grant, *Sovereignty or Security?*; Bercuson, “Continental Defense and Arctic Sovereignty,” 156; David Bercuson, “Advertising for Prestige: Publicity in Canada-US Arctic Defence Cooperation, 1946–48,” in *Canadian Arctic Sovereignty and Security: Historical Perspectives*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2010), 111; and Matthias Heymann, “In Search of Control: Arctic Weather Stations in the Early Cold War,” in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald Doel, Kristine Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 92.
- 43 Heymann, “In Search of Control,” 76. See also Grant, *Polar Imperative*, 294–95.
- 44 Tina Adcock, “Toward an Early Twentieth-Century Canadian Culture of Arctic Exploration,” in *North by Degree: Arctic Exploration and Its Impact on Society*, ed. Robert Peck and Susan Kaplan (Philadelphia: American Philosophical Society, 2013), 109–41.
- 45 Livingstone, *Putting Science in its Place*, 3, 11. See also Bruno Latour and Steve Woolgar, *Laboratory Life: The Social Construction of Scientific Facts* (Beverly Hills: Sage, 1979); and Traweek, *Beamtimes and Lifetimes*.
- 46 See, for example, Dian Olson Belanger, *Deep Freeze: The United States, the International Geophysical Year, and the Origins of Antarctica’s Age of Science* (Boulder: University Press of Colorado, 2006); Williams, “Getting Organized”; Matthew Farish and P. Whitney Lackenbauer, “Western Electric Turns North: Technicians and the Transformation of the Cold War Arctic,” in *Ice Blink: Navigating Northern Environmental History*, ed. S. Bocking and B. Martin (Calgary: University of Calgary Press, 2017), 261–93; and Fogg, *History of Antarctic Science*.
- 47 Kuklick and Kohler, “Introduction,” 6.
- 48 Geissler and Kelly, “Home for Science,” 800–01.
- 49 Geissler and Kelly, “Home for Science,” 800. Kuklick and Kohler observe that these “heterogeneous populations pursue their separate ends and often resent one another” and “interact with and affect one another in significant ways.” “Introduction,” 4.
- 50 See, for example: Jack Stuster, *Bold Endeavors: Lessons from Polar and Space Exploration* (Annapolis: Naval Institute Press, 1996), 101; Paul D. Nelson, “Leadership in Small Isolated Groups: Report Number 62:13” (San Diego: US Navy Medical Neuropsychiatric Research Unit, 1962), 9–10; and Lawrence Palinkas, “Sociocultural Influences on Psychosocial Adjustment in Antarctica: Report No. 85–49” (San Diego: US Navy Medical Neuropsychiatric Research Unit, 1985), 14. This research has not been applied to the Canadian Arctic. See Peter Suedfeld, “Polar Psychology. An Overview,” *Environment and Behavior* 23/6 (November 1991): 654–55; E.K. Eric Gunderson, “Introduction,” *Human Adaptability to Antarctic Conditions* (Washington: American Geophysical Union, 1974), 2; and William R. Moore, “Planning of Social and Psychological Needs at a Canadian Arctic Military Installation” (unpublished master’s thesis, University of British Columbia, 1990), 129.

NOTES TO CHAPTER 1

- 1 Irving Krick, *War and Weather: A Report Prepared for the AAF Scientific Advisory Group* (Dayton, OH: Headquarters Air Materiel Command, 1945), 1.
- 2 Alexander Forbes, *Quest for a Northern Air Route* (Cambridge: Harvard University Press, 1953), ix.
- 3 George W. Wenzel, “Canadian Inuit subsistence and ecological instability — if the climate changes, must the Inuit?” *Polar Research* 28/1 (2009): 89–99. See also R. Barry

- et al., “Environmental and cultural change in the eastern Arctic during the last five thousand years,” *Arctic and Alpine Research* 9 (1977): 193–210; Robert W. Park, “The Dorset-Thule succession in Arctic North America: assessing claims for culture contact,” *American Antiquity* 58/2 (1993): 203–34; Robert McGhee, *Ancient Peoples of the Arctic* (Vancouver: University of British Columbia Press, 1996); and Robert McGhee, “The Archaeological Construction of Aboriginality,” in *Archaeologies of Us and Them: Debating History, Heritage and Indigeneity*, ed. Charlotta Hillerdal, Anna Karlström, and Carl-Gösta Ojala (London: Routledge, 2017), 97–108.
- 4 Wenzel, “Canadian Inuit subsistence”; Milton M.R. Freeman, ed., *Land Use and Occupancy*, Vol. 1 of *Inuit Land Use and Occupancy Project Report* (Ottawa: Supply and Services Canada, 1976); and Robert McGhee, “The Population Size and Temporal Duration of Thule Culture in Arctic Canada,” in *On the Track of Thule Culture from Bering Strait to Greenland*, ed. B. Gronnow (Copenhagen: National Museum of Denmark, 2009), 75–90.
 - 5 Andrew Taylor, *Geographical Discovery and Exploration in the Queen Elizabeth Islands* (Ottawa: E. Cloutier, 1964), 9.
 - 6 Svenn Orvig, “A Century of Arctic Meteorology: From Discovery to Science,” in *A Century of Canada’s Arctic Islands, 1880–1980*, ed. Morris Zaslow (Ottawa: Royal Society of Canada, 1981), 132.
 - 7 Morley K. Thomas, “A century of Canadian meteorology,” *Annual Report of Operations* (Toronto: Canadian Atmospheric Environment Service, 1971–72), 1.
 - 8 For example, British scientists at Fort Prince of Wales recorded one of the earliest series in 1768–69 and their notes were published in London the following year. Thomas Hutchins, an HBC officer at York Factory and Severn House, made one of the earliest instrumental records in northern Canada a few years later. Morley K. Thomas, “A Brief History of Meteorological Services in Canada Part 1: 1839–1930,” *Atmosphere* 9/1 (1971): 1–8. See also Catharine Ward and Dennis Wheeler, “Hudson’s Bay Company ship’s logbooks: a source of far North Atlantic weather data,” *Polar Record* 48/2 (April 2012): 165–76.
 - 9 Hugh N. Wallace, *The Navy, the Company, and Richard King: British Exploration in the Canadian Arctic, 1829–1860* (Montreal & Kingston: McGill-Queen’s University Press, 1980), 5. Pierre Berton noted that, by 1817, ninety percent of Britain’s naval officers were unemployed, leaving them desperate for offshore opportunities that brought activity and the potential for promotion. Pierre Berton, *The Arctic Grail: The Quest for the North West Passage and the North Pole, 1818–1909* (Toronto: McClelland & Stewart, 1988), 18.
 - 10 Trevor H. Levere, *Science and the Canadian Arctic: A Century of Exploration, 1818–1918* (Cambridge: Cambridge University Press, 2004), 44–63.
 - 11 Sir William Edward Parry, *Journal of a Voyage for the Discovery of a North-West Passage from the Atlantic to the Pacific, Performed in the Years 1819–20, in His Majesty’s Ships Hecla and Griper...* (London: John Murray, 1821), 24–31.
 - 12 Taylor, *Geographical Discovery and Exploration*, 27–28.
 - 13 Alexander Fisher, *A Journal of a Voyage of Discovery to the Arctic Regions: In His Majesty’s Ships Hecla and Griper, in the Years 1819 & 1820*, vol. 2 (London: Longman, Hurst, Rees, Orme, and Brown, 1821), 159.
 - 14 Meteorological Council, *Contributions to our Knowledge of the Meteorology of the Arctic Regions*, part III (London: Her Majesty’s Stationery Office, 1879), 257.
 - 15 Parry, *Journal of a Voyage for the Discovery of a North-West Passage*, 145. Fisher also noted in his journal that “the degree of cold indicated by the thermometer and that

- conveyed by our feelings are widely different, for whenever there is a breeze of wind we find that it is much more disagreeable to walk about when the thermometer is at 20° above zero, than when it is at zero in a calm.” Quoted in Meteorological Council, *Contributions to our Knowledge*, part III, 259.
- 16 Taylor, *Geographical Discovery and Exploration*, 27–28.
- 17 At latitude 69°21'N, longitude 124°W, they sent up kites with self-registering thermographs, discovering that the air was isothermal up to 400 feet with a temperature of -24°F (-31°C). These were the last recorded upper-air ascents in the Canadian Arctic until the second Polar Year, more than a century later. Andrew Thomson, “The Growth of Meteorological Knowledge of the Canadian Arctic,” *Arctic* 1/1 (1948): 36–38.
- 18 Levere, *Science and the Canadian Arctic*, 142–43, 162–64.
- 19 William R. Morrison, “The North,” in *Canada, Confederation to Present: An Interactive History of Canada* [CD-ROM], ed. Bob Hesketh and Christopher Hackett (Edmonton: Chinook Multimedia, 2001). On the size and provisioning of Franklin’s “floating palaces,” see Wallace, *The Navy, the Company*, 57, and L.P. Kirwan, *A History of Polar Exploration* (London: Penguin, 1962), 180.
- 20 Wallace, *The Navy, the Company*, 64.
- 21 See Taylor, *Geographical Discovery and Exploration*, 53.
- 22 Thomson, “Growth of Meteorological Knowledge,” 35. The Meteorological Council of Great Britain published records of thirty-six expeditions between 1819 and 1888, the majority of them relating to the Franklin expeditions. See *Contributions to our Knowledge of the Meteorology of the Arctic Regions*, vol. I (London: H.M. Stationery Office, 1879–1888).
- 23 Wallace, *The Navy, the Company*, 161.
- 24 Isaac Israel Hayes, *The Open Polar Sea* (Philadelphia: D. McKay, 1867), 351.
- 25 Hall later travelled by sledge to 83°05'N. See Chauncey C. Loomis, *Weird and Tragic Shores: The Story of Charles Francis Hall, Explorer* (New York: Alfred A. Knopf, 1971).
- 26 John L. DuBois, Robert P. Multhauf, and Charles A. Ziegler, *The Invention and Development of the Radiosonde, with a Catalog of Upper-Atmospheric Telemetering Probes in the National Museum of American History, Smithsonian Institution* (Washington: Smithsonian Studies in History and Technology no. 53, 2002), 1–13, 30, 67.
- 27 James Rodger Fleming, *Meteorology in America, 1800–1870* (Baltimore: Johns Hopkins University Press, 1990).
- 28 Thomas, “Brief History Part 1”; Morley K. Thomas, “A Brief History of Canadian Meteorological Services Part 2: 1930–1939,” *Atmosphere* 9/2 (1971): 1–7; and Morley K. Thomas, *The Beginnings of Canadian Meteorology* (Toronto: ECW Press, 1991).
- 29 Suzanne Zeller, *Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation* (Montreal & Kingston: McGill-Queen’s University Press, 2009), 168.
- 30 James Rodger Fleming, “Storms, strikes, and surveillance: The U.S. Army Signal Office, 1861–1891,” *Historical Studies in the Physical and Biological Sciences* 30/2 (2000): 315–32. Fleming notes that the far-flung information network also served to “gather intelligence on all possible threats to domestic tranquillity,” from railway strikes to developments in the Indian wars on the western frontier. In this sense, Fleming argues, it was a precursor to the current Department of Homeland Security. Fleming, “Telegraphing the Weather: Military Meteorology, Strategy, and ‘Homeland Security’ on the American Frontier in the 1870s,” in *Instrumental in War: Science, Research, and*

- Instruments between Knowledge and the World*, ed. Steven A. Walton (Leiden: Brill, 2005), 153–78.
- 31 Donald R. Whitnah, *A History of the United States Weather Bureau* (Urbana: University of Illinois Press, 1961); Joseph Hawes, “The Signal Corps and its Weather Service, 1870–1890,” *Military Affairs* 30/2 (1966): 68–76; and Patrick Hughes, *A Century of Weather Service: A History of the Birth and Growth of the National Weather Service, 1870–1970* (New York: Gordon and Breach, 1970), 21.
- 32 Thomas, “Century of Canadian Meteorology,” 4.
- 33 Suzanne Zeller, *Land of Promise, Promised Land: The Culture of Victorian Science in Canada*, Canadian Historical Association Historical Booklet no. 56 (Ottawa: Canadian Historical Association, 1996), 2. See also Doug Owram, *Promise of Eden: The Canadian Expansionist Movement and the Idea of the West, 1856–1900* (Toronto: University of Toronto Press, 1980), and W.A. Waiser, *The Field Naturalist: John Macoun, the Geological Survey, and Natural Science* (Toronto: University of Toronto Press, 1989).
- 34 Zeller, *Inventing Canada*, 178, 180.
- 35 Thomas, “Brief History Part 1.” See also Thomas, “Century of Canadian Meteorology,” 6.
- 36 On the purchase of Alaska, see Victor John Farrar, *The Annexation of Russian America to the United States* (New York: Russell & Russell, 1966); Ted C. Hinkley, *The Americanization of Alaska, 1867–1897* (Palo Alto: Pacific Books, 1972); Ronald J. Jensen, *The Alaska Purchase and Russian-American Relations* (Seattle: University of Washington Press, 1975); Howard I. Kushner, *Conflict on the Northwest Coast: American-Russian Rivalry in the Pacific Northwest, 1790–1867* (Westport: Greenwood Press, 1975); Paul S. Holbo, *Tarnished Expansion: The Alaska Scandal, the Press, and Congress, 1867–1871* (Knoxville: University of Tennessee Press, 1983); and Norman E. Saul, *Distant Friends: The United States and Russia, 1763–1867* (Lawrence: University Press of Kansas, 1991).
- 37 H.R. Holmden to A.G. Doughty, “Memo re the Arctic Islands,” 26 April 1921, Library and Archives Canada (LAC), RG 85, vol. 584, f. 571 pt. 5. On the transfer, see Gordon W. Smith, “The Transfer of Arctic Territories from Great Britain to Canada in 1880, and some Related Matters, as seen in Official Correspondence,” *Arctic* 14/1 (1961): 53–73.
- 38 Order in Council PC 1839, 23 September 1882, quoted in Shelagh D. Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia Press, 1988), 5.
- 39 Levere, *Science and the Canadian Arctic*, 307.
- 40 Kevin R. Wood and James E. Overland, “Climate Lessons from the First International Polar Year,” *Bulletin of the American Meteorological Society* (December 2006): 1687, 1689. Wood and Overland note that no one collated, analyzed, or synthesized the synchronous data during or after the First IPY.
- 41 See William Barr, *The Expeditions of the First International Polar Year 1882–82* (Calgary: Arctic Institute of North America, 2008). Levere notes that the limited Canadian involvement in the High Arctic reflected the region’s distance from Ottawa, the absence of “notions of glory associated with Royal Navy expeditions,” and the HBC’s lack of interest in the North Pole or geophysics. *Science and the Canadian Arctic*, 323–24.
- 42 Adolphus Greely, *Three Years of Arctic Service: An Account of the Lady Franklin Bay Expedition of 1881–84, and the Attainment of the Farthest North*, 2 vols. (New York: Charles Scribner’s Sons, 1886); and Leonard F. Guttridge, *Ghosts of Cape Sabine: The Harrowing True Story of the Greely Expedition* (New York: G.P. Putnam, 2000).

- Expedition members died of starvation, hypothermia, drowning, and (in one case) execution for repeatedly stealing food rations. On the transfer of the weather bureau to civilian control, see Whitnah, *History of the United States Weather Bureau*, 43–60.
- 43 “The years around 1900 were those of Scandinavia’s arctic ascendancy,” Levere noted in *Science and the Canadian Arctic*, 362.
- 44 D.C. Archibald, “Brief History of the Establishment of the Jointly Operated Meteorological Stations in the Canadian Arctic,” c. 1949, Northwest Territories Archives (NWT Archives), N-1992-023, f. 39-7; Orvig, “Century of Arctic Meteorology,” 134; Harald U. Sverdrup, “Roald Amundsen,” *Arctic* 12/4 (1959): 221.
- 45 Orvig, “Century of Arctic Meteorology,” 133.
- 46 Nancy Fogelson, “The Tip of the Iceberg: The United States and International Rivalry for the Arctic, 1900–25,” *Diplomatic History* 9/2 (1985): 132–33. On explorations of Ellesmere, see Lyle Dick, *Muskox Land: Ellesmere Island in the Age of Contact* (Calgary: University of Calgary Press, 2001).
- 47 Thomson, “Growth of Meteorological Knowledge,” 36; A.R. Gordon, *Report of the Hudson’s Bay Expedition Under the Command of Lieut. AR Gordon, RN* (Ottawa: Department of Marine, 1884).
- 48 Gordon W. Smith, *A Historical and Legal Study of Sovereignty in the Canadian North: Terrestrial Sovereignty, 1870–1939*, ed. P. Whitney Lackenbauer (Calgary: University of Calgary Press, 2014), 137.
- 49 When the HBC equipped its posts with radio equipment, the company agreed to carry out twice-daily synoptic observations at its Arctic posts, notably Fort Ross, Walker Inlet (later Holman Island), and Arctic Bay. The HBC also provided meteorological training to their classes of new apprentices. By training staff early, they carried their skills with them when they transferred to new posts. Archibald, “Brief History.” See also Thomson, “Growth of Meteorological Knowledge,” 36–38. On the Royal Canadian Mounted Police, 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).
- 50 W.F. King, *Report Upon the Title of Canada to the Islands North of the Mainland of Canada* (Ottawa: 1905), 8, cited in Richard Diubaldo, *Stefansson and the Canadian Arctic* (Montreal & Kingston: McGill-Queen’s University Press, 1978), 5.
- 51 See, for example, Donat Pharand, *The Law of the Sea of the Arctic with Special Reference to Canada* (Washington: Arctic Institute of North America, 1973), 134–35; Donat Pharand, *Canada’s Arctic Waters in International Law* (Cambridge: Cambridge University Press, 1988), 5–8; Janice Cavell, “Sector claims and counter-claims: Joseph Elzéar Bernier, the Canadian government, and Arctic sovereignty, 1898–1934,” *Polar Record* 50/3 (2014): 293–310; and Janice Cavell, “The Sector Theory and the Canadian Arctic, 1897–1970,” *International History Review* 41/6 (2019): 1168–93.
- 52 Quoted in Margaret Morris, “Boundary Problems Relating to the Sovereignty of the Canadian Arctic,” in *Canada’s Changing North*, ed. William C. Wonders (Toronto: McClelland & Stewart, 1971), 327. Although Poirier’s comment that “from 141 to 60 degrees west we are on Canadian territory” could be interpreted to imply that Canada was entitled to everything within these boundaries (land, ice, and water), his frequent specification of “lands” and “land and islands” throughout the rest of his speech strongly suggests that his intent was only to include land areas. Most commentators have observed that Poirier made no specific mention of ice or waters, and they have appropriately concluded that he confined the sector theory to claiming all the lands that

- lie between the western and eastern extremities of a state's sector boundaries and the Pole.
- 53 Gordon W. Smith, "Sovereignty in the North: The Canadian Aspect of an International Problem," in *The Arctic Frontier*, ed. R. St. J. MacDonald (Toronto: University of Toronto Press, 1966), 215.
- 54 V. Kenneth Johnston, "Canada's Title to the Arctic Islands," *Canadian Historical Review* 14/1 (1933): 33.
- 55 Alan MacEachern, "J.E. Bernier's Claim to Fame," *Scientia Canadensis* 33/2 (2010): 43–73; Orvig, "Century of Arctic Meteorology," 134; and J.-E. Bernier, *Master Mariner and Arctic Explorer: A Narrative of Sixty Years at Sea from the Logs and Yarns of Captain J.E. Bernier* (Ottawa: Le Droit, 1939).
- 56 Vilhjalmur Stefansson, *The Friendly Arctic: The Story of Five Years in Polar Regions* (New York: Macmillan, 1921), 142–226, as well as Robert Borden's foreword, xxiv; Robert Bartlett, *Last Voyage of the Karluk* (Boston: Small, Maynard, 1916), 306. See also Trevor H. Levere, "Vilhjalmur Stefansson, the Continental Shelf, and a New Arctic Continent," *British Journal for the History of Science* 21/2 (1988): 238, 240.
- 57 Levere, *Science and the Canadian Arctic*, 382, 393, 406–07, 423. For McKinlay's account of the CAE, see *Karluk: The Great Untold Story of Arctic Exploration* (London: Weidenfeld & Nicolson, 1976).
- 58 Orvig, "Century of Arctic Meteorology," 135.
- 59 On the mathematical side, see Frederik Nebeker, *Calculating the Weather: Meteorology in the 20th Century* (San Diego: Academic Press, 1995).
- 60 Krick, *War and Weather*.
- 61 Robert Marc Friedman, "Constituting the Polar Front, 1919–1920," *Isis* 73/3 (September 1982): 350.
- 62 Charles C. Bates and John F. Fuller, *America's Weather Warriors, 1814–1985* (College Station: Texas A&M University Press, 1986).
- 63 French scientist Robert Bureau coined the term "radiosonde" to describe balloon-borne payloads that transmit atmospheric parameters (usually pressure, temperature, and humidity) to a ground receiver via radio. Other authors applied it to the balloon and payload as a system. In 1938 the US Weather Bureau officially adopted the term "radiosonde" in reference to "meteorological radiosonde," replacing the earlier term "radio-meteorograph." Dubois et al., *Invention and Development of the Radiosonde*, 2, 26, 33, 67. See also Sir Napier Shaw, *Manual of Meteorology, Volume I: Meteorology in History* (Cambridge: Cambridge University Press, 1926) and *Meteorology in History* (Cambridge: Cambridge University Press, 1942); and E. Stringer, *Foundations of Climatology* (San Francisco: H. Freeman and Co., 1976). On the early challenges of and adaptations in using these instruments in the US, see Whitnah, *History of the United States Weather Bureau*, 190–92.
- 64 Thomas A. Blair and Robert C. Fite, *Weather Elements: A Text in Elementary Meteorology*, 4th ed. (Englewood Cliffs, NJ: Prentice-Hall, 1957), 76.
- 65 Dubois et al., *Invention and Development of the Radiosonde*, 67.
- 66 Dubois et al., *Invention and Development of the Radiosonde*, iv.
- 67 Friedman, "Constituting the Polar Front," 343–44, 350.
- 68 Vilhelm Bjerknes, "Structure of the Atmosphere When Rain is Falling," *Quarterly Journal of the Royal Meteorological Society* 46 (1920): 127, quoted in Friedman, "Constituting the Polar Front," 355.

- 69 See, for example, C.K.M. Douglas, "The Polar Front and its Place in Modern Meteorology," *Geographical Journal* 94/2 (August 1939): 135–50.
- 70 Krick, *War and Weather*. Forecasts for ground forces, and particularly for the artillery, required observations of upper air densities and winds.
- 71 G.C. Simpson, "Meteorology in Polar Regions," *Geographical Journal* 74/3 (1929): 258.
- 72 Thomson, "Growth of Meteorological Knowledge," 38; Cal Vince, *A Short History of the Northwest Territories and Yukon Radio System* (self-published, 1960), available online at http://www.nwtandy.rcsigs.ca/1923_29.htm#1923.
- 73 See Jonathan F. Vance, *High Flight: Aviation and the Canadian Imagination* (Toronto: Penguin, 2002).
- 74 William S. Carlson, *Lifelines Through the Arctic* (New York: Duell, Sloan and Pearce, 1962), 22–48. See also Marianne Cronin, "Northern Visions: Aerial Surveying and the Canadian Mining Industry, 1919–1928," *Technology and Culture* 48/2 (2007): 303–30.
- 75 R.A. Logan, "Report of Investigations on Aviation in the Arctic Archipelago carried out during the Summer of 1922," DHH 74/414; Mitchell quoted in Galen Roger Perras, *Stepping Stones to Nowhere: The Aleutian Islands, Alaska, and American Military Strategy, 1867–1945* (Vancouver: University of British Columbia Press, 2003), 30; and John J. Teal, Jr., "Alaska: Fulcrum of Power," *Foreign Affairs* 27/1 (1948): 89. See also P. Whitney Lackenbauer and K.C. Eyre, *Unfurling the Air Force Ensign in the Canadian Arctic: The 1922 Eastern Arctic and 1927–28 Hudson Strait Expeditions*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 3 (Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2015).
- 76 Vilhjalmur Stefansson, *The Northward Course of Empire* (New York: Macmillan, 1924).
- 77 On the idea of legibility, see James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998). On this mapping process, see R.C. McNeill, "Putting Canada on the Map," *Sentinel* 6/3 (1970): 16–19, and B.W. Waugh, "Arctic Mapping," *Sentinel* 6/3 (1970): 44. Ken Eyre observed that "the mapping of the North carried out by the Royal Canadian Air Force and the Royal Canadian Engineers between 1947 and 1967 provides a classic example of the military establishment in peacetime undertaking projects of national development that required skills relative to military operations. When the state of the art developed to the point where a civil branch of government could take over, and when future operations could be carried on as profitable, but still reasonably economic ventures, the military gave up the role and moved on to other fields." Eyre, "The Military and Nation Building in the Arctic, 1945–1964," in *Canadian Arctic Sovereignty and Security: Historical Perspectives*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2011), 218.
- 78 This fit with the RCAF's functional role as the government's "civil air company" between the wars, transporting officials into remote regions, blazing new air mail routes, and flying sick and injured trappers, traders, and Aboriginal people from remote outposts to southern hubs where they could get medical attention. Edward P. Wood, *Per Ardua ad Arcticum: The Royal Canadian Air Force in the Arctic and Sub-Arctic*, ed. P. Whitney Lackenbauer (Antigonish: Mulroney Institute of Government Arctic Operations Series, 2017).
- 79 See, for example, Michael F. Robinson, *The Coldest Crucible: Arctic Exploration and American Culture* (Chicago: University of Chicago Press, 2006).
- 80 Hughes, *Century of Weather Service*, 49.

- 81 “Captain Wilkins’ Arctic Expeditions, 1926–1928: A Summary Statement,” *Geographical Review* 18/3 (1928): 489, 492. On Wilkins, see Lowell Thomas, *Sir Hubert Wilkins: His World of Adventure* (Toronto: McGraw-Hill, 1961); and Simon Nasht, *The Last Explorer: Hubert Wilkins, Hero of the Great Age of Polar Exploration* (New York: Skyhorse, 2011).
- 82 Marionne Cronin, “Polar Horizons: Images of the Arctic in Accounts of Amundsen’s Polar Aviation Expeditions,” *Scientia Canadensis* 33/2 (2010): 100.
- 83 In many situations, they had no one but themselves to police and, doubling as postmasters, they were often the only people around to send or receive mail. Their main activity was mounting long patrols around the islands of the High Arctic, showing the flag to demonstrate a Canadian presence. See Morrison, *Showing the Flag*. According to Gordon Smith, Ottawa officials “made a very big issue out of what had turned out to be a very small one, and then had mishandled it by overreacting to presumed threats posed by Stefansson, Danes, and Americans.” Smith, *Historical and Legal Study*, xvii.
- 84 Later that year the Canadian government paid Sverdrup \$67,000 for all his original maps, notes, diaries, and other documents relating to his expedition. On this era, see Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918–25* (Vancouver: University of British Columbia Press, 2010); Smith, *Historical and Legal Study*; and Peter Kikkert and Whitney Lackenbauer, eds., *Legal Appraisals of Canada’s Arctic Sovereignty: Key Documents, 1905–56* (Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2014).
- 85 Fogelson, “Tip of the Iceberg,” 147.
- 86 D.H. Dinwoodie, “Arctic Controversy: The 1925 Byrd-MacMillan Expedition Example,” *Canadian Historical Review* 53/1 (1972): 51–65; Diubaldo, *Stefansson and the Canadian Arctic*; Nancy Fogelson, *Arctic Exploration & International Relations, 1900–1932* (Fairbanks: University of Alaska Press, 1992); and Cavell and Noakes, *Acts of Occupation*, 235–38. For a contemporary American opinion on Arctic sovereignty, see David Hunter Miller, “Political Rights in the Arctic,” *Foreign Affairs* 4/1 (1925): 47–60.
- 87 Johnston, “Canada’s Title to the Arctic Islands,” 24–41.
- 88 *Legal Status of Eastern Greenland (Denmark v. Norway)*, [1933] *Permanent Court of International Justice* (Ser. A/B) No. 53. See also Janice Cavell, “Historical Evidence and the Eastern Greenland Case,” *Arctic* 61/4 (2008): 433–41; and Smith, *Historical and Legal Study*, 313–20.
- 89 P. Whitney Lackenbauer and Peter Kikkert, “The Dog in the Manger – and Letting Sleeping Dogs Lie: The United States, Canada and the Sector Principle, 1924–1955,” in *International Law and Politics of the Arctic Ocean: Essays in Honor of Donat Pharand*, ed. Suzanne Lalonde and Ted L. McDorman (Leiden: Brill, 2014), 216–39. See also the introduction and documents in Kikkert and Lackenbauer, *Legal Appraisals of Canada’s Arctic Sovereignty*.
- 90 Thomas, “Brief History Part 1.” Thomas notes that, in Canada, “many scientific improvements and technological innovations were put into use during the 1930’s. The telegraph companies replaced Morse code telegraphy with a new teletype system late in 1931, the same year that ventilated psychrometers were introduced. In support of aviation, pilot balloon observations (*PIBALs*) were begun at several stations in eastern Canada in 1930, but most of these observations had to be discontinued in 1932. Special aircraft flights, to obtain upper level temperatures and humidity data (*apobs*), were begun on a regular basis at Toronto in 1934, at Edmonton in 1937, and in the same year at Botwood, Newfoundland. Attention was being given to the development of the

- radiosonde, but not until 1941 did use of this instrument supersede aircraft flights as a means of obtaining upper air data.” Thomas, “Brief History Part 2,” 40.
- 91 In addition to aerological observations, the program included auroral studies and the new field of ionospheric physics. Orvig, “Century of Arctic Meteorology,” 135.
- 92 Canada’s modest contribution to the Second International Polar Year (1932–33) involved establishing manned stations at Chesterfield Inlet and Coppermine in the NWT, Cape Hopes Advance in Quebec, and Meanook in Alberta. Notably, none of these stations were in the archipelago. The British took observations for that year at Fort Rae, the same site at which they and the Canadians had operated during the first Polar Year. Thomson, “Growth of Meteorological Knowledge,” 38.
- 93 Thomson, “Growth of Meteorological Knowledge,” 42–43.
- 94 Orvig, “Century of Arctic Meteorology,” 135–36.
- 95 Thomas, “Brief History Part 2.”
- 96 The Meteorological Branch of Air Services’ responsibilities included civil aviation services for the newly created Trans-Canada Airlines (the forerunner to Air Canada), which prompted a major expansion of the division. Thomas explains that the re-organization freed the branch “of those ancillary responsibilities which it had carried since 1871 and of others which it had developed during the intervening 65 years,” thus allowing it to focus on its weather service mandate. He notes that, on the eve of the Second World War, the total Canadian meteorological establishment consisted of fifty-one graduate M.A. meteorologists, twenty meteorological assistants, fifty-seven meteorological observers, twenty-six teletype operators, and fifty-nine administrative and clerical personnel. This establishment grew almost ten-fold during the conflict. Thomas, “Brief History Part 2.”
- 97 Hughes, *Century of Weather Service*, 34.
- 98 Jerome Namias, “Francis W. Reichelderfer, 1895–1983: A Biographical Memoir” (Washington: National Academy of Sciences, 1991), <http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/reichelderfer-francis.pdf>.
- 99 Thomas, “Brief History Part 2.”
- 100 In the winter of 1936–37, the Service cooperated with the United States Weather Bureau in special investigations on the properties of cold air masses, and 140 special aircraft flights were made at Fort Smith, NWT, to obtain upper air data. Thomas, “Brief History Part 2.”
- 101 C.P. Stacey, *The Military Problems of Canada: A Survey of Defence Policies and Strategic Conditions, Past and Present* (Toronto: Ryerson Press, 1940), 5. See also Ryan Dean and P. Whitney Lackenbauer, “Geostrategy and Canadian Defence: From C.P. Stacey to a Twenty-First Century Arctic Threat Assessment,” *Journal of Military and Strategic Studies* 20/1 (2019): 1–64.
- 102 Hughes, *Century of Weather Service*, 71.
- 103 Jonas A. Jonasson, “The AAF Weather Service,” in *The Army Air Forces in World War II, vol. VII: Services Around the World*, ed. W.F. Craven and J.L. Cate (Washington: Office of Air Force History, 1958), 311.
- 104 See Morley Thomas, *Metmen in Wartime: Meteorology in Canada 1939–1945* (Toronto: ECW Press, 2001), 29–43, 63–88, 185–247. During the war, the government prohibited broadcast or publication of weather reports and forecasts in central and eastern Canada for national security reasons — an obvious indication of the correlation between meteorology and defence.
- 105 Whitnah, *History of the United States Weather Bureau*, 195.

- 106 Bates and Fuller, *America's Weather Warriors*, 31, 42–48.
- 107 Namias, “Francis W. Reichelderfer,” 281; Bates and Fuller, *America's Weather Warriors*, 50–51; Hughes, *Century of Weather Service*, 110, 196. In February 1942, meteorological personnel from Great Britain, Canada, Australia, South Africa, New Zealand, and the United States formed the Combined Meteorological Committee under the Combined Chiefs. See Jonasson, “AAF Weather Service,” 317.
- 108 Jonasson, “AAF Weather Service,” 321. While the Canadian government did not allow the USWB to establish civilian forecast offices in Canada, the Ogdensburg Agreement gave the US military full authority to establish observing or forecast offices in Canada. Thomas, *Metmen in Wartime*, 164–65.
- 109 On their role, see Carlson, *Lifelines Through the Arctic*, 50–51.
- 110 Bernard J. Woodruff, “Aims and Organization of the Survey Work: Establishing Ground-Control for Mapping from Aerial Photography,” in Nicholas Polunin, *Arctic Unfolding: Experiences and Observations During a Canadian Airborne Expedition in Northern Ungava, the Northwest Territories, and the Arctic Archipelago* (London: Hutchinson, 1949), 279.
- 111 Shelagh Grant, “Weather Stations, Airfields, and Research in the High Arctic, 1939–1959. An American Perspective” (unpublished paper presented at the Canadian Historical Association Annual Meeting on 27 May 1990), cited with permission.
- 112 Carlson, *Lifelines Through the Arctic*, 73.
- 113 See Stetson Conn, Rose C. Engelman, and Byron Fairchild, *United States Army in World War II: The Western Hemisphere, Guarding the United States and its Outposts* (Washington: Office of the Chief of Military History, Department of the Army, 1964), 442–58; Dawn Alexandra Berry, “Cryolite, the Canadian aluminium industry and the American occupation of Greenland during the Second World War,” *Polar Journal* 2/2 (2012): 219–35; and Berry, “The Monroe Doctrine and the Governance of Greenland's Security,” in *Governing the North American Arctic: Sovereignty, Security, and Institutions*, ed. Dawn Alexandra Berry, Nigel Bowles, and Halbert Jones (Basingstoke: Palgrave Macmillan, 2016), 103–21.
- 114 The best overview of this route is provided in Carl Christie, *Ocean Bridge: The History of RAF Ferry Command* (Toronto: University of Toronto Press, 1995), 122–46. The US intended to build a complementary network of meteorological stations in northern Manitoba, Keewatin, and northern Hudson Bay in 1942, but the Americans' chronic indecisiveness over the following year meant that, in the end, most operational weather stations were in the east, along the Goose Bay route and, more modestly, the Fort Chimo-Frobisher Bay route. See Stanley W. Dziuban, *Military Relations between the United States and Canada, 1939–1945* (Washington: Office of the Chief of Military History, Department of the Army, 1959), 358; and Gordon W. Smith, “Weather Stations in the Canadian North and Sovereignty,” *Journal of Military and Strategic Studies* 11/3 (2009): 1–63.
- 115 Grant, “Weather Stations, Airfields, and Research”; Forbes, *Quest for a Northern Air Route*; and W.F. Craven et al., *The Army Air Forces in World War II, Volume 7: Services Around the World* (Washington: Office of Air Force History, 1983), 94.
- 116 Jonasson, “AAF Weather Service,” 322. For more detailed observations, see Bernt Balchen, Corey Ford, and Oliver La Farge, *War Below Zero: The Battle for Greenland* (Boston: Houghton Mifflin Company, 1944), and Carlson, *Lifelines Through the Arctic*.
- 117 On the origins of Frobisher Bay, see Mélanie Gagnon and Iqaluit Elders, *Inuit Recollections on the Military Presence in Iqaluit* (Iqaluit: Nunavut Arctic College, 2002); Robert V. Eno, “Crystal Two: The Origin of Iqaluit,” *Arctic* 56/1 (2003): 63–75;

- Matthew Farish and P. Whitney Lackenbauer, "High modernism in the Arctic: Planning Frobisher Bay and Inuvik," *Journal of Historical Geography* 35/3 (2009): 517–44; and Lackenbauer and Ryan Shackleton, *When the Skies Rained Boxes: The Air Force and the Qikiqtani Inuit, 1941–64* (Working Papers on Arctic Security No. 4, Toronto: Walter and Duncan Gordon Foundation, October 2012).
- 118 Carlson, *Lifelines Through the Arctic*, 144, 149; and Dziuban, *Military Relations*, 200–17.
- 119 The Air Corps maintained a weather detachment at Ladd Field, Fairbanks, beginning in 1940, followed by installations at Anchorage, Yakutat, and on Annette Island. By April 1942, it established stations at Nome, Northway, Naknek, Fort Randall, and on Umnak Island. Following the Japanese attack on Dutch Harbor in June 1942, and with Japanese forces occupying Attu and Kiska, US forces occupied Adak and opened a weather station there in October. Early in 1943 the Air Corps pushed this line to Amchitka, and then to Attu and Kiska when US-Canadian forces pushed out the Japanese later that year. Jonasson, "AAF Weather Service," 330.
- 120 Of the many books on the Alaska Highway project, the best remain Ken S. Coates and William R. Morrison, *The Alaska Highway in World War II: The U.S. Army of Occupation in Canada's Northwest* (Norman: University of Oklahoma Press, 1992) and Morrison and Coates, *Working the North: Labor and the Northwest Defense Projects, 1942–1946* (Fairbanks: University of Alaska Press, 1994).
- 121 Carlson, *Lifelines Through the Arctic*, 149.
- 122 Thomas, *Metmen in Wartime*, 162–65.
- 123 Jonasson, "AAF Weather Service," 330–31. The US Army Air Forces continued to press for more control over the weather teletype circuit along the Northwest Staging Route, given that they supplied most of the personnel and equipment. By July 1943, 80% of the weather traffic on the circuit originated in Alaska, the US, and USAAF weather stations in Canada. Henry to Keenleyside, 24 July 1943, LAC, RG 25, vol. 4154, f. 463-Y-40.
- 124 See Morrison and Coates, *Working the North*.
- 125 LAC, William Lyon Mackenzie King Diary, 21 March 1942, item 2399, <https://www.bac-lac.gc.ca/eng/discover/politics-government/prime-ministers/william-lyon-mackenzie-king/Pages/item.aspx?IdNumber=23949>. The editors of King's diary noted that, despite the prime minister's "close friendship with Roosevelt," he "was never without suspicions of the ultimate designs of the Americans." J.W. Pickersgill and D.F. Forster, eds., *The Mackenzie King Record, Volume 1, 1939/1944* (Toronto: University of Toronto Press, 1960), 436.
- 126 Norman Robertson offered this characterization in 1943, as quoted in J.L. Granatstein, *Canada's War: The Politics of the Mackenzie King Government, 1939–1945* (Toronto: University of Toronto Press, 1975), 323. See also Shelagh D. Grant, "Northern Nationalists: Visions of 'A New North,' 1940–1950," in *For Purposes of Dominion: Essays in Honour of Morris Zaslow*, ed. Kenneth Coates and William R. Morrison (North York: Captus, 1989), 47–70.
- 127 For an overview of these themes, see P. Whitney Lackenbauer, "Right and Honourable: Mackenzie King, Canadian-American Bilateral Relations, and Canadian Sovereignty in the Northwest, 1943–1948," in *Mackenzie King: Citizenship and Community*, ed. John English, Kenneth McLaughlin, and Lackenbauer (Toronto: Robin Brass Studio, 2002), 151–68.
- 128 According to the US army historian, the American officials found Foster agreeable and cooperative and they were pleased to have a Canadian counterpart with wide powers. C.P. Stacey, *Arms, Men and Governments: The War Policies of Canada, 1939–1945* (Ottawa: Queen's Printer, 1970), 386–87; Dziuban, *Military Relations*, 137–41. For the

- wartime debate over Canada's sovereignty-security equilibrium, see Grant, *Sovereignty or Security?*, 70–156; and Lackenbauer, “Right and Honourable,” 154.
- 129 “Changing Canadian American Relations,” 5 March 1942, Situation Report no. 2 by the Office of Strategic Services for the British Empire Section of the State Department, 1, and R and A 738a, “Secret Survey of Canada,” 2 September 1942, for the Office of Strategic Services of the State Department, 1-2, NARA, State Department Records, RG 59, Microfiche file M1221, quoted in Grant, “Weather Stations, Airfields, and Research.”
- 130 See, for example, “United States Defence Projects and Installations in Canada,” 12 January 1944, LAC, RG 36/7, vol. 14, f. 28-6.
- 131 Minutes of meeting of Canadian officials in Ottawa, 26 January 1944, LAC, RG 85, vol. 823, f. 7140.
- 132 *Minutes and Documents of the C.W.C.*, Doc. No. 704, memo, Heeney to C.W.C., 3 February 1944, quoted in Smith, “Weather Stations in the Canadian North,” 12–13.
- 133 Smith, “Weather stations in the Canadian North”; and Thomas, *Metmen in Wartime*.
- 134 Wright to Gibson, 9 February 1944, LAC, RG 85, vol. 823, f. 7140.
- 135 Quoted in Grant, *Sovereignty or Security?*, 275.
- 136 Thomson, “Growth of Meteorological Knowledge,” 42–43.
- 137 Jonasson, “AAF Weather Service,” 317.
- 138 Krick, *War and Weather*.
- 139 ARCTOPS Project Report, NARA, RG 27, entry 4, box 1, f. Arctops Project.
- 140 Peter Johnson, phone interview with Daniel Heidt, 26 May 2011.
- 141 Balchen, Ford, and La Farge, *War Below Zero*, 37.

NOTES TO CHAPTER 2

- 1 Ray Atherton to SSEA, 6 November 1946, in *Documents on Canadian External Relations (DCER) Vol. 12 (1946)*, ed. Donald Page (Ottawa: Department of External Affairs, 1977), 1576–77.
- 2 Research Board for National Security and the National Academy of Sciences, “ARCTOPS PROJECT,” c. 1945, National Archives and Records Administration (NARA), RG 27, entry 4, box 1, f. ARCTOPS Project.
- 3 “U.S. Explorer and Meteorologist is Killed in Arctic Airplane Crash,” *New York Times*, 2 August 1950, 1, 19; “Hubbard Killed in Arctic Crash,” *Weather Bureau Topics*, August 1950, 108–09. For newspaper articles, see NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Early Articles and Clippings 1936–37. As Matthias Heymann aptly notes, he attended elite schools in his childhood and thus his upbringing was hardly typical. “In Search of Control: Arctic Weather Stations in the Early Cold War,” in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald E. Doel, Kristine C. Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 81.
- 4 Mrs. Harriet Bissell Hubbard to Mr. Davidson, 1952, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Correspondence of Mrs. Charles Hubbard.
- 5 Alexander Forbes, *Quest for a Northern Air Route* (Cambridge: Harvard University Press, 1953), 18–19, 30–31. For Hubbard's recollections, see his diaries and reports in NARA, RG 401, entry 17, box 4, files: 20 September-6 November 1941 and Crystal Force, 1941–42, as well as a short summary in Richard Hallett, “North Pole May Be World's No. 1 Weather Factory,” *Portland Sunday Telegram*, 13 January 1946.

- 6 Lt. Col. Charles Hubbard, "Report on Points Visited on the North Atlantic Ferry Route, 20 August 1942-4 September 1942," NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 5, f. Report on Points Visited on the North Atlantic Ferry Route; Hubbard, "Flight to Crystal and Bookie, 25 September-5 October 1942," NARA, RG XPOLA, box 5, f. Flight to Crystal and Bookie.
- 7 "Qualification and Experience of the Writer," 1944, NARA, RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46.
- 8 Mrs. Bissell Hubbard to Davidson, 1952. See also "Hubbard Killed in Arctic Crash," 108-09. The Commerce Department awarded Hubbard its Exceptional Service Award in February 1950 for his involvement with the ferry program during the Second World War. "U.S. Explorer and Meteorologist is Killed," 19.
- 9 Mrs. Bissell Hubbard to Davidson, 1952.
- 10 Lt. Col. Charles J. Hubbard, "The Arctic Isn't So Tough," *Saturday Evening Post* 217/9, 26 August 1944, 12.
- 11 Hubbard, "Arctic Isn't So Tough," 12.
- 12 Hubbard, "Arctic Isn't So Tough," 12-13.
- 13 Hubbard, "Arctic Isn't So Tough," 13.
- 14 Hubbard, "Arctic Isn't So Tough," 13. In September 1944, Hubbard began lobbying Congressman Alfred L. Bulwinkle (D-North Carolina), a member of the House Committee on Interstate and Foreign Commerce, to support the establishment of Arctic "research stations." Hubbard to Bulwinkle, 14 September 1944, NARA, RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46.
- 15 Research Board for National Security and the National Academy of Sciences, "ARCTOPS PROJECT," c. 1945, NARA, RG 27, entry 4, box 1, f. ARCTOPS Project; C.J. Hubbard to W.A. Burden, 3 May 1945, NARA, RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46. Although government funding for the ARCTOPS research program fell away because the mechanism it planned on using to flow money to the university proved illegal, MIT sustained the project with a reduced budget. Mrs. Bissell Hubbard to Davidson, 1952. On the National Academy of Sciences in the early postwar period, see Rexmond Cochrane, *The National Academy of Sciences: The First Hundred Years 1863-1963* (Washington: National Academy of Sciences, 1978). On the military-industrial-academic complex, a concept introduced by Senator J. William Fulbright, see Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia University Press, 1993).
- 16 Research Board for National Security and the National Academy of Sciences, "ARCTOPS PROJECT," c. 1945, NARA, RG 27, entry 4, box 1, f. ARCTOPS Project; C.J. Hubbard to W.A. Burden, 3 May 1945, NARA, RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46.
- 17 Mrs. Bissell Hubbard to Davidson, 1952. The Arctic Institute of North America was organized in 1944 and officially created in December 1945 by an Act of Parliament. Robert MacDonald, "Challenges and Accomplishments: A Celebration of the Arctic Institute of North America," *Arctic* 58/4 (2005): 440.
- 18 Bill Davidson, "On Guard at the Pole: Our Sub-Zero Heroes," *Collier's Magazine*, 21 June 1952, 70.
- 19 *Hearings Before the Committee on Agriculture, House of Representatives*, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765), 22 January 1946, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous; "Arctic Weather Stations," US Senate, 79th Cong. 1st session, 2.

- 20 *Hearings Before the Committee on Agriculture, House of Representatives*, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765), 22 January 1946, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous; "Arctic Weather Stations," US Senate, 79th Cong. 1st session, 2. For Hubbard's summary of his wartime experiences (which is conspicuously silent on who exactly directed him to complete the work), see "Qualification and Experience of the Writer," NARA, RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46.
- 21 Hubbard to Louis, 16 February 1945, NARA, RG 27, entry 4, box 1, f. RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46. See also Heymann, "In Search of Control," 83.
- 22 Escott Reid, "Meteorological Stations in the North American polar region," 2 March 1945, Library and Archives Canada (LAC), RG 85, vol. 823, f. 7140.
- 23 L.B. Pearson to N.A. Robertson, 6 March 1945, LAC, RG 85, vol. 823, f. 7140.
- 24 When Pearson and Reid reported on the meeting, they stressed that the stations represented a potential challenge to sovereignty. L.B. Pearson to Norman Robertson, Under-Secretary of State, 6 March 1945, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 25 Quoted in Gordon W. Smith, "Weather Stations in the Canadian North and Sovereignty," *Journal of Military and Strategic Studies* 11/3 (2009): 17.
- 26 R.M. Macdonnell to L.B. Pearson, Canadian Ambassador to the US, 8 March 1945, LAC, RG 85, vol. 823, f. 7140.
- 27 Charles Camsell, Deputy Minister Mines and Resources, to Under-Secretary of State for External Affairs, 13 March 1945, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 28 L.B. Pearson to N.A. Robertson, 6 March 1945, LAC, RG 85, vol. 823, f. 7140.
- 29 Quoted in Heymann, "In Search of Control," 83.
- 30 Hubbard to Senator Owen Brewster, 16 March 1945, NARA, RG 27, entry 4, box 1, f. Hubbard-Correspondence 1944-46; *Hearings Before the Committee on Agriculture, House of Representatives*, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765), 22 January 1946, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous.
- 31 Research Board for National Security and the National Academy of Sciences, "ARCTOPS PROJECT," c. 1945, NARA, RG 27, entry 4, box 1, f. ARCTOPS Project. On the first IPY, see William Barr, *The Expeditions of the First International Polar Year, 1882-83*, 2nd ed. (Calgary: Arctic Institute of North America, 2008).
- 32 Research Board for National Security and the National Academy of Sciences, "ARCTOPS PROJECT," c. 1945, NARA, RG 27, entry 4, box 1, f. ARCTOPS Project.
- 33 Charles Hubbard to L.B. Pearson, 10 April 1945, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 34 L.B. Pearson to Charles Hubbard, 18 April 1945, LAC, RG 25, vol. 3347, f. 9061-A-40. Although Canadian officials were unprepared to back Hubbard's initiative, other Arctic promoters offered their services. Veteran explorer and pundit Vilhjalmur Stefansson wrote to Brewster in September 1945 to compliment the weather stations initiative and recommend that the scale of the stations be increased to mimic the Soviet program and made into platforms for general Arctic studies. Stefansson to Brewster, 19 September 1945, in Senate Report No. 656, U.S Senate, 79th Congress, submitted by Senator Brewster to accompany Bill S. 765, 24 October and legislative day, 22 October 1945.
- 35 R.M. Macdonnell to A. Heeney, 3 November 1945, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 36 King diary, 11 September 1945, quoted in James Eayrs, *In Defence of Canada Volume III: Peacemaking and Deterrence* (Toronto: University of Toronto Press, 1972), 320.

- 37 Dana Wilgress to the Secretary of State for External Affairs, 12 November 1945, reproduced in Denis Smith, *Diplomacy of Fear: Canada and the Cold War 1941–1948* (Toronto: University of Toronto Press, 1988), 118.
- 38 Kenneth C. Eyre, *Custos Borealis: The Military in the Canadian North, 1898–1975*, ed. P. Whitney Lackenbauer (Peterborough: North American and Arctic Defence and Security Network, 2020).
- 39 David Beatty, “The Canadian-United States Permanent Joint Board on Defence” (unpublished PhD diss., Michigan State University, 1969), 117.
- 40 *Hearings Before the Committee on Agriculture, House of Representatives*, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765), 22 January 1946, 1–13, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous.
- 41 *Hearings Before the Committee on Agriculture*, 22 January 1946. Reichelderfer’s testimony left room for the participation of Canadian personnel, but emphasized American resources and know-how accumulated from Arctic construction during the Second World War. For similar American views on the diverse civil as well as military utility of the stations’ meteorological observations, see also: Research Board for National Security and the National Academy of Sciences, “ARCTOPS PROJECT,” c. 1945, NARA, RG 27, entry 4, box 1, f. ARCTOPS Project.
- 42 *Hearings Before the Committee on Agriculture*, 22 January 1946, 22–28. The Secretary of the Navy suggested that S.765 was “primarily intended to aid in the development of civil and commercial air transportation and, if enacted, would have no direct bearing upon the steps which may be taken by the military services in the interests of national defense.” *Hearings Before the Committee on Agriculture*, 26. On expectations for increasing demand for weather information, see NARA, RG 27, entry 126, box 3, f. Management Organization Administration.
- 43 Hubbard also planned to establish stations on Prince Patrick Island and northern Ellesmere Island in 1947. “A Report on Recommended U.S. Weather Bureau Arctic Operations for the period of April 1946 to July 1, 1947, in compliance with Public Law 296, 79th Congress,” NARA, RG XPOLA, entry 17, box 5, f. “Analysis of Possible Arctic Ops, 1946.” Historian Shelagh Grant concluded that, “on paper, Hubbard’s arguments sounded logical from an American viewpoint, but he greatly misunderstood Canadian desire of involvement. It was far more than a matter of national prestige.” See Grant, “Weather Stations, Airfields, and Research in the High Arctic, 1939–1959 – An American Perspective,” presented at the Canadian Historical Association Annual Meeting on 27 May 1990, and subsequently revised as a draft, two-part article on “American Defence of the Arctic, 1939–1960” (cited with permission).
- 44 See LAC, RG 25, vol. 3347, f. 9061-A-40.
- 45 Mrs. Bissell Hubbard to Davidson, 1952.
- 46 Mrs. Bissell Hubbard to Davidson, 1952.
- 47 Lewis Clark, “Arctic Weather Stations,” 1 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 48 Under-Secretary of State for External Affairs to Deputy Minister of Transport, 4 May 1946, in *DCER Vol. 12 (1946)*, 1544.
- 49 Major General Guy V. Henry to General Andrew McNaughton, 30 April 1946, LAC, RG 25, vol. 3047, f. 113.
- 50 For copies of the ACC reports, see LAC, RG 25, vol. 3047, f. 113.

- 51 "Arctic Aviation Development Program for the United States Recommended by the Standing Subcommittee on the Arctic," 6 November 1945, NARA, RG 330, entry 341A, box 451, folder 1, f. Geophysics and Geography.
- 52 Memorandum from Head, Third Political Division Legal Division, "Sovereignty in the Arctic," 6 May 1946, in *DCER Vol. 12 (1946)*, 1545–46. In her book *Sovereignty or Security? Government Policy in the Canadian North, 1936-1950* (Vancouver: University of British Columbia Press, 1988), Shelagh Grant made much out of the full version of this report—which the Canadians did not have access to—in her efforts to depict an American conspiracy to take over the Canadian North. The Air Coordinating Committee report did not overly concern R.M. Macdonnell, however. In a letter to Charles Camsell, Macdonnell noted: "In presenting this request, the United States Embassy made it clear that there was no question of interfering in any way with Canadian sovereignty. I think that their approach to the problem should reassure your minister if he is troubled by any thought of Canadian sovereignty in the Arctic being called into question by the United States." Macdonnell to Charles Camsell, 11 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 53 King acknowledged that further Canadian consent to these moves was likely "inevitable," but he preferred to first consult the British and try to foster cooperation between the three countries. Mackenzie King *Diaries*, 9 May 1946, 407, <http://www.bac-lac.gc.ca/eng/discover/politics-government/prime-ministers/william-lyon-mackenzie-king/Pages/item.aspx?IdNumber=29546>.
- 54 The plan exaggerated the threat posed by the USSR and, according to historian Joseph Jockel, was "clearly inconsistent with the thrust of American, not to mention Canadian, thinking." Yet the American Joint Chiefs of Staff approved the plan in August 1946 because, as Jockel continues, "they really were not paying much attention. The entire military establishment in Washington was in turmoil as it coped with demobilization and internecine struggle. . . . There was no overall air defence policy, much less one for the Canadian North." Joseph T. Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958* (Vancouver: University of British Columbia Press, 1987), 17–21.
- 55 Memorandum for File, J.G. Parsons, Office of British Commonwealth Affairs, 15 May 1946, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243/5-1546.
- 56 Memorandum presented to Canada by the US Embassy, 1 May 1946, in LAC, RG 22, vol. 732, f. SE-4-1-83.
- 57 Meeting of Canadian and American Officials Concerning Suggested Arctic Meteorological Development, 17 May 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243/3-1946; Hubbard, "Diary re WB Arctic Program," NARA, RG 27, entry 4, box 1, f. Hubbard - Program Diary.
- 58 J.G. Wright, Memorandum by the Department of Mines and Resources, 18 May 1946, in *DCER Vol. 12 (1946)*, 1551. Original in LAC, RG 18, vol. 34, f. G-825-8, pt. 1.
- 59 Minutes, Weather Station Meeting, 18 May 1946, Department of National Defence, Directorate of History and Heritage (DHH), box 113, f. 2, pt. 1.
- 60 Minutes, Weather Station Meeting, 18 May 1946.
- 61 Diary Weather Bureau Arctic Program, NARA, RG 27, entry 4, box 1, f. Hubbard - Program Diary. He notes that the Senate Appropriation Committee approved \$500,000 for the program on 24 May 1946.
- 62 H.F. Gordon, Deputy Minister, Department of National Defence for Air, to Norman Robertson, 28 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40; Minutes, Weather Station Meeting, 18 May 1946, DHH, box 113, f. 2, pt. 1.

- 63 J.G. Wright, Memorandum by the Department of Mines and Resources, 18 May 1946, in *DCER Vol. 12 (1946)*, 1553. See also J.G. Wright to R.A. Gibson, 18 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 64 Department of National Defence to Cabinet Defence Committee, "Sovereignty in the Canadian Arctic in Relation to Joint Defence Undertakings," [May 1946], and marginalia, in *DCER Vol. 12 (1946)*, 1555–58. Hume Wrong noted that Canada's claim was stronger than Spry's memorandum suggested. See Cabinet Defence Committee Minutes, 6 June 1946, LAC, RG 25, PJB, f. 113.
- 65 "Sovereignty in the Canadian Arctic in Relation to Joint Defence Undertakings," 1558–61; David Bercuson, "Continental Defense and Arctic Sovereignty, 1945–50: Solving the Canadian Dilemma," in *The Cold War and Defense*, ed. Keith Neilson and Ronald G. Haycock (New York: Praeger, 1990), 157–58. Spry promoted a clear set of formal guidelines for all defence projects in the North, emphasizing that the Americans should be required to seek permission before starting any exercise or project on or over Canadian territory, that the majority of personnel involved at permanent installations be Canadian, that Canadians participate in all projects (even if only as observers), and that any publicity on the projects stress their joint nature.
- 66 R. Madonnell to Associate USSEA, May 1946, in *DCER Vol. 12 (1946)*, 1555.
- 67 Director to the Deputy Minister of National Resources, 20 May 1946, LAC, RG 22, vol. 732, f. SE-4-1-83. This was a popular idea amongst those in Canada who did not want to see the Americans at the stations. In June, Trevor Lloyd commented that "The Arctic Islands are still comparatively unexplored. Most of the mapping was done by non-Canadians and Canada has not policed the area effectively. The existence of weather stations operated by the United States will, in a few years, give that country greater knowledge of the far north of Canada than is at present possessed here." Memorandum on Proposed United States Arctic Weather Stations, Dictated by Dr. Trevor Lloyd, 25 June 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 68 Marginalia, Gibson to Camsell, on meeting summary to Mr. Gibson, 18 May 1946, LAC, RG 85, vol. 823, f. 7140. See also J.G. Wright to R.M. Macdonnell, 20 May 1946, in *DCER Vol. 12 (1946)*, 1550.
- 69 Minutes, Weather Station Meeting, 18 May 1946, DHH, box 113, f. 2, pt. 1. To supply the necessary personnel to operate the proposed stations, Canada's Meteorological Service assessed that it would have to close at least one, and possibly two, current stations. Andrew Thomson noted that Canada's position on sovereignty seemed "unduly cautious," and one of his colleagues suggested that Canada only needed to supply three of the ten staff members when the first stations were established. (In the future, this number could increase so that Canadians made up at least half of all weather station personnel.) In his sober appraisal, this personnel ratio would effectively protect Canada's claims. Thomson to R.M. Macdonnell, 18 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 70 DEXAF Memorandum to Cabinet Defence Committee, Subject: United States proposals for an Arctic Weather Station Programme, 30 May 1946, in *DCER Vol. 12 (1946)*, 1561. The report outlined the benefits of the program, underlining that these stations would supply meteorological information needed for civil aviation, provide intelligence for future military exercises in the North, offer bases from which further study of the Arctic could be conducted, and create the occupation necessary to halt encroachment by foreign powers in the region. The weather stations program could, however, endanger Canadian sovereignty in the region if the United States was given too long of a leash.

- 71 DEXAF Memorandum for Cabinet Defence Committee, Subject: United States proposals for an Arctic Weather Station Programme, 30 May 1946. The head of the legal division, E.R. Hopkins, advised against Canada raising the sovereignty issue “in advance of necessity,” noting that it was unwise to suggest any doubts about it. E.R. Hopkins and R. Macdonnell, 8 May 1946, in *DCER Vol. 12 (1946)*, 1547. By contrast, James Allison Glenn, the Minister of Mines and Resources, had advocated “a clear and definite understanding” of Canadian sovereignty over the Arctic islands. Minister of Mines and Resources to Louis St-Laurent, 25 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 72 Bercuson, “Continental Defense and Arctic Sovereignty,” 158. The CDC did consider the proposal and favoured delaying a decision until 1947, but it also recommended authorization (with conditions based upon the DEA memorandum of 30 May 1946) if the US government “pressed the matter.” A.D.P. Heeney to Air Marshall Leckie, 14 June 1946, in *DCER Vol. 12 (1946)*, 1567–68.
- 73 Note for Mr. Wrong, R.A.J. Phillips, 27 May 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1. To alleviate Canadian concerns, a USAAF contingent flew to Ottawa and informed the Canadian government that Strategic Air Command had downgraded its original plan for permanent airstrips at the weather stations to small, temporary ones. “Weather Stations in the Arctic,” 5 June 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 74 Memo for US Ambassador by Lewis Clark, 20 June 1946; Hume Wrong to Arnold Heeney, 24 June 1946; Memorandum for File, Northern Weather Stations, 26 June 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 75 Major General Guy Henry reminded General Andrew McNaughton that, while the stations were to be constructed by the US Weather Bureau for civil purposes, it was their potential military importance that made the plans urgent. In the long run, weather stations would be the first step if an effective air defence system was ever put in place in the North. The Americans had the funds now, so in Henry’s practical military mindset, they should be built now. Henry to McNaughton, 19 June 1946, LAC, RG 25, vol. 3047, f. 113.
- 76 Pearson to Robertson, 21 June 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 77 William Lyon Mackenzie King, *Diaries*, vol. 154, entries for 19 June 1946, 570, and 20 June 1946, 572.
- 78 Memo for file by R.M. Macdonnell, 28 June 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 79 USSEA, “U.S Request for Arctic Weather Station,” 28 June 1946, in *DCER Vol. 12 (1946)*, 1571; Note for Mr. Pearson from R.A.J. Phillips, 30 October 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 80 R. Macdonnell, memorandum, 28 June 1946, in *DCER Vol. 12 (1946)*, 1571.
- 81 R.A.J. Phillips, “Memorandum – United States Proposals for Weather Stations in the Arctic,” 4 July 1946, LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 82 U.S. Weather Bureau, “Apply for Arctic Service, Deadline – June 15, 1946 – Adventure – Science – High Earnings – Future Career,” LAC, RG 25, vol. 3347, f. 9061-A-40, pt. 1.
- 83 Phillips, “Memorandum – United States Proposals for Weather Stations.”
- 84 Mrs. Bissell Hubbard to Davidson, 1952.
- 85 Memorandum for File, Weather Stations in Canadian Arctic, Division of British Commonwealth Affairs, 27 June 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243 / 6-2746.

- 86 Memorandum for the Secretary from F.W. Reichelderfer, 28 June 1946, Request for Canadian Reconsideration of Weather Bureau Arctic Project, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243 / 6-2846.
- 87 J.P. Parsons, Division of British Commonwealth Affairs, 1 July 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243 / 6-2746.
- 88 Memorandum for Acting Secretary, Request from the Secretary of Commerce for Canadian Reconsideration of Weather Bureau Arctic Project, 1 July 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243 / 6-2746.
- 89 Although Hubbard and Reichelderfer persisted in their attempts to reopen the issue with the Canadians, under the suggestion of John Hickerson, the deputy director of the office for European affairs, the Americans decided to let some six weeks go by, and then raise the station question again, this time for 1947. Memorandum for File, J.G. Parsons, Division of British Commonwealth Affairs, 3 July 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243 / 6-2846.
- 90 On 29 June 1946, Kenneth R. Wilson's *Financial Post* article appeared with the long and misleading title "Canada 'Another Belgium' In U.S. Air Bases Proposal? Hear Washington Insists Dominion's Northern Frontier be Fortified - 'Atomic Age Maginot Line' is Feared." Wilson asserted that the United States had issued Canada a "virtual ultimatum" to establish a massive air defence system in the North — an allegation that enraged King and his advisors, as well as the US Embassy. Macdonnell characterized Wilson's article as "irresponsible and mischievous" and described the author's assertion that the Americans gave Canada an ultimatum as "absurd." R.M. Macdonnell, "Memorandum for the Prime Minister," 27 June 1946, LAC, RG 25, acc. 84-85/226, vol. II, f. 9061-40. On King's response, see Canada, House of Commons *Debates*, 28 June 1946, pp. 2987-88. The Americans were equally upset and the State Department indicated it would be willing to issue a joint denial in appreciation of Canadian concerns, but the Canadian government declined the offer. "Memorandum for the Prime Minister," 27 June 1946, LAC, RG 25, acc. 1984-85/226, vol. 11, f. 9061-40. Lewis Clark speculated that Wilson's report represented underhanded action by a Canadian official, feeding the reporter his information, to paint the Americans as overly aggressive and inhibit bilateral cooperation. Lewis Clark, Chargé d'Affaires, "Alleged American Ultimatum to Canada regarding Arctic Frontier Defence," 9 July 1946, NARA, RG 319, entry (A1) 82, box 700, f. Canada, July 1946. See also Memorandum of Conversation between Kenneth Wilson and Mr. J.G. Parsons, 10 July 1946, NARA, RG 59, CDF 1945-49, box 6002, f. 842.20 / 7-1046, Defense. See also Grant, *Sovereignty or Security?*, 177; Jockel, *No Boundaries Upstairs*, 24; Bercuson, "Continental Defense and Arctic Sovereignty," 158-59.
- 91 J.W.C. Barclay to Secretary, Canadian Section, PJBD, 19 June 1946, in *DCER Vol. 12* (1946), 1568-69.
- 92 Heymann, "In Search of Control," 79-80; Shelagh D. Grant, *Polar Imperative: A History of Arctic Sovereignty in North America* (Vancouver: Douglas & McIntyre, 2010), 297-98. See also NARA, RG 27, entry acc. 71-A-5971, box 8, f. January 2 1946 to July 31 1946; and NARA, RG 370, entry A-1-22, box 1, f. Hubbard Charles. As a USWB facility, the station fell outside of the 1941 agreement that authorized US military bases on the island. See Stetson Conn, Rose C. Engelman, and Byron Fairchild, *United States Army in World War II: The Western Hemisphere, Guarding the United States and its Outposts* (Washington: Office of the Chief of Military History, Department of the Army, 1964), 442-58. When the State Department approached Danish officials in April 1946, the Danes heard that the Americans were also asking the Canadians for permission to set up stations and they approached Ottawa. Canadian officials did not offer the Danes

- much information and simply informed the Danish Minister, G.B. Holler, that the Canadian government had taken the matter under consideration. Memorandum: Weather Stations, 22 July 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 93 R. Macdonnell, memorandum to file, 28 June 1946, in *DCER Vol. 12 (1946)*, 1572.
- 94 Hubbard, "1946 Summer Report," 1, NARA, RG 27, entry 4, box 1, f. 1946-Summer Report. See also NARA, RG 27, entry 4, box 1, f. 1946-47, Thule Report.
- 95 Annex A: "Record and Narrative: Operation Nanook," 9, LAC, RG 85, vol. 2084, f. 16477.
- 96 "Record and Narrative: Operation Nanook," 28.
- 97 "Ships with 'Eyes' Conquer Arctic," *Polar Times* 23 (December 1946): 16; Hubbard, "1946 Summer Report"; and Grant, *Polar Imperative*, 297-98. During the fall and early winter of 1946, Danish personnel constructed their own living quarters and a magnetic observatory adjacent to the weather station site. They occupied one of the American buildings while their residence was under construction. The US Weather Bureau supplied all of the meteorological instruments. Edward Goodale, the US official in charge, had previously worked under Hubbard to establish the Padloping Island station during the war.
- 98 Report on the Inspection of Eureka Sound and Thule Weather Stations during April 1947, LAC, RG 93, vol. 26, f. 11-10-11, pt. 2.
- 99 "Record and Narrative: Operation Nanook," 44-52.
- 100 Hubbard, "1946 Summer Report."
- 101 Heymann, "In Search of Control," 89.
- 102 Hubbard, "1946 Summer Report." See also "Observations at Thule, Greenland," *Weather Bureau Topics* (September 1946): 84.
- 103 Canadian Ambassador Washington to SSEA, No. WA-3686, 16 October 1946, sending message for Macdonnell from Stone, LAC, RG 25, vol. 3347, f. 9061-B-40. For example, no press releases were issued without Canadian permission and the Marines landed on Devon Island.
- 104 W.E. Widdows, Lt. RCNR, RCN Air Arm Observer, to Captain R.E.S. Bidwell, Director of Naval Air Division, 11 October 1946, LAC, RG 24, vol. 8152, f. NSS 1660-12, pt. 1.
- 105 Lt. Dunn Lantier RCN to Captain H.N. Lay, Director of Naval Plans and Intelligence, 3 October 1946, LAC, RG 24, vol. 8152, f. NSS 1660-12, pt. 1.
- 106 Wilson, "Canada 'Another Belgium' in U.S. Air Bases Proposal?," 1; Kenneth R. Wilson, "Ottawa Scotches U.S. Plan to Man Weather Bases in Canadian Arctic," *Financial Post*, 20 July 1946, 1.
- 107 Editorial, "Canada Must Frame Policy for Arctic," *Financial Post*, 20 July 1946, 3.
- 108 Lewis Clark, "News Article and Editorial in Toronto Financial Post Concerning Canadian-American Arctic Weather Base Plans," 19 July 1946, NARA, RG 319, entry (A1) 82, box 700, f. Canada, July 1946.
- 109 Jockel, *No Boundaries Upstairs*, 25.
- 110 F.W. Reichelderfer to J.G. Parsons, 3 September 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243.
- 111 J.G. Parsons to R.M. Macdonnell, 18 September 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243.
- 112 F.W. Reichelderfer to J.G. Parsons, "Memorandum for the Department of State," 23 October 1946, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243 / 10/2346; Secretary

- of State to the Officer in Charge of the American Mission, Ottawa, September 1946, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243.
- 113 Reichelderfer to J.G. Parsons, “Memorandum for the Department of State,” 23 October 1946, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243.
- 114 Reichelderfer to Parsons, “Memorandum for the Department of State,” 23 October 1946; Hubbard, note on file, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243.
- 115 “Meteorological Division – Department of Transport – Canada: Recommendation for Establishment of Weather Station in Canadian Arctic,” 10 October 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 116 R.M. Macdonnell to T.A. Stone, Chargé d’Affaires, Canadian Embassy, 17 October 1946, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 117 T.A. Stone, Chargé d’Affaires, Canadian Embassy, Washington D.C., to the Secretary of State for External Affairs, 22 October 1946, LAC, RG 25, vol. 3347, f. 9061-A-40. Although the US Secretary of State had stopped pressuring the Canadians on the issue, the Weather Bureau and Secretary of Commerce had been hounding the State Department to reopen the weather station issue with the Canadians. Charles Hubbard to the Secretary of State, 17 October 1946, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243 / 10-1746; Secretary of Commerce to the Secretary of State, 17 October 1946, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243 / 10-1746.
- 118 By October, Acting Secretary of State Dean Acheson suggested to President Harry Truman that the Canadians might require a nudge before they agreed to closer collaboration. Memorandum by the Acting Secretary of State to President Truman, 1 October 1946, in United States, Department of State, *Foreign Relations of the United States (FRUS) 1946, Vol. 5* (Washington: United States Government Printing Press, 1969), 55. Acheson urged the president to inform King that the civilian members of the US Administration, not just the military, wanted closer defence cooperation. Memorandum by the Acting Secretary of State to President Truman, 26 October 1946, *FRUS 1946, Vol. 5*, 57.
- 119 The British had told King that they needed the US if they were ever to hold their own against Russia. In this light, a bilateral agreement for Canadian-American defence cooperation would bolster Commonwealth security, not detract from it. J.W. Pickersgill and D.F. Foster, eds., *The Mackenzie King Record, Vol. 3: 1945/46* (Toronto: University of Toronto Press, 1968), 265–66. On the British perspective, see “United States Bases in Canada,” n.d. (November 1946), LAC, MG 26 J4, vol. 380, f. Defence 1946–47, and UK National Archives, CAB 131/5, Defence Committee Minutes, 2 January 1947, 3–4.
- 120 “Had Truman and King directly discussed continental defence,” political scientist Joseph Jockel explained, “King might have discovered the lack of interest at the highest levels of American government in creating a vast and expensive air defence system.” Jockel, *No Boundaries Upstairs*, 25–27. See also Bercuson, “Continental Defense and Arctic Sovereignty,” 160.
- 121 Defence Cooperation Between the United States and Canada, Annex I: Copy of a telegram No. 1770 dated 19th December 1946 from Canada to the Dominions Office, Cabinet Defence Committee, 26 December 1946, UK National Archives, CAB 131/3 DO (46) 146. On Kennan’s participation, see Smith, *Diplomacy of Fear*, 175.
- 122 Memorandum from Under-Secretary of State for External Affairs to the Prime Minister: Defence Discussions with the United States, 23 December 1946, in *DCER Vol. 12 (1946)*, 1721–25.
- 123 Defence Cooperation Between the United States and Canada, 26 December 1946. In planning the meeting, ambassadors Pearson and Atherton “mutually agreed that the

- proposed meetings were not the proper place to discuss the possible claims of other countries to territories in the Canadian Arctic. Pearson appeared to admit that placing that item on a draft agenda might have represented an effort by Canada to obtain acceptance of the ‘Sector Principle.’” Joint Defence Discussions, 21 November 1946, NARA, RG 59, entry 1177, PJBD Subject Files, 1940–59, box 2, f. Basic Papers. If any Canadian officials still believed that the Americans might acquiesce and formally recognize Canadian sovereignty in the Arctic based on the sector principle, their hopes were dashed. Representatives from the two countries would have to devise other measures to guarantee Canada’s sovereignty, and they proved effective in doing so.
- 124 Bercuson, “Continental Defense and Arctic Sovereignty,” 161.
- 125 “Working Papers for Use in Discussions with the United States: Civilian Operations in Support of Defence Projects,” 6 December 1946, RG 59, entry 1177, PJBD Subject Files, 1940–59, box 2, f. Basic Papers.
- 126 Meeting participants agreed that “there might be advantages to carrying out certain of the earlier parts of the projected [continental defence] program under civilian auspices and that whenever this was practicable the U.S. would co-operate to that end.” “Memorandum of Canadian-United States Conversations Held in Ottawa in Suite “E” Chateau Laurier Hotel,” 16 and 17 December 1946, NARA, RG 59, entry 1177, PJBD Subject Files, 1940–59, box 2, f. Basic Papers.
- 127 Defence Cooperation Between the United States and Canada, 26 December 1946.
- 128 Ron Purver, “The Arctic in Canadian Security Policy, 1945 to the Present,” in *Canada’s International Security Policy*, ed. David B. Dewitt and David Leyton-Brown (Scarborough, ON: Prentice Hall, 1995), 82–84; Eayrs, *In Defence of Canada Vol. III*, 343–44; Bercuson, “Continental Defense and Arctic Sovereignty,” 161.
- 129 Bercuson, “Continental Defense and Arctic Sovereignty,” 161; Memorandum for Cabinet, 21 October 1946, LAC, RG 2, vol. 74, f. D-19-2.
- 130 J. Graham Parsons to Secretary of State, 24 January 1947, NARA, RG 59, PJBD, f. 36th Recommendation: General Principles. Parsons also noted that Canadian approval for the revised recommendation, “having regard for Canada’s historic ties with the United Kingdom, is regarded by the Canadian Government as a momentous decision in that it will increasingly orient Canada’s forces towards the United States.”
- 131 House of Commons *Debates*, 12 February 1947, 359–61; Bercuson, “Continental Defense and Arctic Sovereignty,” 155. For the full text of the press release, see *FRUS 1947, Vol. 3: The British Commonwealth, Europe* (Washington: Government Printing Office, 1977), 104–05. On media responses, see for example “North American Security,” *The Times*, 14 February 1947, LAC, RG 2, vol. 74, f. D-19-2; and the *Montreal Star* articles “British Press Praises New Canada-US Pact,” 14 February 1947; “Our Defence Can’t Wait,” 14 February 1947; and “Canada-U.S Defence: French Canadian Press Applauds Arrangement,” 20 February 1947.
- 132 “Northern and Arctic Projects,” 28 January 1948, LAC, RG 2/18, vol. 57, f. A-25-5.
- 133 L.B. Pearson to Ray Atherton, 13 February 1947, NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243/2-1447.
- 134 Bercuson, “Continental Defense and Arctic Sovereignty,” 163–66.
- 135 The clearest example of this perception is Grant, *Sovereignty or Security?*
- 136 See, for example, Adam Lajeunesse, “The True North As Long As It’s Free: The Canadian Policy Deficit, 1945–1985” (unpublished master’s thesis, University of Calgary, 2007), 18, 24; Grant, *Sovereignty or Security?*, 174, 215–16, 238.
- 137 Quoted in Grant, “American Defence of the Arctic, 1939–1960,” part II.

- 138 Pearson thought that the program should be placed in the context of the existing Canadian weather facilities in the North. S.F. Rae to Pearson, 28 February 1947, LAC, RG 25, vol. 3347, f. 9061-A-40.
- 139 On meteorology as a basis for global cooperation, see Paul N. Edwards, "Meteorology as Infrastructural Globalism," *Osiris* 21/1 (2006): 229–50.
- 140 C.D. Howe, House of Commons *Debates*, 1947: vol. 2, 4 March 1947, 989–90.
- 141 Mrs. Bissell Hubbard to Davidson, 1952.

NOTES TO CHAPTER 3

- 1 L.B. Pearson to Ray Atherton, 13 February 1947, National Archives and Records Administration (NARA), RG 59, CDF 1945-49, box 6036, f. 842.9243/2-1447.
- 2 "Copy of substance of United States reply to Canadian Note No. 16 of February 1947," Library and Archives Canada (LAC), RG 22, vol. 732, f. SE-4-1-83.
- 3 For overviews of this landmark Canadian Army exercise in which forty-seven men in snowmobiles travelled north from Churchill to Victoria Island, then west to Coppermine, and south down the Mackenzie Valley to Edmonton, see Kevin Thrasher, "Exercise Musk Ox: Lost Opportunities" (unpublished master's thesis, Carleton University, 1998), and John Lauder, *Tracks North: The Story of Exercise Musk Ox*, ed. and introduced by P. Whitney Lackenbauer and Peter Kikkert (Antigonish: Arctic Operational History Series, Mulroney Institute on Government, 2018).
- 4 Joint Meeting of United States and Canadian Technical Experts to Discuss the Establishment of Arctic Weather Stations, 25–26 February 1947, LAC, RG 22, vol. 732, f. SE-4-1-83. See also LAC, RG 25, vol. 8177, f. 6700-40, pt. 1. The terms of this agreement were summarized by Mr. St-Laurent in a note to Mr. Atherton on March 18. See LAC, RG 25, vol. 3347, f. 9061-A-40C, pt. 2. On previous visits to Winter Harbour and a detailed description of the area, see Moira Dunbar and Keith Greenaway, *Arctic Canada from the Air* (Ottawa: Queen's Printer, 1957), 237–38. On Rowley, see John MacDonald, "Graham Westbrook Rowley (1912–2003)," *Arctic* 57/2 (2004): 223–24.
- 5 Joint Meeting of United States and Canadian Technical Experts, 25–26 February 1947. Canada offered the following salaries in April 1947: officer in charge \$4,500, meteorologists \$3,300, senior technicians \$2,580, and junior technicians \$1,980. Canadians also received a \$1,200 isolation allowance, free room and board, winter clothing, and equipment. Canada, House of Commons *Debates*, 24 April 1947, 2422. US information was not provided.
- 6 Joint Meeting of United States and Canadian Technical Experts, 25–26 February 1947. The Canadians also retained control of customs, radio communications, and publicity. Because it was a civilian program, everyone agreed that the US military should keep publicity about its role to a minimum.
- 7 This flexible and tentative approach also obviated the need to register an agreement with the United Nations, thus averting the "world-wide publicity" that Canada sought to avoid. H.L. Keenleyside to Under-Secretary of External Affairs, 1 May 1947, LAC, RG 22, vol. 732, f. SE-4-1-83.
- 8 Wright to Gibson, 29 November 1946, LAC, RG 85, vol. 823, f. 7140; Deputy Minister of Mines and Resources to the Acting Under-Secretary of State for External Affairs (USSEA), R.M. Macdonnell, 20 December 1946, LAC, RG 25, vol. 3347, f. 9061-A-40C; Wardle to Jackson, 19 December 1946, LAC, RG 88, vol. 19, f. SE. 4-1-83.
- 9 D.M. Johnson to Mr. Dow, 11 March 1947, LAC, RG 25, vol. 3841, f. 9061-A-40, pt. 2. Game laws, in particular, were a clear indication of sovereignty. Before the Americans

- could hunt in the Arctic, they had to secure the approval of External Affairs or the Department of Mines and Resources. In May 1947, for instance, the American military sought permission for men posted at the desolate weather stations to supplement their diets by hunting caribou. J.P. Richard, the Deputy Commissioner of the Eastern Arctic, argued that “if each gets one caribou they will be doing much better than anyone else who will be living in that part of the country — or for that matter anywhere else in the northland. How many families in Canada these days get the amount of food that the army personnel will get in the north, and at that Canada is supposed to be one of the best fed countries in the world.” J.P. Richard to Wright, 12 May 1947, LAC, RG 85, vol. 2084, f. 1730. The Canadians rejected this request and the US accepted the decision — an implicit recognition of Canadian sovereignty which would have pleased the original creators of the Arctic Game Preserve. O.D. Skelton described in 1926 that “aside from its immediate purpose, this Preserve should prove of distinct value as an assertion of our sovereignty in the North.” Skelton to O.S. Finnie, 2 September 1926, LAC, RG 25, vol. 4252, f. 9057-40, pt. 2.
- 10 For example, three observers joined Operation Nanook, an American naval expedition to the waters of Davis Strait, Viscount Melville Sound, and Lancaster Sound, in the summer of 1946. Relations remained generally positive between the observers and American personnel on the cruise, which accomplished most of its objectives and adhered carefully to Canadian guidelines. Canadian Ambassador Washington to SSEA, No. WA-3686, 16 October 1946, sending message for Macdonnell from Stone, LAC, RG 25, vol. 3347, f. 9061-B-40. Nevertheless, the observers noted the unwillingness of low-ranking American military personnel to cooperate with the Canadians. See Widdows to Captain R.E.S. Bidwell, 11 October 1946, LAC, RG 24, vol. 8152, f. NSS 1660-12, pt. 1; and Lantier to Captain H.N. Lay, 3 October 1946, LAC, RG 24, vol. 8152, f. NSS 1660-12, pt. 1.
 - 11 Meteorological Division-Department of Transport-Canada and U.S. Weather Bureau-Department of Commerce-United States, *A Review of the Establishment and Operation of the JAWS at Eureka Sound, Resolute, Isachsen, Mould Bay and Alert and a Summary of the Scientific Activities at the Stations, 1946–1951* (Ottawa: Department of Transport, 1951).
 - 12 J. Peter Johnson Jr., “The Establishment of Alert, N.W.T., Canada,” *Arctic* 43/1 (1990): 23.
 - 13 Canada, Meteorological Branch of the Ministry of Transport, “Joint Arctic Weather Stations: Twenty-Five Years,” Department of External Affairs (DEXAF) Information Division Reprint 28 (1970), 2.
 - 14 USWB, Report on the Inspection of Eureka Sound and Thule Weather Stations during April 1947, LAC, RG 93, acc. 1980–81/306, box 26, f. 11-10-11, pt. 2.
 - 15 Dunbar and Greenaway, *Arctic Canada from the Air*, 294–98; Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918–25* (Vancouver: University of British Columbia Press, 2010), 121–38, 286ff66; Lyle Dick, *Muskox Land: Ellesmere Island in the Age of Contact* (Calgary: University of Calgary Press, 2001), 52–55, 299–305. Ironically, Dick’s study on the human history of Ellesmere makes little mention of the Eureka weather station, focusing almost entirely on high-level sovereignty questions and making no attempt to describe the human experiences at the JAWS station as he does for the RCMP, transitory explorers, or Inuit.
 - 16 Katherine Harding, “How the ‘Frozen Chosen’ Settled Eureka,” *Globe and Mail*, 6 April 2007. See also “Nfldr. Commands Weather Station,” *Western Star* (Corner Brook, NL), 23 May 1947.

- 17 Courtney Report Eureka Sound 1947–1948, 1-2, NARA, RG 27, entry 7, box 1, f. Reports, Eureka. Courtney complained about the lateness of his assignment and the personal problems that this caused, on page 6 of this report.
- 18 M.K. Thomas, “Andrew Thomson: A Profile,” *Atmosphere* 11/4 (1973); Bruce Levett, “Ice Curtain Lifted for Science,” undated clipping, LAC, RG 25, vol. 3347, f. 9061-A-40C, pt. 1.
- 19 John Trinko, “In the Arctic” (unpublished memoirs, 1989), 32.
- 20 Joint Meeting of United States and Canadian Technical Experts to Discuss the Establishment of Arctic Weather Stations, 25–26 February 1947, LAC, RG 22, vol. 732, f. SE-4-1-83. See also Jack Karr, “Six ‘Human Polar Bears’ in Arctic on Weather Job,” *Toronto Daily Star*, 5 April 1947. According to initial plans, two more men (a Canadian and an American) would be sent to Eureka that summer to round out the permanent station staff.
- 21 Courtney Report Eureka Sound 1947–1948, 4. On Dyer’s wartime experiences as commander of Crystal III airbase at Padloping Island, see Charles Hubbard, “Report on Crystal Force Expedition,” 11 November 1941, NARA, RG XPOLA, entry 17, box 5, f. Crystal Force, 1941–42.
- 22 Courtney Report Eureka Sound 1947–1948.
- 23 Courtney Report Eureka Sound 1947–1948, 11–13.
- 24 Courtney Report Eureka Sound, 15 April 1947; Report on the Inspection of Eureka Sound and Thule Weather Stations during April 1947, LAC, RG 93, acc. 1980–81/306, box 26, f. 11-10-11, pt. 2. The aircraft operated on wheels because the skis bounced on the hard snow surface while the wheels tended to cut down to the hard ice. Approximately 50% of the total tonnage was carried by a C-82, which proved especially well adapted because of the ease of loading and discharging cargo from it.
- 25 Courtney Report Eureka Sound 1947–1948, 15–16, 19–21.
- 26 Courtney Report Eureka Sound 1947–1948, 15–16, 19–21.
- 27 Courtney Report Eureka Sound 1947–1948, 18.
- 28 DoT-USWB, *Review of the Establishment and Operation*; Courtney Report Eureka Sound 1947–1948, 20. Courtney found the Quonset hut completely unsuited to Arctic conditions — particularly when trying to erect it in cold and windy weather (p. 22).
- 29 USWB, Report on Inspection of Eureka Sound and Thule Weather Stations during April 1947.
- 30 Eureka Sound Installation, Spring Program, LAC, RG 25, vol. 3841, f. 9061-A-40, pt. 2.
- 31 D.M. Johnson, “Arctic Weather Stations,” 30 April 1947, LAC, RG 25, vol. 3841, f. 9061-A-40, pt. 2.
- 32 Courtney Report Eureka Sound, 9–10 April 1947.
- 33 USWB, Report on the Inspection of Eureka Sound and Thule Weather Stations during April 1947.
- 34 Courtney Report Eureka Sound 1947–1948, 24.
- 35 The material flown to Slidre Bay included two Clark Airborne tractors with bulldozing attachments, one grader, one carryall scraper, parts for a Quonset hut, several Jamesway shelters, aerial towers, fuel oil, and general supplies. Maj. Andrew Taylor, *Report on the Engineering Aspects of the Operations of US Task Force 68 in the Canadian Arctic – 1947*, 24 November 1947, 61–63, NARA, RG 27, entry 5, Formerly Security Classified Subject Files 1942-63, box 8, f. Navy Reports–Confidential.

- 36 Courtney Report Eureka Sound 1947–1948, 25, 29; Taylor, *Report on the Engineering Aspects*, 61. Twice-daily pilot balloon ascents began on 22 July, after the required materials for that activity finally arrived.
- 37 Chief of Naval Operations to Commander in Chief, US Atlantic Fleet, CNO conf. ser. 072P33, 7 May 1947, NARA, RG 27, entry 5, box 12, f. Report of Task Force 68, 1947. Secondary tasks included training personnel; testing ships and materiel in Arctic conditions; making observations of geographical, navigational, and aviation interest; and collecting detailed hydrographic, meteorological, and electro-magnetic propagation data, as well as conducting other scientific experiments in line with the “limited scope of this operation.” The USN also provided logistic support and lift to the US Army Engineers tasked with building an airstrip at Winter Harbour.
- 38 Bill Davidson, “On Guard at the Pole: Our Sub-Zero Heroes,” *Collier’s Magazine*, 21 June 1952, 28–36.
- 39 “Capt. J.D. Cleghorn,” *Montreal Gazette*, 30 September 1942; “James Donald Cleghorn,” McGill University War Records, McGill University Archives, 0000-481.01.2.e0431.
- 40 “Cold Weather Trials: Papers on Exercise ‘Muskox,’” terms of reference, 9 October 1945, Department of National Defence, Directorate of History and Heritage (DHH) 746.033(D1); Lieut.-Colonel G.W. Rowley, “Exercise Muskox,” *Geographical Journal* 109/4-6 (1947): 176; Thrasher, “Exercise Musk Ox,” 21. During Musk Ox, two men under Cleghorn’s command died in a fire in the Officer’s Mess caused by fuel spillage, casting “a somber mood over the camp.” Thereafter, “Cleghorn organized frequent drills to keep the men on their toes.” Thrasher, “Exercise Musk Ox,” 39–40.
- 41 Memorandum for File, Northern Weather Stations, 26 June 1946, LAC, RG 25, vol. 3347, f. 9061-A-40. See also R.H. Winfield, “The supply by air of Exercise ‘Musk Ox’, 1946,” *Polar Record* 6/3 (1952): 340–44.
- 42 A.L. Rand to R.A. Gibson, 29 April 1947, LAC, RG 85, vol. 1013, f. 17742. He was sworn in as a game officer under the provisions of the *North West Game Act* on 11 June 1947. It is notable that Andrew Thomson, in his communications with other officials, explicitly “omitted any reference to Colonel” when describing Cleghorn “in view of the civilian nature of the operation of the Winter Harbour Station.” Thomson to R.A. Gibson, 6 September 1947, LAC, RG 85, vol. 1013, f. 17742.
- 43 J.D. Cleghorn, Confidential Report on the Establishment of the Meteorological Station — Resolute Bay, Cornwallis Island, N.W.T., 1947 [hereafter “Cleghorn Report”], LAC, RG 93, box 26, f. 11-10-11, pt. 3.
- 44 H.L. Keenleyside to Under-Secretary of State for External Affairs, 1 May 1947, LAC, RG 25, vol. 3841, f. 9061-A-40c; Memorandum for Under-Secretary of External Affairs, 1 May 1947, LAC, RG 22, vol. 732, f. SE-4-1-83. On CMS staff shortages following the war, see Canadian Meteorological Service, Oral History Project, Patrick D. McTaggart-Cowan, interviewed by D.W. Phillips, 5 October 1983, 22, transcript available at <https://opensky.ucar.edu/islandora/object/archives%3A7619>.
- 45 H.L. Keenleyside to Under-Secretary of State for External Affairs, 1 May 1947, LAC, RG 25, vol. 3841, f. 9061-A-40c; Memorandum for Under-Secretary of External Affairs, 1 May 1947, LAC, RG 22, vol. 732, f. SE-4-1-83.
- 46 DoT-USWB, *Review of the Establishment and Operation*.
- 47 They marked items critical to the unloading operations and camp construction with red crosses and loaded these into the hold last to ensure that they were offloaded first. Stores were divided into twenty-seven classes of contents, each with its own identification number (e.g., 1-Food, 6-Buildings), preceded by the first letter of the island that was their planned destination (M-Melville, P-Prince Patrick, B-Bathurst). A box of medical

- supplies consigned for Melville Island, for example, would be M/14. Taylor, *Report on the Engineering Aspects*.
- 48 J.G. Wright to R.A. Gibson, 13 June 1947, LAC, RG 85, vol. 2083, f. 7140-2. Apart from selecting Canadian observers to accompany the task force, Canadian officials in Ottawa and at the Canadian Embassy in Washington seemed more preoccupied with controlling publicity than with practical aspects of the voyage. See LAC, RG 25, vol. 3841, f. 9061-A-40, pt. 2.
- 49 Commander Task Force 68 to Chief of Naval Operations, *Report of Task Force Sixty-Eight Summer Operation 1947* (hereafter *TF 68 Report*), 3 November 1947, NARA, RG 27, entry 5, box 12, f. Report of Task Force 68, 1947. *Wyandot's* bow was reinforced, stowage added for reefer boxes, and electronic equipment overhauled. *Edisto* had special storage for the J2F airplane and helicopter, securing straps for the "Weasel," and cradles built to carry gasoline drums on the main deck aft. *Whitewood* also had drum storage installed on the main deck and stowage for an LCVP on the main deck aft.
- 50 Canadian Meteorological Service, Oral History Project, Patrick D. McTaggart-Cowan interview, 22.
- 51 Gerry Metcalf's Logs, <http://www.gerrymetcalf.org/gerry/logs.php> [hereafter Metcalf logs]. A bathythermograph or BT is a small, torpedo-shaped device used to record pressure and temperature change when lowered into the water.
- 52 Metcalf Log, 27 July 1947.
- 53 Cleghorn Report, 6. On dismal conditions below ship, see also Harry Hampton Aimé, *Overalls, Red Serge, and Robes: Life and Adventure in the Great Canadian North* (Red Deer: Hampton Press, 2004), 129.
- 54 *TF 68 Report*, annex 1(a), 2-4.
- 55 *TF 68 Report*, annex 1(a), 4-5; Taylor, *Report on the Engineering Aspects*.
- 56 Cleghorn Report, appendix A (hereafter "Cleghorn Diary"), 28 July 1947, LAC, RG 93, box 26, f. 11-10-11, pt. 3. For Canadian approval, see Andrew B. Foster to Saul F. Rae, 11 June 1947, LAC, RG 22, vol. 732, f. SE-4-1-83.
- 57 Cleghorn Diary, 1-6 August 1947.
- 58 Taylor, *Report on the Engineering Aspects*, 61, 63.
- 59 Courtney Report Eureka Sound 1947-1948, 30. Several of the ship's crews also departed with old muskox skulls, which the staff had collected and nailed up in front of their office, as souvenirs. Aimé, *Overalls, Red Serge, and Robes*, 139.
- 60 *TF 68 Report*. By the end of September, all of the personnel had sufficient RAWIN training to operate the equipment themselves. On postal services, see also Aimé, *Overalls, Red Serge, and Robes*, 138.
- 61 During the operation, crews tested a J2F-6 amphibian aircraft, but its restricted performance and poor handling far outweighed its reconnaissance value. *TF 68 Report*, 5.
- 62 Cleghorn Report.
- 63 Charles J. Hubbard, *Report by U.S. Weather Station Observers on Arctic Activities - Summer 1947*, J-1-J-4, NARA, RG XPOLA, entry 17, box 5, f. US Weather Observers Report on Arctic Activities, 1947.
- 64 Taylor, *Report on the Engineering Aspects*, 66.
- 65 Hubbard, *Report by U.S. Weather Station Observers*, J-6-7; Hubbard diary, NARA, RG XPOLA, entry 17, box 4, f. Diary July-September 1947.
- 66 Cleghorn Diary, 25 August 1947; *TF 68 Report*, annex 1(a), 18. The only possible airstrip sites on the ground east and west of Freemans Cove on Bathurst Island were along the

- ridges between shingle beaches and muddy flats, which bore a mixture of silty clay and gravel. The flat lands were wet and boggy. Taylor, *Report on the Engineering Aspects*, 25.
- 67 *TF 68 Report*, annex 1(a), 18-19; annex 2, 2, 41-42.
- 68 On 29 August, on the floor of a broad valley connecting Erebus and Radstock Bays, engineers located an excellent two-mile stretch of well-graded gravel that would make an excellent airstrip, but the site was surrounded by mountains, which made it somewhat less attractive. Cleghorn Report, appendix A.
- 69 Metcalf Log, 29 August 1947.
- 70 Andrew Taylor, "Report of the Engineering Aspects," 24 November 1947, 66, University of Manitoba Archives, MSS 108, box 16, file 2. On Taylor's background, see Andrew Taylor, *Two Years Below the Horn*, ed. Daniel Heidt and P. Whitney Lackenbauer (Winnipeg: University of Manitoba Press, 2017).
- 71 *TF 68 Report*, 3.
- 72 Metcalf Log, 31 August 1947.
- 73 Taylor, *Report on the Engineering Aspects*, 68. Major Taylor made much of the forty heavy cargo sleds, which were each stacked with up to ten tons of cargo and pulled from the LCMs to the dump area for stores by D-7 tractors. He also noted the sharp demarcation of responsibilities during the unloading operation, with the navy carrying the stores to the beach and the army taking over once it got there.
- 74 Cleghorn Report, 8.
- 75 Taylor, *Report on the Engineering Aspects*, 75.
- 76 Cleghorn Report.
- 77 DoT-USWB, *Review of the Establishment and Operation*, 92-93.
- 78 Taylor, *Report on the Engineering Aspects*, 73-74.
- 79 Taylor, *Report on the Engineering Aspects*, 74.
- 80 Metcalf Log, 6 September 1947.
- 81 Aimé, *Overalls, Red Serge, and Robes*, 140.
- 82 Chief of Naval Operations to Commander in Chief, U.S. Atlantic Fleet, CNO conf. ser. 072P33, 7 May 1947, NARA, RG 27, entry 5, box 12, f. Report of Task Force 68, 1947.
- 83 Metcalf Log, 11 September 1947.
- 84 Aimé, *Overalls, Red Serge, and Robes*, 141.
- 85 Cleghorn Report, appendix A.
- 86 Cleghorn Report, 3.
- 87 R.W. Rae to Controller, Air Services, Meteorological Division, 6 October 1947, LAC, RG 93, box 26, f. 11-10-11, pt. 2.
- 88 Cleghorn Diary, 17 September 1947.
- 89 J.D. Cleghorn, Officer in Charge, to Andrew Thomson, 1 October 1947, LAC, RG 25, vol. 3841, f. 9061-A-40. On Rae's activities, see also Rae to Controller, 1 October 1947.
- 90 J.D. Cleghorn to Controller, Air Services, Meteorological Division, 12 October 1947, LAC, RG 93, box 26, f. 11-10-11, pt. 2.
- 91 Cleghorn Report, 9-10.
- 92 Cleghorn Report, 6.
- 93 Aimé, *Overalls, Red Serge, and Robes*, 146. Cleghorn held Aimé in high esteem, extolling that the RCMP constable "has been a great help to me. He is steady and gets on well with everybody." J.D. Cleghorn to R.A. Gibson, 21 November 1947, LAC, RG 85, vol. 1013, f. 17742.

- 94 “Gave Bear Arm to Chew to Save Neck Twisting,” *Calgary Albertan*, 6 November 1947. See also various other clippings in LAC, RG 85, vol. 1022, f. 18554. See also Willie Knutsen and Will C. Knutsen, *Arctic Sun on My Path: The True Story of America’s Last Great Polar Explorer* (Guilford, CT: Lyons Press, 2005), 256, which erroneously states that Gibbon survived but never regained consciousness.
- 95 Cleghorn Report, 10. For other background on his supposed “warning” to station personnel, see Cleghorn to Gibson, 21 November 1947.
- 96 Aimé, *Overalls, Red Serge, and Robes*, 146.
- 97 Aimé, *Overalls, Red Serge, and Robes*, 147; Cleghorn Report, 10. For the official RCMP inquiry and report, see LAC, RG 85, vol. 1021, f. 18517.
- 98 Andrew Thomson to J.D. Cleghorn, 10 February 1948, and reply, 13 February 1948, LAC, RG 93, box 26, f. 11-10-11, pt. 3; Aimé, *Overalls, Red Serge, and Robes*, 147; Cleghorn Report, 147.
- 99 Cleghorn Diary, 23–26 December 1947. See also Jack Bullington, “A Christmas Story,” <http://nwrain.net/~newsuit/b17labrador/story2.html>, last accessed 20 October 2016.
- 100 Cleghorn Report, 7.
- 101 Cleghorn Report, 11.
- 102 R.A. Gibson to J.G. Wright, 6 January 1948, and marginalia by Wright, LAC, RG 85, vol. 1013, f. 17742.
- 103 Canadian Meteorological Service, Oral History Project, Patrick D. McTaggart-Cowan interview, 22.
- 104 Cleghorn Diary, 22 December 1947.
- 105 “Weather Watching in the Arctic,” *Christian Science Monitor*, 7 May 1948. The personnel felt elated when a shipment of twenty packages of fifteen phonograph records arrived, promising evening entertainment of varied music. Their “eager anticipation turned to keen disappointment” when they unpacked the boxes to find that each one contained the same fifteen records.
- 106 R. Magruder Dobie, “Why Husbands Go North,” *Los Angeles Times*, 9 May 1948.
- 107 Courtney Report Eureka Sound 1947–1948, 34–35.
- 108 Justin Courtney, “Recreational Equipment,” NARA, RG 27, entry 7, box 1, f. Reports, Eureka.
- 109 Canadian Meteorological Service, Oral History Project, Patrick D. McTaggart-Cowan interview, 22–23.
- 110 *TF 68 Report*, 5.
- 111 Mrs. Harriet Bissell Hubbard to Mr. Davidson, 1952, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Correspondence of Mrs. Charles Hubbard.
- 112 See, for example, Shelagh D. Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia Press, 1988), 174, 215–16, 238; Adam Lajeunesse, “The True North As Long As It’s Free: The Canadian Policy Deficit, 1945–1985” (unpublished master’s thesis, University of Calgary, 2007), 18, 24; and David J. Bercuson, “Advertising for Prestige: Publicity in Canada-United States Arctic Defence Cooperation, 1946–48,” in *Canadian Arctic Sovereignty and Security: Historical Perspectives*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2010), 111, which asserts that “the stations would be operated by the United States Weather Bureau, a civilian agency, but they were clearly military in intent.”

- 113 Gloria R. Leon, Gro Mjeldheim Sandal, and Eric Larsen, "Human Performance in Polar Environments," *Journal of Environmental Psychology* 31/4 (2011): 356.
- 114 Aimé, *Overalls, Red Serge, and Robes*, 155.
- 115 In April 1947, Lloyd's article in the *International Journal* on "Canada's Strategic North" lambasted the Canadian government for its failure to effectively develop and control its northern regions. He noted that some Americans disputed Canada's claims and feared that they might attempt to usurp control of the Canadian Arctic. A copy is available in LAC, RG 2, vol. 56, f. A-25. On Lloyd as a heroic defender of Canadian sovereignty, see Shelagh D. Grant, "Northern Nationalists: Visions of 'A New North,' 1940–1950," in *For Purposes of Dominion: Essays in Honour of Morris Zaslow*, ed. Kenneth Coates and William R. Morrison (North York: Captus, 1989), 47–67.
- 116 On the ACND, see P. Whitney Lackenbauer and Daniel Heidt, eds., *The Advisory Committee on Northern Development: Context and Meeting Minutes, 1948–66*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 4 (Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2015).
- 117 Trevor Lloyd, Memorandum to the Advisory Committee on Northern Development: Revised Summary of US Military Activities in Canada, 22 December 1947, LAC, RG 2, vol. 57, f. A-25-5. Heeney also agreed that the scientific investigation of Operation Nanook should have been explored more thoroughly. In the 1948 operation, this was assured. Memorandum for Advisory Committee on Northern Development, 28 January 1948, in *Documents on Canadian External Relations (DCER) Vol. 14 (1948)*, ed. Hector Mackenzie (Ottawa: Department of External Affairs, 1994), 1514–19.
- 118 While Bean agreed with Lloyd that the situation called for "closer liaison all around," the RCAF officer argued that "the proper channel is probably through the Services not between Mines and Resources and the U.S. Service Departments, which I am sure is Trevor Lloyd's objective." W.W. Bean, Group Captain RCAF, to Albert Heeney, 31 January 1948, LAC, RG 2, vol. 57, f. A-25-5.
- 119 Extract from Minutes of First Meeting of Advisory Committee on Northern Development, 2 February 1948, in *DCER Vol. 14 (1948)*, 1519–22.
- 120 P. Whitney Lackenbauer, "Right and Honourable: Mackenzie King, Canadian-American Bilateral Relations, and Canadian Sovereignty in the Northwest, 1943–1948," in *Mackenzie King: Citizenship and Community*, ed. John English, Kenneth McLaughlin, and P. Whitney Lackenbauer (Toronto: Robin Brass Studio, 2002), 162.
- 121 "Weather Watching in the Arctic."
- 122 Canadian Meteorological Service, Oral History Project, Patrick D. McTaggart-Cowan interview, 22–23.

NOTES TO CHAPTER 4

- 1 D.M. Johnson to Canadian Ambassador – Washington, 24 May 1948, National Archives and Records Administration (NARA), RG 59, CDF 1945–49, box 6036, f. 842.924, and Library and Archives Canada (LAC), RG 93, acc. 80-81/306, box 26, f. 11-10-11, pt. 3.
- 2 Johnson to Canadian Ambassador – Washington, 24 May 1948.
- 3 Johnson to Canadian Ambassador – Washington, 24 May 1948.
- 4 Johnson to Canadian Ambassador – Washington, 24 May 1948.

- 5 "Joint Arctic Weather Stations: Five Year Report, 1946–1951" (Ottawa and Washington: Meteorological Division - Department of Transport and the US Weather Bureau, 1951) (hereafter DoT and USWB, "Five Year Report"), 12.
- 6 Charles Hubbard and J. Glenn Dyer, "Report on Operations for Establishment of Isachsen Land and Pr. Patrick Island Weather Stations, Spring of 1948," 2–3, copy provided by John Gilbert.
- 7 Hubbard and Dyer, "Report on Operations," 4.
- 8 Hubbard and Dyer, "Report on Operations," 4–5.
- 9 Willie Knutsen and Will C. Knutsen, *Arctic Sun on My Path: The True Story of America's Last Great Polar Explorer* (Guilford, CT: Lyons Press, 2005), 251.
- 10 The US Air Force prepared preliminary maps of Isachsen and Prince Patrick Islands to support the reconnaissance, which provided considerably more detail than those available to officials at the annual planning meeting in Ottawa. F.W. Reichelderfer to Andrew Thomson, 19 March 1948, LAC, RG 12, vol. 2797, f. 6754-1291, pt. 1.
- 11 Philip S. Marshall, "Obituary: Charles Alan Kenneth Innes-Taylor, 1900–1983," *Arctic* 37/1 (1984): 84–85; Biographical notes on Alan Innes-Taylor; Innes-Taylor to Vilhjalmur Stefansson, 23 November 1948; and Vilhjalmur Stefansson to George Kennan, 10 June 1949, Yukon Archives, Alan Innes-Taylor fonds, MSS 432, acc. 95-32, f. 18. Innes-Taylor won a Carnegie Hero Medal for saving a woman's life off the coast of North Carolina in 1941.
- 12 Innes-Taylor to William H. Carlson, 18 December 1948, Yukon Archives, Innes-Taylor fonds, MSS 432, acc. 95-32, MSS 433, f. 5; Marshall, "Obituary: Innes-Taylor," 85.
- 13 Innes-Taylor to Thomson, 11 May 1948, LAC, RG 12, vol. 6754, f. 1291, pt. 1. Stefansson offered to send along his weather records, but later discovered that he had already deposited them at the National Archives in Ottawa. See also Marshall, "Obituary: Innes-Taylor," 86, on his approach to science.
- 14 Alan [Innes-Taylor] to Charles Hubbard, c. February 1948, and Andrew Thomson to F.W. Reichelderfer, 2 March 1948, LAC, RG 12, vol. 2797, f. 6754-1291, pt. 1.
- 15 Innes-Taylor to Vilhjalmur Stefansson, 21 April 1948, Yukon Archives, Innes-Taylor fonds, MSS 432, f. 18. On the practical impacts of a lack of medical stores, see Innes-Taylor, OLog Isachsen Land (hereafter Innes-Taylor diary), 19 May 1948, Innes-Taylor fonds, MSS 433, f. 6.
- 16 Hubbard and Dyer, "Report on Operations," 6.
- 17 Executive Officer, Isachsen, to Chief Arctic Operations Project, 30 April 1948, LAC, RG 12, vol. 2797, f. 6754-1291, pt. 1.
- 18 Andrew Thomson, Memorandum on Isachsen Island Operation as Observed on 13 April 1948, 16 April 1948, LAC, RG 25, vol. 6298, f. 9061-A-40, pt. 3-1.
- 19 Thomson, Memorandum on Isachsen Island Operation, 16 April 1948.
- 20 Innes-Taylor to Vilhjalmur Stefansson, 12 May 1948, Yukon Archives, Innes-Taylor fonds, MSS 432, acc. 95-32, f. 18.
- 21 Innes-Taylor to Lincoln Washburn, c. May 1948, Innes-Taylor fonds, MSS 432, acc. 95-32, f. 18. On Washburn, see Moira J. Dunbar, "A. L. Washburn," *Arctic* 5/1 (1952): 3, and Carl S. Benson, "Obituary: Albert Lincoln Washburn (1911–2007)," *Arctic* 60/2 (2007): 212–14. Innes-Taylor planned to return to Washington when he completed his job at Isachsen and doubted that he would remain with the USWB.
- 22 Alan Innes-Taylor, "Isachsen Land, 78° 47' N, Lat. 103° 50' W. Long," *Arctic* 1 (1948): 124.

- 23 Innes-Taylor, "Isachsen Land," 124–25.
- 24 Alan Innes-Taylor to Andrew Thomson, 11 May 1948, LAC, RG 12, vol. 2797, f. 6754-1291, pt. 1. See also Appendix B to Hubbard and Dyer, "Report on Operations," 14.
- 25 George Frederick M'Dougall, *The Eventful Voyage of H.M. Discovery Ship "Resolute" to the Arctic Regions, in Search of Sir John Franklin and the Missing Crews of H.M. Discovery Ship "Erebus" and "Terror," 1852, 1853, 1854* (London: Longman, Brown, Green, Longmans, and Roberts, 1857), 290–94.
- 26 "Stefansson Finds New Land," *Bulletin of the American Geographical Society* 47/10 (1915): 768; Stuart E. Jenness, *Stefansson, Dr. Anderson and the Canadian Arctic Expedition, 1913–1918: A Story of Exploration, Science and Sovereignty* (Gatineau: Canadian Museum of Civilization, 2011), 147–49.
- 27 Stuart E. Jenness, *The Making of an Explorer: George Hubert Wilkins and the Canadian Arctic Expedition, 1913–1916* (Montreal & Kingston: McGill-Queen's University Press, 2004), 370.
- 28 Willie Knutsen, "Milestones in my Arctic Journeys," *National Geographic Magazine*, October 1949, quoted in Canadian ambassador in US to Secretary of State for External Affairs (SSEA), 4 July 1949, LAC, RG 25, vol. 3842, f. 4061-H-40, pt. 2.
- 29 Knutsen and Knutsen, *Arctic Sun on My Path*, 257–58.
- 30 Knutsen and Knutsen, *Arctic Sun on My Path*, 258–59. Knutsen has his dates confused in this account, which conflates the second reconnaissance on March 30 and the establishment of a temporary camp on April 11. We have adjusted his account using Hubbard and Dyer, "Report on Operations," 7.
- 31 Hubbard and Dyer, "Report on Operations," 8.
- 32 Knutsen and Knutsen, *Arctic Sun on My Path*, 259.
- 33 Knutsen, "Milestones in my Arctic Journeys." On the personnel numbers, see DoT and USWB, "Five Year Report." The permanent staff establishment was later raised to seven: four Canadians and three US personnel.
- 34 Hubbard and Dyer, "Report on Operations," 8.
- 35 Knutsen, "Milestones in my Arctic Journeys." Knutsen sent a doctor's report to the station to quash rumours that he had faked his injury to get home. Knutsen and Knutsen, *Arctic Sun on My Path*, 262.
- 36 DoT and USWB, "Five Year Report"; and John Dalrymple, "Canada 'Digging In' Atop the Pole," *Ottawa Journal*, 28 January 1950.
- 37 Portions of this section are based on P. Whitney Lackenbauer and Peter Kikkert, "Setting an Arctic Course: Task Force 80 and Canadian Control in the Arctic, 1948," *The Northern Mariner* 21/4 (October 2011): 327–58 and are reproduced with permission.
- 38 Report of Arctic Summer Operation, 1948, U.S. Navy Task Force 80, U.S. Atlantic Fleet, NARA, RG 218, entry 7, box 4, B.P. CCS 381, (10-1-46), f. Report of Arctic Summer Op, 1948; Office of the Chief of Naval Operation, Navy Task Force to Resupply Weather Stations, 27 May 1948, LAC, RG 25, vol. 3841, f. 9061-G-40.
- 39 Report of Arctic Summer Operation, 1948, U.S. Navy Task Force 80; Operational Plan, Task Force Eighty, 15 June 1948, LAC, RG 85, vol. 2084, f. 16477.
- 40 Born in 1903 in Rockford, Illinois, Dufek joined the Reserve Officer Training Corps at his local high school and was appointed to the US Naval Academy in Annapolis, Maryland in 1921. He received his ensign's commission when he graduated four years later, served on the battleship USS *Maryland*, then entered the USN's flight training school and graduated as a naval aviator in 1933. After being promoted to lieutenant in 1939, he requested and received an assignment serving as navigator of the USS *Bear*,

the flagship of Rear Admiral Richard E. Byrd's third expedition to Antarctica. He later received the Antarctic Expedition Medal for his exploratory flying during the expedition. During the Second World War, he commanded a flight training squadron, was senior naval aviator in Algeria during the invasion of North Africa, and helped plan the invasions of Sicily, Salerno, and southern France. After his promotion to captain, he assumed command of the USS *Bogue*, which sank the final German submarine during the war. George Dufek Papers, Special Collections Research Center, Syracuse University Library. Finding aid online at http://library.syr.edu/digital/guides/d/dufek_gj.htm. On Operation Highjump, which was officially titled "The United States Navy Antarctic Developments Program, 1946–1947," see the US Navy's official *Report of Operation Highjump* (1947) and Lisle Rose, *Assault on Eternity: Richard E. Byrd and the Exploration of Antarctica, 1946–47* (Annapolis: Naval Institute Press, 1980).

- 41 Report of Arctic Summer Op. 1948 2 - US Atlantic Commander Task Force, Arctic Operation Summer 1948, Operation Plan No. 1-48, 16 June 1948, NARA, RG 218, entry 7, box 4. The report highlighted the divisions within Cabinet, particularly between St-Laurent and Claxton over defence matters.
- 42 Report of Arctic Summer Op. 1948.
- 43 Report of Arctic Summer Op. 1948.
- 44 L.B. Pearson, Memorandum for Cabinet Defence Committee, Arctic Weather Station Programme, 13 April 1948, LAC, RG 25, vol. 3841, f. 9061-G-40; Canadian Ambassador, Washington, to Secretary of State for External Affairs (SSEA), 27 March 1948, LAC, RG 25, vol. 3841, f. 9061-H-40. Pearson was quickly informed they would only be used for reconnaissance. A.D. Struble, Deputy Chief of Naval Operations, to Andrew Foster, 19 May 1948, LAC, RG 25, vol. 3841, f. 9061-G-40, and Shelagh D. Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia, 1988), 185.
- 45 See David J. Bercuson, "Advertising for Prestige: Publicity in Canada-United States Arctic Defence Cooperation, 1946–48," in *Canadian Arctic Sovereignty and Security: Historical Perspectives*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2011), 111–20.
- 46 H.H. Wrong to Andrew Foster, 17 June 1948, LAC, RG 25, vol. 3841, f. 9061-H-40. In 1946 the Canadians were permitted to send three observers to watch over a task force of eight ships. In April 1948, the Chief of Naval Operations for the USN informed the Canadian Joint Staff that the Task Force could only accommodate five Canadians. Ottawa found this unacceptable and the Canadian ambassador in Washington, Hume Wrong, sought eighteen spots. He argued to the Americans that the observers' work would benefit everyone and that he could not "overestimate" the Canadian government's interest. Wrong also explained that the Department of Transport planned to bring two to three icebreakers into line over the next few years to assume a greater share of the supply responsibility. This demanded experience, making the department "most anxious to acquire the necessary navigation and construction picture through [Captain Albani Chouinard] who has had much icebreaker experience in waters to the south of those to be visited by the Sea Supply Mission." Chouinard, one of the Department of Transport's senior icebreaker captains, was told to keep track of ice conditions and ice reconnaissance, and how the ships handled in the ice and compare their experiences with operations in the St. Lawrence. Based on these observations, he was to report on the type of ship Canada required for Arctic operations: an icebreaker of moderate lines, which could be used to carry more cargo, or a very powerful icebreaker with fine lines built for icebreaking, but large enough to escort other cargo vessels. He was also to report on the value of helicopters to ships' operations and the need for fuel

- storage at strategic points. J.C. Lessard, Deputy Minister, Department of Transport to Captain Albani Chouinard, Master Saurel, 7 July 1948, LAC, RG 25, vol. 3842, f. 9061-J-40. Other notable observers included: a meteorologist from DoT; John P. Kelsall from the Department of Mines and Resources (who represented the NWT Administration and gathered geological and wildlife information); several naval officers including Lt. J.H. MacLean who had been in Washington planning the mission; several RCAF officers; two magneticians from the Dominion Observatory; and Dr. Roman Gadja and Thomas Weir from the Geographical Bureau of the DMR who observed terrain, ice conditions, and geography.
- 47 H. Keenleyside to C.P. Edwards, 27 October 1947, LAC, RG 93, box 26, f. 11-10-11, pt. 1.
- 48 SSEA to Canadian Ambassador, Washington, 28 June 1948, LAC, RG 25, vol. 3842, f. 9061-J-40, pt. 1. On earlier objections of the Joint Intelligence Bureau to the involvement of the new civilian bureau collecting “strategical information,” see Grant, *Sovereignty or Security?*, 220–21.
- 49 SSEA to Canadian Ambassador, Washington, 28 June 1948.
- 50 USSEA to G.L. Magann, 15 September 1948, LAC, RG 25, vol. 3842, f. 9061-J-40, pt. 1. Eventually External Affairs had to step in and instruct the Americans that the RCMP had fully examined and cleared Lloyd and his men. “Our feeling in this Department,” noted St-Laurent, “is that the explanation of Lloyd’s interest in joint defence matters is that his zeal as a geographer has carried him a bit too far in a Department which, of course, has always kept a cautious eye on U.S. activities in the Northwest Territories and especially in the Arctic Archipelago where our claims to sovereignty have not all been formally acknowledged by the United States.” SSEA to Canadian Ambassador, Washington, 28 June 1948.
- 51 “Establishment of Joint Canadian-United States Meteorological Stations in the Canadian Arctic, 1947–49,” *Polar Record* 5/40 (1950): 602–05.
- 52 Harry Hampton Aimé, *Overalls, Red Serge, and Robes: Life and Adventure in the Great Canadian North* (Red Deer: Hampton Press, 2004), 140. See also Report of Captain A.C. Chouinard R.C.N.(R) Retired, 17 November 1948, LAC, RG 85, vol. 828, f. 87-2-1, pt. 2.
- 53 J. Peter Johnson, Jr., “The Establishment of Alert, N.W.T., Canada,” *Arctic* 43/1 (1990): 23.
- 54 Johnson, “Establishment of Alert,” 23; W.I. Griffith, North Ellesmere Reconnaissance Report, Section 5, Journal, 1950, held at Meteorological Division, DoT, Toronto.
- 55 Report of Arctic Summer Operation, 1948, U.S. Navy Task Force Eighty, U.S. Atlantic Fleet, LAC, RG 85, vol. 2088, f. CR 19; George Dufek to United States Atlantic Fleet, 7 August 1948, Syracuse University Library, Special Collections Research Center, George Dufek Papers (hereafter “Dufek Papers”), Task Force 80 box 1, Correspondence 1948.
- 56 Department of National Defence, Commander Thomas Fife, “Observer’s Narrative of USN Task Force 80,” 15 July to 19 September 1948, 24 September 1948, LAC, RG 25, vol. 3841, f. 9061-G-40.
- 57 Report of Arctic Summer Operation, 1948, U.S. Navy Task Force Eighty. *Edisto*, forced to abandon its attempt to survey the approaches to Prince Patrick, also took this new route back to Boston.
- 58 Counsellor, Embassy United States to Assistant Chief, Commonwealth Affairs Division, Department of State, 27 September 1948, in Hector Mackenzie, ed., *Documents on Canadian External Relations (DCER) Vol. 14 (1948)* (Ottawa: Minister of Supply and Services, 1994), 1539–40.
- 59 Memorandum by C.C. Eberts, 19 November 1948, LAC, RG 25, vol. 5912, f. 50197-40.

- 60 Memorandum by Defence Liaison Division for Acting Head, Defence Liaison Division, 19 November 1948, in *DCER Vol. 14 (1948)*, 1544–55.
- 61 Counsellor, Embassy United States to Assistant Chief, Commonwealth Affairs Division, 27 September 1948.
- 62 See G.L. Magann to D.M. Johnson, 27 September 1948, LAC, RG 25, vol. 3841, f. 9061-H-40.
- 63 William P. Snow, file memorandum on Joint mission for resupply of American [*sic*] weather stations, 8 October 1948, NARA, RG 59, CDF 1945–49, box 6036, f. 842.9243. Snow described Lloyd as “an unprepossessing individual with whom Hubbard has locked horns on occasion and whom the latter believes is inclined toward, if not active in, communism.” Hubbard reported that the RCN was so convinced of Lloyd’s unreliability that they refused to share the original task force plans with him, even though Lloyd had requested them several times in his official capacity. For his part, Dufek insisted that he took Fury and Hecla Strait for purely operational reasons. See also correspondence in LAC, RG 25, vol. 3841, f. 9061-G-40, and Lackenbauer and Kikkert, “Setting an Arctic Course,” for a fuller discussion.
- 64 Fife Narrative, 15 July to 19 September 1948, 24 September 1948. The documents came from Captain Peary’s USN expedition of 1905 and from the voyage of British explorer G.S. Nares in 1876.
- 65 Fife Narrative. Several American officers intimated that the Canadians acted secretly and abrasively during the affair, and relations onboard chilled for a short time.
- 66 Hugh Keenleyside tried to calm the head of the Geographical Bureau in a letter on August 30, explaining that Captain Dufek simply followed the usual custom of commanders of exploratory expeditions by removing the original documents and replacing them with exact copies. Furthermore, Dufek had included the Canadian observers in the task. Both the Americans *and* Canadians had erred. Hugh Keenleyside to Trevor Lloyd, 30 August 1948, LAC, RG 85, vol. 302, f. 1009-5-1. While at Slide Fiord, several Americans broke another Northwest Territories ordinance, though this time the Canadians responded more appropriately. During the resupply operation, two American servicemen went ashore and shot four hares in violation of the Canadian game laws for the Arctic Islands Preserve. John P. Kelsall, an observer from the Dominion Wildlife Service, informed an American officer that he had no choice but to tell Ottawa about the situation — even though he understood that there was not an attempt to undermine Canadian authority. “It was quite obvious from their actions, but extremely peculiar, that both men were in complete ignorance of the no hunting regulations,” Kelsall explained in his report. Nevertheless, the Americans took the offense seriously and publicly punished both men. Other than this case, Kelsall emphasized, “all game laws have been adhered to in the most gratifying manner and ... there can be no doubt in the mind of anyone that Canadian Game laws will be respected at all times.” John P. Kelsall to Lewis, 31 August 1948, LAC, RG 85, vol. 302, f. 1009-5, pt. 1. See also Gordon W. Smith, “Weather Stations in the Canadian North and Sovereignty,” *Journal of Military and Strategic Studies* 11/3 (2009): 1–63. In other situations, the Canadian observers made careless errors. In an incredible lapse of judgement, Captain Chouinard informed his American hosts of his desire to name points in the Arctic — rarely visited by Canadians — after Captain Dufek and the other American officers on the expedition. While Ottawa officials managed to avoid an awkward situation by claiming Canada did not name places after living people, a wiser Canadian observer would never have created such a situation. Memorandum by Defence Liaison Division, 19 November 1948, LAC, RG 25, vol. 3346, f. 9061-40, pt. 1. Chouinard did not even realize his error when the Canadian government rejected his request, and he was upset by the stipulation that land

- could only be named after a deceased person. Report of Captain A.C. Chouinard, DOT Remarks and Recommendations of Observer: Recommendation for a Future Trip to the Arctic, LAC, RG 85, vol. 828, f. 87-2-1, pt. 2.
- 67 Johnson to Lessard, 1 November 1948, LAC, RG 25, vol. 3841, f. 9061-H-40.
- 68 Minute Sheet, Sea Supply Mission of 1948, LAC, RG 25, vol. 2127, f. Weather Stations Supply Mission, 1949.
- 69 G.L. Magann to W.P. Snow, 21 October 1948, LAC, RG 25, vol. 2127, f. Weather Stations Supply Mission, 1949. The Americans were also quick to deflect public attention away from military operations in the North out of concern over how the Soviets would view such activities. D.W. Middlemiss and J.J. Sokolsky, *Canadian Defence: Decisions and Determinants* (Toronto: Harcourt Brace Jovanovich, 1989), 17; Elizabeth B. Elliot-Meisel, "Arctic Focus: The Royal Canadian Navy in Arctic Waters, 1946–1949," in *Canadian Arctic Sovereignty and Security: Historical Perspectives*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2011), 27.
- 70 Memorandum for SSEA, 23 September 1948, in *DCER Vol. 14 (1948)*, 1538; and Draft Press Release, 27 September 1948, in *DCER Vol. 14 (1948)*, 1540. Admiral George Nares was a British naval officer who avidly explored the Arctic in the 1870s, including a voyage in search of the North Pole on board the *Alert*.
- 71 Memorandum by Defence Liaison Division for Acting Head, Defence Liaison Division, in *DCER Vol. 14 (1948)*, 1543–44. *The New York Times* published a front-page story describing Hubbard's discovery of the Peary cairn in detail and also described the task force's voyage through "straits and channels believed never to have been navigated before." Murray Schumach, "U.S. Vessels Find 1906 Peary Cache," *New York Times*, 28 September 1948, 1.
- 72 To their credit, most senior Americans understood the seriousness of the situation. In his report, Dufek commented that "while CANADIAN reaction varied among the various branches of government from taking a serious viewpoint of the inadvertent breach of the agreement concerning publicity to regarding the whole affair as a tempest in a teapot, never-the-less it is vital to harmonious Canadian-United States relations in joint ventures that every effort be made to confine publicity to the agreed upon." He suggested that both governments strive to release an official story far more quickly for the next Arctic resupply mission. Report of Arctic Summer Operation, 1948, U.S. Navy Task Force Eighty.
- 73 William Snow actually sat Hubbard down and told him that the rules on publicity prohibited him from making any statement without approval from both governments. Quotes from Hubbard still appeared in the news, and a photo of him in his office, looking every bit the part of the Arctic explorer with a roll of maps on his lap, appeared in *The Times*. Canadian Ambassador to SSEA, 29 September 1948, LAC, RG 25, vol. 3841, f. 9061-H-40. In late October, Hubbard requested permission to appear on the radio program *We the People* to discuss the 1948 supply mission, but External Affairs refused to consent. Magann to Snow, 21 October 1948; Daniel Heidt, "Clenched in the JAWS of America? Canadian Sovereignty and the Joint Arctic Weather Stations, 1946–1972," in *Canadian Arctic Sovereignty and Security: Historical Perspectives, Calgary Papers in Military and Strategic Studies*, ed. P. Whitney Lackenbauer (Calgary: Centre for Military and Strategic Studies, 2011), 156.
- 74 Alan Innes-Taylor to OIC and Executive Officer, Isachsen Land Station, March 1949; Andrew Thomson to Innes-Taylor, 4 May 1949, Innes-Taylor fonds, MSS 333, f. 5.
- 75 Alan Innes-Taylor to Vilhjalmur Stefansson, 23 November 1948, Innes-Taylor fonds, MSS 432, acc. 95-32, f. 18.

- 76 Innes-Taylor to Stefansson, 23 November 1948.
- 77 Innes-Taylor to OIC and Executive Officer, Isachsen Land Station, March 1949, Innes-Taylor fonds, MSS 333, f. 5. Personnel had to build duckwalks between buildings (pallets and spare Quonset stringers with boards nailed across them) and ditches to carry off pools of water.
- 78 Innes-Taylor to Stefansson, 23 November 1948. On the ptarmigan, see Innes-Taylor diary, 31 August 1948.
- 79 Innes-Taylor diary, 10, 15, and 16 June 1948. See also the entries for 3 and 23 January 1949 on Jones's deteriorating condition.
- 80 Innes-Taylor diary, 10 January and 18 February 1949. The station crew particularly welcomed the arrival of books, clippings, letters, and even Valentine's Day cards from Margaret Oldenburg, the benefactor discussed in chapter 8. Innes-Taylor diary, 26 February 1949.
- 81 Innes-Taylor to OIC and Executive Officer, Isachsen Land Station, March 1949. See also Innes-Taylor diary, 22 June 1948, 21 August 1948, 3 January 1949.
- 82 See, for example, Innes-Taylor diary, 28 December 1948, 30 January 1949.
- 83 "The Skipper B.H.O.B.," "Arctic Male," Yukon Archives, Innes-Taylor fonds, MSS 508, acc. 2011/45, f. 2.
- 84 "Arctic Male." Although prefaced with a note presenting it "to the Personnel of Isachsen Land Weather Station in the high hope that they will make it standard procedure that all Arctic Experts arriving at the Station read this book," Innes-Taylor, it seems, simply took it with him when he left the station.
- 85 Report of Captain A.C. Chouinard, Remarks and Recommendations of Observer, Comments on Canadian Stations Visited During the Trip, 22 September 1948, LAC, RG 85, vol. 828, f. 87-2-1, pt. 2.
- 86 Bill Davidson, "On Guard at the Pole: Our Sub-Zero Heroes," *Collier's Magazine*, 21 June 1952, 71.
- 87 J. Léo Lafranchise to J.P. Johnson Jr., 10 March 1982, personal collection of J.P. Johnson Jr.
- 88 Chouinard, Remarks and Recommendations of Observer.
- 89 Minutes of a Canada-U.S. meeting to discuss plans for the Arctic Weather Station programme for 1949, 6 January 1949, LAC, RG 85, vol. 303, f. 1009-5, pt. 1B.
- 90 The type of aircraft is not recorded in the station's journal. Eureka Station Journal, 23 December 1947, Eureka.
- 91 Eureka Station Journal, 25 February 1949, Eureka.
- 92 "Report on Operations during 1949 of Joint Canadian-U.S. Arctic Weather Stations," c. December 1949, LAC, RG 85, vol. 803, f. 100-9-5, pt. 1-B.
- 93 Emphasis in original. Arctic Operations Project, USWB, "Instructions for Satellite Airstrip Improvement Program, 1950," March 1950, NARA, RG 27, entry A1-136, box 1, f. Instructions for Satellite Airstrip Improvement Program 1950, 2.
- 94 Arctic Operations Project, USWB, "Instructions for Satellite Airstrip Improvement Program, 1950," March 1950, NARA, RG 27, entry A1-136, box 1, f. Instructions for Satellite Airstrip Improvement Program 1950.
- 95 Eureka Station Journal, 25 and 31 December 1948, Eureka; DoT and USWB, "Five Year Report," 20-21. See also Innes-Taylor diary, 25 December 1948.
- 96 Eureka Station Journal, 1 and 2 January 1949, Eureka; DoT and USWB, "Five Year Report," 20-21.
- 97 Innes-Taylor to OIC and Executive Officer, Isachsen Land Station, March 1949.

- 98 In November 1948, the Chief of the US Weather Bureau, F.W. Reichelderfer, and his Canadian counterpart Andrew Thomson, the controller of the Meteorological Division at DoT, deliberated potential names. Reichelderfer suggested two names: *Alert*, the name of Captain George Nares's ship, and *Belknap*, the name of the naturalist surgeon on HMS *Alert*. The Board of Geographical Names in Ottawa adopted the name *Alert* in early 1949. Johnson, "Establishment of Alert," 24.
- 99 The "Canadianization" efforts that ensued are described and analyzed in chapter 9.
- 100 Report on Operations during 1949 of Joint Canadian-U.S. Arctic Weather Stations, c. December 1949, LAC, RG 85, vol. 803, f. 100-9-5, pt. 1-B. Although ice reconnaissance aircraft indicated that the icebreaker could have reached Eureka, time precluded any attempt to do so.
- 101 J.W. Burton to J.G. Wright, 30 September 1949, LAC, RG 85, vol. 2083, f. 7140-C.
- 102 On this episode, see Heidt, "Clenched in the JAWS of America?" as well as Lackenbauer and Kikkert, "Setting an Arctic Course."
- 103 J.W. Burton to J.G. Wright, 5 May 1950, LAC, RG 85, vol. 303, f. 1009-5, pt. 1a. In reply to Hubbard, Burton explained that "Canada had no intention of playing dog in the manger in connection with relics left behind in the Canadian Arctic, by Nationals of other countries, while engaged in early exploratory operations, and that, the ordinance referred to at the meeting had been made a law of Canada to protect such relics and to ensure that archaeological and historic sites were not destroyed and articles of value taken for private use by unqualified persons, through which action such would lose both their importance and historical value."
- 104 Burton to Wright, 5 May 1950. See also C.W. Jackson to C.J. Hubbard, 27 May 1950, LAC, RG 85, vol. 303, f. 1009-5, pt. 1a.
- 105 Dalrymple, "Canada 'Digging In' Atop the Pole."
- 106 Can US meeting minutes, 9 December 1949, 26 January 1950, LAC, RG 85, vol. 303, f. 1009-5, pt. 1B.
- 107 Johnson, "Establishment of Alert," 25; Report on Operations during 1949 of Joint Canadian-U.S. Arctic Weather Stations, c. December 1949, LAC, RG 85, vol. 803, f. 100-9-5, pt. 1-B. The air distance from Thule to the northern tip of Ellesmere is 220 miles shorter than Resolute-Alert, making the Greenland base a more convenient hub for airlift operations.
- 108 Johnson, "Establishment of Alert," 24–25.
- 109 Peter Johnson, phone interview with Daniel Heidt, 26 May 2011.
- 110 Johnson, "Establishment of Alert," 25–26. Johnson based his study on his recollections and the Department of Transport records in Toronto. We have supplemented his observations with records from NARA and LAC.
- 111 J. Léo Lafranchise to J.P. Johnson Jr., 10 March 1982, personal collection of J.P. Johnson Jr.
- 112 Lafranchise to Johnson, 10 March 1982; Johnson, "Establishment of Alert," 32.
- 113 Lee to Commissioner, "General Conditions – Canadian Arctic, 1950," 11 September 1950, LAC, RG 18, vol. 3671, f. G567-105.
- 114 Johnson, interview with Heidt, 26 May 2011. By contrast, Johnson noted in the interview that the American "ExO was more easygoing, and certainly didn't want trouble, and generally let his subordinates make their own decisions."
- 115 Johnson, "Establishment of Alert," 26.
- 116 Johnson, "Establishment of Alert," 27.

- 117 Johnson, "Establishment of Alert," 28. They also sought the renewal of radio operator Stanley Whiteman's radio licence. "The latter provided an example of Hubbard's ability to cut red tape," Johnson observed, "when he wired two days later that it had been done."
- 118 Johnson, interview with Heidt, 26 May 2011. "Food was taken more or less continuously," Johnson recalled in an earlier article. "There was a large supply of frozen meat, 'c' and '5-in-1' and other military rations, and during the first couple of weeks many meals consisted of steak, canned fruit, canned fruit juice and coffee, each man preparing his own. A welcome treat was a chocolate cake sent up by a military cook at Thule when one of the Alert crew had a birthday." Johnson, "Establishment of Alert," 27.
- 119 Johnson, "Establishment of Alert," 28–29.
- 120 Johnson, "Establishment of Alert," 29–33.
- 121 Johnson, "Establishment of Alert," 29.
- 122 Johnson, "Establishment of Alert," 30–31.
- 123 Johnson, "Establishment of Alert," 31.
- 124 In addition to Hubbard, eight Canadians were killed: ice observer Dr. D.W. Kirk; Wing Commander D.T. French, DFC; F/L L.M. MacLean; F/L J.F.L. Swinton; F/O T.D. Martin; F/O J.F.L. Dube; F/O J.E. McCutcheon; and LAC R.L. Sprance.
- 125 Johnson, "Establishment of Alert," 32.
- 126 S.T. Wood to USSEA, 20 September 1950, LAC, RG 25, vol. 3841, f. 9061-G-1-40.
- 127 Johnson, "Establishment of Alert," 32.
- 128 Johnson, "Establishment of Alert," 33.
- 129 Dalrymple, "Canada 'Digging In' Atop the Pole."
- 130 U.S., Office of the Secretary of Defense, Memorandum for Secretary Forrestal, 13 August 1948, cited in David Bercuson, "Continental Defense and Arctic Sovereignty, 1945–50: Solving the Canadian Dilemma," in *The Cold War and Defense*, ed. Keith Neilson and Ronald G. Haycock (New York: Praeger, 1990), 165.
- 131 Adam Lajeunesse, "The True North As Long As It's Free: The Canadian Policy Deficit, 1945–1985" (unpublished master's thesis, University of Calgary, 2007); Grant, *Sovereignty or Security?*
- 132 Political III for file, re: Arctic Weather Stations, 30 April 1947, LAC, RG 25, vol. 3841, f. 9061-A-40, pt. 2.
- 133 In 1948, the Canadians took over two northeastern stations, at Mecatina, Quebec and Clyde River, Baffin Island. By 1949, the Americans still operated the stations at Padloping, Cape Harrison, Indian House Lake, Mingan, Frobisher, and Chimo, although Canada promised to assume control of these sites by 1950. Memorandum to Advisory Committee on Northern Development, 2 March 1949, Re-Canadianization of Northern Canada, in Hector Mackenzie, ed., *DCER Vol. 15 (1949)* (Ottawa: Minister of Supply and Services, 1995), 1471–75. Unfortunately, personnel could not be found for the Padloping station until the RCN took it over in 1953. Extract from Minutes of Joint Planning Committee, 6 April 1954, LAC, RG 24, vol. 8148, f. NSS 1616-9, pt. 8.
- 134 Reichelderfer to Chief, USAF, 17 June 1949, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1947–1952.
- 135 Matthias Heymann, "In Search of Control: Arctic Weather Stations in the Early Cold War," in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald E. Doel, Kristine C. Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 76.

- 136 Harriet Bissell Hubbard to Mr. Davidson, 1952, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Correspondence of Mrs. Charles Hubbard.
- 137 Willie Knutsen, "Milestones in my Arctic Journeys," *National Geographic Magazine*, October 1949, quoted in Canadian Ambassador in US to SSEA, 4 July 1949, LAC, RG 25, vol. 3842, f. 4061-H-40, pt. 2.
- 138 Johnson, interview with Heidt, 26 May 2011.
- 139 Heymann, "In Search of Control," 92. As Heymann also suggests, "that developments proceeded smoothly *despite* Hubbard's clumsy handling of sovereignty illuminates the willingness of leaders in all three governments to compromise, to avoid public controversies, and to avoid the appearance of military activity."

NOTES TO CHAPTER 5

- 1 US Department of Commerce and US Weather Bureau, "Assignment: Arctic" (Washington: USWB, 1961), 2.
- 2 R. Magruder Dobie, "Why Husbands Go North," *Los Angeles Times*, 9 May 1948.
- 3 Dobie, "Why Husbands Go North."
- 4 Davis, "Information Concerning U.S. Weather Bureau Arctic Service," 5 December 1960, National Archives and Records Administration (NARA), RG 27, entry 6, box 11, f. Training, Orientation, Development; see also the nearly identical description in Reichelderfer, "Weather Bureau Arctic Project," 28 May 1946, Library and Archives Canada (LAC), RG 25, vol. 3347, f. 9061-A-40.
- 5 See, for example, Vanessa Heggie, "Higher and Colder: The Success and Failure of Boundaries in High Altitude and Antarctic Research Stations," *Social Studies of Science* 46/6 (2016): 812, 820; Henrika Kuklick and Robert E. Kohler, "Introduction," *Osiris* 11 (1996): 4; and David N. Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2010), 180.
- 6 For pre-war studies on the importance of adventure and embodied knowledge in Arctic field science culture, see: Tina Adcock, "Toward an Early Twentieth-Century Canadian Culture of Arctic Exploration," in *North by Degree: New Perspectives on Arctic Exploration*, ed. Susan A. Kaplan and Robert McCracken Peck (Philadelphia: American Philosophical Society, 2013), 110–41; Suzanne Zeller and Christopher Jacob Ries, "Wild Men In and Out of Science: Finding a Place in the Disciplinary Borderlands of Arctic Canada and Greenland," *Journal of Historical Geography* 44 (2014): 31–43; and Michael Smith, *Sir James Wordie, Polar Crusader: Exploring the Arctic and Antarctic* (Edinburgh: Birlinn, 2012).
- 7 Simon Naylor, Katrina Dean, and Martin Siebert, "The IGY and the Ice Sheet: Surveying Antarctica," *Journal of Historical Geography* 34/4 (2008): 574–95; Adrian John Howkins, "Frozen Empires: A History of the Antarctic Sovereignty Dispute Between Britain, Argentina, and Chile, 1939–1959" (unpublished PhD diss., University of Texas at Austin, 2008); Klaus J. Dodds, "Post-Colonial Antarctica: An Emerging Engagement," *Polar Record* 42/1 (2006): 59–70; Dian Olson Belanger, "The International Geophysical Year in Antarctica: Uncommon Collaborations, Unprecedented Results," *Journal of Government Information* 30/4 (2004): 482–89.
- 8 Fred Roots as quoted in Peder Roberts, *The European Antarctic: Science and Strategy in Scandinavia and the British Empire* (New York: Springer, 2011), 132.
- 9 Theodore Binnema, *Common and Contested Ground: A Human and Environmental History of the Northwestern Plains* (Toronto: University of Toronto Press, 2004); Ken S. Coates and William R. Morrison, *Land of the Midnight Sun: A History of the Yukon*

- (Montreal & Kingston: McGill-Queen's University Press, 2017), chapters 2–4; Morris Zaslow, *The Opening of the Canadian North: 1870–1914* (Toronto: McClelland & Stewart 1971).
- 10 Davis, "Information Concerning U.S. Weather Bureau Arctic Service," 5 December 1960, NARA, RG 27, entry 6, box 11, f. Training, Orientation, Development.
 - 11 Don Shanks, phone interview with Daniel Heidt, 10 March 2011.
 - 12 Don Ware, phone interview with Daniel Heidt, 24 October 2011.
 - 13 William R. Morrison and Kenneth A. Coates, *Working the North: Labor and the Northwest Defense Projects, 1942–1946* (Fairbanks: University of Alaska Press, 1994), 245. This list of motivations for volunteering for polar duty are typical. Esther D. Rothblum, "Psychological Factors in the Antarctic," *Journal of Psychology: Interdisciplinary and Applied* 124/3 (1990): 256.
 - 14 Andrew Thomson, "Vacancies at Northern Isolated Stations," 14 February 1950, DoT Archives Toronto, Personnel Circulars; R.A.J. Phillips, "Arctic Operations," 9 May 1952, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3; Kunitaro John Ito, "General Information on Radiosonde Station, Sachs Harbour, Banks Island, N.W.T.," 12 April 1961, LAC, RG 93, acc. 1981-82/084, box 16, f. 6754-1749, pt. 6.
 - 15 American personnel did not receive overtime pay if they worked more than fifty-four hours a week because the USWB considered its bonuses "adequate compensation." "Standard Conditions of Employment for United States Citizens in Foreign Arctic Weather Stations," c. 1947, University of Manitoba Libraries, Andrew Taylor fonds, MSS 108, box 16, f. 15. For the continuation of this pay structure consult: Davis, "Information Concerning US Weather Bureau Arctic Service," 5 December 1960, NARA, RG 27, entry 6, box 11, f. Training, Orientation, Development.
 - 16 From the limited archival evidence available, it appears that Canadian personnel (except for met techs) initially paid some room and board. The Canadian government rescinded the met tech exemption during the early 1950s, only to reinstate it later. In 1960, the Canadian Treasury Board resumed charging each met tech \$70/month for room and board. Hagglund to Thomson, 3 February 1953, NARA, RG 27, entry 7, box 2, f. Resolute Reports; Coulcher, "Temporary Duty at Resolute, N.W.T.," 25 March 1962, NARA, RG 27, entry 6, box 12, f. Arctic Program 1 - Resolute (Narrative Report).
 - 17 Bob Pearson, phone interview with Daniel Heidt, 28 December 2011.
 - 18 Reichelderfer, "Weather Bureau Arctic Project," 28 May 1946, LAC, RG 25 G-2, vol. 3347, f. 9061-A-40.
 - 19 "Apply for Arctic Service," c. May 1946, LAC, RG 25 G-2, vol. 3347, f. 9061-A-40.
 - 20 Reichelderfer, "Weather Bureau Arctic Project," 28 May 1946.
 - 21 A 1950 interdepartmental communication by Andrew Thomson, for example, promised that "personnel who have satisfactorily completed a tour of duty at an isolated station will be eligible for assignment to available preferred stations." Another recruitment pamphlet from 1961 borrowed heavily from the 1946 publications. US Department of Commerce and USWB, "Assignment: Arctic."
 - 22 Howard Wessbecher interviewed by Brian Shoemaker, 20 April 2000, Polar Oral History Project, Ohio State University.
 - 23 Andrew Thomson, "Vacancies at Northern Isolated Stations," 14 February 1950, DoT Archives Toronto, f. Intra-Dept Correspondence — Personnel Circulars.
 - 24 "Meteorological Technician," DoT Archives Toronto, f. Recruiting Literature.
 - 25 Bruce Weaver, phone interview with Daniel Heidt, 9 January 2012.
 - 26 Lowell Demond, phone interview with Daniel Heidt, 26 October 2011.

- 27 "Joint Arctic Weather Stations: Five Year Report, 1946–1951" (Ottawa and Washington: Meteorological Division - Department of Transport and the US Weather Bureau, 1951) (hereafter DoT and USWB, "Five Year Report"), 37.
- 28 At the satellite stations, that Canadian was almost always a met tech. By the late 1950s, Resolute's role as the program's main transportation hub led DoT to generally assign meteorologists to this position. After a few years of following the same arrangement and flying in two meteorologists to work in shifts preparing meteorological and ice forecasts for airlift and sealift operations, one meteorologist was permanently assigned to the station as OIC sometime during the late 1950s. A second meteorologist joined the OIC to help with the shift work during the resupply period. "Notes on Agenda for eighth annual Joint Arctic Weather Station Planning Conference to be held in Ottawa on January 6, 1955," NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1947–1952.
- 29 Thomson, "Vacancies at Northern Isolated Stations," 14 February 1950, Environment Canada Archives Toronto, Personnel Circulars; R.A.J. Phillips, "Arctic Operations," 9 May 1952, RG 25, vol. 3351, f. 9061-H-40, pt. 3; LAC, RG 22, vol. 732, f. SE-4-1-83, notes that OIC pay was \$4,500.
- 30 Bruce Weaver of St. Catharines, Ontario recalls that in 1965, at age twenty-three, he was "one of the older ones" in a class filled with students aged eighteen to twenty. Weaver, interview with Heidt, 9 January 2012.
- 31 Thomson to Director General, Air Services, DoT, "Deputy Minister's Memorandum of August 23, 1956," 23 November 1956, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 12.
- 32 Rae, "Inspection Trip to Joint Arctic Weather Stations, April 1952," LAC, RG 93, acc. 80-81/306, box 24, f. 6754-19, pt. 1.
- 33 Monte Poindexter, phone interview with Daniel Heidt, 3 March 2011.
- 34 Weaver, interview with Heidt, 9 January 2012.
- 35 DoT and USWB, "Five Year Report," 37.
- 36 See suggestion that the ExO visit each station in Roberts, "JAWS Trip Report, May-June 1964," 9 July 1964, NARA, RG 27, entry 6, box 24, f. Arctic Program - Joint Arctic Stations Program.
- 37 William Griffiths, February 1953, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 38 Bill Davidson, "Arctic Outpost - Alert at 'Alert,'" *Collier's Magazine*, 28 June 1952, 63. Although the USWB technically paid no additional wages for assuming these extra responsibilities, the ExOs' seniority within the USWB ensured that they earned a higher salary than their American peers. In the early 1960s, for example, the average ExO earned \$1,100 to \$1,400 more than USWB electronics technicians or met techs. US Department of Commerce and USWB, "Assignment: Arctic," 3–4.
- 39 Wessbecher interview.
- 40 Wessbecher interview.
- 41 John Gilbert, phone interview with Daniel Heidt, 29 March 2011; John Gilbert to Daniel Heidt, 5 July 2012, email; and DoT and USWB, "Five Year Report," 140–45.
- 42 "Memoranda by the Meteorological Division on Agenda of Meeting January 4, 1949," LAC, RG 93, acc. 1980-81 / 306, box 26, f. 11-10-11, pt. 4; Thomson to Reichelderfer, 6 May 1953, RG 12, vol. 2805, f. 6754-12, pt. 4.
- 43 "Minutes of Meeting of MSC and USWB Representatives at Toronto," 4 December 1952, LAC, RG 12, vol. 2798, f. 6754-19, pt. 3.
- 44 John Gilbert, "Way Up North," *The Canadian Amateur*, May 1979, 31.

- 45 John Gilbert, "The Joint Arctic Weather Stations: Completing the First Decade, 1952–59" (unpublished, 2004), Gilbert private collection, 45.
- 46 US Department of Commerce and USWB, "Assignment: Arctic," 14–15.
- 47 Rae, "Inspection Trip to Joint Arctic Weather Stations, April 1952," LAC, RG 93, acc. 80-81/306, box 24, f. 6754-19, pt. 1.
- 48 R.A.J. Phillips, "Arctic Operations," 9 May 1952, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 49 Lee, "General Conditions – Canadian Arctic, 1950," 11 September 1950, LAC, RG 18, vol. 3671, f. G567-105.
- 50 Paul Reid, phone interview with Daniel Heidt, 12 December 2014.
- 51 "Minutes of Meeting of MSC and USWB Representatives at Toronto," 4 December 1952, LAC, RG 12, vol. 2798, f. 6754-19, pt. 3.
- 52 DoT and USWB, "Five Year Report," 38.
- 53 US Department of Commerce and USWB, "Assignment: Arctic," 16.
- 54 For the early years, see for example Eureka Station Diaries, 15–16 April 1948, 16–18 October 1952, October 1960. For the 1960s, we are grateful to Don Shanks for sharing his research on JAWS personnel from this period.
- 55 Carlin to Chief, Training Section, PMD, "Personnel Planning for the Era of Increased Automation," 4 November 1960, NARA, RG 27, entry 126, box 3, f. Management Organization Administration. The authors are indebted to John Gilbert and Don Shanks for compiling roll calls for each of the stations, which allowed us to estimate the number of mechanics who worked at the stations during different periods.
- 56 To qualify for a First Class certificate, radio operators with a Second Class Certificate had to have operational experience on a larger ship or Coast Guard station as a radio operator. John Gilbert to Heidt, 14 and 30 August 2012 and 22 May 2013, emails.
- 57 The reason for the Marine training is that some operators would serve at Transport Canada Marine Stations. Bill Stadnyk to Heidt, 17 July 2021, email.
- 58 Gilbert, interview with Heidt, 29 March 2011.
- 59 DoT and USWB, "Five Year Report," 38; Pearson, interview with Heidt, 28 December 2011.
- 60 Students were paid while attending both courses. "Meteorological Technician," DoT Archives Toronto; Stadnyk to Heidt, 30 August 2012, email.
- 61 Dave Tidbury, phone interview with Daniel Heidt, 12 October 2011; Demond, interview with Heidt, 26 October 2011; P.H. Greenwood to Heidt, 12 August 2012, email.
- 62 Louis Schwalm to Daniel Heidt, 17 February 2018, email.
- 63 See for example: US Department of Commerce, Weather Bureau, "Training Paper No. 6 (3rd Edition), Training Guide in Pilot Balloon Observations" (Washington: US Department of Commerce, 1959), NARA, RG 27, entry Technical Publications, box 1, f. Training Guide in Pilot Balloon Observations; US Department of Commerce, Weather Bureau, "Training Paper No. 8 (5th Edition), Training Guide in Radiosonde Observations" (Washington: US Department of Commerce, 1960), NARA, RG 27, entry Technical Publications, box 1, f. Training Guide in Radiosonde Observations; US Department of Commerce, Weather Bureau, "Training Paper No. 9 (3rd revision), Training Guide in Surface Aviation Observations" (Washington: US Department of Commerce, 1964), NARA, RG 27, entry Technical Publications, box 1, f. Training Guide in Surface Aviation Observations.
- 64 Ken Moulton to Daniel Heidt, 16 and 18 August 2012, emails.
- 65 US Department of Commerce and USWB, "Assignment: Arctic," 2.

- 66 Wood to Decker, 13 January 1961, NARA, RG 27, entry 6, box 11, f. Training, Orientation, Development.
- 67 Adams, "Training at Sterling," 21 October 1964, NARA, RG 370, entry 4, Office Files of the Polar Assistant, box 1, f. 1 July-31 Dec. 1964; "Polar Operations Project Training Center, Sterling, Virginia," 17 March 1961, and Adams to Wood, "Proposed Training Schedule for Arctic Replacements Spring 1962," 29 November 1961, NARA, RG 27, entry 6, box 11, f. Training, Orientation, Development.
- 68 Shanks, interview with Heidt, 10 March 2011.
- 69 Bob Plaseski, phone interview with Daniel Heidt, 2 November 2011; Weaver, interview with Heidt, 9 January 2012.
- 70 Shanks, interview with Heidt, 10 March 2011.
- 71 William Nemeth, phone interview with Heidt, 12 May 2011.
- 72 Hagglund to Thomson, "Inspection of Joint Arctic Weather Stations during Spring Airlift," 27 April 1955, LAC, RG 93, box 2, f. 6754-19, pt. 18.
- 73 Goodbrand to Wheeler, "Briefing - Operation Mould Bay, N.W.T.," 9 October 1963, LAC, RG 12, box 32, f. 6754-1292, pt. 14.
- 74 John Melvin, phone interview with Daniel Heidt, 23 November 2011.
- 75 Shanks, interview with Heidt, 10 March 2011.
- 76 Thomson, "Deputy Minister's Memorandum of August 23 1956."
- 77 Thomson, "Deputy Minister's Memorandum of August 23 1956."
- 78 Reichelderfer to Goodale, 13 July 1946, NARA, RG 27, acc. 71-A-5971, box 8, f. January 2 1946 to July 31 1946.
- 79 Ernest Wood, "General," 10 April 1963, NARA, RG 27, entry 6, box 21, f. Personnel 1-2-Arctic.
- 80 Peter Inglis, "Nearer to Russia Than Any City," *Ottawa Citizen*, 28 May 1952.
- 81 Michael Barkway, "And We Learn More about the Arctic," *Financial Post*, 31 July 1954.
- 82 R.A.J. Phillips, "Arctic Operations," 9 May 1952, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 83 Phillips, "Arctic Operations," 9 May 1952.
- 84 Phillips, "Arctic Operations," 9 May 1952; Rae, "Inspection Trip to Joint Arctic Weather Stations, April 1952," LAC, RG 93, acc. 80-81/306, box 24, f. 6754-19, pt. 1.
- 85 Thomson, "Deputy Minister's Memorandum of August 23 1956."
- 86 Lawrence A. Palinkas and Peter Suedfeld, "Psychological Effects of Polar Expeditions," *Lancet* 371/9607 (12 January 2008): 160; Palinkas, *Sociocultural Influences on Psychosocial Adjustment in Antarctica: Report No. 85-49* (San Diego: US Navy Medical Neuropsychiatric Research Unit, 1985), 8-10; and Jack Stuster, *Bold Endeavors: Lessons from Polar and Space Exploration* (Annapolis: Naval Institute Press, 1996), 100-01.
- 87 Goree to Chief, Arctic Operations Project, "Narrative, Personnel," 9 September 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 88 E.K. Eric Gunderson and Paul D. Nelson, "Adaptation of Small Groups to Extreme Environments," *Aerospace Medicine* (1963): 1113; A.J.W. Taylor, *Antarctic Psychology* (Wellington: Science Information Publishing Centre, 1987), 17; Palinkas and Suedfeld, "Psychological Effects," 160.
- 89 See, for example, calls for further research and commentary by Sir Hubert Wilkins in T.J. Boag, "The White Man in the Arctic: A Preliminary Study of Problems of Adjustment," *American Journal of Psychiatry* 109/6 (1952): 444-49.

- 90 R.E. Strange and W.J. Klein, "Emotional and Social Adjustment of Recent US Winter-Over Parties in Isolated Antarctic Stations," in *Polar Human Biology: The Proceedings of the SCAR / IUPS / IUBS Symposium on Human Biology and Medicine in the Antarctic*, ed. O.G. Edholm and E.K.E. Gunderson (London: Heinemann Medical, 1973), 411; and H.R. Guly, "Psychology During the Expeditions of the Heroic Age of Antarctic Exploration," *History of Psychiatry* 23/2 (2012): 194–205.
- 91 Taylor, *Antarctic Psychology*, 11. Sir Ernest Shackleton, who led various British maritime and continental Antarctic expeditions prior to the First World War, held brief interviews with expedition candidates and posed eccentric questions like "why are you wearing glasses" or "can you sing"? According to cultural anthropologist Jack Stuster, "a humorous, witty, or thoughtful response caused Shackleton to favour an applicant; defensiveness usually resulted in immediate disqualification." By such means, Shackleton determined with remarkable success whether the interviewee could get along with others in stressful situations. Stuster, *Bold Endeavors*, 251.
- 92 Mrs. Harriet Bissell Hubbard to Mr. Davidson, 1952, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Correspondence of Mrs. Charles Hubbard.
- 93 John Trinko, "Memoirs" (unpublished, 1989), Trinko family collection.
- 94 DoT and USWB, "Five Year Report," 39.
- 95 Gilbert, interview with Heidt, 29 March 2011. After the Second World War, the Hudson's Bay Company also relied heavily on this kind of interview that included direct questions designed to prompt unrehearsed answers from individuals who applied to work at their remote trading stations. J.S. Willis, "Mental Health in the North," *Medical Services Journal, Canada*, 16 (1960): 706.
- 96 Stuster, *Bold Endeavors*, 8; E.K. Eric Gunderson, "Psychological Studies in Antarctica: A Review," in *Polar Human Biology*, ed. Edholm and Gunderson, 353–54; Joanna Wood, Sylvia J. Hysong, Desmond J. Lugg, and Deborah L. Harm, "Is it Really So Bad?: A Comparison of Positive and Negative Experiences in Antarctic Winter Stations," *Environment and Behavior* 32/1 (2000): 85; Palinkas and Suedfeld, "Psychological Effects," 154.
- 97 Dian Olson Belanger, *Deep Freeze: The United States, the International Geophysical Year, and the Origins of Antarctica's Age of Science* (Boulder: University Press of Colorado, 2006), 342.
- 98 E.K. Eric Gunderson, "Introduction," in *Human Adaptability to Antarctic Conditions*, ed. Gunderson (Worcester: Heffernan Press, 1974), 2.
- 99 Doug Munson, phone interview with Daniel Heidt, 20 August 2012.
- 100 Willis, "Mental Health in the North," 705–06.
- 101 Willis, "Mental Health in the North," 704–05.
- 102 During the early 1960s, for example, the Advisory Committee on Northern Development's Scientific Research Sub-Committee noted this work. The Defence Research Board also received a memorandum by Willis recommending that research papers from this field "be made available to Civil Service Health [sic] psychiatrists and to senior personnel officers of departments concerned with recruiting to the Canadian North." DoT, like the USWB, does not appear to have followed the Antarctic example in the years immediately following Willis's lobbying by sponsoring systematic research or by adopting more rigorous screening and training regimens. John S. Willis, "Report of the Canadian Delegation to the World Health Organization Conference of Medicine and Public Health in the Arctic and Antarctic, Geneva, 28 August to 1 September 1962," c. November 1962, and V.F. Valentine, "Memorandum for the Scientific Research

- Subcommittee: Antarctic Treaty," 7 December 1961, LAC, RG 24, F-1, vol. 29890, f. DRBC-170-80-583, pt. 1.
- 103 Willis, "Mental Health in the North," 705.
- 104 Gilbert, "Joint Arctic Weather Stations," 9–10.
- 105 Gilbert, interview with Heidt, 29 March 2011.
- 106 Anonymous, "North of Seventy-Four," *External Affairs*, 213. Several drafts of the article by R.A.J. Phillips can be found in LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 107 Demond, interview with Heidt, 26 October 2011.
- 108 John Gilbert, "On Top of the World," *The Red Dragon*, Spring 1957, 40, Gilbert private collection.

NOTES TO CHAPTER 6

- 1 Patrick McTaggart-Cowan, "Letter of commendation," 3 December 1963, National Archives and Records Administration (NARA), RG 27, entry 6, box 21, f. Personnel 1-2-Arctic.
- 2 *Hearings Before the Committee on Agriculture, House of Representatives, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765)*, 22 January 1946, NARA, RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous.
- 3 Alan Innes-Taylor to Andrew Thomson, 11 May 1948, Library and Archives Canada (LAC), RG 12, vol. 2797, f. 6754-1291, pt. 1. See also Innes-Taylor, "Isachsen Land, 78° 47' N lat 103° 50' W long," *Arctic* 1 (1948): 124–25.
- 4 Innes-Taylor departed Isachsen for the US on 1 April 1949 and did not continue with the US Weather Bureau. The US Air Force recalled him in 1950 to teach survival techniques to air crews heading to the Korean War, and he became lead researcher at the Environmental Protection Section of the USAF Arctic Aeromedical Lab in Fairbanks in 1953. After 1956, he served as a consultant to international airline companies using the transpolar air route and developed special survival gear. A continuous proponent of an integrated science policy, he eventually moved back to Dawson and Whitehorse, running Yukon River float trips for the public to teach conservation and ecology. Despite his strident anti-Canadianism in the early postwar period, Innes-Taylor received the Order of Canada in 1977 and the Yukon Commissioner's Medal in 1982. Philip S. Marshall, "Obituary: Charles Alan Kenneth Innes-Taylor, 1900–1983," *Arctic* 37/1 (1984): 86.
- 5 Lester B. Pearson, "Canada's Northern Horizon," *Foreign Affairs* 31/4 (1953): 581, 586.
- 6 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* 39/8 (2007): 1801; Stephen Bocking, "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960," *Technology and Culture* 50/2 (2009): 271; William C. Wonders, "The Joint Arctic Weather Stations (JAWS) in the Queen Elizabeth Islands," in *Essays on Meteorology and Climatology: In Honour of Richmond W. Longley*, ed. K.D. Hage, R.W. Longley, and E.R. Reinelt (Edmonton: Department of Geography, University of Alberta Press, 1978), 407–09.
- 7 Tina Loo and Meg Stanley, "An Environmental History of Progress: Damming the Peace and Columbia Rivers," *Canadian Historical Review* 92/3 (2011): 410–11.
- 8 Sharon Traweek, *Beamtimes and Lifetimes: The World of High Energy Physicists* (Cambridge: Harvard University Press, 2009). For "domus," see P. Wenzel Geissler and

- Ann H. Kelly, "A Home for Science: The Life and Times of Tropical and Polar Field Stations," *Social Studies of Science* 46/6 (2016): 800.
- 9 See, for example, W. Patrick McCray, "Amateur Scientists, the International Geophysical Year, and the Ambitions of Fred Whipple," *Isis* 97/4 (2006): 634–58; and Thomas R. Williams, "Getting Organized: A History of Amateur Astronomy in the United States" (unpublished PhD diss., Rice University, 2000).
 - 10 See, for example, Matthew Farish and P. Whitney Lackenbauer, "Western Electric Turns North: Technicians and the Transformation of the Cold War Arctic," in *Ice Blink: Navigating Northern Environmental History*, ed. Stephen Bocking and Brad Martin (Calgary: University of Calgary Press, 2017), 261–93; Dian Olson Belanger, *Deep Freeze: The United States, the International Geophysical Year, and the Origins of Antarctica's Age of Science* (Boulder: University Press of Colorado, 2006); and Gordon Elliott Fogg, *A History of Antarctic Science* (Cambridge: Cambridge University Press, 1992).
 - 11 See, for example, Powell, "Rigours of an Arctic Experiment," and Bocking, "A Disciplined Geography."
 - 12 On these concepts, see George W. Wenzel, "From TEK to IQ: Inuit Qaujimagatuqangit and Inuit Cultural Ecology," *Arctic Anthropology* 41/2 (2004): 238–50.
 - 13 Vanessa Heggie, "Higher and Colder: The Success and Failure of Boundaries in High Altitude and Antarctic Research Stations," *Social Studies of Science* 46/6 (2016): 811.
 - 14 Geissler and Kelly, "Home for Science," 802.
 - 15 Ted Binnema, *"Enlightened Zeal": The Hudson's Bay Company and Scientific Networks, 1670–1870* (Toronto: University of Toronto Press, 2014), 9–10, 19, 21–27.
 - 16 "Joint Arctic Weather Stations: Five Year Report, 1946–1951" (Ottawa and Washington: Meteorological Division - Department of Transport and the US Weather Bureau, 1951) (hereafter DoT and USWB, "Five Year Report"), 146.
 - 17 "Northern Weather Station Prayer," n.d., NARA, RG 27, entry 6, box 1, f. Arctic 1 (Alert).
 - 18 Surface observations were taken by radio operators and met techs at 0215, 0515, 0815, 1115, 1415, 1715, 2015, and 2315. DoT and USWB, "Five Year Report," 42. For a detailed description of hourly reports, consult Canada, DoT, Meteorological Division, *Manual of Standard Procedures and Practices for Weather Observing and Reporting (MANOBS)*, 2nd ed. (Toronto: Government of Canada, 1949).
 - 19 Canada, *MANOBS* (1949), 7–9; and Brian Brown to Daniel Heidt, 21 May 2013, email.
 - 20 Canada, *MANOBS* (1949), 9–13; W.E. Knowles Middleton and Athelstan F. Spilhaus, *Meteorological Instruments*, 3rd ed. (Toronto: University of Toronto Press, 1953), 167; Paul R. Fundenburg to Chief (POP, USWB), "JAWS, Mould Bay, Canada," 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Mould Bay); and Vlad Jelinek, "Observational Programme," 24 May 1959, LAC Winnipeg, RG 93, box 3, f. Isachsen Station Records – 1952–1960.
 - 21 Brown to Heidt, 21 May 2013; and DoT and USWB, "Five Year Report," 43.
 - 22 DoT and USWB, "Five Year Report," 43; Canada, *MANOBS* (1949), 15–16.
 - 23 Thomas A. Blair and Robert C. Fite, *Weather Elements: A Text in Elementary Meteorology*, 3rd ed. (Englewood Cliffs: Prentice-Hall, 1959), 79; Canada, *MANOBS* (1949), 36–41; DoT and USWB, "Five Year Report," 42–43.
 - 24 DoT and USWB, "Five Year Report," 44.
 - 25 DoT and USWB, "Five Year Report," 42–43. In the mid-1950s the stations received motor psychrometers that were designed to operate in the extreme cold. John Gilbert,

- “The Joint Arctic Weather Stations: Completing the First Decade, 1952–1959,” (unpublished, 2004), 26–27, John Gilbert private collection.
- 26 DoT and USWB, “Five Year Report,” 42–43.
- 27 DoT and USWB, “Five Year Report,” 43–44.
- 28 Canada, *MANOBS* (1949), 43–44; and Canada, DoT, Meteorological Branch, *MANOBS*, 5th ed. (1961), Amendment 2 - 3.6.4 to 3.7.2.
- 29 Blair and Fite, *Weather Elements*, 80; and Canada, *MANOBS* (1949), 42.
- 30 DoT and USWB, “Five Year Report,” 47.
- 31 Middleton and Spilhaus, *Meteorological Instruments*, 190–94, 243.
- 32 DoT and USWB, “Five Year Report,” 46. On 1 June 1957, international requirements changed, and the radiosonde flights were instead launched forty-five minutes before the new standardized release times of 0000 and 1200 GMT. Robert Kistler et al., “The NCEP–NCAR 50-Year Reanalysis: Monthly Means CD-ROM and Documentation,” *Bulletin of the American Meteorological Society* 82/2 (February 2001): 248–49.
- 33 DoT and USWB, “Five Year Report,” 47.
- 34 During the interim, observers had to track the radiosonde the same way they tracked pibals. “Supporting Documentation for the 9th Joint Arctic Weather Stations Planning Conference – Ottawa,” 9 February 1956, LAC, RG 93, box 14, f. 11-10-11, pt. 12.
- 35 Louis Schwalm to Heidt, 18 February 2018, email.
- 36 Monte Poindexter quoted in Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 61; John Trinko, “Memoirs” (unpublished, 1989), Trinko family collection, 32; DoT and USWB, “Five Year Report,” 22.
- 37 Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 30.
- 38 DoT and USWB, “Five Year Report,” 46; Schwalm to Heidt, 18 February 2018.
- 39 Bill Davidson, “Arctic Outpost – Alert at ‘Alert,’” *Collier’s Magazine*, 28 June 1952, 63.
- 40 Middleton and Spilhaus, *Meteorological Instruments*, 169; M.G. Haggglund, “Inspection of Joint Arctic Weather Stations during Spring Airlift, 1955,” 27 April 1955, LAC, RG 93, box 2, f. 6754-19, pt. 18; George Rabbitt, “Report on Fall Airlift of Alert and Eureka via Thule,” 4 November 1953, LAC, RG 93, box 2, f. 6754-19, pt. 5; Schwalm to Heidt, 18 February 2018.
- 41 George Fisher to Heidt, 28 August 2012, email.
- 42 Rockney to Thomson, 30 October 1957, LAC, RG 93, acc. 80-81/306, box 25, f. 6754-19, pt. 11.
- 43 “Monthly Report of the Meteorological Branch,” May 1965, Environment Canada Archives, Toronto; and Middleton and Spilhaus, *Meteorological Instruments*, 169–70.
- 44 George Fisher to Daniel Heidt, 26 and 27 May 2013, email; Thickstun, “Procedures in Rawinsonde Program,” 15 March 1946, NARA, RG 27, entry Office Files of Reichelderfer, box 3, f. MAL Jan 1946 thru July 1946.
- 45 Lowell Demond to Daniel Heidt, 2 January 2013, email.
- 46 Middleton and Spilhaus, *Meteorological Instruments*, 191.
- 47 Walter Gray, “Arctic Weatherman Healthy but Lonely,” *Globe and Mail*, 5 September 1957.
- 48 P.H. Greenwood to Daniel Heidt, 6 July 2012, email.
- 49 Rockney to Thomson, 30 October 1957, LAC, RG 93, acc. 80-81/306, box 25, f. 6754-19, pt. 11.
- 50 Don Shanks to Daniel Heidt, 27 May 2013, email.

- 51 George Foster to Daniel Heidt, 19 February 2012, email. Foster recounted how “someone once said that there were 7000 possible errors in evaluation of a Radiosonde flight. I never checked this out but it seemed reasonable. This whole process has been replaced by a computer in the last 20 years so the only requirement now is to be able to prepare the instrument and fill and release a balloon.” See also Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 25–26.
- 52 Shanks to Heidt, 26 and 27 May 2013; Gregory and Harper to Director (CMD) and Chief (USWB), “Semiannual Activities Report,” 1 January 1962, NARA, RG 27, entry 6, box 12, f. Arctic Program - Isachsen (Narrative Report); Middleton and Spilhaus, *Meteorological Instruments*, 193–94; and Gjernes and Greco, “Mould Bay’s Semi-Annual Activities Report,” 1 April 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Mould Bay).
- 53 DoT and USWB, “Five Year Report,” 143; John Gilbert, “Way Up North,” *The Canadian Amateur*, May 1979, 30; Bob Plaseski to Daniel Heidt, 27 May 2013, email; David Tidbury, phone interview with Daniel Heidt, 12 October 2011.
- 54 Walter Gray, “Ends Up in Tiny Type, But Weather is Work for Many Observers,” *Globe and Mail*, 4 September 1957; John Gilbert, “Radio Circuits at Resolute Bay,” Gilbert private collection. For details on the process, see DoT and USWB, “Five Year Report,” 141–42.
- 55 Due to a lack of rawinsonde equipment, Mould Bay and Isachsen launched their pibals at the same time (0300 and 1500 GMT) as their radiosondes. DoT and USWB, “Five Year Report,” 46. On 1 June 1957, international requirements changed, and the pibals were instead launched at 0515 and 1715 GMT. Canada, *MANOBS* (1961), 3-D-1; Fisher to Heidt, 20 February 2012; Kistler et al., “The NCEP–NCAR 50-Year Reanalysis,” 248–49.
- 56 Lowell Demond to Heidt, 21 March 2015, email.
- 57 Middleton and Spilhaus, *Meteorological Instruments*, 175; John Patterson, “Meteorology in Peace and War,” *Canadian Geographic Journal* 35/3 (1949): 121; and Lowell Demond to Heidt, 23 May 2013, email. For a description of the plotting procedure consult: Middleton and Spilhaus, *Meteorological Instruments*, 182–85.
- 58 Don Ware, phone interview with Daniel Heidt, 24 October 2011.
- 59 Griff Toole in Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 31.
- 60 Don Ware to Heidt, 21 May 2013, email.
- 61 Demond to Heidt, 23 May 2013.
- 62 Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 31.
- 63 Young to Controller (CMD) and Chief (USWB), “Meteorological & Scientific Nattative [sic] For November 1952,” 1 December 1952, LAC, RG 93, box 17, f. 6754-1291.
- 64 Ware, interview with Heidt, 24 October 2011.
- 65 William Nemeth, phone interview with Daniel Heidt, 12 May 2011; Ware, interview with Heidt, 24 October 2011.
- 66 Ware, interview with Heidt, 24 October 2011.
- 67 For further information on SIPRE as well as CRREL consult Janet Martin-Nielsen, “The Other Cold War: The United States and Greenland’s Ice Sheet Environment, 1948–1966,” *Journal of Historical Geography* 38/1 (2012): 69–80; Janet Martin-Nielsen, “‘The Deepest and Most Rewarding Hole Ever Drilled’: Ice Cores and the Cold War in Greenland,” *Annals of Science* 70/1 (2013): 47–70; Matthew Farish, “Creating Cold War Climates: The Laboratories of American Globalism,” in *Environmental Histories of the Cold War*, ed. J.R. McNeill and Corinna R. Unger (New York: Cambridge University Press, 2010), 51–83; Matthias Heymann et al., “Exploring Greenland: Science and

- Technology in Cold War Settings,” *Scientia Canadensis* 33/2 (2010): 11–42; and Edmund A. Wright, *CRREL’s First 25 Years 1961–1986* (Hanover, NH: Cold Regions Research and Engineering Lab, 1986).
- 68 Vlad Jelinek, “Observational Programme,” 18 September 1959, LAC Winnipeg, RG 93, box 3 - Isachsen Station Records – 1952–1960.
- 69 DoT and USWB, “Five Year Report,” 62–63. The ice observations taken in 1950–51 revealed that the bay ice accretion at Alert, the most northerly of the Joint Arctic Stations, was considerably less than at Resolute. Scientists could not explain this phenomenon at the time.
- 70 Isachsen Station Journal, 1 May 1951, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 71 Jelinek, “Observational Programme,” 18 September 1959; Jelinek, 3 May 1962, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports.
- 72 Young to Controller (CMD) and Chief (USWB), “Ice Measurements,” 16 April 1953, LAC, RG 93, box 17, f. 6754-1291.
- 73 The kit included several extension rods to lengthen the auger to any required length, as well as a chisel that observers could use to retrieve the auger assembly if it disconnected from its extension rods inside the hole. Most observers, however, soon learned to avoid this problem by pulling the auger out every few inches to clear the ice chips. Schwalm to Heidt, 18 February 2018.
- 74 Reichelderfer to Thomson, 29 December 1951, LAC, RG 93, acc. 80-81/306, box 24, f. 6754-19, pt. 1.
- 75 Vlad Jelinek et al., “Station Record, 1952–1960,” LAC Winnipeg, RG 93, box 3, f. Isachsen Station Records, 1952–1960.
- 76 DWJC (Derek Challis) quoted in Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 34. For a full and official description of the snow observation procedures, see Gerdel, “Report on the Visit to Joint Arctic Weather Stations,” 7 May 1954, LAC, RG 25, vol. 4416, f. 12074-F-40.
- 77 Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 34.
- 78 Survey courses were set up as ten sites spaced 100 feet apart in a level area with minimal drift-inducing obstructions (a large flat area). The kit included a hollow aluminum sample collection tube with a steel cutting edge at one end and slots up the sides. The tube was screwed into the snowpack until the cutter hit the ground. The tube was then carefully pulled out with its sample inside. The cutter end was examined to see that the sample was dirty at that end, indicating that the entire sample was extracted. Any few pebbles that might be attached were removed and the length of the snow column was measured as seen through the slots in the sides of the tube. The tube and its snow sample were weighed to determine the water equivalent of the snow. The snow was then discarded by pushing it out using the slots in the tube before moving on to the next survey sight. After all ten samples were taken, the results were averaged and reported in a message to the climate centre. Schwalm to Heidt, 18 February 2018.
- 79 David Weston, phone interview with Daniel Heidt, 22 March 2011; “JAWS Conference, Winnipeg,” 18–19 May 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 80 DoT and USWB, “Five Year Report,” 90. At Resolute, the seismology and ionospheric station had separate sleeping quarters for the geophysicist. “Five Year Report,” 91.
- 81 Weston, interview with Heidt, 22 March 2011.
- 82 DoT and USWB, “Five Year Report,” 90.

- 83 Weston, interview with Heidt, 22 March 2011. See also: "JAWS Conference, Winnipeg, May 18 and 19, 1967," June 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 84 DoT and USWB, "Five Year Report," 91; Henrik Knudsen, "Batting the Aurora Borealis: The Transnational Coproduction of Ionospheric Research in Early Cold War Greenland," in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald E. Doel, Kristine C. Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 145.
- 85 Beals to Wardle, 13 July 1947, LAC, RG 22, vol. 732, f. SE-4-1-83. Canada had developed considerable expertise in ionospheric research during the Second World War. See Andrew B. Godefroy, *Defence and Discovery: Canada's Military Space Program, 1945-74* (Vancouver: University of British Columbia Press, 2011), 21-23.
- 86 Edward Jones-Imhotep, "Communicating the North: Scientific Practice and Canadian Postwar Identity," *Osiris* 24/1 (2009): 145.
- 87 DoT and USWB, "Five Year Report," 89-90; Lloyd Cape, *These Are My Stories* (self-published), 123-24.
- 88 Canada, Department of Natural Resources, "Mould Bay (MBC) Magnetic Observatory," <http://geomag.nrcan.gc.ca/obs/mbc-eng.php> and "Alert (ALE) Magnetic Observatory," <http://geomag.nrcan.gc.ca/obs/ale-eng.php> (both accessed 10 May 2014).
- 89 Thomson, "Basic Weather Services," *Annual Report: Department of Transport, 1951-52* (Ottawa: DoT, 1952), 140.
- 90 Tener quoted in Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 38.
- 91 Eureka Station Journal, 18 and 22 July 1951, NARA, RG 27, entry 7, box 1, f. Reports, Eureka.
- 92 Dyer to Logan, 27 May 1959, NARA, RG 27, entry 6, box 2, f. Los Angeles County Museum.
- 93 Dyer, "Memorandum for the Record," 15 June 1959, NARA, RG 27, entry 6, box 2, f. Los Angeles County Museum.
- 94 "The Fifteenth Annual Joint Arctic Weather Stations Planning Conference," 20 February 1962, LAC, RG 93, box 14, f. 11-10-11, pt. 15; see also: "Supporting Document for Joint Arctic Weather Stations Planning Conference," 1959, LAC, RG 24, vol. 17830, f. 840-120; "20th Annual Canada/United States Joint Arctic Weather Stations Planning Conference," 16 February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 95 When McGill's four-person siting team arrived at the weather station in the summer of 1959, Weldy Phipps, a well-known and accomplished bush pilot, was already there waiting. Peter Adams, "The McGill Axel Heiberg Expeditions: Reconnaissance Year, 1959," *Arctic* 62/3 (2009): 364-65; Peter Adams, *Trent, McGill, and the North: A Story of Canada's Growth as a Sovereign Polar Nation* (Peterborough: Cover to Cover, 2007); "Jacobsen - McGill University Expedition Axel Heiberg Island," 9 December 1959, NARA, RG 27, entry 6, box 2, f. Isachsen, McGill University Exp; McTaggart-Cowan to Reichelderfer, "Jacobsen - McGill University Expedition to Axel Heiberg Island - 1959-1961," 11 December 1959, NARA, RG 27, entry 6, box 2, f. Isachsen, McGill University Exp; and Wood, "Memorandum for the Record," 4 May 1960, NARA, RG 27, entry 6, box 2, f. Isachsen, McGill University Exp. On the postwar development of geography, meteorology, and climatology at McGill University, see Matthew L. Wallace, "Reimagining the Arctic atmosphere: McGill University and Cold War politics, 1945-1970," *Polar Journal* 6/2 (2016): 358-78.
- 96 Wonders, "Joint Arctic Weather Stations" 407-08. McGill's footprint at Eureka continued to be minimal during the ensuing decade. See for example: Department of

- Mines and Technical Surveys, "Scientific Activities in the Queen Elizabeth Islands, 1965," LAC, RG 45, vol. 340, f. 3-1-5, pt. 1.1.
- 97 With rare exception, each country funded its own scientific programs which were then tied into the IGY program. For instance, on "World Days," which occurred three to four times a month, each country engaged in intensive data collection. Belanger, *Deep Freeze*, 29–46.
 - 98 "Supporting Documentation for the 9th Joint Arctic Weather Stations Planning Conference – Ottawa," 9 February 1956, LAC, RG 93, box 14, f. 11-10-11, pt. 12.
 - 99 Archie Asbridge, "Archie in the Arctic 1958–1963," n.d., Archie Asbridge collection.
 - 100 Dyer to Goldenburg, "Extracurricular Work by U.S. Weather Bureau Employees," 14 July 1965, LAC, RG 93, box 32, f. 6754-1288, pt. 43.
 - 101 Weston to Heidt, 29 August 2012.
 - 102 Peder Roberts and Eric Paglia, "Science as National Belonging: The Construction of Svalbard as a Norwegian Space," *Social Studies of Science* 46/6 (2016): 894–911.
 - 103 Robert Sykes, Jr. to Andrew Thomson, 24 November 1952, LAC, RG 12, vol. 2798, f. 6754-19, pt. 3.
 - 104 "Resolute Bay Standing Orders Issued by the Commanding Officer, RCAF Station Lachine," 1956, LAC, RG 93, acc. 1995-96-090, box 19, f. 6754-635, pt. 5; "Draft: Royal Canadian Air Force – Department of Transportation (Air Services) – United States Weather Bureau Agreement on Resolute (Revised 1962)," 11 January 1965, LAC, RG 93, box 32, f. 6754-1288, pt. 43; Niverville to Chief of the Air Staff, 25 February 1959, LAC, RG 93, box 19, f. 6754-635, pt. 7.
 - 105 Jean Lesage, Memorandum to the Cabinet: Canadian Operation of the Joint Arctic Weather Stations, Directorate of History and Heritage (DHH) 2002-117, f. Meeting 562; Thirteenth Meeting of the Advisory Committee on Northern Development, 23 November 1953, Raymont Collection, DHH 73/1223/1801, box 89.
 - 106 Robert McDonald, phone interview with Daniel Heidt, 3 May 2011; Bob Plaseski, phone interview with Daniel Heidt, 2 November 2011.
 - 107 H.J. McCabe, "Final Report of the Officer-In-Charge Resolute Bay, N.W.T.," NARA, RG 370, entry 6, box 1, Arctic Station Reports, f. Resolute; "Appendix 'A': Comments Taken from a Letter of July 1st 1953 from Mr. F.W. Reichelderfer, Chief of the U.S. Weather Bureau to Andrew Thomson, Controller of Meteorological Services," LAC, RG 93, acc. 1995-96-090, box 19, f. 6754-635, pt. 3.
 - 108 Asbridge, "Archie in the Arctic 1958–1963."
 - 109 David R. Gray, *Alert, Beyond the Inuit Lands: The Story of Canadian Forces Station Alert* (Ottawa: Borealis, 1997), 15–16.
 - 110 For an example of loaning equipment see Greathouse, "Summer Activities at Alert," 16 September 1959, NARA, RG 27, entry 7, box 1, f. Reports, Alert.
 - 111 Davis, "Information Concerning U.S. Weather Bureau Arctic Service," 5 December 1960, NARA, RG 27, entry 6, box 11, f. Training, Orientation, Development.
 - 112 Howard Wessbecher, interview by Brian Shoemaker, 20 April 2000, Polar Oral History Project, Ohio State University.
 - 113 D.W. Phillips and R.B. Crowe, *Climate Severity Index for Canadians* (Downsview: Atmospheric Environmental Service, 1984).
 - 114 "Supporting Document for Joint Arctic Weather Stations Planning Conference," 1959, LAC, RG 24, vol. 17830, f. 840-120; "The Tenth annual Canada-United States Joint

- Arctic Weather Stations Planning Conference,” 7 February 1957, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 115 See, for example, “20th Annual Canada/United States Joint Arctic Weather Stations Planning Conference,” 16 February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 116 Baldwin to Rowley, “Expansion of Facilities at Joint Arctic Weather Stations to Provide Support for Scientific Parties,” 14 May 1962, LAC, RG 24, F-1, vol. 29890, f. DRBC-170-80-583, pt. 1; “Proposal to Expand Facilities at Joint Arctic Weather Stations to Provide Support for Scientific and Exploration Groups in the Arctic,” May 1962, LAC, RG 93, box 14, f. 11-10-11, vol. 15; “Annex IV: Background Information Concerning the History and Operation of the Joint Arctic Weather Stations Programme,” 16 February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4; “The Twentieth Annual Canada/United States Joint Arctic Weather Stations Planning Conference,” 16 February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4; “Annex: Transient Accommodations and Messing at the Joint Arctic Weather Stations,” 16 February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 117 For the most recent study on the PCSP, see Richard C. Powell, *Studying Arctic Fields: Cultures, Practices, and Environmental Sciences* (Montreal & Kingston: McGill-Queen’s University Press, 2017). Powell devotes little attention to JAWS support to the PCSP in its early years, making only a passing reference on pages 129–30.
- 118 As quoted in Michael Foster and Carol Marino, *The Polar Shelf: The Saga of Canada’s Arctic Scientists* (Toronto: NC Press, 1986), 15.
- 119 On these developments, see Adam Lajeunesse, *Lock, Stock, and Icebergs: A History of Canada’s Arctic Maritime Sovereignty* (Vancouver: University of British Columbia Press, 2016).
- 120 Foster and Marino, *Polar Shelf*, 15.
- 121 Richard C. Powell, “Science, Sovereignty and Nation: Canada and the Legacy of the International Geophysical Year, 1957–1958,” *Journal of Historical Geography* 34/4 (2008): 618–38.
- 122 The PCSP divided the continental shelf into a series of 320 km by 400 or 480 km research blocks and sent its scientists to intensely study each block before moving to the next.
- 123 E.F. Roots, “The Polar Continental Shelf Project,” in *Canada’s Changing North*, ed. William C. Wonders (Montreal & Kingston: McGill-Queen’s University Press, 2003), 411–12. For example, in 1962 the PCSP requested that intermittent accommodations be available for up to eight men at Mould Bay between May and June, that these personnel have access to the station’s bulldozer to clear snow from PCSP stores and move heavy items around the camp, and that their camp could use up to 2 kilowatts of power from the JAWS generators. The PCSP also requested that Alert maintain accommodations for up to three visitors to stay for up to eight days between July and August, and that the station provide communications support between the field teams and Isachsen. The PCSP also increasingly used Resolute as a rallying point, but these activities drew almost entirely on RCAF resources. “Annex 4, Visiting Scientists and Scientific Projects,” February 1962, LAC, RG 93, box 14, f. 11-10-11, pt. 15.
- 124 Steenburgh, “Report of the Scientific Research Sub-committee,” 30 June 1959, LAC, RG 22, A-1-a, vol. 888, f. 87-3-23, pt. 1.
- 125 “1961 Joint Arctic Weather Stations Planning Conference,” 9 February 1961, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14.

- 126 Thomson to Director General, Air Services, "Assumption of Responsibility for Airstrip etc. by Civav at Joint Arctic Weather Stations," 20 August 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14.
- 127 MacAulay and Greco to Director (CMD) and Chief (USWB), "Semiannual Activities Report," 14 September 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Isachsen).
- 128 McTaggart-Cowan to Roots, "Polar Continental Shelf Project – Isachsen – 1961," 24 January 1961, NARA, RG 27, entry 6, box 7, f. Arctic 1 (Isachsen). MacAulay and his new ExO were "very grateful" for these changes. MacAulay and Birdsall to Director (CMD) and Chief (USWB), "Semiannual Activities Report," 5 April 1961, NARA, RG 27, entry 6, box 7, f. Arctic 1 (Isachsen).
- 129 Gregory and Harper to Director (CMD) and Chief (USWB), "Semiannual Activities Report," 1 January 1962, NARA, RG 27, entry 6, box 12, f. Arctic Program - Isachsen (Narrative Report).
- 130 "Annex 4, Visiting Scientists and Scientific Projects," February 1962, LAC, RG 93, box 14, f. 11-10-11, pt. 15.
- 131 McTaggart-Cowan to Wheeler, "Briefing – Operation Mould Bay, N.W.T.," 9 October 1963, NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Mould Bay).
- 132 "Information for the Joint Arctic Weather Stations planning Conference 1964," LAC, RG 45, vol. 340, f. 3-1-5, pt. 1.1; Department of Mines and Technical Surveys, "Annex 5: Scientific Activities in the Queen Elizabeth Islands," 1965, LAC, RG 45, vol. 340, f. 3-1-5, pt. 1.1.
- 133 Race to Director, Meteorological Branch, 22 January 1968, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 134 Wonders, "Joint Arctic Weather Stations," 408–10.
- 135 Wonders, "Joint Arctic Weather Stations," 415; Weston, interview with Heidt, 22 March 2011.
- 136 Doug Munson, phone interview with Daniel Heidt, 20 August 2012.
- 137 David Oldridge, phone interview with Daniel Heidt, 18 January 2012.
- 138 Bruce Weaver, phone interview with Daniel Heidt, 9 January 2012.
- 139 Wessbecher interview.
- 140 During his 1957 tour of the stations, Vaughn Rockney explained to JAWS personnel "the importance of observations from the Arctic stations to meteorology in Europe." Rockney to Thomson, 30 October 1957, LAC, RG 93, acc. 80-81/306, box 25, f. 6754-19, pt. 11. When Goodale and Dyer visited the stations in the early 1960s, they were very "emphatic ... that there was a real necessity to be accurate in your observations and that everything be done to the very best that you could." Lowell Demond, phone interview with Daniel Heidt, 26 October 2011.
- 141 Demond, interview with Heidt, 26 October 2011.
- 142 Weaver, interview with Heidt, 9 January 2012.
- 143 Rick Risbey, phone interview with Daniel Heidt, 26 November 2011.
- 144 Wessbecher interview.
- 145 Wessbecher interview.
- 146 LAC Winnipeg, RG 93, acc. 2004-01213-7, box 2, f. Mould Bay Picture Album.
- 147 Llewellyn, "Monthly Station Activity Report – December, 1965," 15 January 1966, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
- 148 Weaver, interview with Heidt, 9 January 2012.

- 149 Ware to Heidt, 21 May 2013.
- 150 The hard copies of station records required additional work, such as circling the termination altitudes. Although these additional steps were not transmitted south in the twice-daily transmissions, the monthly error count included them. McFarlane, 6 September 1967, NARA, RG 370, entry 6, box 1, Arctic Station Reports, f. Resolute.
- 151 B.A. Coulcher, "Final Report of the Officer-in-Charge," 25 March 1962, NARA, RG 27, entry 6, box 12, f. Arctic Program 1 - Resolute (Narrative Report); McBride, "Report of the Officer-in-Charge, Meteorological Station Resolute, N.W.T. 1960-1961," 1 October 1961, NARA, RG 27, entry 7, box 2, f. Resolute Reports.
- 152 Thornton, "Alert Station Activities - Sept 1964-June 1965," 9 July 1965, NARA, RG 27, entry 7, box 1, f. Reports, Alert.
- 153 For other archival coverage of the error problem see D.A.G. Shanks, "Further to my ECHO 205 on David Paterson," 23 June 1964, NARA, RG 27, entry 6, box 24, f. Arctic Program 1 - Eureka; Dyer to Thornton, "Radiosonde Errors," 8 April 1965, NARA, RG 93, box 33, f. 6754-1388, pt. 14; and McFarlane, 6 September 1967, NARA, RG 370, entry 6, box 1, Arctic Station Reports, f. Resolute.
- 154 Llewellyn, "Monthly Station Activity Report December 1965," 15 January 1966, LAC, RG 93, box 821, f. 6754-1291, pt. 19; and Rockney to Thomson, 30 October 1957, LAC, RG 93, acc. 80-81/306, box 25, f. 6754-19, pt. 11.
- 155 Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 30; Gjernes and Greco, "Mould Bay's Semi-Annual Activities Report," 1 April 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Mould Bay).
- 156 Rockney to Thomson, 30 October 1957, LAC, RG 93, acc. 80-81/306, box 25, f. 6754-19, pt. 11.
- 157 Monte Poindexter, "Radiosonde Balloon Conditioning," Poindexter collection; Gjernes and Greco, "Mould Bay's Semi-Annual Activities Report," 1 April 1960; Noble, "Monthly Report for March 1964," 13 April 1964, Department of Environment Archives, Toronto, f. MA64; Llewellyn, "Monthly Station Activity Report - December, 1965," 15 January 1966, LAC, RG 93, box 821, f. 6754-1291, pt. 19; and Belanger, *Deep Freeze*, 245-46.
- 158 Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 31.
- 159 "Monthly Station Activity Report, Isachsen, NWT," 2 May 1965, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
- 160 Personnel who served at the JAWS stations in the late 1960s or early 1970s do not recall ever launching pilot balloons as part of a synoptic program. Oldridge to Daniel Heidt, 28 August 2012; Rick Risbey to Heidt, 28 August 2012; and Ron Huibers to Heidt, 29 August 2012, email.
- 161 Thomson to Reichelderfer, "Arctic Section," 29 May 1953, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 11.
- 162 Gerdel, "Report on the Visit to Joint Arctic Weather Stations," 7 May 1954, LAC, RG 25, vol. 4416, f. 12074-F-40; Embassy of the United States of America, "No. 171," 9 February 1959, LAC, RG 93, box 14, f. 11-10-11, pt. 13; and "The Eighth Annual Joint Arctic Weather Stations Planning Conference," 6 January 1955, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 163 Grauman, "Eureka Station Narrative," 2 November 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Eureka).
- 164 McTaggart-Cowan to Reichelderfer, "Station Narrative - Eureka," 16 November 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Eureka).

- 165 McTaggart-Cowan to Chapil, "Station Narrative, May-October 1960," 23 November 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Eureka).
- 166 Shanks quoted in Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 35.
- 167 Greenwood to Heidt, 6 July 2012; and Louis Schwalm to Daniel Heidt, 22 May 2013, email.
- 168 Powell, "Rigours of an Arctic Experiment," 1794.

NOTES TO CHAPTER 7

- 1 R.M. (Bill) Rae, *Weather Eye on the Arctic* (Ottawa: Meteorological Division, c. 1958), 3.
- 2 D.W. Buss, "Life at the Joint Arctic Weather Stations," *Weatherwise* 24/6 (1971): 277.
- 3 R.W. Rae, "Joint Arctic Weather Station Project," *Arctic* 4/1 (May 1951): 24.
- 4 Moira Dunbar and Keith Greenaway, *Arctic Canada from the Air* (Ottawa: Defence Research Board, 1956), 451. Resolute's seasonal cycle varies slightly from the more northerly stations on the archipelago.
- 5 Lyle Dick, *Muskox Land: Ellesmere Island in the Age of Contact* (Calgary: University of Calgary Press, 2001), 43.
- 6 Kevin Lynch, *What Time Is This Place?* (Cambridge: MIT Press, 1972); Andrew Stuhl, "Cold Places: Movement, Knowledge, and Time," *Journal of Environmental Studies and Sciences* 6/4 (2015): 779–82.
- 7 "Isachsen Daily Log," 19 February 1952, National Archives and Records Administration (NARA), RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 8 "Isachsen Daily Log," 13 March 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 9 "Isachsen Daily Log," March 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 10 Ice conditions varied from year to year, and early breakup sometimes prevented the use of this surface by aircraft for the full season. See for example: "Minutes of a Canada-United States meeting to discuss plans for the Joint Arctic Weather Station programme for 1951," 11 January 1951, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1947–1952; and Eureka Station Journal, 22, 23, 29 May and 17 June 1948, NARA, RG 27, entry 7, box 1, f. Reports, Eureka.
- 11 For strip mechanics undertaking this work, see for example: G. Morrissette, "Report on Airstrip Construction at Isachsen – Summer 1958," NARA, RG 27, entry 6, box 1, f. Airfields – Isachsen.
- 12 H.U. Sverdrup, "Klima des Kanadischen Archipels and Grönlands," in *Handbuch der Klimatologie*, ed. W. Koppen and R. Geiger (Berlin: Verlag von Gebrüder Borntraeger, 1935), 24.
- 13 Dunbar and Greenaway, *Arctic Canada from the Air*, 451, 477.
- 14 "Joint Arctic Weather Stations: Five Year Report, 1946–1951" (Ottawa and Washington: Meteorological Division - Department of Transport and the US Weather Bureau, 1951) (hereafter DoT and USWB, "Five Year Report"), 35.
- 15 Dunbar and Greenaway, *Arctic Canada from the Air*, 476–77; "Isachsen Daily Log," April 1951, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 16 Fredrick G. Ayling, "Water and Weather in the Arctic," *Christian Science Monitor*, 5 February 1957.

- 17 “Minutes of a Canada-United States Meeting to Discuss Plans for the Joint Arctic Weather Station Programme,” 10 January 1952, Library and Archives Canada (LAC), RG 2, B-2, vol. 224, f. M-50-1A.
- 18 “Annex IV: Background Information Concerning the History and Operation of the Joint Arctic Weather Stations Programme,” February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4.
- 19 On Operation Boxtop, see Daniel Heidt and Richard Goette, “‘This is No ‘Milk Run’: Operation Boxtop, 1956–2015,” in *Canadian Arctic Operations, 1941–2015: Lessons Learned, Lost, and Relearned*, ed. Adam Lajeunesse and P. Whitney Lackenbauer (Fredericton: Gregg Centre for the Study of War & Society, 2017), 270–306.
- 20 “Report on Spring Airlift Operations from Resolute, N.W.T., Spring Airlift 1954,” LAC, RG 85, vol. 2800, f. 6754-19, pt. 6.
- 21 David Weston, phone interview with Daniel Heidt, 22 March 2011.
- 22 John Gilbert, phone interview with Daniel Heidt, 29 March 2011; John Gilbert to Daniel Heidt, 5 July 2012, email.
- 23 George Rabbitt, “Report on Fall Airlift of Alert and Eureka via Thule,” 4 November 1953, LAC, RG 93, box 2, f. 6754-19, pt. 5. Since most new personnel arrived in the spring rather than the autumn airlift, they only had to adjust to the dark period for a few weeks after arriving in the High Arctic.
- 24 Stuart to Chief, Arctic Operations Project, “Communications Narrative,” LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 8.
- 25 Bob Pearson, phone interview with Daniel Heidt, 28 December 2011.
- 26 David Oldridge, phone interview with Daniel Heidt, 18 January 2012.
- 27 Bill Stadnyk, phone interview with Daniel Heidt, 16 January 2012; Stadnyk to Heidt, 17 July 2021, email. See also Howard Wessbecher, interview by Brian Shoemaker, 20 April 2000, Polar Oral History Project, Ohio State University.
- 28 Don Shanks, phone interview with Daniel Heidt, 10 March 2011; John Melvin, phone interview with Daniel Heidt, 23 November 2011.
- 29 Shurie et al., to Oldenburg, 20 February 1958, Dartmouth College Library, Stefansson Collection, MSS-150. The authors appreciate Don Ware’s assistance consulting these materials from the Stefansson fonds.
- 30 Magnus Gunther, “The 1953 Relocation of the Inukjuak Inuit to the High Arctic: A Documentary Analysis and Evaluation,” 2nd ed. (report submitted to Department of Indian Affairs and Northern Development, 1993), reprinted in *Human Flagpoles or Humanitarian Action? Discerning Government Motives behind the Inuit Relocations to the High Arctic, 1953–1960*, ed. P. Whitney Lackenbauer, DCASS No. 16 (Calgary: Arctic Institute of North America, 2020). While Shelagh Grant has insisted that this was done in the interest of sovereignty, Magnus Gunther, after an extensive study, could find no link. For the debate between these scholars, see Shelagh D. Grant, “*Errors Exposed*”: *Inuit Relocations to the High Arctic, 1953–1960*, DCASS No. 8 (Calgary: Arctic Institute of North America, 2016); and Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?*
- 31 “The Seventh Annual Planning Conference of Canada – United States Representatives to Discuss the Joint Arctic Weather Stations Programme,” 14 January 1954, LAC, RG 93, box 14, f. 11-10-11, pt. 11; Strang to Incoming OIC, “Briefing, details of OIC’s position,” February 1963, NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Resolute) (Narrative Report).

- 32 "Report on Spring Airlift Operations from Resolute, N.W.T. Spring Airlift 1954," LAC, RG 85, vol. 2800, f. 6754-19, pt. 6; Strang to Incoming OIC, "Briefing, details of OIC's position," February 1963, NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Resolute) (Narrative Report).
- 33 Robert McDonald, phone interview with Daniel Heidt, 3 May 2011; Louis Schwalm to Daniel Heidt, 22 May 2013, email; H.J. McCabe, "Final Report of the Officer-In-Charge Resolute Bay, N.W.T.," NARA, RG 370, entry 6, box 1, Arctic Station Reports.
- 34 Strang to Incoming OIC Resolute, "Briefing, details of OIC's position," NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Resolute) (Narrative Report).
- 35 E.A. Wood, "Notes on November 19, 1953 Meeting with Mr. D.C. Archibald, Canada Met. Serv., DOT," NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1953-54.
- 36 For the 1950s, consult "Minutes of a Canada-United States Meeting to Discuss Plans for the Joint Arctic Weather Station Programme," 10 January 1952, LAC, RG 2 B-2, vol. 224, f. M-50-1A; Eureka Station Journal, 16-18 October 1952, Eureka. The conclusion for the program's later decade is based on JAWS roll calls compiled by Don Shanks.
- 37 R.W. Rae, "Arctic Weather Stations," *Weather* 7/1 (January 1952): 39; Rae, "Inspection Trip to Joint Arctic Weather Stations, April 1952," LAC, RG 93, acc. 80-81/306, box 24, f. 6754-19, pt. 1. Lowell Demond claimed that the JAWS dentists provided better care than he had received growing up in rural Nova Scotia. Lowell Demond, phone interview with Daniel Heidt, 26 October 2011.
- 38 "A Canada-United States meeting to discuss plans for the Joint Arctic Weather Station programme for 1951," 11 January 1951, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1947-1952; Phillips, "North of Sixty Six," June 1952, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 39 Hagglund to Thomson, "Inspection of Joint Arctic Weather Stations during the Spring Airlift," 27 April 1955, LAC, RG 93, box 2, f. 6754-19, pt. 18; John Gilbert, "The Joint Arctic Weather Stations: Completing the First Decade, 1952-59" (unpublished, 2004), 51, John Gilbert collection. In later years, the RCAF also provided dentists during its resupply flights.
- 40 Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 51-52.
- 41 On RCMP special constables, see Prince of Wales Northern Heritage Centre, "We took care of Them: RCMP Special Constables in the NWT," <https://www.nwtexhibits.ca/specials/>.
- 42 Eureka Station Journal, 22-23 April and 1, 3 May 1953, Eureka; Brambley, "Transients," c. 1958, Eureka; Floyd to wife, 27 February 1958, American Heritage Centre, Floyd Wilson Papers, box 2, f. Diaries 1956-1958 Eureka Weather Station Ellesmere Island. On Greenlandic Inuit as a sovereignty concern, see Grant, "Errors Exposed" and Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?*
- 43 Arctic Operations Project, USWB, "Instructions for Satellite Airstrip Improvement Program, 1950," March 1950, NARA, RG 27, entry A1-136, box 1, f. Instructions for Satellite Airstrip Improvement Program 1950, 2-7, 14-15.
- 44 Arctic Operations Project, "Instructions for Satellite Airstrip Improvement Program, 1950," 11-13.
- 45 Emphasis in original. Arctic Operations Project, "Instructions for Satellite Airstrip Improvement Program, 1950," 13; U.S. Arctic Operations Project, "Report on Arctic Operations and Resupply Summer & Fall 1951 and Spring 1952 to Joint Canadian-United States Weather Stations," September 1952, NARA, RG 27, entry A1-136, box 1, f. Report on Arctic Operations and Resupply Summer and Fall 1951 and Spring 1952, 58-68.

- 46 Arctic Operations Project, "Instructions for Satellite Airstrip Improvement Program, 1950," 2.
- 47 "Minutes of a Canada-United States Meeting to Discuss Plans for the Joint Arctic Weather Station Programme for 1953," 8 January 1953, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 48 "Joint Arctic Weather Stations Planning Conference," 9–10 February 1956, LAC, RG 25, vol. 7718, f. 9061-A-40, pt. 6-1.
- 49 Arctic Operations Project, USWB, "Instructions for Satellite Airstrip Improvement Program, 1950," March 1950, NARA, RG 27, entry A1-136, box 1, f. Instructions for Satellite Airstrip Improvement Program 1950, 17; Nemeth to Controller, "Covering Letter and General Station Affairs," 1 August 1953; French to Controller, "Isachsen Airstrip Report for 1953," 2 September 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 50 Demond, interview with Heidt, 26 October 2011. The Inuit girl was named Zipporah. In 1952 or 1953, her father, whose name is not recorded in the archival record, briefly worked at the station and brought his family along. Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 52.
- 51 Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 52.
- 52 "Minutes 1959 Canada/United States Joint Arctic Weather Stations Planning Conference," 12 February 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14. Airstrip construction at the satellite stations continued throughout the JAWS program. By 1967, strip mechanics had extended the runways at Alert, Eureka, and Mould Bay to meet or exceed a new minimum of 5,000 x 200 feet. By the same year, work to fill a gully that would allow the crews to extend the runway to 5,000 feet was roughly two-thirds complete, but it was not "practicable" to widen the runway beyond 150 feet. "Minutes: 20th Annual Canada/United States Joint Arctic Weather Stations Planning Conference," 16 February 1967, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 4. On challenges at Isachsen, see also "Minutes: 18th Annual Canada/United States Arctic Weather Stations Planning Conference," 25 February 1965, LAC, RG 45, vol. 340, f. 3-1-5, pt. 1.1.
- 53 "Minutes 1959 Canada/United States Joint Arctic Weather Stations Planning Conference," 12 February 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14; "Minutes: 1960 Annual Joint Arctic Weather Stations Planning Conference," 26 February 1962, LAC, RG 93, box 14, f. 11-10-11, pt. 15. JAWS personnel still had to accept inter-seasonal variations. In 1960, for example, muddy conditions on the strips at Isachsen and Mould Bay forced the program to restrict landings to light single-engine aircraft for two weeks in August. "Number of Aircraft Landings at Satellite Airstrips, 1960," LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14. A 1967 memorandum similarly noted that it remained "inadvisable for heavy aircraft to use" the airstrips at some of the satellite stations from July to August, though light aircraft could continue to use the airstrip throughout the summer months. "Use of any of these strips," it concluded, "should be avoided during periods of freeze-up and / or excessive thaw." "Minutes 1959 Canada/United States Joint Arctic Weather Stations Planning Conference," 12 February 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14; "Minutes: 1960 Annual Joint Arctic Weather Stations Planning Conference," 26 February 1962, LAC, RG 93, box 14, f. 11-10-11, pt. 15.
- 54 Dick, *Muskox Land*, 45.
- 55 Dunbar and Greenaway, *Arctic Canada from the Air*, 451, 478.
- 56 Buss, "Life at the Joint Arctic Weather Stations," 79.
- 57 Dunbar and Greenaway, *Arctic Canada from the Air*, 451, 478.

- 58 Alan Faller, "The Rope," Alan Faller collection.
- 59 Wilson to Wife, 14 January (probably 1956), American Heritage Centre, Floyd Wilson Collection, Personal - Letters and Radiograms to Irene (Mrs. Wilson) from Weather Stations, 1951-57.
- 60 Faller, "The Rope."
- 61 Bruce Weaver, phone interview with Daniel Heidt, 9 January 2012; Isachsen Station Journal, 15 July 1951, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports; Morrissette, "Report on Airstrip Construction," 27 August 1958, NARA, RG 27, entry 6, box 1, f. Airfields - Isachsen.
- 62 Frank Lowe, "Monotony is Biggest Enemy in Frigid Arctic Outposts," *Montreal Star*, 22 April 1955.
- 63 Roy Shields, "They're Born to Blush Unseen," *Weekend*, Miro Kostiuik collection. See also Shurie et al., to Oldenburg, 20 February 1958, Dartmouth College Library, Stefansson Collection, MSS-150.
- 64 Demond, interview with Heidt, 26 October 2011.
- 65 Archie Asbridge, "Archie in the Arctic 1958-1963," n.d., Archie Asbridge collection.
- 66 See Chauncey C. Loomis, "The Arctic Sublime," in *Nature and the Victorian Imagination*, ed. U.C. Knoepfelmacher and G.B. Tennyson (Berkeley: University of California Press, 1977), 95-112; and I.S. MacLaren, "The Aesthetic Map of the North, 1845-1859," *Arctic* 38/2 (1985): 89-103.
- 67 Llewellyn, "Weather Station Activity Report - Isachsen, NWT - April 1965," 2 May 1965, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
- 68 Greathouse, "Summer Activities at Alert," 16 September 1959, NARA, RG 27, entry 7, box 1, f. Reports, Alert.
- 69 OIC Isachsen to Chief, Arctic Operations Project, "Station Affairs," c. Fall 1950, LAC, RG 93, box 8, f. 6754-1294, pt. 6.
- 70 Dyer to Greathouse, "Experimental Project Using Lignosol BD on the Alert Airstrip," 9 May 1962, NARA, RG 27, entry 6, box 12, f. Airfields 1 - Alert.
- 71 Goodbrand, "Airstrip construction - Eureka, N.W.T.," 28 March 1962, NARA, RG 27, entry 6, box 12, f. Airfields 1 - Eureka. For an exception to this cooperative atmosphere, see Brambley, "Eureka Station Narrative: Station Affairs, Spring-Fall 1959," when strip mechanics at Eureka, c. October 1959, ignored "frequent requests" to clean up their quarters, forcing the station's regular personnel to do the work.
- 72 Andrew Thomson explained in a 1956 memorandum that the frantic pace of the spring airlift, for example, led JAWS personnel to focus on safely storing the supplies and to delay clearing packing crates and garbage. Thomson to Director General, Air Services, DoT, "Deputy Minister's Memorandum of August 23 1956," 23 November 1956, LAC, RG 93, box 14, f. 11-10-11, pt. 12.
- 73 Eureka Station Journal, 20 April 1953, Eureka.
- 74 See for example: Eureka Station Journal, 15, 18 May, 2, 4, 5, 9 June, 5, 6, 11, 15, 18, 23, 24 July, 12, 29 August 1953, Eureka. The design and construction of "reefers," which were utilized well into the 1970s, was remarkably simple. Several personnel dug out part of a hillside, constructed a small room in the hole, and then covered it back up so that the following winter's permafrost kept everything frozen throughout much of the year without drawing on any of the station's limited power generating capabilities.
- 75 Arctic Operations Project (USWB), "Plans and Instructions for Arctic Resupply Operations: Nanook 53," June 1953, NARA, RG 27, entry A1-136, box 1, f. Plans and Instructions for Arctic Resupply Operations - Nanook 53. This practice was

- discontinued after the development of large synthetic “bladders” that could be installed within aircraft cargo holds during the early 1960s. For more information, see Heidt and Goette, “This is No ‘Milk Run.’” Personnel at the satellite stations also used drums for other purposes, including receptacles for solid human waste, or as fill when building berms or retaining walls. OIC Isachsen to Chief, Arctic Operations Project, “General operations narrative August 1950,” 2 October 1950, LAC, RG 93, box 8, f. 6754-1294, pt. 6; Frank, “Station activity for the Month,” 27 July 1963, LAC, RG 93, box 32, f. 6754-1292, pt. 13; Kitzinger, “Airstrip Report 1954,” 12 September 1954, NARA, RG 27, entry 7, box 2, f. Mould Bay, Reports.
- 76 Thomson to Director General, Air Services, DoT, “Deputy Minister’s Memorandum of August 23 1956,” 23 November 1956, LAC, RG 93, box 14, f. 11-10-11, pt. 12. There were limited attempts to clean some drums at Isachsen in the early 1950s, but these efforts made little difference. Dyer to Thomson, “Arctic Section,” 1 June 1954, LAC, RG 85, vol. 2800, f. 6754-19, pt. 6; OIC to Controller (CMD) and Chief (USWB), “Covering letter and General Operations for month of July 1955,” 3 August 1955, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 77 Ron Huibers, phone interview with Daniel Heidt, 22 November 2011; David Tidbury, phone interview with Daniel Heidt, 12 October 2011.
- 78 Eureka Station Journal, 21 to 23 August 1951, 29 June 1953, Eureka.
- 79 George Rabbitt as quoted in Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 11; see also Rae, “Arctic Weather Stations,” 27–28.
- 80 Arctic Operations Project (USWB), “Plans and Instructions for Arctic Resupply Operations: Nanook 53,” June 1953, NARA, RG 27, entry A1-136, box 1, f. Plans and Instructions for Arctic Resupply Operations - Nanook 53.
- 81 “Nanook 53,” NARA, RG 27, entry 5, box 14, f. Nanook 53, pp. 3–4, I–5, II–17, II–27, II–39. King Boreas in Greek mythology was the God of the north wind and bringer of winter.
- 82 Eureka Station Diaries, 20 August 1953, Eureka.
- 83 “Nanook 53,” NARA, RG 27, entry 5, box 14, f. Nanook 53, pp. 4–5, I–7, II–16 to II–18.
- 84 “Nanook 53,” NARA, RG 27, entry 5, box 14, f. Nanook 53, pp. I–8 to I–9, II–27, II–32; “Plans and Instructions for Arctic Resupply Operations, ‘Nanook 53,’” June 1953, NARA, RG 27, entry A1-136, box 1, f. Plans and Instructions for Arctic Resupply Operations - Nanook 53, p. 3.
- 85 Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 11.
- 86 A short ton is 2,000 pounds or 907 kilograms. “Report of Resupply Operations for Resolute Bay – Eureka and Satellite Stations, NORS ’60,” 29 August 1960, NARA, RG 27, entry 6, box 11, f. Resupply 4 Fall – Arctic.
- 87 Arctic Operations Project (USWB), “Plans and Instructions for Arctic Resupply Operations: Nanook 53,” June 1953, NARA, RG 27, entry A1-136, box 1, f. Plans and Instructions for Arctic Resupply Operations - Nanook 53; Eureka Station Journal, 24 August 1950, Eureka.
- 88 Melvin, interview with Heidt, 23 November 2011.
- 89 Eureka Station Journal, 24 August 1950, 23 August 1951, Eureka.
- 90 Archie Asbridge likened the “meat reefer” at each satellite station to “the ‘freezer section’ of the modern day refrigerator. Essentially, the meat reefer was an underground cavity built into the permafrost accessed by a set of sloping steps, similar to the method used by the early pioneers to preserve vegetables over the winter, except that the pioneers wanted to protect their produce from frost. In this case, the reefers were

- stocked with frozen meats airlifted from Resolute the previous September.” Asbridge, “Archie in the Arctic.”
- 91 Eureka Station Journal, 24–26 August 1951, Eureka.
- 92 Asbridge, “Archie in the Arctic.”
- 93 Paul Reid, phone interview with Daniel Heidt, 12 December 2014.
- 94 Reid, interview with Heidt, 12 December 2014; Shanks, interview with Heidt, 10 March 2011.
- 95 William Nemeth, phone interview with Daniel Heidt, 12 May 2011.
- 96 Dunbar and Greenaway, *Arctic Canada from the Air*, 451, 468, 478–79.
- 97 Rae, “Arctic Weather Stations,” 5.
- 98 Nemeth to Controller (CMD) and Chief (USWB), “Covering Letter and Station Affairs,” 1 October 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 99 Buss, “Life at the Joint Arctic Weather Stations,” 79.
- 100 Eureka Station Journal, 26–30 August, 3–4, 13–14 September 1953, Eureka.
- 101 “Eureka Station Narrative,” Spring-Fall 1959, Eureka.
- 102 Arctic Operations Project, USWB, “Instructions for Satellite Airstrip Improvement Program, 1950,” March 1950, NARA, RG 27, entry A1-136, box 1, f. Instructions for Satellite Airstrip Improvement Program 1950, 13.
- 103 U.S. Arctic Operations Project, “Report on Arctic Operations and Resupply Summer & Fall 1951 and Spring 1952 to Joint Canadian-United States Weather Stations,” September 1952, NARA, RG 27, entry A1-136, box 1, f. Report on Arctic Operations and Resupply Summer and Fall 1951 and Spring 1952, 62.
- 104 Tania Long, “Any Handy Iceberg Is the Old Town Pump For Weather Men at Isolated Arctic Posts,” *New York Times*, 11 September 1953; Nemeth to Controller (CMD) and Chief (USWB), “Covering Letter for Station Affairs,” 1 September 1952, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 11; Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 17–19; Ayling, “Water and Weather in the Arctic,” 17; MacAulay and Lee to Controller (CMD) and Chief (USWB), “Station Narrative,” 1 April 1958, LAC, RG 12, vol. 2806, f. 6754-1291, pt. 15.
- 105 Arctic Operations Project, USWB, “Instructions for Satellite Airstrip Improvement Program, 1950,” March 1950, NARA, RG 27, entry A1-136, box 1, f. Instructions for Satellite Airstrip Improvement Program 1950, 1.
- 106 Asbridge, “Archie in the Arctic.”
- 107 See for example: S/L H.R. Cram, “Report on Fall Resupply – 1963,” 8 October 1963, LAC, RG 24, G-15-4, acc. 83-84165, box 22444, f. 55-00-1316, pt. 1.
- 108 In 1951, Alert, for example, required a dozen landings for its resupply. U.S. Arctic Operations Project, “Report on Arctic Operations and Resupply Summer & Fall 1951 and Spring 1952 to Joint Canadian-United States Weather Stations,” September 1952, NARA, RG 27, entry A1-136, box 1, f. Report on Arctic Operations and Resupply Summer and Fall 1951 and Spring 1952, 49–64. See also: Heidt and Goette, ““This is No ‘Milk Run.’”
- 109 Ritchie Calder, *Men Against the Frozen North* (London: George Allen and Unwin, 1957), 209–10.
- 110 Peter Johnson, phone interview with Daniel Heidt, 26 May 2011.
- 111 “Isachsen Daily Log,” November to February 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 112 Dunbar and Greenaway, *Arctic Canada from the Air*, 451, 476–77.

- 113 On extremely rare occasions, station personnel did see the aurora borealis. Heidt conversation with John Gilbert, 29 February 2016.
- 114 Rae, "Arctic Weather Stations," 4.
- 115 Wessbecher interview.
- 116 "Minutes of a Canada-United States Meeting to Discuss Plans for the Arctic Weather Station Programme," 26 January 1950, LAC, RG 24, vol. 8148, f. NSS 1616-9, pt. 4. The following year, the RCAF questioned the need for any winter flights, suggesting that drops were "extremely hazardous because of [the] darkness and high ground." Nevertheless, Dyer insisted on a Christmas airdrop at each station to maintain station morale "and also because critical spare parts were urgently required and certain supplies could not be stored for more than two or three months under local conditions." "Minutes of a Canada-United States Meeting to Discuss Plans for the Joint Arctic Weather Station Programme," 11 January 1951, LAC, RG 24, vol. 8148, f. NSS 1616-9, pt. 4. Thomson and Sykes corroborated Dyer's contention and winter airdrops to the satellite stations continued.
- 117 Lowell Demond, "Christmas Air Drop," 26 December 1956, Lowell Demond collection; Don Ware, phone interview with Daniel Heidt, 24 October 2011; Young, "Station Affairs," 14 April 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports; Mould Bay Station Journal, 14 December 1951, NARA, RG 27, entry 7, box 2, f. Mould Bay, 1950-53.
- 118 Eureka Station Journal, 18 December 1951, NARA, RG 27, entry 7, box 1, f. Reports, Eureka.
- 119 Demond published his letter in: "Weather Station Christmas, drop off by North Star plane," *The Bridgewater Bulletin*, 19 December 2001; Demond, interview with Heidt, 26 October 2011.
- 120 Eureka Station Journal, 25 December 1953, NARA, RG 27, entry 7, box 1, f. Eureka.
- 121 Weaver, interview with Heidt, 9 January 2012; Jelinek, 3 May 1962, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports.
- 122 Wesley Morris, "Station Narrative — Winter 1954-1955," NARA, RG 27, entry 7, box 2, f. Mould Bay, Reports.
- 123 "Meeting to Discuss Plans for the Joint Arctic Weather Program," 1952, LAC, RG 93, box 20, f. 11-10-11, pt. 9.
- 124 Aikins to Chief, Polar Operations Project, "Narrative Report," 3 January 1963, NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Resolute) (Narrative Report).
- 125 "Station Narrative — Winter 1954-1955," NARA, RG 27, entry 7, box 2, f. Mould Bay, Reports.
- 126 John Gilbert, "On Top of the World," *The Red Dragon*, Spring 1957, 41, Gilbert collection.
- 127 Ilzins, "Eureka Station Narrative: Structures," Winter-Spring 1959-60, Eureka. For earlier work, see also Eureka, "Station Journal - Daily Entries," 17 January - 13 February 1954, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports.
- 128 "Isachsen Daily Log," 3, 9, 11, February 1952, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 9.
- 129 "Isachsen Daily Log," 7 November 1951, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 9. Steve Kalin (OIC Isachsen 1951-52), for example, built a drawer unit from scrap he found around the station.
- 130 "Resolute Bay Standing Orders Issued by the Commanding Officer RCAF Station Lachine," 1961, LAC Winnipeg, RG 93, box 28, vol. 1A - Resolute.

- 131 Lloyd Cope, *These Are My Stories* (self-published), 127, Cope collection.
- 132 Ilzins, "Eureka Station Narrative: Cover letter," Winter-Spring 1959–60, Eureka.
- 133 "Two Years in Eureka," 19 December 2001, John Gilbert collection.
- 134 Roszek to Chief, Arctic Operations Project, "Misc. Narratives for June," 12 October 1950, NARA, RG 93, box 8, f. 6754-1294, pt. 6.
- 135 Lowell Demond to Heidt, email, 22 February 2012.
- 136 "Two Years in Eureka," 19 December 2001, John Gilbert collection.
- 137 OIC and ExO to Director, Toronto, and Chief Polar Operations Project, "Mould Bay's Semi-Annual Activities Report," 1 April 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Mould Bay).
- 138 Paxton to Director, "Christmas Landing at Satellites," 11 November 1961, NARA, RG 27, entry 7, box 11, f. Resupply Ops and Requirements.
- 139 Paxton to Chief, USWB, "Christmas Airlift Activity – Resolute and Satellites," 26 December 1961, NARA, RG 27, entry 6, box 11, f. Resupply 4, Fall – Arctic.
- 140 Paxton to Director, "Christmas Landing at Satellites," 11 November 1961, NARA, RG 27, entry 7, box 11, f. Resupply Ops and Requirements.
- 141 Vlad Jelinek, 3 May 1962, NARA, RG 27, entry 7, box 2, f. Resolute Reports. The ExO at Resolute similarly believed that these flights "proved the feasibility of having nearly year-around air operations" at the satellite stations. Paxton to Chief, USWB, "Christmas Airlift Activity – Resolute and Satellites," 26 December 1961, NARA, RG 27, entry 6, box 11, f. Resupply 4, Fall – Arctic.
- 142 In February 1962, the annual joint planning conference still organized Christmas airdrops for all of the satellite stations, and an RCAF meeting that June stated that the mode of supply delivery would only be determined "at the time of the operation." "Minutes: 1962 Annual Joint Arctic Weather Stations Planning Conference," 20 February 1962, LAC, RG 93, box 14, f. 11-10-11, pt. 15; "Minutes of a Meeting Held at Air Transport Command Headquarters - 1000 HRS – 20 June 62 to Discuss Boxtop VII and Resupply to the JAWS," 22 June 1962, LAC, RG 24, acc. 83-84-215, vol. 292, f. 2001-584-A28, pt. 9 - Organization and Administration - Alert Wireless Station NWT 1962. The following February, Resolute's OIC explicitly noted that "Christmas airlifts (rather than airdrops) were carried out to all satellites, to the joy of the inhabitants. It is hoped that circumstances permit the continuing of those lifts, in preference to chasing parachutes about in the Arctic night." Strang, "Final Report of the Officer-In Charge, Department of Transport, Resolute Bay," 24 February 1963, NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Resolute) (Narrative Report).
- 143 During the last few years of the JAWS program, the introduction of commercial passenger jet service out of Montreal and Edmonton to Resolute on a weekly basis — and during the busy summer oil exploration seasons, at least twice weekly — made travel to Resolute much more comfortable. Louis Schwalm to Daniel Heidt, 19 February 2018, email. Nevertheless, a joint committee meeting in 1965 continued to plan Christmas landings at the satellite stations. "Minutes: Annual Canada/United States Joint Arctic Weather Stations Planning Conference," 25 February 1965, LAC, RG 45, vol. 340, f. 3-1-5, pt. 1.1.
- 144 Llewellyn, "Monthly Station Activity Report," 5 December 1965, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
- 145 Emphasis in original. Llewellyn, "Monthly Station Activity Report," 5 December 1965.

- 146 Isachsen Logs, 14 February 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports; Boynton and Frank, "Station Narrative for February 1957," LAC, RG 12, vol. 2806, f. 6754-1291, pt. 15.
- 147 "Isachsen Daily Log," 9 and 24 February 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 148 Weston, interview with Heidt, 22 March 2011.
- 149 Bill Davidson, "Arctic Outpost - Alert at 'Alert,'" *Collier's Magazine*, 28 June 1952, 65.
- 150 Demond, interview with Heidt, 26 October 2011.
- 151 P. Wenzel Geissler and Ann H. Kelly, "A Home for Science: The Life and Times of Tropical and Polar Field Stations," *Social Studies of Science* 46/6 (2016): 803.
- 152 Rae, "Arctic Weather Stations," 52.

NOTES TO CHAPTER 8

- 1 Bill Davidson, "Arctic Outpost - Alert at 'Alert,'" *Collier's Magazine*, 28 June 1952, 65.
- 2 Monte Poindexter, phone interview with Daniel Heidt, 3 March 2011.
- 3 Lawrence A. Palinkas and Peter Suedfeld, "Psychological Effects of Polar Expeditions," *Lancet* 371/9607 (12 January 2008): 155.
- 4 R.E. Strange and W.J. Klein, "Emotional and Social Adjustment of Recent US Winter-Over parties in Isolated Antarctic Stations," in *Polar Human Biology: The Proceedings of the SCAR / IUPS / IUBS Symposium on Human Biology and Medicine in the Antarctic*, ed. O.G. Edholm and E.K.E. Gunderson (London: Heinemann Medical, 1973), 411; Jack Stuster, *Bold Endeavors: Lessons from Polar and Space Exploration* (Annapolis: Naval Institute Press, 1996), 124–25; Chris L. Kleinke, "What Does It Mean to Cope?," in *The Praeger Handbook on Stress and Coping*, vol. 2, ed. Alan Monat, Richard S. Lazarus, and Gretchen Reeve (London: Praeger, 2008), 290–91. Coping strategies included: changing a demand, altering the environment to lessen a stress, changing the individual's perception of a demand, improving an individual's ability to cope with a demand, changing an individual's perception of her/his abilities, helping the individual to learn from a stressful demand, or training others to recognize stress effects in other individuals. William R. Moore, "Planning for Social and Psychological Needs at a Canadian Arctic Military Installation" (unpublished master's thesis, University of British Columbia, 1990), 22.
- 5 Howard Wessbecher, interview by Brian Shoemaker, 20 April 2000, Polar Oral History Project, Ohio State University.
- 6 G.G. Rabbitt, "Report on Fall Airlift of Alert and Eureka Via Thule," Fall 1953, Library and Archives Canada (LAC), RG 93, box 2, f. 6754-19, pt. 5.
- 7 Poindexter, interview with Heidt, 3 March 2011. See also Ken Moulton, phone interview with Daniel Heidt, 1 November 2011.
- 8 Peter Inglis, "Few Can State Coherently Why They Chose That Life," *Ottawa Citizen*, 27 May 1952.
- 9 This ineligibility was particularly true for American personnel, whose generous base pay made them ineligible for additional financial compensation. William Nemeth, phone interview with Daniel Heidt, 12 May 2011.
- 10 In the early years, there were some exceptions when Canadian personnel were reluctant to undertake extra work if they were not receiving overtime wages. E.A. Wood, "Notes on November 19, 1953 Meeting with Mr. D.C. Archibald, Canada, Met. Serv., DOT,"

- National Archives and Records Administration (NARA), RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1953–54.
- 11 John Gilbert, “On Top of the World,” *The Red Dragon*, Spring 1957, 41, Gilbert collection.
 - 12 Fundenburg to Chief, POP, “Report,” 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Mould Bay); Bruce Weaver, phone interview with Daniel Heidt, 9 January 2012.
 - 13 Poindexter as quoted in John Gilbert, “The Joint Arctic Weather Stations: Completing the First Decade, 1952–59” (unpublished, 2004), 58–59, Gilbert collection.
 - 14 Mould Bay Station Journal, 25 October 1951, NARA, RG 27, entry 7, box 2, f. Mould Bay, 1950–53.
 - 15 Frank Lowe, “Monotony is Biggest Enemy in Frigid Arctic Outposts,” *Montreal Star*, 22 April 1955.
 - 16 Isachsen Station Journal, 10 January 1952, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports; R. Magruder Dobie, “Why Husbands Go North,” *Los Angeles Times*, 9 May 1948, 2.
 - 17 McTaggart-Cowan to White, “Problems at Mould Bay,” 23 December 1963, NARA, RG 27, entry 6, box 21, f. Personnel 1-2-Arctic.
 - 18 Davidson, “Arctic Outpost - Alert at ‘Alert,’” 64.
 - 19 Roszek to Chief, Polar Operations Project, “Misc. Narratives for June,” 1950, LAC, RG 93, box 8, f. 6754-1294, pt. 6.
 - 20 Davidson, “Arctic Outpost - Alert at ‘Alert,’” 64. The station personnel were very appreciative of Oldenburg’s donation and wrote to thank her for her generosity. Horgan to Oldenburg, 5 December 1956; Shurie et al., to Oldenburg, 20 February 1958, Dartmouth College Library, Stefansson Collection, MSS-150.
 - 21 OIC to Chief, Arctic Operations Project, “Recreation and Trail,” 4 November 1951, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
 - 22 “Mould Bay, NWT,” LAC Winnipeg, BAN 2004-01213-7, box 2 - Mould Bay photo book.
 - 23 Lloyd Lockhart, “Too Far North for the Eskimos,” *Star Weekly*, 28 July 1951.
 - 24 Robert McDonald, phone interview with Daniel Heidt, 3 May 2011.
 - 25 Llewellyn, “Monthly Station Activity Report – September 1965,” 22 October 1965, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
 - 26 Llewellyn, “Monthly Station Activity Report – February 1966,” 7 March 1966, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
 - 27 Bob Plaseski, phone interview with Daniel Heidt, 2 November 2011.
 - 28 Ritchie Calder, *Men Against the Frozen North* (London: George Allen and Unwin, 1957), 232.
 - 29 John Gilbert, “Way Up North,” *The Canadian Amateur*, May 1979, 31.
 - 30 Paul N. Janes, “North Pole Talks Back,” *Indianapolis Star*, 30 March 1952.
 - 31 Surber form letter, Lowell Demond collection; Davidson, “Arctic Outpost - Alert at ‘Alert,’” 64–65; John Gilbert to Daniel Heidt, 11 June 2013, email.
 - 32 See correspondence in American Heritage Centre, Floyd Wilson Collection #8927, f. Personal: Early Arctic Years – Letters to Irene, 1951–52, and f. Personal Letters and Radiograms to Irene (Mrs. Wilson) from Weather Stations 1951–57. Most personnel made a phone patch once every month or two. Don Ware, phone interview with Daniel Heidt, 24 October 2011; Bill Stadnyk, phone interview with Heidt, 16 January 2012.

- 33 John Melvin, phone interview with Daniel Heidt, 23 November 2011; Stuster, *Bold Endeavors*, 208.
- 34 “W9NZZ Wins Edison Award,” QST, April 1954, John Gilbert collection.
- 35 Dyer to all Joint Arctic Weather Stations, 5 February 1959, John Gilbert collection.
- 36 “W9NZZ Wins Edison Award.”
- 37 Melvin, interview with Heidt, 23 November 2011.
- 38 Eureka Station Journal, 11 and 25 February 1951, NARA, RG 27, entry 7, box 1, f. Reports, Eureka; and Isachsen Station Journal, 5 June 1951, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 39 Bill Nemeth diary, 25 December 1953, Bill Nemeth collection.
- 40 Roberts, “JAWS Trip Report, May-June 1964,” 9 July 1964, NARA, RG 27, entry 6, box 24, f. Arctic Program - Joint Arctic Stations Program; and David R. Thornton, “Alert Station Activities — Sept 1964 to June 1965,” 9 July 1965, NARA, RG 27, entry 7, box 1, f. Reports, Alert.
- 41 Norman A. McFarlane, October 1967, NARA, RG 370, entry 6, box 1, Arctic Station Reports, f. Resolute.
- 42 Floyd Wilson to Irene, 16 February 1952, American Heritage Centre, Floyd Wilson Collection #8927, box 1, f. Personal: Early Arctic Years – Letters to Irene, 1951–52.
- 43 Original all uppercase. Bill Nemeth diary, 31 May 1953; Bill Nemeth to Heidt, 4 July 2012, email.
- 44 Don Shanks quoted in Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 48.
- 45 Isachsen Station Journal, 18 September 1951, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 8.
- 46 Isachsen Station Journal, 13 November 1951, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 9.
- 47 Stuster, *Bold Endeavors*, 155.
- 48 Eureka Station Diary, 26 November 1953, Eureka. See also C.E. Holsapple to Chief, Arctic Operations Project, “Narrative,” 24 November 1951, NARA, RG 27, entry 7, box 2, f. Resolute Reports; Eureka Station Diary, 27 November 1952, Eureka; Rabbitt to Goldenberg, 14 November 1963, NARA, RG 27, entry 6, box 21, f. Personnel 1-2-Arctic; “Menu: Thanksgiving,” American Heritage Centre, Floyd Wilson Collection #8927, f. Correspondence: Weather Stations 1950–84 Folder 1.
- 49 Willie Knutsen and Will C. Knutsen, *Arctic Sun on My Path: The True Story of America’s Last Great Polar Explorer* (Guilford, CT: Lyons Press, 2005), 256.
- 50 Anonymous, “North of Seventy-Four,” *External Affairs*, 312. Several drafts of the article by R.A.J. Phillips can be found in: LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 51 Wesley Morris, “Station Narrative — Winter 1954–1955,” NARA, RG 27, entry 7, box 2, f. Mould Bay, Reports.
- 52 Steve Kalin to Chief, AOP, and Controller, Met Services, “Recreation and Trail,” 4 November 1951, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 53 Mould Bay Journal, 14 December 1951, NARA, RG 27, entry 7, box 2, f. Mould Bay, 1950–53.
- 54 Eureka Station Journal, 14 February 1954, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports.

- 55 Rae, "Inspection Trip to Joint Arctic Weather Stations, April 1952," LAC, RG 93, acc. 80-81/306, box 24, f. 6754-19, pt. 1; Archibald, "Isachsen File 6754-1291," 22 April 1952, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 9.
- 56 Young to Thomson, 20 July 1953, LAC, RG 12, vol. 2805, f. 6754-12, pt. 4.
- 57 Original message all uppercase. As quoted in Attn Mr. C.K. LeCapelain, Acting Director, DNANR, 22 March 1954, John Gilbert collection.
- 58 Thomson to LeCapelain, 22 March 1954, LAC, RG 85, vol. 2800, f. 6754-19, pt. 6. There is evidence that the station huskies preyed on wildlife around the stations. During the dark period at Eureka in 1964, all of the station's dogs left for "almost exactly a month." When they returned, Don Shanks recalled that personnel were "glad to see them, but the experience made us wonder what they had been doing. They might have lost some small amount of weight but not much. There were no signs of any injuries or wounds on them. One can assume they weren't eating Kibble during their time away from 'home.'" Don Shanks to John Gilbert, 19 April 2003, email.
- 59 Cunningham, "Dogs at the Weather Stations — High Arctic," 14 May 1954, LAC, RG 85, vol. 2800, f. 6754-19, pt. 6.
- 60 John Trinko interview, c. 1948, John Gilbert collection.
- 61 Weaver, interview with Heidt, 9 January 2012.
- 62 Frederick G. Ayling, "Meet Our Northern Neighbors," *Christian Science Monitor*, 11 July 1957.
- 63 Isachsen Station Journal, 4 September 1951, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 8.
- 64 Isachsen Station Journal, 10 September 1951, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 8.
- 65 Isachsen Station Journal, 4 December 1951, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 9.
- 66 Davidson, "Arctic Outpost - Alert at 'Alert,'" 65. It was not until 1961, when three Mould Bay personnel had to be evacuated to Winnipeg due to bites from a rabid husky pup, which had been infected by a fox, that JAWS personnel treated Arctic foxes with more caution. Dyer to Beall, "Emergency Incident in the Arctic," 2 June 1961; Archibald to Assistant Deputy Minister, DoT, "Rabies incident – Mould Bay," 5 June 1961; Hildes, "Report on Rabies Mould Bay, N.W.T.," 26 May 1961, NARA, RG 27, entry 6, box 7, f. Arctic 1 (Mould Bay).
- 67 Davidson, "Arctic Outpost - Alert at 'Alert,'" 65.
- 68 Anonymous interview.
- 69 Calder, *Men Against the Frozen North*, 233–34.
- 70 See Tina Loo, *States of Nature: Conserving Canada's Wildlife in the Twentieth Century* (Vancouver: University of British Columbia Press, 2011), 164–81. See also Peter Kulchyski and Frank James Tester, *Kiumajut (Talking Back): Game Management and Inuit Rights, 1900–70* (Vancouver: University of British Columbia Press, 2007), 55–57, 144.
- 71 Eureka Station Journal, 11 December 1953, 27 January 1954, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports. See also Eureka Station Journal, 8 April 1947, Eureka.
- 72 "Justification," 9 December 1959, John Gilbert collection.
- 73 Bill Nemeth diary, 19 August 1953, Nemeth collection.
- 74 Lowell Demond, phone interview with Daniel Heidt, 26 October 2011.
- 75 Farley Mowat, *Never Cry Wolf* (Toronto: McClelland & Stewart, 1963).

- 76 Karen Jones, “*Never Cry Wolf*: Science, Sentiment, and the Literary Rehabilitation of *Canis Lupus*,” *Canadian Historical Review* 84/1 (2003): 65–93.
- 77 Plaseski, interview with Heidt, 2 November 2011.
- 78 David Oldridge, phone interview with Daniel Heidt, 18 January 2012.
- 79 Davis, “Information Concerning U.S. Weather Bureau Arctic Service,” 5 December 1960, NARA, RG 27, entry 6, box 11, f. Training, Orientation, Development.
- 80 Stuster, *Bold Endeavors*, 145.
- 81 Archie Asbridge, “Archie in the Arctic 1958–1963,” n.d., Asbridge collection.
- 82 Nemeth, interview with Heidt, 12 May 2011.
- 83 Paul Reid, phone interview with Daniel Heidt, 12 December 2014.
- 84 Eureka Station Journal, 11 July 1953, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports; Llewellyn, “Monthly Station Activity Report – November 1965,” 5 December 1965, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
- 85 Gilbert, “Joint Arctic Weather Stations: Completing the First Decade,” 50.
- 86 Isachsen Station Journal, 5 February 1952, LAC, RG 93, acc. 81-82-084, box 18, f. 6754-1291, pt. 9; Llewellyn, “Monthly Station Activity Report – November 1965,” 5 December 1965, NARA, RG 93, box 821, f. 6754-1291, pt. 19; Ware, interview with Heidt, 24 October 2011; Nemeth, interview with Heidt, 12 May 2011.
- 87 Reid, interview with Heidt, 12 December 2014.
- 88 Greco to Director, GMD, and Chief, POP, “Mould Bay’s Semi-Annual Activities Report,” 1 April 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Mould Bay).
- 89 Don Shanks, phone interview with Daniel Heidt, 10 March 2011.
- 90 Boyle, 19 September 1954, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports. See also Gilbert, “Joint Arctic Weather Stations: Completing the First Decade”; Fisher to Heidt, 19 February 2012, email.
- 91 See for example the timesheets kept by Floyd Wilson: American Heritage Centre, Floyd Wilson Collection #8927, box 2, Correspondence Weather Stations, 1950–84 Folder 1.
- 92 McDonald, interview with Heidt, 3 May 2011.
- 93 For analyses of alcohol consumption at Antarctic stations consult: Belanger, *Deep Freeze*, 327–30; H.R. Guly, “Psychology During the Expeditions of the Heroic Age of Antarctic Exploration,” *History of Psychiatry* 23/2 (2012): 201; and Stuster, *Bold Endeavors*, 160–62.
- 94 Stadnyk, interview with Heidt, 16 January 2012; Shanks, interview with Heidt, 10 March 2011.
- 95 Poindexter, interview with Heidt, 3 March 2011.
- 96 Oldridge, interview with Heidt, 18 January 2012.
- 97 Stadnyk, interview with Heidt, 16 January 2012; Shanks, interview with Heidt, 10 March 2011. Resolute continued to receive confiscated booze into the late 1960s. Plaseski, interview with Heidt, 2 November 2011.
- 98 Young to Controller (CMD) and Chief (USWB), “Station Affairs,” 14 April 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 99 Oldridge, interview with Heidt, 18 January 2012.
- 100 Poindexter, interview with Heidt, 3 March 2011. On Isachsen OIC Merlin MacAulay’s beer brewing, see Asbridge, “Archie in the Arctic.”
- 101 Stadnyk, interview with Heidt, 16 January 2012.

- 102 A mechanic at Eureka in the early 1950s, for example, was reportedly an alcoholic, but aside from occasional confrontations, his performance remained satisfactory. Moulton, interview with Heidt, 1 November 2011.
- 103 Poindexter, interview with Heidt, 3 March 2011.
- 104 Glen Dyer to Eureka, c. May 1959, John Gilbert collection.
- 105 Andrew H. Brown, "Weather from the White North," *National Geographic* 67/4 (April 1955): 557. Polar psychologists also recognize the stress that can arise from the lack of sexual outlets at isolated postings. They have noted, for example, that the frequency of sexual discussions may coincide with station personnel observing the mating of polar wildlife. G. Palmi, "Psychological Observations on an Isolated Group in Antarctica," *British Journal of Psychiatry* 109/460 (1963): 366–67.
- 106 Christy Collis and Quentin Stevens, "Cold Colonies: Antarctic Spatialities at Mawson and McMurdo Stations," *Cultural Geographies* 14/2 (2007): 242; Stuster, *Bold Endeavors*, 190–91; and Gretchen Legler, "The End of the Heroic Illusion: How Three Generations of Women Writers Have Changed the Literature on Antarctica," *Polar Journal* 12 (2011): 216.
- 107 Glen Dyer to Eureka, c. May 1959, John Gilbert collection.
- 108 Calder, *Men Against the Frozen North*, 212.
- 109 Stadnyk, interview with Heidt, 16 January 2012. This practice continued beyond the JAWS program. See, for example, Gilda Sekler, "Eureka! Life in a Weather Station," *Nunatsiaq News*, 17 November 1976.
- 110 Sue Curtis to Eureka, "Eureka! Sue's On Top the World," 3 December 1969; Wendy Madley, 23 September 1969; Sandy Hunnex to Eureka, n.d.; Helen Parkinson to Eureka, 14 April 1970. These letters are still kept on file at Eureka.
- 111 Lloyd Cope, *These Are My Stories* (self-published), 133–34, Cope collection.
- 112 Demond, interview with Heidt, 26 October 2011.
- 113 Jack Dobson, "Cup, Cigaret Butt Recall Visit," unidentified publication, c. 1957, John Gilbert collection.
- 114 Dobson, "Cup, Cigaret Butt Recall Visit." The shrine was still at the station four years later. Gilbert, "Joint Arctic Weather Stations: Completing the First Decade," 60.
- 115 Brown, "Weather from the White North," 565.
- 116 See for example, Robert J. Corber, *Homosexuality in Cold War America: Resistance and the Crisis of Masculinity* (Durham: Duke University Press, 1997); David K. Johnson, *The Lavender Scare: The Cold War Persecution of Gays and Lesbians in the Federal Government* (Chicago: University of Chicago Press, 2009); Robert D. Dean, *Imperial Brotherhood: Gender and The Making of Cold War Foreign Policy* (Amherst: University of Massachusetts Press, 2001); and K.A. Cuordileone, *Manhood and American Political Culture in the Cold War* (New York: Routledge, 2005).
- 117 "Alert Personnel Incident," 29 December 1952, NARA, RG 27, entry 5, box 6, f. Alert.
- 118 "Investigation of personnel problem at Alert," 1 January 1953, NARA, RG 27, entry 5, box 6, f. Alert. On the history of homosexuality in Cold War Canada, see Gary Kinsman and Patrizia Gentile, *The Canadian War on Queers: National Security as Sexual Regulation* (Vancouver: University of British Columbia Press, 2010) and Gary Kinsman, *The Regulation of Desire: Homo and Hetero Sexualities*, rev. ed. (Montreal: Black Rose Books, 1996).
- 119 "Investigation of personnel problem at Alert," 1 January 1953, NARA, RG 27, entry 5, box 6, f. Alert.

- 120 "Alert Personnel Incident," 29 December 1952, NARA, RG 27, entry 5, box 6, f. Alert.
- 121 Stuster, *Bold Endeavours*, 9; Guly, "Psychology During the Expeditions," 196.
- 122 Plaseski, interview with Heidt, 2 November 2011.
- 123 Demond, interview with Heidt, 26 October 2011.
- 124 John Gilbert to Daniel Heidt, 7 August 2012, email.
- 125 Archie Asbridge to Daniel Heidt, 24 November 2012, email.
- 126 "Narrative-Personnel, period October to April," 12 April 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 127 Weaver, interview with Heidt, 9 January 2012.
- 128 Weaver, interview with Heidt, 9 January 2012.
- 129 Shanks, interview with Heidt, 10 March 2011.
- 130 "Station Inspection Reports, Joint Arctic Weather Stations, Fall Airlift 1959," 30 November 1959, John Gilbert collection.
- 131 Stuster, *Bold Endeavors*, 99.
- 132 Nemeth, interview with Heidt, 12 May 2011.
- 133 Paul D. Nelson, "Leadership in Small Isolated Groups: Report Number 62:13" (San Diego: US Navy Medical Neuropsychiatric Research Unit, 1962); Stuster, *Bold Endeavors*, 96–100; and A.J.W. Taylor, *Antarctic Psychology* (Wellington: Science Information Publishing Centre, 1987), 73, 92.
- 134 Shanks to Director, "Further to my ECHO 205 on David Paterson," 23 June 1964, NARA, RG 27, entry 6, box 24, f. Arctic Program 1 – Eureka. For confirmation see Stuster, *Bold Endeavors*, 130–31.
- 135 See chapter 3.
- 136 Plaseski, interview with Heidt, 2 November 2011.
- 137 Weaver, interview with Heidt, 9 January 2012.
- 138 Nemeth, interview with Heidt, 12 May 2011.
- 139 Shanks, interview with Heidt, 10 March 2011.
- 140 Moulton, interview with Heidt, 1 November 2011.
- 141 R.A.J. Phillips, "Arctic Operations," 9 May 1952, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 142 Wessbecher interview.
- 143 C.E. Holsapple to Chief of USWB AOP, "Monthly Narrative," 3 March 1952, NARA, RG 27, entry 7, box 2, f. Resolute Reports.
- 144 "Station Affairs," 14 April 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 145 "Narrative-Personnel, period October to April," 12 April 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports.
- 146 John Gilbert, phone interview with Daniel Heidt, 29 March 2011.
- 147 Weaver, interview with Heidt, 9 January 2012.
- 148 Dyer to Scholten, "General," 27 October 1960, NARA, RG 27, entry 5, box 4, f. Eureka.
- 149 Phillips, "North of Sixty Six," June 1952, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 150 David Weston, phone interview with Daniel Heidt, 22 March 2011.
- 151 The only significant point of tension along national lines was wages. As chapter 5 describes in more detail, American personnel received up to twice as much pay for the same work as their Canadian counterparts. Better pay was available if Canadian personnel were willing to leave their salaried position at DoT and work on contract,

- but these individuals lost their seniority within the Canadian civil service. Thomson, "Deputy Minister's Memorandum of 23 August 1956," 23 November 1956, LAC, RG 93, box 14, f. 11-10-11, pt. 12. This dynamic persisted throughout the JAWS program because, while Canadian wages rose over time, they never reached American levels. During the 1950s, most Canadian JAWS personnel were career DoT employees who received the same base salary regardless of where they worked. Canada's Northern allowance could have been raised, but the change would have increased wages at other northern Canadian weather stations like Sachs Harbour. Since the wage discontent was limited to JAWS sites, and since the existing pay scales attracted sufficient personnel to fill Canada's JAWS personnel quota without creating serious morale problems, there was little incentive to match American wages.
- 152 "Station Inspection Reports, Joint Arctic Weather Stations, Fall Airlift 1959," 30 November 1959, John Gilbert collection.
 - 153 Chapil to Director, 21 September 1961, NARA, RG 27, entry 6, box 7, f. Arctic 1 (Eureka).
 - 154 Hagglund to Thomson, "Inspection of Joint Arctic Weather Stations during Spring Airlift," 27 April 1955, LAC, RG 93, box 2, f. 6754-19, pt. 18.
 - 155 Jack Falkenhof, phone interview with Daniel Heidt, 23 January 2012.
 - 156 Burton D. Goldenberg to Dyer, 22 December 1954, NARA, RG 27, entry 5, box 3, f. Resolute.
 - 157 Baldwin to Under-Secretary, 3 October 1955, LAC, RG 25, vol. 6511, f. 9061-A-40A, pt. 5-2.
 - 158 See for example: W.E. Murray, 3 August 1955, LAC, RG 12, vol. 2805, f. 6754-1291, pt. 13; Murray, OIC, to Stotts, Executive Officer, 1 November 1956, LAC, RG 12, vol. 2806, f. 6754-1291, pt. 14. Indeed, these reports were sometimes co-authored. See for example: Boynton and Frank, 28 February 1957, LAC, RG 12, vol. 2806, f. 6754-1291, pt. 15.
 - 159 Nemeth to Controller (CMD) and Chief (USWB), "Personnel," 1 July 1953, NARA, RG 27, entry 7, box 1, f. Isachsen Station Reports; Murray and Johnson to Controller (CMD) and Chief (USWB), 3 August 1955, LAC, RG 12, vol. 2805, f. 6754-1291, pt. 13; MacAullay and Greco to Director (CMD) and Chief (USWB), "Semiannual Activities Report," 14 September 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Isachsen); Jelinek, 3 May 1962, NARA, RG 27, entry 7, box 1, f. Eureka, Station Reports; Nemeth, interview with Heidt, 12 May 2011; Shanks, interview with Heidt, 10 March 2011; McDonald, interview with Heidt, 3 May 2011.
 - 160 Moulton, interview with Heidt, 1 November 2011.
 - 161 Demond, interview with Heidt, 26 October 2011. According to John Gilbert, the subject rarely arose at Eureka between 1956 and 1958. Gilbert, interview with Heidt, 29 March 2011.
 - 162 Ware, interview with Heidt, 24 October 2011. There were exceptions. Bob Plaseski volunteered for Arctic service to contribute to either "science or contribute to sovereignty. And everyone [at his stations] had that sense of both when you were up there. Nothing much else to think about other than those two things." Plaseski also recognized that these sentiments were not common with all Canadian JAWS personnel. Plaseski, interview with Heidt, 2 November 2011.
 - 163 Bob Pearson, phone interview with Daniel Heidt, 28 December 2011.
 - 164 Shanks, interview with Heidt, 10 March 2011.
 - 165 Plaseski, interview with Heidt, 2 November 2011.
 - 166 R.M. Rae, *Weather Eye on the Arctic* (Ottawa: Meteorological Division, c. 1958), 2.

- 167 Stephen Bocking, "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960," *Technology and Culture* 50/2 (April 2009): 274. See also Matthew Farish, *The Contours of America's Cold War* (Minneapolis: University of Minnesota Press, 2010).
- 168 On the call for this work, see P. Wenzel Geissler and Ann H. Kelly, "A Home for Science: The Life and Times of Tropical and Polar Field Stations," *Social Studies of Science* 46/6 (2016): 804.
- 169 We are grateful to an anonymous reviewer for highlighting this distinction.
- 170 Palinkas and Suedfeld, "Psychological Effects of Polar Expeditions," 158.
- 171 B.M. Aikins to B.D. Goldenburg, 8 July 1963, NARA, RG 27, entry 6, box 18, f. Arctic Program 1 (Resolute) (Narrative Report).
- 172 Dyer to Goldenberg, "Resolute Station Operations," 11 December 1964, NARA, RG 27, entry 5, box 3, f. Resolute.
- 173 See, for example, Dyer to Scholten, "General," 27 October 1960, NARA, RG 27, entry 5, box 4, f. Eureka.
- 174 Shelagh D. Grant, *Polar Imperative: A History of Arctic Sovereignty in North America* (Vancouver: Douglas & McIntyre, 2010), 302. Grant does not cite any evidence to support this assessment. See also Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia Press, 1988), 241, 243.
- 175 Bocking, "A Disciplined Geography," 275. See also Matthias Heymann, "In Search of Control: Arctic Weather Stations in the Early Cold War," in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald E. Doel, Kristine C. Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 75–98.

NOTES TO CHAPTER 9

- 1 Thomson to Director General, Air Services, DoT, "Canadian Sovereignty Over Arctic Areas," 27 January 1959, Library and Archives Canada (LAC), RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14.
- 2 C.D. Howe, Canada, House of Commons *Debates*, 4 March 1947, 990.
- 3 Keenleyside to Under-Secretary for External Affairs, 1 May 1947, LAC, RG 22, vol. 732, f. SE-4-1-83.
- 4 Johnson, "Re Arctic Weather Stations," 30 April 1947, LAC, RG 25, vol. 3841, f. 9061-A-40, pt. 2.
- 5 G. McIlraith, House of Commons *Debates*, 11 June 1947. DoT was well aware of its limited ability to Canadianize sites operated exclusively by American personnel. During 1948, the Canadians took over two northeastern stations, at Mecatina, Quebec and Clyde River, Baffin Island. By 1949, however, the Americans still operated the stations at Padloping, Cape Harrison, Indian House Lake, Mingan, Frobisher, and Chimo, although Canada promised to assume control of these sites by 1950. Memorandum to Advisory Committee on Northern Development, Re-Canadianization of Northern Canada, 2 March 1949, in Hector Mackenzie, ed., *Documents on Canadian External Relations (DCER) Vol. 15 (1949)* (Ottawa: Supply and Services Canada, 1995), 1471–75. Even this promise proved to be difficult to fulfill. Personnel could not be found for the Padloping station until the RCN took it over in 1953. Extract from Minutes of Joint Planning Committee, 6 April 1954, LAC, RG 24, vol. 8148, f. NSS 1616-9, pt. 8.

- 6 Gordon W. Smith, "Weather Stations in the Canadian North and Sovereignty," *Journal of Military and Strategic Studies* 11/3 (2009): 50.
- 7 See, for example, Shelagh D. Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia Press, 1988); and Grant, *Polar Imperative: A History of Arctic Sovereignty in North America* (Vancouver: Douglas & McIntyre, 2010).
- 8 Memorandum of a Conversation with Lieutenant J.H. MacLean, 1 October 1948, LAC, RG 85, vol. 2083, f. 7140-3. MacLean suggested the RCAF fly over and around the task force to provide evidence of a Canadian presence.
- 9 S/L G.W. Ewan, F/L A.L. Jewett, and F/O V.W. Eldridge, "RCAF Observers' Report, United States Naval Task Force 80," c. 1948, LAC, RG 25, vol. 4254, f. 9061-G-1-40.
- 10 Heeny quoted in Grant, *Sovereignty or Security?*, 227.
- 11 Advisory Committee on Northern Development (ACND) meeting minutes, 10 March 1949, in P. Whitney Lackenbauer and Daniel Heidt, eds., *The Advisory Committee on Northern Development: Context and Meeting Minutes, 1948–66*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 4 (Calgary: Arctic Institute of North America, 2015), 117.
- 12 Extract from Minutes of Meeting of Cabinet Defence Committee, 8 January 1948, "Weather Station Programme; Report by Interdepartmental Meteorological Committee," in Hector Mackenzie, ed., *DCER Vol. 14 (1948)* (Ottawa: Supply and Services Canada, 1994), 1532; Grant, *Sovereignty or Security?*, 224; Minutes of Second Meeting of Advisory Committee on Northern Development, 1 June 1948, in *DCER Vol. 14 (1948)*, 1523; Group Captain W.W. Bean to Mr. Lessard, Deputy Minister of Transport, 18 June 1948, LAC, RG 2, vol. 57, f. A-25-5-T. The Advisory Committee on Northern Development was established to review and recommend government policy in the North. See Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, for details on this body.
- 13 Adam Lajeunesse, *Lock, Stock, and Icebergs: A History of Canada's Arctic Maritime Sovereignty* (Vancouver: University of British Columbia Press, 2016), 65; and Peter Kikkert, "Pragmatism and Cooperation: Canadian-American Defence Activities in the Arctic, 1945–1951" (unpublished master's thesis, University of Waterloo, 2009), 181–82.
- 14 G.L. Magann to William Snow, 14 March 1949, National Archives and Records Administration (NARA), RG 59, entry 1177, PJBD Subject Files, 1940-59, box 5, f. PJBD-General, 1948–56.
- 15 Office of the Chief of Naval Operations to Dr. Reichelderfer, 30 September 1949, NARA, RG 27, entry 5, box 3, f. Arctic Operations, 1950.
- 16 Reichelderfer to Chief, 29 June 1949, and "Future Plans for Canadian – U.S. Cooperation on Arctic Weather Stations," NARA, RG 59, CDF 1945-49, box 6036, f. 842.9243.
- 17 David Bercuson, "Continental Defense and Arctic Sovereignty, 1945–50: Solving the Canadian Dilemma," in *The Cold War and Defense*, ed. Keith Neilson and Ronald G. Haycock (New York: Praeger, 1990), 165.
- 18 "Minutes of a Canada-United States meeting to discuss plans for Arctic Weather Station programme," 26 January 1950, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 19 Warrant Officer Second Class (WO2) R.B. Hampton, "Arctic Glimpses," *The Roundel* 2/12 (November 1950): 38–42.

- 20 “Minutes of a Canada-United States meeting to discuss plans for Arctic Weather Station programme,” 11 January 1951, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 21 Lesage, “Canadian Operation of the Joint Arctic Weather Stations,” 5 March 1954, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 4-2.
- 22 Secretary of State for External Affairs to U.S. Ambassador, No. D-13, 17 January 1952, LAC, RG 85, vol. 1963, f. 1009-5.
- 23 Smith, “Weather Stations,” 48–49.
- 24 “Minutes of a Canada-United States Meeting to Discuss Plans for the Joint Arctic Weather Station Programme,” 8 January 1953, NARA, RG 27, entry 5, box 5, F. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 25 ACND minutes, 11 May 1953, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 160.
- 26 R.A.J. Phillips, Privy Council Office, to the Clerk of the Privy Council, “Developments in the Arctic,” 29 December 1952, in Donald Barry, ed., *DCER Vol. 18 (1952)* (Ottawa: Supply and Services Canada, 1990), 1196–1200. Shelagh Grant makes much of this statement, suggesting that this acute sovereignty concern was a primary catalyst for the High Arctic relocations discussed in the next section. This is one of the cornerstones of her thesis. See Grant, “*Errors Exposed: Inuit Relocations to the High Arctic, 1953–1960*,” Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 8 (Calgary: Arctic Institute of North America, 2016). For a more convincing argument, better situated in historical context, see Magnus Gunther, “The 1953 Relocations of the Inukjuak Inuit to the High Arctic: A Documentary Analysis and Evaluation (“Gunther Report”),” in *Human Flagpoles or Humanitarian Action? Discerning Government Motives behind the Inuit Relocations to the High Arctic, 1953–1960*, DCASS No. 16, ed. P. Whitney Lackenbauer (Calgary: Arctic Institute of North America, 2020), 165–69.
- 27 On the evolution of continental air defence at this time, see Joseph T. Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945–1958* (Vancouver: University of British Columbia Press, 1987); Richard Goette, *Sovereignty and Command in Canada-US Continental Air Defence, 1940–57* (Vancouver: University of British Columbia Press, 2018); and A.G. Lester, *Special Contract: A Story of Defence Communications in Canada*, eds. Jeff Noakes and P. Whitney Lackenbauer (Antigonish: Mulroney Institute on Government, Arctic Operational History Series, no. 6, 2019).
- 28 Cabinet conclusions, 22 January 1953, LAC, RG 2, series A-5-a, vol. 2652.
- 29 On the concept of defence against help in this context, see P. Whitney Lackenbauer, “Defence Against Help: Revisiting a Primary Justification for Canadian Participation in Continental Defence with the United States” (Waterloo: Defence Strategic Foresight Group Occasional Paper, 2020).
- 30 See Jockel, for example, *No Boundaries Upstairs*, 17–20; Steven J. Zaloga, *The Kremlin’s Nuclear Sword: The Rise and Fall of Russia’s Strategic Nuclear Forces, 1945–2000* (Washington: Smithsonian Institution Press, 2002), 12–16; and Kenneth Schaffel, *The Emerging Shield: The Air Force and the Evolution of Continental Air Defence, 1945–1960* (Washington: Office of Air Force History, United States Air Force, 1991), 130.
- 31 “M. M. Hubbard to F. W. Reichelderfer,” April 28, 1953, NARA, RG 27, Records of the Polar Operations Project, Formerly Classified Subject Files, 1942–63, Project — Research and Developments Bd., box 11, f. Project Lincoln, quoted in John Woitkowitz, “Making Sense of the Arctic: U.S.-Canadian Foreign and Defense Relations

- and the Establishment of JAWS and the DEW Line, 1944–1957” (unpublished PhD diss., University of Calgary, 2018), 195–96.
- 32 See Peter Kikkert, Adam Lajeunesse, and P. Whitney Lackenbauer, “Lester Pearson and Arctic Sovereignty: A Case of Un-Pearsonian Diplomacy,” in *Mike’s World: Lester B. Pearson and Canadian External Affairs*, ed. Asa McKercher and Galen Perras (Vancouver: University of British Columbia Press, 2017), 149–68; John Woitkowitz, “The Northern Education of Lester B. Pearson,” *Zeitschrift für Kanada-Studien* 37 (2017): 77–98; and Woitkowitz, “Making Sense,” 213. Pearson told President Dwight Eisenhower and Secretary of State John Foster Dulles in May 1953 that “quite apart from any question of military need for installations in the Far North constructed by the US or jointly, the political question arose in Canada of why Canada should not construct, maintain and operate all such installations in Canadian territory instead of permitting the United States squadrons and technicians into Canada while Canadian squadrons and technicians were moving to Europe.” Report of First Meeting Between Prime Minister and President of United States, 7 May 1953, in Donald Berry, ed., *DCER Vol. 19 (1953)* (Ottawa; Supply and Services Canada, 1991), 1005. See also Lester B. Pearson, “Canada’s Northern Horizon,” *Foreign Affairs* 31/4 (1953): 581–91.
 - 33 Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 193.
 - 34 Extract from the Thirteenth Meeting of the Advisory Committee on Northern Development, 23 November 1953, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 2; R.A.J. Phillips to Clerk of Privy Council, “Developments in the Arctic,” 29 December 1952, in *DCER Vol. 18 (1952)*, 1196–1200. The same year, reporter Peter Inglis wrote, “Some Canadian weather men in the Arctic stations say they believe Canada is in danger of losing control of the great sweep of territory between the Arctic Circle and the Arctic Ocean unless she pins down her own occupancy more firmly.” Peter Inglis, “The Unknown Canada Chapter 6: Whose Arctic?,” LAC, RG 25, vol. 3842, f. 9061-H-40, pt. 2.
 - 35 Jean Lesage, Memorandum to the Cabinet: Canadian Operation of the Joint Arctic Weather Stations, Directorate of History and Heritage (DHH) 2002-117, f. Meeting 562; Thirteenth Meeting of the Advisory Committee on Northern Development, 23 November 1953, Raymont Collection, DHH 73/1223/1801, box 89. Lesage concluded that the assumption of complete Canadian control over all Arctic activities was “particularly desirable ... in view of the major U.S. military activities which have been indicated as probable there in the future, and the possibility of important oil discoveries.” Phillips argued that if a complete Canadian takeover was not possible, Canadians had to take on more of the essential jobs at the stations, such as the observations and radio jobs, which would “leave little but the cooking to the Americans.” The key was to “emphasize the U.S. role of tenant rather than joint proprietor.” For Canada to accomplish this, R.A.J. Phillips calculated that it would need only seventeen more men. Phillips, “Arctic Operations,” 9 May 1952, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
 - 36 Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 193.
 - 37 “Report re Suggested Take-Over of Joint Arctic Weather Stations,” 16 November 1953, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 4-2.
 - 38 “Future of the Joint Weather Stations,” November 1953, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 4-2. The recent and sudden American withdrawal of weather ships in the north Atlantic explains Canadian fears of an American withdrawal.
 - 39 Minutes of the ACND meeting, 23 November 1953, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 198.
 - 40 Minutes of the ACND meeting, 23 November 1953, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 199.

- 41 Minutes of the ACND meeting, 23 November 1953, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 199–200.
- 42 Lesage, “Canadian Operation of the Joint Arctic Weather Stations,” 5 March 1954, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 4-2.
- 43 “Meeting regarding continuation of the joint U.S.-Canadian Arctic Weather Station Program,” 18 November 1953, NARA, RG 59, CDF 1950-54, box 3066, f. 701.022, Arctic.
- 44 “Meeting regarding continuation,” 18 November 1953.
- 45 This exchange was not the first time that Reichelderfer conflated military and civil agendas to serve his department’s goals. Historian Kristine Harper notes that Reichelderfer “recognized the potential of computer-assisted weather prediction, along with his organization’s inability to fund it” during the late 1940s and early 1950s. To resolve this funding shortfall and fulfill the USWB’s congressionally assigned civil mandate, the retired naval officer convinced the US Navy that his proposed forecasting research could be used to facilitate military operations and perhaps even lead to breakthroughs that would allow the country’s forces to control the weather for offensive or defensive purposes. Harper, *Weather by the Numbers: The Genesis of Modern Meteorology* (Cambridge: Massachusetts Institute of Technology Press, 2012), 99, 237.
- 46 Phillips to Thomson, 30 November 1954, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 5-1.
- 47 Advisory Committee on Northern Development, “Minutes of the Eighteenth Meeting,” 26 April 1954, DHH 73-1223, box 89, f. 1800-1801, 3.
- 48 Each journalist invited to observe airlifts was expected to submit drafts of their articles to Ottawa and Washington for vetting. Ottawa examined each article closely. For example, the RCAF’s Director of Public Relations, R.V. Dodds, requested that William Griffis remove content from his article suggesting that the stations were secret because it was “a fairly flagrant inaccuracy” that was “about six or seven years behind the times.” Dodds to Wershof, 23 February 1953, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3. By contrast, officials approved Rae’s articles that emphasized the multifaceted impact the stations were having in the Arctic. The Meteorological Division at DoT still feared “misleading” statements in the press, however, and in 1953 cautioned against newspaper representation on airlifts “unless the copy prepared by the reporter is submitted to the Meteorological Division for editing prior to its release.” “Joint Arctic Weather Station Programme,” 8 January 1953, LAC, RG 93, box 20, f. 11-10-11, pt. 10.
- 49 Ralph Allen, “We haven’t done right by our North,” *Maclean’s*, 15 November 1954. In a similar vein, Blair Fraser’s article, which followed a visit to the JAWS stations, Fort Churchill, and the US airbase at Thule in Greenland, asserted that “the Canadian Arctic has no defenses whatever.” Fraser, “The Truth about our Arctic Defence,” *Maclean’s*, 15 November 1954. See also Woitkowitz, “Making Sense,” 257.
- 50 Phillips to Thomson, 30 November 1954, LAC, RG 25, vol. 3351, f. 9061-H-40, pt. 3.
- 51 “Joint Arctic Weather Station Planning Conference,” 6 January 1955, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1950, 51, 52, 53, 55, 57.
- 52 On perceived shortcomings to this arrangement, see R.A.J. Phillips, memorandum to Clerk of Privy Council, 29 December 1952, in *DCER Vol. 18 (1952)*, 1198–99.
- 53 Gaskell to Brown, “Joint Arctic Weather Stations,” 12 March 1956, LAC, RG 25, vol. 7718, f. 9061-A-40, pt. 6.1.
- 54 B. Rogers, “Weekly Division Notes,” 19 January 1954, LAC, RG 25, vol. 6510, f. 9061-A-40, pt. 4.
- 55 Minutes of the ACND, 19 October 1953, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 191. In 1952 and 1953, Canadian ships

- independently transported some supplies to Resolute. "Weather Stations: Exchange of Notes Between Canada and the United States of America," 1952 *Treaty Series*, LAC, RG 25, vol. 4254, f. 9061-P-40.
- 56 DoT, "Press Release #500," 18 June 1954, LAC, RG 25 A-4-B, vol. 4253, f. 9061-G-1-40, pt. 2; "Canada is Supplying Arctic Area by Ship," *New York Times*, 29 August 1954. The USN continued to run Alert's sea resupply until 1956, when the RCAF assumed responsibility for the station's resupply.
- 57 Statement by the Hon. Lionel Chevrier, Minister of Transport, in the House of Commons, 9 February 1954, LAC, MG 32, vol. 75, f. 62-1. The 1954 plan for a US task force to conduct the sea supply of Alert was disrupted when bad ice conditions blocked the route. Instead, the USAF resupplied Alert by airlift. Smith, "Weather Stations," 51.
- 58 Howard Wessbecher, interview by Brian Shoemaker, 20 April 2000, Polar Oral History Project, Ohio State University.
- 59 Minutes of the ACND meeting, 22 March 1954, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 247.
- 60 Minutes of the ACND meeting, 20 February 1961, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 701.
- 61 Flight Lieutenant J.D. Harvey, "North of Fifty-Four: The Northern Operations of Air Transport Command," *The Roundel* 7/11 (December 1955), reprinted in Richard Goette and P. Whitney Lackenbauer, eds., *Northern Skytrails: Perspectives on the Royal Canadian Air Force in the Arctic from the Pages of The Roundel, 1949-65*, DCASS No. 10 (Calgary: Centre for Military, Security and Strategic Studies, 2017), 141.
- 62 See Daniel Heidt and Richard Goette, "'This is No 'Milk Run'": Operation *Boxtop*, 1956-2015," in *Canadian Arctic Operations, 1941-2015: Lessons Learned, Lost, and Relearned*, ed. Adam Lajeunesse and P. Whitney Lackenbauer (Fredericton: Gregg Centre for the Study of War & Society, 2017), 270-306.
- 63 Smith, "Weather Stations," 51-52. See also Corporals G.A. Walker and W.M. Noice, "Operation Re-Supply: Semi-Annual Arctic Airlift Has Become Routine for A.T.C.," *The Roundel* 11/5 (June 1959), in Goette and Lackenbauer, *Northern Skytrails*, 158-59. Far from opposing RCAF control, the US Weather Bureau embraced it. See, for example, E.A. Wood, Memorandum for the Record, 11 October 1960, NARA, RG 27, entry 6, box 1, f. Arctic 1 (Alert).
- 64 See, for instance, Ken S. Coates, *Best Left as Indians: Native-White Relations in the Yukon Territory, 1840-1973* (Montreal & Kingston: McGill-Queen's University Press, 1991); and William R. Morrison, "Canadian Sovereignty and the Inuit of the Central and Eastern Arctic," *Études/Inuit/Studies* 10/1-2 (1986): 245-59.
- 65 On the early 1950s, see Frank James Tester and Peter Kulchyski, *Tammarniit (Mistakes): Inuit Relocation in the Eastern Arctic, 1939-63* (Vancouver: University of British Columbia Press, 1994); R. Quinn Duffy, *The Road to Nunavut: The Progress of the Eastern Arctic Inuit Since the Second World War* (Montreal & Kingston: McGill-Queen's University Press, 1988); David Damas, *Arctic Migrants/Arctic Villagers: The Transformation of Inuit Settlement in the Central Arctic* (Montreal & Kingston: McGill-Queen's University Press, 2002); Richard J. Diubaldo, *A Historical Overview of Government-Inuit Relations, 1900-1980s* (Ottawa: Department of Indian Affairs and Northern Development, 1992); and Gordon Robertson, *Memoirs of a Very Civil Servant: Mackenzie King to Pierre Trudeau* (Toronto: University of Toronto Press, 2000).
- 66 J.W. Burton to J.G. Wright, 13 October, 1950; and reply, 21 October 1950, LAC, RG 85, vol. 2085, f. 20996/3; also quoted in Grant, "Errors Exposed," 53 (with a different interpretation).

- 67 Grant, "Errors Exposed," 55. See also Gunther, "1953 Relocations of the Inukjuak Inuit," 127–37.
- 68 Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918–25* (Vancouver: University of British Columbia Press, 2010), 138.
- 69 The best account of life at the post is William Barr, *Red Serge and Polar Bear Pants: The Biography of Harry Stallworthy, RCMP* (Edmonton: University of Alberta Press, 2004).
- 70 Gunther, "1953 Relocations of the Inukjuak Inuit," 130; Lyle Dick, *Muskox Land: Ellesmere Island in the Age of Contact* (Calgary: University of Calgary Press, 2001), 458.
- 71 Eureka "Station Journal, 1952–1953," 12–15 October 1952, NARA, RG 27, entry 7, box 1, f. Reports, Eureka.
- 72 John Melvin, phone interview with Daniel Heidt, 23 November 2011.
- 73 Grant, "Errors Exposed", 6–7.
- 74 Gunther, "1953 Relocations of the Inukjuak Inuit," 134.
- 75 Ken Moulton, phone interview with Daniel Heidt, 1 November 2011; David Weston, phone interview with Daniel Heidt, 22 March 2011.
- 76 Colin MacDonald to Dyer, 28 November 1965, 5–6, LAC, RG 93, box 821, f. 6754-1291, pt. 19.
- 77 The Craig Harbour relocatees would eventually form the community of Grise Fiord. Most studies on the relocations were written to encourage the federal government to apologize to and compensate the relocated Inuit. See, for example, Alan R. Marcus, *Out in the Cold: The Legacy of Canada's Inuit Relocation Experiment in the High Arctic* (Copenhagen: International Work Group for Indigenous Affairs, 1992); Tester and Kulchyski, *Tammarniit*; René Dussault and George Erasmus, *The High Arctic Relocation: A Report on the 1953–55 Relocation* (Ottawa: Royal Commission on Aboriginal Peoples, 1994); Alan Rudolph Marcus, *Relocating Eden: The Image and Politics of Inuit Exile in the Canadian Arctic* (Hanover, NH: University Press of New England, 1995); and Grant, "Errors Exposed."
- 78 John David Hamilton, *Arctic Revolution: Social Change in the Northwest Territories, 1935–1994* (Toronto: Dundurn Press, 1994), 58.
- 79 Farley Mowat's *People of the Deer* (Boston: Little Brown, 1952), which strongly denounced government neglect and inaction with respect to famine and epidemics plaguing the Ihalmiut in the Keewatin (now Kivalliq) region, raised this as an unavoidable political question.
- 80 For a recent literature review, see Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?*
- 81 Alan R. Marcus, "Inuit Relocation Policies in Canada and Other Circumpolar Countries, 1925–60," report for the Royal Commission on Aboriginal Peoples (December 1995), http://publications.gc.ca/collections/collection_2017/bcp-pco/Z1-1991-1-41-149-eng.pdf.
- 82 See, for example, Grant, "Errors Exposed"; Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?*; and Janice Cavell, "'Consolidation and Control of All Eskimo Income': The Motive for the 1953 High Arctic Relocation," *Journal of Canadian Studies* 55/1 (2021): 118–51.
- 83 R.G. Robertson to C.M. Drury, Deputy Minister of National Defence, re: relocation of Inuit families at Resolute Bay, 18 February 1954, LAC, RG 22, A-1-a, vol. 298, f. 40-8-1, pt. 4.

- 84 See, for example, minutes of ACND meeting to discuss the transfer of certain Eskimo families from North Quebec to Cornwallis and Ellesmere Islands, 10 August 1953, reprinted in Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?*, 77–78.
- 85 “Apology for the High Arctic Relocation: Speaking Notes for the Honourable John Duncan,” 15 September 2010, <https://www.rcaanc-cirnac.gc.ca/eng/1100100016115/1534786491628>; Indian and Northern Affairs Canada, “Government of Canada Apologizes for Relocation of Inuit Families to the High Arctic,” News Release 2-3389, 18 August 2010.
- 86 See F. Ross Gibson, “No reason to apologize to the natives,” *Arctic Circle* (September/October 1991): 8; Doug Wilkinson, “The paradox of the Inuit relocates,” *Arctic Circle* (Summer 1993): 32–33; Magnus Gunther, “The 1953 Relocations of the Inukjuak Inuit to the High Arctic: A Documentary Analysis and Evaluation” (report for the Department of Indian Affairs and Northern Development, 1993) reproduced in Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?*; Gerard Kenney, *Arctic Smoke & Mirrors* (Prescott, ON: Voyageur Publishing, 1994); and Gordon W. Smith, “The Relocation of Inuit from Hudson Bay and Baffin Island to the High Arctic in 1953, and Subsequent Events, including Disputed Sovereignty Issues,” in Lackenbauer, ed., *Human Flagpoles or Humanitarian Action?* In its report on the High Arctic relocations, the Royal Commission on Aboriginal Peoples (RCAP) explained rather cryptically that “this is not to say that sovereignty was necessarily of equal rank with the economic concerns that drove the relocation. It is to say, however, that sovereignty was a factor that, in the minds of some people who played key roles in the project, reinforced and supported the relocation and contributed to the attractiveness in their minds of a relocation to uninhabited islands in the High Arctic.” Dussault and Erasmus, *High Arctic Relocation*, 115.
- 87 C.M. Bolger, “Relocation of Eskimo Groups in the High Arctic,” c. 1960, NWT Archives, N-1992-023, box 24, f. 10, Relocations – Movement of Inuit 1953–1968; “Confidential Report on Tour of the Arctic Islands, 8–12 September 1953, LAC, RG 22, vol. 176, f. 40-20-20, pt. 3; and G.W. Stead, 29 September 1953, quoted in Tester and Kulchyski, *Tammarniit*, 154–53. More generally, see P. Whitney Lackenbauer and Ryan Shackleton, “Inuit-Air Force Relations in the Qikiqtani Region During the Early Cold War,” in *De-Icing Required! The Historical Dimension of the Canadian Air Force’s Experience in the Arctic*, ed. P. Whitney Lackenbauer and W.A. March (Trenton: Canadian Forces Air Warfare Centre, 2012), 73–94.
- 88 “Conditions Amongst Eskimos – Resolute Bay,” 5 January 1961, LAC, RG 18, vol. 55, f. TA 500-8-1-14.
- 89 See sources in footnote 66, as well as Larry Audlaluk, *What I Remember, What I Know: The Life of a High Arctic Exile* (Iqaluit: Inhabit Media, 2020); Melanie McGrath, *The Long Exile: A True Story of Deception and Survival amongst the Inuit of the Canadian Arctic* (London: Fourth Estate, 2006); John Amagoalik, *Changing the Face of Canada*, ed. Louis McComber (Iqaluit: Life Stories of Northern Leaders, vol. 2, Nunavut Arctic College, 2007); “Exile,” directed by Zacharias Kunuk (Isuma Productions, 2009, 47 mins.); and the short films and interviews available at Iqqaumavara, <http://www.iqqaumavara.com/>.
- 90 C.M. Drury to R. Gordon Robertson, 2 February 1954, LAC, RG 22, A-1-a, vol. 298, f. 40-8-1, pt. 4.
- 91 Robertson to Drury, 18 February 1954, LAC, RG 22, A-1-a, vol. 298, f. 40-8-1, pt. 4.
- 92 “Conditions Amongst Eskimos – Resolute Bay,” 26 March 1954, LAC, RG 18, vol. 55, f. TA 500-8-1-14.

- 93 Jean Lesage, "Enter the European V: Among the Eskimos (Part II)," *Beaver* 295 (Spring 1955): 6–7, 9.
- 94 Robertson to Drury, 18 February 1954; see also B.G. Sivertz, "Conditions Amongst Eskimos – Resolute Bay, re: RCAF Christmas Airlift," 28 December 1954, LAC, RG 18, vol. 55, f. TA500-8-1-14. Deputy Minister Gordon Robertson felt that it was reasonable to allow Inuit to "engage in whatever casual employment that might be available at the base, or any related establishments, from time to time," and asked the military to train them on machinery so that they could play a more useful role in unloading supplies during the annual sealift. Robertson to Drury, 18 January 1955, LAC, RG 22, A-1-a, vol. 298, f. 40-8-1, pt. 5.
- 95 Bolger, "Relocation of Eskimo Groups."
- 96 Ritchie Calder, *Men Against the Frozen North* (London: George Allen and Unwin, 1957), 212.
- 97 At the base dump, Inuit set traps for fox that fed off discarded food, but they were strictly forbidden from taking clothing or food from the dump for human use. They were allowed to collect scrap wood and other materials to build their homes, which often featured discarded RCAF furniture and even linoleum flooring. At times base personnel helped with the construction or improvements to the Inuit houses, which were considered "well beyond the usual type of Eskimo dwelling constructed from scrap." T.C. Jenkins to O.C., re Conditions Amongst Eskimos, 4 January 1960, and Gordon to O.C., re: Conditions Amongst the Eskimos, 5 January 1961, LAC, RG 18, vol. 55, f. TA 500-8-1-14.
- 98 See "Conditions Amongst the Eskimos – Resolute Bay for the year ending December 31st, 1962." The community continued to experience problems with alcohol after 1961, with people home-brewing or importing it.
- 99 See, for example, Diamond Jenness, *Eskimo Administration II: Canada* (Montreal: Arctic Institute of North America, 1964); and P. Whitney Lackenbauer, "Defence, Development, and Inuit: St-Laurent's Modern Approach to the North," in *The Unexpected Louis St-Laurent*, ed. Patrice Dutil (Vancouver: University of British Columbia Press, 2020), 193–221.
- 100 Lackenbauer and Shackleton, "Inuit-Air Force Relations"; Qikiqtani Truth Commission (QTC), *Community Histories 1950–1975: Resolute Bay* (Iqaluit: QTC, 2014), 33, https://qtcommission.ca/sites/default/files/community/community_histories_resolute_bay.pdf. The RCAF base at Resolute provided Inuit with the opportunity to earn money to buy equipment, such as rifles and bullets, to participate in "modern" hunting.
- 101 Report re: Economic Development and Actions taken in 1953 and proposed for 1954, no date, LAC, RG 22, A-1-a, vol. 298, f. 40-8-1, pt. 5. On the committee's work, see Peter Clancy and P. Whitney Lackenbauer, *Shaping Inuit Policy: The Minutes of the Eskimo Affairs Committee, 1952–62*, DCASS No. 13 (Calgary: Arctic Institute of North America, 2019).
- 102 Only one family of six people was sent to Grise Fiord, perhaps indicating the government's evolving preference for Resolute because of its mixed economy.
- 103 C.M. Bolger to Mr. Stevenson, re: Relocation of Eskimo Groups in the High Arctic, 4 October 1960, NWT Archives, N-1992-023, box 24, f. 10, Relocations – Movement of Inuit 1953–1968.
- 104 NWT Archives, N92-023, Stevenson Papers, Report to the Director, 15 November 1960, quoted in Grant, "Errors Exposed", 62–63. Although sent to the director under the signature of the Arctic Administrator, C.M. Bolger, the draft copies identify Alex Stevenson as the author.

- 105 In addition to the ongoing employment of Inuit during the shipping season, the RCAF also hired several Inuit to help with the northern survival school that had been transferred to Resolute from Cambridge Bay in 1958. Inuit instructors taught RCAF and Northern Affairs personnel survival techniques in case they were forced to make an emergency landing in the Arctic environment. Don Bissett, *Resolute: An Area Economic Survey* (Ottawa: Industrial Division, Department of Indian Affairs and Northern Development, 1968), 89.
- 106 Lee E. Weissling, "Inuit Redistribution and Development: Processes of Change in the Eastern Canadian Arctic, 1922–1968" (unpublished PhD diss., University of Alberta, 1991), 206. On the government's decision not to establish communities near the weather stations, see also Tester and Kulchyski, *Tammarniit*, 324. On the Canadian liberal order, see for example Ian McKay, "The Liberal Order Framework: A Prospectus for a Reconnaissance of Canadian History," *Canadian Historical Review* 81/4 (2000): 616–78, and Michel Ducharme and Jean-François Constant, eds., *Liberalism and Hegemony: Debating the Canadian Liberal Revolution* (Toronto: University of Toronto Press, 2009).
- 107 QTC, *Community Histories: Resolute Bay*; Weissling, "Inuit Redistribution and Development."
- 108 QTC, *Community Histories: Resolute Bay*, 16–17.
- 109 Bruce Weaver, phone interview with Daniel Heidt, 9 January 2012.
- 110 These comments are confined to JAWS, and a more general study of the RCAF station and government footprint in Resolute is needed to determine their applicability more broadly. The QTC notes that "Qausitturmiut received medical care at the base even though the government never intended for medics to serve local populations. Qausitturmiut also took advantage of excess construction materials for building houses and workshops in the settlement and several people eventually worked at the base." The RCAF station also "facilitated consumption of southern goods, including alcohol, and the RCMP likely felt more pressure under the eyes of southern employees to enforce rules." QTC, *Community Histories: Resolute Bay*, 16–17.
- 111 Chief of the Bureau, "Annual Canadian/US Planning Conference on Arctic Operations," 10 January 1955; J. Glenn Dyer to Deputy Chief of the Bureau, 28 December 1955, NARA, RG 27, entry 5, box 5, f. Annual Ottawa Meeting, 1956.
- 112 Damas, *Arctic Migrants/Arctic Villagers*.
- 113 Hamilton, *Arctic Revolution*.
- 114 Ken S. Coates et al., *Arctic Front: Defending Canada in the Far North* (Toronto: Thomas Allen, 2008), 76–79, 87–88; Philip Isard, "Northern Vision: Northern Development during the Diefenbaker Era" (unpublished master's thesis, University of Waterloo, 2010); and Frances Abele, "Canadian Contradictions: Forty Years of Northern Political Development," *Arctic* 40/4 (December 1987): 312.
- 115 On Diefenbaker's wariness of the civil service, see Peter C. Newman, *Renegade in Power: The Diefenbaker Years* (Toronto: McClelland & Stewart, 1963); and Denis Smith, *Rogue Tory: The Life and Legend of John G. Diefenbaker* (Toronto: Macfarlane Walter & Ross, 1995).
- 116 Alvin Hamilton to George Hees, 26 January 1959, LAC, RG 93, box 14, f. 11-10-11, pt. 13.
- 117 Hamilton to Hees, 17 March 1959, LAC, RG 93, box 14, f. 11-10-11, pt. 13.
- 118 Hamilton to Hees, 14 April 1959, LAC, RG 93, box 14, f. 11-10-11, pt. 13.
- 119 Hees to Hamilton, 12 February 1959, LAC, RG 93, box 14, f. 11-10-11, pt. 13.
- 120 Hees to Hamilton, 22 June 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14. Hees's replies made no mention of recruitment problems — one of DoT's typical

- arguments against Canadianization. The department was set to train a record number of met techs in 1960, but recruitment would ebb and flow annually over the following decade, and the department never achieved the capacity to Canadianize JAWS without diverting resources from its weather stations in other parts of the country. DoT met tech recruitment estimates are based on class graduation photos available at Canadian Meteorological and Oceanographic Society Archives, "Table Five - Civilian Meteorological Technician Courses and Conferences," <http://cmosarchives.ca/Metphotos/T5/photoindex.html>.
- 121 Andrew Thomson, "Canadian Sovereignty Over Arctic Areas," 27 January 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14.
 - 122 F.M. Tovell to Mr. Tremblay, DEXAF, 17 February 1959, LAC, RG 25, vol. 4766, f. 50070-40, pt. 7; Thomson, "Canadian Sovereignty Over Arctic Areas," 27 January 1959, and Thomson to C.E. Stevens, Office of the Director General, Air Services, DoT, 12 June 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14.
 - 123 Hees to Hamilton, 3 April 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 13.
 - 124 See, for example, Joseph T. Jockel, *Canada in NORAD, 1957–2007: A History* (Kingston: Queen's Centre for International Relations and the Queen's Defence Management Program, 2007); P. Whitney Lackenbauer and Peter Kikkert, "Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945–68," in *In the National Interest: Canadian Foreign Policy and the Department of Foreign Affairs and International Trade, 1909–2009*, ed. Greg Donaghy and Michael K. Carroll (Calgary: University of Calgary Press, 2011), 101–20; and Kenneth C. Eyre, *Custos Borealis: The Military in the Canadian North, 1898–1975*, ed. P. Whitney Lackenbauer (Peterborough: North American and Arctic Defence and Security Network, 2020), 196–99.
 - 125 Taylor to File, 21 January 1955, LAC, RG 25, vol. 6511, f. 9061-A-40A, pt. 5-2.
 - 126 Minutes ACND meeting, 20 February 1961, in Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*, 701.
 - 127 See LAC, RG 45, vol. 340, f. 3-1-5, pt. 1.1.
 - 128 See Lackenbauer and Heidt, eds., *Advisory Committee on Northern Development*.
 - 129 Dyer to McLachlan, 8 January 1963, Dan McLachlan fonds, box 1, f. D.
 - 130 "20th Annual Canada/United States Joint Arctic Weather Stations Planning Conference, Ottawa, 16 February 1967," LAC, RG 93, acc. 81-82/084, box 15, f. 1200-19, pt. 4. The USWB's austerity began before 1967. In 1963, it had already begun limited retrenchment of its activities in Antarctica. Dyer to McLachlan, 8 January 1963, AIP, Dan McLachlan fonds, box 1, f. D. The following year, George P. Cressman, the new director of the USWB, also considered "reducing its [the USWB's] overall support of the JAWS by \$160,000 rather than drop Isachsen." Roberts, "Background Information for Mr. Cartwright," 27 August 1964, NARA, RG 370, entry 4, Office Files of the Polar Assistant, box 1, f. 1 July–31 Dec. 1964 - full copy.
 - 131 Rockney to Straus, 20 June 1967; Cressman to Noble, 22 June 1967; Vasey, "Curtailement of US Weather Bureau Service in Canada," NARA, RG 59, entry (A1) 5602, box 4, f. Research - Arctic, 1967.
 - 132 Archibald, "USWB Participation in the JAWS Project," 26 November 1969, LAC, RG 93, acc. 81-81-084, box 15, f. 1200-19, pt. 5.
 - 133 Rockney, "Draft Briefing Note for President," c. fall 1970, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 5; Scott, "U.S. Withdrawal from U.S.-Canadian Joint Arctic

- Weather Station Network,” 26 March 1970, NARA, RG 59, entry (A1) 5602, box 3, f. Arctic Weather Station, 1970.
- 134 Boughner, “Internal Met. HQ/ESSA USWB Meeting,” 18 February 1870, LAC, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 5.
- 135 On the legal status of these waters, see Donat Pharand, *Canada’s Arctic Waters in International Law* (Cambridge: Cambridge University Press, 1988); Lajeunesse, *Lock, Stock, and Icebergs*; and P. Whitney Lackenbauer, Suzanne Lalonde, and Elizabeth Riddell-Dixon, *Canada and the Maritime Arctic: Boundaries, Shelves, and Waters* (Peterborough: North American and Arctic Defence and Security Network, 2020), 107–61.
- 136 Maxwell Cohen, “The Arctic and the National Interest,” *International Journal* 26/1 (1970–71): 72.
- 137 See Edgar J. Dosman, ed., *The Arctic in Question* (Toronto: Oxford University Press, 1976); P. Whitney Lackenbauer and Peter Kikkert, *The Canadian Forces & Arctic Sovereignty: Debating Roles, Interests and Requirements, 1968–1974* (Waterloo: Laurier Centre for Military Strategic and Disarmament Studies, 2010); and Ted McDorman, *Salt Water Neighbors: International Ocean Law Relations between the United States and Canada* (Oxford: Oxford University Press, 2009).
- 138 See, for example, “Canada to Run 5 Arctic Posts Without US,” *Globe and Mail*, 31 December 1970. In personal interviews, several former JAWS personnel expressed the same assumptions about a linkage between the *Manhattan* voyage and the “Canadianization” of the JAWS program.
- 139 Interview of Patrick D. McTaggart-Cowan by D.W. Phillips, Canadian Meteorological Service Oral History Project, 5 October 1973, accessed 4 September 2016, <http://n2t.net/ark:/85065/d7d21vzt>, 23.
- 140 Rockney, “Draft Briefing Note for President,” 8 September 1970, NARA, RG 93, acc. 81-82-084, box 15, f. 1200-19, pt. 5.
- 141 Scott to Hillenbrand, “U.S. Withdrawal from U.S.-Canadian Joint Arctic Weather Station Network,” 26 March 1970, NARA, RG 59, entry (A1) 5602, box 3, f. Arctic Weather Station, 1970.
- 142 “Attachment 1: Increase in Canadian commitment in support of JAWS,” 18 February 1970, NARA, RG 59, entry (A1) 5602, box 3, f. Arctic Weather Station, 1970.
- 143 “Joint Arctic Weather Stations: 25 Years,” LAC, MG 31 G-34, f. 188.
- 144 Labelle, “Flag Lowering Ceremony Resolute Bay,” 18 October 1972, LAC Winnipeg, RG 93, box 28, vol. 1 – Resolute.
- 145 Labelle, “Flag Lowering Ceremony.”
- 146 The DoT arranged a seven-course banquet for about thirty people, including all DoT and JAWS staff, following the ceremony. Once again, the departing Americans were in the spotlight. Goodbrand reviewed some of the highlights of establishing and operating the stations before offering a toast to the “spirit of U.S.-Canadian cooperation which had characterized the entire program.” Dyer followed, paying tribute to all JAWS personnel and retelling anecdotes from the program’s early years. The station’s cook, Reno Castellarin, capped off the festivities with a three-foot-square cake sporting icing replicas of the US and Canadian flags in the upper corners and “1947–1972” below. Dyer had the honour of cutting the cake. Labelle, “Flag Lowering Ceremony.”

NOTES TO CONCLUSIONS

- 1 Canada, Meteorological Branch of the Ministry of Transport, "Joint Arctic Weather Stations: Twenty-Five Years," Department of External Affairs (DEXAF) Information Division Reprint 28 (1970), 2.
- 2 William C. Wonders, "The Joint Arctic Weather Stations (JAWS) in the Queen Elizabeth Islands," in *Essays on Meteorology and Climatology: In Honour of Richmond W. Longley*, ed. K.D. Hage, R.W. Longley, and E.R. Reinelt (Edmonton: Department of Geography, University of Alberta, 1978), 399.
- 3 Shelagh D. Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: University of British Columbia Press, 1988), 241, 243; Shelagh D. Grant, *Polar Imperative: A History of Arctic Sovereignty in North America* (Vancouver: Douglas & McIntyre, 2011), 302; and Stephen Bocking, "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960," *Technology and Culture* 50/2 (2009): 275.
- 4 See, for example, Ronald E. Doel, "Constituting the Postwar Earth Sciences: The Military's Influence on the Environmental Sciences in the USA after 1945," *Social Studies of Science* 33 (2003): 635–66; Matthias Heymann et al., "Exploring Greenland: Science and Technology in Cold War Settings," *Scientia Canadensis* 33/2 (2010): 11–42; Janet Martin-Nielsen, "'The Deepest and Most Rewarding Hole Ever Drilled': Ice Cores and the Cold War in Greenland," *Annals of Science* 70/1 (2013): 47; Sverker Sörlin, "Narratives and Counter-Narratives of Climate Change: North Atlantic Glaciology and Meteorology, c. 1930–1955," *Journal of Historical Geography* 35/2 (2009): 237–55; Sverker Sörlin and Paul Warde, "Making the Environment Historical," in *Nature's End: History and the Environment*, ed. Sörlin and Warde (London: Palgrave MacMillan, 2009); J.R. McNeill and Corinna R. Unger, "Introduction: The Big Picture," in *Environmental Histories of the Cold War*, ed. J.R. McNeill and Corinna R. Unger (Cambridge: Cambridge University Press, 2010); J.R. McNeill, "Observations on the Nature and Culture of Environmental History," *History and Theory* 42 (2003): 5–43; Stephen Bocking, "Science and Spaces in the Northern Environment," *Environmental History* 12/4 (2007): 867–94; and Stephen Bocking and Daniel Heidt, eds., *Cold Science: Environmental Knowledge in the North American Arctic during the Cold War* (London: Routledge, 2019).
- 5 See Sverker Sörlin, "The Historiography of the Enigmatic North," *Canadian Historical Review* 95/4 (2014): 562.
- 6 Tina Loo, *Moved by the State: Forced Relocation and Making a Good Life in Postwar Canada* (Vancouver: University of British Columbia Press, 2019), 6.
- 7 See, for example, Suzanne Zeller, "The Colonial World as Geological Metaphor: Strata(gems) of Empire in Victorian Canada," *Osiris* 15 (2000): 85–107.
- 8 Christy Collis and Quentin Stevens, "Cold Colonies: Antarctic Spatialities at Mawson and McMurdo Stations," *Cultural Geographies* 14/2 (2007): 234–54.
- 9 Ronald E. Doel et al., "Strategic Arctic Science: National Interests in Building Natural Knowledge - Interwar Era through the Cold War," *Journal of Historical Geography* 44 (2014): 69.
- 10 Ritchie Calder, *Men Against the Frozen North* (London: George Allen and Unwin, 1957), 214.
- 11 John W. Warnock, *Partner to Behemoth: The Military Policy of a Satellite Canada* (Toronto: New Press, 1970); John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies*, rev. ed. (Atlanta: University of Georgia

- Press, 2008); Greg Donaghy, *Tolerant Allies: Canada & the United States, 1963–1968* (Montreal & Kingston: McGill-Queen’s University Press, 2002); and P. Whitney Lackenbauer and Rob Huebert, “Premier Partners: Canada, the United States and Arctic Security,” *Canadian Foreign Policy Journal* 20/3 (2014): 320–33.
- 12 Hume Wrong to A.D.P. Heeney, 24 June 1946, Library and Archives Canada (LAC), RG 25, vol. 3347, f. 9061-A-40, pt. 1.
 - 13 Gordon W. Smith, “Weather Stations in the Canadian North and Sovereignty,” *Journal of Military and Strategic Studies* 11/3 (2009): 60–61.
 - 14 John Woitkowitz similarly concludes in a recent study that “statements by individual officials and lower-level studies did not reflect the policy of the U.S. Department of State or the White House. Authoritative guidance by Secretary of State Dean Acheson and the comments by President Harry Truman to the Canadian Prime Minister not only” revealed no intention to question Canada’s legal position, “they displayed a keen awareness of Ottawa’s sensitivity ... [and] a nuanced appreciation of the political repercussions and the detrimental international legal rulings likely to result from an aggressive American policy.” Woitkowitz, “Making Sense of the Arctic: U.S.-Canadian Foreign and Defense Relations and the Establishment of JAWS and the DEW Line, 1944–1957” (unpublished PhD diss., University of Calgary, 2018), 163.
 - 15 Woitkowitz, “Making Sense,” 163.
 - 16 J. Glenn Dyer letter to Ellen Burns, 6 October 1959, quoted in John Gilbert, “The Joint Arctic Weather Stations: Completing the First Decade, 1952–1959” (unpublished, 2004), Gilbert collection, 2.
 - 17 Andrew Thomson to Stevens, 12 June 1959, LAC, RG 93, acc. 80-81/306, box 14, f. 11-10-11, pt. 14.
 - 18 Matthias Heymann, “In Search of Control: Arctic Weather Stations in the Early Cold War,” in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald E. Doel, Kristine C. Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 76. Grant, *Polar Imperative*, 297–302 offers similar analysis.
 - 19 Jørgen Taagholt and Jens Claus Hansen, *Greenland: Security Perspectives*, trans. Daniel Lufkin (Fairbanks: Arctic Research Consortium of the United States, 2001), 29. See also Heymann, “In Search of Control”; and Clive Archer, “The United States Defence Areas in Greenland,” *Cooperation and Conflict* 23 (1988): 123–44.
 - 20 Nikolaj Petersen, “SAC at Thule: Greenland in the U.S. Polar Strategy,” *Journal of Cold War Studies* 13/2 (2011): 90–115.
 - 21 Heymann, “In Search of Control,” 75–98.
 - 22 Ronald E. Doel, Kristine C. Harper, and Matthias Heymann, “Exploring Greenland’s Secrets: Science, Technology, Diplomacy, and Cold War Planning in Global Contexts,” in *Exploring Greenland: Cold War Science and Technology on Ice*, ed. Ronald E. Doel, Kristine C. Harper, and Matthias Heymann (New York: Palgrave Macmillan, 2016), 11–12; Henry Nielsen and Kristian H. Nielsen, “Camp Century – Cold War City Under the Ice,” in *Exploring Greenland*, 195–216; and Janet Martin-Nielsen, “The Other Cold War: The United States and Greenland’s Ice Sheet Environment, 1948–1966,” *Journal of Historical Geography* 38/1 (2012): 69–80.
 - 23 See, for example, Matthias Heymann, Henry Nielsen, Kristian Hvidtfelt Nielsen, and Henrik Knudsen, “Small State versus Superpower: Science and Geopolitics in Greenland in the Early Cold War,” in *Cold War Science and the Transatlantic Circulation of Knowledge*, ed. Jeroen van Dongen (Leiden: Brill, 2015), 243–71; and Thorsten Borring Olesen, “Tango for Thule: The Dilemmas and Limits of the ‘Neither Confirm nor Deny’

- Doctrine in Danish-American Relations, 1957–1968,” *Journal of Cold War Studies* 13/2 (2011): 116–47.
- 24 Heymann et al., “Exploring Greenland,” 14, 40.
- 25 Smith, “Weather Stations,” 52. Smith also cites examples of construction projects in the 1950s.
- 26 Collis and Stevens, “Cold Colonies,” 249.
- 27 “Joint Arctic Weather Stations: Five Year Report, 1946–1951” (Ottawa and Washington: Meteorological Division - Department of Transport and the US Weather Bureau, 1951) (hereafter DoT and USWB, “Five Year Report”), 146. For an example of the early use of the JAWS data, see R.W. Rae, “Climate of the Canadian Arctic Archipelago,” a booklet published by the Meteorological Division, DoT, in January 1952.
- 28 Heymann, “In Search of Control,” 85.
- 29 *Hearings Before the Committee on Agriculture, House of Representatives, Seventy-Ninth Congress, Second Session on H.R. 4611 (S.765), 22 January 1946*, National Archives and Records Administration (NARA), RG XPOLA, entry 17, Charles Hubbard Papers, box 1, f. Miscellaneous.
- 30 Doel et al., “Strategic Arctic Science,” 60.
- 31 Doel et al., “Strategic Arctic Science,” 71.
- 32 Calder, *Men Against the Frozen North*, 215.
- 33 Bocking, “Science and Spaces,” 123.
- 34 See, for example, E.F. Roots, “The Role of Logistics in Northern Research,” in *Proceedings of the Second National Northern Research Conference*, ed. J.J. Bond (Edmonton: Boreal Institute, 1969), 65–77; Richard C. Powell, *Studying Arctic Fields: Cultures, Practices, and Environmental Sciences* (Montreal & Kingston: McGill-Queen’s University Press, 2017), 150–62; and Dian Olson Belanger, *Deep Freeze: The United States, the International Geophysical Year, and the Origins of Antarctica’s Age of Science* (Boulder: University Press of Colorado, 2006).
- 35 Marianne Cronin, “Shaped by the Land: An Envirotechnical History of a Canadian Bush Plane,” in *Ice Blink: Navigating Northern Environmental History*, ed. Stephen Bocking and Brad Martin (Calgary: University of Calgary Press, 2017), 108. See also Dolly Jørgensen, Finn Arne Jørgensen, and Sara B. Pritchard, eds., *New Natures: Joining Environmental History with Science and Technology Studies* (Pittsburgh: University of Pittsburgh Press, 2013); Dolly Jørgensen and Sverker Sörlin, eds., *Northscapes: History, Technology, and the Making of Northern Environments* (Vancouver: University of British Columbia Press, 2013); and Edward Jones-Imhotep and Tina Adcock, eds., *Made Modern: Science and Technology in Canadian History* (Vancouver: University of British Columbia Press, 2018).
- 36 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* 39/8 (2007): 1803.
- 37 Doel et al., “Strategic Arctic Science,” 78.
- 38 Liza Piper, “Coming In from the Cold,” *Canadian Historical Review* 95/4 (2014): 573.
- 39 We are grateful to an anonymous reviewer for emphasizing this point.
- 40 See, for example, Bocking, “Disciplined Geography,” and Powell, “Rigours of an Arctic Experiment.”

- 41 James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998), 311.
- 42 Steven Shapin, "Placing the View from Nowhere: Historical and Sociological Problems in the Location of Science," *Transactions of the Institute of British Geographers* 23/1 (1998): 6, quoted in Tina Loo and Meg Stanley, "An Environmental History of Progress: Damming the Peace and Columbia Rivers," *Canadian Historical Review* 92/3 (2011): 406–07.
- 43 Powell, *Studying Arctic Fields*.
- 44 Bocking, "Disciplined Geography," 287.
- 45 Collis and Stevens, "Cold Colonies," 235.
- 46 Henrika Kuklick and Robert E. Kohler, "Introduction," *Osiris* 11 (1996): 2.
- 47 Aspa Sarris and Neil Kirby, "Behavioral Norms and Expectations on Antarctic Stations," *Environment and Behavior* 39/5 (2007): 707.
- 48 Peter Johnson, phone interview with Daniel Heidt, 26 May 2011.
- 49 John Melvin, phone interview with Daniel Heidt, 23 November 2011; Bob Pearson, phone interview with Daniel Heidt, 28 December 2011.
- 50 Lowell Demond, phone interview with Daniel Heidt, 26 October 2011.
- 51 Tom Griffiths, *Slicing the Silence: Voyaging to Antarctica* (Cambridge: Harvard University Press, 2007), 183.
- 52 Griffiths, *Slicing the Silence*, 182–83.
- 53 See Matthew Farish, *The Contours of America's Cold War* (Minneapolis: University of Minnesota Press, 2010).
- 54 On isolation as a dominant theme in the military experience, see Kenneth C. Eyre, *Custos Borealis: The Military in the Canadian North, 1898–1975*, ed. P. Whitney Lackenbauer (Peterborough: North American and Arctic Defence and Security Network, 2020).
- 55 Archie Asbridge, *My Life in Canada* (self-published, 2015), 35.
- 56 Calder, *Men Against the Frozen North*, 231.
- 57 Peter Inglis, "Unknown Canada: Few Can State Coherently Why They Chose That Life," *Ottawa Citizen*, 27 May 1952.
- 58 Canada, Meteorological Branch of the Ministry of Transport, "Joint Arctic Weather Stations: Twenty-Five Years," 2.
- 59 On this critique, see Powell, "Rigours of an Arctic Experiment," 1807.
- 60 Exceptions include Jack Stuster, *Bold Endeavors: Lessons from Polar and Space Exploration* (Annapolis: Naval Institute Press, 1996); A.J.W. Taylor, *Antarctic Psychology* (Wellington: Science Information Publishing Centre, 1987); and H.R. Guly, "Psychology During the Expeditions of the Heroic Age of Antarctic Exploration," *History of Psychiatry* 23/2 (2012): 194–205.
- 61 Sarris and Kirby, "Behavioral Norms," 719. See this study for important gender differences that are not comparable to the JAWS case, given that these stations were staffed entirely by men until Canada ran them as the High Arctic Weather Stations in the 1970s.
- 62 Stuster, *Bold Endeavors*, 102.
- 63 Bob Plaseski, phone interview with Daniel Heidt, 2 November 2011.
- 64 Joan Sangster, *The Iconic North: Cultural Constructions of Aboriginal Life in Postwar Canada* (Vancouver: University of British Columbia Press, 2015), 3.

- 65 Lloyd Lockhart, "Too Far North for the Eskimos," *Star Weekly* [Toronto], 28 July 1951. See also David R. Gray, *Alert, Beyond the Inuit Lands: The Story of Canadian Forces Station Alert* (Ottawa: Borealis, 1997).
- 66 We are grateful to an anonymous reviewer for highlighting this distinction. For a reflection on these ideas, see Rudy Wiebe, *Playing Dead: A Contemplation Concerning the Arctic* (Edmonton: NeWest, 1989).
- 67 Lyle Dick, *Muskox Land: Ellesmere Island in the Age of Contact* (Calgary: University of Calgary Press, 2001), 303.
- 68 Quoted in Hickling Corp., *Assessment of the Factual Basis of Certain Allegations Made before the Standing Committee on Aboriginal Affairs Concerning the Relocation of Inuit Families to the High Arctic in the 1950s* ("Hickling Report"), reprinted in P. Whitney Lackenbauer, ed., *Human Flagpoles or Humanitarian Action? Discerning Government Motives behind the Inuit Relocations to the High Arctic, 1953–1960*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 16 (Calgary: Arctic Institute of North America, 2020), 50. On the sovereignty "threat" posed by Inughuit, see Magnus Gunther, *The 1953 Relocations of the Inukjuak Inuit to the High Arctic: A Documentary Analysis and Evaluation* ("Gunther Report"), in the same volume.
- 69 See Inuit Tapiriit Kanatami, "Inuit Nunangat Map," <https://www.itk.ca/inuit-nunangat-map/>.
- 70 William Nemeth, phone interview with Daniel Heidt, 12 May 2011.
- 71 Robert McDonald, phone interview with Daniel Heidt, 3 May 2011.
- 72 David Oldridge, phone interview with Daniel Heidt, 18 January 2012.
- 73 Plaseski, interview with Heidt, 2 November 2011. See also Bruce Weaver, phone interview with Daniel Heidt, 9 January 2012.
- 74 John Gilbert, phone interview with Daniel Heidt, 29 March 2011.
- 75 Thomson to Director General, Air Services, DoT, "Deputy Minister's Memorandum of August 23 1956," 23 November 1956, LAC, RG 93, box 14, f. 11–10 –11, pt. 12; McDonald, interview with Heidt, 3 May 2011.
- 76 Demond, interview with Heidt, 26 October 2011.
- 77 DoT and USWB, "Five Year Report," 21. Even when Alert had a septic tank, human waste was not treated before it was pumped onto the rocks near the shore of the bay. Plaseski, interview with Heidt, 2 November 2011.
- 78 Don Shanks, phone interview with Daniel Heidt, 10 March 2011.
- 79 Heymann et al., "Exploring Greenland," 40.
- 80 On the "afterlives" of stations, see Vanessa Heggie, "Higher and Colder: The Success and Failure of Boundaries in High Altitude and Antarctic Research Stations," *Social Studies of Science* 46/6 (2016): 823.
- 81 Ron Huibers, phone interview with Daniel Heidt, 22 November 2011.
- 82 Rick Risbey, phone interview with Daniel Heidt, 26 November 2011.
- 83 See, for example, Sawchuk to Regional Director, "Freezing and Related Problems during Severe Weather Conditions," 17 December 1973, LAC Winnipeg, RG 93, box 25, vol. 1 – Isachsen; and Deueau, "Monthly Station Operations Report: Mould Bay," 1 March 1987, LAC Winnipeg, RG 93, box 1, vol. 10 - Mould Bay.
- 84 Doug Munson, phone interview with Daniel Heidt, 20 August 2012.
- 85 Risbey, interview with Heidt, 26 November 2011.
- 86 Matthew Fisher, "Weathering the Nation's Cold Spot," *Globe and Mail*, 29 August 1988.

- 87 Dave Tidbury, phone interview with Daniel Heidt, 12 October 2011.
- 88 Risbey, interview with Heidt, 26 November 2011. The archival record is almost entirely silent on this incident. In February 1976, Stossel did send job descriptions for all personnel to assist Mould Bay's OIC with informing his staff of their duties, "complete probationary reports, narrative performance evaluations, and annual appraisals." Stossel to OIC, Mould Bay, "Job Descriptions," 11 February 1976, LAC Winnipeg, RG 93, box 26, vol. 2 - Mould Bay.
- 89 Christopher Dummitt, *The Manly Modern: Masculinity in Postwar Canada* (Vancouver: University of British Columbia Press, 2011).
- 90 Heather Blain, phone interview with Daniel Heidt, 26 June 2012. Christine Wynowich, who served at Eureka a few years later, expressed similar sentiments — although she told the *Globe and Mail* that she would not have accepted the posting if she had not been accompanied by a second woman. Fisher, "Weathering the Nation's Cold Spot."
- 91 Gilda Sekler, "Eureka! Life in a Weather Station," *Nunatsiaq News*, 17 November 1976, 22.
- 92 David Oldridge to Heidt, 29 August 2012, email.
- 93 Labelle, "Project Hurricane," 5 March 1980, LAC Winnipeg, RG 93, box 2, vol. 4 - Alert; "Monthly Station Operations Report: Mould Bay," 1 April 1985, LAC Winnipeg, RG 93, box 20, vol. 8 - Mould Bay; Environment Canada, "Welcome to the Eureka Weather Station," April 2010, https://wattsupwiththat.files.wordpress.com/2010/04/visitor_guide_to_eureka_apr_2010.pdf.
- 94 Labelle, "Project Hurricane."
- 95 "Monthly Station Operations Report: Mould Bay," 1 April 1985, LAC Winnipeg, RG 93, box 20, vol. 8 - Mould Bay.
- 96 Risbey, interview with Heidt, 26 November 2011.
- 97 Parrott, "What is Life in Eureka Like Now?"
- 98 In 1974, it reduced HAWS tours to nine months, and by the early 1980s to six months. Huibers, interview with Heidt, 22 November 2011. Personnel had always received the option of taking three weeks paid leave at the end of their first year, and this was doubled to twice a year in 1974. Bob McInnes to Heidt, 24 August 2012, email; Ron Huibers to Heidt, 24 August 2012, email; Tidbury to Heidt, 24 August 2012, email. Although these shorter terms and brief respites facilitated recruitment, they also led to high rotation rates. "If I had a toll booth I'd be rich," OIC John Mravnik joked from Mould Bay in 1984. Mravnik, "Monthly Station Operations Report, Mould Bay NWT," 31 August 1984, LAC Winnipeg, RG 93, box 20, vol. 7 - Mould Bay.
- 99 Risbey, interview with Heidt, 26 November 2011.
- 100 Bob McInnes, phone interview with Daniel Heidt, 3 July 2012.
- 101 Kahler, "A Review of AES Operations Resolute Bay, N.W.T.," December 1983, LAC Winnipeg, RG 93, box 20, vol. 8 - Resolute.
- 102 Tidbury, interview with Heidt, 12 October 2011.
- 103 P. Wenzel Geissler and Ann H. Kelly, "A Home for Science: The Life and Times of Tropical and Polar Field Stations," *Social Studies of Science* 46/6 (2016): 804.
- 104 On this theme, see Collis and Stevens, "Cold Colonies," 235.
- 105 Qikiqtani Truth Commission (QTC), *Community Histories 1950–1975: Resolute Bay* (Iqaluit: QTC, 2014), https://qtcommission.ca/sites/default/files/community_community_histories_resolute_bay.pdf.

- 106 Tidbury, interview with Heidt, 12 October 2011. For others who thought similarly, see Eureka Station Journal, 18 June 1980, LAC Winnipeg, RG 93, box 2, vol. 3 - Eureka; Hunter, "Monthly Station Report: Eureka," September 1987, LAC Winnipeg, RG 93, box 1, vol. 12 - Eureka; and Bitton to Stossel, "General Housekeeping - Eureka," 19 November 1986, LAC Winnipeg, RG 93, box 2, vol. 8 - Mainline Stations.
- 107 Katherine Harding, "How the 'Frozen Chosen' Settled Eureka," *Globe and Mail*, 6 April 2007.
- 108 See, for example, Bitton, "Monthly Station Operations Report: Eureka," October 1986, LAC Winnipeg, RG 93, box 1, vol. 10 - Mould Bay.
- 109 Dave Tidbury, "Synopsis Regarding DND/AES Agreement," 28 August 1976, LAC Winnipeg, RG 93, box 21, vol. 2 - Alert - DND-AES.
- 110 Risbey to CAED Winnipeg, "Proposed Amalgamation with DND June 01, 1978," 8 March 1978, LAC Winnipeg, RG 93, box 2, vol. 4 - Alert.
- 111 Risbey, interview with Heidt, 26 November 2011.
- 112 Risbey to CAED Winnipeg, 8 March 1978.
- 113 Risbey, interview with Heidt, 26 November 2011.
- 114 Mike Balshaw, phone interview with Daniel Heidt, 2 February 2012.
- 115 Overall, Broughton concluded that relations between civilian and military personnel "couldn't be better." Broughton, "Comments on AES/DND Joint Meeting Oct 1977," 23 September 1979, LAC Winnipeg, RG 93, box 2, vol. 4 - Alert. See also, "Minutes of the DND/AES Co-Ordination Meeting," October 1979, LAC Winnipeg, RG 93, box 21, vol. 5 - Alert - DND-AES.
- 116 Colin to Marchand, "Closing of Weather Station - Isachsen, N.W.T.," 20 June 1978, LAC Winnipeg, RG 93, box 25, vol. 2 - Isachsen.
- 117 McBride, "Atmospheric Environment Service close the weather Station at Isachsen N.W.T.?" c. September 1978, and McBride to Burton, 8 August 1978, LAC Winnipeg, RG 93, box 25, vol. 2 - Isachsen.
- 118 Denis Stossel, "Proposed First Load for Mould Bay," 13 September 1978, and "Third Trip from Isachsen," 14 September 1978, LAC Winnipeg, RG 93, box 25, vol. 2 - Isachsen.
- 119 Kovisto, Isachsen, 19 September 1978, LAC Winnipeg, RG 93, box 25, vol. 2 - Isachsen.
- 120 Morrison, "High Arctic Weather Stations: Their Future, Appendix 1," 31 August 1983, LAC, RG 12, box 102, f. AA 5230.
- 121 Ken Fluto, phone interview with Daniel Heidt, 25 January 2012.
- 122 Balshaw, interview with Heidt, 2 February 2012. It cost more than \$1 million to transport diesel fuel from Resolute to Mould Bay every two years.
- 123 Ric Stryde, "Nothing in the Forecast," *Northern News Services*, 7 July 1997, http://www.nnsl.com/frames/newspapers/1997-07/jul7_97cold.html.
- 124 Fluto, interview with Heidt, 25 January 2012.
- 125 Balshaw, interview with Heidt, 2 February 2012.
- 126 Fluto, interview with Heidt, 25 January 2012.
- 127 Plaseski, interview with Heidt, 2 November 2011.
- 128 Dan Weaver et al., "Intercomparison of Atmospheric Water Vapour Measurements at a Canadian High Arctic Site," *Atmospheric Measurement Techniques* 10/8 (2017): 2851-80.
- 129 Research resulting from Eureka data includes G. Lesins, T.J. Duck, and J.R. Drummond, "Climate Trends at Eureka in the Canadian High Arctic," *Atmosphere-Ocean* 48/2

(2010): 59–80; Adrienne White et al., “Assessment of Historical Changes (1959–2012) and the Causes of Recent Break-Ups of the Petersen Ice Shelf, Nunavut, Canada,” *Annals of Glaciology* 56/69 (2015): 65–76; and Dan Weaver et al., “Comparison of Ground-Based and Satellite Measurements of Water Vapour Vertical Profiles over Ellesmere Island, Nunavut,” *Atmospheric Measurement Techniques* 12/7 (2019): 4039–63.

Bibliography

Archival Sources

American Heritage Center, University of Wyoming, Laramie, Wyoming

Floyd Wilson Collection #8927

Dartmouth College, Rauner Special Collections Library, Hanover, New Hampshire

Margaret Oldenburg Papers, MSS-150

Department of National Defence, Directorate of History and Heritage, Ottawa, Ontario

DHH 75-50

DHH 80-574

DHH 2002-17

DHH 112.009 (D44)

DHH File 112.3M2 (D117)

DHH File 112.3M2 (D331)

DHH 112.3M2 (D565)

DHH 955.013 (D10)

Department of Transport Archives, Toronto

Reports, Journals, Personnel Circulars, Recruiting Literature

Environment Canada Library, Ottawa, Ontario

Environment Canada Library, Toronto, Ontario

Library and Archives Canada (LAC), Ottawa, Ontario

GOVERNMENT RECORDS:

Privy Council Office Records, RG 2

Department of Transport Records, RG 12

Department of Indian and Northern Affairs Records, RG 22

Department of National Defence Records, RG 24

Department of External Affairs Records, RG 25

Geological Survey of Canada, RG 45

Northern Affairs Program, RG 85

Surveys Mapping and Remote Sensing Records, RG 88

Atmospheric Environment Service, RG 93

MANUSCRIPT GROUPS:

Brooke Claxton Papers, MG 32 B 5

William Lyon Mackenzie King Papers, MG 26

MG 31 G-34

MG 30 E144

Andrew George Latta McNaughton collection, MG 30 E133

Library and Archives Canada (LAC), Winnipeg, Manitoba

Atmospheric Environment Service, RG 93

McGill University Archives, Montreal, Quebec

McGill University War Records

National Archives, Kew, United Kingdom

Cabinet Records, CAB series

Dominions Office Records, DO Series

National Archives and Records Administration (NARA), College Park, Maryland

Weather Bureau Records, RG 27

State Department Records, RG 59

Office of the Chief of Ordinance Records, RG 156

Joint Chiefs of Staff Records, RG 218

International Military Agencies Records, RG 233

Army Staff Records 1903–2006, RG 319

Office of the Secretary of State Records, RG 330

PJBD Records, RG 333

U.S. Army Operational, Tactical and Support Organizations, RG 338

National Oceanic and Atmospheric Administration, RG 370

Charles J. Hubbard Papers, XCJH

Northwest Territories Archives, Prince of Wales Heritage Centre, Yellowknife, NWT

N-1992-023

Personal Collections

Frank Adams

Archie Asbridge

Noble Bowes

Brian Brown

George Butler

Wallo Catto

Lloyd Cope

Walter Crooke

Murray Dean

Lowell Demond

Wally Denholm

Environment Canada

Dick Etherington
Alan Faller
Ken Fluto
Robert Frank
Paul Gilberg
John Gilbert
Robert Grauman
Borge Haagensen
Roy Hayward
Ron Huibers
J.P. Johnson Jr.
Peter Johnson
Jim Jung
Wally Kent
Miro Kostiuik
Eric Lange
Art Leganchuk
Merlin MacAuley
Verne Marsh
Graham Mathes
Robert McDonald
Bob McInnes
Dan McLachan
Ron McLaren
Don McNair
John Melvin
Howard Mosher
Ken Moulton
Bill Nemeth
John Ohnmachts
Bob Pearson
Ken Pilon
Monte Poindexter
Mike Power
George Rabbitt
Neil Roberts
Richard Rutkowski
Don Shanks
Jim Shurie
Gordon W. Smith (in the possession of Tom and Nell Smith, Calgary)
Dave Tidbury

John Trinko
Bruce Weaver
David Westen

Syracuse University Library, Special Collections Research Center, Syracuse, New York

George Dufek Papers

University of Manitoba, Winnipeg, Manitoba

Andrew Taylor Collection

Yukon Archives, Whitehorse, Yukon

Alan Innes-Taylor fonds

Unpublished Interviews

Mike Balshaw. Phone interview by Daniel Heidt. 2 February 2012
Heather Blain. Phone interview by Daniel Heidt. 26 June 2012
Lowell Demond. Phone interview by Daniel Heidt. 26 October 2011
Jack Falkenhof. Phone interview by Daniel Heidt. 23 January 2012
Allan Faller. Phone interview by Daniel Heidt. 14 September 2011
George Fisher. Phone interview by Daniel Heidt. 26 November 2011
Ken Fluto. Phone interview by Daniel Heidt. 25 January 2012
John Gilbert. Phone interview by Daniel Heidt. 29 March 2011
Ron Huibers. Phone interview by Daniel Heidt. 22 November 2011
Peter Johnson. Phone interview by Daniel Heidt. 26 May 2011
Robert McDonald. Phone interview by Daniel Heidt. 3 May 2011
Bob McInnes. Phone interview by Daniel Heidt. 3 July 2012
John Melvin. Phone interview by Daniel Heidt. 23 November 2011
Ken Moulton. Phone interview by Daniel Heidt. 1 November 2011
Doug Munson. Phone interview by Daniel Heidt. 20 August 2012
William Nemeth. Phone interview by Daniel Heidt. 12 May 2011
Lorne Novak. Phone interview by Daniel Heidt. 26 November 2011
David Oldridge. Phone interview by Daniel Heidt. 18 January 2012
Bob Pearson. Phone interview by Daniel Heidt. 28 December 2011
Bob Plaseski. Phone interview by Daniel Heidt. 2 November 2011
Monte Poindexter. Phone interview by Daniel Heidt. 3 March 2011
Paul Reid. Phone interview by Daniel Heidt. 12 December 2014
Rick Risbey. Phone interview by Daniel Heidt. 26 November 2011
Don Shanks. Phone interview by Daniel Heidt. 10 March 2011
Bill Stadnyk. Phone interview by Daniel Heidt. 16 January 2012
David Tidbury. Phone interview by Daniel Heidt. 12 October 2011
Don Ware. Phone interview by Daniel Heidt. 24 October 2011
Bruce Weaver. Phone interview by Daniel Heidt. 9 January 2012
David Weston. Phone interview by Daniel Heidt. 22 March 2011

Published Interviews

- Patrick D. McTaggart-Cowan by D.W. Phillips, Canadian Meteorological Service Oral History Project. 5 October 1973. Accessed 4 September 2016, <http://n2t.net/ark:/85065/d7d21vzt>.
- Howard Wessbecher. Interview by Brian Shoemaker. 20 April 2000. Polar Oral History Project, Ohio State University.

Listservs

- JAWS / HAWS @ Multiply*. <http://lteuicmbrb.multiply.com> (no longer accessible).
- JAWS / HAWS @ Yahoo*. <http://tech.groups.yahoo.com/group/JAWS-HAWS/>.

Published Government Documents

- Canada. Department of External Affairs. *Documents on Canadian External Relations (DCER)*. Ottawa: Queen's Printer.
- Vol. 12, 1946, ed. Donald Page. 1977.
- Vol. 14, 1948, ed. Hector Mackenzie. 1994.
- Vol. 15, 1949, ed. Hector Mackenzie. 1995.
- Vol. 18, 1952, ed. Donald Barry. 1990.
- Vol. 19, 1953, ed. Donald Barry. 1991.
- Canada. Department of Finance. *Federal Budget of Canada: 1945–1954*. Ottawa: Edmond Cloutier, 1946–49.
- Canada. Department of National Defence. *Report of the Department of National Defence for the Fiscal Year Ending March 31, 1947*. Ottawa: Queen's Printer, 1947.
- Canada. Department of Transport, Meteorological Branch. *Manual of Standard Procedures and Practices for Weather Observing and Reporting (MANOBS)*, 5th ed. Toronto: Government of Canada, 1961.
- Canada. Department of Transport, Meteorological Division. *Manual of Standard Procedures and Practices for Weather Observing and Reporting (MANOBS)*, 2nd ed. Toronto: Government of Canada, 1949.
- Canada. Environment Canada. "Joint Arctic Weather Stations: 25 Years." Ottawa: Environment Canada, 1972.
- Canada. House of Commons *Debates*. 1945–71.
- Canada. Meteorological Branch of the Ministry of Transport. "Joint Arctic Weather Stations: Twenty-Five Years." Department of External Affairs (DEXAF) Information Division Reprint 28 (1970).
- Contributions to our Knowledge of the Meteorology of the Arctic Regions*, vol. I. London: H.M. Stationery Office, 1879–88.
- Dussault, René, and George Erasmus. *The High Arctic Relocation: A Report on the 1953–5 Relocation*. Ottawa: Royal Commission on Aboriginal Peoples, 1994.
- Indian and Northern Affairs Canada. "Government of Canada Apologizes for Relocation of Inuit Families to the High Arctic." News Release 2-3389. 18 August 2010.
- Meteorological Council. *Contributions to our Knowledge of the Meteorology of the Arctic Regions*, part III. London: Her Majesty's Stationery Office, 1879.

- Meteorological Division-Department of Transport-Canada and United States Weather Bureau-Department of Commerce-United States. *A Review of the Establishment and Operation of the JAWS at Eureka Sound, Resolute, Isachsen, Mould Bay and Alert and a Summary of the Scientific Activities at the Stations, 1946-1951*. Ottawa: Department of Transport, 1951.
- Milton Freeman Research Ltd. *Inuit Land Use and Occupancy Study*, vol. 1. Ottawa: Department of Indian and Northern Affairs, 1976.
- Thomas, Morley K. "A Century of Canadian Meteorology." *Annual Report of Operations*. Toronto: Canadian Atmospheric Environment Service, 1971-72.
- Thomson, Andrew. "Basic Weather Services." *Annual Report: Department of Transport, 1951-52*. Ottawa: Department of Transport, 1952.
- United States. Department of Commerce and U.S. Weather Bureau. "Assignment: Arctic." Washington: USWB, 1961.
- United States. Department of State. *Foreign Relations of the United States*. Washington: United States Government Printing Press, 1939-79.
- United States. Senate Records.
- Weather Eye on the Arctic*. Ottawa: Meteorological Division, c. 1958.

Newspaper and Magazine Articles

- Allen, Ralph. "We haven't done right by our North." *Maclean's*, 15 November 1954.
- Ayling, Frederick G. "Meet Our Northern Neighbors." *Christian Science Monitor*, 11 July 1957.
- Ayling, Frederick G. "Water and Weather in the Arctic." *Christian Science Monitor*, 5 February 1957.
- Baird, P.D. "Expeditions to the Canadian Arctic." *The Beaver*, outfit 279/4, March 1949, 44-47.
- Baird, P.D. "Expeditions to the Canadian Arctic." *The Beaver*, outfit 280/1, June 1949, 41-47.
- Baird, P.D. "Expeditions to the Canadian Arctic." *The Beaver*, outfit 281/2, September 1949, 44-48.
- Baril, G. "Room at the Top." *Sentinel* 3, 1980, 7-10.
- Barkway, Michael. "And We Learn More about the Arctic." *Financial Post*, 31 July 1954.
- "Bear Mauls Weather Man: Operator at Canadian US Post in Arctic Circle Injured." *Polar Times*, December 1947.
- "British Press Praises New Canada-US Pact." *Montreal Star*, 14 February 1947.
- Brown, Andrew H., and John E. Fletcher. "Weather from the White North." *National Geographic* 67/4, April 1955.
- Camsell, Charles. "Opening the Northwest." *Beaver*, June 1944, 4-9.
- "Canada and U.S. Establish 2 Arctic Weather Posts." *The Polar Times*, December 1947.
- "Canada Is Supplying Arctic Area by Ship." *New York Times*, 29 August 1954.
- "Canada to Run 5 Arctic Posts Without US." *Globe and Mail*, 31 December 1970.
- "Canada-U.S Defence: French Canadian Press Applauds Arrangement." *Montreal Star*, 20 February 1947.
- "Capt. J.D. Cleghorn." *Montreal Gazette*, 30 September 1942.
- Cookman, Aubrey O. "Top of the World Weather Run." *Popular Mechanics*, November 1948.
- Dalrymple, John. "Canada 'Digging In' Atop the Pole." *Ottawa Journal*, 28 January 1950.
- Davidson, Bill. "Arctic Outpost - Alert at 'Alert.'" *Collier's Magazine*, 28 June 1952.
- Davidson, Bill. "On Guard at the Pole: Our Sub-Zero Heroes." *Collier's Magazine*, 21 June 1952.

- Demon, Lowell. "Weather Station Christmas, drop off by North Star plane." *Bridgewater Bulletin*, 19 December 2001.
- Dobie, R. Magruder. "Why Husbands Go North." *Los Angeles Times*, 9 May 1948.
- Doucette, W. "Canada Possesses the Farthest North Weather Post." *Star Weekly*, 19 July 1952.
- Editorial. "Canada Must Frame Policy for Arctic." *Financial Post*, 20 July 1946.
- Fisher, Matthew. "Weathering the Nation's Cold Spot." *Globe and Mail*, 29 August 1988.
- Fraser, Blair. "The Truth about our Arctic Defence." *Maclean's*, 15 November 1954.
- "Gave Bear Arm to Chew to Save Neck Twisting." *Calgary Albertan*, 6 November 1947.
- Gibson, F. Ross. "No reason to apologize to the natives." *Arctic Circle*, September/October 1991.
- Gilbert, John. "On Top of the World." *The Red Dragon*, Spring 1957.
- Gilbert, John. "Way Up North." *The Canadian Amateur*, May 1979.
- Gray, Walter. "Arctic Weatherman Healthy but Lonely." *Globe and Mail*, 5 September 1957.
- Gray, Walter. "Ends Up in Tiny Type, But Weather is Work for Many Observers." *Globe and Mail*, 4 September 1957.
- Hallet, Richard. "North Pole May Be World's No. 1 Weather Factory." *Portland Sunday Telegram*, 13 January 1946.
- Hampton, R.B. "Arctic Glimpses." *The Roundel* 2/12, November 1950, 38-42.
- Harding, Katherine. "How the 'Frozen Chosen' Settled Eureka." *Globe and Mail*, 6 April 2007.
- Hubbard, Charles J. "Should Greenland Be American?" *Collier's Magazine*, 10 November 1945.
- Hubbard, Lt. Col. Charles J. "The Arctic Isn't So Tough." *Saturday Evening Post* 217/9, 26 August 1944.
- "Hubbard Killed in Arctic Crash." *Weather Bureau Topics*, August 1950.
- Inglis, Peter. "Nearer to Russia Than Any City." *Ottawa Citizen*, 28 May 1952.
- Inglis, Peter. "Unknown Canada: Few Can State Coherently Why They Chose That Life." *Ottawa Citizen*, 27 May 1952.
- Janes, Paul N. "North Pole Talks Back." *Indianapolis Star*, 30 March 1952.
- "Joint Station in Arctic Sends Weather Report." *The Polar Times*, June 1947.
- Karr, Jack. "Go North Young Man: US-Canada Weather Observers Head for Coldest Spot in Dominion's Arctic Wastes - Six 'Human Polar Bears' in Arctic on Weather Job." *Toronto Daily Star*, 5 April 1947.
- Keighley, Larry. "The Arctic is an Awful Land." *Saturday Evening Post*, 14 November 1953.
- Lesage, Jean. "Enter the European V: Among the Eskimos (Part II)." *Beaver* 295, Spring 1955.
- Lieviero, Anthony. "Top of the World Open for a New Air Strategy." *New York Times*, 26 October 1947.
- Lockhart, Lloyd. "Too Far North for the Eskimos." *The Star Weekly*, 28 July 1951.
- Lockhart, Lloyd. "With our Arctic Weathermen." *The Star Weekly*, 21 June 1951.
- Long, Tania. "Any Handy Iceberg Is the Old Town Pump For Weather Men at Isolated Arctic Posts." *New York Times*, 11 September 1953.
- Lowe, Frank. "Monotony is Biggest Enemy in Frigid Arctic Outposts." *Montreal Star*, 22 April 1955.
- Lunn, Richard. "Slim Arctic Lifeline." *The Star Weekly*, 16 January 1960.
- MacDonald, Stewart (Photos). "Lift for the Lonely North." *Star Weekly Weekend Magazine*, 9 November 1959.

- McNeill, R.C. "Putting Canada on the Map." *Sentinel* 6/3, March 1970, 16–21.
- Mekler, Gilda. "Eureka: Life in a Weather Station." *Nunatsiaq News*, 17 November 1976.
- "Nfldr. Commands Weather Station." *Western Star* (Corner Brook, NL), 23 May 1947.
- "North American Security." *The Times*, 14 February 1947.
- "Observations at Thule, Greenland." *Weather Bureau Topics*, September 1946.
- "Our Defence Can't Wait." *Montreal Star*, 14 February 1947.
- Roberts, Leslie. "The Great Assault on the Arctic." *Harper's* CCXI/1263, 1955, 37–42.
- Rowley, Diana M.R. "Discovery of Two Islands in Eastern Foxe Basin." *Arctic Circular* 1, 1948, 73–75.
- Schumach, Murray. "U.S. Vessels Find 1906 Peary Cache." *New York Times*, 28 September 1948.
- Sekler, Gilda. "Eureka! Life in a Weather Station." *Nunatsiaq News*, 17 November 1976.
- "Ships with 'Eyes' Conquer Arctic." *The Polar Times* 23, December 1946, 16.
- Stryde, Ric. "Nothing in the Forecast." *Northern News Services*, 7 July 1997.
- "Supply of Northern Weather Stations." *Arctic Circular* 2/6, 1949, 70–71.
- "Task Force 68." *Arctic Circular* 1/1, 1948, 2–3.
- "Task Force 80." *Arctic Circular* 1/6, 1948, 68–69.
- "Task Force 80." *Arctic Circular* 1/8, 1948, 90–91.
- "This is on Us!" *Maclean's*, 1 March 1950.
- "Two Years at Eureka." *Bridgewater Bulletin*, 19 December 2001.
- "U.S., Canada Plan 9 Arctic Stations." *The Polar Times*, June 1947.
- "U.S. Explorer and Meteorologist is Killed in Arctic Airplane Crash." *New York Times*, 2 August 1950.
- Waugh, B.W. "Arctic Mapping." *Sentinel* 6/3, March 1970.
- "Weather Eyes." *Time*, 17 March 1947.
- "Weather Watching in the Arctic." *Christian Science Monitor*, 7 May 1948.
- Wilkinson, Doug. "The paradox of the Inuit relocates." *Arctic Circle*, Summer 1993, 32–33.
- Wilson, Kenneth R. "Canada 'Another Belgium' In U.S. Air Bases Proposal?" *Financial Post*, 29 June 1946.
- Wilson, Kenneth R. "Ottawa Scotches U.S. Plan to Man Weather Bases in Canadian Arctic." *Financial Post*, 20 July 1946.

Secondary Sources

- Abel, Kerry, and Ken S. Coates, eds. *Northern Visions: New Perspectives on the North in Canadian History*. Peterborough: Broadview Press, 2001.
- Abele, Frances. "Canadian Contradictions: Forty Years of Northern Political Development." *Arctic* 40/4 (December 1987): 310–20.
- Adams, Peter. "The McGill Axel Heiberg Expeditions: Reconnaissance Year, 1959." *Arctic* 62/3 (2009): 363–69.
- Adams, Peter. *Trent, McGill, and the North: A Story of Canada's Growth as a Sovereign Polar Nation*. Peterborough: Cover to Cover, 2007.
- Adcock, Tina. "Toward an Early Twentieth-Century Canadian Culture of Arctic Exploration." In *North by Degree: New Perspectives on Arctic Exploration*, edited by Susan A. Kaplan and Robert McCracken Peck, 109–41. Philadelphia: American Philosophical Society, 2013.

- Aimé, Harry Hampton. *Overalls, Red Serge, and Robes: Life and Adventure in the Great Canadian North*. Red Deer: Hampton Press, 2004.
- Althoff, William F. *Drift Station: Arctic Outposts of Superpower Science*. Washington: Potomac Books, 2007.
- Amagoalik, John. *Changing the Face of Canada*. Edited by Louis McComber. Iqaluit: Life Stories of Northern Leaders, vol. 2, Nunavut Arctic College, 2007.
- Anker, Peder. *Imperial Ecology: Environmental Order in the British Empire, 1895–1945*. Cambridge: Harvard University Press, 2001.
- Archer, Clive. “The United States Defence Areas in Greenland.” *Cooperation and Conflict* 23 (1988): 123–44.
- Armstrong, Terence. “Meteorology in the Soviet Arctic, 1920–1945.” *Polar Record* 5/37–38 (September 1949): 354–55.
- Armstrong, Terence. *The Russians in the Arctic: Aspects of Soviet Exploration and Exploitation of the Far North, 1937–57*. London: Methuen, 1958.
- Aronsen, Lawrence. “Preparing for Armageddon: JIC 1 (Final) and the Soviet Attack on Canada.” *Intelligence and National Security* 19/3 (2004): 490–510.
- Asbridge, Archie. *My Life in Canada*. Self-published, 2015.
- Baird, Patrick D. “Transportation.” In *Geography of the Northlands*, edited by George H.T. Kimble and Dorothy Good, 187–209. New York: American Geographical Society and J. Wiley, 1955.
- Balchen, Bernt, Corey Ford, and Oliver La Farge. *War Below Zero: The Battle for Greenland*. Boston: Houghton Mifflin Company, 1944.
- Barnes, Trevor J., and Matthew Farish. “Between Regions: Science, Militarism, and American Geography from World War to Cold War.” *Annals of the Association of American Geographers* 96/4 (2006): 807–26.
- Barr, William. *The Expeditions of the First International Polar Year, 1882–83*, 2nd ed. Calgary: Arctic Institute of North America, 2008.
- Barr, William. *Red Serge and Polar Bear Pants: The Biography of Harry Stallworthy, RCMP*. Edmonton: University of Alberta Press, 2004.
- Barry, Donald, and Duane Bratt. “Defense Against Help: Explaining Canada–U.S. Security Relations.” *American Review of Canadian Studies* 38/1 (2008): 63–89.
- Barry, R., W. Arundale, J.T. Andrews, R. Bradley, and H. Nichols. “Environmental and cultural change in the eastern Arctic during the last five thousand years.” *Arctic and Alpine Research* 9 (1977): 193–210.
- Bartlett, Robert. *Last Voyage of the Karluk*. Boston: Small, Maynard, 1916.
- Bates, Charles C., and John F. Fuller. *America’s Weather Warriors, 1814–1985*. College Station: Texas A&M University Press, 1986.
- Beatty, David. “The Canadian–United States Permanent Joint Board on Defence.” PhD diss., Michigan State University, 1969.
- Belanger, Dian Olson. *Deep Freeze: The United States, the International Geophysical Year, and the Origins of Antarctica’s Age of Science*. Boulder: University Press of Colorado, 2006.
- Belanger, Dian Olson. “The International Geophysical Year in Antarctica: Uncommon Collaborations, Unprecedented Results.” *Journal of Government Information* 30/4 (2004): 482–89.
- Benson, Carl S. “Obituary: Albert Lincoln Washburn (1911–2007).” *Arctic* 60/2 (June 2007): 212–14.

- Bercuson, David J. "Advertising for Prestige: Publicity in Canada-United States Arctic Defence Cooperation, 1946-48." In *Canadian Arctic Sovereignty and Security: Historical Perspectives*, edited by P. Whitney Lackenbauer, 111-20. Calgary: Centre for Military and Strategic Studies, 2011.
- Bercuson, David. "Continental Defense and Arctic Sovereignty, 1945-50: Solving the Canadian Dilemma." In *The Cold War and Defense*, edited by Keith Neilson and Ronald G. Haycock, 153-70. New York: Praeger, 1990.
- Bercuson, David. *True Patriot: The Life of Brooke Claxton, 1898-1960*. Toronto: University of Toronto Press, 1993.
- Berkman, P.A. *Science into Policy: Global Lessons from Antarctica*. San Diego: Academic Press, 2002.
- Bernier, J.-E. *Master Mariner and Arctic Explorer: A Narrative of Sixty Years at Sea from the Logs and Yarns of Captain J.E. Bernier*. Ottawa: Le Droit, 1939.
- Berry, Dawn Alexandra. "Cryolite, the Canadian aluminium industry and the American occupation of Greenland during the Second World War." *Polar Journal* 2/2 (2012): 219-35.
- Berry, Dawn Alexandra. "The Monroe Doctrine and the Governance of Greenland's Security." In *Governing the North American Arctic: Sovereignty, Security, and Institutions*, edited by Dawn Alexandra Berry, Nigel Bowles, and Halbert Jones, 103-21. Basingstoke: Palgrave Macmillan, 2016.
- Berton, Pierre. *The Arctic Grail: The Quest for the North West Passage and the North Pole, 1818-909*. Toronto: McClelland & Stewart, 1988.
- Binnema, Ted. *Common and Contested Ground: A Human and Environmental History of the Northwestern Plains*. Toronto: University of Toronto Press, 2004.
- Binnema, Ted. "Enlightened Zeal": *The Hudson's Bay Company and Scientific Networks, 1670-1870*. Toronto: University of Toronto Press, 2014.
- Bissett, Don. *Resolute: An Area Economic Survey*. Ottawa: Industrial Division, Department of Indian Affairs and Northern Development, 1968.
- Blair, Thomas A., and Robert C. Fite. *Weather Elements: A Text in Elementary Meteorology*, 3rd ed. Englewood Cliffs, NJ: Prentice-Hall, 1959.
- Boag, T.J. "The White Man in the Arctic: A Preliminary Study of Problems of Adjustment." *American Journal of Psychiatry* 109/6 (December 1952): 444-49.
- Bocking, Stephen. "A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945-1960." *Technology and Culture* 50/2 (April 2009): 265-90.
- Bocking, Stephen. "Science and Spaces in the Northern Environment." *Environmental History* 12/4 (October 2007): 867-94.
- Bocking, Stephen, and Daniel Heidt, eds. *Cold Science: Environmental Knowledge in the North American Arctic during the Cold War*. London: Routledge, 2019.
- Bothwell, Robert. *Alliance and Illusion: Canada and the World, 1945-1984*. Vancouver: University of British Columbia Press, 2007.
- Bravo, Michael, and Sverker Sörlin, eds. *Narrating the Arctic: A Cultural History of Nordic Scientific Practices*. Canton: Science History Publications, 2002.
- Brebner, Elizabeth R. "The Northwest Passage: The Emerging Issue in Canadian-American Relations, 1939-1963." PhD diss., Duke University, 1992.
- Buss, D.W. "Life at the Joint Arctic Weather Stations." *Weatherwise* 24/6 (1971): 276-79.
- Calder, Ritchie. *Men Against the Frozen North*. London: George Allen and Unwin, 1957.

- "Captain Wilkins' Arctic Expeditions, 1926–1928: A Summary Statement." *Geographical Review* 18/3 (July 1928): 489–94.
- Carlson, William S. *Lifelines Through the Arctic*. New York: Duell, Sloan and Pearce, 1962.
- Cavell, Janice. "'Consolidation and Control of All Eskimo Income': The Motive for the 1953 High Arctic Relocation." *Journal of Canadian Studies* 55/1 (2021): 118–51.
- Cavell, Janice. "Historical Evidence and the Eastern Greenland Case." *Arctic* 61/4 (December 2008): 347–466.
- Cavell, Janice. "Sector claims and counter-claims: Joseph Elzéar Bernier, the Canadian government, and Arctic sovereignty, 1898–1934." *Polar Record* 50/3 (June 2014): 293–310.
- Cavell, Janice. "The Sector Theory and the Canadian Arctic, 1897–1970." *International History Review* 41/6 (2019): 1168–93.
- Cavell, Janice, and Jeff Noakes. *Acts of Occupation: Canada and Arctic Sovereignty, 1918–25*. Vancouver: University of British Columbia Press, 2010.
- Christie, Carl. *Ocean Bridge: The History of RAF Ferry Command*. Toronto: University of Toronto Press, 1995.
- Clancy, Peter, and P. Whitney Lackenbauer. *Shaping Inuit Policy: The Minutes of the Eskimo Affairs Committee, 1952–62*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 13. Calgary: Arctic Institute of North America, 2019.
- Clark, Elmer F. *Camp Century: Evolution of Concept and History of Design Construction and Performance*. Hanover, NH: Cold Regions Research and Engineering Lab report no. CRREL-TR-174, 1965.
- Coates, Ken S. *Best Left as Indians: Native-White Relations in the Yukon Territory, 1840–1973*. Montreal & Kingston: McGill-Queen's University Press, 1991.
- Coates, Kenneth. "The Rediscovery of the North: Towards a Conceptual Framework for the Study of Northern/Remote Regions." *Northern Review* 12/13 (Summer/Winter 1994): 15–43.
- Coates, Ken S., P. Whitney Lackenbauer, William R. Morrison, and Greg Poelzer. *Arctic Front: Defending Canada in the Far North*. Toronto: Thomas Allen, 2008.
- Coates, K.S., and W.R. Morrison. *The Alaska Highway in World War II: The U.S. Army of Occupation in Canada's Northwest*. Norman: University of Oklahoma Press, 1992.
- Coates, Ken S., and William R. Morrison. *Land of the Midnight Sun: A History of the Yukon*. Montreal & Kingston: McGill-Queen's University Press, 2017.
- Coates, Ken S., and William R. Morrison. "The New North in Canadian History and Historiography." *History Compass* 6/2 (2008): 639–58.
- Cohen, Maxwell. "The Arctic and the National Interest." *International Journal* 26/1 (1970–71): 52–81.
- Collis, Christy. "Mawson and Mirny Stations: the spatiality of the Australian Antarctic Territory, 1954–61." *Australian Geographer* 38/2 (2007): 215–31.
- Collis, Christy, and Klaus Dodds. "Assault on the Unknown: The Historical and Political Geographies of the International Geophysical Year (1957–8)." *Journal of Historical Geography* 34/4 (2008): 555–73.
- Collis, Christy, and Quentin Stevens. "Cold Colonies: Antarctic Spatialities at Mawson and McMurdo Stations." *Cultural Geographies* 14/2 (2007): 234–54.
- Conant, Melvin. "Canada and Continental Defence: An American View." *International Journal* 15/3 (1960): 219–28.
- Conant, Melvin. *The Long Polar Watch*. New York: Harper and Brothers, 1962.

- Conliffe, Christopher. "The Permanent Joint Board on Defence: 1940–1988." In *The U.S.-Canada Security Relationship*, edited by David Haglund and Joel Sokolsky, 145–66. London: Westview Press, 1989.
- Conn, Stetson, Rose C. Engelman, and Byron Fairchild. *United States Army in World War II: The Western Hemisphere, Guarding the United States and its Outposts*. Washington: Center of Military History, Department of the Army, 1964.
- Corber, Robert J. *Homosexuality in Cold War America: Resistance and the Crisis of Masculinity*. Durham: Duke University Press, 1997.
- Cosgrove, Denis. *Apollo's Eye: A Cartographic Genealogy of the Earth in the Western Imagination*. Baltimore: Johns Hopkins University Press, 2001.
- Craven, W.F., and J.L. Cate, eds. *The Army Air Forces in World War II, Volume 7: Services Around the World*. Washington: Office of Air Force History, 1983.
- Creighton, Donald. *The Forked Road: Canada 1939–1957*. Toronto: McClelland & Stewart, 1976.
- Cronin, Marionne. "Northern Visions: Aerial Surveying and the Canadian Mining Industry, 1919–1928." *Technology and Culture* 48/2 (2007): 303–30.
- Cronin, Marionne. "Polar Horizons: Images of the Arctic in Accounts of Amundsen's Polar Aviation Expeditions." *Scientia Canadensis* 33/2 (2010): 99–120.
- Cronin, Marionne. "Shaped by the Land: An Envirotechnical History of a Canadian Bush Plane." In *Ice Blink: Navigating Northern Environmental History*, edited by Stephen Bocking and Brad Martin, 103–30. Calgary: University of Calgary Press, 2017.
- Cuff, R.D., and J.L. Granatstein. *Canadian-American Relations in Wartime: From the Great War to the Cold War*. Toronto: A.M. Hakkert Ltd., 1975.
- Cuordileone, K.A. *Manhood and American Political Culture in the Cold War*. New York: Routledge, 2005.
- Cushman, G. "Struggle over Airways in the Americas." In *Intimate Universality: Local and Global Themes in the History of Weather and Climate*, edited by James Rodger Fleming, Vladimir Jankovic, and Deborah R. Coen, 175–222. Sagamore Beach: Science-History/USA, 2006.
- Dalby, Simon. "Critical Geopolitics: Discourse, Difference, and Dissent." *Environment and Planning D: Society and Space* 9/3 (1991): 261–83.
- Damas, David. *Arctic Migrants/Arctic Villagers: The Transformation of Inuit Settlement in the Central Arctic*. Montreal & Kingston: McGill-Queen's University Press, 2002.
- Dean, Robert D. *Imperial Brotherhood: Gender and The Making of Cold War Foreign Policy*. Amherst: University of Massachusetts Press, 2001.
- Dean, Ryan, and P. Whitney Lackenbauer. "Geostrategy and Canadian Defence: From C.P. Stacey to a Twenty-First Century Arctic Threat Assessment." *Journal of Military and Strategic Studies* 20/1 (2019): 1–64.
- Dege, Wilhelm, and William Barr. *War North of 80: The Last German Arctic Weather Station of World War II*. Calgary: University of Calgary Press, 2003.
- Dick, Lyle. *Muskox Land: Ellesmere Island in the Age of Contact*. Calgary: University of Calgary Press, 2001.
- Dinwoodie, D.H. "Arctic Controversy: the 1925 Byrd-MacMillan Expedition Example." *Canadian Historical Review* 53/1 (March 1972): 51–65.
- Diubaldo, Richard J. *A Historical Overview of Government-Inuit Relations, 1900–1980s*. Ottawa: Department of Indian Affairs and Northern Development, 1992.
- Diubaldo, Richard J. "The Role of the Arctic Islands in Defence." In *A Century of Canada's Arctic Islands*, edited by Morris Zaslow, 93–110. Ottawa: Royal Society of Canada, 1981.

- Diubaldo, Richard J. *Stefansson and the Canadian Arctic*. Montreal & Kingston: McGill-Queen's University Press, 1978.
- Diubaldo, R.J., and S.J. Scheinberg. *A Study of Canadian-American Defence Policy (1945-1975) - Northern Issues and Strategic Resources*. Ottawa: Department of National Defence, December 1978.
- Dodds, Klaus. *Geopolitics of Antarctica: Views from the Southern Oceanic Rim*. Chichester: John Wiley, 1997.
- Dodds, Klaus. "Post-colonial Antarctica: an emerging engagement." *Polar Record* 42/1 (January 2006): 59-70.
- Doel, Ronald E. "Constituting the Postwar Earth Sciences: The Military's Influence on the Environmental Sciences in the USA after 1945." *Social Studies of Science* 33 (2003): 635-66.
- Doel, Ronald E., Robert Marc Friedman, Julia Lajus, Sverker Sörlin, and Urban Wråkberg. "Strategic Arctic Science: National Interests in Building Natural Knowledge - Interwar Era through the Cold War." *Journal of Historical Geography* 44 (April 2014): 60-80.
- Doel, Ronald E., Kristine C. Harper, and Matthias Heymann, eds. *Exploring Greenland: Cold War Science and Technology on Ice*. New York: Springer, 2016.
- Doel, Ronald E., Kristine C. Harper, and Matthias Heymann. "Exploring Greenland's Secrets: Science, Technology, Diplomacy, and Cold War Planning in Global Contexts." In *Exploring Greenland: Cold War Science and Technology on Ice*, edited by Ronald E. Doel, Kristine C. Harper, and Matthias Heymann, 1-22. New York: Palgrave Macmillan, 2016.
- Donaghy, Greg. *Tolerant Allies: Canada & the United States, 1963-1968*. Montreal & Kingston: McGill-Queen's University Press, 2002.
- Dosman, Edgar J., ed. *The Arctic in Question*. Toronto: Oxford University Press, 1976.
- Douglas, C.K.M. "The Polar Front and its Place in Modern Meteorology." *Geographical Journal* 94/2 (August 1939): 135-50.
- Drivenes, Einar-Arne, Harald Dag Jølle, and Ketil Zachariassen, eds. *Into the Ice: The History of Norway and the Polar Regions*. Oslo: Gyldendal akademisk, 2006.
- DuBois, John L., Robert P. Multhauf, and Charles A. Ziegler. *The Invention and Development of the Radiosonde, with a Catalog of Upper-Atmospheric Telemetering Probes in the National Museum of American History, Smithsonian Institution*. Washington: Smithsonian Studies in History and Technology no. 53, 2002.
- Duffy, R. Quinn. *The Road to Nunavut: The Progress of the Eastern Arctic Inuit Since the Second World War*. Montreal & Kingston: McGill-Queen's University Press, 1988.
- Dummitt, Christopher. *The Manly Modern: Masculinity in Postwar Canada*. Vancouver: University of British Columbia Press, 2011.
- Dunbar, Moira. "A. L. Washburn." *Arctic* 5/1 (March 1952): 3.
- Dunbar, Moira, and Keith Greenaway. *Arctic Canada from the Air*. Ottawa: Queen's Printer, 1957.
- Dziuban, Stanley W. *Military Relations between the United States and Canada, 1939-1945*. Washington: Office of the Chief of Military History, Department of the Army, 1959.
- Eayrs, James. *In Defence of Canada Volume III: Peacemaking and Deterrence*. Toronto: University of Toronto Press, 1972.
- Edwards, Paul N. "Meteorology as Infrastructural Globalism." *Osiris* 21/1 (2006): 229-50.
- Elliot-Meisel, Elizabeth. *Arctic Diplomacy: Canada and the United States in the Northwest Passage*. New York: Peter Lang, 1998.

- Elliot-Meisel, Elizabeth. "Arctic Focus: The Royal Canadian Navy in Arctic Waters, 1946–1949." In *Canadian Arctic Sovereignty and Security: Historical Perspectives*, edited by P. Whitney Lackenbauer, 121–44. Calgary: Centre for Military and Strategic Studies, 2011.
- Elliot-Meisel, Elizabeth. "Sovereignty and the North: Canadian-American Cooperation 1939–1945." In *Three Northern Wartime Projects*, edited by Bob Hesketh, 47–64. Edmonton: Canadian Circumpolar Institute and Edmonton and District Historical Society, 1992.
- Eno, Robert V. "Crystal Two: The Origin of Iqaluit." *Arctic* 56/1 (March 2003): 63–75.
- "Establishment of joint Canadian-United States meteorological stations in the Canadian Arctic, 1947–49." *Polar Record* 5/40 (July 1950): 602–05.
- Eyre, Kenneth C. "Custos Borealis: The Military in the Canadian North." PhD diss., University of London-King's College, 1981.
- Eyre, Kenneth C. *Custos Borealis: The Military in the Canadian North, 1898–1975*, edited by P. Whitney Lackenbauer. Peterborough: North American and Arctic Defence and Security Network, 2020.
- Eyre, Kenneth C. "Forty Years of Military Activity in the Canadian North, 1947–87." *Arctic* 40/4 (December 1987): 292–99.
- Eyre, Kenneth C. "The Military and Nation Building in the Arctic, 1945–1964." In *Canadian Arctic Sovereignty and Security: Historical Perspectives*, edited by P. Whitney Lackenbauer, 202–31. Calgary: Centre for Military and Strategic Studies, 2011.
- Farish, Matthew. *The Contours of America's Cold War*. Minneapolis: University of Minnesota Press, 2010.
- Farish, Matthew. "Creating Cold War Climates: The Laboratories of American Globalism." In *Environmental Histories of the Cold War*, edited by J.R. McNeill and Corinna R. Unger, 51–83. New York: Cambridge University Press, 2010.
- Farish, Matthew. "Frontier Engineering: From the Globe to the Body in the Cold War Arctic." *Canadian Geographer* 50/2 (2006): 177–96.
- Farish, Matthew. "The Lab and the Land: Overcoming the Arctic in Cold War Alaska." *Isis* 104/1 (March 2013): 1–29.
- Farish, Matthew, and P. Whitney Lackenbauer. "High modernism in the Arctic: Planning Frobisher Bay and Inuvik." *Journal of Historical Geography* 35/3 (July 2009): 517–44.
- Farish, Matthew, and P. Whitney Lackenbauer. "Western Electric Turns North: Technicians and the Transformation of the Cold War Arctic." In *Ice Blink: Navigating Northern Environmental History*, edited by Stephen Bocking and Brad Martin, 261–93. Calgary: University of Calgary Press, 2017.
- Farrar, Victor John. *The Annexation of Russian America to the United States*. New York: Russell & Russell, 1966.
- Finnie, Richard. "Canada Moves North." *Canadian Geographic Journal* 23 (1941): 254–63.
- Fisher, Alexander. *A Journal of a Voyage of Discovery to the Arctic Regions: In His Majesty's Ships Hecla and Griper, in the Years 1819 & 1820*, vol. 2. London: Longman, Hurst, Rees, Orme, and Brown, 1821.
- Fleming, James R. "Distorted Support: Pathologies of Weather Warfare." In *Science in Uniform, Uniforms in Science: Historical Studies of American Military and Scientific Interactions*, edited by Margaret Vining and Barton C. Hacker, 49–59. Washington and Lanham, MD: Smithsonian National Museum of American History and The Scarecrow Press, 2007.
- Fleming, James Rodger. *Meteorology in America, 1800–1870*. Baltimore: Johns Hopkins University Press, 1990.

- Fleming, James Rodger. "Storms, strikes, and surveillance: The U.S. Army Signal Office, 1861–1891." *Historical Studies in the Physical and Biological Sciences* 30/2 (2000): 315–32.
- Fleming, James Rodger. "Telegraphing the Weather: Military Meteorology, Strategy, and 'Homeland Security' on the American Frontier in the 1870s." In *Instrumental in War: Science, Research, and Instruments between Knowledge and the World*, edited by Steven A. Walton, 115–78. Leiden: Brill, 2005.
- Fogelson, Nancy. *Arctic Exploration & International Relations, 1900–1932*. Fairbanks: University of Alaska Press, 1992.
- Fogelson, Nancy. "The Tip of the Iceberg: The United States and International Rivalry for the Arctic, 1900–25." *Diplomatic History* 9/2 (April 1985): 131–48.
- Fogg, Gordon Elliott. *A History of Antarctic Science*. Cambridge: Cambridge University Press, 1992.
- Forbes, Alexander. *Quest for a Northern Air Route*. Cambridge: Harvard University Press, 1953.
- Forman, Paul. "Behind quantum electronics: National security as basis for physical research in the United States, 1940–1960." *Historical Studies in the Physical and Biological Sciences* 18/1 (1987): 149–229.
- Foster, Michael, and Carol Marino. *The Polar Shelf: The Saga of Canada's Arctic Scientists*. Toronto: NC Press, 1986.
- Foulkes, General Charles. "The Complications of Continental Defence." In *Neighbors Taken for Granted: Canada and the United States*, edited by Livingston T. Merchant, 101–33. New York: Praeger, 1967.
- Friedman, Robert Marc. *Appropriating the Weather: Vilhelm Bjerknes and the Construction of a Modern Meteorology*. Ithaca: Cornell University Press, 1989.
- Friedman, Robert Marc. "Constituting the Polar Front, 1919–1920." *Isis* 73/3 (September 1982): 343–62.
- Gagnon, Mélanie, and Iqaluit Elders. *Inuit Recollections on the Military Presence in Iqaluit*. Iqaluit: Nunavut Arctic College, 2002.
- Geiger, Roger L. "Science, Universities, and National Defense, 1945–1970." *Osiris* 7 (1992): 26–48.
- Geissler, P. Wenzel, and Ann H. Kelly. "A home for science: The life and times of Tropical and Polar field stations." *Social Studies of Science* 46/6 (2016): 797–808.
- Giroux, Henry A. *The University in Chains: Confronting the Military-Industrial-Academic Complex*. New York: Routledge, 2015.
- Godefroy, Andrew B. *Defence and Discovery: Canada's Military Space Program, 1945–74*. Vancouver: University of British Columbia Press, 2011.
- Goette, Richard. *Sovereignty and Command in Canada-US Continental Air Defence, 1940–57*. Vancouver: University of British Columbia Press, 2018.
- Goette, Richard, and P. Whitney Lackenbauer. *Northern Skytrails: Perspectives on the Royal Canadian Air Force in the Arctic from the Pages of The Roundel, 1949–65*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 10. Calgary: Centre for Military, Security and Strategic Studies, 2017.
- Goodspeed, Donald J. *A History of the Defence Research Board of Canada*. Ottawa: E. Cloutier, Queen's Printer, 1958.
- Gordon, A.R. *Report of the Hudson's Bay Expedition Under the Command of Lieut. AR Gordon, RN*. Ottawa: Department of Marine, 1884.
- Granatstein, J.L. *Canada's War: The Politics of the Mackenzie King Government, 1939–1945*. Toronto: University of Toronto Press, 1975.

- Granatstein, J.L. "A Fit of Absence of Mind: Canada's National Interest in the North to 1968." In *The Arctic in Question*, edited by E.J. Dosman, 13–31. Toronto: Oxford University Press, 1976.
- Granatstein, J.L., and Norman Hillmer. *For Better or For Worse: Canada and the United States to the 1990's*. Toronto: Copp Clark Pitman, 1991.
- Grant, Shelagh D. "Errors Exposed: Inuit Relocations to the High Arctic, 1953–1960, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 8. Calgary: Arctic Institute of North America, 2016.
- Grant, Shelagh D. "Myths of the North in the Canadian Ethos." *Northern Review* (1989): 15–41.
- Grant, Shelagh D. "Northern Nationalists: Visions of 'A New North,' 1940–1950." In *For Purposes of Dominion: Essays in Honour of Morris Zaslow*, edited by Kenneth Coates and William R. Morrison, 47–70. North York: Captus, 1989.
- Grant, Shelagh D. *Polar Imperative: A History of Arctic Sovereignty in North America*. Vancouver: Douglas & McIntyre, 2010.
- Grant, Shelagh D. *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950*. Vancouver: University of British Columbia Press, 1988.
- Grant, Shelagh D. "Weather Stations, Airfields, and Research in the High Arctic, 1939–1959. An American Perspective." Unpublished paper presented at the Canadian Historical Association Annual Meeting, 27 May 1990.
- Gray, David R. *Alert, Beyond the Inuit Lands: The Story of Canadian Forces Station Alert*. Ottawa: Borealis, 1997.
- Greely, Adolphus. *Three Years of Arctic Service: An Account of the Lady Franklin Bay Expedition of 1881–84, and the Attainment of the Farthest North*, 2 vols. New York: Charles Scribner's Sons, 1886.
- Greenaway, Keith R. "Science, Technology, and Sovereignty." In *Polar Science, Technology and Information: Tenth Anniversary Conference of ACUNS, Ryerson Polytechnical Institute May 1–2, 1987*, edited by W. Peter Adams and Frank Duerden, 85–90. Ottawa: Association of Canadian Universities for Northern Studies, 1988.
- Greenaway, Keith R., and Moira Dunbar. "Aviation in the Arctic Islands." In *A Century of Canada's Arctic Islands, 1880–1980*, edited by Morris Zaslow, 79–92. Ottawa: Royal Society of Canada, 1981.
- Griffiths, Franklyn. "Canadian Sovereignty and Arctic International Relations." In *The Arctic in Question*, edited by E.J. Dosman, 144–48. Toronto: Oxford University Press, 1976.
- Griffiths, Tom. *Slicing the Silence: Voyaging to Antarctica*. Cambridge: Harvard University Press, 2007.
- Guly, H.R. "Psychology During the Expeditions of the Heroic Age of Antarctic Exploration." *History of Psychiatry* 23/2 (2012): 194–205.
- Gunderson, E.K. Eric. "Introduction." In *Human Adaptability to Antarctic Conditions*, edited by E.K. Eric Gunderson, 1–4. Worcester: Heffernan Press, 1974.
- Gunderson, E.K. Eric. "Psychological studies in Antarctica: a review." In *Polar Human Biology*, edited by O.G. Edholm and E.K.E., Gunderson, 352–61. London: Heinemann Medical, 1973.
- Gunderson, E.K. Eric, and Paul D. Nelson. "Adaptation of Small Groups to Extreme Environments." *Aerospace Medicine* (December 1963): 1111–14.
- Gunther, Magnus. "The 1953 Relocations of the Inukjuak Inuit to the High Arctic: A Documentary Analysis and Evaluation ("Gunther Report")." In *Human Flagpoles or Humanitarian*

Action? Discerning Government Motives behind the Inuit Relocations to the High Arctic, 1953–1960, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 16, edited by P. Whitney Lackenbauer, 117–322. Calgary: Arctic Institute of North America, 2020.

- Gusterson, Hugh. *Nuclear Rites: A Weapons Laboratory at the End of the Cold War*. Berkeley: University of California Press, 1996.
- Guttridge, Leonard F. *Ghosts of Cape Sabine: The Harrowing True Story of the Greely Expedition*. New York: G.P. Putnam, 2000.
- Hamilton, John David. *Arctic Revolution: Social Change in the Northwest Territories, 1935–1994*. Toronto: Dundurn Press, 1994.
- Hare, F. Kenneth. "The Arctic." *Quarterly Journal of the Royal Meteorological Society* 94/402 (October 1968): 439–59.
- Hare, F. Kenneth. "No Great Change: A Commentary on 50 Years of Watching Arctic Science." In *Arctic Environment: Past, Present, and Future*, edited by Ming-ko Woo and Denis J. Gregor, 7–16. Hamilton: McMaster University, 1992.
- Hare, F. Kenneth, and J.E. Hay. "The Climate of Canada and Alaska." In *Climates of North America*, edited by R.A. Bryson and F.K. Hare, 49–192. New York: Elsevier, 1974.
- Harper, Kristine C. *Weather by the Numbers: The Genesis of Modern Meteorology*. Cambridge: Massachusetts Institute of Technology Press, 2012.
- Harwood, T. "The International Geophysical Year." In *The Unbelievable Land: 29 Experts Bring Us Closer to the Arctic*, edited by I. Norman Smith, 114–18. Ottawa: Queen's Printer, 1964.
- Hattersley-Smith, G. *North of Latitude Eighty: The Defence Research Board in Ellesmere Island*. Ottawa: Information Canada, 1974.
- Haulman, Daniel. "The Northwest Staging Route." In *Three Northern Wartime Projects*, edited by Bob Hesketh, 31–46. Edmonton: Canadian Circumpolar Institute and Edmonton and District Historical Society, 1992.
- Hawes, Joseph. "The Signal Corps and its Weather Service, 1870–1890." *Military Affairs* 30/2 (1966): 68–76.
- Hayes, Isaac Israel. *The Open Polar Sea*. Philadelphia: D. McKay, 1867.
- Heeney, A.D.P. *The Things that are Caesar's: Memoirs of a Canadian Public Servant*. Edited by Brian D. Heeney. Toronto: University of Toronto Press, 1972.
- Heggie, Vanessa. "Higher and Colder: The Success and Failure of Boundaries in High Altitude and Antarctic Research Stations." *Social Studies of Science* 46/6 (2016): 809–32.
- Heidt, Daniel. "Clenched in the JAWS of America? Canadian Sovereignty and the Joint Arctic Weather Stations, 1946–1972." In *Canadian Arctic Sovereignty and Security: Historical Perspectives, Calgary Papers in Military and Strategic Studies*, edited by P. Whitney Lackenbauer, 145–69. Calgary: Centre for Military and Strategic Studies, 2011.
- Heidt, Daniel, and Richard Goette. "'This is No 'Milk Run'": Operation *Boxtop*, 1956–2015." In *Canadian Arctic Operations, 1941–2015: Lessons Learned, Lost, and Relearned*, edited by Adam Lajeunesse and P. Whitney Lackenbauer, 270–306. Fredericton: Gregg Centre for the Study of War & Society, 2017.
- Heymann, Matthias. "In Search of Control: Arctic Weather Stations in the Early Cold War." In *Exploring Greenland: Cold War Science and Technology on Ice*, edited by Ronald E. Doel, Kristine C. Harper, and Matthias Heymann, 75–98. New York: Palgrave Macmillan, 2016.

- Heymann, Matthias, Henrik Knudsen, Maiken L. Lolck, Henry Nielsen, Kristian H. Nieslen, and Christopher J. Ries. "Exploring Greenland: Science and Technology in Cold War Settings." *Scientia Canadensis* 33/2 (2010): 11–42.
- Heymann, Matthias, Henry Nielsen, Kristian Hvidtfelt Nielsen, and Henrik Knudsen. "Small State versus Superpower: Science and Geopolitics in Greenland in the Early Cold War." In *Cold War Science and the Transatlantic Circulation of Knowledge*, edited by Jeroen van Dongen, 243–71. Leiden: Brill, 2015.
- Hilliker, John, and Donald Barry. *Canada's Department of External Affairs, Vol. 2, Coming of Age, 1946–1968*. Montreal & Kingston: McGill-Queen's University Press, 1995.
- Hinckley, Ted C. *The Americanization of Alaska, 1867–1897*. Palo Alto: Pacific Books, 1972.
- Holbo, Paul S. *Tarnished Expansion: The Alaska Scandal, the Press, and Congress, 1867–1871*. Knoxville: University of Tennessee Press, 1983.
- Holmes, John W. *The Shaping of Peace: Canada and the Search for World Order, 1943–1957*, vol. 2. Toronto and Buffalo: University of Toronto Press, 1982.
- Hopper, J.F. "Early Meteorological Observations at Fort Enterprise, Northwest Territories, Canada." *Polar Record* 22/141 (1985): 684–91.
- Horn, Bernd. "Gateway to Invasion or the Curse of Geography? The Canadian Arctic and the Question of Security, 1939–1999." In *Forging a Nation: Perspectives on the Canadian Military Experience*, edited by Bernd Horn, 307–334. St. Catharines: Vanwell, 2002.
- Howkins, Adrian. "Frozen Empires: A History of the Antarctic Sovereignty Dispute Between Britain, Argentina, and Chile, 1939–1959." PhD diss., University of Texas at Austin, 2008.
- Howkins, Adrian. "Political Meteorology: Weather, Climate and the Contest for Antarctic Sovereignty, 1939–1959." *History of Meteorology* 4 (2008): 27–40.
- Hughes, Patrick. *A Century of Weather Service: A History of the Birth and Growth of the National Weather Service, 1870–1970*. New York: Gordon and Breach, 1970.
- Iarocci, Andrew. "Opening the North: Technology and Training at the Fort Churchill Joint Services Experimental Testing Station, 1946–64." *Canadian Army Journal* 10/4 (2008): 74–95.
- Innes-Taylor, Alan. "Isachsen Land, 78° 47' N, Lat. 103° 50' W. Long." *Arctic* 1 (1948): 124–25.
- Irvine, Tom A. *The Ice was All Between*. Toronto: Longmans, Green and Company, 1959.
- Isard, Philip. "Northern Vision: Northern Development during the Diefenbaker Era." Master's thesis, University of Waterloo, 2010.
- Jasanoff, Sheila. *States of Knowledge: The Co-production of Science and Social Order*. London: Routledge, 2004.
- Jenness, Diamond. *Eskimo Administration II: Canada*. Montreal: Arctic Institute of North America, 1964.
- Jenness, Stuart E. *The Making of an Explorer: George Hubert Wilkins and the Canadian Arctic Expedition, 1913–1916*. Montreal & Kingston: McGill-Queen's University Press, 2004.
- Jenness, Stuart E. *Stefansson, Dr. Anderson and the Canadian Arctic Expedition, 1913–1918: A Story of Exploration, Science and Sovereignty*. Gatineau: Canadian Museum of Civilization, 2011.
- Jensen, Ronald J. *The Alaska Purchase and Russian-American Relations*. Seattle: University of Washington Press, 1975.
- Jockel, Joseph T. *Canada in NORAD, 1957–2007: A History*. Kingston: Queen's Centre for International Relations and the Queen's Defence Management Program, 2007.
- Jockel, Joseph T. *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945–1958*. Vancouver: University of British Columbia Press, 1987.

- Johnson, David K. *The Lavender Scare: The Cold War Persecution of Gays and Lesbians in the Federal Government*. Chicago: University of Chicago Press, 2009.
- Johnson, Gregory. "Strategic Necessity or Military Blunder: Another look at the Decision to Build the Alaska Highway." In *Three Northern Wartime Projects*, edited by Bob Hesketh, 5–30. Edmonton: Canadian Circumpolar Institute and Edmonton and District Historical Society, 1992.
- Johnson, J. Peter Jr. "The Establishment of Alert, N.W.T., Canada." *Arctic* 43/1 (March 1990): 21–34.
- Johnston, V. Kenneth. "Canada's Title to the Arctic Islands." *Canadian Historical Review* 14/1 (March 1933): 24–41.
- Jonasson, Jonas A. "The AAF Weather Service." In *The Army Air Forces in World War II, vol. VII: Services Around the World*, edited by W.F. Craven and J.L. Cate, 311–38. Washington: Office of Air Force History, 1958.
- Jones, Karen. "Never Cry Wolf: Science, Sentiment, and the Literary Rehabilitation of *Canis Lupus*." *Canadian Historical Review* 84/1 (March 2003): 65–93.
- Jones-Imhotep, Edward. "Communicating the North: Scientific Practice and Canadian Postwar Identity." *Osiris* 24/1 (2009): 144–64.
- Jones-Imhotep, Edward, and Tina Adcock, eds. *Made Modern: Science and Technology in Canadian History*. Vancouver: University of British Columbia Press, 2018.
- Jørgensen, Dolly, Finn Arne Jørgensen, and Sara B. Pritchard, eds. *New Natures: Joining Environmental History with Science and Technology Studies*. Pittsburgh: University of Pittsburgh Press, 2013.
- Jørgensen, Dolly, and Sverker Sörlin, eds. *Northscapes: History, Technology, and the Making of Northern Environments*. Vancouver: University of British Columbia Press, 2013.
- Kay, Paul A. "An Early Nineteenth Century Meteorological Register from the Eastern Canadian Arctic." *Polar Record* 31/178 (1995): 335–42.
- Keenleyside, Hugh L. *Canada and the United States: Some Aspects of Their Historical Relations*. New York: Alfred A. Knopf, 1952.
- Keenleyside, Hugh L. "Recent Developments in the Canadian North." *Canadian Geographic Journal* 39 (1949): 157–76.
- Kenney, Gerard. *Arctic Smoke & Mirrors*. Prescott, ON: Voyageur Publishing, 1994.
- Kikkert, Peter. "Constructing a Role: The Royal Canadian Air Force in the Arctic, 1945–1953." In *De-Icing Required!: The Historical Dimension of the Canadian Air Force's Experience in the Arctic*, edited by P. Whitney Lackenbauer and W.A. March, 17–30. Trenton: Canadian Forces Air Warfare Centre, 2012.
- Kikkert, Peter. "The Polaris Incident: 'Going to the Mat' with the Americans." *Journal of Military and Strategic Studies* 11/3 (2009): 1–29.
- Kikkert, Peter. "Pragmatism and Cooperation: Canadian-American Defence Activities in the Arctic, 1945–1951." Master's thesis, University of Waterloo, 2009.
- Kikkert, Peter, and P. Whitney Lackenbauer, eds. *Legal Appraisals of Canada's Arctic Sovereignty: Key Documents, 1905–56*. Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2014.
- Kikkert, Peter, Adam Lajeunesse, and P. Whitney Lackenbauer. "Lester Pearson and Arctic Sovereignty: A Case of Un-Pearsonian Diplomacy." In *Mike's World: Lester B. Pearson and Canadian External Affairs*, edited by Asa McKercher and Galen Roger Perras, 149–68. Vancouver: University of British Columbia Press, 2017.

- Kinsman, Gary. *The Regulation of Desire: Homo and Hetero Sexualities*, rev. ed. Montreal: Black Rose Books, 1996.
- Kinsman, Gary, and Patrizia Gentile. *The Canadian War on Queers: National Security as Sexual Regulation*. Vancouver: University of British Columbia Press, 2010.
- Kirwan, L.P. *A History of Polar Exploration*. London: Penguin, 1962.
- Kistler, Robert, Eugenia Kalnay, William Collins, Suranjana Saha, Glenn White, John Woollen, Muthuvel Chelliah, et al. "The NCEP–NCAR 50-Year Reanalysis: Monthly Means CD-ROM and Documentation." *Bulletin of the American Meteorological Society* 82/2 (February 2001): 247–68.
- Kleinke, Chris L. "What Does It Mean to Cope?" In *The Praeger Handbook on Stress and Coping*, vol. 2, edited by Alan Monat, Richard S. Lazarus, and Gretchen Reevy. London: Praeger, 2008.
- Knudsen, Henrik. "Battling the Aurora Borealis: The Transnational Coproduction of Ionospheric Research in Early Cold War Greenland." In *Exploring Greenland: Cold War Science and Technology on Ice*, edited by Ronald E. Doel, Kristine C. Harper, and Matthias Heymann, 143–65. New York: Palgrave Macmillan, 2016.
- Knutsen, Willie, and Will C. Knutsen. *Arctic Sun on My Path: The True Story of America's Last Great Polar Explorer*. Guilford, CT: Lyons Press, 2005.
- Krick, Irving P. *War and Weather: A Report Prepared for the AAF Scientific Advisory Group*. Wright Field, OH: Army Air Force Scientific Advisory Group, 1946.
- Kuklick, Henrika, and Robert E. Kohler. "Introduction." *Osiris* 11 (1996): 1–14.
- Kulchyski, Peter, and Frank James Tester. *Kiumajut (Talking Back): Game Management and Inuit Rights, 1900–70*. Vancouver: University of British Columbia Press, 2007.
- Kushner, Howard I. *Conflict on the Northwest Coast: American-Russian Rivalry in the Pacific Northwest, 1790–1867*. Westport: Greenwood Press, 1975.
- Lackenbauer, P. Whitney. "'Defence Against Help': Revisiting a Primary Justification for Canadian Participation in Continental Defence with the United States." Waterloo: Defence Strategic Foresight Group Occasional Paper, 2020.
- Lackenbauer, P. Whitney. "Defence, Development, and Inuit: St-Laurent's Modern Approach to the North." In *The Unexpected Louis St-Laurent*, edited by Patrice Dutil, 193–221. Vancouver: University of British Columbia Press, 2020.
- Lackenbauer, P. Whitney, ed. *Human Flagpoles or Humanitarian Action? Discerning Government Motives behind the Inuit Relocations to the High Arctic, 1953–1960*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 16. Calgary: Arctic Institute of North America, 2020.
- Lackenbauer, P. Whitney. "Right and Honourable: Mackenzie King, Canadian-American Bilateral Relations, and Canadian Sovereignty in the Northwest, 1943–1948." In *Mackenzie King: Citizenship and Community*, edited by John English, Kenneth McLaughlin, and P. Whitney Lackenbauer, 151–68. Toronto: Robin Brass Studio, 2002.
- Lackenbauer, P. Whitney, and K.C. Eyre. *Unfurling the Air Force Ensign in the Canadian Arctic: The 1922 Eastern Arctic and 1927–28 Hudson Strait Expeditions*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 3. Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2015.
- Lackenbauer, P. Whitney, and Matthew Farish. "The Cold War on Canadian Soil: Militarizing a Northern Environment." *Environmental History* 12/4 (2007): 921–50.
- Lackenbauer, P. Whitney, and Daniel Heidt, eds. *The Advisory Committee on Northern Development: Context and Meeting Minutes, 1948–66*, Documents on Canadian Arctic

- Sovereignty and Security (DCASS) No. 4. Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2015.
- Lackenbauer, P. Whitney, and Daniel Heidt. "Leadership, Cultures, the Cold War and the Establishment of Arctic Scientific Stations: Situating the Joint Arctic Weather Stations (JAWS)." In *Cold Science: Environmental Knowledge in the North American Arctic during the Cold War*, edited by Stephen Bocking and Daniel Heidt, 42–60. New York: Routledge, 2019.
- Lackenbauer, P. Whitney, and Rob Huebert. "Premier Partners: Canada, the United States and Arctic Security." *Canadian Foreign Policy Journal* 20/3 (2014): 320–33.
- Lackenbauer, P. Whitney, and Peter Kikkert. *The Canadian Forces & Arctic Sovereignty: Debating Roles, Interests and Requirements, 1968–1974*. Waterloo: Laurier Centre for Military Strategic and Disarmament Studies, 2010.
- Lackenbauer, P. Whitney, and Peter Kikkert. "The Dog in the Manger – and Letting Sleeping Dogs Lie: The United States, Canada and the Sector Principle, 1924–1955." In *International Law and Politics of the Arctic Ocean: Essays in Honor of Donat Pharand*, edited by Suzanne Lalonde and Ted L. McDorman, 216–39. Leiden: Brill, 2015.
- Lackenbauer, P. Whitney, and Peter Kikkert. "Setting an Arctic Course: Task Force 80 and Canadian Control in the Arctic, 1948." *The Northern Mariner* 21/4 (October 2011): 327–58.
- Lackenbauer, P. Whitney, and Peter Kikkert. "Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945–68." In *In the National Interest: Canadian Foreign Policy and the Department of Foreign Affairs and International Trade, 1909–2009*, edited by Greg Donaghy and Michael K. Carroll, 101–20. Calgary: University of Calgary Press, 2011.
- Lackenbauer, P. Whitney, Suzanne Lalonde, and Elizabeth Riddell-Dixon. *Canada and the Maritime Arctic: Boundaries, Shelves, and Waters*. Peterborough: North American and Arctic Defence and Security Network, 2020.
- Lackenbauer, P. Whitney, and Ryan Shackleton. "Inuit-Air Force Relations in the Qikiqtani Region During the Early Cold War." In *De-Icing Required!: The Historical Dimension of the Canadian Air Force's Experience in the Arctic*, edited by P. Whitney Lackenbauer and W.A. March, 73–94. Trenton: Canadian Forces Air Warfare Centre, 2012.
- Lackenbauer, P. Whitney, and Ryan Shackleton. *When the Skies Rained Boxes: The Air Force and the Qikiqtani Inuit, 1941–64*. Working Papers on Arctic Security No. 4. Toronto: Walter and Duncan Gordon Foundation, October 2012.
- Lajeunesse, Adam. "Lock, Stock, and Icebergs? Defining Canadian Sovereignty from Mackenzie King to Stephen Harper." *CMSS Occasional Paper* No. 1. Calgary: Centre for Military and Strategic Studies, 2007.
- Lajeunesse, Adam. *Lock, Stock, and Icebergs: A History of Canada's Arctic Maritime Sovereignty*. Vancouver: University of British Columbia Press, 2016.
- Lajeunesse, Adam. "The True North As Long As It's Free: The Canadian Policy Deficit, 1945–1985." Master's thesis, University of Calgary, 2007.
- Latour, Bruno, and Steve Woolgar. *Laboratory Life: The Social Construction of Scientific Facts*. Beverly Hills: Sage, 1979.
- Leeming, J.M. "HMCS Labrador and the Canadian Arctic." In *The RCN in Retrospect, 1910–1968*, edited by James A. Boutillier, 286–307. Vancouver: University of British Columbia Press, 1982.
- Legal Status of Eastern Greenland (Denmark v. Norway)*. [1933] *Permanent Court of International Justice* (Ser. A/B) No. 53.

- Legler, Gretchen. "The end of the heroic illusion: how three generations of women writers have changed the literature of Antarctica." *Polar Journal* 1/2 (2011): 207–24.
- Leon, Gloria R., Gro Mjeldheim Sandal, and Eric Larsen. "Human performance in polar environments." *Journal of Environmental Psychology* 31/4 (December 2011): 353–60.
- Lesins, G., T.J. Duck, and J.R. Drummond. "Climate Trends at Eureka in the Canadian High Arctic." *Atmosphere-Ocean* 48/2 (2010): 59–80.
- Leslie, Stuart W. *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford*. New York: Columbia University Press, 1993.
- Lester, A.G. *Special Contract: A Story of Defence Communications in Canada*. Edited by Jeff Noakes and P. Whitney Lackenbauer. Antigonish: Mulroney Institute of Government, Arctic Operational History Series, no. 6, 2019.
- Levere, Trevor H. *Science and the Canadian Arctic: A Century of Exploration, 1818–1918*. Cambridge: Cambridge University Press, 2004.
- Levere, Trevor H. "Science and the Canadian Arctic, 1818–76, from Sir John Ross to Sir George Strong Nares." *Arctic* 41/2 (1988): 127–37.
- Levere, Trevor H. "Vilhjalmur Stefansson, the Continental Shelf, and a New Arctic Continent." *British Journal for the History of Science* 21/2 (June 1988): 233–47.
- Livingstone, David N. *Putting Science in its Place: Geographies of Scientific Knowledge*. Chicago: University of Chicago Press, 2010.
- Livingstone, David N. "The spaces of knowledge: contributions towards a historical geography of science." *Environment and Planning D: Society and Space* 13/1 (1995): 5–34.
- Lloyd, Kenneth H. *Upper Atmosphere Research*. Salisbury: Dsto, 1988.
- Lloyd, Trevor. "Aviation in Arctic North America and Greenland." *Polar Record* 5 (1948): 163–71.
- Lloyd, Trevor. "Canada's Strategic North." *International Journal* 2/2 (Spring 1947): 144–49.
- Loo, Tina. *Moved by the State: Forced Relocation and Making a Good Life in Postwar Canada*. Vancouver: University of British Columbia Press, 2019.
- Loo, Tina. *States of Nature: Conserving Canada's Wildlife in the Twentieth Century*. Vancouver: University of British Columbia Press, 2011.
- Loo, Tina, and Meg Stanley. "An Environmental History of Progress: Damming the Peace and Columbia Rivers." *Canadian Historical Review* 92/3 (September 2011): 399–427.
- Loomis, Chauncey C. "The Arctic Sublime." In *Nature and the Victorian Imagination*, edited by U.C. Knoepfelmacher and G.B. Tennyson, 95–112. Berkeley: University of California Press, 1977.
- Loomis, Chauncey C. *Weird and Tragic Shores: The Story of Charles Francis Hall, Explorer*. New York: Alfred A. Knopf, 1971.
- Low, Albert Peter. *Report on the Dominion Government Expedition to Hudson Bay and the Arctic Islands on Board the DGS Neptune, 1903–1904*. Ottawa: Government Printing Bureau, 1906.
- Lüdecke, Cornelia. "The First International Polar Year (1882–83): A Big Science Experiment with Small Science Equipment." *History of Meteorology* 1 (2004): 55–64.
- Lüdecke, Cornelia. "From the Bottom to the Stratosphere - Arctic Climate Features as Seen from the First International Polar Year (1882–1883) Until the End of World War II." In *Climate Variability and Extremes during the Past 100 Years*, edited by Stefan Brönnimann, Jürg Luterbacher, Tracy Ewen, Henry F. Diaz, Richard S. Stolarski, and Urs Neu, 29–46. New York: Springer, 2008.

- Lüdecke, Cornelia. "Research Projects of the International Polar Years." *Geographische Rundschau International Edition* 3/2 (2007): 58–63.
- Lynch, Kevin. *What Time Is This Place?* Cambridge: MIT Press, 1972.
- MacDonald, John. "Graham Westbrook Rowley (1912–2003)." *Arctic* 57/2 (June 2004): 223–24.
- MacDonald, Robert. "Challenges and Accomplishments: A Celebration of the Arctic Institute of North America." *Arctic* 58/4 (December 2005): 331–458.
- MacEachern, Alan. "J.E. Bernier's Claim to Fame." *Scientia Canadensis* 33/2 (2010): 43–73.
- MacLaren, I.S. "The Aesthetic Map of the North, 1845–1859." *Arctic* 38/2 (June 1985): 89–103.
- Marcus, Alan R. "Inuit Relocation Policies in Canada and Other Circumpolar Countries, 1925–60." Report for the Royal Commission on Aboriginal Peoples. December 1995. http://publications.gc.ca/collections/collection_2017/bcp-pco/Z1-1991-1-41-149-eng.pdf.
- Marcus, Alan R. *Out in the Cold: The Legacy of Canada's Inuit Relocation Experiment in the High Arctic*. Copenhagen: International Work Group for Indigenous Affairs, 1992.
- Marcus, Alan R. *Relocating Eden: The Image and Politics of Inuit Exile in the Canadian Arctic*. Hanover, NH: University Press of New England, 1995.
- Marsden, Michael. "Resources and Communication in the Arctic." In *The Arctic Frontier*, edited by R. St. J. MacDonald, 26–56. Toronto: Canadian Institute of International Affairs, 1966.
- Marshall, Philip S. "Obituary: Charles Alan Kenneth Innes-Taylor, 1900–1983." *Arctic* 37/1 (1984): 84–86.
- Martin-Nielsen, Janet. "'The Deepest and Most Rewarding Hole Ever Drilled': Ice Cores and the Cold War in Greenland." *Annals of Science* 70/1 (2013): 47–70.
- Martin-Nielsen, Janet. *Eismitte in the Scientific Imagination: Knowledge and Politics at the Center of Greenland*. New York: Springer, 2013.
- Martin-Nielsen, Janet. "The Other Cold War: The United States and Greenland's Ice Sheet Environment, 1948–1966." *Journal of Historical Geography* 38/1 (2012): 69–80.
- Mayne, Richard. "'An Art of Its Own': Corporate Knowledge, the Canadian Navy and Arctic Operations." *Canadian Naval Review* 5/3 (Fall 2009): 10–16.
- McCray, W. Patrick. "Amateur Scientists, the International Geophysical Year, and the Ambitions of Fred Whipple." *Isis* 97/4 (December 2006): 634–58.
- McDorman, Ted L. *Salt Water Neighbors: International Ocean Law Relations between the United States and Canada*. Oxford: Oxford University Press, 2009.
- McGhee, Robert. *Ancient Peoples of the Arctic*. Vancouver: University of British Columbia Press, 1996.
- McGhee, Robert. "The Archaeological Construction of Aboriginality." *Archaeologies of Us and Them: Debating History, Heritage and Indigeneity*, edited by Charlotta Hillerdal, Anna Karlström, and Carl-Gösta Ojala, 97–108. London: Routledge, 2017.
- McGhee, Robert. "The Population Size and Temporal Duration of Thule Culture in Arctic Canada." *On the Track of Thule Culture from Bering Strait to Greenland*, edited by B. Gronnow, 75–90. Copenhagen: National Museum of Denmark, 2009.
- McGrath, Melanie. *The Long Exile: A true story of deception and survival amongst the Inuit of the Canadian Arctic*. London: Fourth Estate, 2006.
- McKinlay, William Laird. *Karluk: The Great Untold Story of Arctic Exploration*. London: Weidenfeld & Nicolson, 1976.
- McNeill, J.R. "Observations on the Nature and Culture of Environmental History." *History and Theory* 42 (December 2003): 5–43.

- McNeill, J.R., and Corinna R. Unger. "Introduction: The Big Picture." In *Environmental Histories of the Cold War*, edited by J.R. McNeill and Corinna R. Unger, 1–18. Cambridge: Cambridge University Press, 2010.
- M'Dougall, George Frederick. *The Eventful Voyage of H.M. Discovery Ship "Resolute" to the Arctic Regions, in Search of Sir John Franklin and the Missing Crews of H.M. Discovery Ship "Erebus" and "Terror," 1852, 1853, 1854*. London: Longman, Brown, Green, Longmans, and Roberts, 1857.
- Mergen, Bernard. *Weather Matters: An American Cultural History Since 1900*. Lawrence, KS: University Press of Kansas, 2008.
- Middlemiss, D.W., and J.J. Sokolsky. *Canadian Defence: Decisions and Determinants*. Toronto: Harcourt Brace Jovanovich, 1989.
- Middleton, W.E. Knowles, and Athelstan F. Spilhaus. *Meteorological Instruments*, 3rd ed. Toronto: University of Toronto Press, 1953.
- Miller, David Hunter. "Political Rights in the Arctic." *Foreign Affairs* 4/1 (October 1925): 47–60.
- Moore, William R. "Planning for Social and Psychological Needs at a Canadian Arctic Military Installation." Master's thesis, University of British Columbia, 1990.
- Morris, Margaret. "Boundary Problems Relating to the Sovereignty of the Canadian Arctic." In *Canada's Changing North*, edited by William C. Wonders, 310–37. Toronto: McClelland & Stewart, 1971.
- Morrison, William R. "Canadian Sovereignty and the Inuit of the Central and Eastern Arctic." *Études/Inuit/Studies* 10/1–2(1986): 245–59.
- Morrison, William R. "Eagle Over the Arctic: Americans in the Canadian North, 1867–1985." *Canadian Review of American Studies* 18/1 (Spring 1987): 61–85.
- Morrison, William R. "The North." On *Canada, Confederation to Present: An Interactive History of Canada* [CD-ROM], edited by Bob Hesketh and Christopher Hackett. Edmonton: Chinook Multimedia, 2001.
- Morrison, William R. *Showing the Flag: The Mounted Police and Canadian Sovereignty in the North, 1894–1925*. Vancouver: University of British Columbia Press, 1985.
- Morrison, William R., and Kenneth A. Coates. *Working the North: Labor and the Northwest Defense Projects, 1942–1946*. Fairbanks: University of Alaska Press, 1994.
- Mowat, Farley. *Never Cry Wolf*. Toronto: McClelland & Stewart, 1963.
- Mowat, Farley. *People of the Deer*. Boston: Little Brown, 1952.
- Nasht, Simon. *The Last Explorer: Hubert Wilkins, Hero of the Great Age of Polar Exploration*. New York: Skyhorse, 2011.
- Naylor, Simon, Katrina Dean, and Martin Siegert. "The IGY and the ice sheet: surveying Antarctica." *Journal of Historical Geography* 34/4 (October 2008): 574–95.
- Nebeker, Frederick. *Calculating the Weather: Meteorology in the 20th Century*. San Diego: Academic Press, 1995.
- Needell, Allan A. *Science, Cold War and the American State: Lloyd V. Berkner and the Balance of Professional Ideals*. Amsterdam: Harwood Academic, 2000.
- Nelson, Paul D. "Leadership in Small Isolated Groups: Report Number 62:13." San Diego: US Navy Medical Neuropsychiatric Research Unit, 1962.
- "New Canadian Meteorological Stations in the Arctic." *Polar Record* 5/33–34 (1947): 95–97.
- Newman, Peter C. *Renegade in Power: The Diefenbaker Years*. Toronto: McClelland & Stewart, 1963.

- Nielsen, Henry, and Kristian H. Nielsen. "Camp Century – Cold War City Under the Ice." In *Exploring Greenland: Cold War Science and Technology on Ice*, edited by Ronald E. Doel, Kristine C. Harper, and Matthias Heymann, 195–216. New York: Palgrave Macmillan, 2016.
- "North of Seventy-Four." *External Affairs*: 213.
- Olesen, Thorsten Borring. "Tango for Thule: The Dilemmas and Limits of the 'Neither Confirm nor Deny' Doctrine in Danish-American Relations, 1957–1968." *Journal of Cold War Studies* 13/2 (2011): 116–47.
- Orvig, Svann. "A Century of Arctic Meteorology: From Discovery to Science." In *A Century of Canada's Arctic Islands, 1880–1980*, edited by Morris Zaslow, 111–30. Ottawa: Royal Society of Canada, 1981.
- Orvik, Nils. "Defence Against Help – A Strategy for Small States?" *Survival* 15/5 (September/October 1973): 228–31.
- Owram, Doug. *Promise of Eden: The Canadian Expansionist Movement and the Idea of the West, 1856–1900*. Toronto: University of Toronto Press, 1980.
- Palinkas, Lawrence A. *Sociocultural Influences on Psychosocial Adjustment in Antarctica: Report No. 85-49*. San Diego: US Navy Medical Neuropsychiatric Research Unit, 1985.
- Palinkas, Lawrence A., and Peter Suedfeld. "Psychological effects of polar expeditions." *Lancet* 371/9607 (12 January 2008): 153–63.
- Palmai, G. "Psychological Observations on an Isolated Group in Antarctica." *British Journal of Psychiatry* 109/460 (May 1963): 364–70.
- Park, Robert W. "The Dorset-Thule succession in Arctic North America: assessing claims for culture contact." *American Antiquity* 58/2 (1993): 203–34.
- Parry, Sir William Edward. *Journal of a Voyage for the Discovery of a North-West Passage from the Atlantic to the Pacific, Performed in the Years 1819–20, in His Majesty's Ships Hecla and Griper*. London: John Murray, 1821.
- Patterson, John. "Meteorology in Peace and War." *Canadian Geographic Journal* 35/3 (March 1949): 115–35.
- Pearson, Lester B. "Canada Looks Down North." *Foreign Affairs* 24 (July 1946): 638–47.
- Pearson, Lester B. "Canada's Northern Horizon." *Foreign Affairs* 31/4 (1953): 581–91.
- Pearson, Lester B. *Mike: The Memoirs of the Right Honourable Lester B. Pearson, Vol. 2, 1948–1957*, edited by John A. Munro and Alex I. Inglis. Toronto and Buffalo: University of Toronto Press, 1973.
- Pennie, A.M., ed. *Defence Research Northern Laboratory 1947–1965*. Ottawa: Defence Research Board, 1966.
- Perras, Galen Roger. *Stepping Stones to Nowhere: The Aleutian Islands, Alaska, and American Military Strategy, 1867–1945*. Vancouver: University of British Columbia Press, 2003.
- Petersen, Nikolaj. "SAC at Thule: Greenland in the U.S. Polar Strategy." *Journal of Cold War Studies* 13/2 (Spring 2011): 90–115.
- Pharand, Donat. *Canada's Arctic Waters in International Law*. Cambridge: Cambridge University Press, 1988.
- Pharand, Donat. *The Law of the Sea of the Arctic with Special Reference to Canada*. Washington: Arctic Institute of North America, 1973.
- Phillips, D.W., and R.B. Crowe. *Climate Severity Index for Canadians*. Downsview: Atmospheric Environmental Service, 1984.
- Phillips, R.A.J. *Canada's North*. Toronto: Macmillan, 1967.

- Pickersgill, J.W., and D.F. Forster, eds. *The Mackenzie King Record, Volume 1, 1939/1944*. Toronto: University of Toronto Press, 1960.
- Pickersgill, J.W., and D.F. Forster, eds. *The Mackenzie King Record, Volume 3, 1945/46*. Toronto: University of Toronto Press, 1968.
- Piper, Liza. "Coming In from the Cold." *Canadian Historical Review* 95/4 (December 2014): 567–73.
- Polunin, Nicholas. *Arctic Unfolding: Experiences and Observations During a Canadian Airborne Expedition in Northern Ungava, the Northwest Territories, and the Arctic Archipelago*. London: Hutchinson, 1949.
- Powell, Richard C. "Becoming a geographical scientist: oral histories of Arctic fieldwork." *Transactions of the Institute of British Geographers* 33/4 (2008): 548–65.
- Powell, Richard C. "Learning from Spaces of Play: Recording Emotional Practices in High Arctic Environmental Sciences." In *Emotion, Place and Culture*, edited by Mick Smith, Joyce Davidson, Laura Cameron, and Liz Bondi, 115–32. Farnham and Burlington, VT: Ashgate, 2009.
- Powell, Richard. "Northern Cultures: Myths, Geographies and Representational Practices." *Cultural Geographies* 12/3 (2005): 371–78.
- 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* 39/8 (2007): 1794–1811.
- Powell, Richard C. "Science, Sovereignty and Nation: Canada and the Legacy of the International Geophysical Year, 1957–1958." *Journal of Historical Geography* 34/4 (2008): 618–38.
- Powell, Richard C. "The Sirens' Voices? Field Practices and Dialogue in Geography." *Area* 34/3 (2002): 261–72.
- Powell, Richard C. *Studying Arctic Fields: Cultures, Practices, and Environmental Sciences*. Montreal & Kingston: McGill-Queen's University Press, 2017.
- Purver, Ron. "The Arctic in Canadian Security Policy, 1945 to the Present." In *Canada's International Security Policy*, edited by David B. Dewitt and David Leyton-Brown, 81–110. Scarborough, ON: Prentice Hall, 1995.
- Rae, R.W. "Arctic Weather Stations." *Weather* 7/1 (January 1952): 3–5.
- Rae, R.W. "Joint Arctic Weather Station Project." *Arctic* 4/1 (May 1951): 18–26.
- Rae, R.W. "Meteorological Activities in the Canadian Arctic." *Arctic* 7/3–4 (1954): 119–28.
- Reed, John C., and Andreas G. Ronhovde. *Arctic Laboratory: A History (1947–1966) of the Naval Arctic Research Laboratory at Point Barrow, Alaska*. Montreal: Arctic Institute of North America Report AINA-TR-9, 1971.
- Roberts, Peder. *The European Antarctic: Science and Strategy in Scandinavia and the British Empire*. New York: Springer, 2011.
- Roberts, Peder, and Eric Paglia. "Science as National Belonging: The Construction of Svalbard as a Norwegian Space." *Social Studies of Science* 46/6 (2016): 894–911.
- Robertson, Gordon. *Memoirs of a Very Civil Servant: Mackenzie King to Pierre Trudeau*. Toronto: University of Toronto Press, 2000.
- Robinson, J. Lewis. "Reminiscences: Arctic Geography Forty Years Ago." *Arctic* 40 (1987): 239–43.
- Robinson, Michael F. *The Coldest Crucible: Arctic Exploration and American Culture*. Chicago: University of Chicago Press, 2006.
- Roots, E.F. "Canadian Polar Continental Shelf Project, 1959–62." *Polar Record* 11/72 (September 1972): 270–76.

- Roots, E.F. "The Polar Continental Shelf Project." In *Canada's Changing North*, edited by William C. Wonders, 410–16. Montreal & Kingston: McGill-Queen's University Press, 2003.
- Roots, E.F. "The Role of Logistics in Northern Research." In *Proceedings of the Second National Northern Research Conference*, edited by J.J. Bond, 65–77. Edmonton: Boreal Institute, 1969.
- Roots, E.F. "Scientific Research in the Canadian Arctic Islands — the Future." In *Canada's Missing Dimension: Science and History in the Canadian Arctic Islands*, vol. 1, edited by C.R. Harington, 41–53. Ottawa: Canadian Museum of Nature, 1990.
- Rothblum, Esther D. "Psychological Factors in the Antarctic." *Journal of Psychology: Interdisciplinary and Applied* 124/3 (1990): 253–73.
- Rowley, Graham W. "Exercise Muskox." *Geographical Journal* 109/4–6 (April–June 1947): 175–84.
- Rowley, Graham W. "Settlement and Transportation in the Canadian North." *Arctic* 7 (1954): 336–42.
- Sandberg, L. Anders, and Joel Sloggett. "Geography in the Canadian North, c. 1945–1988." *Geografiska Annaler, Series B: Human Geography* 71 (1989): 125–34.
- Sandlos, John. *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories*. Vancouver: University of British Columbia Press, 2007.
- Sangster, Joan. *The Iconic North: Cultural Constructions of Aboriginal Life in Postwar Canada*. Vancouver: University of British Columbia Press, 2015.
- Sarris, Aspa, and Neil Kirby. "Behavioral Norms and Expectations on Antarctic Stations." *Environment and Behavior* 39/5 (2007): 706–23.
- Saul, Norman E. *Distant Friends: The United States and Russia, 1763–1867*. Lawrence: University Press of Kansas, 1991.
- Schaffel, Kenneth. *The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945–1960*. Washington: Office of Air Force History, United States Air Force, 1991.
- Schröder, W. "The First International Polar Year (1882–1883) and International Geophysical Cooperation." *Earth Sciences History* 10/2 (1991): 223–26.
- Scott, James C. *Domination and the Arts of Resistance: Hidden Transcripts*. New Haven: Yale University Press, 1990.
- Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press, 1998.
- Selinger, Franz, and Alexander Glen. "Arctic Meteorological Operations and Counter-Operations during World War II." *Polar Record* 21/135 (1983): 559–67.
- Shadian, Jessica M., and Monica Tennberg, eds. *Legacies and Change in Polar Science: Historical, Legal and Political Reflections on The International Polar Year*. Aldershot: Ashgate Press, 2009.
- Shaw, Sir Napier. *Manual of Meteorology, Volume I: Meteorology in History*. Cambridge: Cambridge University Press, 1926.
- Simpson, G.C. "Meteorology in Polar Regions." *Geographical Journal* 74/3 (September 1929): 258–62.
- Smith, Denis. *Diplomacy of Fear: Canada and the Cold War 1941–1948*. Toronto: University of Toronto Press, 1988.
- Smith, Denis. *Rogue Tory: The Life and Legend of John G. Diefenbaker*. Toronto: Macfarlane Walter & Ross, 1995.

- Smith, Gordon W. *A Historical and Legal Study of Sovereignty in the Canadian North: Terrestrial Sovereignty, 1870–1939*, edited by P. Whitney Lackenbauer. Calgary: University of Calgary Press, 2014.
- Smith, Gordon W. “The Relocation of Inuit from Hudson Bay and Baffin Island to the High Arctic in 1953, and Subsequent Events, including Disputed Sovereignty Issues.” In *Human Flagpoles or Humanitarian Action? Discerning Government Motives behind the Inuit Relocations to the High Arctic, 1953–1960*, Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 16, edited by P. Whitney Lackenbauer, 323–52. Calgary: Arctic Institute of North America, 2020.
- Smith, Gordon W. “Sovereignty in the North: The Canadian Aspect of an International Problem.” In *The Arctic Frontier*, edited by R. St. J. MacDonald, 194–255. Toronto: University of Toronto Press, 1966.
- Smith, Gordon W. “The Transfer of Arctic Territories from Great Britain to Canada in 1880, and some Related Matters, as seen in Official Correspondence.” *Arctic* 14/1 (1961): 53–73.
- Smith, Gordon W. “Weather Stations in the Canadian North and Sovereignty.” *Journal of Military and Strategic Studies* 11/3 (Spring 2009): 1–63.
- Smith, Michael. *Sir James Wordie, Polar Crusader: Exploring the Arctic and Antarctic*. Edinburgh: Birlinn, 2012.
- Sörlin, Sverker. “The Historiography of the Enigmatic North.” *Canadian Historical Review* 95/4 (December 2014): 555–66.
- Sörlin, Sverker. “Narratives and Counter-Narratives of Climate Change: North Atlantic Glaciology and Meteorology, c. 1930–1955.” *Journal of Historical Geography* 35/2 (April 2009): 237–55.
- Sörlin, Sverker, and Paul Warde. “Making the Environment Historical.” In *Nature’s End: History and the Environment*, edited by Sverker Sörlin and Paul Warde, 1–19. London: Palgrave MacMillan, 2009.
- Stacey, C.P. *Arms, Men and Governments: The War Policies of Canada, 1939–1945*. Ottawa: Queen’s Printer, 1970.
- Stacey, C.P. *Canada and the Age of Conflict, Vol. 2: 1921–1948, The Mackenzie King Era*. Toronto: Macmillan of Canada, 1981.
- Stacey, C.P. *The Military Problems of Canada: A Survey of Defence Policies and Strategic Conditions, Past and Present*. Toronto: Ryerson Press, 1940.
- Stairs, Denis. “Realists at Work: Canadian Policy Makers and the Politics of Transition from Hot War to Cold War.” In *Canada and the Early Cold War*, edited by Greg Donaghy, 91–118. Ottawa: DFAIT, 1998.
- Stefansson, Vilhjalmur. “The American Far North.” *Foreign Affairs* 17 (1939): 508–21.
- Stefansson, Vilhjalmur. *The Friendly Arctic: The Story of Five Years in Polar Regions*. New York: Macmillan, 1921.
- Stefansson, Vilhjalmur. *The Northward Course of Empire*. New York: Macmillan, 1924.
- Strange, R.E., and W.J. Klein. “Emotional and social adjustment of recent US winter-over parties in isolated Antarctic stations.” In *Polar Human Biology: The Proceedings of the SCAR / IUPS / IUBS Symposium on Human Biology and Medicine in the Antarctic*, edited by O.G. Edholm and E.K.E. Gunderson, 410–16. London: Heinemann Medical, 1973.
- Stringer, E. *Foundations of Climatology*. San Francisco: H. Freeman and Co., 1976.
- Stuhl, Andrew. “Cold Places: Movement, Knowledge, and Time.” *Journal of Environmental Studies and Sciences* 6/4 (May 2015): 779–82.

- Stuster, Jack. *Bold Endeavors: Lessons from Polar and Space Exploration*. Annapolis: Naval Institute Press, 1996.
- Suedfeld, Peter. "Polar Psychology, An Overview." *Environment and Behavior* 23/6 (November 1991): 653–65.
- Sullivan, W. *Assault on the Unknown: The International Geophysical Year*. New York: McGraw-Hill, 1961.
- Sutherland, R.J. "The Strategic Significance of the Canadian Arctic." In *The Arctic Frontier*, edited by R. St. J. MacDonald, 258–76. Toronto: University of Toronto Press, 1966.
- Sverdrup, Harald U. "Klima des Kanadischen Archipels and Grönlands." In *Handbuch der Klimatologie*, edited by W. Koppen and R. Geiger, 1–30. Berlin: Verlag von Gebrüder Borntraeger, 1935.
- Sverdrup, Harald U. "Roald Amundsen." *Arctic* 12/4 (December 1959): 221–36.
- Syrett, David. "German Meteorological Intelligence from the Arctic and the North Atlantic, 1940–1945." *Mariner's Mirror [Great Britain]* 71/3 (1985): 325–33.
- Taagholt, Jørgen, and Jens Claus Hansen. *Greenland: Security Perspectives*, trans. Daniel Lufkin. Fairbanks: Arctic Research Consortium of the United States, 2001.
- Taylor, A.J.W. *Antarctic Psychology*. Wellington: Science Information Publishing Centre, 1987.
- Taylor, Andrew. *Geographical Discovery and Exploration in the Queen Elizabeth Islands*. Ottawa: E. Cloutier, 1964.
- Taylor, Andrew. *Two Years Below the Horn*, edited by Daniel Heidt and P. Whitney Lackenbauer. Winnipeg: University of Manitoba Press, 2017.
- Teal, John J. Jr. "Alaska: Fulcrum of Power." *Foreign Affairs* 27/1 (1948): 86–95.
- Tester, Frank James, and Peter Kulchyski. *Tammarniit (Mistakes): Inuit Relocation in the Eastern Arctic, 1939–63*. Vancouver: University of British Columbia Press, 1994.
- Thomas, Lowell. *Sir Hubert Wilkins: His World of Adventure*. Toronto: McGraw-Hill, 1961.
- Thomas, Morley. "Andrew Thomson: A Profile." *Atmosphere* 11/4 (1973): 125–33.
- Thomas, Morley. *The Beginnings of Canadian Meteorology*. Toronto: ECW Press, 1991.
- Thomas, Morley. "A Brief History of Canadian Meteorological Services Part 2: 1930–1939." *Atmosphere* 9/2 (1971): 1–7.
- Thomas, Morley. "A Brief History of Meteorological Services in Canada Part 1: 1839–1930." *Atmosphere* 9/1 (1971): 1–8.
- Thomas, Morley. *Forecasts for Flying: Meteorology in Canada, 1918–1939*. Toronto: ECW Press, 1996.
- Thomas, Morley. *Metmen in Wartime: Meteorology in Canada 1939–1945*. Toronto: ECW Press, 2001.
- Thomas, Morley, and W.J. Maunder. *Sixty-Five Years of International Climatology: The History of the WMO Commission for Climatology: 1929–1993*. Downsview: Environment Canada, 1993.
- Thompson, John Herd, and Stephen J. Randall. *Canada and the United States: Ambivalent Allies*, rev. ed. Atlanta: University of Georgia Press, 2008.
- Thomson, Andrew. "The Growth of Meteorological Knowledge of the Canadian Arctic." *Arctic* 1/1 (Spring 1948): 34–43.
- Thrasher, Kevin. "Exercise Musk Ox: Lost Opportunities." Master's thesis, Carleton University, 1998.

- Traweek, Sharon. *Beamtimes and Lifetimes: The World of High Energy Physicists*. Cambridge: Harvard University Press, 2009.
- Tuathail, Gearóid Ó. *Critical Geopolitics: The Politics of Writing Global Space*. Minneapolis: University of Minnesota Press, 1996.
- Turner, Jonathan. "Politics and Defence Research in the Cold War." *Scientia Canadensis* 35/1–2 (2012): 39–63.
- van Rooy, M.P., ed. *Meteorology of the Antarctic*. Pretoria, South Africa: Weather Bureau, Department of Transport, 1957.
- Vance, Jonathan F. *High Flight: Aviation and the Canadian Imagination*. Toronto: Penguin, 2002.
- Vogel, Brant. "Bibliography of Recent Literature in the History of Meteorology: Twenty-Six Years, 1983–2008." *History of Meteorology* 5 (2009): 23–125.
- Waiser, William A. *The Field Naturalist: John Macoun, the Geological Survey, and Natural Science*. Toronto: University of Toronto Press, 1989.
- Wallace, Hugh N. *The Navy, the Company, and Richard King: British Exploration in the Canadian Arctic, 1829–1860*. Montreal & Kingston: McGill-Queen's University Press, 1980.
- Wallace, Matthew L. "Reimagining the Arctic atmosphere: McGill University and Cold War politics, 1945–1970." *Polar Journal* 6/2 (2016): 358–78.
- Ward, Catharine, and Dennis Wheeler. "Hudson's Bay Company ship's logbooks: a source of far North Atlantic weather data." *Polar Record* 48/2 (April 2012): 165–76.
- Warnock, John W. *Partner to Behemoth: The Military Policy of a Satellite Canada*. Toronto and Chicago: New Press, 1970.
- Weaver, Dan, Kimberly Strong, Matthias Schneider, Penny M. Rowe, Chris Sioris, Kaley A. Walker, Zen Mariani, et al. "Intercomparison of atmospheric water vapour measurements at a Canadian High Arctic site." *Atmospheric Measurement Techniques* 10/8 (2017): 2851–80.
- Weaver, Dan, Kimberly Strong, Kaley A. Walker, Chris Sioris, Matthias Schneider, C. Thomas McElroy, Holger Vömel, et al. "Comparison of Ground-Based and Satellite Measurements of Water Vapour Vertical Profiles over Ellesmere Island, Nunavut." *Atmospheric Measurement Techniques* 12/7 (2019): 4039–63.
- Weissling, Lee E. "Inuit Redistribution and Development: Processes of Change in the Eastern Canadian Arctic, 1922–1968." PhD diss., University of Alberta, 1991.
- Wenzel, George W. "Canadian Inuit subsistence and ecological instability—if the climate changes, must the Inuit?" *Polar Research* 28/1 (2009): 89–99.
- Wenzel, George W. "From TEK to IQ: Inuit Qaujimagatuqangit and Inuit Cultural Ecology." *Arctic Anthropology* 41/2 (2004): 238–50.
- Whitaker, Reginald, and Gary Marcuse. *Cold War Canada: The Making of a National Insecurity State, 1945–1957*. Toronto: University of Toronto Press, 1994.
- White, Adrienne, Luke Copland, Derek Mueller, and Wesley Van Wychen. "Assessment of Historical Changes (1959–2012) and the Causes of Recent Break-Ups of the Petersen Ice Shelf, Nunavut, Canada." *Annals of Glaciology* 56/69 (2015): 65–76.
- Whitnah, Donald R. *A History of the United States Weather Bureau*. Urbana: University of Illinois Press, 1961.
- Williams, Thomas R. "Getting Organized: A History of Amateur Astronomy in the United States." PhD diss., Rice University, 2000.
- Willis, J.S. "Mental Health in the North." *Medical Services Journal, Canada* 16 (1960): 689–720.

- Wilson, J.A. "The Expansion of Aviation into Arctic and Sub-Arctic Canada." *Canadian Geographical Journal* 41 (1950): 130–41.
- Winfield, R.H. "The supply by air of Exercise 'Musk Ox', 1946." *Polar Record* 6/3 (January 1952): 340–44.
- Woitkowitz, John. "Making Sense of the Arctic: U.S.-Canadian Foreign and Defense Relations and the Establishment of JAWS and the DEW Line, 1944–1957." PhD diss., University of Calgary, 2018.
- Woitkowitz, John. "The Northern Education of Lester B. Pearson." *Zeitschrift für Kanada-Studien* 37 (2017): 77–98.
- Wonders, William C. "The Joint Arctic Weather Stations (JAWS) in the Queen Elizabeth Islands." In *Essays on Meteorology and Climatology: In Honour of Richmond W. Longley*, edited by K.D. Hage, R.W. Longley, and E.R. Reinelt, 399–418. Edmonton: Department of Geography, University of Alberta Press, 1978.
- Wonders, William C. "Our Northward Course." *Canadian Geographer* 6 (1962): 96–105.
- Wood, Edward P. *Per Ardua ad Arcticum: The Royal Canadian Air Force in the Arctic and Sub-Arctic*, edited by P. Whitney Lackenbauer. Antigonish: Mulroney Institute of Government Arctic Operations Series, 2017.
- Wood, Joanna, Sylvia J. Hysong, Desmond J. Lugg, and Deborah L. Harm. "Is it Really So Bad?: A Comparison of Positive and Negative Experiences in Antarctic Winter Stations." *Environment and Behavior* 32/1 (January 2000): 84–110.
- Wood, Kevin R., and James E. Overland. "Climate Lessons from the First International Polar Year." *Bulletin of the American Meteorological Society* (December 2006): 1685–97.
- Woodruff, Bernard J. "Aims and Organization of the Survey Work: Establishing Ground-Control for Mapping from Aerial Photography." In *Arctic Unfolding: Experiences and Observations During a Canadian Airborne Expedition in Northern Ungava, the Northwest Territories, and the Arctic Archipelago*, by Nicholas Polunin, 279–83. London: Hutchinson, 1949.
- Wright, Edmund A. *CRREL's First 25 Years 1961–1986*. Hanover, NH: Cold Regions Research and Engineering Lab, 1986.
- Zaloga, Steven J. *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945–2000*. Washington: Smithsonian Institution Press, 2002.
- Zaslow, Morris. *The Northward Expansion of Canada 1914–1967*. Toronto: McClelland & Stewart, 1988.
- Zaslow, Morris. *The Opening of the Canadian North: 1870–1914*. Toronto: McClelland & Stewart, 1971.
- Zeller, Suzanne. "The Colonial World as Geological Metaphor: Strata(gems) of Empire in Victorian Canada." *Osiris* 15 (2000): 85–107.
- Zeller, Suzanne. *Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation*. Montreal & Kingston: McGill-Queen's University Press, 2009.
- Zeller, Suzanne. *Land of Promise, Promised Land: The Culture of Victorian Science in Canada*, Canadian Historical Association Historical Booklet no. 56. Ottawa: Canadian Historical Association, 1996.
- Zeller, Suzanne, and Christopher Jacob Ries. "Wild men in and out of science: Finding a place in the disciplinary borderlands of Arctic Canada and Greenland." *Journal of Historical Geography* 44 (April 2014): 31–43.
- Zworykin, Vladimir K., and James Fleming. "Outline of Weather Proposal, 1945." *History of Meteorology* 4 (2008): 57–78.

Online Resources

- American Meteorological Society. "Glossary of Meteorology." <http://amsglossary.allenpress.com/glossary>.
- "Apology for the High Arctic Relocation: Speaking Notes for the Honourable John Duncan." 15 September 2010. <https://www.rcaanc-cirnac.gc.ca/eng/1100100016115/1534786491628>.
- Asbridge, Archie. "Introduction to The Arctic Islands, 1958 to 1963." Canadian Meteorological and Oceanographic Society Archives. http://cmosarchives.ca/History/ArcticIslands_2015.pdf.
- Bullington, Jack. "A Christmas Story." Accessed 20 October 2016, <http://nwrain.net/~newsuit/b17labrador/story2.html>.
- Canada. Department of Natural Resources. "Alert (ALE) Magnetic Observatory." Accessed 10 May 2014, <http://geomag.nrcan.gc.ca/obs/ale-eng.php>.
- Canada. Department of Natural Resources. "Mould Bay (MBC) Magnetic Observatory." Accessed 10 May 2014, <http://geomag.nrcan.gc.ca/obs/mbc-eng.php>.
- Canadian Meteorological and Oceanographic Society Archives. "Table Five - Civilian Meteorological Technician Courses and Conferences." <http://cmosarchives.ca/Metphotos/T5/photoindex.html>.
- Environment Canada. "Welcome to the Eureka Weather Station." April 2010. https://wattsupwiththat.files.wordpress.com/2010/04/visitor_guide_to_eureka_apr_2010.pdf.
- George Dufek Papers. Special Collections Research Center, Syracuse University Library. Finding aid online at http://library.syr.edu/digital/guides/d/dufek_gj.htm.
- Gerry Metcalf's Logs. <http://www.gerrymetcalf.org/gerry/logs.php>.
- Inuit Tapiriit Kanatami. "Inuit Nunangat Map." <https://www.itk.ca/inuit-nunangat-map/>.
- Iqqaumavara. <http://www.iqqaumavara.com/>.
- Mackenzie King *Diaries*. <http://www.bac-lac.gc.ca/eng/discover/politics-government/prime-ministers/william-lyon-mackenzie-king/Pages/item.aspx?IdNumber=29546>.
- Namias, Jerome. "Francis W. Reichelderfer, 1895-1983: A Biographical Memoir." Washington: National Academy of Sciences, 1991. <http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/reichelderfer-francis.pdf>.
- Prince of Wales Northern Heritage Centre. "We took care of Them: RCMP Special Constables in the NWT." <https://www.nwtexhibits.ca/specials/>.
- Qikiqtani Truth Commission (QTC). *Community Histories 1950-1975: Resolute Bay*. Iqaluit: QTC, 2014. https://qtcommission.ca/sites/default/files/community/community_histories_resolute_bay.pdf.
- Vince, Cal. *A Short History of the Northwest Territories and Yukon Radio System* (self-published, 1960). http://www.nwtandy.rcsig.ca/1923_29.htm#1923.

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This is the first systematic account of the Joint Arctic Weather Stations (JAWS), a collaborative science program between Canada and the United States that created a distinctive state presence in the Canadian Arctic Archipelago from 1946-1972. These five meteorological stations, constructed at Eureka, Resolute, Isachsen, Mould Bay, and Alert, became remote hubs for science and sovereignty, revealing the possibilities and limits of modernity in the High Arctic.

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