Title
Science, Infrastructure, Sociality, and Creative Work: Ethnographic Observations on Scientific Knowledge Production from an Arctic Research Station

Author
Bohanon, Luke

Publication Date
2023

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

Science, Infrastructure, Sociality, and Creative Work: Ethnographic Observations on Scientific Knowledge Production from an Arctic Research Station

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Information Studies

by

Luke Michael Bohanon

2023

ABSTRACT OF THE DISSERTATION

Science, Infrastructure, Sociality, and Creative Work: Ethnographic Observations on Scientific Knowledge Production from an Arctic Research Station

by

Luke Michael Bohanon

Doctor of Philosophy in Information Studies

University of California, Los Angeles, 2023

Professor Leah A. Lievrouw, Chair

Remote scientific research settings embody a long-term combination of extreme conditions, physical boundedness, and blurred boundaries among work, play, and sleep that challenge traditional notions of how individuals perceive and interact with infrastructure. In such settings, individuals often use creative outlets to form social bonds with on-site colleagues and to document and share their experiences with distant friends and family; furthermore, they frequently—and often unconsciously—practice a more pragmatic form of creative work as they manipulate station infrastructure and use limited materials in innovative ways to facilitate work and domesticate an austere living environment. Despite the critical implications of polar science, the creative processes at work in everyday life in polar research settings have received little scholarly attention. This research seeks to bring attention to this overlooked but important area of study by exploring how, and to what purposes, science and creative work interact through material, technical, and social infrastructures and how these interactions support scientific

knowledge production.

This research uses literature from information studies, STS (particularly infrastructure studies), sociology, cultural geography, anthropology, and history to ground the ethnographic fieldwork—primarily participant observation—conducted over two-and-a-half months at an Arctic research station during the 2018 summer field season. Subsequent semi-structured interviews with scientists and support staff from the same station augment the ethnographic fieldwork.

This research finds that *Infrastructural Hypervisibility* is a characteristic of ICE research environments, and that with time, insiders learn *Infrastructural Hypervigilance*, the ability to effectively interact with station infrastructure and prioritize issues that arise with it; in work life, this interaction is particularly important to scientific knowledge production and science-adjacent activities such as maintenance, repair, and planning. *Infrastructural Hypervisibility* can be unsettling, and as such, people push back against this visibility through *Infrastructural Normalization*, thereby lessening the foregrounding of infrastructure. Sociality plays a key role in normalization, and within sociality, making and sharing are crucial. Creative work, however, is not just related to sociality, it is also a key component of science that directly relates to the maintenance, repair, and planning work that is so crucial to knowledge production in ICE environments.

The dissertation of Luke Michael Bohanon is approved.

Christopher M. Kelty

Gregory H. Leazer

Stefan Timmermans

Leah A. Lievrouw, Committee Chair

University of California, Los Angeles

2023

For Dad and Ronin. Love and miss you both so very much.

Special thanks to Leah, Asha, and all the friends and participants who made this possible.

TABLE OF CONTENTS

LIST OF FIGURES

BIOGRAPHICAL SKETCH

Luke briefly attended the University of Kansas before transferring to the University of Colorado Colorado Springs (UCCS) where he earned a Bachelor of Arts in English, and later, a Master of Arts in History. During his graduate work at UCCS, and until he moved to California to attend UCLA's doctoral program, Luke worked for the Colorado Springs Pioneers Museum (CSPM) as an Assistant Registrar, an Assistant Archivist, and finally as a Collections Specialist; during his time at the CSPM, among many other responsibilities, he authored numerous archival finding aids, web portal entries, and exhibit text panels.

Luke has worked various jobs since his early teens: he has prepared and packaged produce, driven a delivery van, worked at a climbing gym, coached a climbing team, built custom crates, fabricated and installed granite counter tops, built indoor climbing walls, and worked as a freelance design consultant and fabricator for artists and small businesses. Luke enjoys rock climbing (and was even a sponsored climber in his twenties), hiking, backpacking, camping, listening to music, reading and listening to books, writing, and spending time with his loved ones (his dog included); he also loves getting his hands dirty working on cars and motorcycles and building things. These varied life experiences have made him well-suited for the challenges and delights of research in remote environments.

CHAPTER ONE

SCIENCE, INFRASTRUCTURE, SOCIALITY, AND CREATIVE WORK: SETTING THE STAGE

A substantial portion of scientific discoveries come from fieldwork conducted in remote settings far removed from—yet often aligned with—laboratories controlled by universities, national governments (sometimes in cooperation with other nations and/or organizations), and even multinational corporations. These remote settings range from the International Space Station (hurtling over our heads at 17,000 miles an hour) to Rising Star (a cavern in South Africa accessible only through a passage less than ten inches wide), from the summits of active volcanoes to Aquarius Reef Base (located 60 feet below the ocean's surface in Florida Keys National Marine Sanctuary), from icy polar regions to tropical rainforests, and with the help of rovers like Curiosity and probes like Voyager 1, to other planets within our solar system and beyond to interstellar space. In his work on psychosocial adaptation in Antarctica's Amundsen-Scott South Pole Station, Lawrence Palinkas (n.d. has called the station's setting an "ICE environment," with the acronym "ICE" cleverly stands for **i**solated, **c**onfined, and **e**xtreme (2001 & n.d.). While Palinkas uses the concept of the ICE environment primarily to discuss polar environments, its applicability reaches far beyond. Each of the research settings previously mentioned are, to varying extents, ICE settings, and while they carry site-specific difficulties, they also offer extraordinary opportunities for scientific discoveries.

Few places humans venture are as remote and extreme as the numerous scientific research stations positioned across the planet's polar regions, yet thousands of people visit or live a significant part of their lives in these environments to conduct and enable international scientific endeavors across numerous disciplines. Despite polar regions being hallowed ground for the physical and biological sciences, little systematic research has explored the everyday life experiences and activities of the thousands of scientists, researchers, engineers, laborers, service workers, and even visiting artists, who conduct and enable that crucial scientific work. Furthermore, despite their importance to scientific discovery, a surprisingly small amount of research, particularly *in situ* fieldwork, has been devoted to how science *actually* functions in ICE research settings rather than more traditional laboratory sites.[1]

While the specific configuration of conditions differs among ICE research settings (even those within the same environments), polar research stations and field camps embody a long-term combination of extreme conditions (weather being the most obvious), physical boundedness (shelter to survive that weather), and blurred boundaries among work, play, and sleep as personnel necessarily work, live, and socialize within the same, fairly-restricted place. This is particularly noticeable during the long and harsh polar winters where stations may be cut off from the rest of the world for extended periods of time by inclement weather.

Ahead of my 2018 fieldwork, my preparatory research suggested that many of the personnel who call these polar research stations home documented and shared their experiences—often with extraordinary detail—through creative work including writing, visual and performing arts, and craft. This creative work is evident in much of the material documenting life in ICE environments that has been published in print form or is available online through blogs, vlogs, and social media. What surprised me during my fieldwork, however, was just how dominant a role creative work played in station life and how it often manifested in unexpected ways or had unexpected ramifications. Thus, creative work is widespread in remote

[1] The very nature of ICE environments makes such research difficult as the settings themselves often delimit the number of people working within the setting; as such, priority is—understandably—given to those doing the crucial science. For this reason, the more isolated, confined, and extreme the setting, the more difficult it becomes to gain entrée, let alone conduct a study of any appreciable time.

research settings and a significant, yet overlooked, form of knowledge production.

While scientific work is what scholars primarily associate with knowledge production in polar regions, public audiences can be particularly receptive to forms of knowledge production that bridge science and art through creative work. The National Science Foundation (NSF) has sought to capitalize on public interest in creative work through the Antarctic Artists and Writers (AAW) Program which "supports writing and artistic projects specifically designed to increase the public's understanding and appreciation of the Antarctic and human endeavors on the southernmost continent" (https://www.nsf.gov/pubs/2019/nsf19568/nsf19568.htm) and artists like Zaria Forman, well-known for her photorealistic pastels documenting climate change, have accompanied NASA's Operation IceBridge's flights over Antarctica that "characterize annual changes in thickness of sea ice, glaciers, and ice sheets" (https://icebridge.gsfc.nasa.gov/). Many polar research stations have hosted artists and writers and the number having done so has grown significantly even since my fieldwork. These collaborations, however, seem to retain a separation between science and art as they focus on bringing artists to document science, rather than enabling scientists to creatively document and share their own scientific work in a way that might reach other audiences.

There seems to be little interest in how the creative work of scientists, even work not ostensibly related to science, may be generative for research. In addition to the documentation and sharing of their experiences, scientists and support staff regularly do creative work in their leisure time, sometimes relating to their research, but other times seemingly apart from it; in ICE environments, however, this separation between work and leisure is tentative at best, and often creative work that is seemingly separate from the scientific knowledge creation is actually deeply connected (e.g., the way creative work plays such an important part in station sociality). Finally, there is also a more pragmatic type of creativity operating in ICE environments as scientists, engineers, and support staff manipulate station infrastructure and use limited materials to facilitate their work and domesticate an austere living environment. Thus, it appears that in ICE research settings, science, infrastructure, sociality, and creative work often function together in unexpected and exciting ways.

This dissertation explores the interconnections of science, infrastructure, sociality, and creative work through ethnographic fieldwork conducted at an Arctic research station—generically referred to in this research as Polar Research Station or PRS—during the 2018 summer field season, lasting from June through August, and interviews conducted in 2019 with some of the individuals whom I met, and often worked with, during my fieldwork at the station.

Figure 5 PRS and its surroundings as seen from Bear Mountain.

Research Themes

My research shows that science, infrastructure, sociality, and creative work are deeply connected in ICE settings in ways that may be less clear in other settings. An ICE setting does not just exist; rather it is something that is created indirectly in the service of something else. For

PRS, the isolation and confinement are byproducts of creating a station in a remote Arctic environment with a finite budget, and the extremity comes from a mixture of the Arctic conditions (i.e., extreme climate, long cycles of daylight or darkness) and social stressors associated with isolation and confinement. Science and infrastructure are related in that, for the science to take place, there must be some sort of supporting infrastructure (i.e., the station), and for the station to exist, there must be a reason for its creation and for its continued support (i.e., the science). Superficially, it might seem like this is enough for scientific work: a station exists that offers shelter for researchers, thus enabling the science. However, as will be discussed in later chapters, a station alone is not sufficient for sustainable science; there must be leisure, which in a confined place, is often intertwined with sociality. Early in the PRS's existence, this was the Sunday Hike (a group activity). Over time, much of sociality at PRS, became deeply connected to creative work, with holidays being celebrated with a costume party for Summer Solstice (solstices are important dates at polar research stations), a parade for Fourth of July (labs competing with floats or skits), and a gift exchange for Christmas in July (another widely celebrated polar tradition); for each of these events, the "rules" are that things must be made onsite with onsite materials (e.g., scrap cardboard, clothing or items left in the giveaway pike, found materials like rocks or an antler, or salvage materials like a broken bicycle seat). This research explores these connections between science, infrastructure, sociality, and creative work, through chapters broadly organized around the topics.

Significance

While the primary goals of this work are to add to the scholarly understanding of the intertwined roles of infrastructure (including setting), sociality, and creative work in scientific knowledge production and to advance our understanding of infrastructure in ICE research settings, this research may also: (a) increase interest in the mechanisms of knowledge production in ICE environments and (b) help inform policies relating to ICE settings.

Increasing Interest in Knowledge Production in ICE Settings: While my fieldwork took place at an Arctic station, this research is meant as a first step to understanding knowledge production in ICE settings more broadly. Polar science, particularly the research coming out of Antarctica's U.S.-operated stations, has a large body of popular, accessible work (e.g., writing and visual art) surrounding it, in no small part due to the extensive contributions made through the AAW program, yet other ICE research settings like Aquarius Reef Base seem largely forgotten by the public. Creative work can and does increase support for scientific endeavors; ideally, the conclusions made in this research can be leveraged in a way that brings more attention to other ICE research settings through their own creative processes. Additionally, this research might help stimulate not only popular interest in ICE settings but also further social scientific work as well. The work of the scientists, engineers, and support staff in these remote environments is crucial to humankind, and I hope to see more work meant to directly benefit those individuals as well as the science itself.

Informing Budgetary Policies: Following from this, public interest coupled with an increased understanding of the role that infrastructure, sociality, and creativity play in scientific knowledge production may also help inform policies relating to scientific research in ICE settings. This is especially important in a time when funding for scientific infrastructure is precariously situated in a political quagmire. Even the United States' flagship polar station McMurdo is struggling with modernization, as the entire Antarctic program has run into serious budgetary issues for even the most necessary expenses (Gillis and Corum, 2017); science is not only about laboratories and instruments, however, and in an ICE environment, something as simple as a ping pong table, a set of loaner woodcarving tools, or even just a place to gather together and share a drink while watching a movie, can and does create productive, lasting scientific partnerships. Thus, it is my hope this research can be used to unearth innovative ways in which infrastructure might support creative work, sociality, and science and that such indirect contributions to scientific production might be considered vital in future budgets.[2]

Looking Ahead

This dissertation has eight chapters. This first chapter contextualizes and introduces the research, briefly summarizes significant themes throughout the work, and suggests how the research might be significant.

Chapter Two, the next chapter looks at the literature I used to ground my understanding of remote scientific locations, envision my research, form my understanding of observations made during my fieldwork, guide my interviews, and interpret my findings.

Chapter Three explores the methodology—primarily participant observation and semi-structured interviews—I used in this research and explicates how I collected, managed, and analyzed data, and discusses the ethical considerations I considered during my fieldwork and the writing of this dissertation.

Chapter Four focuses on the Arctic setting where the research takes place, the station I refer to as PRS throughout this work. As the unusual setting of this research is central to the research, it must be properly conveyed; ideally then, one must understand not just what it looks like to be at PRS during the summer field season but also what it feels like to be there during this time with so many other individuals.

While chapter four touches on PRS's infrastructure at a surface level, Chapter Five looks more deeply at how infrastructure is typically conceptualized and how a station like PRS

---

[2] It is likely that this research has implications outside purely scientific settings as well; for example, in prisons where it may be applicable to humane incarceration policies.

challenges this conception infrastructure by looking at how people see and interact with infrastructure in ICE environments; here, two concepts are introduced: **Infrastructural Hypervisibility,** the relationship between the presence of infrastructure in an ICE environment and that environment's inhabitants' heightened perception of that infrastructure, and **Infrastructural Hypervigilance,** a deeper relationship that denotes an inhabitant's ability to ascribe value or priority to critical elements of infrastructure, as well as a readiness to act or intervene to maintain or repair those elements.

Chapter Six looks at how science is done at the station, particularly how Infrastructural Hypervisibility and Hypervigilance often shift the focus from the experiments and data collection to science-adjacent activities like maintenance, repair, and planning work. Chapter Six also explores the roles creative work, innovation, and care play in scientific knowledge creation in ICE environments.

Chapter Seven focuses on everyday life at PRS outside of work and the infrastructure that supports sociality at the station; five types of gatherings are categorized with examples and discussion on each. From this discussion, I propose two concepts: **Infrastructural Normalization,** the process through which actions, habits, and routines lessen the foregrounding of infrastructure in ICE settings, and **Homebuilding**, a special type of Infrastructural Normalization in which someone acts on hypervisible infrastructure in a material way to create a connection to a distant home, or to make a home at the station, to lessen the infrastructure's foregrounding. The chapter concludes with a discussion on making and sharing, common themes that run throughout life at the station, and are often central to sociality there.

Chapter Eight concludes the dissertation with a broad overview of the research that highlights some key points from each chapter. Chapter Eight also takes one final look at the theoretical concepts proposed in Chapter Five (Infrastructural Hypervisibility and Infrastructural Hypervigilance) and in Chapter Seven (Infrastructural Normalization and Homebuilding) and suggests an overarching theory of how these concepts work together in ICE environments, and particularly, how they relate to scientific knowledge production. Finally, Chapter Eight looks at some of the limitations of this research as well as possibilities for future directions it might take.

CHAPTER TWO

A LITERATURE REVIEW: DRAWING FROM ACROSS DISCIPLINES

Chapter Two focuses on the literature I have used to conceptualize knowledge production at the intersections of scientific work, infrastructure, sociality, and creative practices in remote scientific research stations and field camps. Although much of the relevant literature focuses on polar environments, many of the insights from these works should be generalizable to other ICE research settings. While the polar regions are nearly sacred ground for the physical and biological sciences, there has been little rigorous study focusing on the people conducting and enabling those scientific endeavors (i.e., not only scientists, researchers, and engineers but also laborers, service workers, and visiting artists); consequently, the conceptual framework presented here has been informed by multiple disciplines including information studies, STS (particularly infrastructure studies), sociology, cultural geography, anthropology, history, and even psychology.

As many of the concepts I borrow from these fields overlap, this framework is organized around four crosscutting themes—setting, infrastructure, work, and knowledge production—which together situate the proposed work and suggest several research questions. The first section focuses on the geographic, social, and temporal aspects that make the ICE research **setting** particularly compelling. The remote geographic settings of the polar stations and camps largely dictate their social setting through the infrastructural requirements necessary for the functioning of life and work in extreme settings; furthermore, both the geographic and social settings influence the temporal cycles around which life and work happen. Through these facilitating infrastructures, setting influences how and what knowledge is produced. Thus, infrastructure is both a product of setting and produces it. The second section continues with a more intensive examination of the concept of **infrastructure** as it relates to knowledge production in the stations and camps. In these harsh environments, various infrastructures—being material, social, and technical in nature—facilitate the production and distribution of scientific and creative work, act as a medium for social interaction, and at the most basic level, allow humans to survive, and even thrive, in extreme environments. The third section focuses on **the work** being done at the research stations and field camps. This work, whether directly scientific, support-related, or creative, is reliant on these material, technical, and social infrastructures, thus it is nearly impossible to disentangle work and infrastructure. Big Science is a way of life for the stations and field camps. In Antarctica, as mentioned in the previous chapter, creative work is being used to promote Big Science through the NSF's Antarctic Artist and Writers Program (AAW).[3] There is however, paradoxically, unexamined creativity at work in the everyday lives of the personnel as they make and share things within the community, manipulate and repurpose infrastructure to transform the research stations and field camps dotting the inhospitable landscape into home, and document their experiences through creative methods outside the NSF's purview. While the work section deals with process, the fourth and final section on **knowledge production** is more about the shared products coming out of the research stations and field camps. These products—which include not only academic work like peer-reviewed journal articles, data sets, and scholarly blogging, but also creative work including craft, visual and performing arts, and the written word—intersect with and diverge from the NSF's primary interest in scientific knowledge production. The products of this creative work seem to serve one of three purposes: (1) to increase external support for the scientific endeavors; (2) to directly support scientific work at a local level, either officially or unofficially; and (3) as

[3] The NSF states that two to four of the AAW grants are awarded yearly. These grants cover travel, room & board, and field support but no stipend or other form of monetary award is offered.

its own form of knowledge production that has no relation, or only an indirect relation, to the scientific goals of the NSF and other gatekeeper organizations. Chapter Two concludes with a discussion of how the themes of setting, infrastructure, work, and knowledge creation drive the proposed research on knowledge production in the United States' polar research stations.

As I have suggested, the bulk of Chapter Two uses scholarly work borrowed from information studies, STS, infrastructure studies, sociology, cultural geography, anthropology, and history. In addition to this scholarly work, I will also refer to several works produced for popular consumption rather than an academic audience; these works vary widely in quality, subject, age, and authorship; they do, however, share the interesting juxtaposition of being not only sources within my research but also products of the very processes my research explores. The works I discuss are only a few of the many available and range from the products of past AAW awards to an insightful "nasty, crude garbage grunt" (N. Johnson, 2005, p. 115) of Antarctica. Using these and the scholarly sources, I have built my conceptual framework around a diversity of voices whenever possible.

It must be noted, however, that the Western history of polar environments—especially Antarctica's—is predominantly that of men, and while women have been working diligently to make their voices heard, there is little that falls outside the purview of the white Westerner. This issue has, undoubtedly, been compounded by my reliance on sources readily available in English—either in their original form or previously translated. As my sources and research are focused on Western science and cultural institutions—particularly those of the United States—it is my hope that my reliance on English sources will not adversely affect my work. Finally, I should also note that there are, of course, thousands of peer reviewed works published in scientific journals discussing findings from the various disciplines and sub-disciplines of polar science. I have not included these because they seldom directly deal with the issues with which this research is concerned.

Thematic Elements

Four themes—setting, infrastructure, the work, and knowledge production—organize this conceptual framework.

Setting

The first of the four themes influential to my conceptual framework is setting. The mystique surrounding polar geography and the history of polar exploration suggests that setting is likely to be the most evident of the four themes I discuss. Exactly what makes polar environments so striking often defies explanation, although people seem to intuitively recognize the extreme difference from other terrestrial environments. A significant part of this is a folk understanding formed around the romanticism surrounding the Arctic and Antarctica as, historically, wild and unforgiving spaces for adventure and exploration that often devolved into desperate bids for survival. What underlies the romantic view, while also moving beyond it, is the specific combination of features within which ICE research stations and field camps (polar stations, in this case) operate that make them similar to one another yet unlike other terrestrial research settings.

At its most general, setting refers to "the time, place, and circumstances in which something occurs or develops" (https://www.merriam-webster.com/dictionary/setting). A "research setting" follows from this as a "physical, social, and cultural site in which the researcher conducts the study" (Given, 2008, https://methods.sagepub.com/reference/sage-encyc-qualitative-research-methods/n398.xml). In other words, the setting is the site where interaction occurs. Barnet and Casper (2001) have referred to this as the "social environment" and defined it as "encompass[ing] the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact" (para. 2). These various levels of conceptualization share **Geographical and Physical**, **Temporal**, and **Social** dimensions which act together to form the setting. These three dimensions—or subthemes—will be used, in turn, to discuss the literature that shaped both how I understand and how I use PRS's settings within my research. As with the wider themes, the boundaries among them are fluid and blurry. As setting is so place dependent, this section is largely focused on polar environments; however, similar arguments could be made for other ICE settings.

Geographical and physical dimensions of polar settings.

Despite ever-improving travel and communications technology, polar research stations are some of the least accessible places on earth, not just physically, but also bureaucratically, as access to them is tightly controlled. Despite their lack of accessibility, and the vast size of polar regions, they can also be areas of extreme confinement as survival depends on shelter built for efficiency rather than for comfort or aesthetics: small rooms are shared during summer and sometimes through the winter; kitchens, lounges, and restrooms are communal; storms can make leaving shelter impossible; and even in the best of weather, station rules can make it difficult to leave, particularly in the most extreme areas. As such, "workers tacitly concede that there are no truly private spaces, and that one's personal affairs outside of work are to be regulated just as are one's work duties" (N. Johnson, 2005, 104).

Thus, polar research settings tend to have a unique combination of isolation, confinement, and extremity. As mentioned briefly in the previous chapter, Dr. Lawrence Palinkas, a medical anthropologist, uses the term "ICE environment" to refer to the conditions surrounding the setting of his work on psychosocial adaptation at Amundsen-Scott South Pole Station (Palinkas, n.d.; J.C. Johnson, Boster, & Palinkas, 2003); Palinkas's work is some of the only work focusing on Antarctica's human inhabitants. While perhaps not universally applicable for field research, the ICE environment works for many remote research settings. The concept of the ICE environment concerns not only geographical location but also the resulting physical and psychological implications. Palinkas and his co-authors' works have, in particular, explored how social support is especially important to individual and group adaptation (and organizational functioning) in ICE environments. As there may be no other comparable setting on Earth, it should come as no surprise that several organizations including NASA and the European Space Agency (Esa) use Antarctica or the Arctic as analogies for space.[4] In fact, NASA funds much of Palinkas' research as "Antarctica's climate, terrain, temperature, and degree of isolation provide an environment that most closely parallels the conditions of isolation and stress that are likely to be faced on long-duration human missions in space" (https://www.nasa.gov/hrp/research/analogs/antarctica). This suggests that the ICE environment should be recognized as an important factor in the everyday life and functioning of those within the environment, as it directly mediates the conditions through which life passes and under which science and creativity happen. Life is also inevitably mediated by time, which is the subject of the next subsection.

Temporal dimensions of setting and human activity.

The second subtheme drawn from the literature is that of time and makes heavy use of the work of sociologist Eviatar Zerubavel. In his work, Zerubavel advocates for viewing the passage and understanding of time in social settings as being both linear and cyclical. The historic, or linear-vectoral way of thinking, sees time as a "series of events, each of which is historically unique" (Zerubavel, 1979, p. 1) (e.g., Shackleton's Nimrod expedition took place in 1907, the North Pole was successfully reached by foot in 1909, Amundsen reached the South Pole in 1911,

---

[4] For further examples, see Harrison, Clearwater & McKay, 1990; Hollingham, 2015; and Stone, 2004.

the first International Geophysical Year took place in 1957-58, and so forth). This manner of thinking is usually thought to be “most characteristic of the modern Western conception of time” (Zerubavel, 1979, p. 1) and is particularly important for understanding the historical context of a setting. Interestingly, the notion of time that we are more intimately familiar with is cyclical in nature (e.g., cycles of night and day, the passing of seasons, and patterns of hunger, sleep, and work). Zerubavel (1981) discusses this second conception of time as being “sociotemporal” in that these cycles affect social relationships.

Both the historic/linear-vectoral and the sociotemporal dimensions of time are important to establishing and understanding a setting and will be discussed in greater detail.

The historic or linear-vectoral dimension.

Numerous works (both primary and secondary works that span historic and modern times) use the linear-vectoral conception of time in their documentation of the tribulations and triumphs of the early polar explorers: Bown’s (2015) *White Eskimo: Knud Rasmussen’s Fearless Journey into the Heart of the Arctic*, Roberts’s (2013) *Alone on the Ice: The Greatest Survival Story in the History of Exploration*, Rosove’s (2000) *Let Heroes Speak: Antarctic Explorers, 1772-1922,* and Behrendt’s (1998) *Innocents on the Ice: A Memoir of Antarctic Exploration, 1957* to name only a few. More recently, authors have been writing less about heroic exploration or harrowing feats of survival and more about everyday life at polar research stations: McNeil’s (2016) *Ice Diaries: An Antarctic Memoir*, Walker’s (2013) *Antarctica: An Intimate Portrait of a Mysterious Continent*, Fox Roger’s (2007) *Antarctica: Life on the Ice*; Legler’s (2005) *On the Ice: An Intimate Portrait of Life at McMurdo Station, Antarctica,* and N. Johnson’s (2005) *Big Dead Place: Inside the Strange and Menacing World of Antarctica* among others. All these works are treasures for a multitude of reasons, and together they show a continuity of themes—scientific curiosity, creativity, the importance of documentation, and how people work within the constraints imposed on them by the ICE environment—throughout the history of Western interaction with the Poles. Within Douglas Mawson's (1915/1998) *Home of the Blizzard: A True Story of Antarctic Survival*, for example, we see creative manipulation of infrastructure for both survival and well-being and Mawson's deep concern with documenting and sharing his experience, even in the face of death. These sentiments were echoed by Scott, in similar dire circumstances, when he wrote his final note: "had we lived, I should have had a tale to tell of the hardihood, endurance, and courage of my companions which would have stirred the heart of every Englishman. These rough notes and our dead bodies must tell the tale" (Solomon, 2001, p. 245). G.E. Fogg, a historian of Antarctic science, is quoted as saying that Mawson's "Australasian Expedition was easily the most productive scientific effort in the Antarctic before the International Geophysical Year of 1957-58" (D. Roberts, 2013, p. 301). Many of the early explorers used science to wrangle funding, but for Mawson, a trained geologist, the scientific work was of genuine, and often overriding, concern. Nearly a century after Mawson's expeditions, McNeil (2016) captured the relationship between science and the Antarctic setting:

> the science – information, observation – is indivisible in my mind from what actually happened, and what I felt. They are a single entity, like water, or even ice. To not have science would condemn this book to solipsism. In Antarctica, information, experience, and endeavor are welded together; the Antarctic is a giant outdoor laboratory. Apart from a few high-priced tourist adventures, the continent is completely dedicated to science (pp. xvi-xvii).

While McNeil is writing of her own time in Antarctica, an argument could be made that this relationship between science and setting dates back a hundred years on the continent.

In short, thinking about setting through the linear-vectoral concept of time offers a great deal contextually as it is largely concerned with the legacy of polar science and how contemporary polar science formed around that legacy; however, thinking of time in a linear manner only is inadequate, especially as time relates to social interaction (Zerubavel, 1979, p. 2).

The sociotemporal dimension.

We should also consider time as cyclical in nature, or what Zerubavel calls the "sociotemporal" (1979, p. 1) view because the "temporal structure of an organization affects the quality of social relationships within it" (1979, pp. 10-11). Zerubavel writes that sociotemporal order "regulates the structure and dynamics of social life" through "sociotemporal patterns which essentially involve the temporal rigidification of social situations, activities, and events" (1981, p. 2). Sociotemporal cycles are particularly important in polar research settings because so much of the research being conducted relies on natural (i.e., seasonal, diurnal, biological, and so forth) cycles; this is particularly the case with ICE environments where the stations themselves may be reliant on natural cycles. In Antarctica, the windows for flights and shipping, for example, are dependent on seasonal cycles as temperatures fluctuate and sea ice forms or melts. Everything necessary for the station to function through the harsh winter must be brought in during the summer. This window of time during which ships can dock and flights can take off and land (fairly) regularly is essential for the functioning of the Antarctic stations (especially for deep inland stations like Amundsen-Scott). It is only during this time that significant infrastructural changes can take place.[5] If for some reason this period of repair and replenishment were interrupted for a season, the consequences could be disastrous for the stations; furthermore, various agents are working in varying cycles: a contractor, for example, may be working on a seasonal cycle (although for psychological reasons, personnel cannot stay on the continent for more than 10 months at a time) while a scientist make have only several weeks each year during which she can complete her work (for example, during the nesting period of an Adelie chick where if the scientist is unable to make her observations due to adverse weather conditions, the

[5] For arctic stations, winter is often a time to move building supplies to distant locations as snow covers the tussocks and makes long distances traversable via snowmachines equipped with sledges laden with materials.

nesting period continues unaffected). This suggests there is blurring of natural (the biological cycles of an Adelie penguin) and artificial cycles (of a worker's contract or a scientist's grant).

These artificial cycles are crucial to social interaction as well. As Eric Laurier (2008) discusses in the context of a café, even the seemingly unimportant undulations of the populace in a mess hall during breakfast can have important social meanings and consequences. For example, a scientist and a visiting artist might get to know one another over several lunch periods and strike up a collaborative relationship, while with a slightly different schedule they instead might have remained "familiar strangers" (Milgram, 1977, p. 3) who recognize each other in the halls but lack meaningful social contact. In this way, we might think of temporal boundaries as a type of social infrastructure, something that Zerubavel hints at when he states that "boundaries … are, for all social purposes, 'untrespassable.' They resemble glass walls, however, in that they are usually taken for granted, thus becoming practically invisible, until someone tries to walk through them" (1979, p. 2).

Finally, it is worth considering that much of the populace of polar stations see a form of social capital in the seasonal cycles. "Ice time," or the time an individual has spent working in Antarctica, is a form of social capital that can "buy" better accommodations (N. Johnson, 2005, p. 18), provide "lucrative bragging rights" (N. Johnson, 2005, p. 92), or simply win the respect of your colleagues (Walker, 2013, p. 174). While, as far as I know, there was no equivalent name to "ice time" at PRS, the perks associated with the number of seasons one had at the station were similar. In short, paying attention to the way in which natural and artificial cycles affect social interaction is a way to see patterns, and more importantly deviations in those patterns. When we see something abnormal or unexpected, there is likely to be something significant to explore. This can be especially interesting in ICE research settings because the research stations function socially in a very particular way which will be explored in the next subtheme.

Social aspects of setting

Research stations and field camps in ICE environments function in a way that breaks many of the social conventions with which Westerners are familiar. In Antarctica, for example, "there is no need for money; everyone wears the same clothes and has the same kind of lodging … you eat the same food as everyone else; you forget about the existence of mobile phones, bank accounts, driving licenses, keys, even children" (Walker, 2013, p. xv); while less drastic, PRS was similar, and I no longer carried my wallet or keys (instead leaving them in my unlocked room) and usually carried my phone only to take photos. The most noticeable difference, however, is the blurring of work, social, and personal life. According to sociologist Erving Goffman, a "basic social arrangement … is that the individual tends to sleep, play, and work in different places, with different co-participants, under different authorities, and without an over-all rational plan" (Goffman, 1961, pp. 5-6), but in many polar research stations (and especially in the field camps), "there are no truly private spaces, and … one's personal affairs outside of work are to be regulated just as are one's work duties" (N. Johnson, 2005, p. 104). In other words, in ICE environments, individuals *do* sleep, play, and work in the same places, with the same co-participants, under the same authorities, and with an over-all rational plan. Although Goffman did not address polar research stations, he called other institutions that operated outside the normal social conventions "total institutions." Antarctica's McMurdo Station, for example, has been said to have a "slight military flavour" but that it "feels more like a university" (Walker 2013, p. 16), and in fact, both military bases (Goffman, 1965) and universities (Fitz Gibbon, Canterbury, & Litten, 1999) have been discussed as total institutions by Goffman and others who have continued his work.

At its most basic, Goffman defined the total institution "as a place of residence and work where a large number of like-situated individuals, cut off from the wider society for an appreciable period of time, together lead an enclosed, formally administered round of life" (1961, p. xiiv). Goffman differentiated between five types of total institutions, with the first three groupings—which include orphanages, nursing homes, mental hospitals, and prisons—being fundamentally different from the fourth and fifth in terms of the agency of the inhabitants (1961, pp. 4-5). Within the fourth grouping (which includes military barracks, ships, boarding schools, and colonial compounds) and the fifth grouping (which focuses on institutions for spiritual pursuits), there is greater agency for the participants as they are, more or less, willing participants. Since Goffman, the total institution has been used to explore bracero programs (Mize, 2006 & 2016), plantations (Bryce-Laporte, 1968), and even cruise ships and amusement parks (Ritzer, 1998; Williams, 2003). Polar research settings in ICE environments (i.e., field stations and field camps) are another example of total institutions.

Goffman warns us that not all "common characteristics" of total institutions are present in each case nor are they exclusive to total institutions, rather the relevance comes in the intensity of the characteristic attributes they possess (Goffman, 1961, p. 5). Polar research sites are no exception, and even the most isolated exhibit some important distinctions from the total institutions Goffman discusses; perhaps most important is the different hierarchal workings. Antarctica's research stations, which are some of the most isolated settings in the world, are particularly illustrative. Like the cruise ships, the institutional control exercised in Antarctica is "not nearly as blatant and brutal" (Williams, 2003, p. 77), yet that control is absolute. The NSF is the highest authority in the U.S.-operated stations and largely controls access to the continent and nearly completely to the stations.[6] There are also some interesting power dynamics at work, as

[6] For an outsider's perspective of this control, see the foreword to Johnson, 2005, by Eirik Sønneland.

the scientists have more freedom on the continent (support personnel operate under much stricter rules laid out by contracting agencies like Lockheed Martin or Raytheon), but they may also be more anchored to the location due to research requirements. That is to say, support personnel are there voluntarily; in fact, the process of gaining employment at polar research stations are incredibly competitive, and in the most sought-after places, a single position may have hundreds of extremely well-qualified to over-qualified applicants. While not the norm, scientists, however, may be there only semi-willingly (meaning they would rather be elsewhere, but their research necessitates their presence). Thus, role differentiation appears to function differently than it does between Goffman's staff and inmates.[7]

Another crucial difference follows directly from this: while there is typically a separation between those interned in a total institution and those controlling it, with a few notable exceptions, all of Goffman's examples allow those present who are in control of the total institution the standard separation among work, play, and sleep; in polar research stations, however, all actors are in the same blurred environment. This may follow from the differences in the very structure of the institutions: whereas physical infrastructure is the defining feature of many total institutions (such as prisons), in polar stations, the ICE environment largely necessitates the social structure. Nevertheless, despite the differences between polar settings and more traditional conceptions of total institutions, thinking about stations through the lens of the total institution is productive for understanding social interaction that might otherwise seem strange and several of Goffman's (1961) observations seem to map directly onto the polar experience including the release binge fantasy, institutional lingo, gaming the system, the buddy

[7] It is worth pointing out the obvious here: scientists and science support rely on one another to function. Without the presence of scientists, science support would be unnecessary; without the presence of science support, scientific opportunities would be almost nonexistent.

formation, and ceremonies (under which Goffman includes parties and theatrical productions).

In summary, polar research stations and field camps have a unique set of geographical, temporal, and social dimensions that together create a unique setting. The geographic setting largely dictates the social setting through the infrastructural requirements necessary for the functioning of life and work in an extreme setting; furthermore, both the geographic and social settings influence—and are influenced by—the temporal cycles around which life and work happen. Through these facilitating infrastructures, setting influences how and what knowledge is produced. Thus, infrastructure, the subject of the next section, is both a product of setting and produces it.

Infrastructure

At its most basic, infrastructure (the second thematic element) is “something that other things ‘run on’” (Lampland & Star, 2009, p. 17). Geoffrey Bowker, Karen Baker, Florence Millerand, and David Ribes have discussed infrastructures as “vast sets of collective equipment necessary to human activities, such as buildings, roads, bridges, rail tracks, channels, ports, and communications networks” (2010, p. 97). This conception of infrastructure—a commonsense or folk understanding—holds up to cursory inspection but is incomplete. They go on to remind us that “infrastructure also encompasses more abstract entities, such as protocols (human and computer), standards, and memory” (Bowker et al., 2010, p. 97). In other words, while infrastructure is “what things run on,” it is also more than just physical components; infrastructure also encompasses classifications, standards, and practices, and more. In short, infrastructure is material, technical, and social in nature. Susan Leigh Star and Karen Ruhleder (1996), and later Star (1999) and Martha Lampland and Star (2009), also found infrastructure to be “a fundamentally relational concept” (Star & Ruhleder, 1996, p. 113), in that what is infrastructure to some, may be a barrier to others (Star & Ruhleder, 1996, pp. 112-113). With that “caveat,” Star and Ruhleder suggest infrastructure as a configuration of the following dimensions: (1) embeddedness, (2) transparency, (3) reach or scope, (4) learned as part of membership, (5) links with conventions of practice, (6) embodiment of standards, (7) built on an installed base, (8) becomes visible on breakdown (Star & Ruhleder, 1996, p. 113). Paul Wouters has concisely described infrastructure as “the taken-for-granted context that enables our life and work. Infrastructures are multilayered and complex…. they operate in the background and become visible only on breakdown” (2014, p. 61). For example, most people do not think about their plumbing until their toilet will not flush or the power grid until their lights will not work.

In remote research settings, however, reliance on infrastructure is not (just) about the convenience of plumbing or electricity (both of which are lacking in some research settings); rather, in extreme environments, reliable infrastructure can be about survival. As such, infrastructure may be more encompassing than elsewhere as it facilitates survival first and convenience second. This reliance on functioning infrastructure for mere survival may create a hyperawareness of infrastructure. In an ICE environment, the effectiveness and reliability of the infrastructure may also be directly related to the knowledge production. If we give credence to Maslow’s (1943) hierarchy of needs, the infrastructure must provide not just safety but also a sense of home (or belonging) before science and other forms of knowledge production can be done effectively.[8]

It is worth noting that while there may be a hyperawareness of infrastructure as the mechanism allowing for survival, this bleeds into other areas. Gabrielle Walker writes that

> water was precious at the Pole because it had to be melted using fuel flown in from the coast. Showers should be no more than two minutes and were permitted only twice a week. If you noticed that somebody consistently ran over their allotted time, when you pass

[8] While Maslow’s hierarchy of needs has largely fallen out of favor, as we will see in later chapters, it seems to be true that infrastructure must provide safety and a sense of home (or belonging) before science can be done effectively and sustainably.

> them in the corridor you growled "shower thief!" And good behavior, or winning a tournament or fancy-dress party, could gain you the right to a five-minute shower, officially inscribed on a certificate by the base manager (2013, p. 153).

This is less about survival and more about the work that is necessary to melt snow for the additional water demand as well as the disposal of grey water. Thus, this hyperawareness goes beyond just survival and may be the result of mutual dependence between personnel and infrastructure. The infrastructure keeps the workers alive, but they must also keep the infrastructure functioning.

Special cases of infrastructure.

If we think of an infrastructure as (at its most basic) "something that other things run on," as Wouters writes, then we might think of the truth-spot as a special case of infrastructure. As Thomas F. Gieryn explains in "Three Truth Spots,"

> the place of provenance itself enables the transit of some claims from merely local knowledge to truth believed by many all around. The passage from place-saturated contingent claims to place-less transcendent truths is achieved through the geographic, architectural and rhetorical construction of a "truth-spot" (i.e., the place of provenance) (2002, p. 113).

The idea that the provenance of an idea influences its credibility is extremely relevant to polar research stations and scientific knowledge production in general. Antarctica, with the entire continent dedicated (ostensibly, at least) to cooperative international scientific discovery and knowledge production, is the best example. The NSF (and many others) have described Antarctica as a "unique natural laboratory" (https://www.nsf.gov/pubs/1996/nstc96rp/chiii.htm) and there seems to be a certain privileging of the research that comes out of Antarctica that suggests the continent itself can be considered a truth-spot (likely part of this is due to the Antarctic Treaty which preserves the continent as a place of collaborative science). While the Arctic gets less press, is similarly thought of as a privileged place for science. I would suggest the laboratory (as either a contained physical place or a vast natural space) is closely tied with the idea of the truth-spot. Although I was unable to locate sources that interrogated the idea of the polar regions as natural laboratories beyond Gould's (1971) "Antarctica: The World's Greatest Laboratory," several works do so with different locations that share some of the characteristics of remote research environments. Helen Tilley's (2011) *Africa as a Living Laboratory: Empire, Development and the Problem of Scientific Knowledge, 1870-1950*, winner of the Society of the Social Studies of Science: Ludwik Fleck Prize**,** is one such work that studies knowledge colonialization. Another, "Nature's Eden? The Production and Effects of 'Pristine' Nature in the Galapagos Islands" by Elizabeth Hennessy and Amy L. McCleary, critiques the idea of "pristine" nature by suggesting "that such understandings of nature are not in fact natural, but are social productions that reflect particular ways of understanding island space" (2011, p. 131). As science and the polar regions have become intertwined, this idea of the natural laboratory or truth-spot is likely influencing related scientific and scholarly communication (or the production of knowledge or information).

The truth-spot may go beyond just science and be relevant to the idea of experience also. People who have been to Antarctica often describe it as indescribable, but the depth of the experience is believed because of the historical mythology around the continent. Renowned physicist Neils Bohr captured this sentiment in a conversation with Werner Heisenberg about Kronborg Castle and its relationship with Hamlet:

> Isn't it strange how this castle changes as soon as one imagines that Hamlet lived here? As scientists we believe that a castle consists only of stones, and admire the way the architect put them together. The stone, the green roof with its patina, the wood carvings in the church, constitute the whole castle. None of this should be changed by the fact that Hamlet lived here, and yet it is changed completely. Suddenly the walls and ramparts speak a different language. The courtyard becomes an entire world, a dark corner

> reminds us of the darkness of the human soul, we hear Hamlet's "To be or not to be." Yet all we really know is that his name appears in a thirteenth-century chronicle. No one can prove he really lived here. But everyone knows the questions Shakespeare had him ask, the human depths he was made to reveal, and so he too had to be found in a place on earth, here in Kronborg. And once we know that, Kronborg becomes a quite different castle for us (Heisenberg, 1971, p. 51).

Like Kronborg, Antarctica has a specific mythology surrounding it that is hard to argue. When the NSF describes a polar region as a “natural laboratory,” they do so because it is, in comparison to the rest of the planet, largely untouched. When people visit these regions, as researchers, wage-earners, artists, or tourists, its history, reality, and mythology (i.e., of long being uninhabited and uninhabitable, of heroic triumphs of exploration and bleak failures, of cutting-edge science, and of frigid exoticness and inaccessibility to the masses) are inseparable from the experience. If we think of Antarctica and the Arctic as experiential truth-spots, the drive for visitors to document the experience, and the interest in that documentation by outsiders, seems unsurprising. It should be noted that geographer Yi-Fu Tuan (2010) uses the same exchange between Bohr and Heisenberg in *Space and Place: The Perspective of Experience* to explore the difference in experience between space and place. Later in this research, space and place, particularly as conceptualized by Tuan and by Michael Curry (1996 & 1998), became crucial for understanding the culture of PRS.

Shannon Mattern has discussed landscapes as infrastructures—another special case. She writes that “material infrastructures constitute a layered landscape that lends itself to *digging into*; they leave material residues that we can dig up” (2013, para. 6). For Mattern, the idea of digging is both material and metaphor as she is interested in the built city as a communication infrastructure. She discusses the Roman forum and how architecture “shaped both an orator’s delivery and his audience’s engagement” (2013, para. 18). The idea of landscape as infrastructure has several implications for this research: (1) Using Mattern's concept of the built environment as landscape opens the question of how a research station's infrastructure supports and inhibits informal communication—like Mattern's suggestion of gossip at the well (2013, para. 17). A program like the AAW seems to assume interaction between artist or writer and scientists and researchers, but does station infrastructure support or obstruct such interactions? (2) If we think of the natural landscape or environment surrounding polar research stations, Mattern's idea of landscape as infrastructure continues to be productive. If we think of infrastructure as something things run on, then the lake beside PRS and its surroundings (or even the entire continent of Antarctica) can be thought of as an infrastructure supporting the science and creative endeavors, which relates directly back to the idea of the truth-spot. (3) Mattern's approach to infrastructure pushes the boundaries of what we traditionally think of infrastructure. The idea to look beyond the traditional conceptualizations of infrastructure is particularly important in a place where infrastructure functions in untraditional ways.

The traditional conceptualization of infrastructure seems to have largely withstood the test of time. In ICE settings, especially polar regions, however, infrastructure is not (just) about having an advantage or a barrier, but about survival; as such, there seems to be a greater awareness to infrastructural elements. Furthermore, if we consider special cases of infrastructure in relation to polar regions, some of the curious tendencies surrounding them come into focus. In short, infrastructure is crucial to this research in that it is the medium of social interaction and knowledge production in polar regions. The articulation of various elements of infrastructure, and people's active and conscious engagement with it, allow for the production and distribution of scientific and creative work, and at the most basic level, the infrastructure allows humans to survive, and even thrive, in an otherwise extreme—sometimes deadly—environment.

The Work

The third theme that cuts across the literature is that of the work itself. As all types of work being done at polar research stations rely on the functioning of material, technical, and social infrastructures, it is nearly impossible to disentangle work from infrastructure. Traditional laboratory studies have a great deal to say about this entanglement, but related work from information studies and sociology also pushes the conceptualization of laboratory studies beyond a fixed, physical lab and the hard sciences. While science is the work we primarily associate with polar research stations, it is not the only work. As this research suggests, there is creative work going on as well. The amount of time and energy that goes into this non-work work illustrates its importance, as do programs like the AAW that use this type of work in support of science. Also in support of science is the infrastructural work (i.e., science support) that necessarily takes place before, around, and after the scientific and creative work.

Scientific work and laboratory studies.

With the publication of *Laboratory Life: The Construction of Scientific Facts*, Bruno Latour and Steve Woolgar (1986) ushered in a new, rigorous method of studying science and scientists. The idea of observing the daily life of scientists as they went about their work was revolutionary. Latour's (1987) *Science in Action* built on *Laboratory Life* and continued to capture the interactional processes of material, technical, and social infrastructures in scientific work. In remote polar research stations and field camps, laboratory studies relate directly to the special cases of infrastructure discussed in the last section as the stations add an interesting twist to the idea of laboratory studies in that remote areas, particularly polar regions, can themselves be considered laboratories. Although Bowker's *Science on the Run: Information Management and Industrial Geophysics at Schlumberger, 1920 to 1940* seems to be a step back (as he was again studying scientific events from an outsider's perspective), it was a step forward in that, like in Latour and Woolgar's ethnographic work, Bowker (1994) viewed the past with a rigorous and critical eye that recognized science as advancing through mutually constitutive social processes. Through this research he created a template for other sociologists of science to follow in exploring scientific pasts. The historically-informed methods of Bowker, Latour, and Woolgar were key influences in for preparing for my fieldwork.

Creative work.

Patrick Shepherd's brief chapter titled "Creativity at the Frozen Frontier" *in Exploring the Last Continent: An Introduction to Antarctica* examines the role of artists in Antarctica (Shepherd, 2015). Despite its brevity, the article makes several contributions: (1) he points to the important differentiation between artists for whom Antarctica is only imaginary versus those for whom it is part of a lived experience; it is primarily the second group on which this research focuses. Shepherd too differentiates between artists "who went in another capacity, e.g., Edward Wilson who went as Scott's chief scientist, and those who have gone purely as artists" (Shepherd, 2015, p. 401). (2) Shepherd briefly reminds us of the relationship between science and art (for example the biologists that drew, painted, or even photographed the creatures they encountered). (3) Shepherd has a section titled "Unique Challenges" which seems like it would be about the difficulty of producing artwork in such a challenging environment, but what it focuses on is how the artists related to their Antarctic experiences. This seems to go back to the idea posited in the section on infrastructure of Antarctica being an experiential truth-spot. (4) Shepherd begins to explore the idea of the contribution artists make to Antarctic scientific endeavors, but for whatever reason, barely touches on this idea. It does, however, open a topic that seemed completely unexplored when I first started my research. (5) Finally, from a practical standpoint, Shepherd's work is a rich bibliography for exploring products of the creative, scientific, and infrastructural relations this research explores.

Infrastructure work.

It should be clear from the extensive discussion throughout the conceptual framework just how important effective infrastructure is to ICE research settings; crucial to that infrastructure—and the scientific and creative work it supports—is the work that maintains the infrastructure itself. Johnson discusses this importance in the context of McMurdo Station in *Big Dead Place*. He writes:

> As stated by the External Panel, the primary national interest is physical occupation, and the science is the loophole through which the necessary infrastructure can emerge. For every grant-funded American scientist on the ice, there are approximately five wage earners, most of them involved in building or maintaining infrastructure. As the External Panel wrote: "The U.S.'s scientific and environmental research in Antarctica give substance and relevance to the national presence." In other words, ironworkers don't support science; science supports ironworkers (2005, p. 95).

While Johnson puts the ratio of those supporting McMurdo's infrastructure (the wage-earners) as outnumbering scientists and researchers five to one; other estimates put it as high as nine to one. It is likely this disparity is even larger during the winter months when researchers can no longer inhabit field camps or work extensively outside of the station buildings. PRS seems to have a much lower number during the summer (at the station, scientists outnumber staff five or even ten to one), but during winter it is almost exclusively occupied by what Johnson refers to as "wage-earners." If the yearly station use was measured in hours, I suspect the numbers would be similar between the much smaller staff and much larger contingent of researchers.

Knowledge Production & Knowledge Creation

While the theme of work deals with process, the fourth and final theme of knowledge production is more about the shared products coming out of the research stations. These products—including both academic and creative work—intersect with and diverge from the NSF's primary interest in scientific knowledge production. As mentioned in the previous chapter, the products of this creative work appear serve one of three purposes: (1) to increase external support for the scientific endeavors; (2) to directly support scientific work at a local level, either officially or unofficially; and (3) as their own form of knowledge production that has little or no direct relation to the scientific goals of the NSF.

Although not about science, Howard S. Becker's (1982) *Art Worlds* has been crucial to my understanding of the production of science and other forms of knowledge creation. Becker's experienced eye (himself being a musician, an artist, and a Chicago School-trained sociologist) explores the cooperative processes that go into creating works of art. Although art is often placed in opposition to science, we attribute the same factors, such as genius and creativity, to the existence and advancement of each. It should not then be surprising that we might understand science by thinking of it the same way we think of art. Polar research stations offer unique places to explore these links in that science and art (both being forms of knowledge production) are produced in proximity and often by the same individuals.

One prevalent theme in my research to date is how scientists use creative problem solving to "make do" with the resources on hand. Becker discusses the same processes occurring in art when artists, willfully or not, work outside the conventions dictated by either materials, processes, or both. Becker writes that "because equipment comes to embody one set of conventions in such a coercive way, artists frequently exercise their creativity by trying to make equipment and materials do things their makers never intended" (1982, p. 58). Although pointing to a conscious choice here, Becker recognizes that such choices are not always intentional. In ICE environments, scientists and support personnel demonstrate the same type of creativity, although perhaps with less choice in the matter. At PRS, for example, everything that comes in must make a particularly difficult journey to reach the station, and nearly everything there must eventually come back. In between, however, the materials may be used in surprising ways. As Steven Jackson writes in “Rethinking Repair” that “worlds of maintenance and repair and the instances of breakdown that occasion them are not separate or alternative to innovation, but sites for some of its most interesting and consequential operations” (2014, p. 227). This (re)use of materials is often a visible social practice. Non-scientific examples include a wedding dress created from a pair of blown-out Carhartt pants, a retired tent, an old cargo strap, zip ties, a d-ring, cereal boxes, wire, and other miscellaneous scraps (https://web.archive.org/web/20161222181835/http://www.sandwichgirl.com/2014/02/married/). Countless examples presented themselves during my fieldwork and are discussed extensively in later chapters, particularly in the section on the Christmas in July holiday. We also see these innovative practices in the boredom-combatting amateur theatrical productions (recall Goffman), often with intricate prop work, described by Johnson (2015, pp. 51-53) and others dating back to Robert Falcon Scott’s early-1900s Antarctic expeditions. In short, there is an unexamined creativity at work in the everyday lives of the residents of polar stations as they manipulate and repurpose infrastructure to transform the research stations and field camps dotting the inhospitable landscape into homes; furthermore, many participants document their experiences through creative methods outside the NSF’s purview.

Creativity in Knowledge Production

Examining ICE research settings with these four themes—setting, infrastructure, the work, and knowledge production—in mind points to two broad, interconnected areas for exploration: the roles of creativity in knowledge production and the workings of infrastructure in remote research settings.

Roles of creativity.

As discussed in the section covering knowledge production, one of the themes I am encountered in my preliminary research is how scientists, engineers, and support personnel in ICE environments, use creative problem solving to "make do" with the resources on hand. In these environments, there is a complete entanglement of science, creative work, and infrastructure. Becker writes that "art worlds typically have intimate and extensive relations with the worlds from which they try to distinguish themselves" (1982, p. 46) and that "it is not clear what to include in an analysis of art worlds and what to leave out" (1982, p. 37). I would suggest that creativity and science also share "intimate and extensive relations" and that in science worlds, artistry is too often and unfairly excluded. The blame does not lie with scientists alone, artists do it, and so does the public. This tendency to separate science and creativity is curious when we lavish praise on scientists and engineers who think creatively and "outside-the-box" and revolutionize our understanding of the world by doing so. It is even more interesting when considering how many scientists see creative components to their work and artists see scientific components to their own. After all, Darwin traveled on the HMS Beagle with an artist, Mawson took a photographer to document his scientific explorations of Antarctica, and a significant number of these men (and later, women)—scientists and explorers— extensively (and often beautifully) documented their journeys in private journals and subsequent trip reports. Perhaps now, the creative work involved in science has simply shifted in a direction we have yet to realize.

Infrastructural support for creativity.

The second area for exploration is the working of infrastructure in ICE research settings. Two broad themes around infrastructure arose in the literature presented in this work: the hypervisibility of infrastructure and the tendency to normalize—or at least attempt to normalize—atypical infrastructure. While I thought I would encounter these themes during my fieldwork at PRS, it was during the subsequent data analysis phase where their importance and relationship really began to crystallize.

Hypervisibility.

Whereas infrastructure is normally thought of as invisible until, hypervisibility may instead be a dimension of infrastructure in ICE environments. In ICE environments, infrastructure is not only about the convenience of electricity and running water but also about survival. As such, infrastructure may be more encompassing than elsewhere as it facilitates survival first and convenience second. This creates a hyperawareness of infrastructure that appears to be more prevalent in ICE environments. If we take the International Space Station, an extreme case of an ICE environment, the infrastructure is far from invisible, it is constant and encompassing; everything is purpose-built. If we step back to terrestrial environments, we see something similar at work in polar research stations which are built for cost-effectiveness and efficiency and provide life-giving shelter even in the worst conditions.

Hypervisibility may also be related to size. When a setting is exceptionally confined, like the ISS, infrastructural maintenance is not a specialized concern. A five-person team spending a winter at Summit Station, Greenland probably views their infrastructure differently than the 150+ personnel wintering over at Antarctica's McMurdo Station, where in theory, there are enough science support workers (Johnson's wage-earners) that the scientists do not need to think about the functioning of the systems allowing their existence on the otherwise uninhabitable continent. What this suggests is that ICE environments might bring forward two types of vigilance relating to infrastructure: tending vigilance (e.g., a maintenance technician might recognize a potentially deadly problem by a change in the pitch of a machine that provides heat) and survival vigilance (e.g., a scientist knows that if that machine is to break, the consequences could be deadly, but is unlikely to notice the change in pitch as a warning). When the stakes are high, infrastructure can be ever present, and yet, residents push against this visibility.

Normalizing infrastructure.

Despite the ever-present nature of infrastructure in polar research stations, there is evidence suggesting that people work to push visible infrastructure into the background. While never completely invisible, they may at least fade. Johnson writes extensively about how people cope with social conditions surrounding Antarctic living. He gives, for example, a humorous and insightful typology of the motivations of Antarctic workers. One type, whom he calls "penguin hunters," "send down ten boxes of stuff for their four-month stay. Their walls are full of photographs of family. They hang Christmas cards and wreaths on their doors during the holidays. They buy phone cards more than one at a time, and they check email ceaselessly" (N. Johnson, 2005. pp. 73-74). These individuals may be trying to hide the oddities of the station itself behind representations of and interactions with home.

Another simplistic method of normalizing/hiding infrastructure may be familiar to some from dorm-life: door decorations used to express identity. Despite his poking fun at the penguin hunters' door, Johnson mentions that he and his roommate had decorated their own door with a photo of the black metal band Gorgoroth for Johnson and three photos of a field of flowers for his roommate (2005, pp. 20-21). The door decorations might, at first, seem unimportant, but in the spirit of Jenna Hartel's (2010) work on personal culinary libraries, they may be interesting information objects and an instance of a common human behavior for making a place for oneself (recall Tuan becoming more important in this research as I spent time with data analysis); the decorations document and share the identity of the owner and serve aesthetically as a push against the visibility of the infrastructure. We see similar actions in the decorating of office desks or cubicles, the dashboards or rearview mirror of cars, and a dorm room or a prison cell using photographs, clippings, or other mementos. This aspect of infrastructure directly relates to Jackson's work (discussed in the theme of knowledge production), the roles of creativity (discussed at the beginning of this section), and in the idea of space and place (which is discussed extensively in Chapter Four); and if we again allow credence to Maslow's hierarchy of needs, the normalization and manipulation of infrastructure may be important for productivity in that an effective infrastructure must provide not only safety but also a sense of home (or belonging) before science and other forms of knowledge production can be done effectively.

My research themes and questions come directly from these observations regarding how creativity and infrastructure factor into scientific knowledge production in remote/ICE research settings.

Research Themes and Questions

While there are, undoubtedly, numerous interesting information practices at work in ICE research settings, this research, as I have previously noted, focuses on infrastructure, creativity, and sociality in scientific knowledge production. The relationship between creativity, science, and infrastructure is an aspect of the social world that directly contributes to scientific knowledge production but has not been studied from a scholarly perspective at anything beyond a cursory level. Thus, I went into this research interested in: **(1) Expanding scholarly understanding of the roles of creativity in knowledge production in extreme research environments.** This included questions of (a) what and how creative work is being done in polar research settings (b) how scientists see creativity (both their own and others') in relation to their work; (c) how the artists and other non-scientific personnel engaged in creative documentation see their work in relation to science; (d) what type of collaborative work is taking place between science and art; (e) if there is added value when combining scientific and creative or artistic work; and (f) is creative work able to capture public attention in a way that science alone cannot. **(2) Advancing infrastructure studies by exploring how science and creativity interact through material, technical, and social infrastructures.** Of particular interest was: (a) what infrastructural elements are necessary to produce knowledge and creative work in ICE environments; (b) how infrastructural elements enable and constrain scientific and creative work in these extreme settings; and (c) the hypervisibility of infrastructures in ICE environments—when infrastructures are usually conceptualized as invisible systems through which life and work function—and how individuals manipulate and domesticate these atypical infrastructures in order to achieve a semblance of normality.

CHAPTER THREE

RESEARCH METHODOLOGY: TWO AND A HALF MONTHS A PARTICIPANT IN ARCTIC RESEARCH AND LIFE

Chapter Three focuses on the methodology used in this dissertation research. Much of this chapter was written before my fieldwork as part of my dissertation proposal, but I have taken time to note notable deviations between what I planned and what took place during my fieldwork and the writing and analysis that took place during and after that fieldwork. The work I did can be divided into three phases: preparation, fieldwork, and analysis/writing.

The preparation stage, of course, involved coursework that prepared me to think and write about knowledge production and infrastructure, as well as general methodological training, including several courses on ethnography and a course on oral history where I practiced semi-structured interviewing techniques. Outside of the coursework, I researched extensively looking for anything that might be relevant to my topic, with those forming the theoretical framework discussed in Chapter Two. In addition to scholarly work, I also looked at first-hand accounts written by individuals who had spent time in polar regions; the most relevant of these were discussed in Chapter Two. Finally, I spent time doing archival research, working with UCLA's Mary Joe Goodwin Antarctica Collection; however, while interesting, the archival research ended up being outside of the scope of this project.

The second phase, the ethnographic fieldwork I did in 2018, lasted only a few months, but for those few months I was completely immersed in life at an Arctic research station. This fieldwork allowed me to observe first-hand scientific work and everyday life in an ICE environment. For nearly three months, I spent every waking moment immersed in station life, living in an ATCO, eating meals in the dining hall with scientists and station staff, and participating dozens of community events. Most of my days were spent in the field with one or more research groups, my evenings were spent enjoying leisure activities with friends and colleagues, and late nights were dedicated to expanding my field notes and making entries in a private scholarly blog shared only with my advisor. Finally, although not technically part of 2018 fieldwork, I later conducted interviews with ten colleagues from PRS, including researchers, staff, and station managers.

The third stage, dedicated to analysis and writing, was the longest. During this stage, much of my time was dedicated to writing. That writing became a time-intensive but extremely generative process; many of the ideas and theories I started with were scraped and many others were reworked to a point that the beginning stages would no longer be recognizable. Throughout this stage (as well as during the fieldwork), I wrote memos on themes I noticed and happenings that I experienced. I presented work-in-progress at several conferences, where session attendees offered me valuable, and sometimes unexpected, insight into my work through their comments and questions. I also had the privilege to visit with one of UCLA's Information Studies research methodology classes via Zoom during the COVID-19 pandemic, where I talked about my experiences doing ethnography in the Arctic, shared selections of field notes, memos, and photographs, and answered questions. Finally, during this time, I worked heavily on writing and editing the dissertation you are now reading.

Through all stages of this research, I spoke with my no less often than twice a month (although often more); this was invaluable as discussing things with her often teased out nuances that I might not have been able to articulate without her guidance and her knack for pinpointing details in a mass of raw fieldnotes.

In a perfect research world, the work I conducted might best have been done during a winter-over at Antarctica's Amundsen-Scott South Pole Station, Greenland's Summit Camp, or even McMurdo Station. During winter, these stations are some of the most isolated places on Earth and only barely accessible by plane in dire emergencies; the station where I did my research, PRS, on the other hand, is comparably tame. Although it is a long journey, it is even accessible by road. That said, PRS remains very remote and largely cut-off from society in the same way as McMurdo. PRS, having been established about 50 years ago, has had time to mature with specialized infrastructure and community traditions; thus, it is an exceptional spot to conduct ethnographic work. The people I worked with at PRS were brilliant, kind, and fun, and this research owes a great deal to them; I find it difficult to imagine that I could have worked with a better group anywhere else in the world.

Research Plan

The following section includes both my original plan and how and why that plan changed—when it did change—since proposing this work ahead of the 2018 fieldwork.

Stage 1: Preparation for PRS: Interviews and Archival Research

Through the first half of 2018, I will be focused on two main tasks: (1) I will be conducting archival research exploring the intersections of scientific and creative work in polar settings. This will include official documents from the U.S. Division of Polar Programs and its Predecessors held by the National Archives, as well as records of past program participants including journals, correspondence, and other relevant materials held by individuals and heritage archives. I will also explore creative and artistic works completed in or inspired by time in the polar research stations, especially those with ties to scientific work (e.g., artist Zaria Forman's pastels documenting the effects of climate change on remote landscapes). I will draw on my training as a historian and my experience as both an archivist and an archival researcher to synthesize and contextualize these findings. (2) After I have received IRB approval, I will be conducting oral history-style, open-ended interviews with experienced polar researchers, wage-earners (to use Johnson's distinction), and guest artists (e.g., AAW program participants). These interviews will also be informed by the training I have received in oral history methodology and ethnographic methods. Throughout this process I will continue to expand my roster of interviewees until I am satisfied that I have data saturation or as close to it as possible. Finally, after I have completed my fieldwork at PRS, I may revisit archival sources or conduct follow-up interviews with informants, as necessary, to reassess them according to my fieldwork findings and to refine my analyses as needed.

2023 Notes:

As mentioned already, the archival work largely turned out to be out of the scope of this project. The same can be said for creative work like Zaria Forman's. While this originally seemed very relevant, my time at the station showed me that the creative work coming out of the station—by those living and working there—offered more than enough for a single dissertation.

Secondly, as is noted in a later chapter, I continued full time coursework through the first week I was at PRS and the IRB process took longer than I anticipated; thus I was unable to conduct interviews ahead of time. I was, however, able to meet a large number of people who worked at the station when I attended a multiday planning meeting for PRS several months prior to my fieldwork; the extensive conversations I had with those individuals helped inform what I might expect during the field season. While not being able to conduct the planned interviews ahead of time might have had some drawbacks, in retrospect, I believe it was beneficial going in without developed notions of what I should be looking for.

Stage 2: Fieldwork at PRS

The second stage and culmination of this research is the ethnographic fieldwork I will be conducting at Polar Research Station (PRS). While at PRS, I will employ several main techniques for data gathering and analysis, which are detailed below.

Participant observation.

In the spirit of Latour and Woolgar and numerous ethnographers who have studied institutional settings through a similar lens (Latour & Woolgar, 1986; see also Lloyd, 2009; Shankar 2004; Sundin, 2011; Vaughan, 2004 & 2014; Veinot, 2007), I plan to spend a minimum of three months[9] at PRS observing and working alongside scientists, researchers, and support workers. The nature of my project requires more than just observing people at work, however, I also need to be able to observe them in their time off, since a focus of the proposed study is non-work activities. This would be nearly impossible in most situations where, ordinarily, I could not follow researchers home from the lab and observe them from the comfort of their living rooms; the bounded nature of research stations in ICE environments, however, makes this possible as the participants live, work, and socialize (mostly) within the confines of the station. Circumstances permitting, I will also follow scientists into the field as they do their work.

I will spend a minimum of four to six hours a day observing and interacting with PRS's researchers (while being careful not to inhibit their work), in addition to several hours writing detailed fieldnotes each day, perhaps in a common area where, unobtrusively, I can continue to look for interesting interactions and/or events. To the extent possible, I would like to work with research teams and others on-site to observe their work routines and interactions with colleagues (the exact dates I am at the station will be decided around maximizing this potential). Throughout the on-site work I will engage in informal conversations with participants to contextualize and enrich my observations and steer my research in productive directions.

2023 Notes:

[9] An extended amount of time (longer than three months) would be ideal but also impractical due to both the cost incurred for the fieldwork and the time constraints of the dissertation. That said, the fieldwork period will be coordinated with PRS to maximize my ability to work with the station's researchers.

While I had planned to spend at least three months at the station, that time was shortened slightly to two and a half months: I arrived at the station on June 12th and I departed on the 24th of August. The arrival date was necessitated by my course schedule; the Tuesday I arrived at PRS was the earliest date I could get to the station without missing my last classes (I spent finals week at the station, writing my final papers in my room). While I could have stayed after the 24th of August, I did not do so because the summer season had ended, and the station's population was dwindling. While I would have liked to stay longer, the cost of doing so was too great for the return.

While I had originally planned to spend a minimum of four to six hours a day observing and interacting with the station's researchers, after I gained entrée into the community, I was spending much longer with them. On a normal day, I would spend closer to 10 hours a day in the field, labs, dining hall, community center, the Social Circle, or wherever else we ended up; often these days were much longer (sometimes closer to 18 hours between fieldwork and a hike that might last well past midnight) and sometimes a bit shorter so I could catch up on notes. I also ended up spending most of my time with researchers in the field rather than in the labs.

Semi-structured, oral history-style interviews.

Several weeks into the fieldwork period, I will begin conducting semi-structured, oral history-style interviews with those participants who are willing to do so. This style of interviewing, as explained by Teresa Barnett, the head of UCLA's Oral History Program, requires the interviewer to develop a sophisticated guide, but uses this guide largely as a fallback measure when a more conversational style does not develop between the interviewer and interviewee. Oral-history style interviews work best when the interviewer and interviewee are already acquainted and share a knowledge of the topic of discussion, hence the waiting period while I become familiar with the research mannerisms and social life of PRS's residents. A shared knowledge allows a skilled interviewer to notice the interviewee's interests and guide the conversation in a direction benefiting the research. Done properly, the conversational nature of the interview can cover the entirety of the interview guide without seeming unnatural. In my experience, this method of interviewing is more comfortable for both participants and its dynamic, participatory nature is more likely to produce useful data.

2023 Note:

I ended up spending so much time in the field that I postponed these interviews and did them after the conclusion of the field season. Doing this after the conclusion of the season meant that I knew the interviewees well and I was able to do the interviews with minimal use of the guide. The interviews were also quite candid since we had grown to know each other well over the summer field season.

Visual anthropology.

Collier and Collier's (1986) *Visual Anthropology: Photography as a Research Method* points to the exceptional research potential allowed by a camera and visual anthropology, particularly the cultural library on which Hartel (2010) relies strongly. As Collier & Collier write, "the mechanical support of field observation extends the possibilities of critical analysis, for the camera record contributes a control factor to visual observation. Not only is it a check on eye memory, but further, it allows for absolute check of position and identification in congested, and changing cultural events" (Collier & Collier, 1986, pp. 9-10). Field notes can capture a great amount of detail about a setting, an interaction, or a conversation, but they are not sufficient for the proposed research for several reasons: (1) Photography can capture more of the richness of a creative product than can descriptive fieldnotes alone. (2) The researcher can examine visual records after fieldwork is completed for incidentally captured data (e.g., photographs of a laboratory might allow a researcher to observe the placement of key instruments, an important detail in understanding the scientific infrastructure of the lab, months after fieldwork has concluded). (3) Visual records can also help participants recall earlier events which may have gone unnoticed at the time.

2023 Note:

Although I took nearly 2,000 photographs during my fieldwork, there are many others photographs that I did not take that I wish I had taken (or wish I had been able to take). Much of the time I spent in the field, I ended up participating in the work, so I either did not think to take photographs or my hands were numb from cold or muddy from hands-on work; other times, heavy rain necessitated leaving electronics in the protective waterproof bag I carried with me everywhere. The photographs I did take have been invaluable references; a select few of these photographs will show up throughout this dissertation and illustrate points in a way that words alone cannot.

Data Plan

The following is my original data plan from 2018 with the additional notes from 2023 added where necessary.

Data Collection and Analysis

To make my ethnographic work less obtrusive, I will ordinarily take fieldnotes immediately following observations. While this can be difficult at first, it becomes easier with practice and familiarity with the research setting; that said, I may take notes concurrently with my observations, as needed, to capture detail.

The oral history-style interviews will be conducted with a topic guide, but as I have suggested, the guide will be memorized and only used for taking notes regarding the interview itself (e.g., time/date/location/impressions/etc.) or if the conversation wanes. The interviews will be digitally recorded for accuracy and so that I may devote my full attention to the participant rather than constant note-taking; any notes taken during the interview will be short and as unobtrusive as possible. As I mentioned, I will also be going into these interviews with a working knowledge the interviewees; I, therefore, need to learn as much as possible about each interviewee's work in advance. A preliminary, "getting acquainted" interview may help accomplish this. Transcription of the interviews will begin with a simple timed log that will assist with later coding (while not consuming too much field time) and will help determine which interviews will require full transcription after the conclusion of the fieldwork.

My analysis will take different forms at different times in the research process. Through each stage of the research, I will be recording notes and writing memos: "brief, analytically focused writings – asides and commentaries – to identify and explore initial theoretical directions and possibilities" (Emerson, Fretz, & Shaw, 2011, p. 123). Early in the process, my analysis will be limited to these memos, allowing me to track the progress of my ideas and begin a rough form of coding. At the conclusion of the fieldwork, I will bring together the archival research, the interviews leading up to the fieldwork, and my field notes and interviews from PRS and begin coding themes using what Iddo Tavory and Stefan Timmermans refer to as abductive analysis. Abductive (rather than inductive or deductive) analysis is a "creative inferential process aimed at producing new hypotheses and theories based on surprising evidence" (Tavory & Timmermans, 2014, p. 5). In other words, it is a process where hypotheses and data are constantly checked and rechecked against one another; for example, we may look for instances of a particular creative behavior and then place those instances together as a set; if important variations in a set do not fit the theory being developed, the theory can—and should—be reconsidered.

2023 Note:

In the field, as planned, I took minimal notes and usually wrote more detailed notes, often in the form of private blog posts my advisor could read, late in the evening after most of the station's inhabitants were asleep.

Although they took place after the conclusion of the field season, the interviews went as expected, and since I had already worked extensively with the individuals during my fieldwork, the "getting acquainted" interview was unnecessary.

Data management plan.

I expect to produce a significant amount of data, both handwritten and digital, thus I have developed a brief plan for organizing, storing, and sharing that data, as necessitated by the National Science Foundation for pending funding for PRS fieldwork.

Expectations for data.

Expectations of Data Produced for Research			
Type	**Source**	**Volume**	**File Formats**
Field Notes	Toolik fieldwork	Less than 1 gigabyte	Notebook Paper, DOCX
Audio Recordings	Interviews	1GB/10 hours x 100 estimated hours ≈ 10 gigabytes	MP3
Transcripts – Timed Log	Interviews	Less than 1 gigabyte	DOCX
Full Transcripts	Interviews	Less than 1 gigabyte	DOCX
Photography	Fieldwork	24MB/photo x 2000 ≈ 48 gigabytes	
Video Recordings	Fieldwork, possibly interviews	200MB/minute x 1500 minutes ≈ 300 gigabytes	MOV
Memos	Analysis of interviews and fieldwork	Less than 1 gigabyte	Notebook Paper, DOCX
Consent Forms	Participants	Less than 1 gigabyte	DOCX (original) Paper (signed) PDF (copies)
Correspondence	Participants	Less than 1 gigabyte	Email
Key – Participants to Pseudonyms	Fieldwork	Less than 1 gigabyte	DOCX
		Total Volume: ≈ 360 GB	

Figure 6 Expectations for data produced.

Organization and storage.

I expect this research to produce a large amount of qualitative data, primarily in the form of: handwritten and typed fieldnotes; handwritten and typed memos; digital photographs; and audio and video recordings. After the conclusion of the fieldwork, digital audio and/or video files will be transcribed into text in a digital format (i.e., Microsoft Word).

Digital photographs, audio recordings, and video recordings will all be removed from device of creation and stored on a pair of redundant encrypted external hard drives within 24 hours of creation unless this is impossible.

Digital files, apart from photographs (due to quantity), will be named for ease of use and include the date of creation and an identifier (i.e., the name or pseudonym of the participant or the type of activity being recorded). Hard copies will be organized in hanging file folders in locking file cabinet. All email correspondence relating to this research will occur through my UCLA-issued email address.

All data will be kept for at least three years after my dissertation filing, after which time an evaluation will be made whether to continue using it or destroy it.

Sharing.

As an ethnographer, I believe it is my ethical duty to protect my participants privacy and confidentiality. Unless compelled by law, the raw data I collect will not be shared except with the participant/co-creator and/or my dissertation committee.

Security.

Foremost, I will follow or exceed all data management policies and recommendations according to IRB approval. Should a breach of subject confidentially occur, I will contact the IRB immediately.

All computers used for this research will be password protected; additionally, individual files will be password protected when possible. Email correspondence will be protected by using a strong password for my email account. No sensitive information will be purposefully collected, and any such information collected incidentally will be destroyed as soon as possible.

External hard drives for storage of data will be encrypted.

Existing hardcopies will be kept at home in a locked file cabinet whenever possible. In the field, paper documents and digital storage devices will be kept as secure as circumstances permit.

Two Factor Authentication will not be used in the field due to the unreliability of mobile service but may be used at home.

2023 Notes:

To help best maintain the security of my data in the field, the PRS provided me with a room of my own in an ATCO structure for my entire stay. Although, I was unable to lock my door (as far as I am aware, there were no locked doors at the station), all materials were kept in a Pelican storage box under lock and key when I was outside my room. The box was then stashed at the back, bottom of the plywood cabinet that served as my closest. With the exception of a notebook, all data stored in the Pelican box was in an encrypted digital format.

Ethical Considerations

I will submit the details of this study to UCLA's Institutional Review Board for human subjects review as soon as I have incorporated the feedback from my dissertation committee. I hope to obtain expediated IRB approval since the research should pose little risk to participants; nonetheless, I will revise the research design and human subject procedures as needed, according to the advice of both the IRB and my dissertation committee, before beginning any data gathering involving human subjects.

Per my agreement with PRS, I will contact potential respondents/researchers ahead of time to receive their permission to speak with and observe them. Each potential participant will be given a written consent form which will explain their rights regarding the research. I will use the same human subjects consent procedure for all interviewees, whether interviews are conducted at PRS, at conferences, or elsewhere.

When I write-up my research, either for my dissertation or standalone articles, I will not directly name PRS, but rather refer to it generically as a remote polar research site. This will make the possibility of outsiders identifying participants more difficult. The participants will be referred to either by a pseudonym (e.g., Sally or Bob), a general description of their occupation or expertise (e.g., a postgraduate studying tundra vegetation), or both (e.g., Frank, a marine biologist). While this will not keep PRS insiders from recognizing one another, it (along with the avoidance of highly personalized or sensitive descriptions of participants) should allow participants to speak freely about their work and activities at the station. PRS, however, is relatively small and there is a significant chance that, despite efforts to keep participants anonymous, they might be identified through their answers or in association with their work. This is a danger largely for the same reasons that make the environment so interesting for this research: the community is small and relatively closed making identification of other group members easier than it would be in a more general and open population.

2023 Notes:

In the agreement I made with PRS so that I could do my research there, I was given a few stipulations that, consequently, moved my work in certain directions. Most notably, I was asked not to film, photograph, or record others in specific areas including the obvious ones—toilets, wash houses, and the sauna—but also the WeatherPorts and the dining hall (with some exceptions). While I was not explicitly told I could not describe what I saw, as a guest of the station, I believe the intention was to allow people what privacy they have available to them, which is particularly important in an ICE environment where privacy is not easily found. This means that, except for very general mentions, I have avoided talking about things like the interiors of WeatherPorts and ATCOs (besides my room); this was especially important since many rooms were shared, so inviting someone (e.g., "Luke the ethnographer") into one's room, necessarily meant inviting that person into not just one's own room, but one's roommate's or roommates' room also. As such, some of the things I originally envisioned including in my research (e.g., room decorations), I have instead omitted from the research. For this reason, this study became much more focused on the community as a whole, rather than about individuals.

It is also worth noting that in order to protect the identity of participants, in this dissertation I have been intentionally vague about the finer details of research projects and research interests among the people I worked with.

CHAPTER FOUR

PRS: A PLACE FOR SCIENCE, A PLACE FOR PEOPLE

While PRS's setting was briefly mentioned in the Chapter Three, this chapter explores PRS's setting in detail and is the first of two chapters—the following chapter on infrastructure being the second—that are crucial to understanding how life and science function at the station. PRS is geographically remote, located north of the Arctic circle in a vast tundra; the nearest city, with a population of less than 50,000, lies more than an eight-hour drive from the station along a rough, largely unpaved road, and at times, inclement weather makes this already treacherous road nearly impassable. Everything moving to and from PRS is reliant on this lifeline—people, materials, and even the digital bits and bytes transmitted along a buried fiber optic cable paralleling the road. The station is, in fact, so remote that most scientists spend their entire field season at the station without leaving; thus, to many, the station becomes both place of work and a short-term home. In a remote location such as this one, where transporting materials is difficult (sometimes to an extreme) and where the form of something must be justified by its function, setting and infrastructure are intimately connected to one another, and in the same way, both are deeply bound to the population who spend a part of their lives within the constraints of this built environment. This chapter seeks to give the reader the intimate look at PRS necessary to understand what it is like to live and work in this unusual environment.

This chapter focuses on the physical setting of the station (i.e., the environment surrounding the station) and the tangible and intangible elements of the station itself as the setting of not only this dissertation research but also the research setting for numerous scientists from around the world. Chapter Four begins with a narrative of my journey to the station at the beginning of the 2018 field season. Continuing from this narrative, I discuss the setting of the station itself including a broad description of the physical and human geography of the tundra. Following from this, I take a narrower look at the station itself as the primary setting of my research with a descriptive walking tour of the station's geography and physical infrastructure before turning to a more interpretative lens as I attempt to explain some of the more intangible elements of setting that can neither be seen nor touched but are learned and felt by those who live and work within the boundaries of the station. Finally, I bring these two elements of setting together in a discussion on the significance of this location to all stakeholders, past and present.

The nature of PRS's location necessitates a more extensive look at setting than might be typical in this type of study, but understanding this unusual setting is critical as the setting itself plays a fundamental role in how the material, technical, and social infrastructures of the station interact, as well as how the station's inhabitants live, work, and contribute to our understanding of the changing world. For this reason, as I have suggested, this chapter is about more than just a physical description of PRS and its surroundings, but also an attempt to capture and express a general sense of what it feels like to be at this remote location for the entirety of a summer field season.

Getting to PRS: From Los Angeles to the Arctic

On a warm morning in early June of 2018, I boarded a plane at Los Angeles International Airport and began the first leg of the two-day trip to PRS. A full day of air travel and a restless night of sleep later, I was on my way to the logistics trailer to start the second half of my journey—this time driving—toward the station where I would spend the next two and a half months of my life. The following narrative of this drive is adapted from my field notes.

Narrative: The Road to PRS

> *I arrived at the PRS logistics trailer around 8:30 am and was quickly greeted by a worker who showed me where to put my two large duffel bags before he returned to loading what little*

more would fit in the back of the SUV. Once he had finished packing the SUV, his attention shifted to a large white pickup truck with its bed covered by a tough-looking cap. After a few minutes of awkwardly watching the loading, unsure what to do, I offered to help with some large, heavy batteries and several boxes; I was soon sweating in the morning sun but feeling more useful having moved several of the batteries, numerous boxes, and some sealed five-gallon buckets. Shortly after 9:00am—our (loosely) scheduled departure time—the SUV left with three station staff members aboard. The rest of us who'd be driving to the station that day—all researchers—were called in to sign some paperwork authorizing the release of our driving records. That would have surprised me only a few months before when I had imagined the "science trucks" as tractor trailers carrying huge loads of equipment back and forth with several researchers as passengers. In the intervening time, however, I had learned that the science trucks are just normal pickup trucks and we—the researchers—make the 8+ hour drive ourselves (along with our gear, and whatever equipment, mail, and supplies logistics can make fit in the truck's bed), hence the interest in our driving records.

After we filled out the necessary paperwork and logistics made copies of our driver's licenses, we were given an orientation on the truck and its equipment: both a satellite phone and a GPS unit that drops "breadcrumbs" along the way (meaning it will track our progress intermittently and allow us to be located in an emergency), snow chains, two spare tires, two jacks, road flares, shovels, tow straps, and other recovery and emergency equipment. They are emphatic that we wouldn't be questioned if we ruined a tire and rim by driving on it for as long as was necessary to find a safe place to change it. Two of the four of us going up had been to PRS before, so they gave me and the other newbie a crash course on the truck's GPS unit and satellite phone and instruct the other two to demonstrate to us how to use the phone with a call to the station around the halfway point of the drive.

By the time we left, through no fault of our own, we were already running behind schedule. I was relieved when, despite being behind scheduled, the driver turned into the parking lot of a large supermarket. Several months earlier, at a planning meeting, I was told that the stop was customary and that, in addition to food and drink for the long ride ahead, nearly everyone buys alcohol to take with them for bonfires and other get togethers. We all did our shopping separately, and when we reconvened at the truck, I was particularly glad to have received the tip about buying alcohol, as the three of us who had longer stays added a goodly amount of beer and a few bottles of whiskey to the bed of the truck (requiring a bit of rearranging to protect the precious liquid cargo). I was *unsure of my own selection, 24 cans of various microbrews, because I was also told at the planning meeting that "everyone buys too little the first trip, too much the second, and about right from then on" (note: I bought way too little as it turned out that sharing beer was a great icebreaker).*

Although Val (the driver) and Ripley (the passenger) had been to PRS several times before, we ended up lost shortly after leaving the store (mapping apps being very unreliable and/or confusing almost immediately); eventually we ended up in the right direction. Conversations were lively at first while everyone explained their work to varying levels, but relatively quickly, the group conversation lulled. In the back seat, Will (who would be at the station only a few weeks) and I stared out our windows at the passing scenery. Val and Ripley continued chatting quietly (or maybe it just seemed quiet compared to the constant road noise) in the front seat, but at one point I heard them talking about building a wooden bicycle. Between their quiet voices and being lost in my own thoughts, I hadn't caught if one of them was in the process of making a wooden bicycle or just interested in doing so (and I didn't want to insert myself into the middle of a conversation between two friends), but it gave me great hope that the first two seasoned researchers I met were interested in unconventional building techniques (at least for bicycles).

Figure 7 Shrubs replaced trees as we moved deeper into the Arctic.

As the distance from town increased, the road became increasingly worse as it narrowed and turned to dirt and then *became increasingly rougher with frost heaves, long sections of washboard, and countless potholes. Although we had the road mostly to ourselves, we played a game of leapfrog with a pair of adventure motorcyclists for several hours as we (and they) would periodically stop for photographs and restroom breaks. About halfway through the trip, we stopped at a small outpost where we refilled the truck's diesel tank. After several tries the satellite phone connected with the station, and the station manager let us know we were behind schedule.*

From that point on, chastised, we made no more stops despite the scenery seemingly becoming increasing more beautiful the further we drove. The trees became scragglier and finally disappeared altogether, leaving steep, rocky hills, braided riverbeds, and rolling green tundra for scenery. Eventually we were surrounded by mountains, and the sides of the road became steep with snowpack as the temperature plummeted. The truck's windows were icy cold to the touch, and we'd all donned our jackets. Having put the truck into four-wheel drive, we moved along steadily, hoping to avoid becoming stuck in the mud and slush.

Once we made it over the final mountain pass, in what seemed to be a mixture of relief and anticipation, the two returning

Figure 8 First view of the tundra near the station.

researchers became animated again. They started talking about the station again and let us know where, if the day was clear enough, we'd see the station in the distance, but it had snowed several inches the night before and remained cold, windy, and gray. Although the most dangerous part of the drive was behind us, *the road remained muddy and slick and required careful driving. The lake, still mostly iced over but easily distinguished by its flat surface among a sea of rolling hills, soon came into view and the straight and sharp geometry of buildings stood out against the rolling, snow-covered tundra. At 8:15 pm, more than 10 hours after departing the logistics trailers, we arrived at the station.*

A few months earlier—and more than 3000 miles away—I had attended a planning meeting for the station. Over three days, I listened as researchers and station management met with one another and presented, discussed, and planned new and continuing projects; arranged research schedules and allotted precious helicopter time; assessed and prepared for fire and other environmental risks; and generally worked to make the most of the Arctic's short summer field season. I'd been invited to the meeting to present my research to the attendees as part of a poster session, so I would not be going in cold. They'd all been quite welcoming, and over the three days, I met researchers in all career stages and spoke with the station's management. These individuals hinted at what I might expect, gave me countless pieces of advice, and told me hilarious anecdotes about life at the station. I had taken all their words to heart and felt like I was prepared for anything, but as we turned into the station, I was feeling a bit ambivalent: both excited and discouraged.

The people I had spoken with at the planning meeting had largely focused on what the station would be like at the height of summer: a bustling population of enthusiast researchers, mild temperatures (although always only the distant wing-stroke of a butterfly away from a blizzard), rolling hills of green tundra and bright wildflowers, caribou and foxes strolling through the pad, and of course, the mosquitoes (ALWAYS THE DAMN MOSQUITOES!). But my first impression was of a quiet—not quite lifeless, but by no means bustling—industrial complex situated in a cold, snowy expanse shrouded by angry gray skies. It's not that I was disappointed; if anything, I was more excited to find something a bit rougher than I'd expected, but it was different than what I'd been imagining, and that threw me off. It probably didn't help that I was exhausted and a dehydrated from the day of bouncing around in the cramped back seat of the truck.

Despite never having been at the station, it felt a bit familiar (from verbal descriptions and photographs), but at the same time, it was not quite what I'd expected. For starters, even though I knew to expect 24 hours of daylight, my mind had built an image where we arrived in the early stages of nightfall, so that was my first surprise. Although the sky was grey, it was not nearly dark enough to approximate dusk. The station's pad—the dirt, gravel, and rock area on which all the station's structures are built—was *muddy from the recent snow and the station had an industrial feeling, and it was bigger than I expected, bigger by several times, in fact. A mix of small and large trailers and rectangular, tent-like*

Figure 9 First look at the station.

structures with arched roofs surrounded us as we made our way down the drive, and a figure in a thick jacket, a knit cap, and work pants looked at us as we passed and pointed at an imaginary (or maybe real?) watch on his wrist indicating we were late. Val, who was driving again after handing the wheel over to Ripley for the central third of the trip, parked in front of a large, central building. Val and Ripley filled out the truck's logbook and, after a minute, we all climbed out of the truck. I grabbed my laptop bag out of the back but ignored the rest of my gear (and my beer) as we were told that station staff would unload the trucks and we get our gear after orientation.

Before following the others up the steps of the large building we had parked in front of, I took a brief look around. The station's buildings, which I had seen from a few miles off, might have gone unnoticed for much longer if not for the sharp shapes of the trailers standing out against the natural curves of the tundra; besides their square shapes, the station's other structures would likely be inconspicuous in the winter landscape: nearly all were short and squat with only two—a large rectangular garage and an even larger soft-sided building, both near the entrance of the station—being tall enough to have a second story. All the structures were unobtrusive shades of greens, tans, whites, and a bit of blue. A central parking area was dotted with six or eight pickup trucks and SUVs made in the last few decades and a few *considerably older vehicles; all were 4x4s that looked well-loved.*

The two seasoned members of my group wiped their feet on boot brushes mounted at the top of the metal staircase just outside the entrance to the dining hall; I followed their lead, wiping the mud from my boots and entered the building behind them. The interior was brightly lit, and the aroma of grilled chicken and freshly baked bread hung in the air. In the dining area, straight ahead of us, a woman and a man were excitedly talking at a large table. Another person sat alone at a different table absorbed in whatever she was typing on her laptop. A door to our left was open, and the man inside greeted us; he was sitting at a table with the group from the SUV. This was one of the camp managers, and he told us that he was almost done with the other group's orientation and that we should grab some hot food from the kitchen, and he'd do our orientation after we'd eaten.

Initially, I felt awkward since I didn't know the rules for the dining hall, but I kept an eye on Val and Ripley to see how they did things. Although the dinner hour had been over for some time, the kitchen staff had been waiting for us to arrive and the food was still in the warming trays.[10] *We helped ourselves to the buffet, and once we had our plates full, the kitchen staff took the remaining food back into the kitchen to repack as leftovers. It was my first experience with the station's food, and it was already clear why so many of the researchers I spoke to earlier in the year told me about the "PRS Pounds," or the weight that many of the researchers gained over the season despite the grueling hours they worked: the food is incredibly good (something the kitchen—rightfully—takes great pride in). For dessert, I helped myself to a Rice Krispies treat from a clear bin. I took the presence of this marshmallowy deliciousness (a favorite of mine since childhood) as a good sign. The station manager must have been keeping an eye on us because we were called into his office only a few minutes after the last of us (not me) had finished his plate. Again, I mimicked Ripley and Val's actions and placed my dirty plate in a window separating the kitchen from the dining area and followed them into the office for the orientation.*

PRS is not easily reached; it is a place remote in a way few modern Westerners understand. It is many hours of driving over a largely unpaved road with little to no cellular reception that leaves both driver and passengers anxious for what could (and might) go wrong,

[10] This is an early season benefit, as later in the season, with more people coming in, it would be too difficult to wait for arrivals, so the remaining food was taken away and repackaged as leftovers as soon as the dinner hour ended.

made especially clear through the emphasis on safety during the pre-departure orientation at the logistics office. The remoteness is not just about the geographic location of the station, but also the affect—the feeling—of the place. It feels distinctly different from normal life: inhabitants no longer needs to carry cash or credit cards because there is no need to buy groceries or even gas (let alone worry about a morning commute), there is no need to lock the doors of a room or office when leaving it unoccupied because theft is not a concern, but also there is no hospital nearby in case of an emergency. At PRS, the entirety of the analog world around the inhabitants becomes a population maxing out at around 150.[11] It is this very experiential alienness that makes a remote scientific research station like PRS such a fascinating place for research. Thus, the purpose of this chapter is to not just to sketch the appearance of the tundra around the station and the station itself, but to also try to impart what it is like to be at PRS for the entirety of a summer field season and to be part of a community of others who are sharing in this experience.

PRS's Setting: A Vast Arctic Space

From the window of the truck, my early-season introduction to the Arctic gave me the impression that the vast rolling tundra was nearly devoid of life—just a windswept land of snow and ice slowly warming in the continuous daylight that would soon reveal a ravaged landscape of mud, bogs, and dead plants and shrubs—but the tundra was far from the wasteland it appeared. What at first looked dead to me was merely coming out of a long dormancy. The snow that blankets the tundra for the majority of the year is, in fact, critical to the ecology of the plants and animals that make the tundra their year-round homes as it maintains internal humidity and provides insulation, habitat, and during the thaw, a water supply that shapes the distribution of the tundra's plant life (Huryn & Hobbie, 2012, pp. 6-8). Within a few weeks of my arrival, most

[11] Is it just a happy coincidence that the maximum summer population around the time of my research is the same as Dunbar's number?

of the snow had melted, and not long after the last of the ice had melted from the lake. The change in the tundra itself was astonishing: the white and grey tones were quickly replaced by a landscape of vibrant green tones that would take on a red hue toward the end of the season before once again being covered by snow.

The Arctic Tundra

Due to a constant, slow shift in the tilt of the Earth's axis, the exact point where one crosses into the Arctic can be difficult to ascertain, but somewhere on our drive to the station, we crossed over that line; in fact, we even stopped and took photos at a sign marking its approximate location. From that sign, to both the north and south, we were greeted with similar vistas: rolling hills, seemingly either largely barren or thickly covered by brush punctuated with thin trees of medium height, mostly spruce but with the occasional birch plainly visible by its papery white bark spotted with black. The further we traveled north, the shorter and scragglier the trees became until they seemed to disappear altogether. This is the Arctic tundra.

At almost 200 miles north of the Arctic circle, PRS is well within the boundaries of the Arctic, but it remains in the low Arctic, meaning it is closer to the southern Arctic Circle than to the North Pole. Compared to the high Arctic, the low Arctic has "comparatively lush vegetation and high plant diversity" (Huryn & Hobbie, 2012, p. 4), but when compared to the lower latitudes, even in the low Arctic there are "relatively few species, [though] each with many individuals—large herds of caribou, for example, or vast swarms of mosquitoes" (Lopez, 1986, p. 31). The flora of the tundra is similarly distributed with a greatly reduced number of species found in the Arctic. The smaller variety, however, does not mean that this is a simple ecosystem. The late Barry Lopez writes of this in his masterpiece *Arctic Dreams: Imagination and Desire in a Northern Landscape*:

> The overall impression, coming from the South, would be of

> movement from a very complex world to a quite simplified one…. But this sensation of simplicity would be something of an illusion. Arctic ecosystems have the same elegant and Byzantine complexities, the same wild grace, as tropical ecosystems; there are simply fewer moving parts—and on the flat, open tundra the parts are much more visible, accessible, and countable. The complexities in Arctic ecosystems lie not with, say, esoteric dietary preferences among 100 different kinds of ground beetle making a living on the same tropical acre, but with an intricacy of rhythmic response to extreme ranges of light and temperature. With the seasonal movement of large numbers of migratory animals. And with their adaptation to violent, but natural, fluctuations in their population levels (Lopez, 1986, pp. 24-25).

Because the tundra is a landscape of stunted growth—with the tallest shrubs rarely reaching more than a few feet, except in riparian habitats where their spindly branches might reach twice that height—it is easy to misinterpret its complexity. The tundra flora does not regrow entirely each year with the retreat of the snow but rather survives under its insulation through the long, windy winter season. Although it is true that the biological diversity diminishes as you travel north, the tundra is a landscape filled with vigorous life, sometimes deceptively so. Arctic bell-heather (*Cassiope tetragona*), for example, a dwarf shrub with tiny, drooping white bell-shaped

Figure 10 Cassiope tetragona.

flowers and angular scale-like leaves jutting upward in distinct rows, may be a decade or older while only reaching a few inches in height. Life in the Arctic regions is difficult and yearly growth can be slight; as an example of this, Lopez points out that:

> A cross-section of the bole of a Richardson willow no thicker than your finger may reveal 200 annual growth rings beneath the magnifying glass. Much of the tundra, of course, appears treeless when, in many places, it is actually covered with trees—a thick matting of short, ancient willows and birches. You realize suddenly that you are wandering around on *top* of a forest (Lopez, 1986, p. 28).

While it is possible to wander on top of an old forest, around PRS, when stepping off the boardwalk, it is more likely for one to find themselves walking on or between tussocks (thick, dome-shaped clumps of plant life protruding from the ground).[12] Around PRS, likely owing to the acidity of the tundra, the dominant tussock forming material is cottongrass (*Eriophorum vaginatum*). While the tussocks make it more difficult to walk across the tundra, their shape is

Figure 11 The tussocks make for difficult walking. Boardwalks not only help preserve the tundra but also make it easier to move among areas.

---

[12] There seems to be some disagreement among different researchers on whether it is better for minimizing impact on the tundra to hop from tussock to tussock or to step in the space between them. Most of the researchers with whom I spent time in the field seemed to step between them, so I adopted this style. All seem to agree to limit steps as much as possible (for example, if you are stopped, try to stay in place rather than shifting around in a small area). Groups would also typically spread out a bit so that any two people were not using the same path.

advantageous in tundra habitats. Their height causes them to become free of snow sooner and they can absorb low angle sunlight more effectively, meaning they experience a longer growing season than the flora between the tussocks, and within the tussock, “nutrients are recycled as much as 10 times more rapidly than those within inter-tussock soils” (Huryn & Hobbie, 2012, p. 78). The importance of this, and the reason why tussocks dominate the landscape, cannot be overlooked, when as Lopez describes:

> Almost everywhere you wander on the open tundra you find whole dead leaves, preserved flower parts, and bits of twig, years of undisturbed organic accumulation. Decomposition in the Arctic is exceedingly slow, work that must be accomplished by even fewer organisms operating for even shorter periods of time…. Arctic soils are thin, acidic, poorly drained, and poorly aerated. They are rich in neither nitrogen nor the phosphorus essential for plant growth (Lopez, 1986, p 26).

Knowing the hostility of the tundra toward growth makes it all that much more astonishing that a cottongrass tussock of average size typically ranges between 122 to 187 years old (Huryn & Hobbie, 2012, p. 78)! The tundra is also dotted with boulders—a reminder that the area was covered in ice only 10,000 years ago—and in places the thin soil and spongy tussocks completely give way to rocky patches. At the extreme of this is the mountains to the south, which are almost bare of plant life beyond their lower slopes and protected gullies.

Figure 12 The mountains south of PRS are steep, rocky, and covered in snow for much of the year.

Lopez writes that “like other landscapes that initially appear barren, Arctic tundra can open suddenly, like the corolla of a flower, when any intimacy with it is sought.” This proved especially true coming at the cusp of the summer season as I did. While the frozen land I arrived to in early June had an austere beauty, the extensive flora hiding underneath the snow was truly remarkable. My appreciation for these plants grew the more I examined them—with their delicate pink and white flowers; blue, black, yellow, and red berries; and leaves, waxy or fuzzy, sometimes short and stout other times long and lithe—and considered their tenuous yet lasting grip on survival in a land of extreme fluctuations.

Figure 13 Polygonum bistorta partially encased in ice after midsummer storm.

It has been suggested that for the low Arctic, the idea of four seasons is not particularly useful, rather the idea should be that of a long cold season and a short warm season, in much the same way that dry and monsoon seasons are more relevant when discussing tropical seasonality. Roughly speaking, if we stay with the four seasons, most of the year would be considered winter with the remaining three seasons greatly abbreviated: Spring lasting from approximately mid-May to mid-Jun, Summer from mid-June to mid-August, and Fall from mid-August to mid-September; thus, winter is the long eight-month period from mid-September to mid-May (Huryn

& Hobbie, 2012, p. 5). While the term "Arctic" is considered synonymous with cold, summer temperatures at PRS can be cool, mild, warm, or even hot with normal highs anywhere from the low 40s to high 70s. The lows can be significantly colder, and snow is possible at any time. Typically, snowfall from mid-June onward melts quickly until September when temperatures are low enough that it may start accumulating and last until the following June. Lakes and ponds spend much of their time iced over; the lake next to PRS, for example, begins freezing over in

Figure 14 Seemingly endless tundra viewed from the summit of Bear Mountain.

mid-to-late-September and is not ice-free again until the following June. Although most of the precipitation falls as rain during the summer months, it is far from constant, and many days are bright and sunny. These sunny days may also be more pronounced than they are at lower latitudes, because for much of the summer field season, the sun does not set, and even late in the season, there is only a few hours of darkness. Conversely, in winter, the station is in complete darkness from mid-November to mid-January. Thus, sunshine is a "seasonal phenomenon" (Lopez, 1986, p. 21) rather than the daily one with which we are familiar in the lower latitudes. Finally, powerful winds can rip through the station at any time, and heavy winds are typical during the winter. During the summer, however, the wind (as well as the rain) is often appreciated in that it offers a reprieve from the constant barrage of mosquitoes suffered by human and animal alike on the tundra.

The word “vast,” which I have used several times already, is the word I repeatedly come back to in my attempts to describe the expanse of rolling tundra dotted with lakes and ponds and

Figure 15 Tundra stretching toward the southern mountains.

crisscrossed with streams and rivers that surrounds the station. Except for the road used to access the station and the experimental plots of varying prominence, there are virtually no indications of human use for miles in any direction. The tundra is not a suitable surface for building on, so the station occupies an area people call “the pad,” an artificially flattened area of dirt, gravel, and rock on which all the station’s structures are built. Several footpaths, like arteries, stretch away from the heart of the station and into key areas of the nearby tundra. The most notable of these paths is a long boardwalk, with several offshoots, that leads to numerous experimental plots, some decades in the making. If one continues beyond the boardwalk, the experimental areas become less obvious, sometimes marked only by a stake at each corner of a 100 x 100-meter square; many more are not marked at all and impossible to find without GPS coordinates (and often difficult to locate even with those coordinates). It is when going to some of these far away locations that the vastness (that word again) becomes something you can *feel* around you. When the station is no longer visible, it is easy to lose one's sense of scale on the tundra; this loss of scale, paradoxically, allows the vastness to be seen as much as felt. The tussocks—although

Figure 16 Four experimental plots surrounded by boardwalk.

varying greatly in size—provide the only hints of scale and these hints diminish in the distance as the tussocks appear to be more of a solid blanket of green rather than the individual mounds they truly are. Without an object of a known size with which to orient oneself, distances become skewed in the mind: a pond can look like a lake, rivers may look like creeks, and even animals can be misidentified, sometimes hilariously so. Barry Lopez captures this feeling wonderfully in *Arctic Dreams* when he relates several such incidents:

> Stefansson recalls spending an hour stalking a tundra grizzly that turned out to be a marmot. A Swedish explorer had all but completed a written description in his notebook of a craggy headland with two unusually symmetrical valley glaciers, the whole of it a part of a large island, when he discovered that he was looking at a walrus. Johann Miertsching, traveling with M'Clure aboard the Investigator, wrote of a polar bear that "rose in the air and flew off" as the hunting part approached. A snowy owl. "These comical deceptions," wrote Miertsching, "are a frequent occurrence" (Lopez, 1986, pp. 238-239).

This strange distortion of how we perceive distance may make PRS feel even more remote than it is. When we were visiting distant field sites, or sometimes just hiking, it was easy to look in any direction and feel completely alone and detached from the rest of the world.[13] The way the landscape distorted our sense of distance was something we were constantly amused by, and often after an unfamiliar hike, we would guess at our distance hiked before checking the Garmin InReach satellite communication unit we always carried: although we were all seasoned hikers, our guesses on the distance we covered were sometimes half or double the actual mileage.

While we often felt alone on the tundra, we knew we were not. While we were unlikely to run into other humans while out hiking or working in the distant plots, an encounter with an animal was not uncommon. Like the InReach device, we always carried bear spray. Of all the animals on the tundra, the grizzlies—although relatively rare—are the most awe-inspiring (and terrifying). I saw several across the lake from the safety of the dining hall's balcony, but a group of four of us had a close encounter as we lazily fished on the lake. I am not much of a fisherman, so I was paying more attention to scenery as our canoe drifted around the lake; I had looked at the shore only moments before, but the next time I looked up, there was a grizzly within 100 feet of us at the shoreline. As there were scientists working in the plots, we yelled at it until it ambled away; we shadowed it from a safe distance to the far side of the lake where we continued to watch from the canoes until it was a speck in the distance. For a moment longer it was a bear, and suddenly it was indistinguishable from the rocks jutting from the hillside. Late in the season as we watched a large one foraging among boulders on the other side of the lake, one of the seasoned Arctic veterans in the station said something along the lines of "the grizzlies here scare me. The ones in the south are stuffed on fish, the ones we have up here in the tundra are eating berries and grubs. They're hungry and can be desperate this time of year."

[13] And were detached. Chance encounters seemed exceedingly rare on the tundra. Anytime we left the station, we signed out the number of people going, when we left, where we were going, and when we planned to be back, because if something happened, without that information, there would be little chance of being found quickly, if at all.

While grizzly sightings were (thankfully) rare, even more rare were wolf sightings, although people see them occasionally. I, along with the rest of a small group, had the good fortune to see a pair on my first hike with PRS's naturalist, but I did not see another wolf the entire time I was in the Arctic. Caribou, on the other hand, were a frequent sight, and they would even wander through camp. Occasionally someone would see an ermine, particularly when one would use the boardwalks to move quicker through the tussocks and muskegs. By far the most seen predator was a fox (called "Camp Fox" by a number of people) who made its home nearby

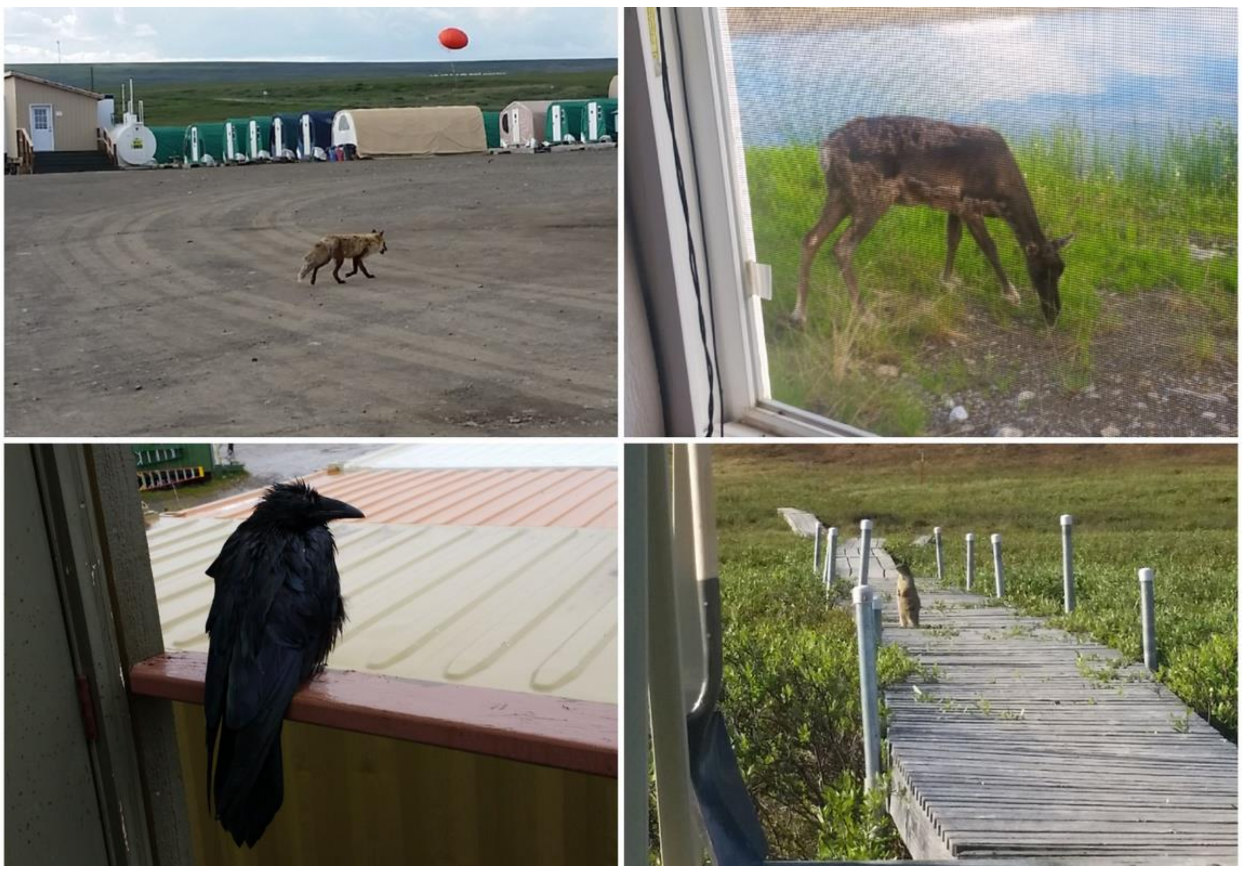

Figure 17 Station wildlife. Top left: Camp Fox; top right: caribou calf outside the window of my ATCO; bottom left: one of the PRS's ravens sitting on a tower railing; bottom right: an arctic ground squirrel using the boardwalk for a higher vantage.

and would often trot through camp with a vole or a ground squirrel in its mouth; while Camp Fox's presence was not a constant, it was seen more days than it was absent. Despite Camp Fox's hunting prowess, the Arctic ground squirrels remained plentiful at the edge of the pad nearest to the lake and they would often chirp sharp cries at nearby scientists. In addition to many smaller and more skittish birds, a pair of huge ravens also made the station their home, and many in camp would complain about the ruckus the pair would often make in the mornings with their hops across the roof of an ATCO sounding more like a caribou thrashing around overhead. Occasionally we would also see musk ox near camp, although unlike the caribou, they never seemed to venture onto the pad. Further from the station, scientists would occasionally report sightings of porcupine, beavers, Dall sheep, and even wolverines.

While some of the research conducted out of the station centers on wildlife, the residents' interest in the wildlife goes beyond just what is necessitated for work or even scientific curiosity. Most of the inhabitants take genuine pleasure in seeing wildlife around the station, on hikes, or while traveling to distant research sites. Lopez writes that "few things provoke like the presence of wild animals. They pull at us like tidal currents with questions of volition; of ethical involvement, of ancestry" (Lopez, 1986, p. 37) and this seems to be particularly relevant in the polar wilds where the animals, despite their relatively small populations, greatly outnumber the humans. We would often pause work to watch a fledging gyrfalcon learning to fly overhead or to photograph a pair of musk ox lumbering by in the distance, my companions would tell me about the behavior of a type of bird flying overhead as we drove down a dirt road to a distant field site, or we would stop in an area where someone else had a sighting in hopes that we might see the elusive creature. The whiteboard in the dining hall designated for official use even had an entire section dedicated to recording sightings, where researchers could record what animal was seen and when and where the sighting took place. There was a certain sense of pride adding a rare sighting to the list.

Before the Oil, Before the Science

There are few obvious signs of human habitation between the logistics office and the field station, yet the vast area has been occupied continuously for 13,000 years as evidenced by the archaeological record. To western eyes, these areas were—and largely remain—empty territory, but indigenous peoples have lived and hunted in the area since the Paleolithic. In my preliminary work, I stumbled across a chronology of Arctic exploration that started in the third century BC with a visit—possibly fictious—to a northern island by a Greek merchant and explorer named Pytheas; the second entry of the same chronology jumps ahead several millennia to 985 when Eric the Red and nearly 700 followers arrive in Greenland and establish two settlements. This type of erasure of indigenous people—whose ancestral lands and hunting grounds span much of the Arctic—is all too common. We easily recognize that the polar regions support a limited species of plants, insects, and animals, and limited numbers of each species, yet somehow see the small number of humans as a sign that it is not being used properly or efficiently by the people who have lived and hunted the lands since the Stone Age.

PRS is working to make its users aware of this legacy and prominently display a land acknowledgement statement on their website and thank the indigenous people who inhabit and steward the land. They ask users to be respectful of any artifacts found on the tundra and to report any such finds so the authorities may be contacted. The planning meetings I participated in over several years started with similar acknowledgements, and even at an individual level, researchers and station staff seem to be more frequently acknowledging land use, particularly when tagging photographs on social media. During my stay, an archaeologist visited PRS and gave a Tuesday Talk about the human history of the area; the community center was packed full of researchers and support staff who listened intently and asked numerous questions; of all the talks that summer, that one had the most people in attendance and the most engaged audience. While there is undoubtedly much work to be done in acknowledging the roles of the local indigenous populations, PRS and its inhabitants appear to be making sincere efforts to make steps in the right direction. Unfortunately, as noted in a previous chapter, my own research lacks indigenous perspectives as there were no native people at the station during my summer there. I am, of course, profoundly grateful for the time I spent on this indigenous land.

PRS as Setting: A Place (Not Just) for Science

While the Arctic has been home to indigenous people for millennia, it is a difficult place for living and working: the climate is inhospitable and it is far away from the conveniences and safeties afforded by developed areas, meaning there is a certain circumscription to daily life. While perhaps not as "ICE" as Amundsen-Scott, PRS shares many of the core characteristics with its southern cognate:

- **Isolation:** PRS is far from developed areas in a place where few people live or work, requiring a long drive to access.
- **Confinement:** PRS is, in a sense, a miniature city, with places to live, work, and socialize, yet this is all done in the space of only a few acres[14] and the distance to get to anywhere from the station (except for outside recreation like hiking or backpacking) is prohibitive. As such, the boundaries between work/non-work and public/private life are blurred for extended periods of time.
- **Extremity:** The tundra is inhospitable to humans with dangers including unpredictable weather, wildlife (a concern Antarctica does not share), environmental dangers (e.g., bogs and rivers). Long term survival in the Arctic requires either specialized knowledge and/or infrastructural elements.

As ICE environments necessitate special infrastructure, particularly in the support of work, the

[14] At the peak of summer, the population density of the eight or so acres that comprise the common areas of the pad (meaning the lab, community, and living areas, as well as the outside area of the pad surrounding these where people walk, play games, and socialize) is similar to Chicago or Philadelphia.

concept of the ICE environment—and of PRS as an ICE environment—will be revisited in the next chapter that focuses on the station's infrastructure.

Background

While the area around PRS has held deep significance for its indigenous residents for thousands of years, the recognition of the area's importance to modern western science is considerably newer and much of this interest has come as science has increasingly recognized the critical importance of understanding climate change. Arctic science is particularly important because the extreme conditions have prevented an influx of people, leaving a relatively pristine environment largely free of human influence at the local level. PRS was established as a field camp in the mid-1970s, and now, with nearly fifty years of observations and world class research facilities, PRS is a premier Arctic research station for ecological research; and in the summer of 2018, it became the setting for my ethnographic research.

A brief history of PRS.[15]

In the mid-1970s, an aquatic research project based out of a coastal village was nearing completion. The researchers involved with the project were looking for a deep inland lake that did not freeze solid over during the Arctic winter to compare with their work on shallow lakes that did freeze solid. After surveying ecological and limnological sites, a lake of just under a square mile with a depth nearing 100 feet was chosen as the site for a new research camp. While the lake fit the researchers' needs, the deciding factor for the placement of what was to become PRS was likely the newly built road, that could provide access to the site. Miles, an individual involved in the early days of the station, said:

> The only reason [PRS] is where it is, is because of the [road]. It

---

[15] Much of the information regarding the history of the station comes from an interview with one of my participants whose name is withheld for confidentiality. Other information comes directly from the station's website, which is withheld for the same reasons.

> was the logistics. Nobody probably ever could have afforded, at the time, to set up a camp . . . because the road was there . . . buildings could get pulled in, because the road was there, people could get in trucks to get to a research station that had a major research hub . . . If it wasn't for the [road], it might have been a totally different story of where Arctic research, or if this base, was ever put in.

In short, building, maintaining, and accessing the station would have been prohibitively expensive without the road, and this was particularly important in the early years of the station when funding was scarce to non-existent; thus, the establishment and growth of PRS over four decades is directly connected to the road used to access it.

Figure 18 Researchers at work on the lake.

In addition to providing access, the road's construction left a convenient place to situate the station. A camp for workers had been built near the lake that included an ice airfield for the transportation of materials, as well as a large area for the storage of those materials. As such, the area had already been cleared, and to some extent, leveled. In the summer of 1975, a 16-foot travel trailer was placed on the old airstrip at the north end of the lake. Over the next seven years, a motley assortment of structures was added to the airstrip including modular units, a motorhome, temporary wooden structures, and an assortment of tents. By the early 80s, this assortment of structures provided 1,400 square feet for laboratory use and 500 square feet for food service; visitors brought and slept in their own tents. In these early years, the camp felt especially remote with communication to the outside world limited to a single sideband radio that was unreliable at the distances needed, and even with the road, accessing the site proved difficult. This was especially true when moving materials. Pulling a trailer to the camp required a multi-day drive averaging 10 to 15 miles per hour, and the unmarked road looked extraordinarily similar for long stretches and often left those who were driving to the station confused as to their location at any given time during their journey. One driver, unencumbered by a trailer and traveling faster than prudent, even managed to overshoot the station by a hundred miles. Adding to the other difficulties, the drivers had to be vigilant as the rough condition of the road tended to destroy the windshields, shocks, and tires of the trucks using it.

The camp had already outgrown the airstrip, and after the necessary administrative work was completed, the camp moved to the old materials site on the south side of the lake. With the move, the camp became a station (although—informally—it is often still referred to as camp).[16] Surplus ATCOs were purchased for the new site leading to a frenzy of activity around their relocation to avoid being charged by the former owners for their removal. Funding was tight, but several people and groups donated items and materials to the station, and some crucial work like leveling or moving heavy equipment was done by other crews in the area in exchange for showers, meals, and laundry services at the station. While the administration frowned on this

[16] Throughout these chapters I use "station" and "camp" interchangeably when discussing PRS. While PRS is now officially a station, most of the population of PRS, at least during the summer I was there, referred to PRS as "camp" (e.g., "we'll grab lunch at camp" or "they left camp this morning"). This may be partially because there was a bit of a joke around the station that the summer field season was "summer camp for scientists."

bartering system, there was something of an institutional disconnect, as they were far away and did not understand how expensive it would be to pay for the same work. Thus, early on, there was a bartering system that has, at least to some extent, has remained in use. Where outside crews used to work for laundry services, a shower, or a hot meal, now people within the station trade work for work, beer for wine, books to read, or whatever else.[17] While this happens elsewhere, it is particularly important in an ICE environment where there is no easily accessed outside source for these Arctic luxuries.

Even though the station had greatly expanded, the sideband radio was still the only "fast" method of communication out of the station, and even this was often done using a predetermined code as it was difficult to hear transmissions. Much of the communication was instead done by a "Pony Express method" where people would handwrite a letter requesting supplies and give it to the driver of one of the trucks that delivered supplies three times each month. The driver would then deliver the letter to an "expeditor" who would purchase the supplies and load them on the next truck. For those at the station, the arrival of a truck was like "Christmastime" as they discovered if they had received their requested items.

Over time communications continued to improve, with meteor burst communication (MBC) eventually sidelining the sideband. MBC, which relied on bouncing transmissions off meteor trails, was more reliable but also slow with only 24 characters transmitted every 20 seconds. These transmissions went to a computer hub where it was converted to an email message and relayed to the proper parties. MBC's limitations were not always understood, which could cause difficulties for everyone. Miles told me of one scientist who attempted to send a 50-page proposal through the system which jammed the system for over a week while the proposal

[17] It is worth noting that the same goods and services that are sometimes traded will often be gifted instead.

was queued for sending before it was eventually cancelled so communications could resume. MBC was replaced by tall antennas and one channel was licensed for use on the microwave system once the station was allowed to tap into the road's backbone.

Despite consistent funding from a parent university, considerable support from the NSF starting in the mid-1980s, and intermittent state funding, the ebb and flow of funding was always a concern for the camp in the early years of its existence, and over the years the station grew in sometimes unorthodox ways. One memorable example of this was the acquisition of several WeatherPorts in the 1980s purchased for use as housing during an international conference on permafrost. After the conference, these tents were given to PRS in exchange for the help they offered during the conference, specifically, in the form of a tour up the road leading to and past the station. The tour's participants were taken up the road on a chartered bus for a three-day tour, and each day the volunteers from PRS would rush ahead of the bus to set up a camp that included sleeping areas, a kitchen, and a cleanup tent complete with hot water; each morning the volunteers would break down camp, rush ahead of the bus, and set up camp at the next area.

In the late 1980s and early 1990s, the funding situation began to improve. Power was run from the generators to each of the buildings and the generators themselves were placed in a soundproof trailer that also allowed for servicing during the winter when the station was closed. In addition to the generator improvements, the station purchased a water filtration system, several snowmachines, and several vital pieces of laboratory equipment, followed a few years later by several computers and printers, a large capacity fuel storage tank for the generators, and upgrades to the station's electrical systems.

Since the early 1990s, PRS has consistently improved its facilities, capabilities, and communications. One of the most significant changes, particularly in the lives of those living at the station, was internet accessibility. When email first arrived at PRS, the entire station shared a single address, and the camp manager would go through 50 or 60 emails each day, print them out, fold the printings for privacy, write the recipient's name on the outside, and hang them on a board. Many senders did not understand that the email address was shared and would not make it clear who the email was from, so the camp manager had to read through the email to try to decipher who it was intended for. This meant that the camp manager often knew everything that was going on around the station and in people's lives since he was often unintentionally privy to personal correspondence. In contrast to this rudimentary email communication, during my stay nearly three decades later, I checked four personal email accounts, posted photos and journal entries to a private blog for my advisor, scrolled through Instagram to see what my friends were up to back home, videochatted with family, and even streamed Netflix from the comfort of my ATCO, all while others did the same. Even my cellphone had a spotty signal in a few places in camp, although the reception was poor to the point of being nonexistent sometimes.

For more than two decades, PRS operated as a seasonal site, open from May through August. In the late 1990s, it was decided that PRS should support winter operations as well and the "Winter Quarters" were designed and built with redundant power and heating sources (including a wood stove which some higher ups felt was unnecessary until it repeatedly proved invaluable). Still, the station was difficult to access in the winter as the area between the main road and the station itself was unplowed. Typically, winter work meant using a snowmachine to reach the station from the main road, staying for a few days, and then leaving. The first continuous presence at the station was not until the mid-2000s after modifications were done to improve the buildings and provide power and communications for winter occupation; this continuous presence also necessitated the difficult task of keeping the access road plowed so that fuel deliveries could be made as needed.

PRS is now one of the premier Arctic research stations, with more than a dozen well-equipped labs—most being hard-sided buildings but also a few soft-sided WeatherPorts—with power, heat, high-speed internet, and in the hard-sided buildings, running water. While the

Figure 19 Lab buildings early in the season.

capabilities of the labs vary, most have some combination of office space, lab tables, and much of the equipment necessary for analyzing specimens in the field (often if one lab lacks a necessary tool or instrument, it can be borrowed from or used in another lab). There is also an extensive range of loaner carpentry and mechanics tools, larger power equipment (e.g., earth and ice augers), and hardware available to the station's users. A large kitchen and dining area, a small gym, a community center, laundry and shower facilities, and even a sauna that is active several times each week. Finally, several boats and canoes (as well as the required lifejackets) are available for both work and pleasure. With the growth of the station's facilities and capabilities, the population—particularly at the height of the summer field season—has greatly increased over the years now peaking at around 150. In addition to the staff—including a team of maintenance technicians, an EMT, GIS professionals, a naturalist, and a fully staffed kitchen that provides hot meals two to three times daily except on Sundays—summer inhabitants include undergraduate and graduate students, postdoctoral researchers, early career scientists, and veteran PIs who have returned to the station yearly for decades. Since 2008, these users have represented more than 100 academic institutions from across the globe.

Figure 20 The dock area early in the season.

Much of this growth is possible because the road allows PRS's infrastructure to adapt to changes as necessary. The road makes access easy with users arriving and departing the station several times each week on science trucks. The road allows for weekly deliveries of the fresh fruit and vegetables, raw meat, and other provisions the station's kitchen turns into mouth-watering, made-from-scratch meals.[18] The road allows fuel for the generators to be delivered so that the Winter Quarters, Winter Lab, and other essential buildings can remain operational throughout winter. The road also allows access to nearby field sites that would otherwise be too distant to reach from the station except in winter when thick blankets of snow allow travel over the tundra by snowmachine. This is an irony that must be acknowledged: while much of the research coming out of PRS is focused on the effects of human-caused climate change, the station exists—in part—because of the fossil fuel industry that drives much of the necessity of

[18] With these weekly deliveries, the station is in no danger of suffering the same fate of the doomed Swedish balloonist Salomon Andrée, who as related by Annie Dillard, as he lay dying of starvation on an arctic island, wrote in his diary: "our provisions must soon and richly be supplemented, if we are to have any prospect of being able to hold out for a time."

that research. Without the oil reserves, there would be no road nor the crucial, nearly continuous maintenance that keeps the road open, and without the road, PRS could not exist as it does today.

A look at PRS's science.

While the road undoubtedly played an important role in the establishment and growth of PRS, the primary concern was finding a lake that fit the needs of an ongoing research project; it was fortuitous that such a lake was easily accessible from the newly built road, and together the lake and the road have guided the science. In the beginning, the questions being asked were more about establishing a baseline understanding of the environment as researchers learned about the lake and the terrestrial ecosystem around it (e.g., what species are present and why). Over time the questions continued to become more complex (e.g., where do the grayling go during winter) and relatively simple experiments were devised and started like adding nutrients (e.g., nitrogen and/or phosphorus) to a small patch of tundra or warming or cooling a patch of tundra (using a greenhouse or shadehouse) to simulate different environmental conditions.[19] Like the camp itself, with time and increased infrastructure (again, greatly eased by the existence of the road), the science expanded.

In a sense, the growth of scientific work at the station mirrors the growth of the station's infrastructure. While researchers were able to study the Arctic ground squirrels or migrating birds, other animals remained elusive. Until the 2000s, there was no helicopter support for the station, so studies on caribou and muskox were essentially impossible since the station could not support aerial surveys. Now, with one to three helicopters available during the summer season, this type of work is possible: helicopters move heavy equipment to sites that once necessitated snowmachine transport during winter; they take researchers to burn sites too distant to reach on

[19] Some of these experiments have now continued for decades and will likely continue for decades to come.

foot to collect data crucial to understanding the increasing threat of wildfires in the Arctic; and they take researchers to snowy mountain ridges to live trap wolverines and fit them with satellite collars.

As the station's infrastructure grows, so too do the scientific possibilities. The station has advanced to a point where it can support labor and material intensive projects like an ambitious lake-warming project that requires helicopters to ferry large propane tanks to and from a nearby—but difficult to access by foot—lake to power a large floating heater and mixer that warms the lake just enough to keep it ice-free a few extra weeks; this massive undertaking is an important effort to understand how Arctic lakes will be effected by warming global temperatures. There are, of course, less dramatic examples, and one of the most crucial advantages of the station's expanding infrastructure could almost be overlooked: the processing and analysis of samples. Where early on, samples collected over the summer had to be taken back to a lab at a researcher's home institution for analysis over the winter, now most analyses can be done onsite; this makes for a much nimbler form of science where protocols can be adjusted immediately rather than seasonally. Similarly, as the facilities advanced, more "fringe work" has become possible. Where PRS was once focused almost solely on biology, now the station can support geophysical work as well. PRS had simple beginnings with the 16-foot trailer, but now it has cutting-edge research facilities with dozens of active research projects at any given time. Chapter Six will look at the scientific work taking place in much greater detail.

Life at PRS

While PRS exists because of the scientific work being done there, the station would not be the premier locale for science that it is, if not for the station offering something outside the science too. The station staff, scientists, and researchers living at the station put in long hours and typically work six days a week (sometimes working hours akin to split shifts). Not only are they working these long hours, but they are often doing so under great pressure. For scientists and researchers, among others concerns, there are time and budget constraints, and for many, the added difficulties of graduate work (e.g., research/writing for theses and dissertations, with all that entails). For the relatively small staff, they are attending to that entire group of (sometimes stressed) scientists: making sure everyone has returned from fieldwork on time, preparing hot meals and bottomless coffee, cleaning common areas, making repairs, loading and unloading trucks, and doing everything else that is required to keep the station running smoothly. And everyone—staff member and researcher alike—is missing family and friends; during my summer at the station, I heard from or about several researchers who were feeling very cut off to the point of tears. Spending months, or even weeks like this, is not sustainable, but PRS fortunately (and not by coincidence) works hard to make life outside of work pleasant; this work, in fact, is the subject of chapter of Chapter Seven but it needs also be mentioned here as it is an important aspect of the station's setting.

A place for people.

PRS is a premier station not just because of its laboratories and equipment but also because of the life it actively supports that is not directly—or at least not as obviously—related to scientific output. For a scientist, a workday at PRS might start with a two-minute walk to breakfast at the dining hall, followed by another ten-minute walk along the boardwalks to a plot for data collection (i.e., fieldwork) in the morning, punctuated by an hour break for lunch (not infrequently cut short or skipped all together), and then data analysis (in the laboratory) in the afternoon. Most scientists worked until shortly before dinner and often went straight to the dining hall from their labs; some would return to their labs (or even back into the field) after a short meal and work for a few more hours. These meals are the first and immediate hint of something unusual: all meals are provided—free, or rather included as a part of their user days—

for the station's residents. Meals are in the dining hall with set times: breakfast from 7:30 to 8:30, lunch between 12:00 and 13:00, and dinner starting at 18:00 and running until 19:00; often individuals from the same lab eat together since they are usually on similar schedules. It may not be completely unheard of for workers to take all their meals together outside total institutions, but there are few places where working and everyday life are completely intertwined as they are in remote locations.

The lack of separation between work and non-work life is felt the most at the conclusion of the workday. There is no drive home, no going out to meet non-work friends, and for most, no spending time with family or significant others; this is, of course, because the station is a full day's drive from the nearest city and the majority of life at the station takes place within the confines of the pad.[20] PRS and its inhabitants—particularly the staff and researchers who return each year—have worked to make PRS inviting not just for its scientific potential but also for the opportunities it offers outside of work. Those in charge have outfitted the station with a wood burning sauna, a small gym, a tv room with a ping pong table, loaner bicycles (as well as a small structure for repairing those and personal bicycles), games for both indoor (e.g., puzzles, playing cards, board games, etc.) and outdoor (e.g., cornhole, tetherball, etc.) entertainment, sports equipment (soccer balls, frisbees, etc.), a woodshop and tool trailer, and multiple areas for gatherings. There are also showers and laundry facilities, although both have necessarily strict restrictions on usage. It does not take being at the station very long to realize that despite the station existing for the sake of scientific research, the living and community areas occupy more of the pad's limited space than the laboratories and the station's residents make good use of the spaces and equipment they are provided.

---

[20] The pad is approximately 15 acres but that includes the helicopter pad, storage and maintenance areas, generators and fuel tanks, and several ponds. The area of the pad that the station's inhabitants use outside of work is closer to 8 acres.

My arrival at PRS was early in the season, although late enough that the summer staff and as many as a dozen other researchers had arrived before our truck. As I arrived at the station before UCLA's spring semester had officially ended, I spent most of my first few days working on a final for a class. This allowed me to settle in a bit slower than I might have otherwise, and during breaks from my paper, I walked around the station and the boardwalks to begin familiarizing myself with the place. The following section is a description of the station using my fieldnotes from those early walks, coupled with the hindsight of having spent the summer at the station. I later filled in blanks in my understanding as well as added some general impressions. Many of the places and events mentioned below will be referenced again in later chapters.

A walk around the station.

PRS exudes a sense of business-like purpose nearly from the moment one turns from the main gravel road onto the station's access road; about a mile down the road, shortly before it splits into two, an astute observer might notice a narrow boardwalk—a narrow, raised walkway of wood—leading uphill from the side of the road to an old experimental plot. At the split in the road, a right turn leads toward the lake's outlet, a primitive boat launch, and several smaller ponds before ending at a small turn-around. This is also the road leading to the original site of Polar Research Camp before its move in the 1980s. The left turn, leading to the station, shows more use and is marked with a large sign alerting visitors that they have arrived at PRS, but that they are only allowed in by prior arrangement. Two additional signs continue with warnings of "low flying aircraft," and in several languages, "no services, no fuel, no visitors. No one guards the entrance to turn unexpected visitors around, but over the season I was at the station, only a few ignored the sign, and they left quickly after talking to the station manager.

If one continues beyond the signage, they will quickly reach the helipad—a flat gravel area with a pair of small structures housing equipment, and during working hours, the flight coordinator; at the height of the season, two to three helicopters might be waiting to ferry researchers to and from remote plots, perhaps to track wolverines or examine burn scars, or those helicopters might be busy transporting heavy equipment to distant sites. The large, imposing shape of Cold Storage—a soft sided structure for housing equipment and materials that can

Figure 21 Helicopter moving materials near Cold Storage.

survive long-term sub-zero temperatures—is just past the helipad on the opposite side of the road. While building materials are scattered about the station (though always neatly stacked), the bulk of it—weathered lumber, massive spools of cables, stacks of tires, an army of white propane

Figure 22 Cold Storage is surrounded by building materials and other items from past or for future use.

tanks of varying ages, tarped equipment, and numerous other mysterious items for future use, or more occasionally from past use—resides around Cold Storage, sharing the area with four large shipping containers used for further enclosed storage. Just beyond this storage area, the ground drops away to a pond on one side of the road while the station's generators reside on the other side. Although they are surprisingly quiet, their hum is an ever-present, if often forgotten, sound at PRS.

Nearly everything directly south of the pond is dedicated to housing. Most of the housing consists of WeatherPorts (arching, soft-sided buildings of varying sizes), but they are slowly being replaced by the larger, hard-sided buildings referred to as ATCOs. In both the WeatherPorts and the ATCOs, the rooms are mostly shared. Some of the larger WeatherPorts have as many as five beds per room while many of the rooms in the ATCOs are set up for two people with each person having a small bed and roughly-built wardrobe but sharing a simple desk in the center of the room. Priority for the ATCOs typically goes to those staying the longest (the same individuals often have the room to themselves except at the height of the season). Staff members—who arrive before the summer field season begins and stays until after it has ended—

Figure 23 WeatherPorts and ATCOs house the stations residents. A newly constructed tower with two toilets is visible to the right of the white ATCO.

nearly always have individual rooms but may also need to share a room at the height of the season. Even in summer, the temperatures frequently drop below freezing, and wall heaters keep the rooms warm (the heaters are only for use while rooms are occupied). The ATCOs have locks on the doors, but residents are not given keys to the locks, so the doors can only be locked from within.

PRS only has two flush toilets, both located at the entrance to the dining hall, so the station otherwise shares the four sets of “towers” located throughout the camp (two sets of which are in the housing area). The towers are elevated, outhouse style facilities accessed by stairs; each tower has two or three separate stalls. The oldest towers have simple hook and eye locks on both the inside and outside of the doors (the outside locks are necessary to keep the wind from slamming the doors open and closed), but the newer towers have locking door handles. The walls of the older towers are not insulated, and although the interiors are painted, the 2×4 framing is visible. The toilets themselves are simply walled, plywood benches with holes cut in them topped by a normal toilet seat and lid combination. A vertical chute deposits waste into a series of large, cylindrical metal vats below. Due to the expense of hauling wastewater, all toilet paper is thrown (“poo side down please,” a sign asks) into a trash container and later incinerated. A slot above or beside the toilet has reading material if someone desires (copies of the *PRS Post* from last year and back issues of *Nature* and *Science* magazines). Every stall has a copy of Title IX Policies hanging from the door, and a few have creative safety signs (e.g., a cartoon showing someone being decapitated because they did not follow the safety rules around the helicopters). The older stalls have some creative ink graffiti decorations as well including the Tussock Tongue Twister:

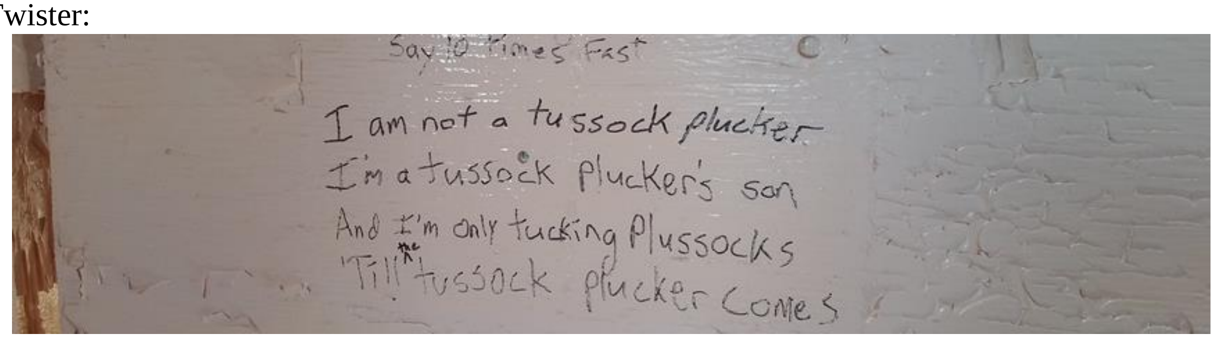

Figure 24 The tussock tongue twister.

Or—in much smaller writing—a gentle warning in childish poetics:

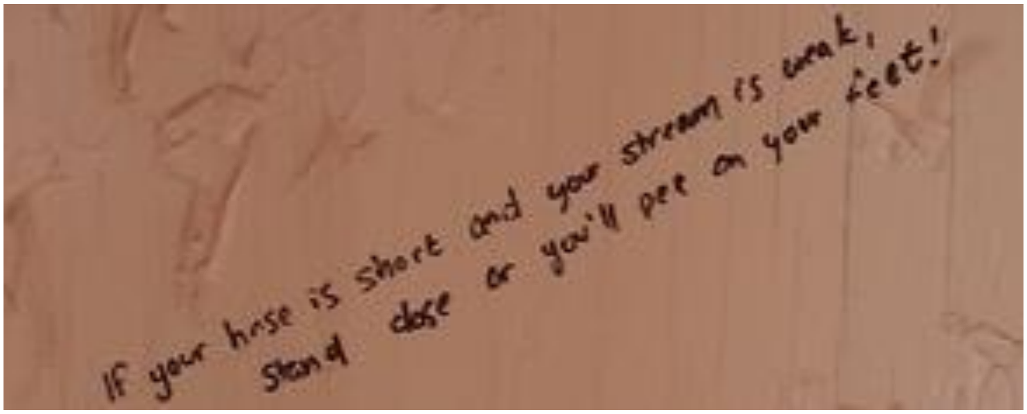

Figure 25 Tower graffiti.

West of the housing is largely a community area: station parking (primarily used by the science trucks when they are not moving people back and forth between the station and the logistics trailer); a large WeatherPort that does double-duty as both shipping/receiving and a woodshop; the main office, dining hall, and kitchen which all share what is probably the largest building in the camp; a medium-sized WeatherPort used for meetings and get togethers; the community center, complete with a big-screen television and a large collection of movies; and even a small building known as the Health Club, a surprisingly well-equipped gym.

The large building that houses the main office, dining area, and kitchen is the first stop for new residents (where they are required to check in and do an orientation for their first arrival

Figure 26 The dining hall and the office are the first stop when entering the station. Fog frequently blankets the station. The dining hall also has lots of parking for station and personal bicycles out front.

of the season); frequently, it is also the source of tantalizing smells around dinner time as Pat and the kitchen staff work their magic. The door to the offices is, as far as I could tell, always open. To the right of the office door, Polaroid photos (taken at orientation) of everyone in camp on a given day are tacked up a large board (individuals who work together are grouped together and the groups are tagged with their lab number or project). I was one of only a few individuals during the season with a solitary photograph (and the only one who spent more than a few days at the station). My photograph was tagged as "Ethnographer." This board was invaluable for remembering someone's name, what lab someone worked in, or to put a face to a name that someone had mentioned.

The dining area is made up of two large rooms, a main area used throughout the season and another room for overflow. Although the table configurations shifted a bit throughout the season, the main room was usually set up with four tables pushed together to make a long table seating about 16 people while three more single tables along the windows seated four to six each

Figure 27 The dining hall.

(I always tried to get a seat at the long table facing the huge windows that looked out toward the lake, rolling tundra, and the snowcapped mountains in the distance). More than half of the room is dedicated to buffet carts (two of which are filled at mealtimes and a third that is always stocked with an abundance of ingredients for salads), a wall of glass faced refrigerators housing leftovers, a single upright freezer for goodies like homemade ice cream, and several shelves filled with just about every snack imaginable (e.g., candy bars, nuts, chips, homemade cookies, etc.). The overflow dining area, with a single door just to the right of the photo board, seated about 40 more and had three long tables set up (two tables pushed together to make each) and a single table pushed against another wall; this room was usually vacant unless the population was large enough to necessitate its use at mealtime.[21] Finally, there are several plastic picnic tables on the balcony that could seat 30 or more (although they did not see a lot of use during the times of highest population because peak human and peak mosquito seasons roughly correspond). At the peak of the season, it can occasionally be difficult to find a seat, but usually enough people are in the field at mealtime that it is seldom a problem, even when the station's population is higher than the capacity of the dining area. Each of the two dining rooms has a large wall-mounted rack for hanging mugs, and every individual who visits the station is given a mug to use throughout their stay to cut down on dishes and waste. At orientation we were given a few minutes to make tags for our mugs; I marked mine only with my name as I was unaware that the tag was only so could recognize our own mugs. Those more familiar with life at the station had mugs marked in more amusing ways such as "Goat Goblet," "This Person is Good at Trivia," and my favorite, "Muggy McMugface" (a much-appreciated reference to the ship that should have been—Boaty McBoatface).

Just a few steps from the dining hall is another building—or more accurately a conglomerate of small buildings and a WeatherPort with interior connections—central to life at

[21] This second room was also used for staff meetings and for events like Trivia Night.

PRS: the community center. Every Tuesday, a good portion of the station's population gathers in the community center after dinner to listen to a researcher talk about her and/or his work and take questions; other nights the same room might be used to watch (and/or heckle) *The Bachelorette*, sing karaoke, or have a holiday celebration. The WeatherPort part of the community center, with its ping pong table, couches, big screen television, and impressive array of DVDs and VHS movies, is often used late into the evening.

Several other buildings—spread across the central area—make up the rest of the community area: a WeatherPort housing PRS's many community-use bicycles; a trailer filled with tools and miscellaneous hardware; another hard-sided building housing the station's washing machines and dryers (one load to each resident every two weeks), showers (four minutes per week per resident), and sinks; and the Health Club, a well-equipped gym complete with a stationary bicycle, elliptical trainer, treadmill, rowing machine, weights, and other equipment for working out. Finally, the second largest WeatherPort is used as the station workshop as well as a shipping/receiving office. This building does not see a great deal of use outside work needs (station staff making stairs or building obstacles for the race or researchers cutting stakes to mark plots, for example) until mid to late July when dozens of people start working on their Christmas in July presents (for more on Christmas in July, see Chapter Seven).

Finally, the last area of the station is primarily dedicated to the station's scientific work, comprised mostly of a dozen or so laboratories. Most of the labs are hard-sided buildings, primarily double-wide trailers, but several are still housed in WeatherPorts. Most of the labs have shared table space as well as a few individual offices. While lavish considering PRS's remote location, space remains tight, so they are well-organized but also jam-packed. Occasionally (e.g., during a pluck) as many as a dozen people will work around a single table with so little extra space that for one of them to leave the table, several others would have to get up and let them through. Back outside, one of the four towers (of the older style) is also centrally located among the labs. Finally, as much of the science is done on the lake, the boat dock is accessed by a path starting from the lab area. Several canoes, a rowboat, and several types of small craft with outboard motors fulfill most of the researchers' needs; the motorized boats primarily see use from the groups working on the lake while the canoes are more often used for crossing the lake to access plots on the far side of the tundra.

While most of the areas key to the station's shared social life are in the central part of camp, two spots crucial to PRS's social life are found amongst the labs: the "Social Circle" and the sauna. The Social Circle is on the far north edge of camp, just steps away from one of the labs. Most of the time, the Social Circle just looks like an open place at the edge of camp where

Figure 28 The Social Circle early Sunday morning shortly after the departure of the last celebrants.

old pallets and scrap lumber is burned as waste, but on Saturday nights (and occasionally for other celebrations), the Social Circle becomes a place for revelry as the pallets and scrap wood are burned in a bonfire as music plays from cell phones connected to a portable speaker, researchers and staff talk and play games together, and most of the camp enjoys beer, wine, and other libations together. Just to the west of the Social Circle, about halfway down the hill to the lake, is the sauna. The sauna is open five days a week (closed Tuesdays or Thursdays) with separate men's and women's hours followed by mixed hours late in the evening. With only four minutes of shower time per week, many of PRS's residents use the sauna not just to relax sore muscles but also to help stay clean. Just a few steps down from the sauna, there is a small dock for jumping into the lake and even a narrow sliding board. Although the lake is frigid—even partially covered with ice early in the summer season—it is typical to see people swimming in the lake before or after basking in the heat of the sauna.

Figure 29 The sauna in mid-June with the frozen lake in the background.

Finally, although it went almost completely unused during my time at the station, it is worth mentioning that the north side of the camp is also host to "Tent City." Just south of the sauna, Tent City, offers a home to introverts and people who just want a bit of private space. By using their own tents, the people who stay in Tent City guarantee themselves privacy that might be lacking in shared WeatherPorts and ATCOs. I was told, however, that Tent City is more conducive to people who have storage space available in their lab areas and so do not need to keep their clothing and other equipment in the tents with them, and furthermore, that Tent City can get a bit awkward when tents get placed too close to one another or too far to the north (hence too close to the sauna, which is clothing optional).

An invisible setting.

While a casual observer can see much of what we consider setting, setting is not just—like infrastructure itself—about what we can see and touch but also about how a space is structured in ways that are not apparent to an outsider or even to an insider who has not considered why something is the way it is; in other words, part of setting is how a space is interpreted by the people, particularly those who interact meaningfully with the setting. In fact, this interpretation is an important part in distinguishing space from place, or as Tuan describes it: "what begins as undifferentiated space becomes place as we get to know it better and endow it with value" (2014, p. 6). As Chapter Seven will discuss, the social infrastructure of PRS is extremely important to life at the station, and most of those who spend an appreciable amount of time at the station recognize some sensibilities of setting—of place—that are not apparent: first, are the rough divisions of the camp between personal, public, and work spaces that do a great deal for structuring interactions in a relatively confined area; second, is the sense of shared purpose; and continuing from this, third, is a general sense of responsibility to, trust in, and dependence on one another. While there are undoubtedly many others (whether perceived or not), these are sensibilities the I recognized in both formal and informal talks with the station's inhabitants and within myself.

As alluded to earlier, the camp is, roughly speaking, divided along the Goffman's basic social arrangements: one area for work, one for play (or more accurately here, sociality, or perhaps shared experience), and one for sleep (or personal space). This is, of course, an oversimplification as the use of any given area blurs the boundaries at institutional, community, and individual levels; still, it is worth considering when thinking about the setting. As has been pointed out, what is infrastructure to some is a barrier to others; similarly, an area that is primarily about recreation for one person is work for another and vice versa: a researcher is—

generally—not working in the dining hall, but for the cook and the kitchen staff, the building housing the dining hall and kitchen is the center of work life, in much the same way that the researchers mostly know the north side of camp as a work environment.[22] While no one I spoke with discussed PRS as a "total institution" (I am not even sure anyone else was familiar with the concept), many of Goffman's divisions and the concept of the total institution fit PRS well and helped explicate sociality at the station in that they suggested what to expect of interactions (or suggested how one might behave) in various locations throughout the station.

As mentioned earlier, there is a sense of purpose around PRS from the time one encounters the sign at the entrance that suggests visitors are only welcome with prior arrangements, but this is only the surface level of a feeling that deepens as one spends time at PRS. River, who works in the kitchen, mentions at one point that there is a good sense of community because "everyone contributes." Everyone at the station is working long hours, often doing strenuous work involving both the body and the mind. The scientists support the station with their work, and the station's work supports the scientists in a mutually beneficial and necessary arrangement between the existence of science and station. The PRS crowd is active, and life outside of work is not typically spent in one's room but rather in shared areas; group hikes are a common occurrence on Sundays or in the evenings during the work week, and it is not unusual to see people out jogging or biking in pairs or groups. What is clear, is that life outside of work is shared too. This creates a sense of familiarity, community, and as River pointed out, contribution. At a bonfire, a researcher named Jules mentioned she was getting good at identifying people from far off by their hats, their clothing, and their walks; in reply, River,

[22] While researchers undoubtedly use the dining hall for work (whether for talking shop or using tables between meals as a warm place to enter data onto a laptop), it is not the primary location of their work, but it is the primary location for meals, for camp gatherings for trivia, for playing card and board games when the bonfire is rained out, and so forth. On the other hand, for the chef or other kitchen staff, the north side of camp is more familiar as a location for Saturday night bonfires or for basking in the sauna rather than for their work.

who spends a good deal of time in the kitchen washing dishes, agrees with Jules's statement, adding that he is good at identifying people from their mid-halves and their boots. As residents return their dishes after meals to a window separating the kitchen from the dining area, River cannot see faces without ducking over but has a view of the lower halves of anyone approaching the window or entering the dining area. At this, Cody, who does maintenance and heavy equipment work, points out that he recognizes vehicles (and hence the occupants who typically use the same vehicles) by the sound of their engines as they enter and exit the station.

There also seems to be a great deal of trust around camp. As mentioned, most doors are left unlocked or even open. Although I never tried to enter a lab after hours, it is my understanding that they, like most of the camp, remain unlocked throughout the night. Showers are limited to two, two-minute-long sessions each week and a single load of laundry is allowed every other week because of the extraordinary cost of disposing of grey water (which must be transported more than 150 miles for eventual disposal); the showers and washing machines are open 24/7, however, and their use is on the honor system. The dining hall and main offices are also open 24/7 and anyone in the station can help themselves to food and drink at any time (although the kitchen itself is off-limits, despite its doors remaining open). The office too is left open at night, and if necessary, the station manager and/or EMT can be contacted at any time day or night using a radio in the office. Although it is only speculation, I suspect that this sense of community, contribution, and trust also creates, if not a sense of ownership, then at least a sense of protectiveness. A minivan, for example, driving down the gravel road was immediately identified as a vehicle that did not belong at the station. It turned right toward the north end of the lake, but there was a sense of suspicion as someone pointed out that "there are signs that say no camping." Indeed, any unfamiliar vehicle was greeted with some suspicion until it left or until it was clear that the occupants were not intruders.

Thus, three things are working in combination here: (1) there is an unusual lack of separation between the different spheres of social life; (2) there is a sense of purpose not just to the visible infrastructure but also a more affective sense of purpose among the people residing at the station; and (3) trust is an intangible, yet crucial, element that guides the setting (and no doubt relates to the importance of recognizing others—both insiders and outsiders—in unusual ways). These three, and other, invisible elements of setting are part of how we think of a location as a place rather than just a space, but what is place? Michael R. Curry suggests that "people construct a world made up of places . . . by establishing and maintaining sets of activities and practices" (Curry, 1998, p. 48). In other words, place is about doing things in a certain manner and recognizing that things are done in a certain way; it is a shared sensibility. Perhaps because of the communal nature of ICE environments, this idea of place—and of placemaking—seems especially important in remote settings. The practices and concepts around the idea of place arises in each subsequent chapter; therefore, to understand how integral it is to PRS's setting, a discussion on space versus place is necessary. The remainder of this chapter will focus on this discussion and how it relates to PRS.

Discussion: From a Space to a Place, Interpreting PRS

The concepts of space and place are necessary to talk about ICE environments as the ICE environment necessitates both space and place. For there to be isolation, there must be space, and where there is this type of confinement, there will be place. Space, to visiting researchers, is the seemingly endless forests, the towering mountain ranges, and the vast tundra separating the station from their homes. Place is found at the experimental plots, the station itself, and the boardwalks connecting the two, but place is as much experience and practice as it is any sort of physical infrastructure. More than it is about the structures, place is about the parts of setting that are not immediately obvious. Yi-Fu Tuan, one of the eminent minds on space and lace, writes:

> Abstract knowledge *about* a place can be acquired in short order if one is diligent. The visual quality of an environment is quickly tallied if one has the artist's eye. But the "feel" of a place takes longer to acquire. It is made up of experiences, mostly fleeting and undramatic, repeated day after day and over the span of years. It is a unique blend of sights, sounds, and smells, a unique harmony of natural and artificial rhythms such as times of sunrise and sunset, of work and play. The feel of a place is registered in one's muscles and bones…. In time we become more familiar with a place, which means that we can take more and more of it for granted (2014, pp. 183-184).

In a sense, space is about the physical areas we pass through, but place exists because we make interpretations about spaces. As the interpretations and the experiences of PRS as a place are central to this research, this discussion will explore the concepts of space and place more deeply, then look at the concept of placemaking—how it is done both passively and actively—and finally why this matters to later chapters of this dissertation.

Space and Place

What is space? What is place? Why do space and place matter?

Space and place.

In the way Curry, Tuan, and other scholars of human geography conceptualize them, space and place only exist in relation to each other. Tuan, for example, has written that "place is security, space is freedom" (Tuan, 2014, p. 3). This relatively simple juxtaposition says a great deal about Tuan's thoughts on space and place. For Tuan, space is a liminal area that implies movement, and in turn, there is the potential for place when movement ceases. Tuan elaborates that "space is experienced directly as having room in which to move…. place is a special kind of object. It is a concretion of value, though not a valued thing that can be handled or carried about easily; it is an object in which one can dwell" (Tuan, 2014, p. 12). While less whimsical in style than Tuan, Curry shares that same idea that place is a "concretion of value." Curry writes that "to say something is a place is not to say that it has some natural boundaries, ones that somehow existed long before people were there, but rather that it is a location that has been given shape and form by people" (Curry, 1996, p. 96). For Curry, space becomes place by "engaging in everyday routines and habits [that] inevitably transform a bare world into a world of places. The making of places is a fundamental way in which we externalize our actions" (Curry, 1996, p. 3). In short, place for Curry, is "simply what we do *here*" (Curry, 1998, p. 139). Place is a shared set of externalized routines, habits, and actions taken together to put meaning to a space. Hidden within the ordered whimsy of Tuan's most simple explanations of space and place—"place is an organized world of meaning" (Tuan, 2014, p. 179)—is an agreement with Curry's more concrete and accessible understanding of space and place. For both, space is liminal and full of potential, and place is space that has been acted on and transformed.

Why space and place matter.

Space and place are ubiquitous, so why do they matter? The answer is that they do not matter, at least not in and of themselves. What matters is that the ideas of space and place help elucidate what does and does not matter in specific locations. As *The SAGE Handbook of Geographical Knowledge* points out: "the question of space and place in geographical knowledge is ultimately not just about whether the question of 'where' matters in the way that 'when' does in explaining 'how' and even 'why' something happens. It is also about how it matters." (Agnew & Livingstone, 2011, p. 316). Space and place help us understand the "how" of a location. In this case, understanding space and place helps us to understand the "how" of PRS. Much of this dissertation work is part of the story of how PRS became a place and how it continually renews itself as a place where scientists and support workers return year after year in the interests of scientific knowledge production. This placemaking reverberates not just throughout these chapters but also through the lives of the researchers, some of whom first visited as undergraduates and are now principal investigators of their own research projects based out of the station.

Understanding space and place help us better understand PRS as a setting for this research and helps us recognize the transformative work—both conscious and unconscious—being done at PRS to make it a place for science as well as a setting. Tuan writes that "a child's idea of place becomes more specific and geographical as he grows" (Tuan, 2014, p. 30). And while in this case he is referring specifically to how children grow to better understand place, it also works with how researchers come to understand an unfamiliar place. As we spend more time in a place, we begin to understand it more deeply and can refer to it more precisely. In the shared, collective experience of an ICE environment—where isolation and confinement are the norms—recognizing the intricacies of place and placemaking is invaluable.

Placemaking

How does space become place? What is placemaking? Why does placemaking matter?

How space becomes place.

The way space becomes place has been alluded to while discussing what space and place are, but the ongoing nature of the transformation suggests it is important enough to discuss in detail. Place does not just exist. It is something that happens through conscious and unconscious work by stakeholders. Curry writes that "to say something is a place is not to say that it has some natural boundaries, ones that somehow existed long before people were there, but rather that it is a location that has been given shape and form by people" (Curry, 1996, p. 96), but he also recognizes that this does not have to be a conscious act of creation, because "just by engaging in everyday routines and habits we inevitably transform a bare world into a world of places" (Curry, 1996, p. 3). In a similar manner, Tuan writes that "space is transformed into place as it acquires definition and meaning" (Tuan, 2014, p. 136). It has already been mentioned that Tuan sees space as movement, but this suggests that Tuan is interested in not just physical movement but also in transformative movement through experience.

In our lives, we move through space without concrete definitions. During my summer at PRS, when we would hike the valleys around the station, we were thinking less about the individual areas than we were focusing on moving through them. When we would pause, however, perhaps to pick blueberries like we did on our way back to the truck after hiking a fog-enshrouded ridge, we began to see more of the individual characteristics of the hillside we were on: not just the delicious "bloobs" as they were frequently called, but also the rocks and dirt, the mosses and lichens, the flowers and shrubs, a single feather and a chunk of fur, and a pile of bear scat. As we experienced the area more deeply, our minds began to put definition and categorizations on the space (the becoming-place?) where we had stopped. While we—for a short time—experienced that spot as place, it does not seem to continue to be place. It was place while we were stopped but became space again once we left. What this points to is that for place to exist, it must be shared. Tuan writes:

> we may say that deeply-loved places are not necessarily visible, either to ourselves or to others. Places can be made visible by a number of means: rivalry or conflict with other places, visual prominence, and the evocative power of art, architecture, ceremonials and rites. Human places become vividly real through dramatization. Identity of place is achieved by dramatizing the aspirations, needs, and functional rhythms of personal and group life (Tuan, 2014, p. 178).

This speaks deeply to placemaking as not just something that happens (although it does just happen), but something that we also actively do, and are sometimes pushed towards.

Placemaking at PRS.

While placemaking is inevitable as people settle in a place, Curry suggests five ways primary methods of placemaking: through naming, typologies, symbols, stories, and doing things

(Curry, 1996, p. 97). These following subsections touch on examples of each, but focus on how placemaking is done through naming, stories, and doing things, as these are most relevant to PRS.

Naming.

Curry points out that one of the first thing settlers do when they arrive somewhere is to name it (Curry, 1996, p. 97). This simple act is a critical part of place in that it gives a point or reference for sharing information: “PRS” is the name of the station, indicting the station itself and some part of its surroundings (although the boundaries of what constitute PRS vary among individuals); “the pad” is the name of the gravel area on which the station is built; “the Boardwalk” specifically refers to the main boardwalk—and its offshoots—that winds away from the pad; the various greenhouses are numbered and referred to by that number (e.g., “Greenhouse 1” or Greenhouse 4); most station structures are named (e.g., “Willow,” “Cold Lab,” “Lab N,” “Lab T,” “Turtle Hut,” etc.) as are some key areas (e.g., “The Social Circle”); and the mountain nearest the station is known as Bear Mountain to the station’s inhabitants. Naming is critical to how things are done here because they expediate the sharing and understanding of information. When someone says, “we’ll meet after lunch near the Turtle Hut,” they convey information in an efficient and specific way that other station insiders understand easily.

On the other hand, there is something interesting going on here in that there is “undifferentiated” space in between areas. This ties into Tuan’s understanding that “space is movement.” These are areas in which we move through to get to places. To hike to the summit of Bear Mountain, the most common route starts on the Boardwalk, using it to get as deep into the tundra as possible; once a hiker steps off the boardwalk, however, there is no trail until high on the summit ridge. This area did not seem to have a name, it was just the tundra between the Boardwalk and the mysterious point where Bear Mountain becomes Bear Mountain. These types of liminal spots then are the spaces—the movements—between places. A possible complication

Figure 30 Bear Mountain (top right), a popular hike accessible directly from the station, involves crossing open tundra after the boardwalk ends at the greenhouses.

to this is the use of GPS to find specific spots in the otherwise unremarkable tundra. These locations, found only with the use of GPS, might be as small as a single core of tundra only a few inches in diameter (that one could easily miss while staring directly at it) to a square site 100 meters to a side but only marked with a single, short stake at each corner. These are transitional areas that seem to shift between space and place (where coordinates are—temporarily—analogous to names). It seems though, that the nature of these transitional areas is part of what makes them useful for science: they remain space for all but a few moments each year. This idea of space being useful for science may relate directly to how the importance of polar science is about its relations to pristine environmental conditions and being pristine seems to be related to low densities of place.

Finally, the idea of naming is also important to placemaking in that it differentiates insiders from outsiders. Knowing the names used at a place—what people are referring to and how to refer to them oneself—is critical to being a part of a community. In his discussion on naming, Curry refers to Denali (briefly known as Mount McKinley in its long history) as an example of how a name embeds a place within "narratives and practices" (Curry, 1996, p. 97), but while Denali is known far and wide, the name Bear Mountain is known only to few and does not seem to appear on any maps. To return to another example, to refer to the "Turtle Hut" is meaningless to someone new in camp as they have yet to learn the names. Here again the ideas of space and place tie into infrastructure. In much the same way that infrastructure—particularly social and technical infrastructure—is learned on membership, so too are place names, particularly local place names learned by membership in a community, and like scientific names and standardized practices, these place names become a key component of communication among the station's inhabitants.

Typologies.

Curry writes that "a second way in which people create places also uses language; we create places by applying typologies…. We make places by coming to see what is new to us as a case of what is familiar" (Curry, 1996, p. 97). In a sense, this is what was happening in the earliest years of PRS when scientists were trying to get baseline readings; they were looking at the area around the station in such a way as to create something familiar from which they could expand. This type of work remains ongoing for many projects too, particularly for ones that are seeking baseline data for comparison with other sites around the world, and these sites are often the ones that require GPS coordinates to locate. Finally, while not precisely the same thing, at a more personal level of placemaking, this is what is happening as individuals try to make an unfamiliar space (or even place) into something more familiar; in this sense, placemaking through typologies relates directly to the ideas of normalization and homebuilding which are the topics of Chapter Seven's discussion.

While the terminology of "typology" perhaps does not fit, the idea of seeing something new as something familiar was a recurring theme in talks with PRS residents. In the earlier discussion on the invisible aspects of settings, there are several examples of this form of individualized and personal placemaking: Jules identifying people from a distance by their dress or mannerisms, River doing the same from a pair of boots, and Cody recognizing the sound of different vehicles.

Symbols.

Curry writes that "a third way of making a place is by making—or picking out—a symbol" where a "part stands for the whole" (Curry, 1996, p. 97). This seems to be more relevant based on scale—Curry, for examples uses Yosemite as being a symbol of the West and the American Flag being a symbol of the United States—and is therefore perhaps of lesser importance to a smaller place like an Arctic research station, yet it does warrant discussion. At PRS, the bonfire might be seen as a symbol of rest and relaxation around those familiar with station life; while the concept of the bonfire might be meaningless to those not familiar with the Saturday evening ritual that *signifies* the end of yet another work week. At this local level, we again see the idea that placemaking is related to the idea of the insider, but there is something larger at work also but also more abstract.[23] Tuan writes that "an object becomes a symbol when its own nature is so clear and so profoundly exposed that while being itself it gives knowledge of something greater beyond" (Tuan, 2014, p. 114). In this sense, PRS, and many other stations like Amundsen-Scott or McMurdo, become symbols of science, in much the same way that Antarctica itself symbolizes international science. This idea of a place symbolizing something

[23] This is perhaps the way of symbols. The larger the thing symbolized, the more abstract it is. For PRS, the bonfire (as a thing outside the symbol) is a very meaningful occurrence in weekly life, but a flag is an abstract way to symbolize something. Even Yosemite, while an important piece of the western landscape, is but a small piece of that landscape and the western landscape itself is but a small piece of the U.S. West.

greater will be discussed in the next chapter while looking at the concept of the "truth spot."

Stories.

Placemaking is also accomplished through the telling of stories. In my case, except for learning the station's name, this was the earliest type of placemaking I experienced with PRS. As mentioned in the narrative early in this chapter, I began to hear stories about the station and its people at the planning meeting months before I made my journey. I was regaled with funny stories of past events and people, of nearby hikes, and advice—often given alongside a funny anecdote—for what I should bring (e.g., the importance of a Bugshirt along with a story about a group of researchers eating their lunches from within their Bugshirts as thousands of mosquitoes swarmed around them). These stories gave me a powerful sense of not just what to expect from station life but also what to expect from the people at the station, and it also heightened my excitement to be at the station, experiencing this life with these people.

Tuan writes about how humans can experience place in other people; he uses examples like how humans talk about *dwelling in the heart* of another or of someone else as being *home* (Tuan, 2014, p. 139). It does not require this kind of direct language to evoke these feelings. It was common during a bonfire for someone to tell a funny or interesting story about something someone else had done or to talk about where someone was and how their presence was missed at the fire that night. And sometimes when the hour was late and only a few remained huddled near the dying fire, usually warmed with too much wine or whiskey, we could speak candidly about the reasons we found ourselves in a remote place in the Arctic or talk with more intimacy about how someone's friendship had improved our lives. Telling these stories helped solidify not just PRS as a place but also solidified those of us sharing the stories as a community. And looking back now, when I think of PRS, the station is often a backdrop for the people I met and the friends I made at the station. From talking with these people over the intervening years, this seems common. As will be covered in Chapter Seven, these types of informal placemaking rituals are not only encouraged, but at some level, are designed as the social events set the stage for stories to be told about the station.

The sort of stories told among friends at lunch during a planning meeting or around a Saturday night bonfire are an informal type of placemaking, but there are also more formal efforts at placemaking through storytelling. The most obvious of these is probably the station's website, particularly when discussing history. These types of stories tend to weave a narrative free from any problematics—even of the most minor sort (e.g., bartering work from nearby crews in exchange for hot meals and showers, which is not mentioned on the website). These types of stories are not untrue, they just omit certain ambiguities for the sake of clarity. Another type of formal storytelling coming from the station is about the scientific work. The experimental plots, as one example, have complex stories told through hypotheses, measurements, data collection and analysis, the back and forth between colleagues, and through the publications detailing the work. And for the work published in journals, to others who can decipher the work, these articles tell fascinating stories about what has been, what is, and what might come.[24]

Doing things.

"Finally," writes Curry, "we make places by doing things. Some of these practices or habits are, in fact, highly ritualized" (Curry, 1996, p. 97). For a place that with a consistent population, this is probably the most prevalent form of placemaking—almost a place*keeping*—in that people are continually doing things that accomplish this work (often) without a thought towards this goal. While there are hints of each type of placemaking scattered throughout these chapters, this form of placemaking is evident throughout this dissertation (examples appearing

[24] And, this very dissertation is another story, mixing the formal and the informal, and trying to tell another research story through hundreds of smaller stories.

later in this work including Everest sweeping the lab each morning before he started work, the Stump and/or Cornhole games that took place weekly during the bonfire, the bonfire itself, and so forth).

In ICE environments, this form of placemaking is the most intertwined with infrastructure. While infrastructure is the topic of the next chapter, there are several things that must be said here about its relationship to placemaking. First, is that infrastructure facilitates the doing of things in ICE environments. If something is to be done, it must be done with what is available at the station, or if something external is required, a considerable wait is involved. For example, if a certain instrument is required for analyzing a sample, if that instrument is not available at the station, it must either be delivered to the station (which can take a week or more as it travels through multiple stops) or the analysis must wait until the researcher is in a location with the instrument (typically meaning the researcher has returned to her home institution after the conclusion of the summer field season). The same is true for non-work situations. If, for example, a staff member wants to start an exercise group, the exercise group must work with the equipment that is either already present or can be built with available materials (until other equipment can be acquired).

Secondly, this type of placemaking is central to Goffman's total institutions. While the total institution will be discussed as a special case of infrastructure in the next chapter, here it should be pointed out that total institutions tend to create, or at least cultivate, ritualized behavior, and the concept of the ritualized doing of things is particularly interesting to Curry's concept of placemaking. Again, the bonfires are a prime example of something that is highly ritualized, happening every Saturday around the same time, yet ritualized behavior does not have to be social to be a form of placemaking like Everest's previously mentioned sweeping; this was a man used to roughing it, to living out of his truck for months at a time, so it was not because he was a "neat freak" but because the sweeping of the lab was an important part of the science to him. It was a ritual to start the scientific work he did each day, whatever the work was. Doing things—and the ritualization of the doing of things—can be an individual form of placemaking, and this form of placemaking is just as important as placemaking at a station-wide level. An individual who creates a place for themselves at the station naturally creates a place for others.

Why placemaking—and the place made—matter.

While built environments—material infrastructures—are neither necessary nor sufficient for the creation of place, they are often associated with place in that we usually first visualize what a place looks like rather than the deeper ideas associated with it. The intangible social and technical infrastructures, however, play pivotal roles in both Tuan and Curry's conceptions of place. Placemaking is, in fact, an iterative process of social and technical infrastructure at work: social in that much of placemaking is shared within a community and technical in that the standards of that community factor deeply into place and the work of placemaking. As the communities participating in placemaking are fluid, so too is placemaking. It is a continuous process that does not stop, even if a place ceases to grow or shifts in boundaries: people continue to come up with new names, typologies, and symbols (sometimes discarding or forgetting older ones); the telling and meaning of older stories shift and new ones are told; and the way things are done slowly evolve. Thus, by exploring placemaking, we have another entry point into unseen infrastructural elements that tell their own stories about a place.

For the purposes of this research, the creation of place and the actions of placemaking have an important side effect: they create a relationship between people and place. To expand on a passage quoted earlier in this section, Curry writes:

> one of the central ways in which people construct a world made up

> of places—home, the workplace, the nation—is by establishing and maintaining sets of activities and practices. As with social groups, the relationships between people and the places in which they live are often strong and enduring (Curry, 1998, p. 48).

Tuan shares this belief; he writes that "place can acquire deep meaning for the adult through the steady accretion of sentiment over the years" (Tuan, 2014, p. 33). The suggestion here is that placemaking creates a place that people care about and a place to which they want to return. For PRS and other remote locations, this supports both the station's scientific work and those working on and for the science: scientists and support staff want to return for work and for what life offers outside of that work. This connection between person and place is especially important in an ICE environment where those working cannot separate themselves from the workplace.

There is also a special type of intimacy with place in an ICE environment. Tuan states that both home and hometown are intimate places (Tuan, 2014, p. 144). For those living at PRS over a summer, the station becomes both home and hometown—simultaneously a place of work, socialization, and rest. The way in which Tuan discusses home—as an intimate space offering shelter—and hometown point to an interesting feature of ICE environments: those within the ICE environments become dependent on the "place" (e.g., PRS) as shelter from the surrounding "space" (e.g., the tundra). In ICE environments like PRS, all the experience of place tends to blur together without movement between to differentiate. In this way, place in ICE environments is deeply connected to Goffman's idea of the total institution and the lack of differentiation between aspects of life that tend to be separate outside of total institutional settings. While Goffman does not explain these separations, Tuan would likely suggest they relate to the space—to the movement—between places.

For Tuan, the intimacy of place, and what that means to individuals experiencing place, matters deeply. He writes that "intimate experiences, whether of people or of things, are difficult to make public" (Tuan, 2014, p. 147) and that "intimate experiences are difficult but not impossible to express. They may be personal and deeply felt, but they are not necessarily solipsistic or eccentric. Hearth, shelter, home or home base are intimate places to human beings everywhere" (Tuan, 2014, p. 147). For Tuan, it seems intimate experience is much of what makes place, yet as he makes clear, intimate experience is difficult to make public. This may be part of what makes PRS[25] such a powerful place in the minds of the residents. In addition to what becoming the all-encompassing space in the lives of its residents during their stays, much of the experience at the station is shared. While it may be difficult or impossible to make intimate experience public, the sharing of that experience creates something similar, and much of life at research stations in ICE environments is shared. The sense of intimacy with place is likely enhanced by the increased vulnerability one feels in ICE environments where the only shelter available is the shelter offered by a camp.

For better or for worse, the relationship between person and place develops naturally. Tuan notes that "intimate experiences lie buried in our innermost being so that not only do we lack the words to give them form but often we are not even aware of them" (Tuan, 2014, p. 136). While Curry notes how people engage in placemaking, he also recognizes that placemaking happens without the placemakers necessarily being aware of their actions. In other words, much of the placemaking experience, at least at a personal level is, to use Tuan's words, "buried in our innermost being," yet not all placemaking is unconscious or unintended; placemaking can be intentionally pursued as well. Tuan writes that "the effort to evoke a sense of place and of the past is often deliberate and conscious" (Tuan, 2014, p. 198). Elsewhere, he illustrates this using the example of a college campus:

[25] PRS and likely other stations within ICE environments, provided they have the same sort of placemaking, or supporting social infrastructure detailed in chapter 7.

> Trees are planted on campus to give it more shade and to make it look greener, more pleasant. They are part of a deliberate design to create place. Having only a few leaves, the trees do not yet make much of an aesthetic impact. Already, however, they can provide a stage for warm human encounters; each sapling is a potential space for intimacy, but its use cannot be predicted since this depends on chance and on the play of imagination (Tuan, 2014, pp. 141-142).

Thus, spaces can be designed for the creation of place, yet at the same time, the success of that design cannot be guaranteed. At a research station located in an ICE environment, there is necessarily a design for creating place, although the success and complexity of this design can vary dramatically; furthermore, the success of this design also depends on the inhabitants' own conscious and unconscious placemaking work.

At PRS, the "deliberate and conscious" efforts of those in charge of the station have largely been successful. The station is well-funded with well-equipped labs, warm and comfortable housing, delicious meals, ample research opportunities, and a strong sense of community. As will be discussed further in Chapter Six, the station has also provided the necessary materials and support to deal with the constraints of a remote station that primarily operates seasonally (e.g., providing GIS mapping support so that a research assistant can turn over a project to someone in a following year that they might never meet or speak with). Furthermore, as will be discussed in more detail in Chapter Seven, the station has done a great deal to support life at the station outside of the work itself. They have provided a home in which to live (that also takes the role of a hometown) through both material infrastructure (e.g., the gym, the Social Circle, the sauna, and also the more practical aspects like shower and laundry facilities) and social infrastructure (e.g., Tuesday Talks, holiday celebrations, bonfires, obstacle course, etc.). Perhaps of even greater importance, over the years the station's inhabitants have built on these foundations to in appreciable ways: sometimes this is as simple as the staff member who took it on herself to print several copies of the *New York Times* Crossword Puzzle each day for residents to be able to do at breakfast; while other times it is as momentous to the station as the Trivia Nights started nearly a decade before my visit by someone who just wanted to be more involved in the station's community; and, often, it is a small act like sharing a beer with someone newly arrived to the station at their first bonfire.

This Place at This Time: PRS's Setting and Placemaking in an ICE Environment

Although PRS is allied with numerous academic institutions, governmental organizations, and non-profits from across the globe, its place as a field station sets it apart from many of the more traditional research environments upon which studies have looked at knowledge production. To reach the station takes a full day of travel traversing deep forests, snowy peaks, and vast tundra along a single access road that allows the existence of the station. In many ways, its ICE setting makes the station more akin to total institutions (e.g., care facilities, monasteries, and cruise ships) than to more traditional academic institutions or research laboratories. Many of the researchers will spend their entire field season—sometimes lasting for months—without leaving the station because of the difficulties involved in getting to the station, but just because the station is far from the conveniences we frequently take for granted in cities, does not mean that the inhabitants of the station are roughing it in the wilds.

Over the years, PRS has expanded from a single trailer to a premiere research station with more than a dozen labs, miles of boardwalk for accessing nearby experimental plots, station trucks for venturing further afield (via the road, of course), and the ability to house and feed 150 people at a time. This is, of course, imperative in an ICE environment; the station must be able to meet the needs of its researchers. While there are exceptions, for most researchers it would not be feasible to spend anywhere near the same amount of time at the station if they were responsible for something even as basic as providing their own food.[26] The station provides the necessities for life so that the researchers can do the science for which they travel so far from their home institutions. As should be clear by now, there is more to PRS than just infrastructure directly related to science. Those in charge of PRS have created a place for science, but place is not exclusive to science; science is part of PRS's identity as a place, but there is much more to it.

The early camp that would later become PRS was undoubtedly more focused on science than is the station of today. Early on the camp's structures were largely for laboratory use, and eventually, for food preparation. Now, while the station has much more laboratory space, it also has areas that are not directly devoted to science. Probably the most notable of these is the community center; while the largest room in the community center is used for weekly scientific presentations and discussions (in addition to watch parties and such), the smaller TV room is unlikely to play host to anything more related to science than a viewing of John Carpenter's *The Thing* (set at an Antarctic station) or a *Jurassic Park* marathon (perhaps with a ping pong game going on at the back of the room). Probably the best example, however, is the Health Club (known colloquially as the HC). While it does not serve science directly, it serves science indirectly in that the station's staff and scientists have an improved quality of life over what they would have without it and other non-science-related facilities.

These (and others mentioned earlier in this chapter and in later chapters) are institutional attempts at placemaking, and as has been noted, the success of these might be predicted but cannot be guaranteed. At PRS, however, they have been implemented successfully and have become an important part of PRS as a place. Movie nights and watch parties are a nightly

---

26 My gear for the summer season weighed around 100 pounds, not including the snacks and beer I bought as we left the logistics trailer for the station. A scientist visiting the station would likely have been bringing specialized equipment for their work, whereas my tools were limited to sturdy boots and clothing, a laptop, a small camera, backup drives, and a small lockbox for my work. Had I needed to bring my own food, cooking utensils, and such, I would have needed to carry three to four times my 100-pound load.

occurrence in the community center and the HC is host to daily workouts before breakfast and evening stretching groups. The Social Circle, the gathering place for Saturday bonfires, points to the fact that the intentional creation of place by an institution is more than just about providing physical infrastructure: the bonfire is an example of how institutions can attempt—successfully in this case—to guide personal time as well as work time. While this might seem problematic in more typical environments, in an ICE environment, this type of optional event is welcome. The bonfire has become a beloved weekly tradition and most of the researchers and staff make at least short appearances with many spending hours of their Saturday evening around the fire; similar events include the holiday celebrations, obstacle course races, trivia nights, Tuesday Talks, and others that will be discussed in greater detail in Chapter Seven. Perhaps one of the best examples is the food the station provides. Simply put, it is delicious. The station's residents greatly appreciate the food the kitchen staff prepares each day, and it contributes to the desire people have to go back (e.g., during the first planning meeting I attended, numerous people gushed about the quality of the food and warned me about the "PRS pounds").

Of course, it must be stressed how important individuals are to the placemaking. Institutional support only goes so far in placemaking, individuals must do the rest. In a sense, the placemaking a stakeholding institution participates in is only building a foundation on which the inhabitants of the station will build on or mold as needed. The Health Club was built (perhaps at the urging of the station's residents), but without the individuals running the morning workouts and evening stretching clubs, it would not be the same HC that station inhabitants know. Likely the intentional placemaking work in which the station engages is as often built on the work of the inhabitants as vice versa. Trivia Night, while now a traditional event, started with an individual who just felt like he was not contributing enough to station life. This suggests something important: many of the station's inhabitants see PRS as more than a place where they worked for a summer. They genuinely care for the station, the experiments, and the land surrounding the station. Tuan notes that "while it takes time to form an attachment to place, the quality and intensity of experience matters more than simple duration" (Tuan, 2014, p. 198). An ICE environment enhances the intensity of experience, and placemaking improves the quality of that experience.

There is a certain care ethics that seemed more common at PRS than at other places of work that I have experienced in that people seemed more concerned about those who might take their places in future field seasons: for example, as related in Chapter Six, a researcher spending extra time mapping an experimental plot—even bringing in an extra set of eyes in an effort to make sure her notes are comprehensible—to help a researcher who might replace her the following year succeed. Or, also discussed in Chapter Six, another set of researchers took great care placing Geoblock in a way that those who would work continue their work the following year could reach specific areas for phenology while also doing as little damage to the tundra as possible. While there are undoubtedly individuals who did not share the same level of concern as most seemed to, I cannot think of a single example among station staff or researchers where anyone showed a lack of concern for those who might continue their work in future seasons.

This is all to say that placemaking at PRS has been particularly successful. The institutional efforts as well as the conscious and unconscious work by the station's inhabitants over the years have helped a place where scientists, researchers, and supporting staff want to work year after year; in a very real sense, their handprints are all over the station as each season and each year they help build and rebuild the station as a place—a place that matters deeply to the people who have worked at the station over the years. This sentiment will echo throughout the remaining chapters in this dissertation. Place and the acts of placemaking, therefore, are critically important aspects of knowledge production in ICE environments. The place itself—PRS—is a material infrastructure supporting science, while placemaking is inextricably linked to social and technical infrastructure, topics which will be explored more in the next chapter. As infrastructures do, these directly and indirectly support not just PRS's scientists and staff but also the scientific work coming out of the station.

Throughout this research we will repeatedly return to both PRS's setting and ideas related to placemaking.

CHAPTER FIVE

PRS AND ICE INFRASTRUCTURE: VISIBILITY AND VIGILANCE

Chapter Four detailed PRS's setting, both in terms of the station's physical setting and of the station as the setting for research; Chapter Four also explored the usefulness of space and place for understanding how setting relates to infrastructure and scientific work. The station itself is, of course, necessary infrastructure for scientific work in an ICE environment, but as briefly discussed in the last chapter, place is also an infrastructure. In the case of PRS, place—place, according to Curry, being the way things are done somewhere—supports scientific knowledge production. The idea of infrastructure then goes much deeper than just the tangible structures, facilities, and lines through which things function. In an ICE environment, where work and non-work life are blurred, the infrastructures that support science include non-work life at the station. In ICE environments, particularly at a research station like PRS, the way people interact with infrastructure is particularly interesting and much more present than it is more conventional environments.

Thus, this chapter advances the focus from setting to a deeper discussion of infrastructure. It beings with a brief discussion of the basic conception of infrastructure as the tangible, built environment needed for operating things before moving onto the more complex view of infrastructure conceptualized in STS and Infrastructure Studies. Next, building on the STS conceptualization, this chapter explores what can be thought of as special cases of infrastructure including the *truth-spots* and the *total institution*. Once this background work on infrastructure is complete, the discussion spotlights PRS's infrastructure—including the importance of the special cases mentioned above to this research—and looks at concrete examples from my fieldwork. This chapter builds off the previous chapter on setting, and it is in this section where the relationship between setting and infrastructure will become clearer as we see how PRS's infrastructure, particularly material infrastructure, is a reaction to the setting.

Finally, the discussion section of this chapter fully brings together the ideas of setting and infrastructure with the station's inhabitants through a discussion of the concepts I am calling Infrastructural Hypervisibility and Infrastructural Hypervigilance—embodiments of the ties among material and social infrastructure in ICE environments and the individuals and groups who call these remote settings home. After briefly introducing these two concepts, the discussion will continue with a narrative focusing on two different meetings that took place at PRS only a few hours apart—one for the station's staff and another open to all the station's inhabitants—that illustrate infrastructural hypervisibility and infrastructural hypervigilance and help them be conceptualized more deeply through examples.

Conceptions of Infrastructure

A layman's conceptualization of infrastructure is often limited to the tangible: the roads we use on our way to work or to visit with friends or to travel to work, the railcars and cargo ships that enable the efficient transportation of goods, the power and water lines that supply our homes and businesses, and the satellites that allow global positioning and wireless communication in even the most remote areas, along with countless other artefacts. We can, of course, take this a step further and recognize the bridges that allow roads and rails to cross rivers, the distant power stations and reservoirs that supply power and water lines, and the rockets without which satellites would remain earthbound and useless. These are undoubtedly crucial parts of the infrastructure that both enable and constrain modern life, but continuing this line of thinking leads quickly begins to point to intangible elements of infrastructure that are no less important: the extensive planning underlying the construction of roads that maximize the flow of traffic (although, to be fair, it sometimes seems like road construction lacks all semblance of reason), the carefully monitored and regulated shipping lanes and flight paths, the standards and regulations that keep water and power safe for our uses, and the algorithms that allow GPS units and satellite phones to function. Although intangible, they are no less important.

The Commonsense Notion of Infrastructure

Martha Lampland and Susan Leigh Star call seeing infrastructure as “something that other things ‘run on,’ things that are substrate to events and movements: railroads, highways, plumbing, and more recently, the information superhighway” as the “commonsense notion” (Lampland & Star, 2009, p. 17). This commonsense notion is also what Geoffrey C. Bowker and his co-authors are thinking of when they write: “the term ‘infrastructure’ evokes vast sets of collective equipment necessary to human activities, such as buildings, roads, bridges, rail tracks, channels, ports, and communications networks” (Bowker et al, 2010, p. 97). These things—these tangible things—are some of the first artefacts that come to mind when infrastructure comes up, particularly in discussions outside of the academic fields of STS and Infrastructure Studies. In government infrastructure bills, for example, the discussion often focuses on the tangibles within the bills (e.g., road maintenance or contentious military equipment), even though the bills usually go beyond just *things*. Likewise, when there are news reports on failing infrastructure, it seems to nearly always be—at least at the surface level—about the crumbling of *things*—the tangible substrates—like roads, bridges, dams, buildings, and so forth, but the material infrastructure we can touch cannot function effectively without deeper invisible webs of infrastructure that those things run on. These are, among countless others, the plans, the regulations, and algorithms mentioned before. So then, what is—and what is not—infrastructure, or as Star and Karen Ruhleder aptly suggest, “when is an infrastructure?” (Star & Ruhleder, 1996, p. 112). This is a central question in STS and Infrastructure Studies.

Rethinking Infrastructure: STS and Infrastructure Studies

The tangible components of infrastructure are crucial to knowledge creation and sharing—sometimes literally the foundations of schools, universities, libraries, laboratories, and museums—but infrastructure goes further than just tangible, built environment; as Bowker and his co-authors put it, "beyond bricks, mortar, pipes, or wires, infrastructure also encompasses more abstract entities, such as protocols (human and computer), standards, and memory" (Bowker et al, 2010, p. 97). While even some of the leaders in the field of infrastructure studies have stated that

> many aspects of infrastructure are singularly unexciting. They appear as lists of numbers and technical specifications, or as hidden mechanisms subtending those processes more familiar to social scientists. It takes some digging to unearth the dramas inherent in system design creating, to restore narrative to what appears to be dead lists (Bowker, Timmermans, Clarke, & Balka, 2015, p. 474).

Nevertheless, they have put out a "call to study boring things" (Bowker et al, 2015, p. 474). For more than two decades now, academics have been answering that call to study "boring things," "unearth the dramas," and "restore narrative," and much of the relevant work has been quite enlightening and changed our understanding of some of the processes underlying knowledge creation.

Beyond (just) the built: when is an infrastructure?

So then, what— or when—is an infrastructure? While infrastructure is "what things run on," it is also more than just physical components; infrastructure also encompasses classifications, standards, and practices, and more; infrastructure is material, technical, and social in nature. Infrastructure is now recognized as "a fundamentally relational concept" (Star & Ruhleder, 1996, p. 113), and even to an individual, what is infrastructure can change at different times. This idea that infrastructure is not the same to everyone is why the question "when is an infrastructure" is more apt than "what is an infrastructure?" Thus, with the "caveat" of infrastructure being relational, Star and Ruhleder suggest we can know when an infrastructure is by looking for a configuration of: (1) embeddedness, (2) transparency, (3) reach or scope, (4) learned as part of membership, (5) links with conventions of practice, (6) embodiment of standards, (7) built on an installed base, (8) becomes visible on breakdown (Star & Ruhleder, 1996, p. 113).

To expand on these dimensions:[27]

- Embeddedness: infrastructure is a part of something else—it is embedded within something else—in the sense that it is something on which other things are built. In a sense it is a foundation, but it does not need to be the base level; in fact, infrastructure will operate at many different levels in different ways.
- Transparency: infrastructure does not need to be reinvented each time in the support of a task.
- Reach or scope: infrastructure is neither single use nor will it be used only at a single site, rather is far-reaching. As Star and Ruhleder state, "an infrastructure occurs when tension between local and global is resolved. That is, an infrastructure occurs when local practices are afforded by a larger-scale technology" (Star & Ruhleder, 1996, p. 114).
- Learned as part of membership: for infrastructure to be relational—in the sense that what is infrastructure for some is a barrier to others—then there must be a way that one becomes an insider.
- Links with conventions of practice: infrastructure is iterative in nature—it both affects and is affected by the things it stands in relation to.
- Embodiment of standards: while perhaps not always the case, infrastructure operates

[27] Summarized, and in some cases expanded on, from Star & Ruhleder, 1996.

more efficiently if it is modular in the sense that it can be modified as necessary—with relative ease—and be used elsewhere. This relates directly to the need for infrastructure to be transparent.

- Built on an installed base: infrastructure typically grows alongside or out of something pre-existing and because of this, it will often share the same affordances and constraints under which the original thing operated. For example, looking back at the last chapter, the fiber optic line that now powers so much high speed communication at PRS exists because it was dug alongside the hundreds of miles of pre-existing road, without which its existence would be nearly impossible (this example is particularly fitting as Star and Ruhleder use the example of "optical fibers run[ning] along old railroad lines" (1996, p. 113) in their own discussion). Infrastructure being built on an installed base is why, in many cases, we can keep tracing infrastructure backwards (e.g., the way shipping relies on trucks that run on roads requiring planning and materials that, in turn, rely on infrastructure of their own). This suggests the necessity of relationality to infrastructure (even a temporal relationality), otherwise everything would be infrastructure.
- Becomes visible on breakdown: infrastructure is usually invisible—or functioning in the background—until it breaks. Once the infrastructure is no longer doing its job, it becomes noticeable until fixed when it recedes again to the background.

For many purposes, these dimensions might seem overly complex, and we can simply fall back on the idea that something is an infrastructure when it is a substate—tangible or not—on which other things run, and in most cases, we will be able to identify an infrastructure. As Star and Ruhleder put it, "most of us, in speaking loosely of infrastructure, mean those tools which are fairly transparent for most people we know about, wide in both temporal and spatial scope, embedded in familiar structures—like power grids, water, the Internet, airlines. That loose talk is perfectly adequate for most everyday usage, but is dangerous when applied to the design of powerful infrastructural tools on a wide scale" (Star & Ruhleder, 1996, pp. 113-114). Star and Ruhleder's framework, along with Bowker's concept of the "infrastructure inversion"—were infrastructure is foregrounded through close analysis of "technologies and arrangements that, by design and by habit, tend to fade into the woodwork" and by "recognizing the depths of interdependence on technical networks and standards, on the one hand, and the real work of politics and knowledge production on the other" (Bowker & Star, 1999, p. 34)—allow us to explore—and to understand—infrastructure at a deeper level with more rigor.

In their *Handbook of New Media*, Leah Lievrouw and Sonia Livingstone discuss media infrastructure as having three components that stand out: "the artefacts or devices used to communicate or convey information; the activities and practices in which people engage to communicate or share information; and the social arrangements or organizational forms that develop around those devices and practices" (Lievrouw & Livingstone, 2012, p. 2). While primarily focused on ICTs, Lievrouw and Livingstone point out that this framework works for "all technologies" (2012, p. 2). Like Bowker and Star, Lievrouw and Livingstone recognize the "depth of interdependence" among these components writing that they "also rejected definitions of new media based solely on particular technical features, channels or content. Instead, deliberately incorporating both technologies and social, political, and economic factors, we defined them as 'information and communication technologies and their associated social contexts' (p. 23, this volume)" (Lievrouw & Livingstone, 2012, p.2). The important thing to note here is the continued recognition of the interdependences of material infrastructure (or artefacts), technical infrastructure (or practices), and social infrastructure (or arrangements).

Special Cases of Infrastructure

The need to see beyond commonsense or traditional conceptualizations of infrastructure is particularly important in environments where infrastructure functions in untraditional ways, and in ICE environments, infrastructure does function in untraditional ways. Here we will look at two concepts—the total institution and the truth-spot—that are not usually discussed alongside infrastructure; however, in ICE environments, these concepts are deeply implicated in infrastructure.

The total institution.

Goffman suggests that a “basic social arrangement … is that the individual tends to sleep, play, and work in different places, with different co-participants, under different authorities, and without an over-all rational plan” (Goffman, 1961, pp. 5-6); however, in polar research stations—and even more so in field camps—“there are no truly private spaces, and … one’s personal affairs outside of work are to be regulated just as are one’s work duties” (N. Johnson, 2005, p. 104). Polar research stations are necessarily confined as they are too remote for people to easily move between, and the material infrastructure necessary to support life and science is difficult to maintain and prohibitively expensive. As such, in polar research stations and other ICE environments, individuals *do* sleep, play, and work in the same places, with the same co-participants, under the same authorities, and with an over-all rational plan. Although Goffman did not specifically address polar research stations, he called other institutions that operated outside the normal social conventions “total institutions.”

Goffman offered a basic definition of the total institution “as a place of residence and work where a large number of like-situated individuals, cut off from the wider society for an appreciable period of time, together lead an enclosed, formally administered round of life”

(Goffman, 1961, p. xiiv). For Goffman, total institutions can be categorized into five groupings, with the first three groupings—including orphanages, nursing homes, mental hospitals, and prisons—being fundamentally different from the fourth and fifth in terms of the agency of the inhabitants (Goffman, 1961, pp. 4-5). Within the fourth (which includes military barracks, ships, boarding schools, and colonial compounds) and the fifth groupings (which focuses on institutions for spiritual pursuits), there is much greater agency for the participants as they are, more or less, willing participants.

Not all the "common characteristics" of total institutions are present in each case nor are the characteristics exclusive to total institutions, the relevance instead comes in the intensity of the characteristic attributes they possess (Goffman, 1961, p. 5). This is indeed the case, and even the most isolated polar research station is likely to exhibit important distinctions from the more standard total institutions, which are unlikely to be in found in remote settings.[28] Likely one of the most important differences between most groupings of total institutions and a polar research station is the hierarchal workings. When compared with other total institutions, the institutional control exerted on polar research stations is, to use William's observations on cruise ships, "not nearly as blatant and brutal" (Williams, 2003, p. 77), yet the institutional control at polar research stations and camps is (nearly) absolute. In Antarctica, for example, the National Science Foundation has a great deal of control over U.S. scientist's access to the continent and nearly complete control over entrance to field stations like McMurdo or Amundsen-Scott.

Local power dynamics and role differentiation in polar field stations can also be quite unusual when compared with other total institutions. Within the stations, scientists often have

[28] It is worth noting that for Goffman, isolation and/or remoteness do not seem to factor into his groupings. In many ways, a ship and a military base may be similar enough to group together, but to the relevant participants dealing with much different levels of isolation, confinement, and extremity—a storm at sea versus a storm on land are very different at an affective level—the experience is vastly dissimilar.

more freedom than the support personnel who may operate under much stricter rules laid out by their employers (often contracting agencies like Lockheed Martin or Raytheon); on the other hand, those same scientists might be much more anchored to the station due to research requirements. Similarly, in Antarctica, support personnel during a winter-over are there voluntarily; in fact, contrary to popular television tropes that seem to portray the inhabitants of remote stations as outcasts and oddballs, the process of gaining employment in Antarctica is incredibly competitive and a single position may have hundreds of extremely well-qualified (or over-qualified) applicants. While this is not usually the case, some researchers may be at a research station only semi-willingly (meaning they would rather be elsewhere but their research—or perhaps an advisor or mentor—necessitates their presence), but the staff always choose to work in such a place. Thus, role differentiation appears to function differently than it does between the staff and inmates in Goffman's discussions on total institutions.

Another crucial difference follows directly from this: while there is typically a separation between those in control of the total institution and those interned within it, polar research stations mostly lack this separation. With a few notable exceptions, all of Goffman's examples allow those who control the total institution to maintain the standard separation among work, play, and sleep; in polar research stations, however, all local actors are in the same blurred environment. This may follow from the differences in the very structure of the institutions: whereas material infrastructure is the defining feature of many total institutions (such as prisons), in polar stations, it is physical distance and extremity that largely necessitates the social structure of the station.

The truth-spot.

If, at the most basic, infrastructure is "something that other things run on," then a truth spot might be considered a special type of infrastructure. In "Three Truth Spots," Thomas F.

Gieryn explains that a truth spot is somewhere where “the place of provenance itself enables the transit of some claims from merely local knowledge to truth believed by many all around” (Gieryn, 2002, p. 113). Gieryn explains that “the passage from place-saturated contingent claims to place-less transcendent truths is achieved through the geographic, architectural and rhetorical construction of a ‘truth-spot’ (i.e., the place of provenance)” (Gieryn, 2002, p. 113). In short, Gieryn is suggesting that the provenance of an idea can influence its credibility, and this certainly seems to be true; thus, truth-spots are places from which a claim originates that gives the claim—for whatever reason—more credibility. Polar science—and particularly science done in Antarctica, where the entire continent is, ostensibly, dedicated to cooperative international science—seems to be seen as particularly prestigious and important. While not universal, it seems that the public seems more enamored with polar science (again, particularly Antarctic science), and the NSF cultivates this image.

There is something telling about this idea of the “natural laboratory.” The concept of the laboratory suggests science being done under controlled conditions. While humans have impacted the entire planet (especially through industrialization), there are few places that have been influenced less by humanity than the polar regions where conditions have not allowed for large populations. While places like Amundsen-Scott South Pole Station or Summit Station now have year-round populations, those populations are small and focused on the science, but the stations are surrounded by space. These liminal, not-places seem to be the truth-spot rather than the stations. Tuan writes that “space is a common symbol of freedom in the Western world. Space lies open; it suggests the future and invites action” (Tuan, 2014, p. 54). In other words, space is possibility. If we think about science, the liminal spaces of the tundra and/or ice shelves, and the truth-spot, then space is the possibility of, and the invitation for, more experiments and more experiences. Thus, there seem to be ties among the ideas of the truth-spot, the natural laboratories, and the infrastructure of ICE environments. And perhaps this is an iterative relationship between the truth-spot and ICE infrastructures: maybe the reason that so many research stations and so much research can come out of ICE environments is because their settings are thought of—often unknowingly—as truth-spots and with this prestige comes the funding necessary to provide the infrastructure that allows for the science.

To further connect the concept of the truth-spot to the concept of space, place, and placemaking—and thus, infrastructure—consider Tuan's discussion of how space and place relate to experience in *Space and Place*. Quoted in Chapter Two, Heisenberg and Bohr spoke of how the association between Hamlet and Kronborg castle change their understanding of the place. Like Kronborg, polar environments have specific mythologies that are hard to argue. When the NSF describes Antarctica as a "natural laboratory," they do so because it is, in comparison to the rest of the planet, largely untouched. Thus, the purity of the polar regions seems to lend credibility—purity—to the experience of knowledge production taking place in those regions. Furthermore, when people visit Antarctica and the Arctic, as researchers, wage-earners, artists, travelers, or tourists, the regions' histories, realities, and mythologies (i.e., of sparse or non-existent human habitation, of heroic triumphs of exploration as well as bleak failures, of cutting-edge science, and of frigid exoticness and inaccessibility to the masses) are inseparable from the experience.

Both the concept of the total institution and the truth-spot, with a focus on PRS's infrastructure, will be revisited later in this chapter.

Infrastructure and ICE Environments

Material infrastructure, the stuff that other stuff runs on, must be specialized according to the constraints under which it functions. A typical home might need specialized work if moved from the city to a rural lot: fresh water previously provided from the city might now need to be pumped from a well, a septic system might replace sewer lines, and electricity may no longer come from the grid but instead from battery banks powered by solar panels. That house might feel significantly colder on a winter day because the insulation values are no longer adequate for a drop in temperature that comes from an increase in elevation as the house has been moved from the foothills deeper into the mountains. A commercial building built in North Dakota is probably not going to have the same level of resistance to earthquake danger as a one in Anchorage. This is all to say that infrastructure is specialized to a location, and while all ICE environments are not the same, by nature the infrastructure required for a station to thrive in an isolated and extreme environment will be more extensive than elsewhere. This section looks at this relationship between infrastructure and ICE environments.

ICE Environments

Palinkas's concept of the ICE environment was discussed in the previous chapter, but as an ICE environment influences infrastructure so deeply, it is worth exploring the idea further in this chapter.

What is an ICE environment?

The "ICE environment" term describes a location subject to three specific "stressors": (I) isolation, meaning inhabitants are cut off from the outside world; (C) confinement, the flip side of isolation, means that while the inhabitants are largely cut off from the rest of the world, they are stuck with one another and often lack privacy and Goffman's basic separation in social arrangements; and (E) extremity, meaning that, despite any improvements in living conditions, the environment itself is a stressor, this can be because of climate, altitude, lack of light/dark cycles, extreme working conditions, and so forth (Palinkas, n.d., pp. 3-4). While the ICE acronym fits Antarctic research stations particularly well, these stressors—isolation, confinement, and extremity—can be found in locations all over the world from polar research stations like PRS that are relatively free of snow during the short summer season to field camps in equatorial jungles. ICE environments also include deep caves requiring multiday descents to reach, and perhaps one of the most famous ICE environments, the International Space Station orbiting approximately 250 miles over our heads (and at least some of Palinkas' work on ICE environments has been funded by the NSF and NASA, clearly suggesting that his work on Antarctic stations has significance to locations off the ice). While outside the scope of Palinkas' work, it is worth noting that the idea of the ICE environment can be transitory: the same 30-foot sailboat competing in the Golden Globe Race (a solo, around the world sailing race) aptly fits the concept of the ICE environment while battling through Cape Horn as opposed to when making repairs off the coast of Cape Town. Thus, ICE environments seem to be partially existing and partially created. They exist because of the isolation that comes with distance from other places and because of the extremity of their settings, but they are created in that the infrastructure that allows them to exist as a social setting is carefully constructed—and necessarily confined—but still unable to mitigate the extremity of the setting.

It should be noted that when Palinkas writes of ICE environments, that he is not speaking of the isolation and confinement of a prison's "solitary confinement" where an individual is left alone in claustrophobic conditions with a minimum of human contact, rather Palinkas's isolation and confinement are rooted in small group sociality. He writes:

> these stations comprise a collection of "microcultures" where adaptation to the isolation, confinement and extreme environmental characteristics that define The Ice may be seen as a process of negotiation between the needs of the individual and the needs of the social group. The cultural systems of Antarctic research stations are both the product of this negotiation and a set of rules that regulate this process" (Palinkas, n.d., p. 1).

This isolation is the isolation of the larger group separated from the rest of world as well as the smaller groups that form within the larger, and the confinement is the individuals within these groups existing solely together in a small location cut off from the rest of the world. Tuan points out that "crowding is an awareness that one is observed" (Tuan, 2014, p. 60) and in ICE environments, one is nearly always under observation. While ICE environments might be geographically remote, they are themselves insular and very little is truly private. This lack of personal space is accentuated because life for a researcher or station support staff in an ICE environment is a lot like being at work all the time; this is because they are at work all the time. A locomotive operator or a flight controller sees infrastructure as an encompassing feature of her work when she is at work, but what if she were always at work? This is the reality for those working in ICE environments where there are no clear delineations between work, social, and personal lives.

Finally, returning to the idea of extremity, ICE environments are not just about the extremity of the setting but also what that means to the setting's inhabitants should infrastructure fail. In extreme cases (e.g., the ISS, the Aquarius undersea laboratory, camps in deep cave complexes, and polar stations), the infrastructure of an ICE environment, can—and often does—mean the difference between life and death; in these situations, the awareness of the both the ICE stressors and the infrastructure is certainly more acute.

PRS: An ICE environment.

While PRS's setting was explored in detail in the last chapter, it is worth briefly noting here what qualifies the station as an ICE environment:

Isolation

- Very remote, extremely low population density area.
- Full day drive to the nearest city.
- Single, potentially dangerous road makes for difficult access (particularly outside of the

summer field season).

- Too far from anything for outside entertainment (with the notable exception of outdoor recreation including hiking, backpacking, canoeing, and so forth).
- Access strictly controlled, thus no outsiders allowed.[29]

Confinement

- Station relatively small with the pad's area only being about eight acres.
- High population density at station during peak season.
- Mostly shared buildings (the population density becomes particularly noticeable when bad weather forces entertainment inside during the height of the season).
- Conversely, limited private space (even living quarters are often shared, sometimes with several others).
- Shared meals in dining hall.
- Boundaries between work/non-work and public/private life blurred for long periods of time.

Extremity

- Unpredictable weather (even during the summer field season temperatures can plummet to below freezing with high winds and heavy snowfall).
- No natural shelter, and in an emergency, almost nothing with which to construct any sort of shelter on the tundra.
- Long term survival in the Arctic requires either specialized knowledge and/or infrastructural elements.
- 24-hours of daylight for almost the entire summer season, followed by long darkness during the winter.

[29] Beyond just not allowing visitors without prior arrangements, the station has specific rules that can also make isolation more evident (e.g., no dogs are allowed at the station, so even the rumor of a nearby dog could spark excitement, and if someone encountered someone with a dog at a field site away from the station, sometimes jealousy).

- Maddening swarms of mosquitoes for much of the summer field season.
- Dangerous geography (cliffs, bogs, rivers and creeks swollen with snowmelt, etc.).
- Dangerous animals including wolves, tundra grizzly bears, wolverines, musk ox, and caribou.

Caveats of PRS as an ICE environment.

Is PRS an ICE Environment? Yes. Is PRS the exemplar of an ICE Environment? No, probably not. Palinkas's work looked at 45 years' worth of data from Antarctic winter-overs (winter-overs lasting a period of about seven months, from mid-February through late-October) where the station was physically isolated from the rest of the world. Much of the work focuses on Amundsend-Scott where, at the time of his writing, the winter population was around 50 inhabitants. Amundsen-Scott and other Antarctic field camps and stations are more isolated, arguably more confined, and more extreme than PRS during the summer field season. A notable exception to confinement in Antarctica is McMurdo Station. McMurdo sits on about 160 acres and can handle more than 1,200 inhabitants; this makes McMurdo about 12 times the size of PRS with eight times the peak population.

Isolation and remoteness are related, and early on in this project, I spoke with some of the PIs who have spent decades worth of summers working at PRS about isolation, and several of them were rather antagonistic to the idea of PRS being isolated, but during my fieldwork, more than one first time PRS researcher spoke about how isolated they felt at the station (this despite having close friendships and enjoying both their work and their social lives at the station). In other words, like infrastructure, the concepts of isolation and remoteness seem relational. For those who remember the station when it still used meteor burst communications for contact with the outside world, PRS no longer seems remote, but for the researchers visiting the station for their first time, many still in undergraduate programs at universities or freshly graduated or starting graduate school, the station seems very isolated. Similarly, it feels less confined now for those who remember the station as only a few buildings and tents than it does for those visiting for their first time.

Finally, unlike the Antarctic, the Arctic has a long history of human use, and continues to this day. Native communities have inhabited the region for at least 13,000 years and continue to live nearby, and they, like the veteran researchers, would likely have something to say about the remoteness—the isolation—of the area. This suggests that there is a frame of reference for what it means to be remote. To some, PRS is far removed from their communities and their everyday life, while to others "remote" would be a place like Los Angeles that is far from the communities they call home.

PRS: Ice Infrastructure

Leaning on Star, Bowker, and others, Paul Wouters has summarized infrastructure as "the taken-for-granted context that enables our life and work. Infrastructures are multilayered and complex…. they operate in the background and become visible only on breakdown" (Wouters, 2014, p. 61). In ICE environments, however, infrastructure seems to push at the limits, and perhaps break, this standard conception of infrastructure. This section first focuses on PRS's material infrastructure before exploring its technical and social infrastructure through the lens of the total institution and concludes with a brief discussion on the landscape of PRS as a type of ICE infrastructure.

PRS: material infrastructure.

In ICE environments, infrastructure is—by design—often exposed in ways we typically do not see in more conventional environments. This is immediately evident on entering the station: after passing the helipad, the first things one encounters on entering the station are piles of building materials on the side of the entrance road; soon after, one drives by the station generator modules and the massive diesel and unleaded fuel tanks that power the generators and science trucks; large pipes snake their way through and around the station, only dropping below ground in a few places where they would otherwise cross roads; even the toilets are raised in the air with the collection tanks below exposed; the well house sits beside the Social Circle, the main

Figure 31 The utilitarian nature of the station is immediately evident on entering PRS.

outside gathering area in the station; throughout the station, the buildings are utilitarian, looking more like the temporary structures around a construction site than finished buildings; even within the rooms, electrical conduit is exposed rather than hidden within the framing; rough plywood walls are not an uncommon sight. And it is not just the visual infrastructure that is noticeable. The science and supply trucks' engines, the outboard motors moving boats swiftly around the lake, the whir of power tools—saws, drills, drivers—as construction and maintenance takes place, and the constant, deep hum of the generators are striking sounds against the largely silent tundra. Although less persistent than the sights and sounds, the acrid smells of diesel and unleaded fuel, the savory odor of food and paper waste burning in the incinerator, and sometimes, the smell of the towers, waft through camp.

PRS: ICE infrastructure and the total institution.

PRS is, of course, not the only setting where material infrastructure is purposefully left exposed; in fact, in blue-collar work environments, this is not at all uncommon. Star, Bowker, and others point to this fact when they suggest that "unless we are electricians or building inspectors, we rarely think about the myriad of databases, standards, and instruction manuals subtending our reading lamps, much less the politics of the electric grid they tap into" and that infrastructure is "never transparent for everyone" (Bowker & Star, 1999, p. 33). In some sense, PRS's researchers and station staff are like the electricians and inspectors in the sense that they are working with this infrastructure, but there is a key difference: what makes PRS, and other ICE environments, different is that lack of separation between the basic social arrangements that Goffman flags as a key characteristic of the total institution. At PRS and other ICE environments—where the boundaries between work, social, and personal life are indistinct—there is a constant awareness of infrastructure. In a very literal sense, the worker remains at work for an indefinite period.

Thus, we return to Goffman's conception of the total institution to helps better understand and explicate the technical (i.e., activities and practices) and social side (i.e., social arrangements and organizational forms) of infrastructure at PRS and other ICE environments. The power dynamics and role differentiation at play in total institutions matter also at PRS. While PRS may be more accessible than the Antarctic stations discussed earlier, entrance to the station remains tightly controlled, as immediately evidenced by the sign at the entrance to the station reading "visitors allowed only by prior arrangement." Arctic stations, broadly speaking, are not quite as sought after as those in Antarctica, however, they are still extremely competitive and the desire for staff positions at PRS far outstrips the need. After speaking with both members of the staff and researchers, PRS seems to be a particularly sought-after research and work location; still, a few people I spoke with throughout the season seemed ready to move on, yet their research (or an advisor) kept them anchored to PRS in a way that staff members were not. Notably, none of the staff members seemed to suggest they would rather be any place else when it came to work. While most of Goffman's examples allowed those in control of the total institutions to maintain the "basic social arrangements" that the "inmates" lacked, in PRS, all local actors navigate the same blurred environment. In some cases, the PIs might have better accommodations (i.e., a single-occupancy room in an ATCO rather than a shared WeatherPort) than a graduate student visiting for the first time, but this is due to reasons mentioned in the last chapter rather than a function of the total institution itself. It seems that in Goffman's conception of the total institution—and particularly in the prisons and asylums on which he focuses—the material infrastructure itself is a defining feature of the total institution; in a place like PRS, however, it is the ICE environment that largely necessitates the social structure of the station.

PRS: Landscape as (ICE) infrastructure.

Professor Shannon Mattern of the University of Pennsylvania has written about landscape as infrastructure and how the built environment, specifically the Roman Forum, operated as a communication infrastructure. While she does not tie her argument to the concept of the truth-spot, it seems to be a related idea. If infrastructure as something things run on, then PRS Lake and its surroundings (or at the macro-level, polar regions in general) can be thought of as an infrastructure supporting science, which relates directly back to the idea of the truth-spot. Recall the last chapter: PRS exists where it does because the setting supports the science and because the same setting supports industry that allowed for the station's construction. In this case, the vastness—and thus purity (and provenance)—of the tundra itself is the primary infrastructure for science (and for everyday life) at PRS. The idea that landscape or setting is infrastructure seems to be even stronger with creative/innovative work (see Chapter Six) that relates to the station's setting, as well as creative/artistic work that leans on the extraordinary nature of polar locations (see Chapter Seven). Similarly, science from a truth-spot seems to garner more attention, suggesting that the truth-spot itself (i.e., provenance)—tied to the landscape—acts as a type of communication infrastructure.

We also see the landscape as infrastructure at a local level. The Social Circle—location of the beloved Saturday evening bonfires—mentioned previously in Chapter Four and later in Chapter Seven, functions too as an infrastructure for communication. For much of the week, the Social Circle is just empty space where staff discard pallets and scrap lumber and through which researchers move to get from one lab to the next, only truly becoming place on Saturday evenings (and occasionally special occasions like the Fourth of July). From shortly before the lighting of the bonfire until an indeterminate time after the last piece of scrap pallet wood is added to the fire and the flames slowly die, the Social Circle becomes the center of camp life as staff, researchers, and management gather around the bonfire to share conversation, games, and drinks; and while the bonfire signals the end of the work week, it is very common to discuss work, make plans for coming week, recruit extra help as necessary, and so forth. Like Mattern's forum, the Social Circle only functions as an infrastructure for communication when it is directly in use by the inhabitants; otherwise, it is simply space. But, as pointed out in the previous chapter, it was put there for the purpose of building sociality in the station and serves science indirectly (see Chapter Seven).

By thinking of landscape as infrastructure—meaning liminal spaces can be infrastructure—Mattern seems to push at the boundaries of the concept of infrastructure, but experience at PRS seems to suggest that liminal areas can indeed be infrastructure, at times, in much the same way the last chapter discussed how space can become place and vice versa. An example of this can be seen in small cores taken from the tundra that would be impossible to find without GPS, but with precise instruments, these small plugs can be found year after year and measured and analyzed. For 364 days a year, the landscape itself as well as the associated GPS coordinates are meaningless, but the one day each year the cores are located and measured, both become scientific infrastructure while at the same time the area of the cores—usually indistinguishable from the rest of the tundra—achieves place-ness for a short time.

Having discussed infrastructure and ICE environments as well as focusing on some details of PRS's infrastructure, it is time to shift the discussion to the relationship that inhabitants have with infrastructure in ICE environments.

Discussion: Infrastructural Hypervisibility and Infrastructural Hypervigilance

In ICE environments, infrastructure seems to function differently than it does in other settings. Most notably, infrastructure in ICE environments does not require a breakdown to be visible; instead, it is visible both by design and by the way inhabitants constantly interact with it. For most people, infrastructure is a background presence that, moment to moment, needs little recognition or critique, but in ICE environments, where infrastructure is often critical to survival, individuals develop different, more attentive, relationships with infrastructure.[30] Infrastructural Hypervisibility and Infrastructural Hypervigilance are terms I use to describe two relationships prevalent at PRS:

[30] While doing a final formatting pass before filing this dissertation, a 2021 paper by John S. Seberger and Geoffrey C. Bowker titled "Humanistic infrastructure studies: hyper-functionality and the experience of the absurd" was brought to my attention. As detailed in this article, Seberger and Bowker have also found that infrastructure can become visible without the need for breakdown but in a different manner from what I suggest in this dissertation; they argue that infrastructures can be rendered visible by being "too functional, thus effecting a state change in [one's] relationship to [the] world" (1717). This paper is well worth a read by anyone interested in infrastructure and would have been addressed in the main text had I known about it earlier.

Infrastructural hypervisibility is the relationship between the presence of infrastructure in an ICE environment and that environment's inhabitants' heightened perception of that infrastructure. Although theorizations of infrastructure typically emphasize its invisibility, in ICE environments, material infrastructure that is ordinarily hidden in common settings is exposed by design. At the same time, because infrastructure in ICE environments is critical to inhabitants' well-being and survival, even infrastructure they do not "see" is often perceived and understood to be there although it may not break down (a typical condition for becoming aware of infrastructure). This makes infrastructure in ICE environments *hypervisible*—ubiquitous and the object of continuous awareness that may require action.

Infrastructural hypervigilance takes this relationship between infrastructure and people's perceptions in ICE environments a step further. Hypervigilance denotes inhabitants' ability to ascribe value or priority to critical elements of infrastructure, and readiness to act or intervene to maintain or repair those elements, when the need arises. It is learned from others as part of socialization in the setting (we might recall the point made by Star and Bowker (1999) that infrastructure is learned through membership in a social setting).

In short, hypervisibility might be thought of as inhabitants' heightened awareness of the presence of infrastructure, while hypervigilance can be considered a more watchful readiness to act to maintain or repair critical infrastructure as needed.

The remainder of this chapter will focus on infrastructural hypervisibility and infrastructural hypervigilance using several narratives that accentuate just how visible infrastructure is in ICE environments and will also refer to details from both this chapter on infrastructure and the previous chapter focused on PRS as a setting.

Narrative: Staff and All-Station Meetings

The following narratives—written using field notes—detail two meetings that took place during the afternoon and evening of a single day: the first, a brief staff meeting taking place after lunch, is so that staff can both be informed about station happenings and also discuss any concerns they might have about its functioning; the second, an after-dinner meeting to which the entirety of the station is invited, is a forum for addressing any concerns that inhabitants might have. Taken together they begin to suggest just how much a part of life infrastructure is in ICE environments and illustrate both infrastructural hypervisibility and infrastructural hypervigilance at work.

> *I've been here for a little over two weeks, and in the last week, I've been in the field with two teams and two other individual researchers; even made a few friends through the bonfires. I've fallen into the rhythm of station life now and eat most of my meals in the dining hall unless I'm out and about (although I often stay up late into the night writing and skip breakfast the next morning. Or at least I do that if I don't have morning plans in the field). While few of the researchers make it to every meal consistently, during mealtimes, the dining hall is one of the best places to find someone you're looking for, so it was usually during breakfasts (when I went), lunches, and dinners when I would get an offer to observe or help in the field or lab.*
>
> *Today was not an exception, but it was a bit different. As I was eating my sandwich (a delicious Croque-Monsieur, if it matters), Aston, one of the station's managers, approached me to let me know that the staff meeting, usually scheduled for Friday, was taking place today at 1:15pm with a hard stop time of 2:00pm. I had intended to introduce myself to the staff the week before, but I had been in the field with a pair of researchers and hadn't made it back in time. I agreed to do the belated introduction, quickly finished my lunch, and hurried back to my room where I spent a few minutes making a few notes to remind me what I needed to say.*

Staff meeting.

A few minutes later I was back in the dining hall's overflow area sitting among a mixture of familiar and new faces. Just before sitting down, I asked one of the managers if I could stay for the entire meeting so I could get an idea of what they were like. He said it "wasn't an issue," but it might be a bit of an "oddball" meeting because in addition to myself, Tess (a master's student in communication who was visiting for a few days) and a new staff hire would also be introducing themselves.

The meeting starts with a brief explanation that the helicopter was getting maintenance on its hydraulic system and one of the staff members who's usually present for meeting is helping the helicopter coordinator get a truck ready to retrieve the pilot. Aston started the meeting by having Tess introduce herself and talk about her reason for being at the station. After Tess finishes, I introduce myself by talking a bit about what I'm doing and how long I'll be at the station. I invite the staff to approach me anytime if they'd be willing to talk; I get a few polite nods, but not a lot of enthusiasm (not really surprising).

Esme, the new staff member, introduces herself. She will be taking over the position of camp manager and has an impressive list of Arctic locales where she has worked: PRS as part of an external research group, throughout Alaska's north slope, Norway, Greenland, and even Siberia.

After Esme's introduction, Aston talks for a bit about things geared specifically toward staff:

- *One of the users (meaning non-staff, so primarily the station's researchers) brought up a special cheese plate for the staff.*
- *The Fourth of July Parade plans need to be figured out soon.*
- *Esme says she'd like to hold an Independence Day celebration for her country on the appropriate date also.*
- *Keep in mind boat safety rules.*
- *A group of students from New York are visiting soon and that everyone is expected to be "normal" and on their "best behavior." Someone jokingly asks whether he wants "normal" or "best behavior," and everyone laughs (at least partially because everyone seems to have anticipated the joke).*

After he's said his part, Aston goes around the room asking for any thoughts or issues that people want to address. Most of the staff shrugs it off with nothing to say, but several people respond:

- *One of the logistics crew lets everyone know that there will be a lunch barbeque in the parking lot every Friday at the logistics trailer and that anyone who is in town is welcome.*

- *Cody mentions that people are letting the sauna "go out" after they leave and suggests they redo the "professional" sign—Sharpie marker directly on the walls—that asks people to make sure the fire is tended to before they leave.*
- *Talk of the sauna reminds Beck, the station's naturalist, that the shower pot he made is leaking like a "sieve," so he'd like an addition to the sign asking people to treat it gently. He also says he'll try to fix it as soon as he can find the time.*
- *Gray, the safety coordinator, talks a bit more about canoes.*
- *Pat, who's in charge of the kitchen, is one of the last to speak. She first thanks everyone for their help on Saturday evening unloading a very late trailer (that supplies the camp with its food) but asks that they please be careful that things are put away as an entire case of fresh strawberries was left out to get warm. She says that this "isn't terrible, but not good either" (I think this explains why several meals over the last few days have had strawberries incorporated into the main meals or dessert). She also asks that all towels that are used for things outside of the kitchen but put into the kitchen laundry be rinsed first. Finally, she mentions that a nice sleeping bag was left in the kitchen area at some point, and she's going to put it into general use (a bunch of outdoor gear that anyone can borrow) if the owner isn't found soon.*

> *Once everyone has had a chance to share their comments or concerns, Aston calls an end to the meeting. Someone complains about having sat too long (the meeting was just after lunch, so some people had come directly from lunch breaks), and everyone is a bit slow getting moving, but once people are up, they depart quickly. I stop on my way out and ask Aston about the "User Forum" scheduled for that night. It's posted on the whiteboard, but I'm not sure what it is or if it's something that anyone can show up to. He explains that it's just a meeting where anyone can express comments or concerns with anything dealing with work and life at the station and how to improve them and that I'm exactly who the meeting is for.*

At first glance, this is much like what we might expect from any staff meeting (even an "oddball" one): new people are introduced, management discusses their concerns and members of the staff bring up their concerns; even the joke about whether their "normal" or their "best" behavior is expected when the students visit is, well, expected. There are, however, hints within the narrative that all is not business-as-usual: why is the station's naturalist making and repairing the pot used for post-sauna showers and why does this not surprise anyone? And why does that sauna “go out”? Pat’s annoyance at items left out of refrigeration is not unusual, but there is a seriousness to it that might be lacking in many other situations; similarly, the concern with boat safety is not unusual but it is clear the stakes are particularly high. Perhaps most telling is the mention of the missing staff member at the beginning of the meeting who is helping the helicopter coordinator get the truck ready to go pick up the pilot. Why is it necessary to prepare a truck just to go pick someone up?

These questions and concerns are all related to infrastructural hypervisibility and infrastructural hypervigilance within an ICE environment. Taken individually the subjects of the staff meeting would raise few questions, but together, they start to suggest that something unusual—and yet, since there are no suggestions that any of this is unusual, typical within the station—is at work. The simple answers are that: (1) the naturalist made the shower can because he saw the need for something that was not available at the station and made it with materials on hand; the result was a metal bucket similar to a watering can that the station’s inhabitants use to “shower” with water heated from the sauna. Although seemingly inconsequential, the shower bucket allows station inhabitants to take warm bucket showers without taxing the infrastructure necessitating the 4-minute rule for heated, running water or breaking the etiquette around shower usage (which works on the honor system). (2) Similarly, the sauna can “go out” because it is simple wood-burning design that allows heavy usage without putting extra demands on the station’s generators, thus the staff want everyone to be prepared to tend to the fire on sauna nights (3) The lead cook’s concerns about food being left become clear when provisions for the entire station are delivered once per week from hundreds of miles away, thus she asks those who unload the truck and move the food to the kitchen (often involving more than just the kitchen staff) be diligent about storing food properly. (4) With the exception of the on-duty EMT, emergency medical help is hundreds of miles and hours away, so boating accidents—near drownings or hypothermia, for example—can have greater consequences, hence the staff, and particularly the EMT, being interested in everyone being vigilant about their own safety as well as the safety of those around them.[31] (5) Finally, the need to prepare a truck is crucial because, in order to pick up the pilot, the helicopter coordinator is embarking on a long and potentially treacherous drive through the tundra; it is critical that she and the truck be prepared for any scenario they might encounter on the drive. It is worth remembering the safety orientation that all scientists and staff are given before they are allowed to start the drive to the station (mentioned in the narrative early in Chapter Four). While summer is typically more forgiving, this attention to detail in preparing the truck can be the difference between life and death in the winter. Each of these illustrate both infrastructural hypervisibility and hypervigilance.

Superficially, this might appear in line with the conception of infrastructure we see in STS, Infrastructure Studies, and Information Studies, as it is the staff—those in charge of station infrastructure to varying capacities—who are addressing these issues; however, in most of these examples, it is clear that the staff intends to bring the scientists and researchers of the station into the proverbial fold. As I spent more time at PRS, I was constantly impressed by the collaboration and socialization between station staff and scientists; often, someone from the staff would volunteer their time to help in the field (e.g., the EMT, still on call and carrying her radio, helping a researcher erect a greenhouse for an experiment, or conversely, a scientist helping a staff member break down boxes after a food delivery). This collaboration and socialization

[31] It is worth noting here that the first time I went out on a boat to observe aquatic fieldwork, without my asking, one of the crew leaders made sure that I had on a top-quality life preserver and that I was wearing it properly, which I greatly appreciated since I have spent very little time on boats.

between staff and scientists is something that the station has actively encouraged, as will become particularly evident through the next narrative and in later chapters.

Next, we look to the all-station meeting, similar in scope to a staff meeting, except all PRS's inhabitants are invited to address whatever concerns they might have. In this meeting it becomes clearer that the station's infrastructure is not just the concern of management and staff; rather, everyone at the station is implicated and involved.

All-station meeting.

> *Later that evening, after a wonderful dinner surrounded by amusing conversation (mostly focused on fishing), I head to my second meeting of the day: a user forum where anyone can raise issues and/or make suggestions for improving the station. I expect more people, but it turns out to be a small group of about sixteen (maybe 1/3 of the camp's current population), about evenly split between station staff and researchers; only four women were present for the meeting, which didn't reflect the fairly even spilt of gender identity among the station's researchers. As with many of the evening gatherings, it's a laid-back atmosphere with several people enjoying beer; Eddie, a masters student I've met but not talked to much, notices I don't have a beer and offers me one of his; I gratefully accept it and make a mental note to do the same for others in the future.*
>
> *The meeting starts with Kevin asking if anyone present wants to make any suggestions or comments. No one volunteers immediately, but after a short silence, Eddie suggests that a large water jug by the sauna would be appreciated, so that if people run out water or forget to fill their bottles, they don't have to make the trek all the way back to the other side of camp. With this first suggestion made (and acting as a reminder that minor suggestions are fine), the room enlivens, and others start offering their suggestions.*

Like the first meeting with only the staff members, this second meeting, this time including researchers at all stages of their careers, is rife with examples of both infrastructural hypervisibility and infrastructural hypervigilance. The first request a researcher makes is for a jug of water to be placed at the sauna so that people are not forced to walk halfway across the station to the dining hall to fill their bottles (the only place outside some of the labs with accessible running water). While the jug itself is not particularly important, the request points to how even minor things highlight the visibility of the station's unusual infrastructure where running water is at a premium.

> *Nolan, a GIS staff member, points out that a 3D printer might be a good addition to the station. He justifies the purchase by suggesting the ability to make small things (the example he uses is a "clip") would be extremely beneficial rather than waiting a week or more for something ordered online to arrive. He mentions that there's now a 3D printer on the ISS because it takes a significant amount of time, not to mention expense, to get something to the space station, so the 3D printer was a wise investment for them.*[32] *He finishes with a statement that while PRS isn't quite the space station, the same problems arise here. Several others nod enthusiastically and voice their support for the idea. They talk for several minutes about possible uses. This gets me thinking about what it means to make do now when we have 3D printers available to make small but crucial items.*

Nolan suggests another ICE environment, the ISS, as proof of concept and—without recognizing either the concepts of the ICE environment or the total institution—points out that the ISS and PRS share problems with quickly procuring items they could benefit from having immediately. The idea of being able to make something—like Beck's shower can or a 3D-printed part—comes up repeatedly through the season (and will be the subject of a section of Chapter Six). This idea of making things—and often making do with what is available—makes sense when even the fastest delivery will take several days.

> *My attention shifts back to the meeting as Eddie asks about someone teaching the usage of drones at the station and the conversation stays on drones for a bit. After some discussion, the consensus seems to be that it's probably not possible due to the*

---

[32] It is worth remembering that the cost of a 3D printer for the ISS is very high, not only does it include the price of the printer (and one would assume testing for safety in the ISS's environmental conditions) but also the considerable expense of launching the equipment.

restrictions drones operate under at the station.

Even this question about learning to fly drones points to the constraints infrastructure puts on PRS's inhabitants. While the vast Arctic tundra might seem like an excellent place to learn how to fly a drone, Unmanned Aerial System (UAS) operations—drones—operate under the jurisdiction of several different land management groups and institutions and requires depending on flight locations, can require permits, written approval, or is completely prohibited. The rules under which drones operate are just another example of the institutional controls—intangible social infrastructures—PRS's inhabitants operate under (recall the discussion on Goffman's total institutions).

> *Once the people in the room seem out of suggestions, Kevin pulls scraps of paper from the suggestion box (which usually resides just outside the camp manager's office) and reads them aloud:*
>
> - *There are three different complaints about the coffee not being good (we laugh as Kevin notes that each is in different handwriting). It's mentioned that they switched to the current brand of coffee because they wanted to use a more environmentally friendly coffee company, and after some conversation, it's decided that most of the people in the station like the new coffee (apparently no matter what coffee they use, there are always some complaints about it).*
> - *Three different suggestions to stock plain potato chips. Someone points out they do stock plain potato chips, but they are very popular and frequently run out.*
> - *Someone wants jump ropes for double-dutch, but this turns out to be a suggestion from Jules, who is present, and she says that she bought them herself and they will be arriving on the next truck.*
> - *The next slip of paper is a request that the windows in one of the labs be fixed because they leak. After some joking that this is probably something more important than should be addressed via a suggestions box, the topic is addressed more directly. Apparently, it takes a very specific wind and rain combo for the windows to leak, but when this happens, they leak badly and no solution for the leaks has been found. Cody says he'll look at it and see if he can fix it.*
> - *Another slip of paper just reads "Aston is awesome." We laugh, he is good people.*

The seemingly simple request to fix a leaky window is another place where we see infrastructural hypervisibility and hypervigilance at work. It is not surprising that a researcher noticed a leaking window in their lab, but what is unusual is that several of the staff members and one of the senior researchers immediately know which window the request refers to, and even more importantly, they know that it only leaks in certain environmental conditions.

> *Once all the suggestions from the box have been read, the people attending the meeting have more to offer. Alex mentions that the walkway between two of the ATCOs has a large gap between it and one of the structures (while being pushed right up to the other), and the hole is large enough for someone to step into and get hurt. After some discussion, it's hypothesized that the ground is probably settling under one of the ATCOs and that some careful work with one of the front loaders might fix the problem (Cody again says he'll do what he can).*
>
> *The speed of the Internet connections on the housing side of the station comes up and leads to a longer discussion. Marie, who has been working at the station for decades, mentions that the speed of the Internet has always been an issue and that as it improves, people demand more, but she goes on to say that the wireless in the lab in which she and Eddie work isn't very good. Kevin points out that their lab is now directly connected to the fiber optic connection so it shouldn't be slow. Eddie says he'll try connecting directly to see if the problem is with their router.*

Here again it is important to note how aware of these issues many of the individuals are, as well as the reasons, and possible solutions. Eventually the discussion turns from the commonsense version of infrastructure: the leaking windows, shifting walkways, and slow internet, consequences of the remote and extreme environment in which the station is built, and turns to "the scroll."

> *There's also some talk about the monitors, or the system they refer to as "the scroll," in the dining room. Currently, it's just set up as a screen saver that acts a bit like a digital bulletin board, but Kevin and Aston want to get it to show real time usage of water and electricity as well as a weather report. The hope is that having usage monitored in real time will motivate the station's users to be more mindful of their water and energy consumption. Esme says that she knows of another station that does this, so she'll get in*

touch with them for pointers. While on the topic of station tech, someone compliments the new online reservation system and Kevin says that the plans are to continue getting things going through that system and that if anyone has any ideas for it, to let him know.

While an argument might be made that many of the previous examples are about infrastructure in need of repair, and thus—despite my argument otherwise—adhere to the principle of invisibility until breakdown, “the scroll” suggests there is something deeper at work. At the time of the meeting, “the scroll” was set up as a screen saver, and throughout the day, the screen would cycle through informational images: reminders about upcoming events, safety and conservation tips, notices of lost and found items, even my brochure letting station inhabitants know about my research and offers of field assistance. What Kevin and Aston wanted to do was have it show not just premade slides, but also real time information; and this real time information was not just a local weather report (of critical importance in the Arctic), but also about the energy and water consumption of the station with the hope that it might motivate mindfulness in their usage. In other words, Kevin and Aston were intentionally working not just to make the station’s inhabitants more aware of the infrastructure around them but also to make beneficial choices for the station (i.e., using less power and water); they want to teach people how to interact with the station’s infrastructure. This is perhaps one of the most straight forward examples of teaching infrastructural hypervigilance, as well as recognition of the hypervisibility of the station: to some extent, everyone knows how the station functions (i.e., through generators), just not exactly how they contribute to that functioning, but this idea for “the scroll” invites them in. Notably, Esme (recall from the earlier narrative her extensive experience in Arctic settings) is aware of other stations that already have a system like this implemented, suggesting this is not at all unusual in ICE environments.

There’s also some talk about more events. Since this year is *a World Cup year, they are hoping to do more soccer tournaments as they've done in the past (during Olympic years, they do station Olympics as well). Aston also mentions that badminton games should be starting up soon and that there's been some talk about a golf championship, but in the form of mini-golf with each lab building and sponsoring a hole. Someone brings up the lack of putters in the station (apparently there's only one in the entire station), so someone suggests that maybe each lab should be responsible for making the putter for use on their hole also.*

With talk about the events, someone thanks Alex for his 8th year of running trivia. He says he's planning two more for the year (in addition to one that already happened). With the continued focus on social events, someone asks about the potential for karaoke, and it's revealed there is a karaoke machine coming at some point in time. I've heard karaoke mentioned several times already at the bonfires, so I know this will be wildly popular when it happens.

These and other events are, in their own way, a reaction to the hypervisibility of infrastructure at PRS (and thus a type of hypervigilance) and will be discussed at length in Chapter Seven.

One of the older PIs makes a suggestion that she knows she'll "regret next year," but goes on to say that she has a nice "plush" room in CG (an ATCO) and she feels like it's because she's "old and grey," and she thinks it would be more fair to have people who are staying longer get those rooms. Aston thanks her, but explains that CG is short-term housing, so she's there, not because she's old and grey, but because she only staying for a week. This brings up the topic of the new ATCOs which are nearing completion and should be put into use at the end of July during peak season (once the heating system has been checked for leaks).

The "old and grey" PI, a gregarious and kind woman, illustrates another type of hypervigilance here. Rather than hypervigilance in relation to the material infrastructure, her vigilance here is about social infrastructure and etiquette. She does not want to transgress the social norms of the station where length of stay dictates housing more than seniority. Here we might be reminded of the shower bucket from earlier in this discussion and think about how it lets people take showers more frequently without using more than the allotted four minutes of shower time each week (monitored only by the honor system). In fact, much of the station operates on this honor system and few want to, or are willing, to transgress (recall the discussion in the previous chapter around "the invisible setting," particularly in relation to trust, that discusses how much of the rules in the station operates on the honor system). Thus, even in the showers, hypervigilance is working at multiple levels: at the most basic we are literally counting the seconds on our showers, but at the same time we are making sure we do not make a social misstep like showering longer than our allotted time and therefore taking more than we should (i.e., becoming the dreaded "shower thief").

> *Shawn compliments the blackout curtains in the ATCOs and several of us staying in ATCOs express our agreement. Marie asks if they can do new blackout curtains on the WeatherPorts. Hers is apparently using trash bags and masking tape for blackout curtains. Aston says they did the WeatherPorts a few years back, but it's time they do them again and they'll try to do something better this time around.*
>
> *No one seems to have any more suggestions, so Aston thanks everyone for showing up and is about to call the meeting when Cody, who appeared to be fast asleep on the couch only a few minutes before (and his timing seems to suggest that he was napping or at least nodding off), makes one last request for the Health Club: he'd like a whiteboard so they can keep track of the "workouts of the day." This gets a short conversation going on the HC, and interestingly, according to Marie, it was built with the attitude of "better to ask for forgiveness than permission," because they were having trouble getting any support for it as it wasn't directly related to science. I find this particularly interesting as the HC is extremely popular among the station's residents and is an important part of life at the station for many of PRS's inhabitants.*

The Health Club, mentioned already in Chapter Four and again later in Chapter Seven, is a central part of the social infrastructure of the station with daily workouts led by one of several volunteers from among both staff and researchers, yet it was built with little external support because it was not related directly to science; however, in an ICE environment, where everyone is acutely aware of the infrastructure around them—and usually of what that infrastructure does and does not support—everything is related to scientific infrastructure. This small gym directly affects the everyday lives—which are inseparable from work lives in an ICE environment—of everyone in the station who uses it.[33] Those on-site recognized the importance of this infrastructure while the "outsiders" could not; and while it is not clear if the support for non-scientific infrastructure projects has grown in the years since the building of the HC, it is clear that those higher-ups who have experienced life at the station continue to recognize the importance of these kinds of things; hence a meeting where people can request—and usually receive—not just 3D printers that directly help scientific output, but also water jugs, potato chips, karaoke machines, and if they are patient enough, even jump ropes.

> *Just before we're about to leave, someone mentions something unrelated to the meeting but important to the entire station: although at lunch there had still been a patch of ice floating in the lake, it had disappeared at some point, and the lake is now completely free of ice. The community whiteboard in the dining hall had a calendar with a betting game for who could guess the "ice-off" date and someone had indeed picked today and therefore was the winner of the game (I learned the next day that the person who had picked the correct date had only done so the day before, so there was some contention on whether the guess should count or not).*

The relationship between inhabitants and infrastructure is, in fact, the overarching theme of the entire meeting from questions about learning to fly drones (not allowed because of the rules PRS operates under), to issues with the taste of coffee (because residents lack the ability to make their own preferred type of coffee while at the station), to sagging walkways (a

[33] Although I never tried to get an exact count, I suspect that out of the station's inhabitants who stayed for a month or longer, between one quarter to one half used the gym at least occasionally. For a select group, the HC was a crucial part of daily life.

consequence of building on tundra), from power and water consumption (important when all power at the station, including power for the well pump, requires fuel hauled in from hundreds of miles away), to written (e.g., shower time allotments) and unwritten (e.g., guessing "ice-off" only one day in advance) rules.

To step back, Chapter Four, which looks at PRS's setting in great detail, is also rife with examples of infrastructural hypervisibility and hints at infrastructural hypervigilance. As discussed earlier, infrastructure is intentionally more apparent in ICE environments where conventional methods of hiding certain aspects of infrastructure are some combination of too costly, unnecessary, and undesired. My initial impression of PRS, described in the previous chapter, was not one of disappointment—because I had looked at photographs and talked to scientists ahead of time—but rather of surprise at just how viscerally industrial the station felt with its muddy roads, modular and canvas structures, exposed conduit and piles of building materials, and even its collection of work trucks (or perhaps more precisely, its lack of cars).

> *But my first impression was of a quiet—not quite lifeless, but by no means bustling—industrial complex situated in a cold, snowy expanse shrouded by angry gray skies. It's not that I was disappointed; if anything, I was more excited to find something a bit rougher than I'd expected, but it was different than what I'd been imagining.*

Interestingly, what I had first imagined is more like what I would later see in the station.

Infrastructural hypervisibility is quickly learned. In the Arctic, it is clear how important infrastructure is just for sustaining life; in the absence of specialized knowledge (which few Westerners possess), life on the tundra without shelter, heat, and food is impossible, even during the summer. The station was always a lifeline and when it was no longer in our sight, it could be a disconcerting feeling, made only a little easier knowing that we—like everyone else—had signed out with our location, number in our party, mode of transportation, and expected time for return. I never stopped seeing the exposed conduit and building materials or the rough structures around me, but as I settled into life at the station, these things came to feel like safety. At the same time, I was becoming attuned to infrastructure in a way that is not about what is seen, like the constant, low hum of the life-sustaining generators.

As I talked with staff members and worked alongside researchers, I learned how to recognize what was and was not important and how to interact with the infrastructure surrounding me. This is hinted at in Chapter Four's section titled "An Invisible Setting." It is what I described as "the affective sense of purpose among people residing at the station." While I was always attuned to the sound of the generator, I recognized that it was also out of the scope of my knowledge; had it started sounding strange or stopped, the best I could hope to do is alert the staff; however, as I learned about the experiments around me, I became very aware of the factors that might affect them, like a sudden drop in temperature or a shift in wind direction. Similarly, I—and those around me—would notice things like a truck engine that was running poorly (an engine in need of maintenance could become dangerous for the crew using it if it left them stranded somewhere on the tundra). Crucially, we were aware that we needed to act on what we were recognizing. Sometimes this was as simple as sending a message to someone to let them know that temperatures outside were dropping so that they could check on their equipment if necessary or other times it was to warn someone that one of the tires on their truck was looking suspect, while other times it was taking direct action (sometimes as easy as hammering in a few protruding nails from the boardwalk but sometimes as serious as completely rebuilding something).

Hypervisibility and Hypervigilance

The largest departure from the STS version of infrastructure in infrastructural hypervisibility is that while infrastructure typically requires a breakdown to become visible, in

ICE environments, there is an awareness of infrastructure that does not require any breakdown; in fact, infrastructure is often intentionally exposed in these types of settings. Infrastructure may not be problematic, but it is always present and visible. While visibility, in the literal sense of the word, is a part of infrastructural hypervisibility, it is not the end of hypervisibility. Hypervisibility is more about how we perceive the infrastructure rather than just how we see it and therefore involves not just sight but all our senses. There is instead a constant awareness—sometimes general, sometimes more specific—of the surrounding infrastructure that is learned through both personal experience and from how others interact with the infrastructure. As such, infrastructural hypervisibility is social in nature; we learn, and we teach, neither of which need to be conscious action. There is, however, push-back against the hypervisibility of the infrastructure because that visibility feels awry. We tend to make efforts to push infrastructure back into the background. This may be toward the material (e.g., decorating rooms and living spaces), technical (e.g., a ritualistic cleaning of the lab before starting work each morning), and/or the social (e.g., the social events that make up the Chapter Seven).

While I was unable to visit other ICE environments for this research, there seems to be evidence that the level of infrastructural hypervisibility is probably related to the level of extremity of the ICE environment: the level of isolation, the level of confinement, and the level of extremity. Infrastructural hypervisibility at PRS is likely increased during the winter when the station is more isolated due to weather, more confined due to the limited operation buildings, and more deadly because of the sub-zero temperatures and constant wind and ice. Amundsen-Scott or the ISS is likely even more so. This may also be part of the reason some of the veteran PIs quibbled over whether the station was or was not remote; simply put, they remember the station when the access road, communications, accommodations, and entertainment were all worse. In short, they remember a version of the station that was more isolated, more confined, and more extreme than the station of 2018 or of today. Perhaps another reason they see the station as less of an ICE environment than they once did is because they are much more familiar—and comfortable—with the unusual infrastructure of the station. In other words, they mastered infrastructural hypervigilance at PRS.

Infrastructural hypervigilance requires infrastructural hypervisibility: visibility must precede vigilance. While individuals may not always be conscious of the infrastructure around them, infrastructural hypervigilance is a persistent—although not necessarily conscious—attention to infrastructural elements in ICE environments so that changes can be acted on quickly. This suggests knowledge of what is and is not normal, which is learned with time and socialization into hypervisibility. Once the infrastructure is seen and recognized (necessitating an insider's understanding of a particular ICE infrastructure), then infrastructural hypervigilance comes in forms that can be active interventions (e.g., fixing things before they break, but perhaps above what we usually think of as "routine maintenance") or passive watchfulness (e.g., paying attention to changes that might require future attention, like "watchful waiting" in the medical field, albeit on a shorter timespan). At the same time, it should be recognized that just because something is noticed, does not mean it will be acted on. Finally, because infrastructural hypervigilance involves decision making, it is affective in nature; decisions often involve feeling just as much or even more than logic.

Like infrastructural hypervisibility, hypervigilance has both social and individual components: people learn what is normal and what is abnormal from both personal experience and from others, and furthermore, judgements and reactions can be made at the individual or group level. This is of particular importance in total institutional-type settings where people are in contact with the same community much more than they would be in other settings. Similarly, because the typical separation of work, social, and personal life is largely lacking in ICE environments, individuals constantly feel the pressure of all of these spheres of life concurrently: for example (as detailed in the next chapter), when the temperature unexpectedly drops—well after the “workday” has ended—during a holiday celebration, leaving field instrumentation vulnerable to freeze, a researcher immediately exits the celebration to hike out to the site to weatherproof the equipment. In other words, inhabitants are continually physically and mentally engaged with the infrastructure at some level.

This leads to another point: infrastructural hypervisibility also has a temporal component lacking in more typical conceptions of infrastructure where infrastructure is not a concern until the “then” of breakdown; in infrastructural hypervigilance, however, infrastructure is a continual presence in the “now.” The way infrastructure is currently described, when things shift (the breakdowns), people are unprepared, and this lack of preparation is why the breakdowns are so disruptive. In infrastructural hypervigilance, because people are ready to react in the “now,” analogous breakdowns tend to be less disruptive than they might be elsewhere.

Like infrastructural hypervisibility, hypervigilance is also likely related to individual and group reliance on the infrastructure. Although I was unable to spend time at the station during winter, I would expect the winter population to be much more cognizant of problems, particularly ones with the potential to be life-threatening, than they might be in summer. We can see this type of hypervigilance easily enough even outside of ICE environments: for example, we notice a strange noise coming from our car, does it mean problems? If that car has had problems in the past (or if cars from our past had such problems), or if it is the only way we can get to work or to school, we are probably more likely to notice the sounds because we are more concerned about potential issues. Taken to the extreme, I would suspect astronauts are very likely to notice even minor deviations in their environment when they are living on the ISS when the infrastructure is the only thing keeping them alive second by second (and there again is that relationship to the constant “now”).

To summarize, we see the following relationship between infrastructural hypervisibility and infrastructural hypervigilance: first, both are departures from the typical conceptions of infrastructure that emphasizes invisibility until breakdown. In ICE environments, infrastructure is—by design—more visible, but also more visible because of the relationship people in ICE environments have with that infrastructure. Second, hypervigilance is a reaction to hypervisibility. Visibility is a necessary condition for vigilance. A vigil suggests wakeful action during a time usually meant for rest, and this speaks to the idea of being conscious to infrastructure even though it goes unnoticed in more typical settings. Third, infrastructural hypervisibility and hypervigilance feed creativity and innovation in ICE environments; this will be demonstrated further in Chapters Six and Seven. Finally, while infrastructural hypervisibility is primarily about recognition, infrastructural hypervigilance is a higher-level relationship in that it involves not just seeing, but also making judgements on what is seen, and as such, it is affective in nature and often involves feeling or instinct as much as logic.

Infrastructural hypervisibility and infrastructural hypervigilance are topics that the remaining chapters in this work will return to periodically, although not always by name.

CHAPTER SIX

PUTTING IN THE WORK: FIELDWORK, MAINTENANCE, REPAIR, AND PLANNING

The last two chapters looked at PRS's setting and infrastructure. At both a figurative and literal level, setting and infrastructure are the foundations on which the station—and the scientific work taking place there—are built. The station's setting, the arctic tundra, is the reason the science is being done at PRS, and the supporting infrastructure, the station and the improbable road, facilitates that science. Setting and infrastructure implicate each other and create an ICE environment, and ICE environments tend to have the characteristics of total institutions. While neither of these terms are likely to be meaningful to the station's inhabitants, they help explicate the particular set of circumstances scientists and staff live under at PRS, circumstances which have profound effects on the work done at the station. This chapter looks at how science happens at PRS under such circumstances and can be roughly divided into three sections. The first section will focus on the science itself, starting with a brief overview of the science being done at the station and then looking at concrete examples of how science functions in the arctic tundra surrounding the station as well as inside the station's laboratories. The second section will examine several themes—maintenance, repair, and planning—that are particularly prominent in the scientific work taking place at the station. Finally, the third section will discuss the roles of creativity, innovation, and care in science in ICE environments.

Science at PRS

As mentioned in Chapter Four, PRS was established in the 1970s by an international group of researchers studying shallow coastal lakes. With the building of the access road, the researchers saw the opportunity to study a foothills lake as their coastal project was ending. This first group collected extensive baseline data, and they and others have continued collecting measurements year-round. Scientists working at the station now have access to decades of data measuring changes in the local aquatic and terrestrial ecosystems that allow much of the research based at the station to focus on climate change.

Since the station's inception, international researchers from dozens of countries have conducted fieldwork at PRS. At any given time, active research at the station spans the breadth of natural science with work in physics, chemistry, geology, meteorology, biochemistry, microbiology, botany, zoology, and ecology, with some of the research ongoing for decades now. More recently, the station has hosted anthropologists, archaeologists, sociologists, and artists as well. Each year brings new researchers with new projects while many other projects continue indefinitely.

PRS is a premier station largely due to the support it offers researchers who pay a user-day fee. While the user-day fee is significant if not included in research funding, it includes not just housing and meals, but also access to well-equipped laboratories, shared equipment, long-term baseline environmental data, GIS services, IT support, and numerous other services helpful when navigating life outside developed areas. Transportation to and from the station is also provided, as is local transportation while at the station. Many of the station staff members, time permitting, also help scientists with field and laboratory work as necessary; in fact, PRS can provide researchers with limited skilled field assistance, and during the shoulder seasons, can even help off-site researchers collect data and troubleshoot onsite instrumentation. Finally, PRS supports science and researchers by providing a strong social infrastructure (see Chapter Seven).

Researchers typically work six-day weeks from Monday through Saturday. Sundays are for leisure, and station residents talk online to family and friends, watch streaming movies, play games in the dining hall, catch up on sleep, go hiking, write, paint, or do whatever other activity in which they find pleasure. From Monday through Saturday, however, the focus is on work, and the researchers typically work long hours, sometimes starting before breakfast and ending late in the evening. Some, as mentioned in Chapter Four, work something akin to split shifts so that they can check live traps or instrumentation several times daily. While the days can be grueling, PRS offers valuable fieldwork opportunities for both graduate and undergraduate students.

Generally, most of the researchers split their days between working in their labs and working in the field, with some preferring fieldwork in the morning and others preferring to do it in the afternoon. Sometimes, rather than being a matter of preference, the decision is guided (or made) by the weather. If it is raining in the morning, scientists might opt to spend that time in the lab and then work in the field after lunch when (hopefully) the weather has improved; on the other hand, if a storm is predicted, they might be in the field before breakfast trying to finish work before the storm hits (this can be particularly important as some instrumentation cannot be used in rain, other instrumentation is sensitive to cloud cover, and so forth). That said, it is not at all unusual to see researchers working outside in rain, sleet, snow, or any other weather the arctic can muster. During working hours, from the dining hall balcony, with its sweeping views of the lake and the surrounding tundra, one can nearly always spot at least one person working outside no matter how poor the weather conditions; really the only exception to this was when thick fog makes seeing beyond the balcony impossible. Still, someone is likely working somewhere out in that fog.

While researchers are often able to choose when they will be in the field and when they will be in the lab, this is not always the case. More than once, I spoke with someone who desperately wanted to be in the field but were stuck in the lab watching instruments, doing timed experiments, cataloging data, or sorting through samples. Similarly, fieldwork has its own demands on researchers' time: if a data site is not within walking distance from the station, it might often require several hours of driving and walking to reach, often taking a full day between travel and data collection. I, for example, worked with a small team at a location that took nearly two and a half hours of driving time to reach, followed by a 20-minute hike from the truck to the experimental site. During the two and a half hours we spent at the site, we worked in

Figure 32 Collecting data in the rain, hours away from PRS.

two groups in pouring rain using pencils and waterproof paper to collect data on transplanted tussocks (this is how I learned that even "waterproof" notebooks can only withstand so much rain before returning to pulp). Only on the way back to the station did the rain finally relent, and we stopped alongside the road for a break to eat. We were gone the entirety of the workday and even missed dinner.

Figure 33 Collecting qiviut (the soft undercoat from musk ox) from branches after a long day of data collection.

Sometimes, helicopter scheduling dictates when a researcher will be in the field and when they will be in the laboratory. Several research projects necessitated visits to particularly remote sites far from roads—burn scars, mountain ridges, and distant lakes, ponds, and rivers too far to reach on foot—that necessitated helicopter drop offs and pickups. Helicopter usage required careful coordination as they moved not just people from multiple teams but also materials and were sometimes grounded by inclement weather. Often the schedules of the helicopters dictated when a team would be in the field.

Finally, fieldwork scheduling was often dictated by a timer. Mosquito traps, for example, needed to be collected at specific intervals so that mosquito densities could be accurately compared. Timing was even more important with live traps, where animals—particularly small mammals like mice, voles, and arctic ground squirrels—must not be left in traps too long, particularly on cold and wet days; even with the bedding placed in each trap, the small creatures could freeze if left too long. Once the live traps were set, they were never left unchecked for more than 12 hours, meaning the teams often worked in the middle of the night (according to the clock, of course, since the sun never set) in rainy and cold conditions.[34]

Fieldwork

While PRS has about a dozen laboratories, they are not the primary laboratories for any of the station's researchers; after the field season—with occasional forays into the shoulder seasons—the researchers return to their home institutions and continue working in their primary labs. In a place like PRS, all work is fieldwork including the lab work; in this research, however, for clarity's sake, I will refer to the work taking place inside the station's laboratories as lab work

[34] Traps were not set if snow was expected, but if they were set before an unexpected snow, the teams would go out in the snow and check them unless it was especially dangerous (as working on the tundra always has some element of danger) for the researchers to do so.

and the work taking place outside on the tundra, mountains, lake, ponds, and streams as fieldwork. Thus, fieldwork encompasses sites less than a dozen paces from the dining hall (a small pond) to sites more than 100 miles to the north and south that researchers use for comparative studies.

To help minimize impact on the tundra, boardwalks access many field sites within walking distance of the station as well as several sites dotting the nearby tundra requiring five-minute to thirty-minute drives. Most of the boardwalks near the station are elevated and several feet wide, but some in the less trafficked areas are simply single pieces of 2x12, 2x10, or even 2x8 lumber placed end to end and balanced on blocks cut from 4x4 or 6x6 lumber. Away from the station, the 2x lumber boardwalks are more common with only a few of the wide, raised style. Near the station, boardwalks often ring and/or cross through the sites, allowing easy access from all directions, but further from the station, the boardwalks might only ring the outside of the plot or form a cross through the center of it. In a few areas, paths made from Geoblock sit directly on the tundra, shifting awkwardly underfoot when in use. Finally, in some areas, there are no paths at all, and researchers simply try to minimize their impact on the fragile tundra ecosystem; the areas lacking boardwalks are primarily either locations where only a single group infrequently works or in areas too overgrown to realistically support boardwalks (e.g., along rivers). More boardwalk is added each year.

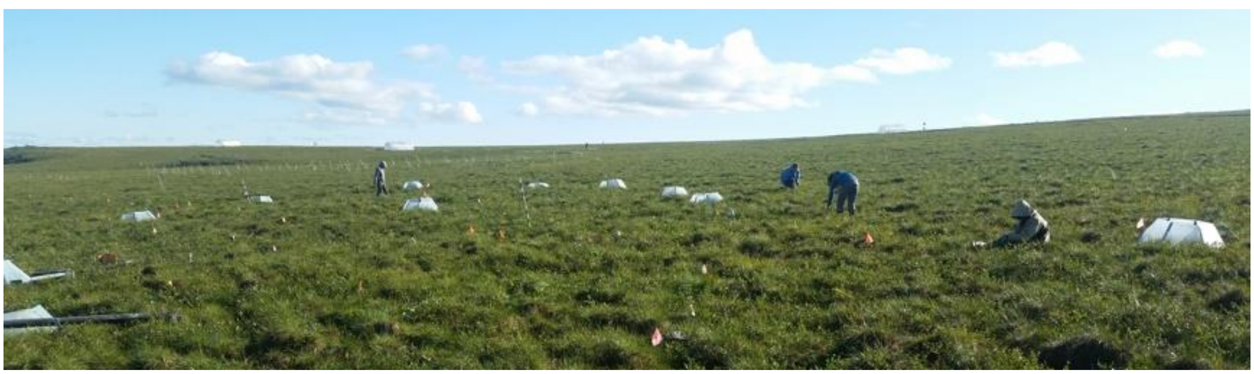

Figure 34 Scientists working in the field.

The plots themselves range in size from several square meters to as much as 10,000 square meters. As mentioned above, some of the plots are surrounded by boardwalks, making their edges clear, but most are marked with stakes at four corners; sometimes these stakes are so short they are barely visible and other times they stand several feet above the tundra. Some plots have no markings at all and are so far from the station, and so seldomly visited, that they require the use of GPS to locate their corners. When visiting these sites, researchers will sometimes bring flags and temporarily mark the edges (or at least the corners) of the plot to facilitate their work. The rarest of "plots," in my experience, were those marked only with a single coordinate on the GPS unit (e.g., a solitary point where a soil core is taken, measured, and analyzed once or twice each year); usually there are a number of these "plots" but they are some distance apart and have no markings that would indicate their presence, even to one walking only a few feet away.

Figure 35 Some plots are flagged but still require GPS to locate.

Narrative: a day in the field.

The day after the Solstice Bonfire (detailed in Chapter Seven), I was invited into the field with Everest and Remy, who I had met the night before. The following is a mix of my field notes and discussion that touches on what it is like to do fieldwork in a remote part of the Arctic.

> *My invitation to join them in their fieldwork came the night before when a dropped can of beer led to my first conversation with Everest and Remy. As was frequent, conversation quickly turned to what we're doing at the station and how long we'd be there. They knew a little about what I was doing from my flier (a constant fixture on "the scroll"but wanted to know more. They seemed interested and told me they were going out at 7:30 am to place mosquito traps (but I probably didn't want to go), but I could meet them a little before 11:00am and do the "phenology loop" with them. I thought maybe it was a hint they'd prefer me not go to the mosquito traps with them, so I told them I'd meet them at 11:00.*

As happened many times, my invitation came about through a conversation at a social gathering, and like many of those other conversations, it involved a beer. This time, however, the beer was dropped, rather than offered to someone who was beer-less.

When I showed up at Lab N just before 11:00, Everest was putting a black storage bin in the bed of the truck he and Remy used for fieldwork. The morning air was warm (for the Arctic) and the door to the Lab N was open. I followed Everest inside. Remy, who has worked with Everest several times before, greets me as I enter. It was my first time inside Lab N. The lab was split in two between an aquatic and a terrestrial group—Everest and Remy—but an interior door allowed the two groups to move freely between one another's areas.

> *I was surprised by how nice and how clean the work area was. As I spent more time with Everest and Remy, I'd learn that Everest cleans the lab space each morning before starting work.*

The cleanliness and tidiness of the lab surprised me because, while most of the other labs I had been inside were organized, they had too much piled on shelves or covering counters to look tidy, but Lab N's space seemed meticulously well kept. This might have been because Lab N was newer and had accumulated less stuff by successive researchers, but Everest and Remy also seemed to take pride in keeping their area very clean. During the summer field season, the Arctic can be extremely wet and everything that is dirt turns to mud, so keeping work areas clean is Sisyphean task and something that Everest seemed to do as a pre-work ritual.

We left the station, with me in the back seat of the small crew cab truck and headed northeast. Several trucks (sometimes from the station but usually not) passed us going the opposite direction, and each time Everest and Remy waved, and often, a wave was returned. The weather was clear and the road was dry, so Everest drove at the speed limit with occasional slowdowns for potholes. He clearly knew the road well, and after crossing a river, we made an almost U-turn onto a narrow road I had not noticed and stopped at a locked gate.

> *We pull up to a locked gate and Remy jumps out and taps in a code on the padlock. Everest drives through and Remy closes the gate behind us and jumps back in the truck. As we continue driving slowly down the bumpy two-track, they point out bible verses scrawled near the road. This has them "weirded out" since only a small number of people have padlock codes (some from the station but some not). We see three verses, with the last one being about judgement day. They tell me that one bothers them a bit because they aren't fond of the idea of meeting a "religious crazy" in the middle of nowhere.*

This was one the earlier times I went out for fieldwork and the first time I had been out with less than four other people. Seeing the bible verses in this gated off area miles from the safety of the station (and thinking how the individual who wrote them might not be a big fan of the local scientists working to understand climate change) showed me that hypervigilance can extend well-beyond the station and does not necessarily have to be a reaction to the infrastructure, it could also be a reaction to the absence of that infrastructure (i.e., an absence of safety). There were certainly environmental risks on the tundra, but I realized then, that even in the vast empty space of the Arctic, there were also non-environmental concerns associated with leaving the safety and the community of the station.

> *Not far after the judgement verse, we pull into a dirt turnout and stop. Everest and Remy grab some items and lock the truck's doors. Remy hides the ignition key and asks Everest if he has the bear spray; he opens back liftgate of the truck again (left unlocked) and grabs the cannister of bear spray.*

And again, a form of hypervigilance as Remy hides the ignition key (rather than bringing it, since a dropped key on the tundra would never be found) and asks about the bear spray (again, a danger on the tundra, especially for a pair of researchers rather than a group, as tundra grizzlies can be extremely dangerous since they are not as well fed as their southern cousins who feast on fish). The Arctic is a harsh place to live, even for—or maybe especially for—a 500-pound grizzly bear.

Everest and Remy walk toward a distant tower on a path made from plastic tiles—Geoblock, they tell me it is called—that are held together with metal bands. The Geoblock is

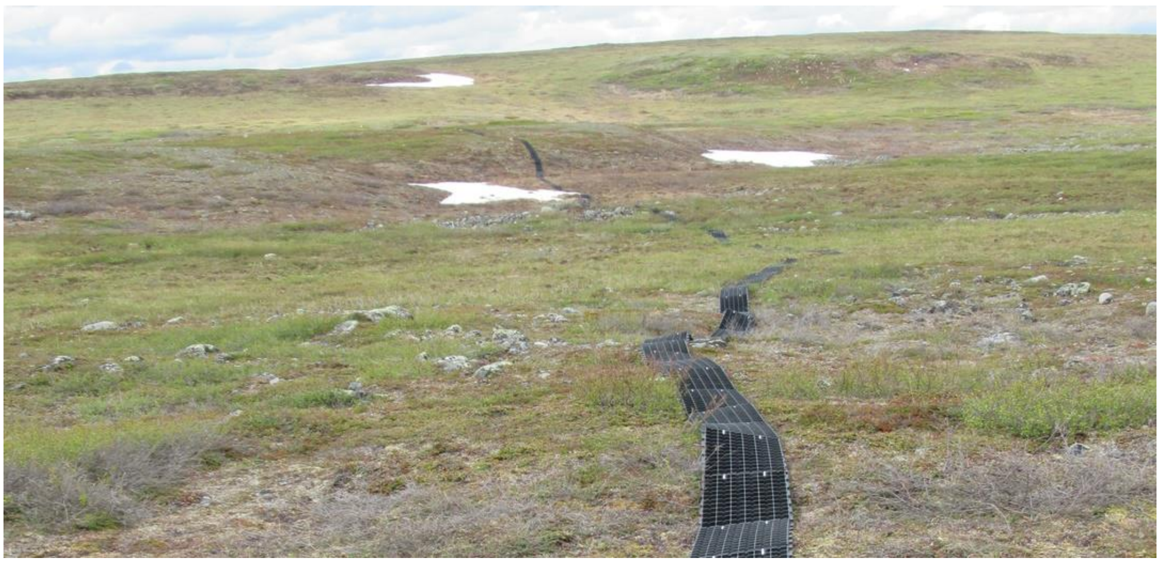

Figure 36 A Geoblock path stretching away into the tundra.

made with thick plastic walls but are designed more like a grate than a solid deck, thus allowing moisture and sunlight to pass through to the tundra. As we walked, the Geoblock path shifting slightly under our feet, Everest explained the tower as he understood it.

> *Areas have an "airshed" that is sort of like a "watershed" and this tower is measuring things relating to this specific airshed. While the tower is a part of Lab N's work, no one permanently attached to PRS works on it, rather the group that works on the towers visit for a short period of time for maintenance and then return home to monitor the tower remotely.*

On nearly every outing, the topic of maintenance would come up. It was not something I realized until later in the season, but maintenance was a constant concern because the Arctic, particularly during winter, tends to damage and eventually destroy all but the most robust—or the most well-maintained—infrastructure. Later, as the end of the season neared, the concern for preventative maintenance went up exponentially as researchers prepared to leave their work for the long winter season.

Fairly quickly, the Geoblock path intersected with a giant rectangular walkway made from numerous 2x8s placed two wide (for a width of about 14.5 inches) end to end and elevated a few inches above the tundra. Along the walkway, certain plants were marked with brightly colored flags. They tell me that each flagged plant is one of three species that Lab N monitors (according to Everest, the specimens Lab N monitors are from the three most common local) and that every few days, they return to the phenology loop and check the progress of every flagged plant recording growth, color, presence of pollen, and whatever else their protocol requires of each.

> *They explain to me that a lot of what they are doing is sort of abstract and subjective, like judging greenness. Since it would be difficult to correlate two people's understanding of "green" and what "50% green" means, they place more importance on consistency: every time they do the loop, Remy gets down on her hands and knees in the tundra and examines the flagged specimen while Everest records her interpretation on the tablet. This, they believe, gives more consistent readings than it would if it was sometimes Everest's and sometimes Remy's interpretation of greenness.*

Although, again, this was early in my fieldwork, it was the first time I had heard anyone push back again what they were doing. Everest and Remy realized that Lab N's protocols—the standardized sampling method they used across all sites—were subject and subject to error. Although the protocols did not seem to suggest that a single person do the same measurements each time, they decided to do this to try to keep their results consistent.

As Remy sampled and Everest recorded her observations on a tablet (clad in a thick waterproof housing), I followed closely behind. Several times, I realized I was casting a shadow

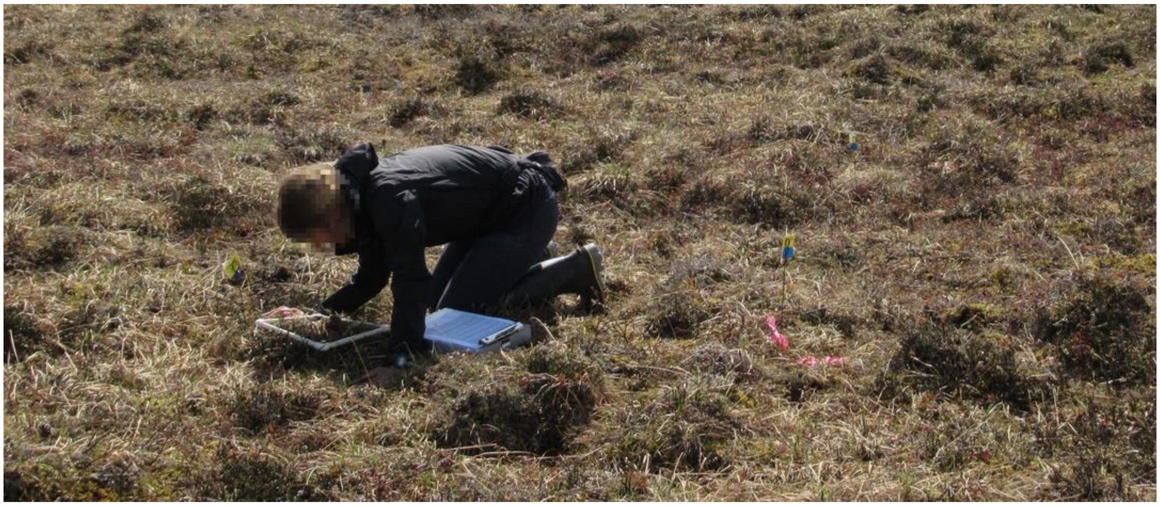

Figure 37 Phenology often requires working on hands and knees.

over the specimen Remy was examining and shifted out of the way and apologized. As we moved down the boardwalk, they explained that Lab N works on a long-term, large-scale project that compares specific data across several continents.

> *The year before they had worked in Alaska on a phenology loop near Christopher McCandless's bus (of Into the Wild fame or infamy). "DON'T GO SEE THE BUS," their supervisor warned everyone! Another loop, or perhaps the same one, was on land owned by an Iditarod legend. Apparently, the musher would also sometimes, as a service, take his neighbors' sick or damaged livestock onto his land and kill them. Remy tells me how he had killed a cow right by one of her specimens, so for the entire season she had to kneel beside the dead, terrible-smelling cow. This came up after they tell me that in 2017, a hunter had cleaned a caribou at the base of one of their trails at the start of the season, so they had to walk past rotting caribou guts each time they did the phenology loop. Seeing the tower in the distance, they are reminded that the musher's daughter would play on Lab N's sensor tower even though she was not supposed to do so (the daughter told Remy "I CLIMBED THAT!"). "Just normal things for remote science" they tell me.*

Later in the season they would tell me that they had encountered caribou hunters camped in front of one of the gates they needed to drive through and had to ask the group of armed men to move their camp out of the way so they could open the gate and drive to the site to do their sampling. The men were not happy to do move but did so without serious incident. “Just normal things for remote science,” indeed.

Everest carried on telling me about Lab N, which he explained was based out of a mountain town in the Lower 48—a very different environment far removed from the Arctic tundra. As such, he explains that sometimes the protocols they are supposed to follow just do not really “fit” with Arctic science.

> *Some measurements are supposed to be done around sunrise, but sunrise was weeks ago, and sunset won’t be for many more weeks. One protocol requires they look for ticks, but a tick has never been found anywhere near PRS. Still, each week, they take out a white piece of cloth and drag it around and record how many ticks they collected. Zero. Again.*[35]

Perhaps the biggest disconnect they contended with nearly daily involved the boardwalk. According to the protocols, they were not supposed to step off the boardwalk, yet 95% of the marked specimens were located from 5 to 25 feet off the boardwalk and required close examination due to their small size (as noted in Chapter Four, flora grow very slowly on the tundra and tends toward smallness). To count buds, check the size of leaves, ground cover, and so forth, Remy needed to be within a foot of the plant (my vision is better than 20/20 and I was unable to make out details of any but the closest plants to the boardwalk).

As we continued around the loop, Everest and Remy told me that working out of PRS was especially fun for them because it was the only place they had been where Lab N worked alongside other groups. While this was much more enjoyable for them, it has not always gone smoothly. From what they heard,

> *When Lab N was new to PRS, it put stress on the station’s*

[35] It should be noted, of course, that they recognized that if (or when) they or someone else eventually finds a tick, it will be an extremely important indicator of change on the tundra.

> *resources and may have angered some of the scientists who had been there longer. Lab N is still learning things about working in the Arctic, so they're sometimes doing things incorrectly or inefficiently. Everest points out that the scientists who have been working longer in the Arctic have not always been understanding about this learning process. He mentions, for example, that when they need to get fish, protocols use a shock method to capture them, but the Arctic lakes around PRS don't have the salinity necessary to carry an electrical charge properly. Everest has heard that people that've been working at the station longer pour salt in the water so the shock method can work.*

At the time, I thought this might be exaggerated a bit; I could imagine some resentment for stressing the station's resources, if that was the case, but I did not think that other scientists would be less understanding about Lab N learning the proper way to do science in the Arctic; however, I later overheard a pair of senior scientists discussing a tower that Lab N had erected that had fallen over due to summer melt. Everest and Remy's statement was confirmed when the scientists said, somewhat dismissively, that Lab N had no idea how to operate in the Arctic. Lab N was established by the time I did my fieldwork, but in my experience, the relationship between the researchers operating out of Lab N and the rest of the station's researchers from all other groups were cordial and helpful to each other.

> *As we go further, they tell me that some Lab N people say the "vibe" at PRS has changed over the years for the positive. They do, however, have a question about the food: "why's the food so good? People will come up anyway to do research," Remy once asked, not really expecting an answer.*

As has already been mentioned and will be discussed further in Chapter Seven, PRS's food is excellent.

> *They ask me more about my research, and I tell them a bit more about total institutions and how PRS is interesting because it breaks down the normal social and spatial barriers between work, play, and the personal. This interests them and they tell me how one of Lab N's offices has something similar going on because the people (who are mostly seasonal) arrive at the same time, work together, become friends and hang out together, and often room*

together, to the point that they barely associate with the locals but rather just spend all their time with one another.

Something that came up working with Everest and Remy, and indeed, many of the scientists I worked with, is how inquisitive they were. They were genuinely interested in my research even though it was far different from their own, and they were eager to learn things and talk about new ideas. The many social gatherings fostered this curiosity and often individuals or groups that studied completely different disciplines would be engaged in deep conversations somewhere between their fields.

Yet another example of their curiosity presented itself as we neared the Geoblock again, having traversed the entire phenology loop. Everest stopped to examine a strange conglomeration:

> *A mold or fungus growing on a pile of poop. They speculate on it and Everest suggests maybe voles "shit" in a certain chamber so as not to "shit in their nest." Remy teases Everest about being a nest-shitter. But after a moment they are telling me that the voles like the boardwalks, maybe because the space under them offers protection from the elements and from predators, so the teams who work with voles can't use boardwalks because they skew the results of their studies.*

Interestingly, without realizing it, they touched on one of my interests with the conversation on voles and boardwalks. Here was yet another example of how scientists had to adapt their methods for Arctic work.

Once we got back to the truck, we ate our lunches while watching a bird—a plover as I recall—flying nearby. Everest told me that it eats eggs from other birds' nests and that a team of researchers had once used flags to mark nests, but this kind of bird (smart like a crow, he says) figured out that the flags were marking nests and had raided every one of the flagged nests. After lunch, we drove back to the station. Along the way, Everest and Remy decided to do an impromptu research study to see if truckers are nicer to women or men along the road.

> *They briefly discuss the idea of asking for some sort of favor on the CB radio but decide that won't work. Finally, Remy suggests they can just count reciprocated waves, initiated either by her, by Everest, or by both. They decide the test will run for several days to get a larger sample size.*

Everest and Remy enjoyed playing these sorts of games. The drives, and sometimes the walks between sites, could be extensive so they were constantly finding ways to pass the time more quickly. It was particularly interesting to me, how they discussed a research plan until they settled on something they were happy with. Another example will be mentioned shortly.

After we got back to the station, Everest and Remy invited me to go out with them again to check the mosquito traps they had placed that morning. An hour and a half later, I am in the truck with them again, this time with Remy driving. As we drive, they explain what the protocol is:

> *The mosquito traps we're checking must be out for eight hours, not a minute less, and ideally not much more either.*

They had set the traps in the morning, having left the station at 7:30am. We arrived at the first trap about five minutes ahead of scheduled and had to wait to collect it. As we waited, they explained how the trap worked.

> *A metal bar (the type used to hang plants) is driven into the ground. A small blue thermos containing dry ice hangs from the top of the bar. As the dry ice sublimates, carbon dioxide escapes the thermos through a hole in the bottom that is placed at about the same height as a caribou's head. "Mosquitoes are dumb," so a thermos emitting carbon dioxide is the same to them as a caribou emitting carbon dioxide. When a mosquito goes near the thermos, a battery powered fan sucks it into a mesh bag and traps it within.*

Exactly eight hours after they set the first trap, they started taking it down. There were only a few mosquitoes inside, but they did not pay much attention to that. They instead recorded the time and made sure the trap still contained dry ice (so they would know that the trap had worked properly for the full eight hours); they also marked which bag came from which trap, which would be important later when they examined the contents of the traps. The metal bar the trap hung on was left in place, but the trap itself was broken down into its four components: thermos, fan/shroud, catch bag, and battery. While I was unable to help on the phenology loop, this time they gave me the battery to carry while they carried the other three pieces between them. At each area we checked and disassembled several traps then we would return to the truck, place the batteries in a bin inside the truck's cab and put the thermos and fan into bins in the bed. The mosquito bag (and the remaining dry ice) was placed in a cooler with more dry ice to keep the contents refrigerated.

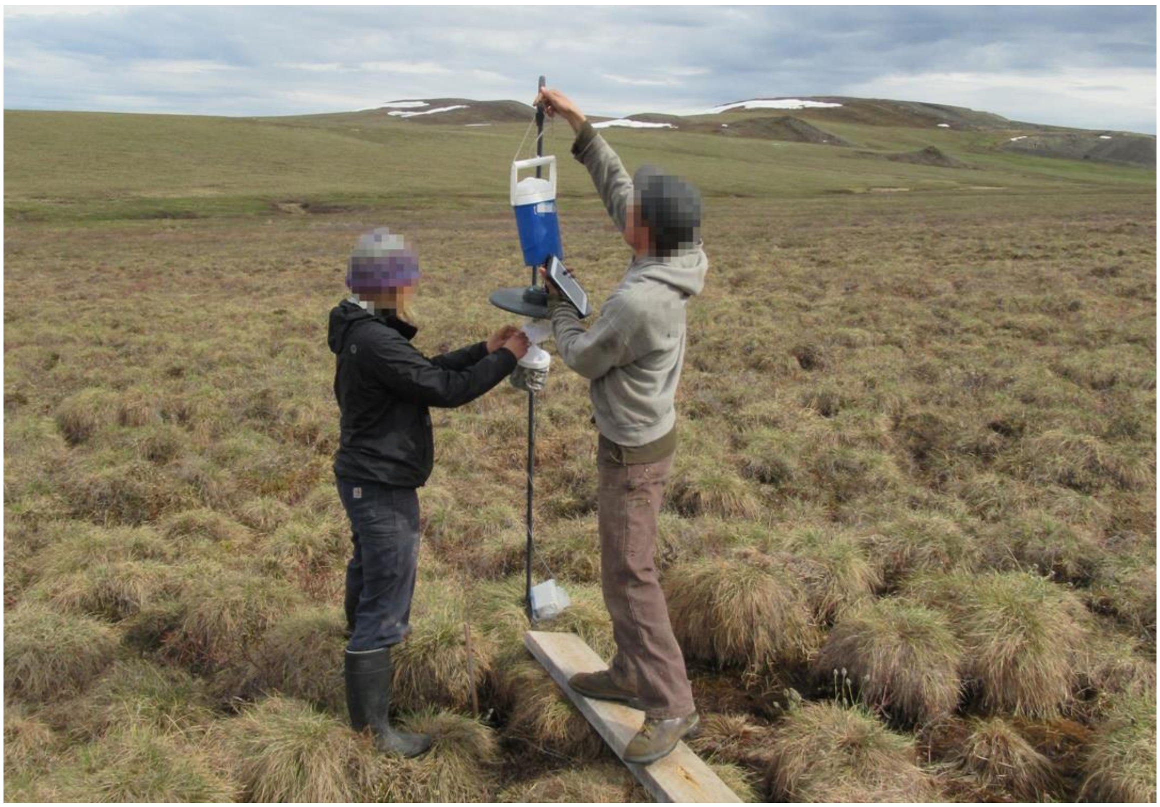

Figure 38 Taking down a mosquito trap.

When powering the traps, the batteries are placed in Ziploc bags to keep them from getting wet, but as we worked several batteries tore through the bottom of the fragile bags as they changed hands. Everest tells me that "down south" they only use the Ziploc bags once, but he is trying to get more uses out of them. This makes sense at a place like PRS, where all trash that cannot be burned must be hauled out at a significant cost, but Everest and Remy—like most of the scientists at the station—are also cognizant of their environmental footprint, and as we work, the two of them discuss other ways that the traps might be done with less waste.

> *perhaps a Pelican-style case to contain the batteries, one suggests. Everest says, they "talk all day about what to do to make the protocols better."*

I believed him as they had already discussed the protocols several times and it was only my first day out with them. They went on to tell me that in the coming months the mosquitoes will get so thick that, in eight hours, they will fill the traps completely, and that once the bag is full, the mosquitoes that continue to get sucked into the fan are cut apart by it, with all the mosquitoes in the bag becoming covered in "mosquito sludge."

Everest and Remy knew exactly where to go, and in what order, and by the time we reached the second to last trap (of somewhere between 15 and 19 total traps), we were only two minutes behind (meaning that trap was up for 8 hours and 2 minutes). Once that trap was down, we drove back to the station, parked in front of Lab N, but headed directly out to the boardwalk to check the last trap. We all laughed as we walked by the ground squirrels who would peek out of their holes in the hillsides to watch scientists pass, sometimes while screaming angrily.

Once we were back at the lab, I helped Everest put away the equipment into the two large shipping containers Lab N used for storage. Marlon, another researcher with Lab N, had devised a hanging system that allowed the fans and thermoses to hang high in the top corner of one of the shipping container's long walls. Everest tells me he really likes the organization because it makes things easy if his boss shows up with short notice and it makes it easier to pack for the different protocols. By the time we finished putting away equipment it was just before dinner started. Everest and Remy put the mosquito bags into a refrigeration unit (to await examination the next day) and then closed lab for the night. Ending an 11-hour work day, they headed toward the dining hall for a much appreciated meal.

I learned later in the summer that each time Everest and Remy set mosquito traps, they tried to do it quicker than the time before; this often involved brutally fast hiking across open tundra while loaded with all the equipment necessary for the protocol. It was, at least partially, for this reason that they did not think I would want to go with them when they had first invited me into the field with them. This game continued throughout the season where each time they set mosquito traps, they tried to break their previous record. In fact, much of the time when they could move quickly without affecting the quality of their work, they would see if they could do a task faster than they had done it before (e.g., when setting traps they would race their best times, but not when doing phenology or other observation-based protocols).

Everest and Remy seemed to spend more time in the field than many of the researchers, but they still spent around a third of their time in the lab. If they spent a full day out in the field, which was not unusual for them, the next day was often spent half or fully working in the lab.

The next section discusses laboratory work at PRS.

Laboratory Life

Many excellent studies focus on laboratory work, a few of which have already been mentioned in Chapter Two, thus the focus of this chapter is more about fieldwork; that said, it is worth remembering that all work out of the station is, in a sense, fieldwork. While the laboratories at the station are used extensively and allow much analysis to take place in situ, there are limits to what can be done; even if equipment is not the limiting factor, time may be. Thus, for many of the researchers working out of PRS, much of the lab work will be done in the off-season at their home institutions.

Narrative: Lab S visit.

Several weeks after that my first outing with Everest and Remy, an ecologist named

Hadley sat across from me at lunch. I knew him from the February planning meeting, but it was my first time seeing him at the station. When I asked, I found out he had only just arrived a few days before. Marlowe, another ecologist I knew from the meeting, took the empty seat beside Hadley. Hadley was around my age, but Marlowe was probably 20 to 25 years older than I. Marlowe greeted me, apparently remembering me from our shared table at a pub. The pub had been the only place in town that was open after the meeting had ended, so it was the place to be for thirsty scientists. Although we had not come together, we ended up at the same table as seating was limited. Hadley, I had learned was a postdoc studying soil ecology, and Marlowe was a professor of ecology. We had spent several hours drinking beer and talking about music, philosophy, politics, science, and all the other subjects slightly inebriated academics enjoy discussing until the bar's 10:00pm closing time. We talked through lunch, and afterwards, Marlowe and Hadley invited me to drop by their lab when I had time. I had fieldwork scheduled for the rest of the day and the next, but I let them know I would be by as soon as I could.

The following day, during a lull in fieldwork, I stopped at Lab S to take them up on their invitation. Unlike most of PRS's labs that use doublewide trailers, Lab S was a WeatherPort. With a footprint of only around 20' x 20', Lab S was also only about a third of the size of most of the other labs. When I arrived, another pleasant day, the door to the lab was open with a screen keeping the mosquitoes at bay. I said hello and was invited inside.

> *Sunlight filtering through the white fabric walls made for a bright interior, even without the corded lights hanging overhead. Two walls were lined with blue cabinetry with black counter space, while the other two walls were lined with heavy duty metal shelving filled with dozens of white buckets. Makeshift 2x4 shelving (with lighting below) was mounted to the framing above the counters. Extension cords, supplying power from a central location, crisscrossed the floors and shelving.*

While one might assume a WeatherPort would be a subpar laboratory compared to the hard-sided buildings, it is important to remember that WeatherPorts are quite common for polar research stations, and its makeshift interior was more a statement about it recently being put into use rather than about the lab's overall quality. In addition to seeing use as living quarters, storage spaces, and meeting halls, WeatherPorts were also used extensively for housing larger experiments that did not fit in the hard-sided labs; one WeatherPort, for example, housed close to a dozen large tanks filled with Arctic fish.

Besides Marlowe and Hadley, two others—one I recognized from the planning meeting but the other was a stranger—were at work at folding tables in the center of the room; Hadley introduced me to them. Ellis, who I recognized from the meeting, was working on a laptop, and Kit, the stranger, was working with a soil sample. The folding tables they worked at sandwiched two tall shelving units made from plywood.

> *Each of the shelf systems held three rows of experiments. A string of large outdoor-style Christmas lights dangled a few inches below the shelf from which it hung. Below each light was a funnel filled with soil with the funnel resting in holes cut into another shelf. Below the bottom opening of the funnels were liquid-filled jars marked with a number. A piece of heavy aluminum foil encased each light and funnel into one unit.*

The shelves were clearly purpose built for an experiment, but I did not know what the experiment was. Hadley explained that they were looking for microbes in the soil and the setup was made to extract the microbes.

> *Both the brightness, and more importantly, the heat of the light would drive any microbes deeper into the soil where they would eventually fall through the bottom of the funnel into isopropyl alcohol below.*

When I looked again at the larger shelves along the wall, I realized they were similar in design but used buckets instead of funnels, and rather than lights encased in aluminum foil, they used a metal lid with a built-in lightbulb (perhaps intended for this purpose). Blue tarps hanging behind the shelves helped regulate the direction of the light.

The design was elegant in its simplicity. I asked if they had come up with it, but they explained that similar setups had been used for a hundred years. My question, since both Hadley

Figure 39 Soil microbe experiment.

and Marlowe were familiar with my research interest, shifted the conversation to creative work. Hadley suggested Christmas in July and the Fourth of July holidays as being excellent examples of creativity; he also told me a few locations where I could find some Christmas in July presents that—for whatever reasons—were not able to make the journey home and had thus become station decorations. My favorite, easily missed until Hadley told me where to look for it, was a Rudolph the Red-Nosed Reindeer made from bicycle parts.

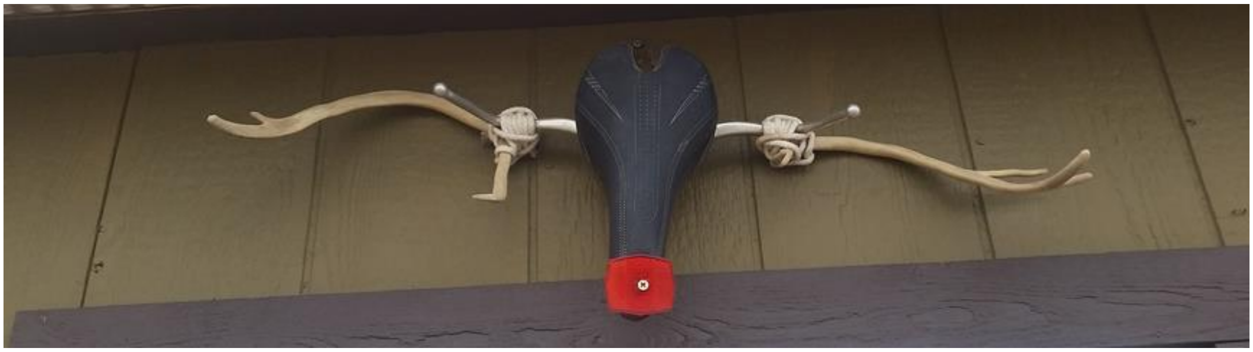

Figure 36 Rudolph the Red-Nosed Reindeer sculpture decorating one of the station's buildings.

Talk about the station's holiday celebrations then shifted the conversation toward sociality at PRS. Marlowe had worked out of PRS for decades and Hadley was just short of a decade himself, so they had first-hand knowledge of the changes over the years. Hadley tells me that the station has become much more social but in a different way.

> *Years ago, everyone would sit down and watch a movie together even if it wasn't their thing, but now with the much larger population and the increase in things to do, there are few times besides the bonfires and special events where the entire station gathers.*

The conversation continued to move quickly, and in different directions, and the talk about sociality lead to a discussion about alcohol as a social lubricant. Hadley mentioned that they had to get the rules changed for drinking in lab areas because there were only lab areas at one time. He also mentioned, that at one point, PRS had almost become a dry station (meaning no alcohol allowed), but important people had been willing to fight that because they believed going dry would have been detrimental to the station. Marlowe agreed with this and mentioned the symposium as a diplomatic way of talking about the importance of alcohol to science, and that the station, with events like the bonfire, was carrying on a long-standing Western tradition in science and philosophy where scientists get together to drink and talk about things.

As the conversation moved from topic to topic, I was again struck by the curiosity and interest that so many of the researchers shared. They were interested in so many different things and wanted to talk about them all. As we talked about these different things, I nearly missed Hadley's statement about the changing of the rules for alcohol in lab areas. After that statement, I took more notice of the lab areas and the freedom the researchers enjoyed within them. Sometimes later in the evening (after normal working hours had passed). I would stop by a lab and find someone hard at work but also nursing a bottle beer. Other times, people would be hard at work, doing some sort of intensive analysis, while wearing a unicorn onesie. While I can only speculate on this, I suspect there were two things at work here: (1) the researchers simply had more freedom because, in many cases, they worked on their own with no boss or advisor onsite, so they had the freedom to be a bit silly or a bit less formal than they might be otherwise; but also, (2) even in cases where a boss or advisor was around, there still seemed to be an unusual allowance for harmless shenanigans, which I suspect was at least partially because the researchers did operate under so many stressors. Anything, within reason, that eased that was encouraged.

At one point, someone I had not seen before came in and asked Marlowe about the potential to do an experiment in puddles, but Marlowe suggested he talk to a different PI instead; oddly, I never saw that person again. With the interruption breaking the momentum of our conversation on sociality at the station, Hadley motioned for me to follow him to a microscope outfitted with a screen. Marlowe, and even Ellis and Kit, gathered around also.

> *Hadley pushed a button, and the dark screen came to life with a large image of an impossibly small creature I recognized immediately as a tardigrade. For several minutes the five of us watched it swimming around, largely in silence. I would have assumed it was something completely ordinary for them to see, yet they all seemed as taken with the water bear as I was. It wasn't until later that I realized I had been so entranced by the small creature that I hadn't even thought to take a photo.*

That moment—all of us entranced by that tiny, resilient creature—is one that has stuck with me. It captured a feeling that was present so much of the time in both the fieldwork and the laboratory work: wonder. Everyone at the station—scientists, staff, myself—were captivated by the world around us. Everyone, working in so many different disciplines and on so many different projects, were there for this same reason: something had captivated their interest enough to bring them to this remote place, to leave behind family and friends, to shower once a week, and fight hordes of mosquitoes, so they could follow their sense of wonder.

Unfortunately, my Lab S visit did not last long as Marlowe and Hadley had fieldwork planned and needed to get going (and knowing their distant site, I assumed that meant they had helicopter time scheduled). I had hoped to visit again to talk more about their work, but I had not realized that they were only planning to be at the station for two weeks; they were gone before I knew they were leaving.

Maintenance, Repair, and Planning

Unfortunately, not all science is making phenological observations or marveling over tardigrades. In the Arctic, moisture, cold, high winds, and freeze-thaw cycles limit the viability of long-term infrastructure. Greenhouses, shade houses, boardwalks, and even marking stakes require maintenance, repair, and/or replacement. This is particularly true at the beginning and

Figure 40 Even t-posts bend and collapse over repeated Arctic winters.

end of the field season. At the beginning, much of the infrastructure used in scientific work needs repairs from damage inflicted by the Arctic winter. Maintenance happens throughout the season as time permits or circumstances necessitate. Planning, of the type discussed here, primarily happens toward the end of the season as groups ready their labs for seasonal closure, or alternatively, toward the end of an individual researcher's time at the station. This work may not be direct science, but it is critical to scientific work; and much infrastructural hypervigilance is related to this type of work.

Maintenance and Repair

Steven J. Jackson writes of an "always-almost-falling-apart world" and of a "world in constant process of fixing and reinvention" (Jackson, 2014, p. 222). In the Arctic, both of these are true, with a minor correction: in the Arctic it is an "always-~~almost~~-falling-apart world." It might seem that with the focus being on repair, that this shifts back to the traditional conception of infrastructure: it broke, so it is visible. There is a temporal component at work here, however. Infrastructure breakdown is expected. It is inevitability rather than possibility. The visibility does not come with the breakdown, rather the visibility precedes the breakdown, and the breakdown can be acted on immediately (and often necessitates it).

Figure 41 The tundra overtaking greenhouses and shadehouses that have been warped by the harsh Arctic weather.

Narrative: greenhouse repair.

While Los Angeles celebrated a warm, sunny Fourth of July with barbeques and beach parties, a powerful storm swept through PRS. High winds drove the windchill well below freezing and caused the lake to churn with whitecaps. While most of the station's inhabitants took the stinging sleet as a cue to work inside, a few continued their work in the field. Fortunately, the Fourth of July Parade was scheduled to take place the coming Saturday, and the weather did little to spoil the Fourth of July meal the kitchen had prepared: fillet mignon with shitake mushroom sauce, crab legs, and strawberry shortcake for dessert.

After dinner I joined Tristan, a doctoral student, at the pond as he ran one last series of tests ahead of his departure the following morning; he had only been at the station for a week and was disappointed he was going to miss the upcoming Fourth of July Parade. The roaring wind

Figure 42 Research continues even during storms.

made it difficult to hear one another, even yelling, so I silently observed his work from the boardwalk bordering the pond and took some photographs and video for him (most of his fieldwork is done solo in alpine environments, so he was very appreciative to have some photographic documentation of his Arctic fieldwork). After he had finished his work and retrieved the last of his instrumentation from the pond, I helped him carry the equipment back to his lab.

It had been a long day and busy day, and I was considering going back to my room but instead decided to stop by the dining hall. I wiped the mud from my feet, entered the first set of doors into the dining hall and almost collided with Jontur—who seemed visibly stressed and quite distracted—as she hurried the opposite direction. When I asked if she was okay, she said she was on her way to check the greenhouses. I asked if she wanted a hand, but she just shook her head "no" without stopping. Until that moment I had not thought of the greenhouses during the storm. Seeing her concern made me realize that they might not survive the storm. Although I had been at the station three weeks, I was still deeply in the learning phase of hypervigilance; Jontur, however, in her third year at the station, knew exactly what to be concerned about.

As was typical on a rainy evening at the height of the summer, the dining hall was filled with people chatting and playing games together. Several people did not look to have moved since finishing dinner. Although the dining hall was not as busy as it had been during the holiday feast, it was much louder than before; this was also common, especially on holidays when people were less likely to return to work after dinner and more likely to relax with a beer or glass of wine. Later in the evening, as I drank hot tea trying to warm up after sitting too long in the chilly community center, Jontur approached and asked if I could help her repair the greenhouses in the morning if the weather improved. We had talked about doing minor repairs on them earlier in the week anyway, so I quickly agreed to help her.

The next morning, she sent me a me a text message asking to meet at 9:15. She had a backpack full of miscellaneous parts and tools, a plastic bag filled with more of the same, and a cordless drill and driver set. I tucked the bag and the cordless tools into my own backpack, and we walked toward the boardwalk. Although the thick clouds were still an angry mix of grey and black, the wind had died down and it was only sprinkling rain off and on. As we walked up the boardwalk toward the greenhouses, she told me about the experimental plots. Although I had heard some of it in the planning meeting, it made a lot more sense as she talked.

> *She pointed out the various locations and explained the experimental plots; most involved different treatments that mimicked natural processes that Arctic could experience due to climate change: greenhouses and shadehouses raising and lowering temperatures, different types and quantities of fertilizers added, and so forth.*

While Jontur seemed to be friends with everyone at the station, as often as not, she worked alone in the field, so I was particularly appreciative of her efforts to explain the experiments. Something that would later become apparent was the magnitude of repair work that could be necessary, much of which she did herself. If, from the start, maintenance, repair, and planning work had been done yearly, perhaps one person could keep up, but now that seems impossible.

Much of Jontur's distress from the night before had faded. Although she was still concerned about the repairs ahead of us, her happiness to be working on the tundra had returned.

> *As we walked toward the greenhouses (placed in some of the furthest plots accessed by the boardwalk), she made several brief stops to admire a flower, a plant, or a shrub just off the path, or she would turn around and look over the tundra toward the station with a contented smile.*

Like so many of the researchers working at PRS, she genuinely loved the station and the Arctic landscape, and just being in the field seemed to raise her spirits. In the distance, several groups and individuals were already at work on the tundra. They largely looked the same to me because of the widespread use of Bugshirts to protect against the hordes of mosquitoes, but

Jontur knows the areas well enough that she can recognize who most of the shapes are by what they are doing and where they were doing it. I later learned that not only do many people recognize each other like this, but also how to do it myself.[36]

> *As we neared the greenhouses, Jontur showed me metal tags screwed into the boardwalks in places. The tags are roughly stamped to identify the plots according to their fertilization type (e.g., nitrogen or phosphorus) and levels. She pointed out one that started receiving a different kind of fertilizer ten years earlier when the type they were using before became more difficult to get because of its usage in bombs; the experiment, she explained, was to see whether the new fertilizer would perform similarly or not.*

While this could have happened anywhere, and probably did happen in many places, the change in fertilizer suggested more of the adaptability that was so necessary in Arctic science; things can change quickly. Sometimes a fertilizer that has been in use on an experiment for 20 years becomes more difficult to get, other times a storm comes through and tears apart a group of greenhouses. Again, this was a form of infrastructural hypervigilance, as the scientists anticipate and react to these difficulties. The night before Jontur realized what the storm might—and did—do and less than 12 hours later she had formulated a rough plan of action to address the damage.

> *Each greenhouse was about a quarter of the size of the plot it was placed on, centered on one side near—but not against—the boardwalk. The greenhouses were structures of metal hoops with thick plastic walls stretched over them, each approximately 10' wide and 30' long with a center height of about 8 feet. Each greenhouse was vented from the top—basically a 3-sided slit in the roof stiffened using PVC piping—via a temperature sensitive spring unit. A slit in the center of the end wall served as a door. The slit could be closed most of the way by looping a thin rope around several deck screws along the center post. Even closed, there was an opening one to two inches wide and five to six feet high, but the temperature inside was considerably warmer.*

---

[36] After I had been at the station longer, I would often find myself in the field with various groups playing the same game that involved guessing who someone was from some distance away. Often, since we all used the same boardwalks to move around the field sites, we would pass by the mysteriously garbed person to confirm or disprove our guesses.

The interiors of the greenhouses were often some of the most pleasant places to work. Several times throughout the summer I found myself jacketless inside a greenhouse as we did phenology reports, when I would have been shivering had I been outside; indeed, Jontur told me that, several times in greenhouses further from the station, she had found imprints from hunters who had slept in the sheltered piece of tundra. While she did not seem too concerned about it, I was reminded of the stories Everest and Remy told me about remote science; they had yet to tell me about encountering the hunters blocking the road, so I did not ask Jontur what she might do if she encountered a hunter taking a nap in one of her greenhouses.

Jontur had planned to do maintenance on the greenhouses sometime that week and had already recruited me to help, but the storm turned what had been intended as minor repair work into a considerably bigger—and much more pressing—job. While necessary, the vents proved to

Figure 43 One of the greenhouses badly damaged by the Fourth of July storm.

be problematic in the storm; the high winds had created long tears down the walls starting at the edge of the vents. Jontur hypothesized that part of the problem was that some of the clips that attached the plastic sheeting to the PVC piping were "light grip" and had come off under the force of the wind, which allowed the wind to slowly tear the loose flap of plastic down the sidewalls. This theory seemed to be correct as we found light grip clips—identifiable by their color—laying on the tundra under the vents.

Greenhouse One, the furthest along the boardwalk, sustained the worst damage, with massive tears down the side walls and both end walls blown down. The edges of the sidewalls, usually held in place by tension from the end walls, were also loose and had started to peel away from the hoops. After a bit of deliberation, Jontur decided to start on Greenhouse One since it had sustained the worst damage and would lose heat the quickest. I had not yet worked in the plot themselves, so I asked her about stepping in the tundra. She told me it was necessary to make repairs but to try not to step in the plot more than was needed to complete the work.

> *We started with the back wall. It had been blown down, but the plastic wasn't torn. The wall should have been held in place by a rope snaking through thick plastic grommets and knotted to a bar at each bottom corner, but the plastic end wall was slightly too small for the grommets to all sit behind the hoops. This meant that when the wind started blowing through the greenhouse, the walls blew outward and collapsed. While Jontur stood on a ladder in the center of the back wall, I did my best to put the sides of the back wall where they should have been. We pulled hard on the rope to get the wall as tight as possible.*

The work went by quickly, and Jontur clearly knew her way around the greenhouse's construction. I found out later that she had only put up the greenhouses a few weeks before the storm, so their assembly—and the issues like the use of light grip clips—were still fresh in her mind.

Jontur decided we should concentrate on the massive hole in the roof before the front wall since it would be easier to get the ladder inside with the front wall down. I asked about four yellow flags marking a small square near the front left side of the greenhouse.

> *Yellow flags mark an area where she does phenology throughout the season. Once or twice a week, throughout the summer, she carefully examines the square and notes each type of plant that is or isn't present and where it is in its life cycle. A week or two later, she invited me along with her as she did phenology throughout the plots, and this quickly became one of my favorite field activities as she taught me the types of plants and the lifecycle of each. As a mediocre biology student, I found a lot of joy when, on occasion, I'd find the type of plant we were looking for before her, and I was particularly proud when I remembered it by name rather than using the illustrated guide she brought along for me.*

One of the things that struck me is how some of the people I worked with would invite me along for things that they really loved doing rather than just for things they needed help with. For the greenhouse repairs and much of the maintenance and planning work we did later in the season, Jontur really benefited from my help, but even at my best, when doing phenology, she was likely slowed by my presence. Still, she invited me along, I believe because she wanted to share with me her love for the work she was doing. And, as my notes said, I absolutely loved the style of phenology that Jontur did. Whereas Everest and Remy focused on single specimen scattered throughout a large area, Jontur's style of phenology had us combing through everything in a one-meter by one-meter area. It was the tundra in microcosm.

To avoid stepping in the plot any more than necessary, we used three blocks of lumber (basically 4x6 pieces about a foot long) and two planks (eight-foot long 2x12s) to make temporary boardwalks inside the greenhouse. Jontur placed one block about eight feet into the greenhouse, and I handed the plank across to her to place on the block. I then tossed the other block in and placed the other plank across to it. This created a wobbly 11.5" wide walkway reaching just past the center of the greenhouse. With the added height of the makeshift boardwalk, I could just touch the peak of the greenhouse with the tip of my fingers; Jontur was unable to reach the plastic and we quickly realized the ladder was the only option.

> *As Jontur climbed on the ladder, the spongy tundra caused it to tip precariously, so the first part of my job was to keep the ladder steady as she balanced on it four or five feet above the uneven tundra. I took on the role of greenhouse assistant surgeon, handing her the roll of greenhouse tape, or more often, cutting pieces of it to whatever length she needed, handing her scissors or taking them back, tracking down PVC clips, or whatever else she needed. Several times I acted as a second ladder, as she would balance with one foot on a ladder rung and the other on my shoulder to work on part of the tear that would otherwise have been unreachable. As she stood on my shoulder, I would carefully use one foot to keep the ladder under her steady as I continued to cut and hand her pieces of greenhouse tape. It felt a bit of an acrobatic routine, but it was effective.*

After a bit of trial and error, we discovered that taping worked best as a two-person job with one of us on the outside of the wall and the other on the inside.

> *The tear at the peak required Jontur to be near the top of the ladder, using my shoulder for balance, hanging out the vent while I stretched my fingertips up to the inside of the plastic to give her a firm area to push the tape against. Once the peak was mended and we were able to work without the ladder, it became a much easier job. We worked facing each other, Jontur inside the greenhouse and me outside. With our left hands, we would pull the torn plastic as close together as possible; then, with our right hands, we'd push our palms together hard from opposite sides of the wall, with the tear and the greenhouse tape between. We'd push up and down the length of the tear to try to get the tape to seal against the plastic wall material. The process seemed somewhere between a pairs mime routine or the meeting of two friends separated by a pane of glass, but like the acrobatic routine on the ladder, it was effective.*

Eventually we mastered the routine, and although we talked some, we mostly focused on the work. We finished repairs on Greenhouse One in about four hours, then took a short, late lunch, and then returned to the plots to fix the other two damaged structures. Using the same acrobatic/mime routine, we fixed the second and third over the next four and a half hours. While the worst of the storm had passed, the temperature outside the greenhouse had remained cool, and we spent much of the day wet from the intermittent rain (which was enough to get us wet, but not enough to warrant the loss of mobility caused by rainsuits). We got back to the station around 7:00pm, nearly an hour late for dinner, but we found, much to our relief, that the food was still out, and more importantly, still warm.

Figure 44 The same greenhouse from Figure 40 after we completed repairs.

Repairing the greenhouses felt like a turning point in my stay at PRS. Before, much of the time I spent in the field, had just made me feel like an observer. I helped as much as I could, but that help was largely limited to data recording or carrying equipment. While I knew I was helping a little, I realized that, at best, I was speeding up the work by maybe 10 to 25 percent. Working on the greenhouses, however, left me with a feeling of accomplishment, as it was the first time I felt like I had actually shared an equal amount of work with my partner-of-the-day. When Jontur told me that she could not have done it without me, I knew she meant it, and it was a good feeling to have contributed to the station. After our successful greenhouse repairs, Jontur often came to me for help with repair work, and any time I was not already working with another group, I jumped at the chance. Working on these types of projects with Jontur, and with several others, throughout the season made me realize how much work—scientific and otherwise—in an

ICE environment involves maintenance and repair.

Planning for Those Who Come After

Another key aspect of scientific work in ICE environments is planning. The type of planning discussed here goes beyond the normal level of planning in science (e.g., creating and implementing a repeatable method of study), rather this type of planning is often at the most fundamental level, almost akin to making sure there is a shared language for discussion in the first place. This type of planning is the teaching of infrastructure in both the common sense (i.e., in that infrastructure is learned as part of membership) and is hypervigilance in the extreme as it is working to impart knowledge—how to see and react to that infrastructure—to someone in the future. Planning is a type of maintenance that carries ethical weight. The people who are planning do not necessarily know who they are planning for, but they know that the planning benefits the project currently under their care. Planning is preventative maintenance and preemptive repair.

Narrative: Geoblock paths.

Several weeks after helping Jontur repair the greenhouses, Everest and Remy invited me to help with some work on the same phenology loop where I first accompanied them. Although I had been out with them several times since, I had not been back to the loop since early in the season, so I jumped at the chance. Apparently, their concerns about the distance between the boardwalk and the specimens had finally been heard and they were told to place Geoblock between the boardwalk and the specimens flagged for observation.

I helped load the truck with Geoblock and we drove to the phenology loop, again passing the religious graffiti. We unloaded the Geoblock to the foot of the boardwalk. Each of us picked up a stack, carrying somewhere between six and eight pieces each, and set out single file along the narrow boardwalk to its far side. After several trips, each shorter than the one before so we could leave the piles balanced on boardwalk, we had placed most of the blocks in strategic locations along the path.

The Geoblock was meant to protect the tundra, so that Everest and Remy, and whoever took their place in the coming years, could observe each specimen from the necessarily close distance with less damage to the tundra. When we started laying the Geoblock, we found the plan still had some flaws.

> *we quickly discovered the shape of the block—something like a foot and a half wide by three feet long—fit poorly between the tussocks. When we'd try to place a block, it would bounce up and down, rock back and forth, or act like a teeter totter on the uneven ground.*

They talked about it, and after asking my thoughts, we all agreed that the unsteady Geoblock might do more harm than good. They recorded a five-minute video with Everest explaining the issues and showing how much the Geoblock moved around at a few different locations to send to their boss (who only very occasionally visited the station). We left the Geoblock stacked along the boardwalk and drove back to Lab N. Once there, Everest carefully composed an email and attached the video and sent it to their boss. Their hope was that they could work out a plan for protecting the sites. A few minutes later, however, a reply came back that said something similar to "just put the Geoblock down like you're supposed to."

> *They were frustrated by the reply since their boss didn't really seem concerned about how things worked on the tundra and just wanted to use the same methods that were done elsewhere. The purpose of the Geoblock was to protect the tundra, but if it was causing more damage than the repeated footsteps of those doing phenology, what was the point?*

The next day Everest messaged me and let me know that he and Remy had an idea. I met up with them, and we drove back to the loop. Their idea was to cut the blocks into smaller pieces that could be placed more carefully between the tussocks; this would allow the smaller blocks to sit on fairly level ground. The idea seemed sound. Everest retrieved a cordless sawzall from the bed of the truck and cut a few pieces from what remained of the pile at the start of the boardwalk. Each piece became two or three smaller pieces, and we carried those smaller pieces out to the first specimen.

> *After building a few paths, Everest and Remy had a good idea of how best to put the Geoblock down, and we soon had a good rhythm going. I ferried full pieces from the piles left on the boardwalk to the path they were constructing, while one of them handed whole or cut pieces to the person laying the path. When we ran out of cut blocks, we would all return to the truck, Everest would cut more pieces, and we would each carry a load of cut tiles back.*

Despite the speed at which they worked, Everest and Remy took great care in placing the tiles to do the least damage possible to the tundra. To reach some specimens, only a single piece of Geoblock (either full sized or cut into smaller pieces) was necessary, but to reach the furthest (as far as 25 feet off the boardwalk), as many as six of the full-size tiles or a dozen cut pieces were necessary. In some places the smaller cut tiles were able to sit between tussocks, and in other places, they were used under one side of a larger piece like a shim. Since the phenology loop did not see constant use (and only Lab N used it), they did not need a continuous path. All they needed was for the path to be easy for future workers (who might not be as young or agile as Everest and Remy were) to use. Thus, they tried to keep the blocks about one foot apart, so that it was easy to hop between the pieces. At the end of each path, they always left at least a half block well-positioned by the flagged specimen so that whoever was doing the phenology would have a solid place to stand or sit while making observations. Although their design used more Geoblock than would have been used had they been less careful, the resulting paths were easy to navigate, caused less damage to the tundra than they might otherwise have, and were less likely to send someone tripping face first due to a block shifting underfoot.

Although these paths were addressing a problem that Everest and Remy had encountered, the work they were doing was not only for them. Both Everest and Remy were as agile and resilient as mountain goats and would have had no trouble moving through much more precarious terrain than what they left. The entire time they were putting down the block, they were thinking of whoever would be taking their place the following year. Perhaps it would be someone who could not jump as far as them or just someone who was not very coordinated. This idea of planning for future researchers was prevalent among those I worked with at PRS. Most of the researchers had a fairly good idea if they would return the next summer, but there was never a guarantee: their funding might run out unexpectedly, their academic direction could change, or a pandemic could even close the station to all but a skeleton crew (as happened two years after I was there); however, since they cared deeply about their work, the station, and the tundra, they would take the time to plan ahead for whoever might take their place. Often this took the form of fixing problems they encountered, for example, building paths to specimens they needed to reach or repairing boundary markers around plots that had been damaged when they arrived. They would often, as the saying goes, "leave it better than they found it."

Narrative: end of season preparations.

During my last few days at the station, the season was clearly winding down. Many of the individuals and groups I had worked with throughout the summer had already gone, and most of those still at PRS were making final preparations to depart the station within the week: collecting their final samples or data sets, packing samples and equipment, making shipping arrangements for those samples and/or equipment to go back to their home labs, and cleaning and preparing the lab spaces for winter. This final preparation was particularly important as most of the labs are closed during winter. I had already planned my own departure and would be riding back to the logistics trailer with office with Eddie; he warned me that the van was going to be full of shrubs (specimens for his graduate work). Like many others, I was feeling a bit sad about my upcoming departure, despite a last solo hike to Bear Mountain's summit and a grizzly bear sighting (thankfully I saw the large, hungry grizzly foraging for food from the dining hall's balcony rather than while I was hiking).

There was little fieldwork left to do, so I had spent much of my remaining time working with Jontur as she prepared for her own departure. Several days earlier we had taken down the mesh from the last group of shadehouses. If the shade cloth remained up, the winter's accumulation of snow and ice would destroy it (and likely the weathered frames underneath). To avoid this, at the end of each summer, the mesh is rolled tightly down to the base of the frames where it would remain until Jontur, or someone taking her place, puts it back up again the following field season.

The next day, I had again worked with Jontur doing repair and planning work on some of the plots near the site of the original camp. That morning I stopped by Lab R and picked up a bunch of 1x4 material she had found in one of the lab's storage containers. While Jontur worked at her computer, as she often did in the morning, I took the 1x4 material to the woodshop and ripped the boards down to 1x2s on the table saw and then cut all the material down to 18" pieces with a beveled point at one end. The result of my work was about 100 sturdy stakes we could use to mark plots. I met Jontur back at her lab and we loaded some tools into the old truck she used to get to her sites. We drove over to the woodshop, put the stakes I had cut into the back of the truck, and then drove back to some plots near the shadehouses we had worked at the day before.

Jontur told me that she was unsure if she would be at the station the next year. This surprised me until I found out she was planning for grad school but was not yet sure what she would be studying. In case she did not return, she wanted to make detailed notes for whoever took her place. She also said the GIS staff would be marking plot coordinates if the weather held long enough, and when they did their work, they would also use her notes. Jontur stopped us in front of a large plot I had not seen before.

> *She handed me a piece of paper and asked me what plot we were standing by. I looked at the hand drawn map she gave me and at the nearby landscape looking for landmarks to orient myself. Even though by this time of the year the sun was rising and setting, it was difficult to use its path across the sky for navigation, and the access road makes a series of turns near the station the made it difficult to use. After a few moments of looking at landmarks on the horizon (Bear Mountain and another distant range), I was able to orient myself to the unfamiliar plots (I hadn't even known they existed before, how had I missed them?). I pointed out which plot I thought was which and described what I thought different marks on the map meant in relation to various markers within the plots. Jontur was pleased that her map was clear enough even for a non-scientist with no foreknowledge of the plots. She asked if I thought anything was unclear. I didn't.*

After she has returned the notes to her truck, we started working on the plots. The ground in that area was much rockier, and the surrounding landscape less contoured, than it was around many other plots. Between freeze and thaw cycles and winter's constant wind, ice, and snow, the plots take a beating, especially in less sheltered areas: stakes are pushed from the ground or blown back and forth until they snap at the base. No where else I had seen made this quite as obvious as these plots. Jontur's hope was that the new stakes I had made with the lumber she found would last longer than the quarter inch thick stakes we were replacing. She also pointed out several areas where stakes had been replaced by someone at some point, but they had been misaligned; she wanted to fix those too as the misalignment made some aspects of her work more difficult.

> *The rocky soil made for slow, laborious work and even a few of the new, thick stakes broke as we tried pounding them into the rocky soil with drilling hammers. At times, the work was frustrating as we tried to realign a stake only to repeatedly find a large rock just below the surface. Jontur wanted to make sure things were clear*

> *for future scientists though, and the straighter the lines, the easier the work for those who would continue it after she left.*

This work was clearly important to her, but when I thought about it later, I realized that Jontur was caring for projects that had been running for 30 or 40 years. It was very important to her that no mistakes were made that could ruin decades of research; rather, she wanted to ensure its continuation. It was important to her that it was done right not because she might be back but because she might not be back.

The next day, only a few days before I left, I again worked with Jontur. This time, however, I showed up an hour before our outing because another researcher in her lab had invited me to see a "pluck." My overall impression of the pluck was one of awe at the sheer amount of work that goes into it.

> *A pluck can take a group of a dozen people weeks to complete as sample after sample of tussocks are taken down to the individual roots and are everything is meticulously sorted, bagged, and cataloged. Several different groups do plucks throughout the season, and most will invite others to visit the station to help with the pluck. Often these people are researchers who worked with the lab in the past, students, teachers, or just friends who are recruited for the work.*

When I visited, there were ten women working on the pluck. I only recognized four of them, including one of the first people I met at the February planning meeting who had not been at the station until the pluck. All the work was happening at two tables pressed against each other to form one large table that took up most of the central room—the largest room—in Lab R. Three sides of the table were so close to the workbenches along the walls of the room, that each time someone needed out, the people beside her had to stand up so she could get by. Despite the meticulous work that was going on, music was playing in the background and the women were constantly talking, joking, and laughing with one another.

When Jontur was ready, we drove back to the one of the areas where we had worked on the shadehouses only a few days before to mark plots again. The area was so thick with shrubs that we used six-foot long pieces of rebar capped with white PVC instead of the 18” stakes. Jontur carried a sledgehammer and a paper she used for noting what we had marked, and I carried the bundle of rebar over my shoulders. The work was exhausting as we pushed our way through the thick shrubs in water from four to ten inches deep. I was glad at least to have worn my Muckboots as the previous time I had worn hiking boots and the water had been high enough to pour into them from the top leaving me with soggy boots for the entire day.

> *The area had boardwalks—just 2x8 and 2x10s laying down—but many of the boards were partially submerged and slippery enough that I fell hard onto my butt once (Jontur would do the same later in a different area). Often, since we were marking corners again, for both the GIS guys and whoever might take Jontur’s place in the future, we ended up wading into the water to reach the point where we needed to pound in markers. The water made it particularly difficult to figure out what was what, so Jontur was using different colors of tape that would help differentiate edges of plots and the interior plot markers.*

Again, the work was tedious, wet, and cold, but time passed by quickly as we talked out what we were doing. We spent much of the rest of the time in silence or talking about a moving podcast she had recommended called “Exploring Deep Wilderness.” When we finally finished, it was nearly dinnertime.

> *As we walked back to the truck along an old dirt path, a fox came toward us. It barely slowed as it saw us but moved a few feet to one side and trotted by, close enough to touch. It was a beautiful sight, one of many that day; several times, Jontur had stopped to take photos of the tundra and gush about how beautiful it was. And she was right, it was a vibrant red color and absolutely breathtaking. As the fox disappeared around a bend, we looked at each other, both of us asking “how cool was that” without saying a word.*

Discussion: Creativity and Care in Science in ICE Environments

There is something in polar fieldwork that seems to bring out creativity and care in those doing it. Perhaps it is the hundreds of different encounters with the sublime world—like the fox passing by—that polar researchers and support staff experience across the Arctic and Antarctic each day; the writings of Barry Lopez and dozens of others are filled with such experiences. But, it seems to go beyond that, or perhaps before that, because creativity and care do not require those experiences, rather it seems to be an intrinsic part of the fieldwork, whether it be pure science or the related work of maintenance, repair, and planning.

Creativity in Fieldwork

Creativity manifests through fieldwork in many ways. Everest and Remy offer several excellent examples: (1) they often practiced a form of gamification to make their work even more enjoyable (and they really loved their work). Doing mosquito traps, something they did once or twice a week, they would compete against their fastest time to complete all the traps (starting at the truck, setting the trap where required, and then returning to the truck), or they would split into teams and compete against one another (this was a friendly competition, and no scientific rigor was sacrificed for the win). (2) they would often look for ways to improve their scientific rigor (e.g., Remy always doing phenological observations, so their observations were not based on how two different people interpreted "greenness" or saw "30% cover"). (3) Everest and Remy often looked for creative ways to improve the equipment they worked with (e.g., long discussions on how to make an effective battery cover that would have a longer life than the Ziploc bags).

Sometimes things would go wrong and require a creative solution. Tristan, who I observed working on the pond during the Fourth of July storm, told me a story during a later interview about being in the middle of a remote alpine lake when an expensive piece of instrumentation he was using came loose from the rope that held it and sunk to the bottom of the lake. It was too deep to retrieve by swimming. After thinking on it for a few days, he built a tool, returned to the lake, and dropped the tool he had built into the water. With a bit of work, he was able to snag the instrument and bring it back to the surface.

Figure 45 The tool Tristan made to retrieve the lost instrument.

Creativity in Maintenance, Repair, and Planning

While there does not appear to be anything particularly "creative" in maintenance and repair work—after all, it is just working on or fixing something that is already there—Jackson reminds us that "worlds of maintenance and repair and the instances of breakdown that occasion them are not separate or alternative to innovation, but sites for some of its most interesting and consequential operations" (2014, p. 227). This proves true at PRS, where maintenance, repair, and planning are deeply intertwined with the concept of infrastructural hypervigilance.

While mending a greenhouse might not seem like creative work, it is. As Jackson points out, “breakdown disturbs and sets in motion worlds of possibility that disappear under the stable or accomplished form of the artifact” (2014, p. 230). When Jontur and I repaired the greenhouse, she did not just repair it to the condition it was in before the storm, she imagined—a creative process—how the storm was able to inflict so much damage on the greenhouses, and she devised—another creative process—ways to improve on the weaknesses of the greenhouse. When we finished repairing the greenhouses, they were sturdier than they had ever been. Although more storms hit throughout the field season, the greenhouses required no more maintenance that season (and remember, before the storm hit, the greenhouses had only been up for a few weeks and we were already planning some maintenance on them). There is creative action even in something as simple as repairing boardwalks and building boardwalks—another type of repair work I did with Jontur several times throughout the season. Jackson writes that

Figure 46 The author carrying lumber for new boardwalk to a distant plot.

repair is “a facet or form of articulation work (and vice versa)” and that “articulation lives first and foremost in practice…. it’s a creature of bones, not words” (2014, p. 223). Building boardwalk is, quite literally, an act of creation.

We also see creativity in planning. When Everest and Remy ran into a problem with placing Geoblock, meant to make things easier for the people who would take their place in the coming seasons, they tried to get guidance from higher-ups involved with the lab. When that did not work, they decided to try something that had been done nowhere else at the station. They cut the Geoblock into pieces either small enough to fit between tumps and/or to use as heavy-duty shims to steady the Geoblock. When Jontur marked plots at a particularly difficult site, she used different colors on the marking posts that would indicate different boundaries on the map she made (the map being another creative way of planning).

Care in Science

Finally, we come to the idea of care in science, but it is not a separate idea. Jackson suggests that "foregrounding maintenance and repair…invites not only a new functional but also moral relations…. It references what is in fact a very old but routinely forgotten relationship of human to things in the world: namely, ethics of mutual care and responsibility" (2014, p. 231). This is true, care is woven into all the maintenance, repair, and planning that has been discussed thus far. Everest and Remy gamify their work, but they do it in a way that does not jeopardize the science because they care deeply about their work and the results; this is the same reason why they look for creative ways to improve their scientific rigor. They wanted to replace the plastic bag that protected the batteries because they cared enough to recognize the single-use bags were an issue. Tristan could have given up on the piece of instrumentation that was lost, but instead he built a tool to retrieve it. When Jontur made repairs to the greenhouse that left it in better condition than it had been before the storm, she did this not because she did not want to repair it again, but rather because she did not want the experiments she cares for damaged. And when Everest and Remy built the Geoblock paths, they cut the blocks because they cared for the wellbeing of the tundra and for future researchers.

In this type of work, not only is this an “ethics of mutual care and responsibility” between people and things, but also between people and people. Throughout the summer field season, in both the pure science and in the accompanying maintenance, repair, and planning work, scientists (and station staff) acted with responsibility to the future in their actions: they maintained, planned, and repaired to make things better. This should not be surprising though, as it is coming from people concerned about the future of the planet (this is, after all, what their research is about). Care will come up again in the next chapter, particularly in the final section that looks at making and sharing.

CHAPTER SEVEN

EVERYDAY LIFE AND SOCIALITY IN SCIENCE

"And on Sunday we hike." – A common refrain at PRS

Chapter Six explored the PRS's with special attention to the maintenance, repair, and planning necessitated by the station's remote setting, as well as the importance of creativity, innovation, and care in such settings. Chapter Seven continues some of the same themes but looks at the "everyday life" side the station (i.e., the part of life that is "outside" of scientific work). Where Chapter Five focused on infrastructure, largely material infrastructure, this chapter focuses on the social infrastructure underpinning life at PRS and how leisure complements scientific work. It must be noted, however, that the station's ICE setting and its resulting infrastructure cause work and nonwork life to be blurry at times—sometimes nearly indistinguishable—thus, even the social side of life at PRS is a mix of leisure and informal or indirect work that often appears purely recreational but feeds into scientific work.

There is a tendency to think of a research station only in terms of the work being done there, but even the most dedicated researchers and station personnel need time to step away from their work and something to occupy that leisure time. Early in the history of PRS, work was the totality of the station experience, but both the scientists and the science suffered under this arrangement. As Miles—one of my contacts affiliated with the station since its beginning—told me: "people would get up, work, have breakfast, work, have lunch, work, have dinner, and then work 'til way late at night, and then do it again. And that's all they did until one event in the 70s where . . . some people in one group said, 'we just can't do this.' So that's when the Sunday Hike originated. We're going to take Sunday off and just take a break."[37] This was a turning point in

[37] This interview took place after I completed my fieldwork, but during my fieldwork, I had heard several people say "on Sundays we hike" in a way that almost suggested a religious overtone. At the time, I took it as a joking way of saying that this is

life at the station, and while there are always some individuals working, since then, hiking and other leisure activities have been the dominant station activity on Sundays.

Over the years, the infrastructure supporting social life has been built by both the management in charge of the station and the inhabitants themselves: highly-anticipated holidays and special events mark the summer calendar at regular intervals; informal science talks take place every Tuesday evening and a bonfire ends the work week each Saturday night; and groups get together many evenings to go for a quick hike, watch movies in the community center, play games or just hang out and talk while enjoying a beer or a mug of wine in the community center (often while enjoying the various cookies and other snacks made-from-scratch by the beloved kitchen staff), work out at the HC, or play soccer, frisbee, or ping pong outside on the rocky ground of the pad. While the station was once little more than a trailer focused solely on science, it is now quite comfortable, and while the scientific opportunities remain the primary draw for most of the inhabitants, the social side of station life makes for a coveted research or work opportunity that draws individuals back season after season. All the while, these local events create connection among residents and with the larger world outside of the station.

Thus, Chapter Seven is about how the researchers and station staff spend their leisure time, with a strong emphasis on how they socialize outside the station's regular work schedule, and how this leisure time contributes to scientific knowledge production. This chapter is divided into three parts. The first part, "PRS's Social Infrastructure," starts with a narrative of my introduction to the social side of the station life along with a general discussion on social infrastructure, followed by a look at some of the material infrastructure that supports socialization at the station. The second part, "The Five Types of Gatherings" categorizes the

just how it is, but since this interview, I have wondered if the "on Sundays we hike" is actually a reference to this event that has been passed along through the station's inhabitants over the years.

social events taking place at the station and gives an example of each type through narratives that recount personal experiences I had with social gatherings at the station including the Christmas in July holiday celebration, a Saturday evening bonfire, an after-work hike, a spoon-making workshop, and a protest. In the third part, “Discussion: Normalization and Homebuilding,” I propose and expand on the concepts of Infrastructural Normalization and Homebuilding as important methods PRS’s researchers and staff use to push back against the hypervisibility (discussed in Chapter Five) of the station’s infrastructure which leads into a final discussion of why socialization is crucial to the science being done at the station. Throughout this chapter the theme of creativity will be apparent.

PRS’s Social Infrastructure

This first section looks at PRS’s social infrastructure.

Social Life at PRS

At PRS, life outside of work is as important to the science as the work itself. While my fieldwork largely avoided private spaces (in part due to the agreement I made with the station so that I could conduct my fieldwork there, discussed in Chapter Three), public space was fair game, so I focused on social life rather than individual life (which would have been largely anecdotal). The following is a discussion of social life at the station from my own viewpoint as my leisure time at the station intersected with the leisure time of others.

Entrée: The Solstice Celebration, a community bonfire.

For the first week and a half of my stay at PRS, I spent much of my time alone. I arrived at the station while Spring classes were still in session at UCLA, so I spent much of my first week on site finishing coursework in my room. Although I ate meals in the dining hall, I had not connected with any of the other researchers; perhaps this was partially because I was the lone social scientist at the station and was not associated with any lab group nor with any of the science and support staff. My entrée into the community, and to frequent participant observation with the researchers, came about accidentally during the Solstice Celebration, the first annual holiday gatherings hosted by the station that I attended.

My arrival at the beginning of June put me at PRS in the early stages of the field season when daytime temperatures were hovering just over freezing, snow blanketed the tundra, much of the lake remained frozen, and the skies were cloudy and grey, blunting the 24-hour sunlight (but seemingly also blunting the spirits of the inhabitants). Including both staff and researchers, we numbered just over 20, but the population grew quickly as the science trucks brought new arrivals several times each week. I was able to get a feel for PRS's material infrastructure quickly just by wandering through camp at my leisure. With few locks, only a sense of propriety (shared, it would seem, by most) kept me from peeking into the labs, maintenance areas, and private rooms. PRS's social life, however, had largely eluded me, and walking the pad's muddy roads and peering at station life from afar seemed a poor substitute for involvement from within.

Although four of us had together driven a science truck to the station, had chatted quite a bit, and even taken some photos together at a few picturesque stops along the way, once we were in the camp, the convenient camaraderie had ended. Val and Ripley knew each other from previous seasons and worked together, and Will quickly integrated with the researchers he shared a lab with. While neither malicious nor as pronounced as they often seem, clique-like groups seemed to form naturally among lab co-workers; the only noticeable exception to this pattern was among the researchers and staff who had worked at PRS before who knew each other and moved more comfortably outside their work groups. As a PRS first-timer with no lab or coworkers, I found myself an outsider with little meaningful social interaction. This was, undoubtedly, made worse as I had largely been isolated in my room during my first week at the station as I finished coursework, and to complicate things more, I am an introvert by nature and have never felt comfortable inserting myself into a situation without an invitation.

My introduction to PRS's social life came in the second week of my stay. The following is a narrative recreated using my fieldnotes:

> *The dining hall had a large whiteboard along one wall that was for unofficial use: messages and notices (of sometimes questionable importance), lost and found items, jokes and drawings of varying quality, and tidbits of information that might be useful or interesting to the community. At the bottom of the board, a poll labeled "Solstice Celebration Theme Ideas" caught my eye. From the February planning meeting, I knew PRS celebrated the Summer Solstice each year with a themed costume party. The leading contenders this year were "Band Names (literal)" and "Guilty Pleasures," tied at eight tally marks each; five other potential themes shared only five votes total. A day or two later I found the board had been changed to read: "Solstice Theme: Literal Band Names."*

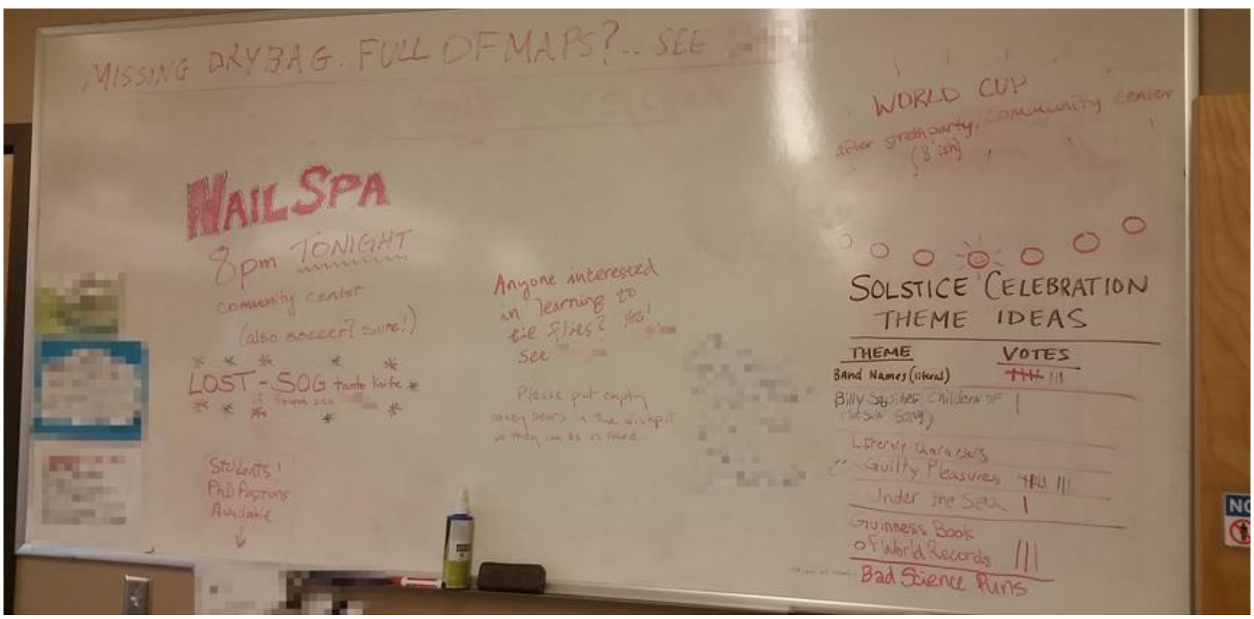

Figure 47 Community whiteboard with the Solstice Celebration costume theme poll.

> *The night before the Solstice Celebration, I went to the tool trailer for the first time (the tool trailer was always unlocked, but until asking the station manager, I had been unsure if I could access it). I explored the small space to see what tools and hardware I had available, and to my delight, I found exactly what I had hoped to find: a can of 1" roofing nails and some fishing line. I took nine nails and a few feet of low test (strength) fishing line*

and returned to my room. Using some dental floss, I fashioned the nails into a necklace and used a single piece of the fishing line to close the loops (in theory, it would break easily if the necklace caught on something and save me from being decapitated by the dental floss and nails). In the space of about an hour, I had created a—literal—Nine Inch Nails costume.

Figure 48 My Nine Inch Nails costume for the Solstice Celebration.

The next day, I arrived around 9:00pm to a group of about 20, a good portion of the station's then approximately 30-person population, standing around talking in several groups. As I neared the bonfire, a well-dressed and nametagged Val motioned me over to him. After allowing me entrance to the bonfire through a set of bollards, he handed me a folded piece of paper, and despite the bright sunshine, escorted me to the fire with a flashlight before returning to his post. I'm embarrassed to admit that it took me overhearing someone mention it to realize that Val's elaborate performance was part of his Usher costume.

Almost everyone had a drink in their hands or placed conveniently beside them: a bottle or can of beer, a Nalgene bottle filled with wine, or a station mug filled with whiskey or some other alcoholic concoction. The cold that had greeted my arrival in the Arctic had given way to several beautiful days and much of the snow had melted and the mud of the pad had dried out—mostly. The evening was warm, even pleasant with the heat of the burning pallets and scrap wood, and a Bluetooth speaker played an eclectic playlist from someone's phone; I realized later in the evening that the bands on the playlist came from the costumes of the partygoers. And indeed, everyone had donned a costume of various levels of effort, and nearly all these costumes were made with materials available at the station. While Val's *costume/performance was the most elaborate, other costumes included:*

Radiohead: Cody, the one controlling the playlist, had a radio attached to his hardhat.

Josie and the Pussycats: Everest was dressed in a woman's dress with a nametag reading "Josie" and his partner Remy was dressed in a cat onesie.

Genesis: Beck had a simple sign hanging around his neck reading "In the beginning . . ."

Alkaline Trio: Derek wore a shirt with three C batteries taped to his chest in a clear pouch.

Dr. Dre: Ripley wore a white lab coat identifying her as "Dre, M.D."

The Animals: Arlie had several different stuffed animals attached to her.

Arctic Monkeys: Sky had a onesie with ears and a long tail made from flexible electrical conduit; she was also carrying several bananas.

ZZ Top: Dannie was wearing a hat with the letters "ZZ" on top.

Guns N Roses: Logan came wearing a tank top with fake tattoos on his biceps (his guns) and a lei around his neck.

Pink Floyd: Billy wore a pink shirt, pink marking flags, and a "Hello My Name Is FLOYD" nametag.

Queen: Kam wore a paper crown.

Britney Spears: Riley wore sunglasses and a bright gold, skintight jumpsuit and had a silver microphone made from a plastic tube and aluminum foil.

The White Stripes: Emery and Kenzie, having just arrived a few hours earlier, came together with several pieces of white tape encircling each of their legs.

50 Cent: Alex had a giant 50 cent coin made of paper taped to his chest.

The Eagles: A scientist I never met was wearing her normal clothing but had several photos of eagles taped to her.

Nickelback. Another researcher I never met had a single nickel taped to the back of his shirt.

By the end of the night, almost the entire station had shown up in costume (including the newest arrivals who had only been in *camp for a few hours). The costumes made for easy conversation starters, and by the end of the night I had, at least briefly, talked to most of the people at the bonfire. Most were able to guess my costume and a few said they had also considered doing Nine Inch Nails (although by making nine-inch-long nails instead). We played several games (Kubb, Cornhole, and Stump with appropriate or necessary tweaks to the rules), listened to music, danced, and drank as we talked the night away.*

Figure 49 The Solstice Celebration. The gathering culminated with the burning of the Sun-worshipper sculpture.

At one point, while explaining to a small group why I was at PRS (this is an extremely popular topic of conversation at the station among people who've just met), I dropped an unopened can of beer. It punctured when it landed, and beer oozed from the pinhole in the side. Remy and Everest, two researchers whom I had not spoken with before, were in the group I was talking to, and Remy immediately begin urging me to "chug it" since the precious contents were leaking from the side. This small interaction led to a longer talk with Everest and Remy long after the other members of the small group I had been talking with had drifted away. They invited me along for some fieldwork the next, and by the end of the summer we had developed a good friendship; I spent dozens of hours in the field, and just as much time outside of work, with them.

The bonfire culminated just before midnight with the burning of a life-sized sculpture of a man with arms raised to the sky—as though worshipping the sun—standing atop two *intertwined cubes. Although crudely shaped, the artistry behind it was impressive: it was put together from scrap lumber without the use of nails or screws, instead held together with hand-made dowel pins. Several researchers lifted and carried the sculpture, in the style of a litter, and placed it in the fire as the rest of us cheered. The blaze ignited the dry wood quickly and soon after the sculpture collapsed into the fire pit. Within an hour of the sun-worshipper's burning, most of the slightly inebriated attendees had left the bonfire so they could still get a decent, if shortened, night of sleep before work the next morning, because unlike the weekly bonfires, the Solstice Celebration was held on a weeknight. Almost the entire station had work in the morning. A small group of about five of us stayed and talked late into the night, sitting on a tower made from discarded industrial wire spools, and waited until the exact time of the solstice, and toasted our drinks (most of us having switched to water by then).*

A few minutes later, I snapped a photograph of two new friends sitting together looking out toward the lake and the sun as they talked. Although I was behind the camera, rather than in the photo, it became a reminder to me of the friendships we all forged that early-field-season night in the Arctic. Before that night, most of us had not known each other—familiar strangers at best—but through that night, and others like it, we became colleagues and friends.

Figure 50 A friendship started at the Solstice Celebration.

I had been at PRS for nearly two weeks, but the Solstice Celebration was my first encounter with the social side of PRS. Before the bonfire I felt like a stranger in camp and was unsure if I would gain entrée into the community without inserting myself into a lab group. I had been to a Tuesday Talk a few days before and had immediately followed that up with a birdwatching outing led by a naturalist, but the talk was not the best place to meet new people, and the small group that participated in the nature walk afterwards had seemed unsure of each other and had not progressed beyond small talk about the birds and the wolves we watched from a distance. After the Solstice Celebration's bonfire, I felt a burgeoning sense of belonging in the community: I had taken part in a station tradition; spent hours talking, joking, drinking, and playing games with scientists and station personnel alike; and by the end of the night, I had several invitations to accompany scientists into the field over the coming week—the first of many invitations that would continue throughout the rest of the season.

The Solstice Celebration was the first of many community events in which I participated. While these were prime research opportunities for me, they quickly became much more than just a series of data points. They were an opportunity for all the station's residents to meet individuals who had just arrived in camp, a time and place to visit with friends and colleagues who were otherwise tucked away in their labs or far afield for most of the week, and they marked the end of a long week of work for most of the station's inhabitants. Despite my introversion, I found myself looking forward to the bonfire each Saturday night, and perhaps even more so, to the unique events scheduled throughout the season: holiday celebrations, trivia nights, workshops, and friendly competitions. I was not alone in looking forward to these events; in fact, much of PRS's social life revolves around community-oriented events.

Just how much of PRS's social life revolves around these structured gatherings becomes clear when looking at the schedule of events over the course of the season with smaller happenings taking place weekly (or even several times a week) and larger events happening every few weeks.[38] At PRS the work week generally runs from Monday through Saturday, and after dinner each Saturday night, a bonfire similar to the Solstice Celebration's, although without the costuming[39] and burning of an effigy, takes place. Tuesday Talks happen weekly after dinner and several nights each week the sauna is warmed up for evening usage. Bonfires, Tuesday Talks, and scheduled saunas are traditional events, but there are also numerous small, non-traditional community events happening all the time (e.g., watch parties, group workouts, hikes, and games)[40] where participation simply involves being in the right place at the right time. In addition to the Solstice Celebration, there are several other community events that happen only once a year. Two weeks after the Solstice Celebration, the station celebrates the Independence Day as a split celebration with an extra-special dinner on the Fourth of July and a "parade" the following Saturday leading into the bonfire. At the end of July, the pinnacle of the station's holiday season takes place: Christmas in July. About two weeks after Christmas in July, the station put together an obstacle race that led into another bonfire. Another two weeks after Christmas in July, just before the end of the season for most of the station's inhabitants, the semi-traditional Blacklight Party replaced the bonfire on a rainy evening. Finally, throughout all of this, the season is punctuated by smaller, frequently one-off, events run by community members including, but not limited to, knowledge sharing workshops, and more rarely, local

---

38 The schedule changes a bit over the years as some of the events are tied to specific days, and often, the events are scheduled so that they take place on a Saturday evening so that most of the station's inhabitants are not working the following day; furthermore, some of the events mirror world happenings that might not be yearly (e.g., PRS does its own version of the Olympics during Olympic years instead of the obstacle race).

39 Although the Solstice Celebration was the only costume party bonfire, it was not unusual for at least one person to show up in costume at any given bonfire (in fact, it was not even unusual for someone to show up for work in a onesie or some sort of extravagant outfit).

40 Favorite indoor games for the 2018 season included *Cribbage*, *Settlers of Catan*, and *One Night Werewolf* (using the *One Night* app for narration). Printed *New York Times* crossword puzzles, provided by one of the FOAs, were also popular and a single puzzle would often cycle through several people before it was completed.

activism (e.g., a Pride Parade and a march protesting the separations of families at the U.S. border).

These events are an immensely important part of life at PRS. Apart from the research itself, they are the largest part of the summer field season experience and much of PRS's social life revolves around them. They provide entertainment and help build community, while at the same time providing structure for sociality in a remote, utilitarian setting. They also create a rhythm that helps normalize life in a very abnormal place and keep the station's inhabitants from the fatigue that can occur with too much work and too little leisure. The importance of this cannot be overstated when many of the scientists are working 12-hour days six days a week as they race against the coming winter to finish work.[41] The regularly-held, weekly events are important markers during and at the end of each week, while less-frequent special events give the station's population something special to look forward to in the longer term. Finally, the calendar is punctuated with workshops and smaller get togethers that offer a chance for social leisure at a moment's notice. The social happenings mark the passing of time and signal the boundary between work and leisure, and for those spending the entirety of the summer at the station, they mark and advance the season as well.

This chapter is largely about how these artificial cycles of gatherings and events paradoxically contribute to PRS feeling vastly different from other places of research in some ways and yet oddly similar to more typical settings in others. Within the microcosm that is the field experience, both artificial and natural cycles affect work and social relationships. For many, the tundra's various life cycles dictate their start and end dates at the station, while the social gatherings and special events bring people together from outside of the work groups that form

---

41 The station's staff also work long hours, often with split shifts; unlike the researchers, under normal circumstances, they are required to leave the station several times a month for several days at a time.

naturally within the labs. The summer field season (which is highly dependent on the Arctic's capricious weather) is, in fact, only part of a larger landscape that is itself influenced by other cycles (e.g., academic calendars and grant cycles) and by the work of previous years. All this factors into PRS's social infrastructure.

Social season calendar.

The following calendar shows many of the events that happened during my time at the station, most of which are mentioned within this chapter. There are, of course, many more events that I either did not attend or did not hear about. On Sundays, there were typically at least a dozen different things happening from the oft-mentioned hikes to activities on the lake (like fishing or canoeing), from watch parties to games (from soccer to cribbage to D&D), and of course, sometimes people just preferred to spend the day alone resting or talking with family and friends back home.

June 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2 Bonfire
3	4	5	6	7	8	9 Bonfire
10 Pride Parade	11	12 My Arrival at PRS	13	14	15	16 Bonfire
17	18	19 Tuesday Talks Nature Walk	29	21 Summer Solstice Bonfire/Costume Party	22	23 Bonfire
24	25	26 Tuesday Talks	27 Staff Meeting All-station Meeting	28	29	30 "Keep Families Together" March Bonfire

July 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 Spoonmaking Workshop	3 Tuesday Talks	4 Special Holiday Meal *Independence Day* Watch Party Worst Storm of Season	5	6 Soccer Games	7 4th of July Parade Bonfire
8 *Jurassic Park* Movie Night	9	10 Tuesday Talks *"Reality"* Night	11	12	13	14 Bonfire
15	16	17 Tuesday Talks *"Reality"* Night	18	19	20	21 Trivia Night Bonfire
22	23	24 Tuesday Talks *"Reality"* Night	25	26	27	28 Snowflake Cutting Workshop Bonfire
29 Christmas in July	30	31 Tuesday Talks				

August 2018						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4 Obstacle Race Bonfire
5	6	7 Tuesday Talks *"Reality"* Night	8 After Dinner Hike	9 Wine and Cheese Party	10	11 Bonfire
12	13	14 Tuesday Talks *"Reality"* Night	15	16 Bad Nicolas Cage Movie Night	17	18 Blacklight Party
19	20	21 Tuesday Talks	22 Trivia Night	23	24 My Departure from PRS	25 Bonfire
26	27	28	29	30	31	

Material Infrastructure and Community Building

Before discussing the gatherings at PRS, we must first look at the material infrastructure that supports the station's social infrastructure; this support includes several crucial material elements: (1) social spaces including the dining hall, the community center, the health center, and the Social Circle; (2) personal spaces, particularly the inhabitants' living spaces; and finally, (3) the vehicles used to leave the station for hikes and other leisure activities (e.g., scenic rides/destinations, exploration, etc.); each of these will be further discussed below. The material infrastructure gives structure, and often place, to the social infrastructure that is so crucial to the station and its scientific output. In some cases, the social activities associated with the material infrastructure would likely not exist without it, and in other cases, the activities would be seriously curtailed (e.g., without the HC and its equipment, group workouts would look different, and without vehicles, hiking—the most popular rest-day activity—would be limited to the nearby tundra).

Social places.

The most obvious spots given over to social life are the places intended for gathering members of the community together (often in exceptionally large groups) including the dining hall, the community center, the Social Circle, and the HC.

The dining hall, which shares a building with the kitchen and main office, is the station's largest indoor space with comfortable seating and table space for most of the population even at peak season, as well as housing 24/7 salad and deli bars, several refrigerators filled with leftovers and non-alcoholic beverages, an assortment of snacks, and hot drinks. As the space where the station's residents take most of their meals, it is the most consistent place for gatherings: breakfast, lunch, and dinner. Like much of the station, the dining hall is a liminal space. Groups will often start and/or continue work discussions during meals, and as mentioned, the main office shares space with the dining hall. Monday through Saturday, outside of mealtimes, the dining hall is typically empty besides an FOA cleaning up before the next meal or a lone researcher seeking a warm, quiet place with reliable internet; but after dinner and throughout the day on Sundays, especially during inclement weather, the dining hall becomes a social place where groups sit together at the tables and talk, play games, do crosswords, put together puzzles, knit or crochet, make jewelry, or work on carving their wooden spoons. Sometimes, during a rainy (but not rainy enough to be completely rained-out) bonfire, the community center will be the livelier place filled with a constant drone of voices and outbursts of laughter.

Figure 51 The dining hall.

Over the years the station's **community center** has grown to several buildings and a WeatherPort, all with interior connections. Although the community center is used for official purposes (for example, the all-station meetings where the station's residents can voice any concerns and/or make suggestions), the primary use is for entertainment, particularly when the weather forces large groups inside. Conveniently located next to the dining hall, the main entrance to the community center leads into an antechamber that helps keep the heat inside the main room on cold days and houses some shelving where people can leave or take clothing and other items; this shelving is one of the first places people go when they need to create a costume or need materials for a craft project.[42] This room leads into the main room, a high-ceilinged area large enough to hold most of the station's population even at the height of the season. This room is used for traditional events (e.g., the Christmas in July celebration and Tuesday Talks), but is also used for things like karaoke nights and watch parties, particularly those using streaming services, as it has a projector that can be connected to a laptop and has a better Internet connection than many other rooms. A smaller room without A/V can be used for small get

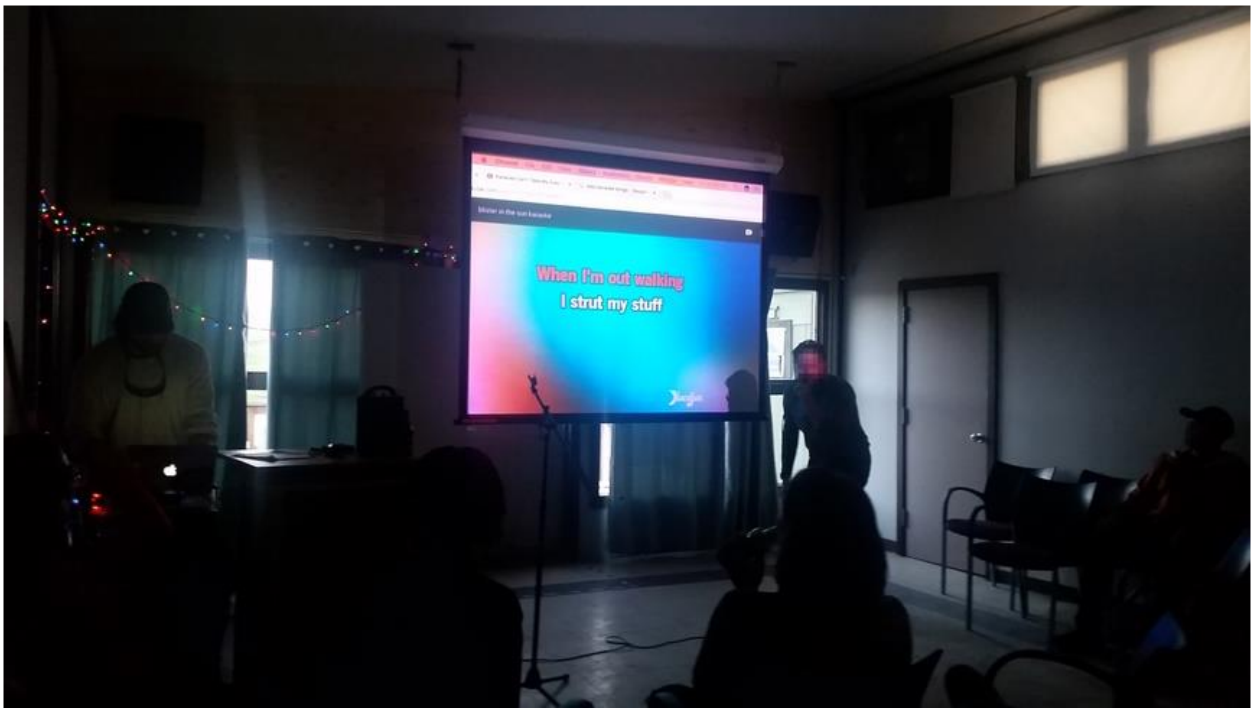

Figure 52 Karaoke in the community center.

togethers (e.g., Sip and Stitch) and the WeatherPort has the station's version of a movie theatre complete with several couches, a big screen TV, movie posters hanging from the walls, and an extensive collection of VHS tapes and a smaller assortment of DVDs. At the back of the theatre

42 I never heard it referred to by a special name at PRS, but this is what would be called a "skua pile" in Antarctica. Nicholas Johnson writes in *Big Dead Place* that a skua is "a large, aggressive gull whose predatory and scavenging nature has inspired the use of its name to refer to voracious hunting and collecting through station 'skua piles' (free piles of abandoned but reusable commodities)." At PRS, it was typical to hear someone suggest something along the lines of "check the community center if you need a pink tutu." It was rumored, though I was never able to confirm, that people occasionally leave stashes of alcohol on the shelves when they leave and don't want to bother trying to take it with them on the long journey back to town.

is also a ping pong table that can be used with a bit of rearrangement of the couches or can be carried outside for open air games. Although the sound from adjacent rooms can penetrate the walls, the community center's connected structures allow several groups to use it at the same time (e.g., a typical Tuesday night might have a reality TV watch party going on in the main room, a Sip and Stitch happening in a smaller room, and a movie night in the WeatherPort).

The Social Circle—as the site of the weekly Saturday night bonfires—holds a special place in the hearts of the station's residents and is a particularly interesting outdoor space. The north side of camp is primarily home to the labs, but at the far end lies the Social Circle. During the Saturday night bonfires, the Social Circle seems vital and alive, yet for most of the week it is an inert space—mostly noticed only for the stacks and piles of scrap wood surrounding a large fire pit—enclosed by places of work. On Saturday nights, however, this relationship flips as the empty space becomes the place to be. The surrounding labs seem lifeless spaces while the Social Circle becomes the place of gathering and entertainment for the entire station (while also functioning as waste disposal for the lumber, mostly pallets, coming into the station each week).

The Social Circle itself is a bit amorphous; its shape and borders change with the population and weather. On some evenings, a small population huddles close to the bonfire, avoiding puddles by standing on strategically placed pieces wood, but on a beautiful Saturday, especially those following one of the big gatherings, the Social Circle seems to stretch its reach as people continually move between the immediate area surrounding the five-foot-wide bonfire pit and the surrounding areas: the lake offering icy swimming from the dock and the sauna allowing the swimmers to warm up before rejoining the bonfire only 75 to 100 feet to the east; soccer, Stump, Kubb, and/or Cornhole games frequently happening between the labs to the south; all while people stand at the northern edge of the pad watching friends canoeing on the lake or hiking far out on the tundra as a steady stream of people move back and forth between the dining hall and the living quarters further to the south and east.

Figure 53 Much of the station's population shows up for the bonfires, turning the Social Circle into the place to be.

Like most of PRS's infrastructure, the **Health Center** (or the HC) is built with simple function in mind. A sign at the entrance reminds users to remove their dirty boots or shoes, and a bench, conveniently placed by the door, makes this easy. The floors are lacquered plywood, and the seams of the drywall are obvious through the yellow and blue walls. Windows let in ample light during most of the summer field season, but fluorescent lights keep the area lit during the winter and shoulder seasons. Shelving holds foam rollers, yoga mats, resistance bands, shoes, and personal equipment. Several space heaters dot the floor and a small monitor hangs on the wall in front of the elliptical machine and treadmill. The HC is well equipped for a gym in such a remote location with a weight bench, dip station, heavy punching bag, stationary bike, and a rowing machine in addition to the elliptical and treadmill. Gymnastic rings, a pull up bar, a hangboard (for increasing finger strength for rock climbing), exercise balls, free weights, and jump ropes complete the workout equipment. Several of the PIs that I spoke with were quite proud of the existence of the health center; as noted in Chapter Five, despite the massive boost in morale it gives PRS's inhabitants, it was something that the station's higher-ups had to fight for. It was a worthwhile fight as the station's residents love the HC and use it frequently.

Figure 54 The HC helps scientists stay in shape while away from home.

Personal space.

Personal space is, paradoxically, extremely important to socialization when in a remote, confined setting. On some days, personal space feels like a luxury, while on other days, it feels like a necessity, depending on one's tolerance at any given time for the people with whom they will spend an entire summer. Personal space is at a minimum and there are only a few places where one can be alone, but there are several places where one can feel alone or at least be left alone; these include an individual's living quarters (with caveats), the shower and tower facilities, and the tundra itself.

Each of the station's residents is assigned a living space, typically either a portion of a WeatherPort tent or a room in an ATCO; much like a college dorm, this living space will often be shared with others (especially during high population times). There is also a section of land between the Social Circle and the lake called Tent City where individuals can place tents on a first come first serve basis (however, doing so means the individual has given up their space in the WeatherPort or ATCO they were assigned). The advantage of living in Tent City is that while one can be assigned a roommate at any time if living in a WeatherPort or ATCO, a pitched tent assures one a space of their own, complete with a beautiful view of the lake, rolling tundra, and Bear Mountain beyond. Use of Tent City varies greatly from season to season; during my stay, only two individuals opted to camp, and both eventually abandoned their tents and went back to shared WeatherPorts.[43] Still, the option exists for those inclined.

Rooms are assigned largely based on the length of time an individual will be at the station; thus, those who will spend the entire season at PRS are likely to have a room in an ATCO or one of the private divisions of the WeatherPorts. While the WeatherPorts are heavy

[43] Both individuals had their tents collapse under high winds.

duty tents, the ATCOs feel very much like a dorm. Even in a shared room, but especially in a single, the rooms are the most personal space at the station. The ATCOs had locking doors, but we were not given a key to our rooms, so we could lock the door when we were inside but not while we were gone. If we accidently locked ourselves out of our room, we had to go to the office and get a key from one of the staff members (getting a key also included a bit of teasing if it happened more than once). Strangely, as nothing else was locked up, the locks on the rooms felt out of place. Everyone knew where they should and should not be and seemed to respect

Figure 55 My ATCO room on first arriving at the station.

that. For those of us without a roommate, our rooms were our personal bastions: places where we could express ourselves freely by setting them up how we wanted, decorating how we wanted, and inviting in those whom we wanted in and excluding those we did not (while, of course, being respectful of our colleagues on the other side of the very thin walls).

PRS is connected to the rest of the world through fiber optic internet and the station has Wi-Fi of varying quality across the pad and extending a short distance into the surrounding tundra and nearby plots. Spotty cell phone coverage is available on the pad and surrounding areas as well. With this availability, personal space can also be important for connecting to friends and family in the outside world. That said, it is probably worth noting that some of the living spaces have better connectivity than others, and for those with poor connectivity, it was often better to use an empty lab after work or to find an unused corner in one of the community areas than to try to deal with a poor connection.

Finally, it is worth noting two other spaces that are both personal and public space: the shower trailer and the tundra. As all fuel must be hauled in and grey and black water hauled out, showers were limited to two times a week for two minutes each. Still, the showers were private spaces with a small, curtained-off individual changing room leading into an even smaller private shower (the towers were also private areas but not conducive to extended stays). A walk in the tundra or along the old roads (after signing out on a public board for safety reasons) also allowed for some time alone. I spent several Sundays and quite a few evenings on solitary hikes on the

Figure 56 One of the helicopter pilots (top right, laying down) enjoying some alone time during a hike.

tundra near camp or walking the old road to the lake's outlet; oftentimes on these jaunts, I would go the entire time without seeing another person. As fast-moving storms with high winds and extreme cold, large grizzly bears (and tundra grizzlies can be particularly hungry), and tussocked terrain that can easily lead to a broken ankle are ever present dangers on the Arctic tundra, leaving the station alone is not exactly encouraged, but neither is it prohibited (perhaps because the communal atmosphere of the station necessitates, at least for some people, time alone). Many of the station's inhabitants, especially those with longer stays, often walk, run, and bike on the nearby trails and roads, and sometimes the open tundra; sometimes this is done alone and sometimes it is done in groups.

Transportation.

It is easy to overlook transportation as a critical part of PRS's infrastructure, but nearly everyone arrives via the science trucks. This means they lack personal transportation, and thus, rely on the station's vehicles for any trip outside of the station. Fortunately, there are several trucks around the station that can be used to access remote sites and recreate outside the narrow confines of the station. PRS provides canoes and bicycles for use around the station for work and recreation alike. Staff and researchers use the canoes and rowboats to access the far shores of the lake for hikes (saving several miles of difficult hiking among the tussocks required if accessing them by foot), for fishing on the lake, and for leisurely paddles under the Arctic skies. Bicycles offered some of the same freedom for areas that can be accessed by the old road, and they are also quite popular for moving quickly around camp; in fact, the bikes are such an important part of camp life that an entire WeatherPort is dedicated to bicycle repair and maintenance.

What becomes immediately apparent is that these infrastructural elements—social spaces, personal space, and transportation—are all necessary to the smooth functioning of the station, and most are provided by the station. Their use makes them both material and social infrastructure. Without these material infrastructures, the social infrastructure would be greatly weakened, and so too then would be the science. Thus, material and social infrastructure that seemingly lies outside of the science, directly impacts the science.

Five Types of Gatherings

Generally, the community events fell into five categories: (1) large-scale holiday celebrations and other annual or semi-annual events; (2) frequent, regularly scheduled gatherings; (3) spontaneous gatherings; (4) ad hoc knowledge sharing workshops; and (5) local reactions to world happenings.

Large scale holiday celebrations, annual, and semi-annual events.

These are the unique or infrequent events that have become important station traditions and are central to PRS's community. Holiday celebrations include the early-season Summer Solstice Celebration (while I was present, the only bonfire not on a Saturday), the Fourth of July

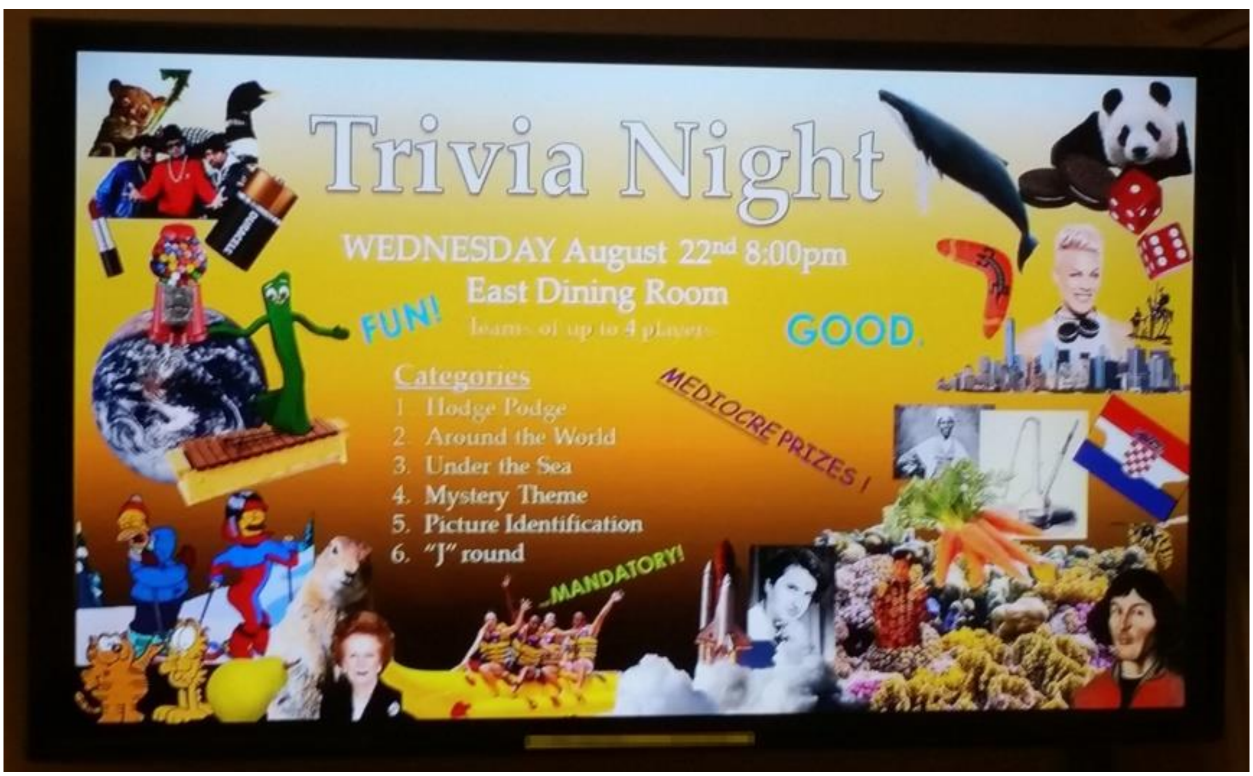

Figure 57 An advertisement for Trivia Night on "the scroll."

(split between a special dinner on the holiday and skits on the following Saturday), and the greatly anticipated Christmas in July (a staple of many Antarctic stations when the month of July falls at the heart of winter). Other beloved PRS traditions within this grouping include an obstacle course race (or the PRS Olympics depending on the year) and Trivia Nights (which may happen several times during the field season, depending on the schedules of the organizers, but with each Trivia Night featuring original topics and questions).[44] The events that fall into this grouping bring in nearly the entire population of the camp.

Figure 58 The author competing in the obstacle course race.

The first gathering we will look at in detail is a traditional holiday: Christmas in July. Of the holiday celebrations, Christmas in July is probably the biggest, partially because it happens at the height of the field season in late July, but also because people enjoy the gift exchange; even the people who did not make gifts seem genuinely interested in seeing what others had made.

[44] Only a small portion of the population will be present for multiple Trivia Nights as they happen only a few times over the field season and are scheduled more than a month apart.

Christmas in July takes place near the end of the month, Sunday, July 29th, the year I was there,[45] but for those participating in the gift exchange, preparation begins days or even weeks earlier as they plan and create a gift. Everyone who joins in the celebration enjoys spiked eggnog and a Secret Santa-style gift exchange, complete with PRS's version of Santa Claus handing out gifts from underneath a Christmas "tree" fashioned from tundra flora.

The countdown to Christmas in July began for me when Alex gave me the small envelope with the name of the person who I would make a gift for. Although the participants in the gift exchange do not know ahead of time who they will be making their gift for, nor whom they will receive a gift from, I would later hear that it was quite common to start thinking about the gift we would make long before we knew who the gift was to be for, and I experienced this firsthand. Less than two weeks into my stay at PRS, I had been reminded about this Christmas tradition and had immediately started to think about what I might make. I thought about drawing on my skills in the granite industry, perhaps a set of bookends if I got Jules since she always had a book in her hands, or if I ended up with Eddie, who smoked often, I could make an ashtray fashioned from one of the river rocks along the bank he loved to fish from. I also thought about trying to leverage my new spoon carving skills. I also worried about getting someone I barely knew or that I did not know at all. If I was going to spend the time making a gift, I really wanted the gift to be not just appreciated but enjoyed.

> *I gently broke the seal of the envelope and cupped my hands around it for privacy: Marlon. Relief. I didn't know Marlon very well, but he reminded me a bit of a younger version of myself, and he worked with the Everest, Remy, and Jules so I could ask them for advice. Marlon was outdoorsy and loved to fish, he was quiet but quick to laugh, and like me until a few weeks earlier when I had shaved it in anticipation of the lack of showers at PRS, Marlon had a long, thick beard and mustache. Although he was an*

[45] I suspect Christmas in July is celebrated on a Sunday evening, rather than Saturday evening before the bonfire, to give busy participants one last day to work making their gifts.

> *occasional smoker, he typically smoked a pipe rather than cigarettes, so the ashtray didn't seem very fitting. Unlike Jules, he didn't carry a book around with him, so bookends didn't seem like a particularly good gift either. I continued thinking about Marlon's gift-to-be as I finished dinner and caught up with what had happened while I was gone.*

After dinner I decided to look around the station to see what materials and tools I could use for Marlon's gift. My first stop was the tool trailer since it was only a handful of steps from the dining hall. Like most of the buildings in the station, it was unlocked. I cracked open the door just wide enough to get in and shut it quickly behind me to avoid letting in too many mosquitoes. The interior of the trailer was filled with equipment and materials that might be useful to the station's residents: hand and power tools, spare parts, hardware, scraps of angle iron and piping, and numerous materials unidentifiable to me despite a background in construction. For metal or woodworking, the shop seemed quite complete, but it seemed to lack a variable speed angle grinder, which I would need for fine sanding if I made something from river rock.

> *While I rummaged through the tools and hardware, I couldn't help but notice people walking by only a few feet away, their heads just about even with the bottom of the tool trailer's windows. Some of them were heading back to the nearby labs to get in a bit of work after dinner while others were heading to the building just to the north of the tool trailer that held the sinks, showers, and laundry facilities. Someone passed by with wet hair and glistening skin, suggesting he had just used one of his two weekly two-minute long showers. I wasn't sure if they could see me in the trailer, but each time I saw someone pass by, I felt a tinge of guilt, as though I was somewhere I shouldn't be. Yet, they were there for us to use.*

It just seemed strange to have thousands of dollars in tools unlocked and easily accessible throughout the night. Yet, throughout my stay, I would never hear of anything going missing besides the occasional misplaced or lost item that would usually resurface in a week or two. Still, as I left the tool trailer, it felt weird closing the door behind me without locking up the valuable contents. I next went to the building that doubles as the station's woodshop and shipping &

receiving area.

> *As I entered, Darian was working on something, and he nodded at me in greeting. He stopped the table saw and we chatted for a minute. I told him I was just seeing what materials I had to work with for my Christmas gift, he nodded again and returned to his own work. I didn't want to pry, just in case he was working on a Christmas gift already, so I gave him his space.*

The shop seemed to be a mixture of public and private space, roughly divided diagonally through the center. The southwestern side of the building was largely devoted to the woodshop while the northeastern side of the building was primarily for incoming and outgoing shipments, experiments, baggage, and even packages from various e-tailers; it was also where we picked up our bags after orientation, where we would find our online orders left by the most recent science truck, or a case of beer brought up by a friend or colleague. Unlike the shop side, the shipping and receiving part of the building seemed to belong to someone, in fact, many someones. I always avoided it unless I was looking for a package of my own. The shop's soft walls meant it was colder than the tool trailer and that sound—like the screech of a table saw or the high-pitched whine of a drill—would easily penetrate the building's thin walls and reach the ears of anyone nearby. Since the shop was less than a hundred feet from the nearest residential WeatherPorts, late night tool usage was kept to a minimum; the meaning of "late," however, was stretched in the days leading up to the gift exchange when people would frequently be working well past midnight.

> *A broken piece of wood caught my eye as I explored the scraps of plywood, lumber, and dowels. It looked like the broken handle from a shovel: a thick, rough, round piece of wood nearly an inch and a half in diameter and splintered on one side. It seemed like a perfect handle for a…well…for something. Of course, it seemed like a perfect handle, it was a handle before someone pushed its use too far. I kept looking around and found a small legal pad with a diagram on it. It took me a moment, but I realized this was Darian's notes for the* Sun-worshipper *sculpture he had built for burning at the solstice bonfire. I snapped a photo of the pad and*

put it back where I found it.

I fell asleep that night thinking about the Christmas present I might make. I was not sure exactly why it was so important to me, but it was. Perhaps I just wanted to prove that my talent was not just in academic areas and that I could "walk the walk" behind my research, or maybe I was just looking forward to making something after being in researcher mode nearly constantly for more than a month.

> *I'm not sure when it happened, but within the next two days, I had decided to make Marlon a reusable six-pack carrier. I had talked with Everest, Remy, and even Jules, who was Marlon's work partner, and all of them thought it was a great gift idea for him. I'd also found out that Everest was nervous because his giftee was his old boss and someone he both liked and respected, but he wasn't sure what to make for her. Remy didn't know her giftee very well and was also concerned.*

It seemed like my initial fears were shared by many of the people who were participating in the gift exchange. I realized I was not the only one who found the gift-making very important. I think we had all heard about some of the lazy gifts of the past and no one wanted to be the creator of a lazy present or give a bad gift.

> *Once I had settled on an idea, I drew up a rough plan for the carrier and claimed the materials I would use for the project, including the old shovel handle. I placed the materials together at the back of one of the work benches and put my name on a piece of paper over the materials; several others had already assembled similar piles, so I was glad no one else had decided to use the shovel handle.*

With a limited amount of space in which to work and only so many tools to go around, not to mention the awkwardness of wondering if I was might accidently sit next to someone working on a gift for me, I quickly took to working on Marlon's gift either in the morning before I went out for fieldwork (which usually happened after lunch as many of the researchers I worked with did lab work in the mornings) or late at night after most of the camp had gone to sleep. Over a few days my project went from a design on a piece of paper to a sturdy carrier.

> *Although "complete," the carrier I'd made didn't feel personal enough, so I decided to try some woodburning. PRS didn't have a woodburning tool, but Alex had one he was lending out. I settled on a design with the name of the station and year on one side of the carrier and an outline of the lake on which Marlon spent so much time working and fishing on the other.*

During the time I spent in the shop working on Marlon's gift, I saw numerous other people working on their own gifts. As the gift exchange neared, the shop had become busier and

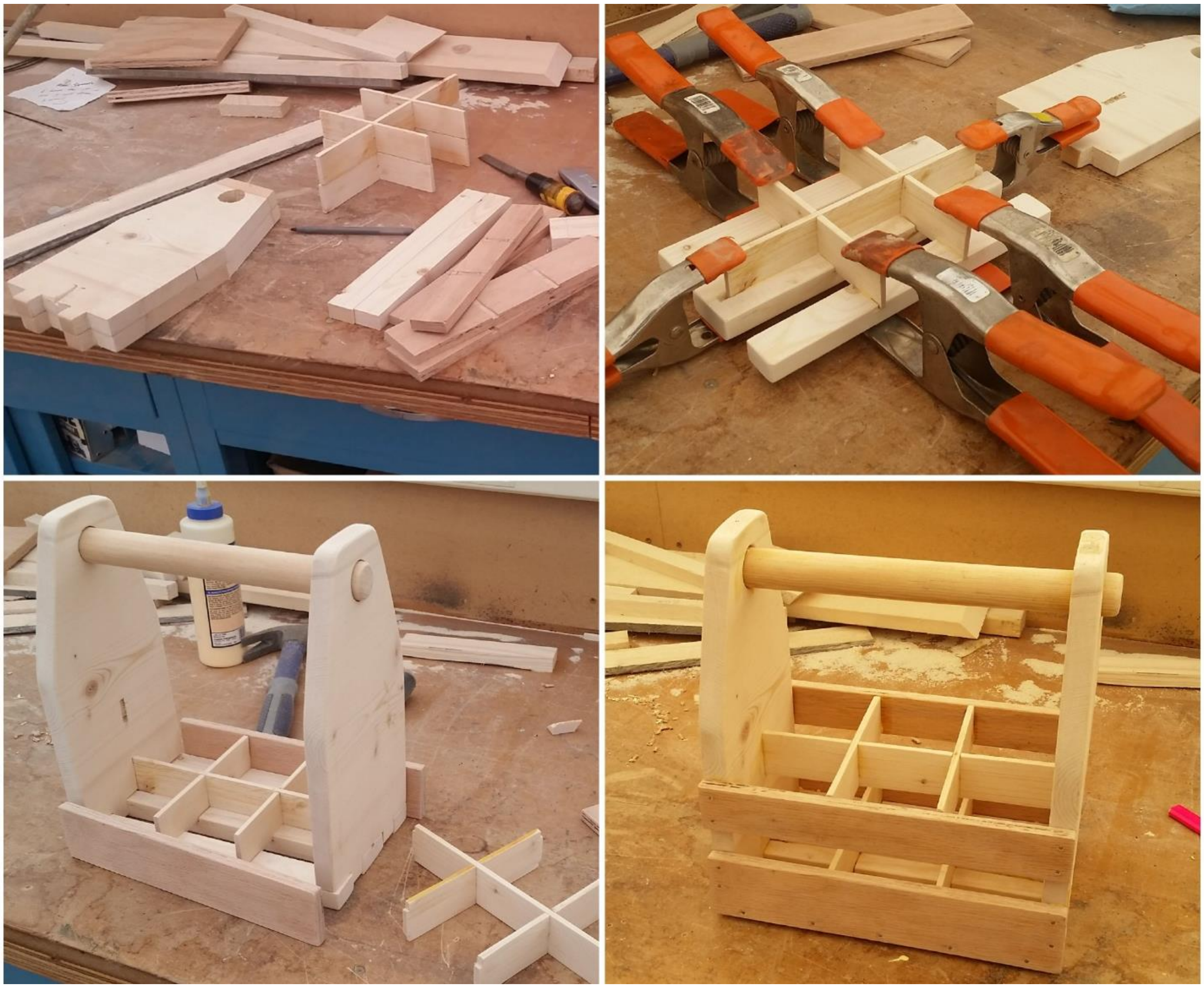

Figure 59 Marlon's gift in various stages of completion.

busier until later at night. The night I used the woodburning tool, I had company until past 1:00am. The care with which I saw so many others working was inspiring, and there was also a very communal sense of the project as tools changed hands and people taught each other the necessary skills to do their projects from basic tool usage (e.g., how to use a drill) to welding. While the gifts were ostensibly from a single person, few of them could have been made without a communal effort either through the sharing of knowledge or of tools beyond what PRS could loan out.

On the night of the gift exchange, I wrapped Marlon's present after dinner. I had hoped to find some newspaper to use for wrapping paper—ideally the Sunday comics for some added color—but used the remains of a thick black trash bag after a search for comics came up empty.

> *I took the present to drop off at the community center. The main area was empty, but there was a Christmas "tree" fashioned from shrubs and plants from the nearby tundra; fireweed provided beautiful purple flowers throughout the tree. A few ornaments decorated the "tree" and paper snowflakes—work several of us did under Alex's tutelage—hung from the ceiling of the room. Red garland hung from the whiteboard, paper cutouts of ornaments decorated one of the walls, and Christmas lights ran along several other walls. I added my gift to the pile of several dozen presents under the tree. Most of them were wrapped in white paper of unknown origin (I suspect it's something the scientists use in their work). A few gifts weren't wrapped at all but instead just placed in recycled Priority Mail or Amazon boxes. Marlon's gift was the only one wrapped in trash bag (I would have felt guilty about this if the bag hadn't been riddled with pinholes and torn in places destined for the trash anyway).*

I was in the dining hall chatting with Everest and Remy about the hike they had done earlier in the day when the staff announced the gift exchange was going to start in a few minutes. A long line formed for eggnog at the doors of the community center, but I wanted nothing to do with eggnog heavy with rum, so I slipped past the line and took a seat. More flowers had been added and the tree looked even more beautiful, and more presents had been placed beneath it in the hour since I had placed Marlon's. The seats started filling quickly as people made it through the eggnog line; Tamara took a seat next to mine. Tamara and I had sat together and shared wine the night before while Alex taught a small group of us how to cut snowflakes from paper. Alex's snowflakes were exquisite pieces of art that none of the rest of us could match, but a few of the

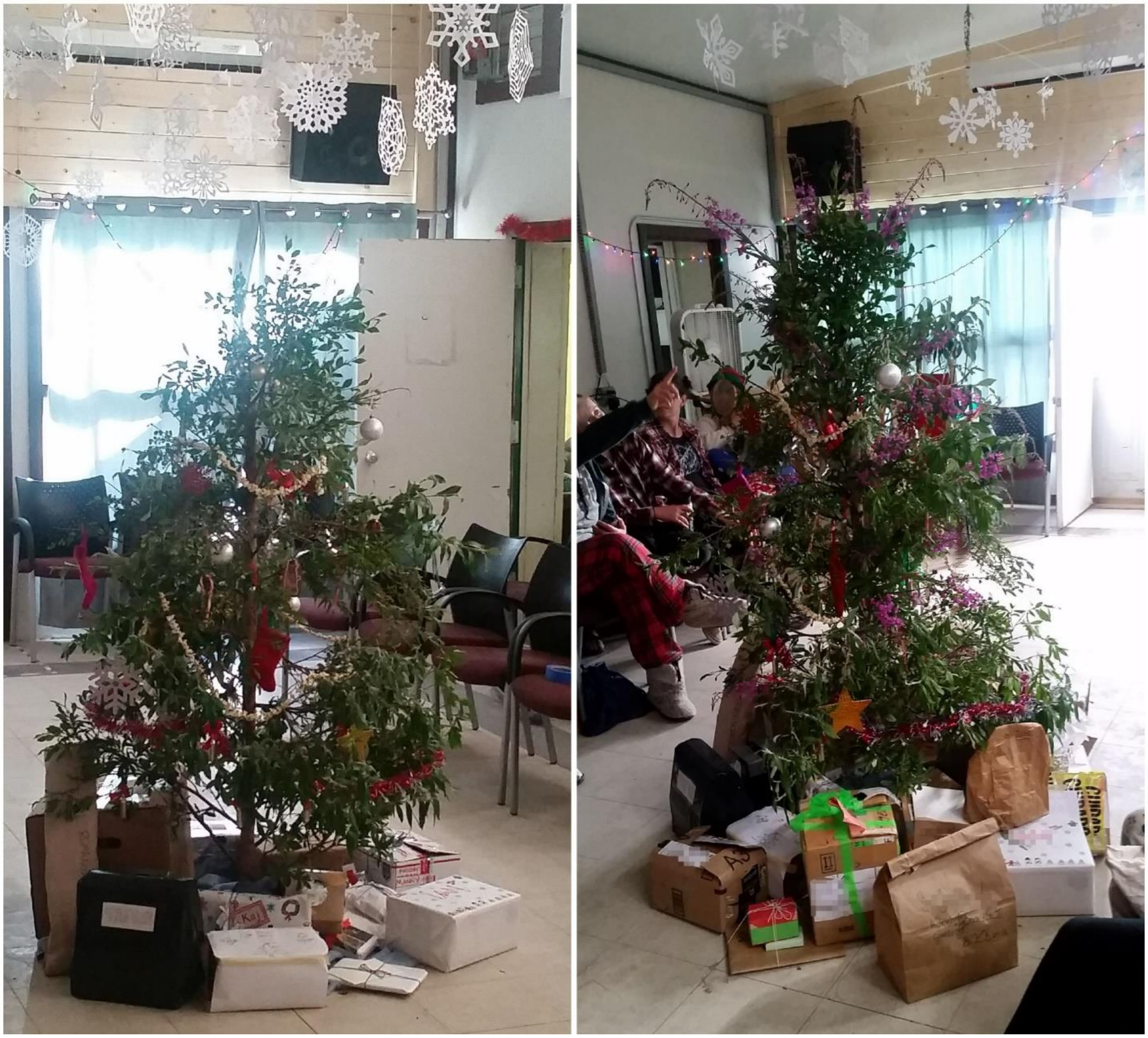

Figure 60 The Christmas in July "tree" before and after additional tundra flowers and gifts.

others in the group had made quite passable designs, while the rest of us looked much more amateurish. Tamara and I tried to pick our own snowflakes out of the ones hanging above us, but several of them looked surprisingly similar. Neither of us could find all our snowflakes with any certainty.

Aston started the gift exchange.

He was dressed in red one-piece pajamas with a blue flowered button-up shirt. The shirt was open to display a massive pot belly more reminiscent of a pregnancy than of a cookie-stuffed Santa Claus. His beard was a flowing blonde mane of a wig, the same one he had worn as part of a rock star costume for the staff's Fourth of July skit. He wore a traditional Santa hat along with a crown of what would normally be laurel but was instead woven from a tundra plant. Ripley was acting as Santa's elf. She was wearing patterned red pajama pants, a white long-sleeved shirt, and a green hat trimmed in red that looked like a cross between something Robin Hood and an elf might wear.

The gift exchange took nearly close to an hour. Either Tundra Santa or his helper would select a present from under the tree, read out the name, and take it to the recipient. Each gift was

Figure 61 Santa preparing to start the gift exchange.

opened before the next person received their gift. Although only a few of the presents had the giver's name listed (as it was ostensibly a Secret Santa-style exchange), nearly everyone who received a present wanted to know who it was from and thanked them personally if the person volunteered their identity; only a few people did not take credit for the gifts they had made. The crowded room made loud "oohs" and "aahs" for each gift, but a few of them were probably more forced than others as some of the gifts clearly had much more time or thought put into them. It made sense that so many people were concerned with the quality of the gifts they made; I would have been mortified to have clearly slacked off on the gift I had made only to then have received a particularly thoughtful gift from someone else.

> *Several people happy-cried over their gifts. Issa created a beautiful painting of the nearby mountain range and gave it to Remy; on the back, Issa had written a John Muir quote and Remy sobbed several times as she read it aloud to the gathering. One of the staff had taught Esme how to weld, and she had welded a large mosquito out of rebar, scrap metal, and mesh; it even wore a little Santa hat in honor of the holiday. Although one of the legs had fallen off, Rowan smiled widely as he held it aloft for everyone to see, and Esme promised to fix the leg. Cribbage had become a popular pastime and Ellis had created a beautiful cribbage board shaped like the state of Alaska for Coby, with whom he frequently played cribbage. Alex gave Issa a gorgeous handmade box with a painting of a porcupine on top and inlaid with blue, velvety material. Josselyn made a gorgeous coaster for me that had the station's name and logo woodburned into it; I was particularly impressed with its detail when I learned it was her first time using a woodburning tool. The coaster included a note, handwritten on a piece of brown paper, that explained what she had used to make and how she had done so.*

It did not occur to me at the time, but when I later thought about the coaster I was given, I wondered if Josselyn had chosen to make me a coaster because we usually sat close to each other in the dining hall, and I nearly always enjoyed a mug of hot tea after my dinner. It would have make sense, since we did not know each other, that she could have picked up on something like that to guide her gift.[46] A full list of gifts is too long to go into detail but some other gifts included: handmade jewelry from local materials, a fanny pack made from cloth scavenged from the giveaway items, a bird feeder made with scrap wood and an empty bottle of Fireball, an

---

[46] I have never used the coaster as a coaster. It's far too beautiful and means too much to me to risk damaging it. It instead sits on my desk as a decoration reminding me of all the good times I had at the station and all the great people (like Josselyn) I worked with over the summer.

obsidian knife with a caribou antler handle, a handmade vest, a carved loon, and even a personalized workout plan.

> *After the last gifts were passed out, most of the people who hadn't made and received a gift left, but the rest of us either spent time with the people who had made or received our gifts or walked around to get a closer look at everyone else's gifts. I immediately sought Josselyn out and gave her a hug and thanked her for the beautiful gift. After I had thanked Josselyn, Marlon found me, and we also shared a hug. The huge smile on his face made me happy because I could tell that he really appreciated the gift I made him.*

Josselyn, like me, was shy, so we had not talked much before the gift exchange, but we were more comfortable with one another afterwards. We smiled when we saw each other and often sat together—usually without much talk—at the large table in the dining hall. I even joined her in the field one afternoon for a few hours where she taught me how to browse tundra foliage like a caribou would. Marlon and I had our longest conversation of the season at that point, and he invited me out on the boat with him and his colleagues the next day; I spent most of the day with them in the boat and ended up joining them several more times throughout the rest of the

Figure 62 Working in the field with Marlon and one of his colleagues later in the season. Many personal and professional relationships develop from the Christmas in July gift exchange.

season. After talking with Josselyn and Marlon, I realized people were leaving with their gifts, so I asked several people if I could photograph their presents.

Figure 63 Just a few of the many gifts exchanged during the Christmas in July celebration.

With the possible exceptions of the trivia night that happened during peak season population and the Fourth of July skits, in which participation was borderline mandatory as it was a friendly competition between lab groups, Christmas in July was the largest gathering that took place while I was at PRS. It was, fittingly, also the jolliest of all the events. While the skits and trivia nights were competitions, the gift exchange had a quite different feeling. Undoubtedly there was a bit of competition—"no one wants to give", as Remy put it, "a lazy or bad gift"—but it did not seem like it was about making a better gift than everyone else but rather about making the best gift possible for the person whose name Alex had drawn for us.

Frequent, regularly scheduled gatherings.

Frequent, regularly scheduled gatherings are a longstanding part of life at PRS, although these can be traditional events like the Saturday night bonfires (which occur nearly every Saturday evening during the summer field season) and the well-attended Tuesday Talks, or non-traditional additions like the recurring watch-parties (e.g., "Reality" Night) or crafty get-togethers (e.g., Sip and Stitch, which involves wine and conversation over craft projects ranging from embroidery to wood-carving) that are organized by an individual or small group and might be unique to the year they occur. These events are probably the most likely to move from the non-traditional to traditional if they are organized by someone who returns to the station for several seasons.[47]

The bonfires happened every Saturday night, unless the weather was poor enough to keep everyone in (I only recall a single bonfire being completely rained out). The bonfires were a time to unwind, when the normally very professional researchers and staff could get a little silly, play dumb games or just talk around the fire, and drink a bit too much alcohol. Interesting, while most of the station's staff would join in, the PIs, when they were in camp, seemed to stay away. I took this as a sign they wanted their researchers to be able to let loose a bit without fear of judgement from a boss. Although it described the Solstice Celebration, the narrative in the first part of this chapter detailing my entrée into the station's social life captured the feel of the Saturday evening

[47] Sip and Stitch, for example, was organized by an individual who had spent time at McMurdo and participated in "Stitch and Bitch" which is one of the "longest running gathering[s] at McMurdo" (see http://www.antarcticaknitters.com/knitters-in-antarctica.html). If that individual continues to work at PRS, the Sip and Stitch will likely take on a life, and longevity, of its own.

bonfires. With the exceptions of the costume theme and the burning of the sunworshipper sculpture, it could stand in as a typical bonfire. The discussion section of this chapter will refer to that narrative in discussions involving weekly bonfires.

Figure 64 In all but the worst weather, the bonfire will draw a crowd. While many gathered in the dining hall this night, a small group of about dozen people stood in the rain amongst the puddles to enjoy fire and friendship.

Spontaneous gatherings.

As the name suggests, spontaneous gatherings happened with little notice, and while usually open to everyone, because of the spontaneity, often involved smaller groups of friends. Still, these played an important part in creating, maintaining, and enlarging PRS's social networks. Some examples included: after-work hikes (hiking was a popular way to greet friends and colleagues who had just arrived at the station), small one-off watch parties that were especially prevalent during inclement weather (during my stay at PRS, I went to *Lord of the Rings*, *Jurassic Park*, bad Nicholas Cage movies, *John Wick*, and *Princess Mononoke* watch parties), informal after-hours work (often nearly indistinguishable from formal work except the bottle or can of beer each worker nursed throughout the night), and so forth. When a spontaneous gathering included someone unfamiliar, the small group nature made them excellent for getting acquainted with someone; through after work hikes, for example, I met quite a few people who were only at the station occasionally throughout the summer but who knew someone I knew, and twice during the summer I accompanied groups I met in this way out for fieldwork. Hiking is, therefore, an excellent example to use to discuss this type of gathering.

Of all the forms of recreation available to the inhabitants of PRS, hiking is probably the station favorite, and as recounted in the introduction to this chapter, has been for decades. Nearly any Sunday, weather cooperating, five or more groups—with a single group sometimes being large enough to necessitate multiple vehicles for transportation—will be out for longer day hikes, while several more groups (or solitary individuals) will be making shorter hikes near the station. Of all the forms of spontaneous gatherings, hikes were perhaps the best way to meet the people who were only at the station for a short time because, unlike a movie night or a game of *One Night Werewolf*, the hiking near the station was unique to the station's setting (meaning people usually jumped at the opportunity to participate since it was a chance they might only have once). I experienced this during several hikes and met more than a dozen people who were at the station for less than a week and who often never made it to a single other gathering. Although not the first one, perhaps my most memorable hike of the summer came when Puget and Quinn, two of Everest and Remy's out-of-station colleagues visited for three days to help with some intensive, time-sensitive fieldwork spanning multiple sites and protocols. The last day they were at the station, I joined the four of them for soil sampling, which we did quickly and efficiently so that we could do a relatively short but intense 7-mile hike along a fishhook-shaped ridge.

> *On the third day I joined them for soil sampling. The sampling sites were within walking distance of the station but in two different directions. To expedite the process, the four scientists decided to split into two teams, which they playfully called Team Boy (Everest and Puget) and Team Girl (Remy and Quinn), to see who could finish their sampling first.*

This splitting into two teams to "compete" was not at all surprising as Everest and Remy frequently turned their fieldwork into a game of sorts. In the last chapter I mentioned how they would race to set all the mosquito traps more and more quickly in a game that continued throughout the season; I also mentioned the impromptu experiments they would run (e.g., were truckers more likely to wave to Everest or to Remy). For them, it helped pass the long hours of work, while often making that work more efficient.

Both teams invited me along, so I made the difficult decision, partially just playing to the team names, to join Team Boy for the morning's friendly rivalry. This decision was partially motivated by Everest's gregarious nature and the fact that he would always verbalize what he was doing and why he was doing it when I was in the field with him. While Remy was also exceptionally good at explaining what she was doing for me, I thought that Team Boy would probably be a bit more vocal since Everest and Puget already knew one another quite well.

Team Boy started with the farthest site from the station and worked backwards. Although the areas needing sampling were marked with flags, they were almost invisible. Once we found

Figure 65 Soil sampling with Team Boy.

the first marker, Everest and Puget set to work while I located the next marker. Once I had located all the sites (marking the next few Everest and Puget would be working at so they could find them quickly), I recorded data and marked samples while Everest and Puget sampled and ran the necessary tests. We worked quickly and efficiently and made it back at the station in a few hours with a win for Team Boy (not unexpected since we had a three-person team). As we waited for Team Girl to finish their fieldwork. Once Team Girl returned, we planned a meet up in the dining hall and gathered our gear. Before leaving the dining hall, we each packed a dinner (sandwiches and wraps) into brown bags, put a few snacks in our pockets, and were on our way to hike.

> *We packed into the small truck and made a 30-minute drive to the end of a small dirt road. We hiked up a braided creek bed leaping back and forth over the narrowest spots where the blue-green water ran extra fast and deep. Along the banks we stopped to poke at huge piles of bear scat (and hoped aloud that we wouldn't encounter the grizzly or grizzlies that left them) and to look at flowers and shrubs. The hiking was easy, and we all stayed close together and talked loudly to alert nearby bears of our presence. About a mile in, we left the drainage and began hiking on the steepening tundra leading to a talus field of sharp rocks rising to the ridge above at a 45-degree angle. We stopped briefly to admire a porcupine heading up the hill parallel to us, but once it disappeared into the rocks, we fell into a silence (no longer worried about a grizzly encounter as we had left the concealing shrubs behind) and continued upwards.*

Invariably, when I hiked with someone from the station, we would stop multiple times to examine something. It might be just watching a bird, or a porcupine in this case, but often it was to examine plants or shrubs, often as if they were conducting informal phenology. They would carefully examine a plant to figure out if it was ahead or behind the station's similar plants or just to see where it was in its lifecycle.

> *I was already breathing hard as we spread out and picked individual routes up the steep talus field looming above us. As we climbed, occasionally someone would yell a warning that they had*

Figure 66 Hiking up the steep talus slope.

dislodged a rock or that a large boulder was loose and might cause a slide if weighted, but otherwise, we kept to ourselves. Everest and Remy, who were in phenomenal hiking shape, set a modest pace and by the time I reached the ridge I was out of breath and my thighs were burning. The view was breathtaking, and the thick clouds moving our way made us happy to have made the ridge before they obscured our view. We sat down and admired the valley, rivers, and lakes below us; within 15 minutes of reaching the ridge, we were completely engulfed in clouds.

Figure 67 Thick clouds engulfing the ridge and obscuring the tundra below.

With the clouds came a strong wind that made my sweaty shirt feel like ice against my skin, and the gusts blowing up the mountainside and over the ridge brought snow that seemed to be falling upwards. We walked single file along the ridge with enough distance between us that the person in front of me looked ghostly in the mist—not quite there. The changing visibility and lack of trees played tricks on my perception. Several times I thought a boulder was more than a hundred feet away, only to reach it in a dozen paces; the disorientation was an odd feeling that I had never experienced before in the mountains.

Figure 68 Hiking through the clouds.

The ridge changed elevations sharply several times at one point my right leg cramped with each step I took upward. When I reached the next crest, the others were waiting for me, and Everest assured me we were at the highest point and that it would be mostly downhill now. After another snack, we began the descent. Several times Everest checked the Garmin InReach he carried as few landmarks were visible in the fog and several false ridges jutted off from the main one.

The ridge is shaped like a fishhook and somewhere in the turn of the ridge, we stopped in a sheltered area, still surrounded by fog, and ate dinner. We laughed and talked about other hikes we had done, about family, friends, and music that we liked. We sat for nearly an hour before realizing that we couldn't stay forever and that it was past 9:00 pm and we still had around two hours of hiking to reach the truck.

Eventually we reached the edge of the ridge (what would be the point of the fishhook) and started the steep descent. The rocks were snow-covered, and it took longer than we expected to reach the tundra. Even when we reached the tundra, we were still in the clouds.

We followed another smaller creek bed down, this one a smaller tributary of the one we had followed up to the base of the other ridge earlier. Eventually we descended from the clouds and had a clear valley view. Again, we stopped along the way to marvel at several plants and picked a few tundra flowers. Someone, perhaps Alex, had taught Remy how to embed plants in resin, so she was looking for some small specimens to preserve. This was particularly relevant because most of the flowers near the station were already gone.[48] *About half a mile from the truck, and nearing midnight, we came across a hillside filled with plump blueberries that none of us could resist. We spent another half an hour eating tundra blueberries straight off the plants.*

Figure 69 Stopping to examine plants or to pick blueberries was a constant when hiking with station researchers.

The ride back to the station was largely quiet as we were all tired, wind burnt, and content. The truck smelled like the violet lotion Remy had kindly shared with us. When we were back at the station, Everest ran into lab N to put the InReach on its charger, and then we all walked back to our rooms together.

[48] The snow near the station had melted sooner than the snow in the foothills of the mountains, so the lifecycles of the station plants were several weeks ahead of the foothills plants. This could even be seen in microcosm at the station where areas that were drifted over with snow were behind the areas that held melted out sooner.

Puget and Quinn left in the morning, and I did not see them at PRS again. Several months later, Puget posted a photo that has become one of my favorites; in it, we are looking across the ridge at another mountain as the clouds began to close around us; Quinn and I, with our backs turned to the camera, look out toward the mountain, while Everest and Remy, being silly as they often were, look like children pretending they are about to fly off the mountain using their arms as wings. The hike was one of the most memorable experiences I had during my time in the Arctic, and while that hike and the preceding morning of work was the only time I spent with Puget and Quinn, we remain in touch through social media.

Figure 70 Puget's photo.

Ad hoc knowledge sharing workshops.

Knowledge sharing workshops are hosted by individual members of the PRS community who want to share their knowledge and/or abilities with their friends and colleagues. In workshops, individuals learn skills as varied as changing the large tires on the station's science trucks, carving wooden marking stakes into beautiful and functional spoons, cutting intricate snowflake designs from sheets of paper, hand tying flies geared toward fish found in the local lakes, or taxidermizing voles for use as museum specimens. Although these are ostensibly about learning a new skill, they are more akin to a bonfire in that they are mostly put together for social reasons with the skill being taught providing structure for sociality among a group of people with shared interests; this seems particularly true the less practical the skill. Sometimes the skill learned in a workshop would become a form of recreation for the rest of the field season; it was, for example, not unusual to see someone new to the craft tying flies after dinner or working on a wooden spoon during a Tuesday Talk.

Figure 71 Snowflake paper cutting workshop.

The topics of the informal workshops could be extremely diverse. One of the staff members, for example, taught a well-attended workshop on how to change the tire on a large truck. As someone who has been working on cars with my dad since I learned to walk, it had not even occurred to me how important a skill like that might be to some of the scientists who had no knowledge of automobile repair and maintenance yet were now in a situation where they might have to change a tire a hundred miles from help. Other workshops were practical, but maybe not as crucial: tying fishing lures, building packrafts, taxidermizing voles, or even learning proper exercise or stretching techniques. Still other workshops were less practical in nature but still fun: making wooden spoons or jewelry, preserving fragments of tundra flora in resin, making obsidian blades, or cutting paper snowflakes. Usually, a workshop had one individual teaching, but sometimes it was a group effort. One individual, Alex, was responsible for a disproportionate number of workshops. In one of these, the first workshop I attended, Alex taught us how to make a wooden spoon from a marking stake.

> *I was halfway through my salad when Alex tapped me on the shoulder to tell me that he would be teaching people to carve wooden spoons after dinner in the wood shop if I was interested. In my relatively short time at the station, I had learned that "after dinner" was a common, slightly arbitrary, starting time for gatherings. "After dinner" could mean anything from as soon as people were done eating (which could be well before the dinner hour was officially over), to an hour after the dinner hour had ended (frequently due to people chatting after dinner or getting involved in a game), or in extreme cases, it might mean several hours later (although these extreme cases were usually for outside gatherings that were somewhat dependent on the weather). I, like many others, had picked up the habit of checking in occasionally to see if anything was happening yet, so when I wandered over to the shop shortly after dinner, I was a bit surprised to see that Alex and several others were already there and working on spoons.*

When I arrived, Alex, Val, and Ripley were sharing a table. I knew Ripley and Val from the truck we had shared on the way to the station, but we had not talked much since. Alex, Ripley, and Val, however, knew each other well and had worked together for several seasons and seemed to be friends. They all chatted together easily as Ripley and Val worked on spoons that were too far along to have been started only a few minutes before. Rowan and Gray had apparently arrived just arrived and were standing near the table talking to each other.

When Alex's conversation was done, he started the lesson for the three of us who had just arrived.

He opens a small plastic bin, and from among the tools and sandpaper, takes out several spoons he'd made. Each varied in size and design, but they were all quite beautiful. Ripley and Val continue working on their spoons as Rowan, Gray, and I look closely at Alex's spoons. After we had an idea of what the end product might look like, Alex has each of us look through the boxes of wooden marking stakes (normally used for marking plots in the tundra), select one we liked, and draw a rough, enlarged outline of the spoon we wanted to make; he recommended that if we wanted a symmetrical spoon, we should mark a line down the center of the stake before we started cutting it.

Rowan, Gray, and I selected stakes and then stared at the blanks trying to envision what we might make. I eventually decided to make a long thin spoon (something I could fit in my mouth but could also use to stir stew boiling over a camp stove). As we made our outlines, Alex explained that we should use a bandsaw to cut the rough shape of our spoon. I had not used a bandsaw for years, so I appreciated Alex giving us a demonstration on how to use the saw safely. I finished my simple outline before Rowan or Gray, so I end up being the first one cutting on the

Figure 72 My spoon after cutting the rough shape with the bandsaw.

bandsaw. It is an old tool that vibrates considerably as the belt alternates between making steady squeals and occasional shrieks.

As each of us finishes our rough cuts, Alex explains the next step of using a rasp to cut away more of the material and bring it to an approximation of the final shape. Once the group part of the lesson is behind us, we spread out around the shop a bit more. Ripley, Gray, and I stay at the work bench Alex is at since it has easy access to the tools, but Val and Rowan move to work at the bench along the shop's framed-in back wall.

Gray's ambitious design, with a handle that will look like a *feather, spurs me to be a bit more creative and I decide to make my handle a bit thinner which allows me to give it a spiral shape. The sounds of rasps and sandpaper fill the room as we all work on our designs. We're all using Alex's tools and it strikes me as being extremely generous of him to not only be willing to teach us how to carve spoons, but also to bring enough tools to this remote station that we can all work on our spoons at the same time, under his direction, and not only are we able to borrow his rasps, chisels, and knives, which the wood slowly dulls, but he has provided us with consumables like sandpaper without any sort of expectation of a payment to cover their costs.*

Throughout my stay at the station, I would see Alex's generosity again and again as he taught others crafts and skills, loaned out tools, or let people use his consumables like sandpaper

Figure 73 The spoonmaking workshop.

and paint. He also gave freely of his time for many of the beloved events that took place: in addition to the workshops, he organized the matches for Christmas in July, co-wrote and co-hosted Trivia Night with Val (an enormous task), and had at least a minor role in most of the other events.

Throughout the evening Alex checks in on each of us and helps us along. Most of the group lacks woodworking experience, so it's a slow process. Despite being the first day of another six-day week, two hours pass before anyone noticed how late it was getting.

We're all just focused on our creations.

After he has made sure we all know what we are doing, Alex is the first to leave; by 11:00pm only Gray, Rowan, and I remain. Gray talks some as she works, but Rowan chats nearly constantly; Gray and I laugh at his self-deprecating jokes and appreciate his knowledge of ancient history (a passion that becomes especially evident several beers into a bonfire). We worked on our spoons for about three hours, yet none of us made it to the sanding step. My

Figure 74 My spoon (still) awaiting sanding.

spoon was shaped and ready for sanding, but I decided not to start it until I would have time to finish it. We all leave at the same time.

> *We walk out into the (almost) midnight sun grasping our wooden stakes turned rough spoons. The station is quiet besides our hushed—but excited—voices as we make the short walk to our rooms. Mine is the farthest away, so after I say goodnight to Rowan, I stop to take in the silence for a few minutes until a truck starts in the distance (likely one of the groups trapping voles as they check their live traps at all hours, day or night). I open the door to my ATCO and head to my room to sleep.*

For the remaining months I was at PRS, I would occasionally notice someone from that night working on a spoon. During the "Reality" Nights—watch parties where we would get together and drink beer and watch (or make fun of, depending on the attendee) the newest episode of a reality dating show on the community center's spotty Wi-Fi—I would often see Gray or Rowan carving away at spoon. Wooden spoons, at various stages of completion, made appearances at several bonfires. Occasionally a finished spoon—Ripley's, for example—would show up in the dining hall, perhaps to test its functionality.

I am a bit embarrassed to admit that I never finished sanding my spoon, but like my coaster, it sits on my desk as a memento; more specifically, my partially finished spoon reminds me of the first several weeks at PRS after I had started to feel comfortable among the researchers and felt like I had gained entrée into the community. This is fitting, as I would discover in a subsequent interview with Alex that, after he had spent a few seasons working at PRS, he realized that some of the regulars still did not know his name. This bothered him and he decided to become more involved in the station by organizing a community event; his first was trivia.

Now, all these years later, Alex is a well-known and trusted fixture of the PRS community who one resident described to me as PRS's "creative guru" while explaining that "he's good at everything." He has earned this reputation by willingly sharing his knowledge—from how to carve a beautiful, functional wooden spoon from an old wooden stake to how cut exquisite snowflake designs from paper—with anyone interested in learning, and he has a collection of tools—including, among other things, the tools we used for making spoons, various types of paint, and even a woodburning unit—that he happily loans out to anyone in need.

While Alex once brought people together to bring himself into the community, this is no longer necessary; he is now a fixture of the PRS community. Now his workshops and events bring others into the community in a way he perhaps desired in his early years. In my case, it was not the singular event that made me feel like a part of the community, but it was one of several events over a few weeks that made me feel like I was more than just an observer. Over the following months, I spent a great deal of time with Gray and Rowan, who I had not spoken with much before we learned to make spoons together, and they turned out to be among the closest friendships I had during my time at PRS.

Local reactions to world happenings.

Events like these connect PRS to the outside world. This connection can be around activism (e.g., a Pride parade supporting the LGBTQ community and a march protesting the separation of migrant families at the border by the United States government), a connection with the outside world that can be extremely important in a place where many of the normal worries of society can seem quite distant, but it is not always about activism (e.g., PRS has its own version of the Olympics during Olympic years as well as World Cup Soccer watch parties and pick-up games). Although this type of event feels decentralized (unlike the workshops where an individual's knowledge is a necessary focal point), it happens due to the organization of a community member who is passionate about the cause or fandom to which the event is tied. PRS often feels very distant from home, especially for the researchers who spend an entire summer at the station. This distance is not just physical, it is emotional; it is easy to feel disconnected from the rest of the world when there is no need to shop for food or even carry money or credit card around anymore. Thus, it is unsurprising that individuals at PRS look for connections to the outside world. These can be as easy as having pick-up games of soccer during the World Cup games, but the occasional moves toward activism at the station perhaps exemplify this desire to connect the most. World events could weigh especially heavily on people when they felt helpless to make change while living in a semi-utopian place hundreds of miles away from any population center, but participating in nationwide protests, like the June 30th, 2018 "Keep Families Together" march, offered powerful moments of connection with distant people and causes.

Several of the groups I worked with had field sites that required significant driving and/or walking to access. Despite PRS's remote location, thanks to Wi-Fi and cellular coverage, it was easy to keep up with national and world news, and during the longer drives and hikes, conversations often shifted to happenings back home. If the topic was U.S. news, the policies of the then current administration inevitably came up. Thus, it was not surprising when someone I frequently worked with invited me to march with her and several others to protest the White House's policy to separate migrant families at the border.

> *A small group of researchers approached from the opposite direction. The three women worked together, so I assumed they were returning from fieldwork. One of them, Lucie, I recognized but had not met, but I had talked with Nella for a bit at the bonfire the week before. I had worked with Sky several times; in fact, I had been in the field with her and her team twice in the previous 20 hours checking the live traps for voles to microchip and release.*[49] *As we neared, we said our hellos, and Sky told me they were going to have a "Families Belong Together" march and were on their way to their lab to make protest signs.*

From some of the conversations we had on our drives to field sites, Sky knew I was not a fan of the President or his policies, and she asked if I wanted to join the March. I had not yet heard about the marches that were happening across the United States that day, but when Sky told me about them, I was glad to hear they were happening and very much wanted to join this small one. Once I knew what was going on, I realized they had been coming from the dining hall where they had taken cardboard scraps from the recycling boxes to make signs. They had an extra piece for me, so I followed them to the lab where we worked on our signs.

> *We talked about our anger for the families being separated, the march, our signs, and perhaps most of all, our frustration at not being able to participate in the marches at home. All of us had been to at least one of the protests taking place over the last year, and we felt that we needed to speak up, even in a place like PRS where nearly everyone disapproved of the president and his anti-science administration.*

We spent half an hour talking about what we wanted to say and what it meant to us, and we all created simple signs with text—and a bit of art—made with black Sharpie markers on

[49] The live traps required frequent checks; thus, four of us (including Sky) had checked traps around midnight the night before and again around 9:00am the morning of the march.

salvaged cardboard. Something someone said inspired my sign that read "land of the free" behind a design meant to look like the bars and lock of an old-fashion jail cell.

> *We held up our signs and walked around the station under the clear blue skies, looping around the labs and then through the residential area. As we walked, we pumped our signs up and down and chanted "families belong together," "immigrant rights are human rights," and "pro-permafrost, anti-ICE." Along the way, Ferne, whom I had met at the February planning meeting, joined us. Although she didn't have a sign, she chanted with us as we walked.*

After walking through the camp, we took several photos on the dining hall deck. We thought we might be the furthest north protest happening (although it might be difficult to believe from the sea of green behind us and lightweight clothing we were wearing). Several individuals posted the photos to their Facebook, Instagram, and/or Twitter accounts with the appropriate tags to join the social media conversations happening around the country.

Figure 75 The northernmost protest?

After the protest, a few of us kept our signs (rather than returning the carboard to the recycling bin) and used them as a sort of decoration in our rooms. Mine ended up on the wall above my bed, held in place by electrical conduit. I did not end up close friends with anyone because of the march, but we were all friendly afterwards. A week later, Lucie, who I had not really met before the march, asked if I could help her take soil core samples from across the lake. We paddled a canoe over and spent several hours taking soil cores and marking core locations with pink flagging tape—both for her reference and as a warning to other scientists that there was an experiment in progress—before paddling back to the station with plenty of time to prepare for the Fourth of July Parade.

Spillover Among Gatherings

It must be noted that there is significant spillover among the five types of gatherings with the most obvious, and widely experienced, being that most of the holiday celebrations (category 1) nearly always transitioned directly into the weekly bonfires (category 2). A few other examples include the snowflake-making workshop (category 4) that helped decorate the community center for the Christmas in July celebration (category 1), the march protesting the separation of migrant families (category 5) was preceded by a spontaneous gathering where signs were made (a mixture of categories 3 and 4 as those more inclined to art helped the others with their signs); and in some cases, we even see two of the same categories of events flowing from one to another as, for example, when the weekly "traditional" Tuesday Talks were immediately followed by the weekly, "non-traditional" "Reality" Night watch parties (with both category 2 events taking place a few minutes apart in the main community center).

As the last case suggests, we can further differentiate between "traditional" and "non-traditional" events. This differentiation came about in an interview with Aston in response to my suggestion that some events were "official" and some "unofficial." He felt that it was important for me to understand that these events belonged to the station's community rather than to the management and that “traditional” events become such organically, rather than through some arbitrary decision by an administrative body. And indeed, while “traditional” events are often officiated, albeit loosely, by station staff, the “traditional/non-traditional” division better catches the possibility and method for transformation from “non-traditional” to “traditional” (or assumedly, vice versa), than would “official/unofficial.” In most cases, “traditional” events fall into the first category, while the “non-traditional” events fall into the third through fifth categories. The second category has both “traditional” and “non-traditional” events and can be a liminal area where we are most likely to see a transformation from “non-traditional” to “traditional.”

The final section of Chapter Seven looks at how these various gatherings affect life, including work, at PRS.

Discussion: Normalization and Homebuilding

In Chapter Four, I discussed PRS’s setting as an ICE environment. The reality of working in an ICE environment is a lack of clear delineation among work life, social life, and personal life, as the same spaces are used for all three. Even if one can find time to themselves, the sights (e.g., the thin, shiny material of a WeatherPort’s walls or the exposed electrical conduit of the ATCOs), sounds (e.g., the constant, low hum of generators or the jarring sounds of construction or helicopter traffic), and smells of station life (e.g., diesel exhaust, burning kitchen scraps and toilet paper, and occasionally, even an acrid smell from the towers) can intrude on one’s privacy; sometimes, even the feel of a surface (e.g., the rough edge of unfinished plywood cabinetry or the extreme cold seeping through the floors and walls) offers a reminder that this is not your typical home. Thus, while infrastructure “never stands apart from the people who design, maintain and use it” (Lievrouw & Livingstone, 2012, p. 230), the affective awareness of it can vary greatly.

In Chapter Five, I proposed two related concepts regarding this awareness in ICE environments: (1) Infrastructural hypervisibilty—the relationship between the presence of infrastructure in an ICE environment and that environment's inhabitants' heightened perception of that infrastructure—and (2) Infrastructural hypervigilance—a deeper relationship with infrastructure, in which some inhabitants have learned to ascribe value to and make judgements on a hypervisible infrastructure. The key takeaway here is that a predominant aspect of infrastructure—that it is invisible when not in breakdown—does not hold up in an ICE environment where people are both deeply reliant on that infrastructure while also being constrained by its limitations.

In Chapter Six, I focused on the work taking place at PRS which, at times, is guided by hypervisibility and hypervigilance. Many of the scientists and researchers working out of the station find themselves in a state of hypervigilance and must, at any time, be ready to tend to their work, often at the least ideal of times (e.g., when a terrible storm strikes in the middle of a holiday celebration requiring someone to go check on an experiment). Even without a sudden shift in circumstances (e.g., the storm), the ICE conditions that scientists face, mean they are often involved in maintenance, repair, and planning to greater extents than they would be in more typical research settings. These are difficult conditions to work under and undoubtedly exacted mental and physical tolls, particularly for extended periods of time. Thus, in the early years of the station, when the scientists could no longer handle constant work, the Sunday Hike was born.

Finally, we arrive at Chapter Seven—this chapter—which looks at station life "outside" of formal work. From the first Sunday Hike in the 1970s to my fieldwork in 2018, station life outside of work has changed greatly. There is now, as discussed throughout this chapter, a vibrant social life that continues to grow with a great deal of infrastructural support. While these various activities—hikes, gatherings, workouts, workshop, and so forth—are very much breaks from work, they are also serving to make life in a very abnormal place feel normal. In ICE environments, the awareness of infrastructure—infrastructural hypervisibility and/or hypervigilance—does not need to be problematic (although it is sometimes), but even when that awareness is faint, there seems to be push back against it. The ways in which inhabitants push back are the clearest and most direct, but there are also efforts by distant stakeholders (e.g., logistics, management, etc.) to make ICE environments seem like more normal settings.

In ICE environments, I have suggested that hypervisibility (rather than visibility upon breakdown) may be a "salient feature" of infrastructure, meaning that to the station's residents, the presence of infrastructure is constant and encompassing. The remainder of this chapter explores how these stakeholders react to and deal with the hypervisibility of infrastructure in ICE environments through what I am terming "Infrastructural Normalization" and "Homebuilding" and suggests their observable benefits.

Infrastructural Normalization is the process through which actions, habits, and routines lessen the foregrounding of infrastructure in an ICE setting; this can be done consciously or unconsciously and can act on not just material infrastructure but also social and technical infrastructures. In ICE environments like PRS, the process of normalization can happen from both the inside (from the station's inhabitants) and from the outside (by distant stakeholders that administer the station). While the act of normalization is not limited to ICE environments, it is particularly crucial for the inhabitants in such places.

Homebuilding is a special instance of Infrastructural Normalization where someone acts on hypervisible infrastructure to create a connection to their distant home, or in some cases, to make a home at the station[50] to lessen an infrastructure's foregrounding; this connection is personal (although not necessarily private), is strongly intertwined with the idea of placemaking, often seems to have strong creative elements, and often materially changes something. Homebuilding can take place anywhere someone is able to carve out a personal space: a shared or private room, a laboratory, or anywhere one can assert partial ownership (even if it is just a community whiteboard). Attempts at homebuilding, being a more personal activity than normalization otherwise is, will not always be successful, particularly when they are made by outside sources. Successful homebuilding requires personal knowledge: one might be able to successfully homebuild for a friend or colleague but doing so for a stranger is unlikely to be successful. That said, it is possible to provide the space and/or means for others to homebuild without the personal connection.

Homebuilding, like the more generalized process of normalization, is especially important for the well-being of inhabitants in ICE environments. While work can be accomplished in extreme environments without normalization and homebuilding, it does not seem sustainable in the long term.

Why Normalize, Why Homebuild?

NASA and other space agencies seem to recognize the importance of having a piece of home available to their astronauts as they allow certain personal items to make the expensive transit to the International Space Station. Most terrestrial settings are more forgiving when it comes to the weight and space of personal effects, and normalization can act on material infrastructure in a way that will not occur in a shuttle or the ISS; however, regardless of size, normalization seems to be important for productivity in that an effective infrastructure must

[50] By now the emotional attachment some inhabitants have for the station should not be at all surprising. Many return summer after summer, and to them, the station has become not just *like* a second home but an actual second home.

provide not only safety but also a modicum sense of home (or belonging) before science and other forms of knowledge production can be done effectively.

While different people have different experiences of the social gatherings that have been the focus of this chapter, broadly speaking, the gatherings serve some combination of five main purposes, all related to normalization and homebuilding: (1) they give the inhabitants opportunities for recreation and relaxation; (2) they help build community within the station; (3) they make the station a place where people want to be; (4) they help mark the passing of time at the station and anticipate the passing of the field season; and (5) they help residents stay connected to the world and causes outside of the station. Each of these is discussed in more detail below.

Normalization and Homebuilding in the U.S. Space Program

Astronauts may take a small number of personal effects with them into space, referred to as the Personal Preference Kit (PPK). The PPK is limited to a maximum of 20 items, with a total weight of 1.5 pounds, fitting into a 5" x 8" x 2" bag. There are also "crew care packages…manifested by the psychological support teams and include personal items considered to be for the wellbeing of the crewmembers, such as books, CDs, religious supplies, holiday decorations, and favorite condiments." Finally, there is also the Official Flight Kit "in which crewmembers can put mementos for family members or their support team." (https://www.quora.com/How-much-stuff-can-astronauts-bring-to-space/answer/Robert-Frost-1)

The importance of the PPK and the crew care packages becomes clear when the cost of putting cargo into space is estimated at $27,000 per pound (https://www.businessinsider.com/spacex-rocket-cargo-price-by-weight-2016-6). Thus, the PPKs (having included wedding rings, a pocket watch, a medallion, a miniature Torah, a starship Enterprise toy, paper dolls, a copy of *Pride and Prejudice*, a Snoopy figurine, and more) (http://www.collectspace.com/news/news-092418a-intrepid-personal-space-exhibit.html) cost around $40,000 per astronaut, yet they are considered a necessary and good expenditure.

Here, both NASA (allowing astronauts to take mementos to space despite the high cost) and the astronauts (engaging in deep personal connections with their chosen items) are involved in normalization and homebuilding. The items that make it to space are necessarily small, but they are important normalizing elements for individuals living in one of the most extreme of ICE environments.

Recreation and relaxation. The most obvious purpose of the events is to provide a structured form recreation and/or relaxation for the inhabitants of the station, something that can be particularly difficult to do when there is so little physical separation between places of work and of leisure. As has been mentioned, most of the researchers work six days a week, often with 10+ hour days, and they tend to be extremely focused on their work. The scheduled events offer a structured form of entertainment that allows an individual to join in without much effort and to let loose for a few hours before focusing on work again, and the less structured events can be tailored to individual interests. In fact, with the exception of the optional Christmas in July gift exchange, the events are intentionally meant to be low effort so that people could participate without feeling as though they should be working instead; an excellent example of this is the Fourth of July skits: the only real rule for the competition is that each lab's skit is only allowed to be created and rehearsed in the two-hour timespan before the competition. Miles, who identified himself as the "founder of the Fourth of July Parade," explained it thus in an interview:

> It was Fourth of July and you walked around the camp and you'd go, "hey, it's…the Fourth of July. What are you doing?" [and you'd be answered with] "What do you think we're doing? We're working?" Okay, so there's your starting point. So what I did, was with the parade, I said, "okay, we're going to have a parade, but you're not allowed to plan or prepare anything until the Fourth of July, until 7:00pm, after dinner, and you only have two hours to prepare your marching unit, your truck or your float, because at 9:00pm…we're going to have a parade." And now everyone bought into because they said, "okay, we can take off for a couple of hours after dinner on the Fourth of July." And that's why the whole thing worked. Their workday was not interrupted, and they were willing to give up two hours to participate in something that looked like it was fun to do.

This format was a way to work within the constraints of the infrastructure and provide a fun experience. Too often they had run into issues because people were "too busy to participate," but by forcing it to be lower effort, they were able to increase participation and enjoyment.

Building Community. The various types of gatherings also have the benefit of building community, occasionally through one-on-one interaction, and other times small or large group interactions. With the long hours both the staff and scientists work, it would be easy—especially for the more reserved individuals—to simply eat dinner after work and return to their rooms or find a quiet corner somewhere to chat via phone or computer with friends and family back home. While non-participation remains an option, the gatherings offer an enjoyable, structured alternatives that bring the station's inhabitants together and foster community at multiple levels: (1) as suggested, they give the inhabitants an easy way to join together and meet one another (the bonfires are excellent for this, as the entrée narrative illustrates); (2) they can strengthen the relationships within lab groups and turn colleagues into friends, as it gives individuals the chance to get to know one another outside the concerns of work (as lab groups tend to cluster together outside of work too, this happens naturally during the less structured events, but some of the events, like the Fourth of July skits, also nudge individuals toward this as they compete in lab groups); and (3) events like the Tuesday Talks allows individuals to share their research to a wide audience which can lead to collaborative work, but this same kind of collaboration can also come about through a discussion while sharing whiskey at the bonfire. At the same time, these types of events also normalize individuals in the eyes of the people around them. This was part of what happened for me at the bonfire, as I shared beer, talked, and laughed with these individuals, I was normalized in their eyes, and these were my first steps to becoming an insider. Through participation, it was shown that this strange social scientist among them was not there to judge everyone's actions from afar; rather he was just doing his own research in much the same way the scientists were doing their own. Thus, these events create and nurture community and relationships among the station's inhabitants.

Placemaking. While community building is largely about relationships within the station, placemaking is about the relationship of the station with the world outside of it. The many gatherings contribute to making PRS a place where people want to go for, and (perhaps more importantly) return to, for research. During the February planning meeting, several months ahead of the field season, I spoke with several scientists who had been returning to the station year after year, some for more than a decade, and they were still excited to get to the station and start the field season. Several who were involved in the logistics but had obligations that kept them from the fieldwork, expressed regret at not being able to spend more time at the station; in fact, two of them showed up at the station over the summer when presented with a reason to visit (i.e., when a number of volunteers were brought in for the intensive, tedious labor of a pluck). While the scientists I spoke with at the planning meeting were passionate about their research, their excitement was not just for the science; they talked as much about things that had happened at bonfires, gifts from past Christmas in July celebrations, and their favorite trivia team names. They reminisced about swimming in the lake's icy waters and laughing in the sauna afterwards, and they assured me how much I would love the hiking nearby. When it came up that I was a rock climber, someone told me that the HC had a hangboard I could use. There is a mythology of sorts surrounding the station, and the participants are active in building and maintaining that mythology. PRS is a place to which the researchers want to return, and it is a place they love to talk about with others who have been there or will soon be going.

All this plays into making PRS a place that where scientists want to go, where they want to stay once there, and where they want to return in subsequent years. This is particularly interesting when we consider who controls the events. The holiday events, Tuesday Talks, and bonfires are now traditional events that were created and/or encouraged, and now run by, those tasked with PRS's success as a science station; however, the non-traditional weekly get-togethers, the spontaneous gatherings, the knowledge sharing workshops, and the reactions to world events are driven by individuals and change from season to season. It is not surprising that those tasked with PRS's success cultivate it as the place to be, but their success at doing so is perhaps most obvious when you consider how much the inhabitants themselves work to make the station a great place to work.

In short, placemaking is about building a reputation as an attractive place to be and to return to, and this extends beyond just the quality of the research, to the quality of station life.

Marking and anticipating the passing of the field season. As mentioned earlier in this chapter, social gatherings play an important temporal role in the field season. While PRS's field season is just part of a larger cycle of research that begins long before a scientist arrives at the station and may continue indefinitely, the field season itself is filled with cycles that help maintain normality in an unusual setting. In a place where most of the inhabitants are working 12-hour days Monday through Saturday, the various events become important markers of time. This is a crucial part of normalization. The regularly held events—the Tuesdays talks and bonfires—are important markers during and at the end of each week, while the special events—occurring every few weeks— help give the station's population something special to look forward to in the longer term; workshops and smaller get togethers offer a chance for social leisure at a moment's notice.

The social happenings mark the passing of time and signal the boundary between work and leisure. For those visiting in the short term, they offer mostly entertainment, but for those spending the entirety of the summer at the station, they mark and advance the season as well, culminating with Christmas in July celebration and slowly winding down as the tundra changes colors, the station's population begins to dwindle, and temperatures drop as winter looms. These markers are especially important in a place where an entire year of seasons feel compressed into a "summer" field season as many arrive to snow, watch the tundra and lakes thaw, see the flowers bloom and the brown tundra turn green, soon after to watch the tundra turn red as the temperatures drop and days grow shorter, until finally, snow covers the ground and will remain until spring comes again the following year. In other words, over the space of a few months, long-term inhabitants see something analogous to winter, spring, summer, fall, and winter again.

The artificial cycles that help pass and mark time become especially important when many of the station's inhabitants are so removed from the normal conventions and cycles that structure life outside the station. While it may not be unusual for those who have lived in the far north, the day-night cycle, probably the most obvious natural cycle for timekeeping, is missing for nearly the entire summer field season; often, particularly early in the season, the sun is hidden behind clouds that diffuse the light in a way that completely obscures the sun's location and makes it impossible to mark the passage of time by its position. In addition to the interruption of some of our most basic natural cycles, many of the cultural constraints on one's time are absent; to mention only a few examples: there is no commute to work, to the gym, or to visit a friend; personal grooming is minimal with showers being limited to four minutes a week; and the need to shop for groceries and/or cook a meal is non-existent as breakfast, lunch, and dinner are prepared by kitchen staff 6 days a week (salad and deli materials, leftovers, and snacks are available 24-hours a day as well). In short, the frequent gatherings, of all kinds, contribute greatly to normalizing temporal and social structures that help the station's inhabitants move smoothly through the season in a setting lacking many of sociotemporal structures we take for granted at home.

Connecting to the larger world and outside causes. Finally, PRS's social events help connect a remote place and its inhabitants to the wider world. Despite spotty cellular network coverage and a reliable-enough broadband connection for passable Internet access, PRS feels distinctly different from being *home*, even if it feels like *a home*. Despite, or perhaps because of, this ability to communicate with the outside world, PRS feels distant—sometimes heartbreakingly distant—from home. Although many of the researchers who have been working at the station the longest rebuff the idea that PRS is isolated,[51] to many first-timers, it seems unimaginably far from much of what—and who—they know and love. At times they feel incredibly isolated, despite the strong sense of community that pervades the station. The social gatherings can not only distract inhabitants from the strange situation they find themselves in but also help connect the inhabitants to the larger world. Something as simple as celebrating the Fourth of July at the same time as family back home[52] or playing a pick-up game of soccer on the pad during the World Cup season (as one might do if they were back on campus), helps create and maintain a sense of normality. In the case of things like the Pride Parade or the March Against the Separation of Families at the Border, a small gesture of support for a marginalized community can be extremely important. It can be easily to detach oneself from the wider concerns of the world while at PRS: room, board, and transportation are provided (station staff and some—but not all—researchers are being paid for the work); the work itself consumes a great deal of mindpower; a general sense of camaraderie (and Title IX protections) helps keep conflicts at a minimum; and violence, poverty, and other societal woes are not directly visible. So, for some, activism at the station can be a way of keeping focused on the responsibilities we have to others.

Settling In: My First Experience with Normalization and Homebuilding at PRS

What individuals experience at PRS is not as extreme as what the astronauts mentioned earlier encounter, yet normalization is equally important the station's inhabitants, some who will not leave PRS from May through September. There is not, for example, a hard limit on the

---

51 From the station's veterans, I would often hear about how it was isolated early on, but then "whatever" came and now it is no longer isolated ("whatever" is frequently the fiber optic internet connection, but not always; sometimes it is the road that has slowly improved over the years, the growth of the station, or the increasing number of trucks that arrive and depart throughout the week). Undoubtedly, the station is not as isolated, or even as remote-feeling as it once was, but there can also be little doubt that some of the veterans' feelings are related to their numerous seasons spent at the station. To them, after so many visits, PRS's strangeness has become a "normal" part of their lives.

52 I suspect this is why the station has a special dinner on Independence Day even though the larger celebration, in the form of the parade, happens on a weekend.

personal items that a researcher or employee can take to PRS. As the first leg of my trip was on a commercial airline, I took approximately 100 pounds of gear with me including clothing, footwear, camping and hiking gear, and of course, my laptop and other research-related materials. I had slightly more gear than the others on my truck (with Val and Ripley planning stays of a similar length to mine but Will only staying for a week or two), but that was in part due to my camping gear and the locking Pelican used to ensure privacy and confidentiality; additionally, we made a customary stop before leaving civilization and each of us purchased alcohol for our field seasons. Still, all our gear and provisions together amounted to only about 10% of the volume of the back of the science truck, with the rest of it being taken up by a second spare tire and recovery gear, scientific equipment, mail for those already at the station, and other items the station needed delivered.

Although I did not realize it or act it out consciously, almost immediately on arriving at the station I engaged in my first act of normalization as I got to work unpacking in my ATCO.

> *I put away my clothing and toiletries and shoved the Pelican case to the back of the plywood cabinet serving as my closet, hopefully out of sight if someone was nosey. I organized my desk, made my bed, and stuck my beer under the bed. Hopefully the cold floor would keep it cooler.*

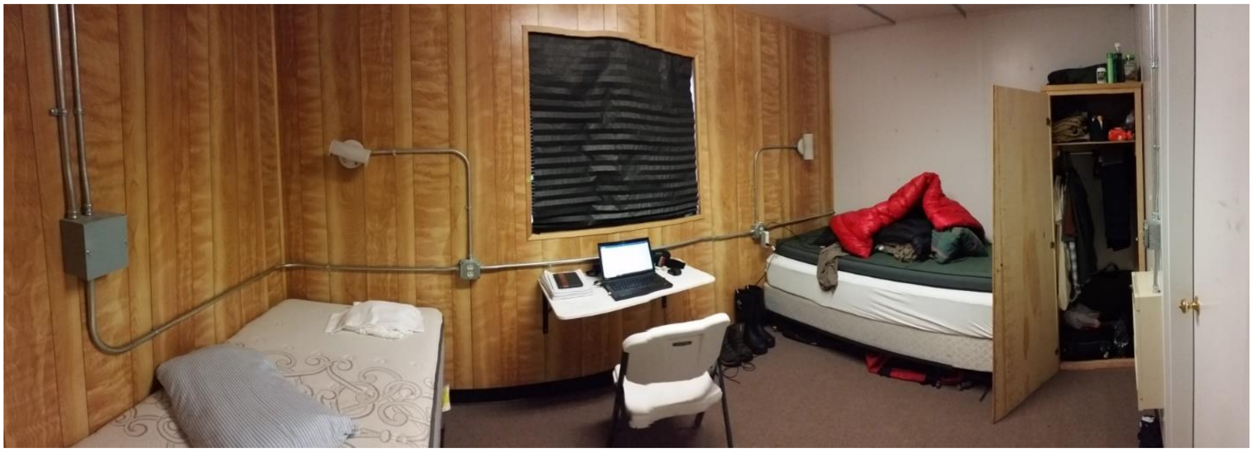

Figure 76 My first act of homebuilding was organizing my room on arrival: unpacking, setting up my desk, organizing my closet, and so forth.

Once I had finished unpacking and organizing my belongings, the sparse and unfamiliar dormitory-style room had become something I recognized as mine. Still, it felt strange.

I realized later that nearly everything I took with me was a necessity for life at the station; everything was either something I needed for my research (e.g., my laptop, research-related books and papers, and so forth) or something that was listed as "recommended personal gear" (e.g., a watch with an alarm that I purchased only days before leaving, cheap binoculars, a pillow and my down quilt, and four different types of footwear including Muckboots, hiking boots, trail runners, and sandals. Despite planning to be at the station for nearly three months, I had not brought anything like an astronaut might. I did not even bring a single book for pleasure reading nor had I thought to bring along any physical mementos of home or friends. My laptop[53] and my cell phone replaced photographs, books (outside the scope of my research), my vinyl record collection, and my journal; I had not brought even a single item that I could use to decorate my space. I did, however, accumulate decorations during my stay: as already mentioned, the small protest sign I made hung on my wall above my bed lodged behind some exposed conduit and the coaster Josselyn made for my Christmas in July gift sat on my desk (not for use as a coaster but as a decoration). Gray gave me a fly (for fishing) that she had made while learning to tie, and Remy gave me a resin cast of a leaf that she had made during a workshop; these two items, along with the half-finished wooden spoon I had started working on, were placed carefully on my windowsill. At the time, I did not think much about what I was doing; I just wanted to see these things because they made me happy, but I realized later that I was homebuilding at the same time

[53] Even my laptop was specifically for research, as my home computer is a desktop I built. As such, even the music I had on the laptop was specifically geared for the purpose of drowning out background noise when I wrote (e.g., mostly soundtracks and classical music. Special shoutout to Noella's album *Beautiful Sorrow*). If I used my laptop more in my everyday life, it might have done much to make me feel more at home; I am always relieved when I return from a trip and put my laptop away and am able to return to the desktop that I have finetuned to my needs over the years and stores 25 years of files, correspondence, and photographs.

and in a similar way as many of my station colleagues were.

As mentioned earlier in this chapter, part of my research agreement restricted photographing and recording in several areas, including the WeatherPorts and living ATCOs (except for my own). While it might not have been strictly necessary according to the wording of the agreement, I avoided asking to see anyone else's living area, particularly since most WeatherPorts and many ATCO rooms were shared by several others. Interestingly, and perhaps because of this shared arrangement, most socializing took place outside of individual's rooms. During the nearly three months I was at the station, I only went into others rooms a handful of times (most often when helping a departing friend move heavy bags to their ride back to the logistics station). For this reason, I have focused on my own room when I discuss private space. That said, from talking with people, I know I was not alone in homemaking at the station. Some of the people I talked to had brought a few photographs or mementos from home, while others had—like me—accumulated meaningful decorations while at the station (particularly after Christmas in July), and often, it was a mix of things brought and accumulated.

Thus, it seems that while homebuilding can be done with materials brought from home, this is not always the case. Homebuilding can be done in a strange place with items from that place. This suggests two things: (1) that it is not the material itself but rather the affective connections to home that are the most important in homebuilding, and (2) that homebuilding is not necessarily about creating a connection with a faraway home but can instead be about creating a home in a new place. This second point is important considering the affective connection that so many I spoke with had with the station and is a point that will be touched on again when discussing why normalization and homebuilding is particularly important in ICE environments.[54]

Normalization and Homebuilding at the Community Level

Fortunately, infrastructural normalization and homebuilding are not limited to private spaces, rather they are often, by design, for public display. While the normalization and homebuilding work done by outside stakeholders (i.e., distant administration) is obviously done at a public level, the work done by station insiders—sometimes as groups and sometimes as individuals—is no less important to the community at large. The following section will discuss examples of infrastructural normalization by both distant stakeholders and station insiders using the social infrastructure and gatherings discussed earlier in this chapter.

Normalization by distant stakeholders.

By far the most crucial way that distant stakeholders participate in normalization—and to a lesser extent, attempt homebuilding—is through the infrastructure they provide and maintain. In the early days of the camp, its infrastructure was wholly devoted to science; at one point, the only structure, a trailer, was a laboratory. Over the years, this has changed drastically with the station now having a dining hall capable of seating the entirety of the station, a large community center, a sauna, and even a small gym; additionally, the station has numerous bikes and several canoes for use by residents. Like the early implementation of the Sunday Hike, those in charge of the camp quickly realized that infrastructure focused only on science was detrimental to that science. In his interview, Miles explained there is a "decision matrix" that they use to prioritize things and that the "dining hall was built before another lab because it was proven that we'd get more science done" by focusing on the dining hall rather than another lab. Crucially, about 30 minutes earlier, he had stated:

---

[54] We also see occasional hints of infrastructural normalization or homebuilding at the personal level through ritual (e.g., Everest cleaning his lab each morning before starting work or Cody's daily morning workouts).

> the day we flipped on the Internet, everybody went to their rooms…. It changed things instantly…. So before the Internet, everybody would be in the dining hall after dinner and people would play cards and board games and you know, socialize. Once the Internet hit, all that disappeared overnight. And it's taken years that we're now back to where, and I think because the one thing that changed the dynamic…is the dining hall, the new dining hall. The old one got to the point where there was like a hundred people in camp. There's no room. So people would eat and leave and then they wouldn't come back. Now people can congregate, you know, after dinner and there's actually space for people to have social interactions.

It is also worth noting here that I had not asked about the dining hall either time he had mentioned it; he brought it up because he sees the dining halls as having been crucial pieces of infrastructure that shaped station sociality—and science—through the years. Having worked at the station in the early years, both before and after the construction of the first dining hall, Miles sees spaces like the dining hall and the Social Circle as ways to bring people together, and he has pushed for these types of places over the years.

Most people who have spent time at the station recognize the importance of the dining hall to the station, if not for the key part it plays in sociality, then definitely as the location where they can find all the meals and desserts that everyone raves about. While I was not able to get an answer, I would suspect the quality of food is an attempt at homebuilding: the meals are cooked from scratch and consistently delicious. They also, it would seem, are well known, even to outsiders who have an "in" with the station. Recently a friend from the station visited and she was with a friend from her graduate school. He had not been to the

Figure 77 One week's menu.

station—although he had been close enough to see it from the entrance sign—but he knew several others who had been there and mentioned how he had heard the food was "so good." Besides hearing this numerous times at the February planning meeting ahead of my stay, I also heard this on one of my connecting flights back to Los Angeles when the person sitting beside me happened to be friends with one of the station managers. While it might be difficult to make a "homecooked meal" that works for everyone, PRS does seem to be doing this one as well as possible. So, in answer to Remy's question in Chapter Six, "why's the food so good? People will come up anyway to do research," I would suggest it is an effort at homebuilding. Those in charge of the station have intentionally built this part of the infrastructure—that supplies sustenance to the researchers—to be enjoyable and to feel homecooked meals. Crucially, however, it is not just about the food being good, it is also about working with dietary restrictions. In an interview, one researcher told me, "I have a severe peanut allergy and I have to be gluten free…and I know that I could never go to Antarctica now because … you can't have a nut allergy down there." Small things like being able to accommodate food allergies and preferences (e.g., every meal has a vegetarian option if the dish contains meat) do a great deal to make a place feel more like home.

Another form of normalization by distant stakeholders is the attitude toward alcohol. While station staff and researchers must bring their own alcohol—the station does not provide any—those making the decisions in both science and support, with the occasional issue aside (and to be clear, I saw no issues during my stay), see allowing the use of alcohol at the station to be both normal and beneficial. This is backed up through several conversations I had with PIs. Several times during my stay, it came up in conversations that when the one of the institutions associated with the station was considering a dry policy (which would have extended to the station), those in positions of authority at the station were prepared to fight to continue to allow alcohol at PRS. Two other scientists I spoke with, each who had spent over a decade of summers at PRS, discussed how PRS had become more social than it had been in their early years. As briefly described in Chapter Six, one of them mentioned that PRS necessitated a change in rules that had prohibited alcoholic beverages in lab spaces because all PRS, especially in the past, was lab space. The other mentioned the symposium as pointing toward alcohol's importance to science and that the drinking in PRS is the continuation of a long-standing Western tradition in science and philosophy.

The allowance of alcohol at the station benefited PRS primarily in two ways: (1) it works as a social lubricant and (2) it is a demarcation between work and leisure. The boundaries between these are, like nearly everything else at PRS, blurry.

Alcohol acted as a social lubricant. On trivia nights, for example, some teams formed from people who did not know each other, but with a bit of alcohol, even some of the shyer researchers would open up a bit. Bonfires are another excellent example. As recounted earlier in this chapter, my most productive relationship (and closest friendship), came about from a dropped can of beer. Also, following Eddie's example in Chapter Five, I never passed up an opportunity to offer a stranger a beer, and more often than not, that simple gesture turned someone newly arrived in camp into a known colleague. Alcohol also served a function for Team building. The Fourth of July skits, which involved a friendly competition among the labs, was a good example of this. The group I was with enjoyed several beers together as we developed and rehearsed our skit, and this continued later into the bonfire. Another group performed a hilarious apocalypse-themed skit—one of the favorites among attendees—portraying a dry PRS that had turned into a cult of mosquito-worshipping scientists. Another example, outside of celebrations, each night at dinner, one table of veteran researchers would share wine. They even had their own wine glasses they kept in the dining hall (unusual since almost all drinking, not directly from a can or bottle, was from our personal mugs). Although no one ever stated it directly, it seemed like it was a source of pride among junior researchers to be invited to join this table for a drink.

Alcohol was sometimes used as a demarcation between work and leisure. During normal working hours, there was no public alcohol use, but after work had concluded, many would sit back and relax with a beer while playing cards, watching a movie, or whatever other leisure activity they choose to relax with. Alcohol also was a marker of less formal events; for example, many individuals who attended the Tuesday Talks would bring a drink (or several) to enjoy during the hour-long lecture. Even the February planning meeting followed this type of format where the poster session had a cooler full of beer for presenters and audience.[55]

Another form of normalization can be seen in the community-wide gatherings that take place regularly at the station. These events blur the lines between normalization done by outside stakeholders and from within by community insiders. The frequent, regularly scheduled gatherings like bonfires and Tuesday Talks are weekly events meant to bring the entire station together for companionship and entertainment. Like alcohol, the bonfire is a demarcation between work and leisure, as it acts as a very explicit signal of the end of the work week for most of the station's residents. The station-wide celebrations, particularly the holiday celebrations, serve a similar purpose as they help mark the passing of the season in larger chunks of time. Besides the station's food, these celebrations are probably the clearest attempt at homebuilding that is done at the institutional level. Celebrating the holidays, even when away from friends and family, helps make a place feel like home, and celebrating them makes one feel connected to

[55] As a reserved person, being able to enjoy a beer as I pitched my idea to scientists who were very invested in PRS, out of which many had spent decades researching, made the poster session much easier for me; the session felt much less formal than it might have otherwise, and it remains one of the most supportive and enthusiastic academic environments in which I have presented work.

home (recall that in the staff meeting described in Chapter Five, Esme said she wanted to celebrate her own nation's Independence Day as well). Unlike the quality of the food served by PRS, these types of celebrations can be found nearly universally in ICE environments regardless of size or location.

Normalization by station insiders.

While the support for the community-wide gatherings comes from station administration, the community itself runs the events, and often, individuals and groups add their own twists and personalize the gatherings. Christmas in July, without the individual effort going toward making gifts and decorations, would just be a room full of people drinking eggnog. Without the support and enthusiastic participation of the community, events planned by outsiders would fail at normalization and homebuilding. In a sense, the role of the outsiders is to create a framework that will, ideally, work within an ICE environment, while the station insiders use that framework to create what something meaningful to themselves and to those around them.

Alex's story, related earlier in the section looking at ad hoc knowledge sharing workshops, is an excellent example of one of the primary ways that people engage in homebuilding at PRS. In an interview, he told me:

> I remember my first years up here feeling very … much an outsider…. And people who have been up here a long time didn't even know my name…. I remember feeling pretty lousy about that. So I was like … if I can do stuff … try to be very inclusive with everyone, and anyone, and it doesn't really matter what it is, whether it's trivia or … carving spoons or anything like that. It's like that's something I'm happy to share…. I really like to try to do inclusive events that even someone that … just got here, or someone that's up here all summer that does feel kinda outta place, or… just ignored … or just doesn't know … what this place is. I just like to have a way to let someone … get their feet wet and meet other people in camp.

A few minutes later in the interview, he went on to say:

> it's really a fun time to learn something new and take advantage of other people in that camp that may know how to do something, or learn … a new little craft or skill or something fun, that again, gets people talking and just … fosters … more cohesive community than … going back to your room and watching Netflix by yourself and stuff like that.

Early on in his time at the station, he started holding workshops and doing trivia nights so that he could be more a part of the community, but now as a fixture of that community, he continues these so that he can bring others into the community. Early on, he was homebuilding for himself, but now he has transitioned into helping others feel more at home at the station.

The spontaneous gatherings serve similar purposes to the workshops Alex and others do throughout the season. They give people a chance to meet, to talk outside of work, and to learn about shared interests. More often than not, someone new to the station will be invited to hike up Bear Mountain with one group or another, often with their lab group. Hiking Bear Mountain seems to be an important part of normalization: seeing the station as the sole point of safety and shelter from a distant point on the tundra goes a long way to helping one recognize the station as home, if only for a time. Although affectively different than recognizing your vulnerability from the top of a mountain, drinking beer with friends while watching a movie (or a World Cup match) in the community center serves much the same purpose in making the station feel like a more typical environment (i.e., one where people can be away from their work and go see a movie at a theatre or watch a game at a bar).

The local reactions to world happenings have strong normalization and homebuilding components because each acts as a proxy for what someone would be doing if they were at home. The same people who organize and march at PRS go to protests when they are home. Everyone at PRS who marched to protest the separation of migrant families at the borders had attended at least one protest since the presidential election, with all of us having been to either our local Women's March or March for Science, and with most of us having gone to both. There are few times when the disconnect between PRS and home feel more substantial than when we feel like we should be home for something important, but we are not. There are many things that can evoke this feeling of distance (e.g., the desire to celebrate an important event in the life of a distant loved one), but many of these things are too personal to be able to celebrate with others who do not share that meaning; something like a protest, however, can be meaningfully shared even among near strangers.

Making and Sharing: Creativity and Knowledge Creation

As I spent more time involved in the community, both in the field and participating in social gatherings, the importance of making and sharing become more and more clear. While I had gone into my research with the belief that creativity was an important part of life in ICE environments, I had expected to see that creativity primarily in interactions with material infrastructure; I found, instead, creativity to be more about social infrastructure; even in interactions with material infrastructure, the end goal was often more about things social. Much of sociality, in fact, revolved around making and sharing.

The station has a strong culture of sharing, much of it cultivated through the social gatherings; there is a constant exchange (often without expectation of reciprocity) of small gifts and trinkets, alcohol (as one of the few goods in demand that are not provided by the station), time (e.g., from helping someone from a different lab with an extensive research project to as simple an action as arranging for an incoming colleague to get a bottle of mouthwash for someone who ran out), knowledge (i.e., teaching someone a new skill), and unusual for most places, the rarest of gifts is the one ordered online (e.g., a favorite book ordered for a friend or colleague).

Nearly as strong as the culture of sharing is the culture of making. Residents gather around bonfires or act out skits wearing costumes made from discarded materials and second-hand clothing from the skua pile. People come together to learn how to carve spoons, tie fishing flies, taxidermy voles, tie knots, cast resin, or anything else someone might want to teach to others. They meet up to talk as they knit during the Sip and Stitch. They gather to make signs and protest government policies. They play Kubb, Cornhole, Stump, Cribbage, or a dozen other games with blocks and boards residents built from scrap material. Volunteers take time out of their busy schedules to turn scrap lumber and repurposed items into obstacles for a race. And researchers stop along the road to pick fine tufts of musk ox fur from branches to turn into hats or to trade for other raw materials.

Of course, the epitome of the station's culture of sharing and making is the Christmas in July gift exchange, where each participant received the name of another participant for whom they made a gift; this recipient, in turn, made a gift for someone else. Countless hours went into these gifts; many people learned new skills (e.g., woodburning, welding, sewing, etc.) to create the gifts they envisioned. While some of the gifts clearly had more work than others, there was a general feeling throughout participants that Remy summed up as, "no one wants to give a lazy or bad gift." This seems to be in line with Mauss's theory of the gift which, as Mary Douglas explains, "is part of a system of reciprocity in which the honour of giver and recipient are engaged" (Mauss, 1950/2002, p. xi). Douglas goes on to explain that according to Mauss, "the whole society can be described by the catalogue of transfers that map all the obligations between its members. The cycling gift system is the society." While Mauss's theory has received some criticism over the years, the idea that gifts come with some level of obligation seems clear. At the minimum, there is an obligation to thank the gift-maker, but often it ran deeper. While

Marlon and I became friends after Christmas in July, he invited me into the field with his team with no more knowledge he had of me before, besides an appreciation for—or perhaps an obligation created by—the gift I made for him. In this sense, Mauss's idea that when a gift is exchanged, "persons and things merge" (Mauss, 1950/2002, p. 61) seems apt.

Making gifts and giving—including sharing—is not, as should be obvious by now, limited to Christmas in July; the gift exchange is simply the clearest example. Every day, people in the station exchanged not just things, but also time, ideas, knowledge, patience, understanding, and experience. In an ICE environment, people share their entire lives with one another and with the station (that has its own personality). Everyone is obligated to one another, and as Chapter Six suggests—with the care that goes into tending to long term projects and for planning for those who will tend to those projects in the future—this extends to people who are no longer, or not yet, present. Life at the station was a gift of experience, and all who shared in it felt obligated to the station, to its scientific mission, and to one another.

CHAPTER EIGHT

BENEFITING EVERYONE: SCIENCE, INFRASTRUCTURE, SOCIALITY, AND CREATIVE WORK

Chapter Eight, the final chapter in this dissertation, serves four purposes: (1) as summation of the research as discussed in chapters one through seven, (2) to highlight the theoretical concepts developed from this research, (3) to discuss how these concepts work together and how they relate to scientific knowledge production, and (4) to acknowledge limitations within the research and suggest future directions it might take.

The Dissertation in Summary: Chapters One through Seven

The first two chapters contextualize this research. Chapter One introduces the idea that surprisingly little social science has been done on remote scientific research stations despite their importance to scientific knowledge production. After introducing the concept of the ICE environment, Chapter One suggests that scientific knowledge production, infrastructure, sociality, and creative work become intertwined in ICE environments, which is, of course, central to this dissertation. While the first chapter contextualizes the interest in—and the motivation for—this research, Chapter Two outlines the literature used in this research by broadly organizing them into the thematic elements of setting, infrastructure, the work, and knowledge production.

Chapter Three explores the methodology I used to explore the relationship among science, infrastructure, sociality, and creative work during a summer field season at a remote Arctic field station I refer to in this research as PRS. During the two and a half months I spent at PRS, I practiced participant observation and worked alongside researchers in the field and socialized with them during the limited leisure time we shared, including being involved in as many organized activities as I could. After the conclusion of the field season, I also conducted interviews with ten of the individuals I worked with.

The remaining chapters (four through eight) focus on the research I did at PRS and on the conclusions I have drawn from that research. Chapter Four is dedicated to PRS's setting because the setting is both very unusual and critical to understanding why the infrastructure is the way it is, how science is done, how sociality works, and why creative work happens the way it does. In Chapter Four, I discuss my journey to the station, the station's history, and what it is like to live and work at the station during the Arctic summer. Finally, I bring the concept of space and place into the discussion to dig more deeply into the setting and surface things that might otherwise be invisible.

Chapter Five focuses on PRS's infrastructure, and because a field station's infrastructure is largely a reaction to setting, Chapters Four and Five are closely linked. Chapter Five looked at theories of infrastructure and then suggested two more concepts—the total institution and the truth-spot—that are not typically considered part of the conversation around infrastructure but are relevant when discussing ICE infrastructure. Using this as a starting point, Chapter Five then goes deeper into the idea of ICE environments and their relationship with infrastructure and suggests that one of infrastructure's central characteristics—invisibility until breakdown—is lacking in ICE environments. Here I introduced two concepts: Infrastructural Hypervisibility and Infrastructural Hypervigilance as ways to think about the relationship between station inhabitants and infrastructure.

Chapter Six explores scientific knowledge production at the station looking at both fieldwork and laboratory work. Of particular interest, however, are types of work—maintenance, repair, and planning—that we usually associate less with scientific work but are critical to long term research in the Arctic. Maintenance, repair, and planning relate back to infrastructural hypervisibility and hypervigilance in that this atypical relationship between inhabitants and infrastructure motivate this uncommon type of science-adjacent work and explores the relationship between these ideas and creative work, innovation, and care.

Finally, Chapter Seven focuses on sociality at the station, beginning with my entrée into the community. After discussing how infrastructure supports sociality I categorize and discuss five types of gatherings that took place throughout my fieldwork. The discussion in Chapter Seven revolves around the concepts I refer to as Infrastructural Normalization and Homebuilding, which are ways of lessening the foregrounding of infrastructure in ICE environments. Finally, I conclude with a discussion focused on how making and sharing are central themes of not just sociality—but life more generally—at PRS.

Theoretical Concepts

From these chapters, four core concepts emerged:

(1) Infrastructural Hypervisibility, discussed in Chapter Five, is the relationship between the presence of infrastructure in an ICE environment and the inhabitants of that environment's heightened perception of that infrastructure. Although theorizations of infrastructure typically emphasize its invisibility, in ICE environments, material infrastructure that is ordinarily hidden is exposed by design; further enhancing its visibility, infrastructure in ICE environments is critical to inhabitants' well-being and survival. Even infrastructure not "seen" is often perceived and understood to be there although it may not break down (a typical condition for becoming aware of infrastructure). Thus, infrastructure in ICE environments is hypervisible; it is ubiquitous and the object of continuous awareness that may require swift action.

> **Example:** Max has been at the station for a few days and is excited to be doing his first round of winter fieldwork. He is walking from the dining hall to his lab

when he realizes the hum of the generators sounds different. He thinks to himself that it sounds unhealthy, and he hopes the generator does not have an issue that causes it to fail because it will get very cold very fast without power to run the station's heaters. Max then goes to his lab and starts preparing for his fieldwork.

Explanation: Max is attuned to the infrastructure enough that he notices that the generator does not sound right, but not attuned enough to make any sort of meaningful judgement, such as talking to a maintenance technician and asking about the change in generator's pitch.

(2) Infrastructural Hypervigilance, also discussed in Chapter Five, takes infrastructural hypervisibility a step further. Through infrastructural hypervigilance, insiders can ascribe value and/or priority to infrastructure, through which they can act on the infrastructure as necessary. For Infrastructural hypervigilance to be productive, it must be learned either through experience or taught by other insiders.

Example: Chris, a graduate student researching the possible effects of increased levels of summer precipitation on Arctic shrubs, is at a Saturday night bonfire. They step away from the fire to play a game of Stump when they notice that the temperatures have dropped significantly. Their first thought is that their irrigation system could freeze which might ruin the entire experiment they have been working on over the entirety of the summer. Chris immediately drops out of the game of Stump they were winning, stashes their beer, and heads up the boardwalk to protect the device they built from freeze damage.

Explanation: Immediately on noticing a drop in temperature, Chris thought of the infrastructure supporting their experimental work, and realizing it could ruin their progress, decided to check on their project, and can decide whether to remove the equipment, drain the water and leave the equipment, or let it continue running.

(3) Infrastructural Normalization, discussed in Chapter Seven, is the process through which actions, habits, and routines lessen the foregrounding of infrastructure in ICE setting; this can be done consciously or unconsciously and can act on not just material infrastructure but also social and technical infrastructures. Normalization can be attempted by both station insiders and outside stakeholders.

Example: The institution funding PRS has decided that rather than build a new lab, they will instead build a new dining hall because experience tells them the new dining hall will have more of an impact on science than the new laboratory would.

Explanation: This example, taken straight from one of my interviews, suggests that the funding institution recognized that sometimes something that seems less important to science can have more of an impact. In this case, the building of a larger dining hall meant it would be easier for people to gather together (one of the primary ways of normalization at PRS), something that had not been happening since the station's population had grown.

(4) Homebuilding is a special instance of infrastructural normalization where someone acts on infrastructure to create a connection a distant home or by making the station a home. Infrastructural normalization is not necessarily personal, but homebuilding needs to be personal to be effective; that said, it is possible to provide the space and/or means for others to homebuild without a personal connection. Homebuilding has strong creative elements and is strongly intertwined with the idea of placemaking (discussed in Chapter Four).

Example: Cody, the station's resident fitness buff, decides to start a morning group that meets in the HC, to do what he calls the "Lunatic Workout" (because you would have to be a lunatic to want to get up at 5:00am everyday to do it). He writes an note on the whiteboard inviting anyone interested in joining him. Although Cody does not have access to the same equipment he has at home, he is still really excited for the group, because he did the same type of thing with friends back home and has managed to devise a similar workout plan with the equipment available in the HC.

Explanation: Cody is bringing a favorite activity from home and sharing it with others who are interested in joining him early in the morning at the station's small gym (a space which, obviously, is provided by the station, as is the equipment within). While unable to do exactly the same workout (due to the lack of some equipment or facilities), he has managed to create a workout using the station's equipment that he feels will be similarly difficult to his home routine. To many, something as simple as keeping the same workout routine going can help minimize the strangeness of an ICE environment. The HC, while small, is just like any other gym.

A Framework Supporting Scientific Knowledge Production in ICE Environments

Through these concepts, and the extensive discussion around them—particularly in Chapters Four through Seven—I am arguing that in ICE environments, infrastructure is very much seen and interacted with daily (i.e., infrastructural hypervisibility). As station inhabitants spend more time interacting with the infrastructure and other station insiders, it becomes more familiar to them, and they begin to be able to make informed judgements on how to interact with that infrastructure (i.e., infrastructural hypervigilance). In work life, this interaction is particularly important to scientific knowledge production and its adjacent activities (i.e., maintenance, repair, and planning), but in leisure time the visibility of infrastructure can be unsettling. As such, people tend to push back against this visibility through infrastructural normalization (including homebuilding). Sociality plays a key role in normalization, and within sociality, making (a form of creative work) and sharing (a form of care) are crucial. Creative work, however, is not just related to sociality, it is also a key component of science in ICE environments, not only as just a recognized component of scientific work but also as it relates directly to the maintenance, repair, and planning work that is so crucial to knowledge production in ICE environments.

What this suggests is that, in ICE environments, creative work is important to both scientific work and sociality.

Science and Creative Work

While not always acknowledged, creativity is crucial to any science. Creativity is behind many of the big, and the little, questions scientists ask, and creativity is involved in devising experiments and hypotheses to answer those questions. Creativity is also used to think around problems, and creativity can simply make science more fun (e.g., when Everest and Remy gamify their work). In ICE environments in particular, creative work also serves several other purposes. In maintenance and repair work, which is a large part of Arctic science, creative thinking helps one solve problems (e.g., how to repair a greenhouse) and work with what is available (e.g., cutting Geoblock in a way that minimizes damage to the tundra). And in planning work, creativity allows researchers to put themselves in the proverbial shoes of a less experienced scientist and devise answers to questions someone new to the station might have; it also allows for creative solutions help teach hypervisibility and hypervigilance.

Sociality and Creative Work

Creative work is equally important to sociality, particularly in an ICE environment where methods for sociality are more limited. The creative work involved with the holiday celebrations, workshops, protests, costume parties, and other gatherings are important aspects of sociality and of community building. The Christmas gift exchange probably best illustrates this, particularly if we think of it as Mauss would with the gift exchange creating obligations to one another; in other words, the making and sharing strengthens community bonds, which is immensely important in a place where people are confined together. Creative outlets can be excellent for helping individuals cope with trauma, and while living and working in an ICE environment is not traumatic, an ICE environment is, by definition, a setting with extreme stressors that take mental and physical tolls on its inhabitants. Creative work then can and does help alleviate these stressors. I still laugh out loud remembering sitting in PRS's dining hall one rainy evening watching a few friends playing a game where an individual draws part of a figure, then covers the work and passes it on to the next who adds to the drawing blindly. The drawing nearly always ended up a hilarious monstrosity.[56] Finally, at the most basic level, engaging in creative work of one's own choosing is fun for almost everyone; this is why the workshops work—they are optional and only people who are interested in the subject attend them. At this most basic level, sociality is not even necessary. While I did not discuss it with anyone, I watched individuals pursue their creative passions—photography, drawing and painting, knitting, writing, tying flies, or woodcarving—alone on many occasions.

Science, Sociality, and Creative Work. Benefitting Everyone.

Increased attention to creativity and creative work benefits everyone involved in the same

[56] I have since heard this game called either "Combination Man" or "Exquisite Corpse."

way that a dining hall can be of more scientific value than a laboratory. Happier, better adjusted people are better to be around and do better work (as do the others around them). Furthermore, creativity is a crucial part of placemaking, and placemaking is a crucial part of normalization. This is all to say that creative work benefits both the science coming out of the station and the individuals who live there and produce that science.

Research Limitations and Future Directions

While I have spent a great deal of time on this research, it is only a beginning. As such, I want to briefly address some of its limitations and suggest several intriguing directions it might take in the future.

Research Limitations

Several limitations for this study should be addressed. Most notably, I was only able to do fieldwork at one research station and only during the summer field season. While I was able to see nearly the entirety of the summer field season at PRS, this research would have benefitted from a much longer visit or an additional site, particularly one not as well-equipped as PRS, to see how inhabitants worked and socialized with less available to them. At the very least, an extended visit to PRS during the winter—when the station was more isolated, with a much smaller population, and with many of the buildings closed—would have been useful. I hope in the future I can visit other ICE environments to compare against my PRS findings.

Another limitation relates to privacy. This was briefly discussed in Chapter Three, but it is worth mentioning again. To do my fieldwork at PRS, I agreed not to photograph, film, or record in certain areas including the dining hall and WeatherPort housing. While I was not specifically told I could not write about what I saw in these areas, I felt that the spirit of the agreement was about allowing station inhabitants to have what privacy they could find (which is very little in an ICE environment) when they could find it, as such this work became much more focused on the community than on individual practices.

Another limitation was the lack of prior research on this topic to guide my own. While this was a great opportunity to do new work, it necessitated drawing from a wide range of sources. My original research direction was guided by themes I uncovered relating to information practices and knowledge production in literature intended for popular (rather than scholarly) consumption, as well as scholarly research. Much of this came from work focused on polar settings as they have the largest body of literature (both scholarly and creative) surrounding them; thus, the conceptual framework I have used to understand remote research stations is geared toward polar settings, particularly Antarctica's stations, as much less has been written focusing on Arctic research stations. Still, the framework should be applicable to a broad range of ICE research settings.

Finally, it is worth noting that this study is very Western-centric. My conceptual framework is almost exclusively Western sources, much of the history of polar exploration—at least what is available in English—is Western, and the station itself, while hosting international researchers, is run by a U.S. institution. While I suspect much of my framework would hold up elsewhere, but even relatively small cultural differences can drastically change the dynamics of work and sociality. Thus, it would be very interesting to see a similar study done by an international researcher working within their culture, as I worked within mine; it might also be interesting doing cross-cultural research for the same reason.

Future Directions

In addition to looking at a different culture, another direction for research, perhaps the most obvious one, would be to do something similar but in a more extreme setting. It would be very interesting to see if these concepts and ideas held up in a similar, yet much more extreme environment, like Amundsen-Scott South Pole Station during a winterover. While Amundsen-

Scott and PRS share many similarities, a winterover at Amundsen-Scott would be as isolated, confined, and extreme as is possible in a terrestrial situation: more isolated (i.e., no one entering or leaving through the winter and more cut off from civilization), more confined (i.e., an even smaller population together in a smaller station without the ability to leave the station for recreation), and more extreme (i.e., incredibly hostile weather, complete darkness for a good portion of the winterover, and heightened mental and emotional stressors).

Another obvious direction for future research would be to look at how people deal with ICE environments at a more personal level. In my original research plan, I was very interested in creative documentation (e.g., if people documented their time through journaling, drawing, photography, painting, or a myriad of other creative outlets), but as mentioned, this was not possible to do during my time at PRS. Similarly, I was interested in how people might push back against infrastructural hypervisibility at a personal level either in material ways (e.g., how they take to decorating a personal space and why) or intangible ways (i.e., how they mentally cope with ICE stressors); both of these have potential to unearth interesting creative processes that are vital to life in ICE environments.

Finally, while not the identical, I saw many similarities to my research in the way people reacted to the COVID-19 lockdowns. During the lockdowns, many people experienced isolation and confinement, and in some cases, even instances of the psychological stressors Palinkas discusses in his work on ICE environments. With the lockdowns came an explosion of creative work as people learned how to knit or bake, took up woodworking, started writing or painting, or leveraged their creative ideas through gardening or home improvement projects. Sometimes this type of work was done with limited access to the materials that one would typically use in such endeavors (e.g., baking starting from a sourdough starter or learning how to spin roving into yarn for knitting). As a rock climber, my social media feed was full of people who built home walls from scrap lumber and turned anything they could hang onto into climbing holds because their local climbing gyms were closed. Exploring this link between lockdowns creating an environment analogous to an ICE environment and the apparent uptick in creative work would be an interesting research direction to follow as it is much more relatable to most people than is working at a polar research station. While ICE environments seem extraordinary, perhaps these concepts apply not just in geographic or climate extremity but also in less exotic settings.

Figure 78 Scientists enjoying a summit respite on a late-night hike after work.

REFERENCES

Agnew, J.A. & Livingstone, D.N. (Eds.). (2011). *The SAGE Handbook of Geographical Knowledge*. Los Angeles: SAGE Publications Inc.

Barnet, E. & Casper, M. (2001). A Definition of Social Environment. *American Journal of Public Health*. *91*(3). Retrieved May 19, 2023 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446600/pdf/11249033.pdf.

Becker, H. (1982). *Art Worlds*. Berkeley: University of California Press.

Behrendt, J.C. (1998). *Innocents on the Ice: A Memoir of Antarctic Exploration, 1957*. Niwot: University Press of Colorado.

Bowker, G.C. (1994). *Science on the Run: Information Management and Industrial Geophysics at Schlumberger, 1920-1940*. Cambridge: The MIT Press.

Bowker G.C., Baker K., Millerand F., Ribes D. (2010). Toward Information Infrastructure Studies: Ways of Knowing in a Networked Environment. In: Hunsinger J., Klastrup L., Allen M. (eds) *International Handbook of Internet Research*. Springer, Dordrecht. doi:10.1007/978-1-4020-9789-8_5

Bowker, G.C. & Star, S.L. (1999). *Sorting Things Out: Classification and Its Consequences.* Cambridge: The MIT Press.

Bowker, G.C., Timmermans, S., Clarke, A.E., & Balka, E. (Eds.). (2015). *Boundary Objects and Beyond: Working with Leigh Star*. Cambridge: MIT Press.

Bown, S.R. (2015). *White Eskimo: Knud Rasmussen's Fearless Journey into the Heart of the Arctic*. Philadelphia: Da Capo Press Books.

Bryce-Laporte, R.S. (1968). The Conceptualization of the American Slave Plantation as a Total Institution. Unpublished Ph.D. dissertation, University of California, Los Angeles.

Collier, J. Jr. & Collier, M. (1986). *Visual Anthropology: Photography as a Research Method*. Albuquerque: University of New Mexico Press.

Curry, M.R. (1996). *The Work in the World: Geographical Practice and the Written Word*. Minneapolis: University of Minnesota Press.

Curry, M.R. (1998). *Digital Places: Living with Geographic Information Technologies*. New York: Routledge.

Emerson, R.M., Fretz, R.I., & Shaw, L.L. (2011). *Writing Ethnographic Field Notes: Second Edition*. Chicago: University of Chicago Press.

Fox Rogers, S. (2007). *Antarctica: Life on the Ice*. Palo Alto: Solas House, Inc.

Gillis, J. & Corum, J. (2017, July 17). Where Else Does the U.S. Have an Infrastructure Problem? Antarctica. *New York Times*. https://www.nytimes.com/2017/07/17/climate/where-else-does-the-us-have-an-infrastructure-problem-antarctica.html

Fitz Gibbon H.M., Canterbury, R.M, & Litten, L. (1999). Colleges as Total Institutions: Implications for Admission, Orientation, and Student Life. *College and University 74(2),* 21-27.

Gieryn, T.F. (2002). Three Truth-Spots. *Journal of History of the Behavioral Sciences, 38*(2), 113-132.

Given, L.M. (Ed.) (2008). Research Setting. The SAGE Encyclopedia of Qualitative Research Methods. SAGE. https://doi.org/10.4135/9781412963909.

Goffman, E. (1961). *Asylums: Essays on the Social Situation of Mental Patients and Other Inmates.* New York: Anchor Books.

Gould, L. (1971). Antarctica: The World's Greatest Laboratory. *The American Scholar, 40*(3), 402-415.

Harrison, A.A., Clearwater, Y.A., & McKay, C.P. (Eds.). (1990). *From Antarctica to Outer Space: Life in Isolation and Confinement*. New York: Springer-Verlag.

Hartel, J. (2010). Managing documents at home for serious leisure: a case study of the hobby of gourmet cooking. *Journal of Documentation*, *66*(6), 847–874. doi:/10.1108/00220411011087841

Heisenberg, W. (1971). *Physics and Beyond: Encounters and Conversations*. New York: Harper & Row.

Hennessy, E., & McCleary, A. (2011). Nature's Eden? The Production and Effects of "Pristine" Nature in the Galápagos Islands. *Island Studies Journal*, *6*(2), 131–156.

Hollingham, R. (2015, December 22). How do you prepare for the isolation of space? *BBC.* Retrieved from http://www.bbc.com/future/story/20151222-how-do-you-prepare-for-the-isolation-of-space

Huryn, A. & Hobbie, J. (2012). *Land of Extremes: A Natural History of the Arctic North Slope of Alaska*. Fairbanks: University of Alaska Press.

Jackson, S. (2014). Rethinking Repair. In T. Gillespie, P. Boczkowski, & K. Foot (Eds), *Media Technologies: Essays on Communication, Materiality and Society*. Cambridge: The MIT Press.

Johnson, J.C., Boster, J.S., & Palinkas, L.A. (2003). Social roles and the Evolution of Networks in Extreme and Isolated Environments. *Journal of Mathematical Sociology*, *27*, 89-121.

Johnson, N. (2005). *Big Dead Place: Inside the Strange and Menacing World of Antarctica*. Los Angeles: Feral House.

Lampland, M. & Star, S.L. (Eds.). (2009). *Standards and Their Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life*. Ithaca: Cornell University Press.

Latour, B. (1987). *Science in Action: How to Follow Scientists and Engineers Through Society.* Cambridge: Harvard University Press.

Latour, B. & Woolgar, S. (1986). *Laboratory Life: The Construction of Scientific Facts*. Princeton: Princeton University Press.

Laurier, E. (2008). How Breakfast Happens in the Café. *Time & Society, 17*(1), 119-134. doi:/10.1177/0961463X07086306

Legler, G. (2005). *On the Ice: An Intimate Portrait of Life at McMurdo Station, Antarctica*. Minneapolis: Milkweed Press.

Lievrouw, L.A. & Livingstone, S. (Eds). (2012). *The Handbook of New Media: Updated Student Edition*. Los Angeles: SAGE Publications Inc.

Lloyd, A. (2009). Informing practice: information experiences of ambulance officers in training and on-road practice, *Journal of Documentation*, *65*(3), 396-419. doi:/10.1108/00220410910952401

Lopez, B.H. (1986). *Arctic Dreams: Imagination and Desire in a Northern Landscape*. New York: Charles Scribner's Sons.

Maslow, A. (1943). A Theory of Human Motivation. *Psychological Review,* 50(4), 370-396.

Mattern, S. (2013). Ear to the Wire: Listening to Historic Urban Infrastructures. Retrieved from http://amodern.net/article/ear-to-the-wire/

Mauss, Marcel. (1950/2002). *The Gift: The form and reason for exchange in archaic societies.* London: Routledge Classics.

Mawson, D. (1998). *The Home of the Blizzard: A True Story of Antarctic Survival*. New York: St. Martin's Press.

McNeil, J. (2016). *Ice Diaries: An Antarctic Memoir*. Toronto: ECW Press.

Milgram, S. (1977). *The Individual in a Social World: Essays and Experiments*. Boston: Addison-Wesley.

Mize, R.L. (2006). Power (In)-Action: State and Agribusiness in the Making of the Bracero Total Institution. *Berkeley Journal of Sociology*, *50*, 76-119.

Mize, R.L. (2016). *The Invisible Workers of the U.S. – Mexico Bracero Program: Obreros Olvidados*. Lanham: Lexington Books.

Palinkas, L.A. (n.d.). On the Ice: Individual and group Adaptation in Antarctica. Retrieved from http://www.bec.uclapapers.edu//Palinkas_On_The_Ice.pdf.

Palinkas, L.A. (2001). Psychosocial Issues in Long-term Space Flight: Overview. *Gravitational and Space Biology Bulletin 14*(2), 25-33.

Ritzer, G. (1998). *The McDonaldization Thesis: Explorations and Extensions*. London: Sage Publications.

Roberts, D. (2013). *Alone on the Ice: The Greatest Survival Story in the History of Exploration*. New York: W.W. Norton & Company.

Rosove, M.H. (2000). *Let Heroes Speak: Antarctic Explorers, 1772-1922*. Annapolis: Naval Institute Press.

Seberger, J.S. & Bowker, G.C. (2021). Humanistic infrastructure studies: hyper-functionality and the experience of the absurd. *Information, Communication and Society*, 24:12: 1712-1727.

Shankar, K. (2004). Recordkeeping in the Production of Scientific Knowledge: An Ethnographic Study. *Archival Science*, *4*: 367-382. doi:/10.1007/s10502-005-2600-1

Shepherd, P. (2015). Creativity at the Frozen Frontier. In D. Liggett, B. Storey, Y. Cook, & V. Meduna, V. (Eds.), *Exploring the Last Continent: An Introduction to Antarctica* (pp. 399-410). New York: Springer Cham.

Solomon, S. (2001). *The Coldest March: Scott's Fatal Antarctic Expedition*. New Haven: Yale University Press.

Star, S.L. (1999). The Ethnography of Infrastructure. *American Behavioral Scientist, 43*(3), 377-391.

Star, S.L. & Ruhleder, K. (1996). Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces. *Information Systems Research 7*(1), 111-134.

Stone, E. (2004, November 9). Treating the Antarctic Blues. SPACEREF. https://spaceref.com/press-release/treating-the-antarctic-blues/.

Sundin, O. (2011). Janitors of knowledge: constructing knowledge in the everyday life of Wikipedia editors. *Journal of Documentation*, 67(5), 840-862. doi:/10.1108/00220411111164709

Tavory, I. & Timmermans, S. (2014). *Abductive Analysis: Theorizing Qualitative Research*. Chicago: University of Chicago Press.

Tilley, H. (2011). *Africa as a Living Laboratory: Empire, Development and the Problem of Scientific Knowledge, 1870-1950.* Chicago: University of Chicago Press.

Tuan, Y. (2014). *Space and Place: The Perspective of Experience*. Minneapolis: University of Minnesota Press.

Vaughan, D. (2004). Theorizing Disaster: Analogy, Historical Ethnography, and the Challenger Accident. *Ethnography*, *5*(3), 315-347. doi:/10.1177/1466138104045659

Vaughan, D. (2014). Analogy, Cases, and Comparative Social Organization. In R. Swedberg (Ed.), *Theorizing in Social Science: The Context of Discovery* (61-84). Redwood City: Stanford Social Sciences.

Veinot, T.C. (2007). "The Eye of the Power Company": Workplace Information Practices of a Vault Inspector. *Library Quarterly, 77*(2), 157-179. DOI: 10.1086/517842

Walker, G. (2013). *Antarctica: An Intimate Portrait of a Mysterious Continent*. Boston: Houghton Mifflin Harcourt.

Williams, S. (Ed). (2003). *Tourism: Critical Concepts in the Social Sciences*. London: Routledge.

Wouters, P. (2014). The Citation: From Culture to Infrastructure. In Cronin, B. & Sugimoto, C. (Eds.), *Beyond Bibliometrics: Harnessing Multidimensional Indicators of Scholarly Impact*. Cambridge: The MIT Press.

Zerubavel, E. (1979). *Patterns of Time in Hospital Life*. Chicago: University of Chicago Press.

Zerubavel, E. (1981). *Hidden Rhythms: Schedules and Calendars in Social Life*. Chicago: University of Chicago Press.