Imaging Environmental Belonging in a Wounded World: Toward a Visual Rhetoric for the Anthropocene

A Dissertation
SUBMITTED TO THE FACULTY OF THE
UNIVERSITY OF MINNESOTA
BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Daniel J. Philippon, Advisor

May 2019

Acknowledgements

Many people contributed directly or indirectly to this project. First, I must thank my advisor, Daniel J. Philippon, who encouraged the transdisciplinary character of this research and whose attentive questions, suggestions, and support over the last three years made this research possible. I also wish to thank my committee: Lee-Ann Kastman Breuch, whose feedback kept my work anchored in conversations about technical communication; Ronald W. Greene, whose deep, compassionate rhetorical knowledge shaped my understanding of visual communication; and Thomas Reynolds, whose insightful questions at key junctures helped me find opportunities for specificity in successive drafts. Thank you all.

I would also like to thank my colleagues, including those members of the Weekly Writing Group who gave feedback during the drafting of Chapter Two. I must also thank Juliette Lapeyrouse-Cherry, who made this process survivable over the years by sharing with me the excitement of research, occasional dread about the state of the global environment, and many photographs of cats. Thank you.

I would also like to thank Carl M. Sack, Jordan Engel, Dakota Wind, and KK Rebecca Lai for discussing their work. I hope that my own work can amplify attention to issues that matter, even if only in a small way.

There are also those whose impact on me was formative: Michael Day, who taught me to be a better writer and scholar and who continues to be a friend and advocate many years later; and Gail Jacky, who provided feedback on essay drafts over the years and allowed me to learn about the dissertation process by coaching dissertators at the Northern Illinois University Writing Center long before I became one. I have learned so much from both of you, including the lifelong joy of writing communities. Thank you.

I also want to thank my family, particularly Abraham Swee, my indefatigable partner and supporter, who gave me space to work but also knew when it was time to watch *The Great British Bake Off* instead; and my parents, Kate and Carl. You gave me strength over many years, and you ensured that I fell in love with books, language, trees, and drawing pencils at a young age. None of this would be possible without your love and good instinct as parents. Thank you both most of all.

Dedication

To my parents and partner, who fill the corners of my world and make me whole.

Abstract

Recent scholarship has introduced the idea of the Anthropocene, a geologic epoch characterized by human intervention on a planetary scale. The Anthropocene draws our attention to three issues that have historically led societies to made environmentally poor choices: (1) an inability to foresee how human actions affect other life, (2) ideas of nature that create artificial binaries, partitioning the world into "wilderness" and "civilization," and (3) excessive distance in time, space, or scale, which obscures violence and causality. This project argues that surviving the Anthropocene will not simply be about techno-scientific fixes or public policy. Instead, it will require that we address all three issues by fundamentally shifting how we see ourselves and our world. Drawing on three cases of contemporary discourse—online mapping of the Dakota Access Pipeline conflict, digital photography of the retreating Mýrdalsjökull and Vatnajökull glaciers in Iceland, and interactive mapping along the Great Lakes shoreline—I outline a set of strategies for visualizing environment that promotes more realistic ways of understanding human-nonhuman relationality. Ultimately, I argue that the key to resiliency in the Anthropocene will be our ability to develop new technical and scientific communication rooted in our belonging and emplacement in the world.

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1 Introduction: Third Coasts

I AM WRITING THE FIRST DRAFT OF THIS INTRODUCTION in a notebook, sitting in a car, parked at an overlook above Temperance River on Minnesota's North Shore. Formed during the creation of the Keweenawan Rift 1.1 billion years ago, Temperance River flows out of Brule Lake, tumbles through narrow gorges and stands of yellow birch and white pine, and finally joins Lake Superior. I have the car door open. It is one of the last warm fall mornings of the year. My traveling companion is getting his camera from the trunk to take photographs, and I am thinking about third coasts.

'Third coast': a common American colloquialism for those overlooked shorelines of the nation that are neither east or west, but middle (Popik, 2008). The term has often been leveraged to describe the Great Lakes, arguably the planet's largest freshwater body and part of a vast watershed covering 765,990 km^2 (Larson and Schaetzl, 2001, p. 518). In the climate change era, the Great Lakes are not only a critical focus for resource management and conservation efforts, but they are also primed for future hydro-political tension (Farinosi, et al., 2018). Today, however, the waters merely murmur peaceably as I sit in the car. Nonetheless, I am thinking about the environmental crises to which the Great Lakes may yet bear witness, and the discourses through which such events will be negotiated. Facing the growing forces of ecological precarity, I find myself wondering whether we have neglected a key contour of our public and academic discourse, a conceptual third coast much like the coasts of flyover country.

In contemporary environmental scholarship, much attention has been given to technologies of adaptation and mitigation on the one hand, and the sociological study of

mass media persuasion on the other. Both areas deserve the attention they have received. After all, technologies may help us survive environmental crisis, while studies of mass media may help us understand how to build support for productive policy change. Both emphases ask questions designed to arrive at expedient solutions, which are important in the time of climate change. However, scholars have pointed out that ethical problems may arise "when expediency becomes an end in itself," replacing humanistic values with an interest in speedy solutions (Katz, 1992, p. 272). While I would not suggest that studies of technology or persuasion have forsaken humanistic values—quite the opposite, as they generally seek to address critical anthropogenic issues—I *would* suggest that many environmental studies have not addressed something fundamental that precedes technological innovation or public persuasion. I am thinking here not of the effectiveness of the messages we deploy in the workplace or public but of their content and character. Persuasion is built on a substrate of ideologies and implicit values, an imaginative bedrock that defines our concept of collective social life and which can be given form through the images and texts we create. This substrate is what Charles Taylor (2004) calls a 'social imaginary,' "that common understanding which makes possible common practices, and a widely shared sense of legitimacy" (p. 172). Here, I am speaking of an 'environmental imaginary.' Even if technology and persuasion help us mitigate ecological disaster, doing so will not guarantee a corresponding shift in the underlying imaginary that frames how we think, communicate, and rehearse culture—an imaginary that has in fact enabled many of the unwise activities at the root of our current environmental crises.

The contemporary imagination of environment has been identified as a threat and barrier to responsibly resolving environmental issues. Buck (2015), for instance, argues that

our "imagination of capital" has led us to surrender power to environmentally destructive forces (p. 370). She instead proposes an imagination that would "enchant humans-in-nature" without relying heavily on romantic ideas of wilderness (p. 371). Meanwhile, Buell (1995) declares that "environmental crisis involves a crisis of the imagination the amelioration of which depends on finding better ways of imaging nature and humanity's relation to it" (p. 2). Both scholars point us toward a need to invent a new environmental imaginary. Such an imaginary would perhaps involve what Jedediah Purdy (2015) calls a "next politics of nature," guiding humans toward taking "active responsibility" for their impact on the world (p. 21). Purdy directs us to the central issue, which was evident around me as I sat in my car at Temperance River, looking out at a shoreline characterized by sprawling state parks, extensive highway infrastructure, and towering taconite production plants:

> Why talk about an intensified politics of nature, rather than a politics without nature? Why not say that "nature," that all-too-flexible argument stopper which never quite succeeds in ending the argument, is just an archaic way of talking and thinking, best overcome and discarded? There are several reasons that I don't think this is either possible or desirable. The most telling is that ideas about nature have been much more than rhetorical flourish or metaphysical gloss. They have deeply shaped the landscapes, economies, and social practices in which we continue to live. The material world—so-called natural and so-called artificial—that we inhabit is in many ways a memorial to a long-running legacy of contested ideas about nature: how it works, how we fit into it, and what we have at stake in doing right by it. (p. 21)

For two centuries, we have lived in a world of images and texts shaped by a nature that through our own ideology and rhetorical construction excludes us. The binary mentality behind such fundamental pairings as 'nature' and 'culture' has led us to think of wilderness as something that mostly exists beyond arterial urban highways and city centers, with any overlap between those two worlds strange and unsatisfying. An unexpected migration of birds appearing on a downtown river is, for instance, often cause for delight or confusion.

Such binaries have been like walls cutting through the socio-material relationships upon which shrewd, informed decisions should be based. Like Purdy, I do not believe it feasible or desirable to expunge nature from our politics, let alone the underlying imaginaries through which we define ourselves. Certainly, developing a public imaginary without nature would not be possible with the speed necessary to adequately address climate change and other environmental issues that demand attention. I do, however, believe that the human-in-nature needs to be reimagined if we are to become more actively responsible for our interaction with global ecosystems. If this imaginary has, as Purdy argues, "shaped landscapes," we will need to fashion a new nature by telling ourselves fresh stories about the world through image and text, and then telling ourselves those stories again and again and again until they become a bedrock within us, a set of commonplaces upon which we draw almost without thinking. In a digital age, images in particular will, as Buell suggests, be critical forms of expression for a new nature. As Hariman and Lucaites (2007, p. 304) write, "If liberal-democratic societies are to evolve into better versions of themselves, they will have to be able to see themselves doing so" (p. 304). Images also matter because contemporary environmental crisis is deeply visual: it is, by turns, too microscopic, too vast, too slow, or too fast for us to bear witness. A new nature will require a new world-making—one not only stated but seen. Through visual rhetoric, we must find a way to bear ourselves back into the world we have parted ourselves from.

All our old images of nature, from the luminous landscapes of the Hudson River School painters to interactive GIS mapping systems, have been defined by what I will call a 'Holocene visuality.' 'Visuality' here refers to the "social fact" of seeing, in contrast to the "physical operation" of human vision (Foster, 1988, p. ix). 'Holocene' is a term adopted by

the International Geological Congress in Bologna in 1885 to describe the geologic epoch in which we have lived since the retreat of the glaciers 11,700 years ago. In the Holocene, human exploitation of the biosphere has rapidly expanded through uncontrolled industrialization (Crutzen and Stoermer, 2000). A Holocene visuality, then, comprises the collective ideas about the world that have been propagated through sign systems—frequently Western ones—until their rhetorical construction has at times become nearly invisible to us. How often do we question that which is excluded by the blank spaces on a digital map? Have we successfully fulfilled Dragga and Voss's (2001) call to "humanize the visual display of information" (p. 269)? In the environmental crisis era, a humanistic ethics may be insufficient to address the long-term environmental consequences with which uninformed decision-making has burdened us. A reimagining of our fundamental commonplaces is now needed if we are to act responsibly about matters involving human and nonhuman nature.

Ideas of Nature in American Society

The current American idea of nature is an example of what rhetoricians would call an ideograph, "an ordinary-language term found in political discourse…a high order abstraction representing commitment to a particular but equivocal and ill-defined normative goal" (McGee, 1980, p. 15). Historically, nature as a term has been as broad and variable as the phenomena it describes, taking on the ideology of whomever is looking. Generally, however, ideas of nature have followed one of several lines of thinking. Nature has, for instance, been seen as an economic resource, available as raw capital for use in human projects (Hull, 2018). In economic nature, the nonhuman world is a "garden for human needs," and the transformation of those resources is considered providential (Purdy, 2015, p. 23). Nature has

also been adopted as a scientific or ecological ideal, used to argue that humans are a disruptive, unnatural force, or that they ought to become nature's masters. Additionally, nature has been an aesthetic ideal, a grandly rugged, fog-rimed sublime of mountains and shorelines, pristine and untarnished by human touch. This Romantic nature offers visitors to American parklands a way of "meeting nature" (Purdy, p. 24). Thus, we see writers during the American Renaissance use nature to enter into an epiphanic awareness of the sublime. For instance, Muir (1911) is taken by "Nature's big heart" in what Wulf (2015) describes as a "spiritual dialogue" (p. 325), while Thoreau (1849) is able to write in *A Week on the Concord and Merrimack Rivers:*

> For every oak and birch too growing on the hill-top, as well as for these elms and willows, we knew that there was a graceful ethereal and ideal tree making down from the roots, and sometimes Nature in high tides brings her mirror to its foot and makes it visible. The stillness was intense and almost conscious, as if it were a natural Sabbath, and we fancied that the morning was the evening of a celestial day. (p. 53)

Thoreau writes of a pristine, immanent 'Nature' glimpsed through the nature of the everyday. Such a notion of wilderness would become a foundation for more utilitarian practices of wilderness protection. In the utilitarian nature, wilderness is a virtue rather than a waste, with its proponents "insisting that the solitude of wild places edifyingly revealed a human being's smallness and dependence on the vast and ancient natural world" (Purdy, p. 25). It is this notion that, as Hull describes, makes nature something that urban children must reconnect with to understand how to live properly. Despite the differences among these ideas of nature, what they frequently share is a division, either formally stated or merely implied: humanity and nature are separate.

Despite the relatively brief lifespan enjoyed by these ideas of nature, they have collectively become an invisible truth of American life. Even if we address our current

environmental crises effectively, these ideas of nature will continue to persist, grounding our decision-making in an idea of planetary ecosystems in which humanity and nature are divided. Cronon (1995) illustrates the problem well:

> We inhabit civilization while holding some part of ourselves—what we imagine to be the most precious part—aloof from its entanglements. We work our nine-to-five jobs in its institutions, we eat its food, we drive its cars (not least to reach the wilderness), we benefit from the intricate and all too invisible networks with which it shelters us, all the while pretending that these things are not an essential part of who we are. By imagining that our true home is in the wilderness, we forgive ourselves the homes we actually inhabit. In its flight from history, in its siren song of escape, in its reproduction of the dangerous dualism that sets human beings outside of nature—in all of these ways, wilderness poses a serious threat to responsible environmentalism at the end of the twentieth century. (p. 81)

Cronon's critique responds in part to late twentieth century environmental writing, such as Bill McKibben's landmark 1989 book, *The End of Nature*, which argues that human action has ended "Mother Nature" by drawing on the romantic idea of a virginal wilderness separate and distinct from human labor. Thirty years later, this idea of nature remains with us. For example, the *Ecomodernist Manifesto*—a document that argues for technoscientific fixes to pressing environmental issues—discusses the need to "preserve wilderness," and recommends the "decoupling of humanity from nature" (Asafu-Adjaye, et al., 2015, pp. 26 & 12). In doing so, the manifesto obscures the reality that there is no true thing called wilderness, unsullied and pure, except our rhetorical construction thereof. Nonetheless, the document forwards ideas of Romantic nature through a *pathos*-rich evocation of the wilderness ideal, a place that does not and cannot exist. For there to be a true wilderness, there would need to be not only a true separation of human and nonhuman spheres, but a separation of air and weather. And what of nonhuman nature living on the rooftops of our cities or the brown spaces of abandoned lots? Is that nature less true for being less wild?

Despite these questions, a Romantic or utilitarian nature is part of our cultural inheritance, going unquestioned and enjoyed by most of us in ordinary life. Romantic nature reflects a set of commonplaces that have grown inside of us during the last 250 years, and which are largely coterminous with the idea of the Holocene. As we begin to recognize the inadequacies of how we witness nature, we may also recognize the need for an alternative. What we need now is an idea of nature suited to imaging the world not as we have seen it, but as we need to see it for active environmental responsibility. What we need now is a visuality for the Anthropocene.

Three Provocations of the Anthropocene

'Anthropocene' is the name for a prospective geologic epoch brought about by human intervention, particularly oil extraction and the burning of fossil fuels. First proposed by Paul J. Crutzen and Eugene F. Stoermer (2000), the Anthropocene would, if adopted, replace some portion of the current Holocene, although its start date remains tentative. Scientists currently debate whether the Anthropocene began in the late 18th Century, when the Industrial Revolution ushered in an era of extreme air and water pollution (Crutzen and Stoermer; Foley et al., 2013), or on July 16, 1945, when the Trinity bomb test near the Carrizozo Malpaís, New Mexico sent radioactive contamination into the atmosphere as far away as Indiana (Ortmeyer and Makhijani, 1997; Zalasiewicz et al., 2015). Some scientists suggest that the Anthropocene began in 1965, with the "Great Acceleration" of greenhouse gases, ocean acidification, and deforestation (McNeil, 2015; Turney et al, 2017). Still others suggest 1610, by which time European disease had reduced the 61 million people in the Americas to just 6 million, allowing 50 million hectares of farmland to return to its prior

vegetal state—thereby lowering global atmospheric CO_2 by between 7 and 10 parts per million (Lewis & Maslin, 2015).

Notably, all possible start dates for the Anthropocene are marked by human activity that can, with sober eyes, be seen as the radical advancement of one group of people at the expense of another, often with a devastating effect invisible to—or ignored by—its perpetrators and architects. Thus, the Anthropocene has been defined by iniquitous failures of vision, an inability or unwillingness to see the causal web through which events connect. By calling recent history the 'Anthropocene' rather than the 'Holocene,' we choose to name our failure and open it up to being rhetorically redefined and rehearsed through text and image.

Researchers have dedicated admirable time to studying the efficacy of textual and visual strategies for communicating environmental issues to the public. These studies frequently investigate the role of emotion, especially fear appeals or statements of hope, in motivating environmental action (see, for instance, Chadwick, 2014; Meijnders, Midden, and Wilke, 2001; and Moser, 2007). Other efficacy-centered studies have focused on frames and framing (Gifford and Comeau, 2011 and Bilandzic et al. 2017, for example) as well as readers' perceptions of uncertainty or risk (such as Corbett and Durfee, 2004; Whitmarsh, 2011, or Brown and Stewart, 1999). In addition to studies of efficacy, some scholars have developed longitudinal studies based on a corpus constructed from newspaper or online media content (see, for instance, Takahashi et al., 2016 and Booth, 2016). Among image-based research, many studies have focused on how public media, particularly newspapers, visually depict environmental threats using data displays (such as Grittmann, 2014, Metag et al, 2016, and Rebich-Hespanha et al., 2015) or photography (Leon & Erviti, 2013 and

O'Neill & Smith, 2013). Given variations in methodology, few strong trends about audience perception or persuasion have emerged. However, a consensus seems to exist that convincing participants to engage meaningfully with environmental issues is difficult but can be managed by conceptualizing such issues as local rather than global problems. Attention to audience is paramount.

Certainly, these studies of persuasion contribute productively to environmental knowledge. If we are to mobilize public concern to alter policy, understanding persuasion will be critical. However, such studies often test whether messages are successful without questioning whether the messages, successful or not, are the *right* messages. In other words, attention has been placed on expedient communication, while underlying commonplaces such as concepts of nature remain largely unexplored. Thus, while research has investigated how environmental ideas can propel both technoscientific solutions and successful public persuasion, the need to reimagine ideas of nature themselves and establish a visuality for the Anthropocene remains elusive and "under-researched" (Christensen, 2017). This is the third coast of environmental studies that this project addresses. How are nature and environment being imaged? In the Anthropocene, how should they be?

Some scholarship has emerged at this intersection of visuality and the Anthropocene. As an example, Mirzoeff (2014) has proposed an 'Anthropocene countervisuality.' Mirzoeff argues that visualization has historically been a hierarchical and autocratic way to preserve "the authority of the visualizer above and beyond the visualizer's material power, a supplement that completes the ability to rule" (p. 216). For Mirzoeff, an Anthropocene visuality is "one that allows us to move on, to see nothing and keep circulating commodities, despite the destruction of the biosphere" (p. 217). Mirzoeff's countervisuality offers a useful

provocation, encouraging us to account for all living beings and to support participatory democracy, but the forms or tenets of such a visuality remain unstated.

A successful Anthropocene visuality would need to encourage ways of seeing that help publics move beyond the two issues identified thus far: (1) the historic human inability to see ecosystem connections and (2) problematic ideas of nature, particularly Romantic or utilitarian nature. In addressing both connectivity and nature, I align this project with the environmental humanities, a loose constellation of scholarship that approaches environmental issues as fundamentally cultural and social, offering a counterpoint to scientific inquiry. The environmental humanities seek to "identify connections and lines of convergence" among humanistic disciplines and to use those insights to understand and question the environmental crisis era (Bergthaller, 2014, p. 269). Methodologically diverse, the environmental humanities nonetheless aim to be "relentlessly and deftly historicist," producing richly contextualized accounts of the artifacts it studies (p. 272).

In the environmental humanities, scholars have frequently critiqued ideas of nature. Purdy, quoted above, is one such example, and others, such as Ursula K. Heise (2008), have also examined the divisions and organization of concepts of nature and culture. Increasingly, the environmental humanities also unite around a rejection of the "Spaceship Earth" premise, the idea that all humans are equal participants in current environmental troubles. Although an alluring and romantic notion not without value, Spaceship Earth generally does not picture the disparities fundamental to the Anthropocene. As Nixon puts it, "those who are directing the spaceship are sitting in Geneva, Washington, or wherever" (Christensen, p. 2). The environmental humanities seek to decentralize that power through a proliferation of voices and an increasing focus on ideas of justice and equity.

Thus, the environmental humanities draw our attention to a final issue that, in addition to connection and nature, must be addressed by a successful Anthropocene visuality: (3) distance. Although connection and nature are issues, it is distance—in time, space, or scale—that obscures connection to produce disparity and harm. Forms of distance have been called the "most important" barrier to engendering civic discourse about environment (Moser & Dilling, 2004, p. 34). That which we cannot see can be difficult to recognize, such as the dispersal and flow of toxins through the human body or the slow onset of climate change itself. Such issues are what Glantz (1999) calls 'creeping environmental problems': "long-term, low-grade, incremental but cumulative," which when combined with human behavior prevent action about the problem until it is too late to act (p. vii). Buell (2014) suggests a variation on this idea, describing environmental apocalypse as being like a car undergoing a "slow smash"; we cannot see the whole accident, only "a bumper being crushed here, a door caving in there" (p. 203). We have neither a sense of the destruction nor of the thing being destroyed. Peeples (2011) offers another take on the problem through her notion of 'toxic imaginaries,' arguing that art can productively confront invisible toxicities through images of vast, desolate wastelands. Perhaps the most robust critical engagement with issues of distance, however, is Nixon's (2011) 'slow violence,' a violence that "occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space" (p. 2). Nixon argues that visualization and representation are central to exposing slow violence and climate injustice, asking the following:

> In an age when the media venerate the spectacular, when public policy is shaped primarily around perceived immediate need, a central question is strategic and representational: how can we convert into image and narrative the disasters that are slow moving and long in the making, disasters that are anonymous and that star nobody, disasters that are attritional and of indifferent interest to the sensation-

> driven technologies of our image-world? How can we turn the long emergencies of slow violence into stories dramatic enough to rouse public sentiment and warrant political intervention, these emergencies whose repercussions have given rise to some of the most critical challenges of our time? (p. 3)

Coupled with the problems of connectivity and nature articulated by Buck, Buell, Cronon, Purdy and others, Nixon's questions about distance and slow violence identify the three fronts that must be reshaped in the new environmental imaginary.

Thus, the goal of this Anthropocene visuality is to provide a philosophy of visual rhetoric that can help guide communicators—particularly in workplace and public settings—toward the production of images that highlight ecosystem connections, temper Romantic and utilitarian nature, and grapple with distance. Through this visuality, it is my hope that communicators can produce more ethical rhetorics that facilitate responsible discourse. Redefining old commonplaces will take great time and effort, but I believe that it can be done not through revolutionary new technologies of the image, but by drawing on technologies and genres we know in more deliberate ways.

My idea for an Anthropocene visuality is derived inductively from the three cases of contemporary discourse that make up this project: online mapping of the Dakota Access Pipeline during the Standing Rock crisis, digital photography of the retreating Mýrdalsjökull and Vatnajökull glaciers in Iceland, and interactive mapping for environmental adaptation along the Great Lakes shoreline. Historical accounts relevant to each case are provided in their respective chapters, as these are unique to the places therein. And while each case emphasizes a particular visual genre, I freely pursue that genre's relationship with other genres as needed to give a full picture of the case. What matters here is that although the goal of this project is to generate an Anthropocene visuality, the cases are not only a

waystation to a solution. Each one will explore how particular arrangements of media offer differing rehearsals of culture, encouraging or discouraging certain ways of thinking and being. How do the given visuals in each case provide rhetorical resources for certain kinds of world-making? By exploring this question, I demonstrate principles for an Anthropocene visuality, but each case has its own life. Before providing the cases themselves, I first outline my idea of an Anthropocene visuality and its five key components: shadow rhetorics, rhetorical folding, defamiliarization, intimacy, and belonging. Further specification of these components is provided in the subsequent chapters.

A Visuality for the Anthropocene

In the Holocene, rhetoric studies have often emphasized the need for clear, concise communication, particularly for technical genres and workplace scenarios. While I do not wish to challenge this basic principle, I do argue that the Anthropocene's hidden complexity and tendency to produce disparity and injustice demands a messier, more complicated rhetoric. What is needed, I suggest, is an 'iskiorhetoric,' or shadow rhetoric (from Greek ἦσκιος or 'shade'). The term is adapted from photographer Lothar Schiffler's 'iskiography,' "writing with shadow," in which thousands of photographs of bird silhouettes are combined to reveal their otherwise unseen flight-lines. Iskiography is a form of photographic superimposition, or multiple exposure, in which two or more images are overlaid on each other in one of several ways, such as in the camera, during darkroom post-processing, or through digital editing. Figure 1 provides an example of multiple exposure, combining seventeen individual exposures taken at the Lóndrangar basalt cliffs, West Iceland to reveal

Figure 1: An example of photographic multiple exposure. Seventeen long exposures were taken of black-legged kittiwakes in flight at the Lóndrangar basalt cliffs, West Iceland. The final image shows their invisible flight-lines.

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the flight-lines of nesting black-legged kittiwakes. Just as the superimposition of individual frames reveals movement otherwise hidden, so a shadow rhetoric would combine multiple images or information layers to reveal dynamic socio-environmental relationships normally occluded by technical and public visuals' emphasis on concision and simplicity. While the component images shed some of the data they would display by themselves, together they invite alternate ways of seeing, comparing, and contextualizing.

Something similar can be seen in Misrach and Orff's (2013) *Petrochemical America* (See Figure 2). In the book, a photograph of a bayou features dark trees looming over darker waters. A series of animal silhouettes have been layered over the photograph. A web of

dotted lines connects the animals, with the names of a variety of toxic chemicals appearing to float up through the water. The result is a visual that might easily become an image of Romantic nature, but instead is 'shadowed' by a system of ecosystem relationships and environmental degradation. In turn, the technical schematic is shadowed by a sense of place, recalling Dragga and Voss's idea of creating "semantic fusion" by overlaying elements that are "statistically redundant" but not "emotionally redundant" into graphical displays (p. 271). Writing in 2001, Dragga and Voss proposed icons and cartoons that might seem heavy-handed today, but the onset of increasingly sophisticated and accessible graphical editing software enables us to realize their ideas more fully while broadening from humanistic interests to environmental ones. In the Anthropocene, such "double consciousness" will be a vital remediation of the visual, especially the technical visual (Nixon, p. 250). Thus, this shadow rhetoric would allow the signs of environmental damage, slow violence, or

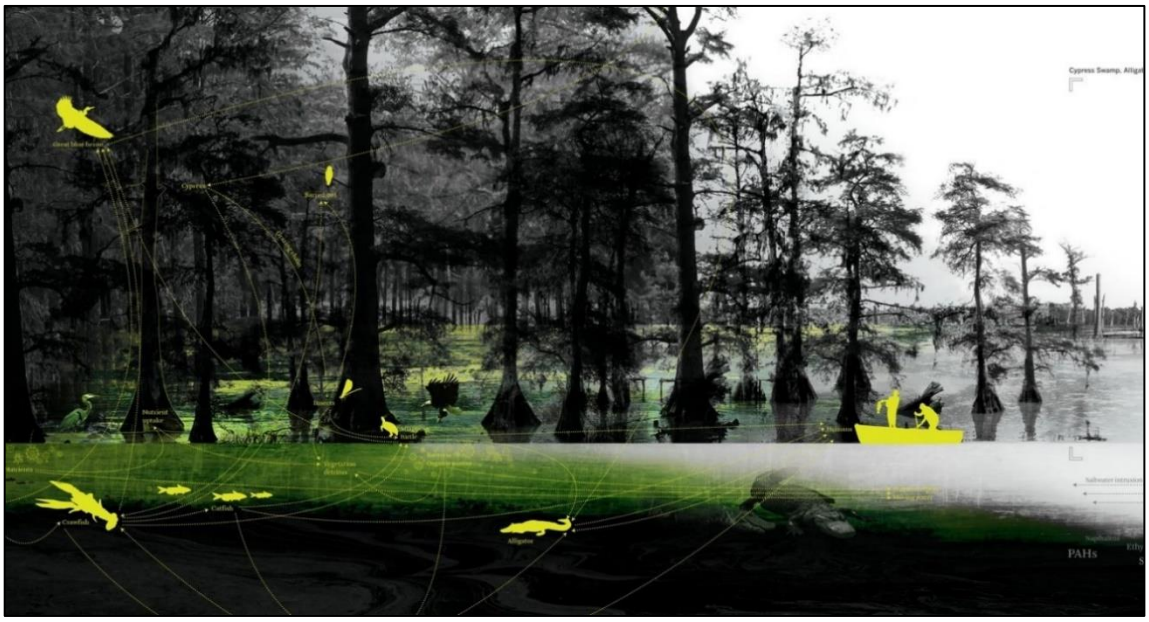

Figure 2: A scene from Misrach and Orff's *Petrochemical America* (cropped to show detail). This scene of nature is inscribed with technical connections among ecosystems. Toxic chemicals float up from the decimation seen at right. One order of information shadows the other.

relationality to ghost through a given visual, imbuing hidden relationships with drama and life. In doing so, an Anthropocene visuality also extends Nixon's idea of ghost habitats, "those ecological shadows of a once powerful presence in the landscape, traces from which one can reconstruct what might otherwise appear to have vanished entirely" (p. 250). Shadow rhetorics are, therefore, characterized by both 'defamiliarization' and 'intimacy.' Defamiliarization occurs when shadows make hidden relationships manifest, destabilizing our commonplace expectations of how a genre should look. Such instability and visual discomfort are critical in an epoch defined by forms of harm that are familiar and comfortable. Forms of defamiliarization are explored in Chapter Two, which features several maps that challenge our visual expectations by adding, removing, or altering cartographic elements we have come to expect. When, for instance, a map is rotated so that north is no longer at the top, productive defamiliarization takes place. We are forced to digest visuals more carefully, opening us to a renewed sensitivity to the rhetorical possibilities of the image.

Through defamiliarization, we may also find a renewed intimacy both between orders of information and between ourselves and our environments. In the Anthropocene, portraying connection matters, as does closing the conceptual invisibilities produced by vast distance in time, space, and scale. Both Chapters Two and Three explore ways that information is combined to fold eras of time together. Both cases produce new intimacies that help make vast distances more digestible. This is particularly important in Chapter Three, which explores the uncomfortable reality of photographing landscapes during climate change, when every image seems to practice a kind of ecological mourning for a vanishing world while inevitably celebrating the romance of that vanishing. This chapter considers the way that Anthropocenic visuals might produce new intimacies through materiality and

making, which may in turn help communicators temper the overwhelming force of Romantic nature.

The intimacy between people and landscapes is considered in greater depth in Chapter Four, which gives a full consideration to how the affordances and constraints of interactive user interfaces can shape users' sense of 'belonging' in a place and the world. Here, I extend the implications of an Anthropocene visuality to processes of design testing, considering how slow violence might suggest the need for a 'slow rhetorical situation' and 'slow user experience,' the idea that our interaction with objects and events is incremental and accretive, and the true experience and consequences of that use often occurs out of sight, beyond human perception. Ultimately, Chapter Four argues that by observing more complex rhetorical situations or ideas of user experience, we provide ourselves with more assets for creating shadowed visuals that defamiliarize accepted commonplaces, establish new intimacies, or facilitate belonging.

If slow rhetorical situations are what we observe to construct successful visuals, and shadow rhetorics—defamiliarization, intimacy, and belonging—are the emotional and cognitive effects produced by the visuals we create, we still need a term for the set of material, replicable actions by which effects are produced. These acts themselves I call 'rhetorical folding,' and they would include everything from rotating the aforementioned map to layering a photograph behind a technical diagram, as in Misrach and Orff's work in *Petrochemical America.* Rhetorical folding would be like holding up a sheet of paper and bringing two opposing, peripheral edges together. Inevitably, doing so pushes the middle of the paper away, creating a new periphery out of the original plane of the paper (See Figure 3). Unlike the easy way that nodes in a network can be linked effortlessly, an Anthropocene

visuality foregrounds the idea that every rhetorical act creates an omission. For everything gained, something is lost, as Longo (1998) teaches us:

> In choosing one way of linking, we necessarily exclude other ways, thereby silencing the knowledge that could be made through those other linkings. A cultural study of technical writing would explore those silences, absences, and exclusions still held within the dominant knowledge and discourse of that field's practices. (p. 126)

Rhetorical folding would thus imply an ethical obligation to recognize that every visual choice necessarily excludes other frames and narratives. Consequently, acts of folding and their resultant shadows suggest a rhetoric *that is never entirely on our side.* In a world full of exclusions, an Anthropocene visuality will encourage us to find innovative ways to bring disparate but deeply connected phenomena together, while remaining aware of the injustices and erasures we perform in the process. There is no 'out' in this system. Instead, we must always consider our positionality. We cannot restore fractured histories or undo the harmful binaries that have led to contemporary environmental crisis and injustice without constant self-awareness. In doing so, we might find a deeper sense of belonging, here referring to a fruitful awareness of living and nonliving matter, its roots in us and our roots in it, as well as the benefits and harm of those intersections.

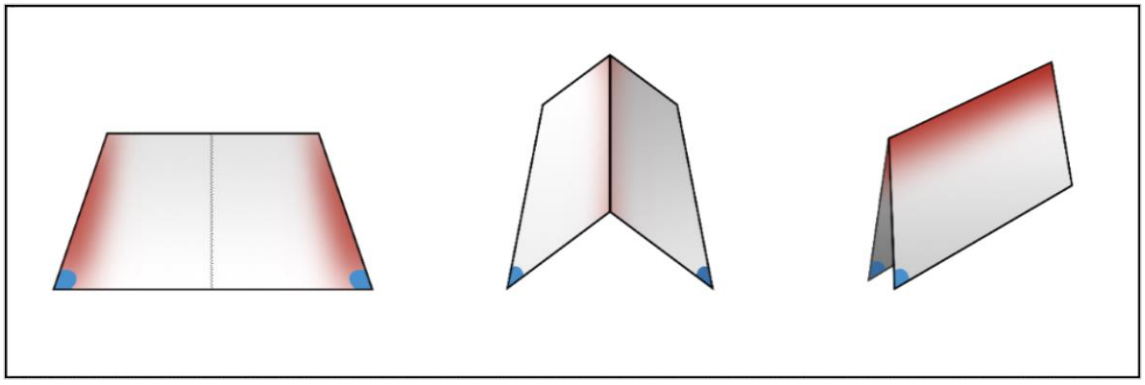

Figure 3: The practice of rhetorical folding. In bringing two separate, peripheral ideas into contact, something previously in the plane of vision is pushed away, becoming a new periphery.

Table 1: Schema for a Visuality of the Anthropocene		
What we observe	**What we do with information**	**The effects we produce**
Slow rhetorical situations/user experiences: Everyday objects People Communication Events Histories Geographies Weather Biota Absences Emotions Artifacts	Rhetorical Folding: Rotating Including Excluding Overlaying Comparing Creating concurrences Emulating	Shadow rhetorics: Defamiliarization Intimacy/connection Belonging

This, then, is the general outline and interests of a theory of visuality for the Anthropocene, intended to provide some guidance for communicators interested in developing a way of working with visuals in a time of environmental crisis (See Table 1). All that remains to be said before providing the cases themselves is, finally, a few words about the fundamental through-line of this project: the act of studying visuals itself. It's clear at this point that I have assumed the existence of 'visual rhetoric,' which might also be known as 'visual communication' or 'visual studies.' However, I recognize that despite the proliferation of visual research in rhetoric studies (see, for example, Foss's 2004 "Theory of Visual Rhetoric"), a skepticism toward the visual remains. It is because of this skepticism that many rhetorical studies of visual culture still introduce the visual as an emergent subject of the field and provide extensive literature reviews defending images as a subject of legitimate inquiry. While I appreciate this strategy, I have not done so here. Some of this skepticism relates to understandable disciplinary concerns, as when Hart (1976) suggests that studies of the visual

would cause "the cogency with which we as a field make theoretical distinctions" to be "severely opened to question" (p. 143). Others, such as Zarefsky (1992), suggest that visuals sometimes "stand in for a more complex reality" (p. 412), which can certainly be true for images as much as with text, and a reasonable concern of all forms of communication. Such anxieties about the visual have at times also been part of a deeper vein of "suspicion of vision and its hegemonic role in the modern era," which Jay (1993) identifies in the works of French critics such as Sartre, Levinas, Foucault, Derrida, and others. Scholars such as Finnegan (2003) and DeLuca (2012) have tempered such concerns, choosing instead to dignify visuals as a key part of contemporary civic life. Hariman and Lucaites (2007) provide a forceful defense of the visual in their study of iconic photographs, which I share here because it has shaped the current project profoundly:

> A photograph captures a tiny sliver of time and space yet can reveal in a flash the social order. Photojournalism shows what can be done in public, and it allows one to think that what is not shown cannot be done. Any photo can be an invitation to participate in a way of life and also a vivid reminder that others—you, perhaps—are not welcome, perhaps not even thought possible. (p. 287).

Our digital age blurs the boundaries between visual genres, and what Hariman and Lucaites argued about photography a decade ago might also be true of contemporary visual culture more broadly. Images in the public and workplace reveal the social order of our time, making available or foreclosing viewers' possibilities for being. After fifty years of scholarship, visual rhetoric is no longer emergent but established. As we do not defend writing as a rhetorical subject, I believe we have arrived at point in our scholarship at which the image also does not need further defense. Instead, this study simply commits to the investigation of how images invite our participation in public culture.

A Few Words About Researcher Positionality

Research writing inevitably exerts some ownership over ideas. Citation credits sources, but paraphrasing nonetheless tends to subsume other people's words. Writing as a white, cisgendered, gay male at a land grant institution, I wish to acknowledge that form of rhetorical power, as this project touches on the rhetoric of people whose bodies and ideas have at times been subject to disenfranchisement or deracination. Thus, although my discipline favors paraphrasing, I have chosen to excerpt some passages to allow my sources' ideas to stand on their own with a minimum of rhetorical styling. In this, I follow the model used by feminist writer Ursula K. Le Guin (1989), who in her nonfiction essays sometimes follows up excerpted passages with conversational remarks such as, "That is certainly the high point of this paper," or "That is Fritjof Capra, providing another useful analogy" (p. 87-8). My goal is to find a dialogue with sources, a call and response. I believe this approach reflects the *ethos* of the environmental humanities. In seeking to bring its presence into rhetorical studies and technical communication, this is one piece I carry with me.

I also do not see my role as speaking for people whose ideas appear in this project, who have better things to do than tell technical communicators how to respect their practices and identities. Rather, I see my role as a technical communicator and rhetorician writing to other technical communicators and rhetoricians. I cannot speak for others, but I can recommend practices by which I believe technical communicators can be better listeners, advocates, and amplifiers of the words and worlds they touch through their work. This project is generative, a beginning place for a visuality of the Anthropocene, but its secondary message, expressed throughout the chapters, is the importance of listening to places and people as we create, communicate, and enable the work of others.

2 Maps, Silence, and Standing Rock: Rhetorical Folding as an Anthropocene Communication Strategy

ON APRIL 1, 2016, the Standing Rock Sioux Tribe founded the Sacred Stone Camp near the confluence of the Missouri and Cannonball Rivers in North Dakota. The camp was established to protest construction of the Dakota Access Pipeline (DAPL), a 1,172-mile-long conduit intended to move Bakken shale oil from Stanley, North Dakota, to a Patoka, Illinois terminal. Initially routed northeast of Bismarck, North Dakota, DAPL was rerouted due in part to Army Corp of Engineers' (USACE) concerns about municipal water supply wells (United States Army Corps, 2015; Dalrymple, 2016). The revised route passed under Lake Oahe within a mile of the Standing Rock Sioux Reservation. Pipeline proponents argued that protestors were blocking the greater good—reducing American dependence on foreign oil (Stevens, 2016), but pipeline opponents were equally vocal about issues over water safety and the preservation of tribal land and artifacts (Camp of the Sacred Stones, "Dakota Access"). In September 2016, skirmishes between protestors and police gained national attention. Although the USACE would deny easement for the pipeline under Lake Oahe in December 2016, incoming President Donald Trump would reverse the decision and sign an executive order expediting DAPL in late January (Eilperin & Mufson, 2017). By May 14, 2017, Bakken oil flowed through the pipeline unfettered.

Forms of Anthropocenic distance and dispersion converged to create the DAPL conflict as a rhetorical event: a thousand-mile pipeline; numerous settlements along its route; the socio-political effects of oil extraction; a long history in which indigenous people have sought to preserve culture amid encroaching, assimilative institutional forces. And these

issues did not play out only on the ground. After the founding of the Sacred Stone Camp, images of Standing Rock flashed across webpages and headlined news articles. But it was a map of DAPL's path—a seemingly simple, mundane map—that circulated most widely, often across mainstream journalism outlets or in articles supporting the protestors (See Figure 2). Yet even the simplest map reflects the mapmaker's ideologies "inevitably, unavoidably, necessarily" (Wood & Fels, 1992, p. 24), and is never "value-free or ever completely scientific" (Harley, 2002, p. 37). Despite its use in neutral-toned journalistic coverage, the map was produced by Energy Transfer Partners (ETP), the parent company to Dakota Access, LLC, a party with a stake in the pipeline's success. Thus, a map unavoidably shaped by pipeline interests became a supporting visual in public arguments often intended for very different ends.

All maps, including the ETP map, inscribe possible stories about space, mobility, and bodies. Few forms of technical communication are as representative of the Anthropocene as the map, for as Barton and Barton (1993/2004) tell us, maps strategically include and exclude information (pp. 235-239). Given Nixon's (2011) concept of slow violence, inclusion and exclusion become key strategies—and dilemmas—for communication in the Anthropocene, when injustices often take the form of "an attritional violence that is typically not viewed as violence at all" (p. 2). Slow violence includes climate change, deforestation, toxic drift, and other incremental, accretive harm that often most directly affects those who already live within the bounds of poverty or institutional racism. Because slow violence is often invisible, it is often excluded from Western discourse. Thus, such crises require representation. Nixon, as noted in Chapter One, asks, "how can we devise arresting stories, images, and symbols" that transform "disasters that are slow moving and long in the

making" into stories "dramatic enough to rouse public sentiment and warrant political intervention?" (p. 3). Nixon's question has been taken up through the transdisciplinary alliance of environmental humanities, and it must be asked by rhetoric and technical communication, too. How do we visualize environmental crises too slow or dispersed to be visible on a map? As suggested above, how we visualize matters because solutions based on technology and public persuasion do not necessarily address harmful aspects of our underlying cultural imaginaries, including hidden connection; issues of distance; and the widespread "false dualism between nature and culture" (Cronon, 1996, p. 459) that separates civilization from wilderness and enables us to act in one sphere without understanding, acknowledging, or mitigating our impact in the other. Emerging science now calls for a comprehensive, interwoven vision of human and nonhuman systems (Rockström, et al., 2009), not unlike calls for comprehensive vision by indigenous writers like economist and activist Winona LaDuke (1999) describing "the relations all around" (p. 2), or Potawatomi scientist Robin Wall Kimmerer (2013) describing a way forward with help from "nonhuman people" (p. 369). If we continue to store human history and natural history in different parts of the library (or in different databases, or in different maps) we will continue to act expansively with limited understanding of the consequences in a world already marred by such action. Part of the project for fields of communication, therefore, will be to find ways to represent interwoven complexity through visual genres like the map.

Despite their role as environmental visuals, however, maps often fall outside our scholarly attention—exceptions include Kimball's (2006) study of London poverty maps, Welhausen's (2015, 2017) studies of yellow fever and flu maps, Propen's (2012) study of environmental maps, and Barton and Barton's 1993/2004 call for inclusive design. Yet, maps

are omnipresent in our research, structuring the titles of Rude's (2009) "Mapping the Research Questions in Technical Communication" or Yeats and Thompson's (2010) "Mapping Technical and Professional Communication: A Summary and Survey of Academic Locations for Programs." Mapping appears in the literature about networks and genre ecologies. In short, maps are a kind of ligament, so embedded as a tool of our field and scholarly experience that they are almost invisible as a topic of critical inquiry; thus, their social construction remains a "hidden aspect" of our discourse (Harley, 2002, p. 154). As I will argue, the map is a place where we can alter visual commonplaces to renegotiate relationships between life, mobility, and geography. Informed by a clearer knowledge of how exclusions in our design work obscures critical social and environmental crises, we may be able to better address the complexities of the Anthropocene. Technical communicators have the skillsets and tools to do this work, particularly with theoretical perspective from the environmental humanities.

Environmental humanities ideas like slow violence can expand also technical communication's humanistic agenda, which began forty years ago with Carolyn R. Miller's 1979 argument for a humanistic rather than positivistic view of technical writing. Almost twenty years ago, Dragga and Voss's (2001) aforementioned article called for technical illustration to be designed with the same humanistic care. Extending these foundational texts is research in decolonialism with writing from Powell (1999); Jones, Moore, and Walton's (2016) work on antenarrative; Agboka's scholarship (2014) on methodological alternatives to intercultural theory; and Haas's 2015 piece on indigenous digital and visual pedagogy. If this scholarship represents a turn, then the field seems to be turning toward narrating, questioning, and revising its Western ideology, welcoming new trajectories.

In this chapter, I explore the role that digital maps played in the environmental crisis surrounding DAPL between April and December 2016. I will demonstrate how cartographic vision includes and excludes, offering examples of how rhetors have altered Western visual tropes to change the commonplaces frames through which environmental crisis is understood. To organize these ideas, I follow environmental humanities best practice by first offering a contextual, place-based history of European and Sioux cartographic vision in the Plains and Black Hills regions involved in this study. I then outline my process of data collection and offer four perspectives on maps guided by Sibley's (2002) question: "who are places for, whom do they exclude, and how are these prohibitions maintained in practice?" (p. x). My environmentally inflected version of this question is as follows:

(1) What rhetorical choices, such as uses of inclusion and exclusion appear in maps in the DAPL discourse?
(2) How did inclusions or exclusions in design shape possibilities for narrating civic, national, historical, and spatial identities?
(3) What can maps tell us about prospects for technical visualization—both practice and theory—in the era of environmental crisis?
(4) How can technical communicators use visuals to address issues like slow violence and promote more ethical work?

Ultimately, I will indicate how elements of the proposed Anthropocene visuality—particularly defamiliarization and rhetorical folding—can help rhetoric and technical communication scholars build more responsible images and thereby further a more just environmental imaginary.

Background: Traditions of Cartographic Visuality in the Plains Region

My goal in this chapter is to offer one interpretation of the public visual discourse surrounding Standing Rock. This corpus, containing 62 maps, splits into two groups: maps

that drew exclusively from Western cartographic tropes and maps that altered those tropes. To discuss these maps, I first describe Western cartography, as well as aspects of indigenous cartography disrupted by Euro-American encounters. Doing so will contextualize contemporary visual storytelling about DAPL.

The design of contemporary Western maps begins during the mid-eighteenth century, when the ornate iconography of earlier centuries gave way to mathematically precise gridlines, bar scales, rhumb lines, and topographic hachure (Goeman, 2013, p. 18; Harley, 2002, p. 37; Monmonier, 1996, p. 27-28). These maps functioned both as transcriptions of the observed world and visual ideas of imperial destiny, forming a European planetary consciousness driven by "a new territorial phase of capitalism propelled by searches for raw material" (Pratt, 2007, p. 11). By the time this phase began occurred, European explorers had long made their way into what would become the Americas. Earlier explorers had tended to leave "the interior of their maps [of the Americas] blank; designated the area terra incognita; filled it with fanciful mountains, rivers, and forests; or decorated with ornate cartouches" (Ehrenberg, 1987, p. 3). When commercial mapmakers entered the Plains region around 1810, they created increasingly precise maps, which became a tool for railroad construction and gold prospecting by mid-century (Allen, 1987, p. 41). During the prior two centuries, colonists had also gradually released livestock across North American pasturelands and forests, disrupting or decimating subsistence resources that indigenous peoples relied on (Anderson, p. 170-171). Such lands became a "colonial outer commons" that foreshadowed cartographic colonization (Greer, 2012, p. 376). As Anderson (2004) notes, "Colonists in effect appropriated Indian common lands to serve as their own commons" (p. 170-171). State-sponsored surveyors secured this appropriation by parceling land into territorial

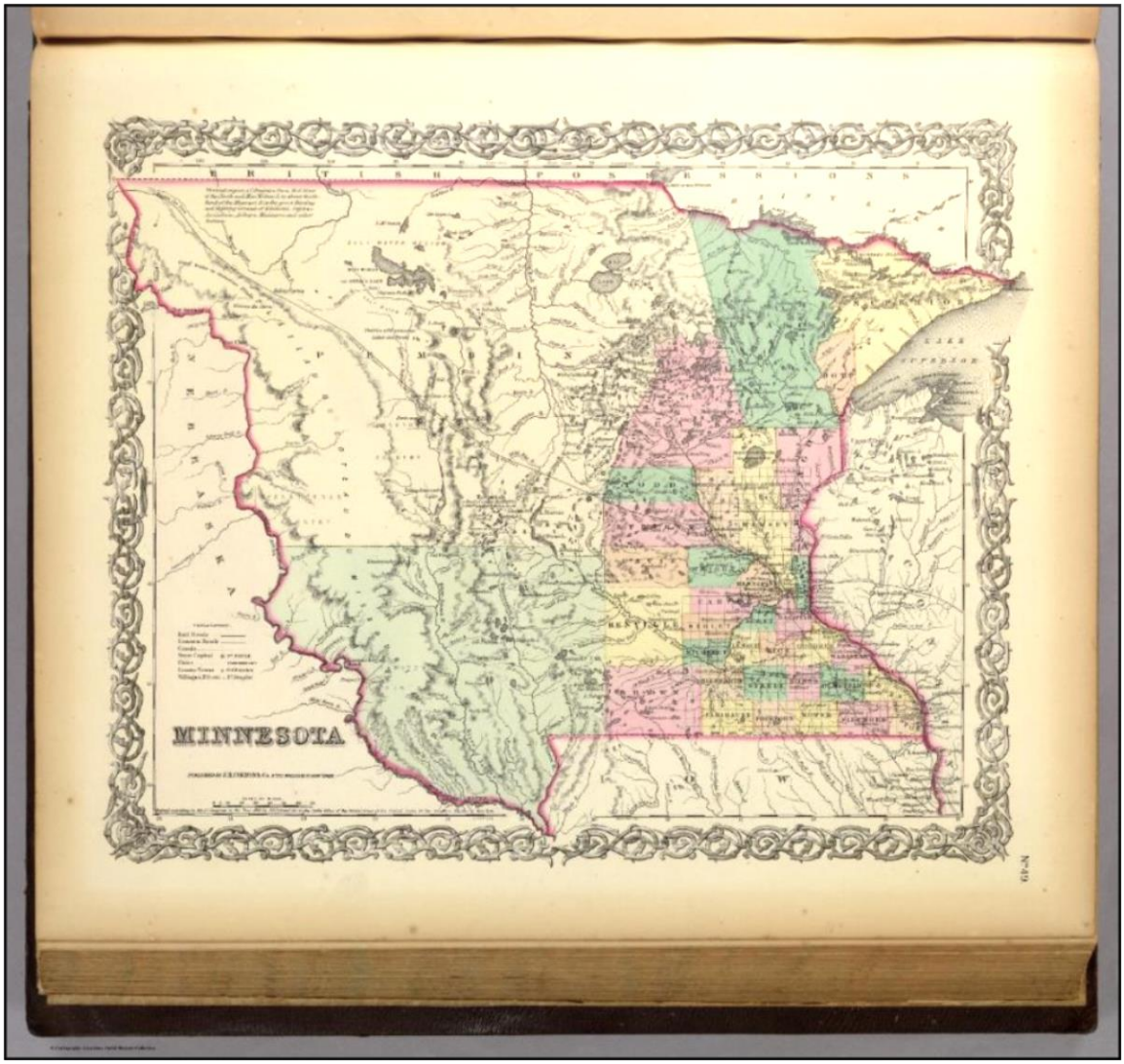

Figure 4: Colton's map of Minnesota and the Dakota territories, depicting the westward movement of Euro-American settlement into indigenous lands (Colton, 1869).

enclosures. Faced with a resultant resource shortage, many indigenous people "could not resist dispossession and confinement to reservations" (Greer, p. 384). In effect, the closing of the commons enclosed not only territory but bodies (Alston, 2016, p. 93).

This process of Empire is inscribed in early Euro-American maps of what would become the Standing Rock region. A map by G.W. Colton & Co. (1856) depicts the Dakotas shortly before the second Fort Laramie treaty forced Sioux tribes onto the reservation (See

Figure 4). The Dakotas are rendered in pale yellow, carved by a few rivers, dotted with hachure markers suggesting the shape of landmarks like Bears Den Hillock, and adrift with languidly sprawling toponyms like "Y A N K T O N N A N C O U N T R Y ." No counties are demarcated, and but a few settlements stipple an otherwise vast, empty territory. To the far east, however, the viewer finds dark yellow, pink, and green parcels of land stacked neatly one on top of another, dense with commercial routes, cities, and veining tributaries. Following Haas (2015), these formations suggest the Western notion of an "advanced civilization" overtaking indigenous groups "relegated to the darkness of technological illiteracy and the wilderness" (p. 195-196). Such maps did not merely report contemporary geopolitics, but employed a preemptive rhetoric articulated by Legg (2006) in his study of governmentality in India. Legg describes how the mapping "preceded, accompanied and succeeded territorial conquest, as new forms of possession were required, and imposed, and new forms of identity were presumed and created" (p. 713). Much the same can be said of nineteenth-century Dakota maps, which documented, anticipated, and secured the westward movement of Euro-American interests. Put another way, Goeman describes such maps' rhetorical work (2013):

> In this narrative of conquest, maps have affirmed 'the truth' of territories. The 'closure' of blank spaces or mapping of territories is a strategy to limit Native legal rights, ownership of land, and tribal imaginations. It is a means of transfiguring Native land into colonial territories in the socioimaginary. (p. 35)

Three decades later, maps of the Dakotas would be filled entirely with these colorful squares.

However, describing such maps as purely Euro-American would be inaccurate. Berenstein (2016) documents how mapmaking was carried out in a "complex web [of] negotiations and contestations" with indigenous people advising about geographic features

and acting as guides (p. 627). In addition, Euro-American maps sometimes solidified indigenous claims to land that had been gained and lost in intertribal conflict (p. 639). Thus, these maps took part in Western practices of creating "seemingly objective and rational diagrams that obfuscate the history of local struggles, conflicts, and compromises" (Legg, 2006, p. 713). Such maps ultimately inscribed American expansion and state power in increasingly violent ways.

Part of this violence occurred by disrupting indigenous relationships between mobility and cartography. This is a history that can only be related briefly here, but one example concerns members of the Sioux peoples, who comprise the Seven Council Fires: Mdewakaŋtoŋwaŋ, Wahpekhute, Wahpetoŋwaŋ, Sisitoŋwaŋ, Ihaŋktoŋwaŋ, Ihaŋktoŋwaŋna, and Titoŋwaŋ. In scholarship, Sioux history is fraught and incomplete; I do not claim authority in telling it. Because the record of indigenous maps is uncertain, I concentrate this section on the best-known traditions—those of the Titoŋwaŋ, or Lakota Sioux, some of whom live at Standing Rock. However, it is important to understand that other Sioux tribes have been mapmakers, too.

While the Sioux tribes' origins are uncertain, archaeological evidence suggests they entered the Northwoods of Minnesota and Wisconsin from the Mississippi Valley before 800 CE (Gibbon, 2008, p. 43). When French fur-traders entered the Midwest in the mid-seventeenth century, they reported no sign of the Sioux, suggesting they were already dwelling in more westerly woodlands and the eastern Dakotas. But the Sioux were urged further west in the 1600s by "multiple pulls and pushes," including intertribal conflict, the Little Ice Age, and Euro-American colonization, which limited material resources (p. 53). By the early 1800s, the Lakota people had become a horseback force, waging war on

neighboring tribes—and posing a threat to American Empire.

Throughout this era, the Lakota used maps to navigate between contiguous points, with travel given in days rather than the spatial distances of Euro-Americans (Gibbon, 2008, p. 61). However, maps were also spiritual guides connecting earthly and celestial worlds. Following decolonial practices of counternarrative (Powell, 2004; Haas, 2015; Jones, Moore, and Walton, 2016), these maps offer a technical history for scholars to observe. Haas (2007) and Smith (2016) both envision indigenous traditions—the use of quahog wampum and handwoven rugs, respectively—as complex technical practices. Similarly, Lakota stellar cartography, which involved the encoding, storage, and retrieval of information before the advent of institutionalized programs of technical writing, serves as another example. An account of such maps comes from Goodman (1992), who relates a firsthand account from Mr. Stanley Looking Horse:

> When our grandfathers came onto the reservation, they had three things: two hides and them sticks. One hide was a star map, and other hide was an earth, "maka," map—buttes and rivers and mountains and even creeks clear out to Colorado Springs. Star map and earth map, they were really the same, because what's in the stars is on the earth, and what's on the earth is in the stars. Them sticks were used for time, were used for telling time. (p. 18)

Goodman describes how, between spring equinox and summer solstice, members from several Lakota groups traveled through the Black Hills, their journey on earth mirroring the cartographic movement of the sun through the constellations. From the winter camps in Nebraska and South Dakota, they moved among key ceremonial locations, ending at Mato Tipila Paha, or Devil's Tower at the Summer Solstice, when all the People met in ceremony and council (p. 12). Both earth and sky offered "visible 'scriptures'" for Lakota life: "Both night and day the Lakota lived between stories and symbols written in the sky and mirrored

on the earth" (Goodman, p. 9). As these technical practices depended on expanse and unfettered mobility, it is hard to overstate the harm that reservation would cause.

In 1851, following decades of increasing violence, the United States government and the Plains tribes signed the first Treaty of Fort Laramie, which paved the way for the reservations (Fort Laramie Treaty, 1851). Treaty transcripts testify to the federal government and the tribes' differing cartographic imaginaries, as illustrated in Superintendent of Indian Affairs David Mitchell's comments to the tribes that were present:

> In order that justice may be done to each nation, it is proposed that your country shall be divided into geographical districts—that the country and its limits shall be designated by such rivers, mountains, and lines, as will show what country each nation claims and where they are located. (Sioux Tribe vs United States, 1969, p. 377)

Mitchell speaks the technical language of Western maps: division, partition, and designation by topological feature. This cartography differs from the spatially loose but linearly coherent indigenous cartographies. Nonetheless, the treaty was established, committing to a series of protections and guarantees between indigenous people and Euro-Americans. The treaty was promptly broken by the United States government, settlers, and tribes alike. War followed.

This period also saw indigenous literacies rewritten by emerging American educational practices. In 1862, the signing of the Morrill Act paved the way for land-grant institutions, which emphasized agricultural studies and engineering. These emphases set a course toward the need for technical writing training (Connors, 1982, pp. 174-175). But, as the seeds of disciplinary history were planted, other forms of technical communication, such as Lakota stellar cartography, were deracinated. Efforts were underway to 'civilize' indigenous people through education programs, which undertook, as Haas (2015) describes, the "re-writing of indigenous histories, the privileging of Western ways of organizing

knowledge, the diminished capacity for a coexistence of languages, literacies, memories, and space with indigenous knowledges, and the perpetuation of the notion that what is different is wrong or deficient" (p. 188-189). These efforts would be further institutionalized with the creation of new reservations.

In 1868, the second Treaty of Fort Laramie sought to end the violence by creating the Great Sioux Reservation, which removed most 1851 treaty lands in North Dakota, Montana, Wyoming, and most of Nebraska and left only land west of the Missouri River in the Dakotas to Sioux peoples. The treaty allotted a limited acreage for farming or ranching to families on the reservation and opened leftover land to settler development. Critically, this patchwork territory prevented communal Sioux practices of land use and extended family socialization (Gibbon, 2008, p. 120). In the following years, a fearful US government would outlaw activities such as trade and celebration, including "storytelling and visiting among relatives" (Gibbon, p. 139).

In 1877, the U.S. government seized the Black Hills and partitioned the Great Sioux Reservation into smaller reservations, claiming a full third of Lakota lands. Half of the remaining land would be lost again in 1889, with further land loss occurring in 1901. In the 1960s, a USACE dam project flooded 353,313 acres of reservation land along the Missouri, including parts of Standing Rock (Schneiders, 1997, p. 238).

Government attempts to constrain indigeneity were not limited to human life, but included indigenous nonhuman participants. LaDuke (1999) aligns the decimation and survival of Lakota people with the eradication and survival of the bison, of which "almost 50 million" were eliminated by the late nineteenth century (p. 142). Calling the bison "prairie makers," LaDuke documents their vital role in maintaining indigenous prairie ecosystems,

and the hope they pose for the Lakota people in the future (p. 143). Such concepts of indigenous being and interchange are not visible in Western maps, historically or presently.

For the Lakota people, the reservations were not merely borders on a map; the reservations disrupted the relationships between bodies, geography, and sky described in Looking Horse's account. Indeed, reservations like Standing Rock embody a tension that persists in the 2016 DAPL discourse. To examine that discourse, I first explain my process of data collection, and then offer a possible narrative of the inclusions and exclusions in contemporary maps. Finally, I discuss what these maps tell us about rhetorical folding and its resultant defamiliarization, as well as the prospects of an Anthropocene visuality for rhetoric and technical communication.

Organization and Data Collection

I began compiling Standing Rock maps from online news outlets and blogs in April 2016. Ultimately, I limit the maps I discuss in this chapter to those published in the nine months between the establishment of the Sacred Stone Camp and the USACE denial of easement in December. I do so because the events that have since unfolded at Standing Rock—eviction of the campers, dismantling of camps, and oil flowing through the DAPL—are a different part of the story with a different rhetorical context.

Maps were collected by setting a filter to collect all stories crawled by Google that mentioned the terms "Standing Rock," "Dakota Access," "DAPL," "Sacred Stone Camp," "Camp of Sacred Stones," and "Iŋyaŋ Wakháŋagapi Othí" (Sacred Stone). Of 383 articles collected, I reduced the corpus to 147 articles containing maps. I then eliminated articles featuring maps duplicated elsewhere, keeping the first known instance of each. I also

eliminated maps that referred incidentally to Standing Rock and DAPL, collecting 62 maps.

While I considered quantitatively analyzing the data, doing so would position me further from my research questions. For instance, only one map circulated significantly in the early months of the conflict, and the random sample required for a quantitative analysis might have distorted the discourse by excluding that map. Instead, following Harley (2002), I sought to "read between the lines of the map—'in the margins of the text'—and through its tropes to discover the silences and contradictions that challenge the apparent honesty of the image" (p. 153). I also accounted for reach by tagging maps according to date, Facebook shares, Alexa analytics, frequency of reuse, number of comments, and article genre. Genres included mainstream news articles, feature stories, justice-oriented editorials and blogs, pro-pipeline editorials and websites, and historical maps.

Because I wished to identify how rhetorical choices such as inclusion and exclusion shaped possibilities of civic, national, historical, and spatial identities, I chose four maps that

(1) provided insight into different subgenres

(2) met at least one measure of digital engagement, such as multiple comments and shares, and

(3) helped to depict changes in the discourse over time.

This corpus ultimately included map by Energy Transfer Partners, two blogs, and the *New York Times*. Collectively, these documents capture not only how the discourse developed, but the rhetorical constructions that characterize the 62 maps.

Selected Maps of Standing Rock

The Energy Transfer Partners Map

In 2015, the USACE sent the Tribal Historical Preservation Office of the Standing Rock Sioux Tribe (THPO) a letter seeking a permit for local passage of the DAPL (Department of the Army, 2015). In response, the THPO called for a complete archaeological assessment (THPO, 2015a). Studies have documented how interaction between tribal offices and environmental policymakers go awry and the importance of not constraining discussion or making decisions without full debate (Ross, 1994). Tribal records suggest that such failures were perceived in this case. In example, THPO later argued that follow-up letters to the USACE went unanswered (THPO, 2015b). Subsequently, local tribes, the EPA (2015) and Department of the Interior (2015) voiced concerns about the USACE's evaluation, but the pipeline proceeded. Against this background, the Standing Rock Sioux Tribe and others founded the Sacred Stone Camp, named for the rounded rocks of the Cannonball River (Camp of the Sacred Stones, n.d.). The protests would continue throughout 2016.

In those first months, the visual reproduced most frequently was the aforementioned "DAPL Project" map created by Energy Transfer Partners (ETP), the pipeline's parent company (See Figure 5). The map appears as early as a January 13, 2015 PowerPoint presentation (Energy Transfer Partners, 2015, slide 5) and has been used in least 122 publications and shared tens of millions of times across social media. Visually, the ETP map makes typical cartographic inclusions: stars mark key locations like the Bakken Formation; counties through which the pipeline passes are shaded in; and state boundaries, blue waters,

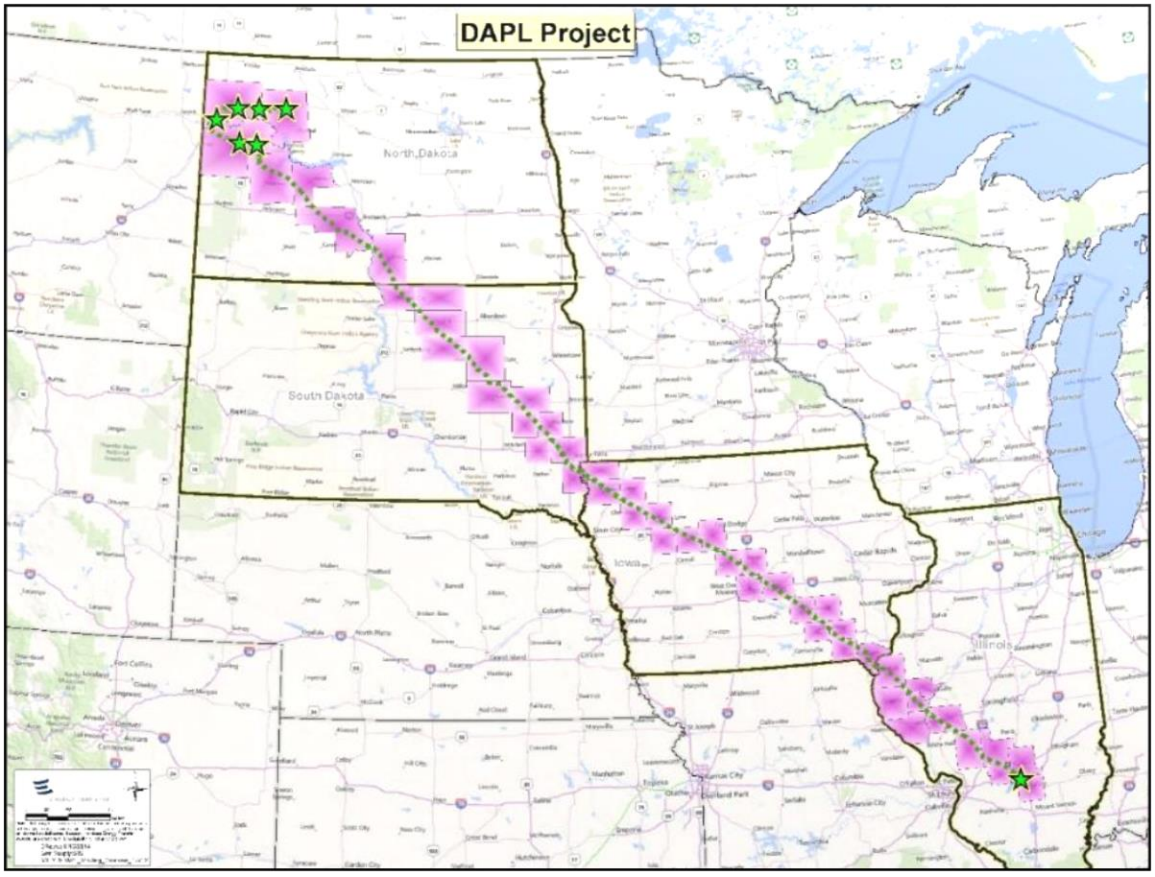

Figure 5: The "DAPL Project" map, which was one of the dominant visuals shared online in the first months after the establishment of the Sacred Stone Camp (Energy Transfer Partners, 2015).

and urban centers all appear. According to Western tradition, the map is ordinary, offering technical information with minimal ornamentation.

However, typical inclusions and exclusions become more complicated given the rhetorical context of environmental risk. For instance, the map includes a series of zones affected by the pipeline. These zones follow county lines and are shaded in purple-pink rather than the red-yellow-green sequencing that often conveys risk in Western societies (Monmonier, 1996, p. 171). Purple—in Western rhetoric, historically known as a royal

color[1]—instead enables viewers to read the pipeline as a non-threatening participant in local geography, ennobling the land through which it passes. Thus, the ETP map allows viewers to see the pipeline as a positive player in the national story of energy independence. Additionally, the DAPL is drawn as a dotted, porous line that belies its robust, entrenched materiality. Purple counties like Morton are given solid lines, inviting viewers to imagine firm boundaries cordoned off from neighboring non-purple counties like Grant and Sioux; viewers in those counties are invited to constitute themselves as citizens excluded from the pipeline's influence. In this fashion, the ETP map minimizes the pipeline's potential as an object of fear.

Unexpectedly, the map's delivery becomes itself a form of exclusion. Perhaps because it was originally clipped from a compressed PowerPoint PDF, the map appears in all 122 instances at low resolution (although ETP generously permitted the republishing of a higher resolution version, that version did not appear in publications I encountered in 2016). Consequently, toponyms like Standing Rock Indian Reservation, located beneath the line between South and North Dakota, are rendered nearly unreadable to viewers seeking information. Likewise, city names are indecipherable within the purple zone, meaning that where risk is highest, data density is lowest.

The resulting map limits the stories we might tell about Plains residents' welfare. The

[1] The original purple dye, Tyrian purple, was derived from two kinds of shellfish indigenous to the Mediterranean region (for a fuller account, see Kassia St. Clair's 2016 *The Secret Lives of Color,* pp. 161-70*).* Squeezing a particular gland secreted a single drop of liquid that turned green, then blue, then purple in the sunlight. To create one ounce of dye, 250,000 shellfish were killed. Thus, the dye was by default the dominion of the extremely wealthy. In a regrettable but not unusual chapter of environmental history, the shellfish were hunted nearly to extinction for the coveted dye, causing purple to fall out of use for three centuries. Purple did not return to fashion until English scientist William Henry Perkins accidentally invented the first synthetic colorfast dye, mauve, while trying to synthesize the antimalarial drug quinine. While Perkin's discovery spared many shellfish from extermination, the key ingredient for the mass manufacturing of mauve would turn out in fact to be coal tar, and plenty of that was available during the coal-fueled industrial revolution. Somewhere, a history of environment told completely through the color purple is waiting to be written.

erasure might be read through Mishuana Goeman's (2013) words in *Mark My Words: Native Women Mapping Our Nations*: "As Native nations maneuver for power in the liberal nation-state, it is important not to be coerced by the power of abstracting land and bodies into territories and citizens" (p. 32). Here, the map provides rhetorical resources for people to visualize themselves and the land as less than territories or citizens; in some cases, they may be indecipherable pixels, non-matter. In Dragga and Voss's (2001) terms, expediency has not been tempered by humanism. The map offers efficiency, at the cost of nuance. Nonetheless, major news outlets such as the BBC and Minnesota Public Radio published the map without question or reconfiguration, in part because no other maps existed in the early days of the Sacred Stone Camp. That would change, however.

The Decolonial Atlas Map

On September 3, 2016, like a lingering thundercloud unleashing a storm, the DAPL protests turned violent. A day after the Standing Rock Sioux Tribe (2016) filed court documents claiming a two-mile stretch of territory as a sacred burial ground, Dakota Access machinery razed the area. The same day, at least thirty protestors were pepper sprayed by law enforcement officers, and six people suffered security dog bites (Peralta, 2016). In a previously quiet media landscape, public attention piqued.

On September 7, Jordan Engel and Dakota Wind (2016), contributors to the *Decolonial Atlas* blog (DCA), published a Standing Rock map that would be shared 569 times on Facebook (See Figure 6). The DCA map differs from prior Standing Rock maps. Its view is local, focusing on the northeastern edge of Standing Rock. It is sepia-toned, with lightly

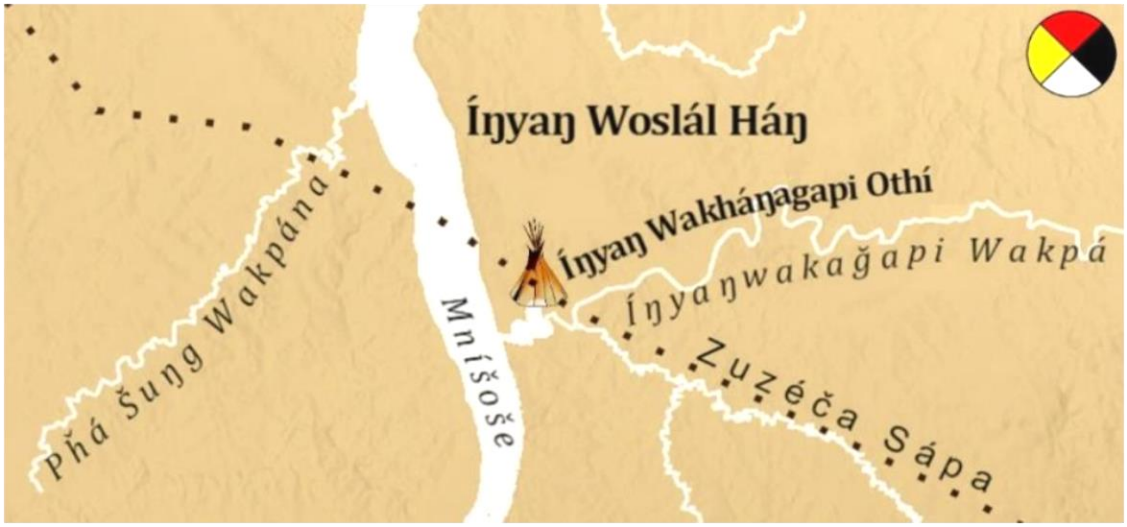

Figure 6: The *Decolonial Atlas* map, which was shared online in the wake of the proliferation of other maps of the conflict, such as the Energy Transfer Partners map (Engel & Dakota Wind, 2016).

drawn topography and rivers in eggshell white. In lieu a compass, a Lakota/Dakota medicine wheel indicates the wind's quarters, and the map is oriented with south at top.

Whereas the ETP map might be said to practice exclusions that limited risk, the DCA map practices what can be read as strategic exclusions that disrupts Western discourse. Absent are cities, highways, and borders. Instead, labels denote waterways, Standing Rock, the Sacred Stone Camp, and the pipeline itself, depicted as a black line labeled "Zuzéča Sápa" or "Black Snake," referencing a Lakota/Dakota prophecy. All toponyms are given in Lakota/Dakota, not English. An accompanying text post is brief and neutral, offering no impassioned argument, but simply describing the map and its context. Neither text nor map references any interlocutor. The map is strategically defamiliarizing, saying nothing about settler, immigrant, or national US identities. In doing so, it calls into existence the possibility, foreclosed in earlier maps of Standing Rock, of Lakota/Dakota identity, land, and language unconstrained by Western institutions. Colonial history is circumvented, and the single

Western feature, the pipeline, is naturalized into indigenous belief and storytelling rather than—as is often the case—the reverse. Through a defamiliarizing set of exclusions, the map offers locally framed, decolonized visuality.

The #NoDAPL map

On September 9th, a judge permitted the Dakota Access Pipeline to continue, but the Departments of Justice, the Army, and the Interior issued a joint statement refusing to authorize pipeline construction—although construction continued anyway (Heim & Berman, 2016). On October 30, over 1 million Facebook users checked into Standing Rock to protect protestor identities from police, although law enforcement later declared any danger a hoax.

Two days later, Carl M. Sack, a University of Wisconsin-Madison Ph.D student in Geography, published his "#NoDAPL map" (See Figure 7). Sack's map remains among the most visible, with 30,000 Facebook shares, a feature in the *Huffington Post*, and over 150 comments. In an accompanying blog post, Sack (2016) describes his reasons for creating the map:

> Maps like [the DCA map] are great, and there should be more of them. However, I felt strongly that there still needed to be a map of the area that would look familiar to most viewers and orient them to the important geographic facts of the struggle.

Like the DCA map, the #NoDAPL map provides a local view of North Dakota, ranging from Bismarck to Standing Rock. Sack's map makes several inclusions, particularly bulldozed burial grounds marked in red and protest camps marked with white tipis. He also includes the 1851 Treaty of Fort Laramie boundaries, not seen in prior DAPL maps. A dashed black line indicates the rejected pipeline path near Bismarck, which along with other cities is coded a "majority-white" settlement. County boundaries are given less visual weight than other

map features, particularly the treaty boundaries.

Sack contextualizes his map as a response to both the ETP and DCA maps, giving insight into how rhetors structured cartographic resistance differently to suit differing rhetorical aims. The DCA map promotes Lakota/Dakota identity without actively practicing Western strategies of persuasion; thus, it does not need to follow Western cartographic tropes. Comparatively, Sack's map aims to educate and persuade, and thus must resist Western vision while adhering more closely to Western fundamentals. Of interest is Sack's inclusion of the 1851 Fort Laramie Treaty boundaries— nullified by the 1868 treaty that

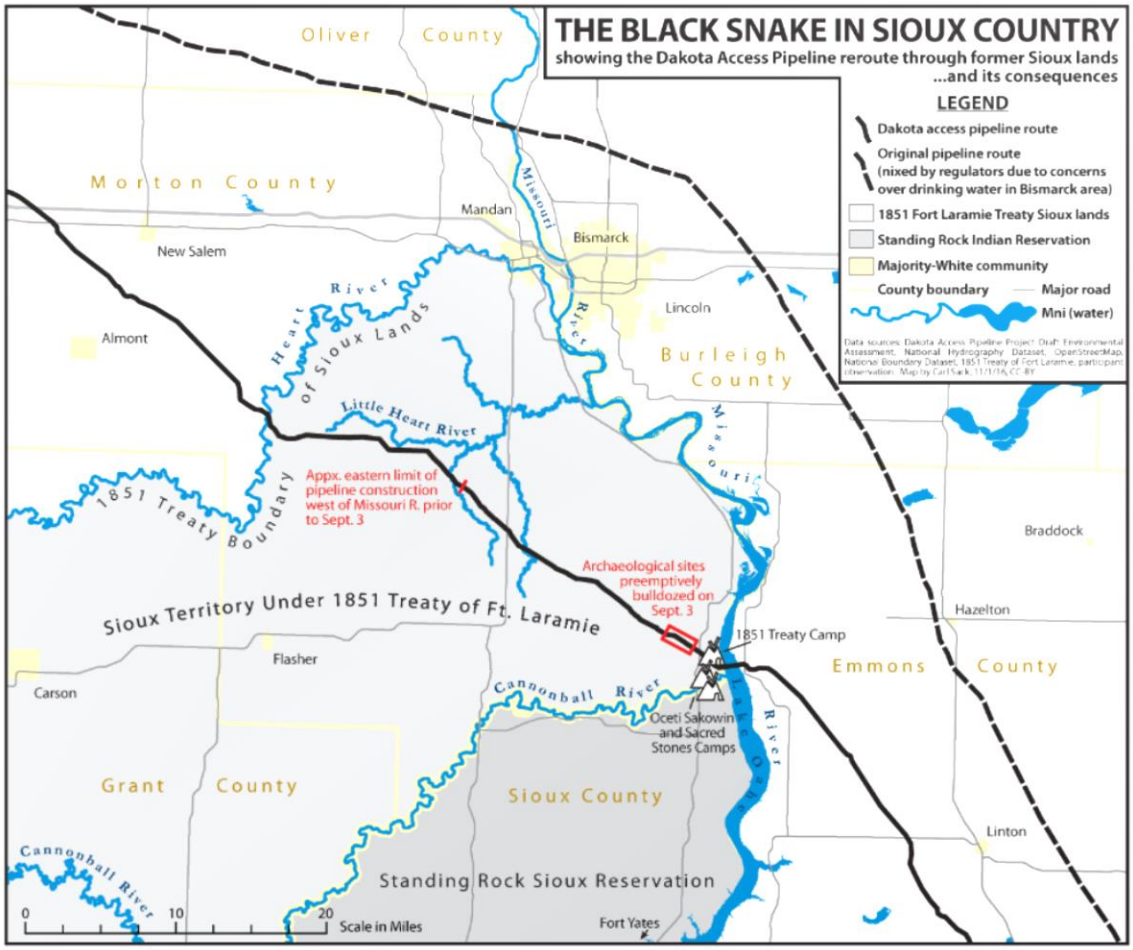

Figure 7: The "#NoDAPL" map, one of the most widely shared maps of the DAPL conflict (Sack, 2016).

created the reservations—which invites rhetorical possibilities otherwise absent in the discourse. The erosion of Sioux lands might be viewed as a kind of slow violence, a piece of the national narrative largely excluded in contemporary coverage of Standing Rock. By including the outdated boundaries, Sack ensures that a longer history can be witnessed. This, too, produces a defamiliarizing effect, destabilizing the contemporary focus of other maps in the corpus. Sack effectively performs a rhetorical folding of time, allowing past violence to shadow the contemporary crisis and enable a narrative in which rerouting the pipeline away from "white majority" Bismarck becomes not an isolated incident but the latest in a violent national history. This particular narrative cannot easily be argued from most other DAPL maps. Effectively, the treaty becomes a new rhetorical resource for meaning-making within the discourse, and—given its viral uptake—a visible one. Notably, the #NoDAPL map would also go on to subtly reshape how the controversy was portrayed in national media.

The *New York Times* map

On November 23, the *New York Times* published "The Conflicts Along 1,172 Miles of the Dakota Access Pipeline" (Aisch and Lai, 2016). To depict the entire length of the pipeline, the *Times* reoriented the map with northwest at the top, allowing the southeast-bearing pipeline to flow down the page without veering off the right side of the screen. Additionally, the map credits the inclusion of historical Sioux treaty boundaries to Sack.

These two choices—treaty inclusion and map rotation—differ subtly from typical Western cartography. As discussed above, including the treaty boundaries in the #NODAPL map provides new resources for public deliberation. Here, again, the map creators rhetorically fold two eras together to reveal meaning. The result is a destabilization of the

contemporary narrative in favor of one that involves a longer view of history. Additionally, the angle of the map tips the familiar, rectangular county grid onto its side. Resultantly, cities and landmarks are defamiliarized, shifting out of their usual alignment. The disorientation has rhetorical force, requiring that viewers look attentively to make sense of the landforms, boundaries, and sites that their eyes might otherwise gloss over. Most maps demand little from us as viewers—we look and move on. This map asks viewers to actively participate or become lost. Furthermore, the map's design urges an experience of complicit, voluntary closure.

Comics theorist Scott McCloud (1993) describes closure—in which a reader or viewer follows a text to its conclusion—as "continuous, largely involuntary, and virtually imperceptible" in most electronic media (p. 68). But closure works differently in comics. McCloud offers two panels: one showing a man in the shadows swinging an axe at an unlucky victim, the other showing a skyline at night, with the word EEYAA!! splashed across the sky. "Every act committed to paper by the comics artist," explains McCloud, "is aided and abetted by a silent accomplice": the reader, who infers action not explicit on the page (p. 68). The *Times'* map does not necessarily encourage awareness of complicity, but also cannot be seen without the viewer's active participation in closure. Because the map is tall and narrow, the viewer must scroll the pipeline to Patoka to complete the narrative. In short, by including the treaty boundaries and distorting familiar Western cartographic tropes, the Times map—shared 3,600 times—not only uses Sack's resources but offers a means of more actively witnessing historical violence.

A little over a week after the *Times* published its map, the USACE announced on December 4, 2016, that it would deny easement for the Dakota Access Pipeline to pass

under Lake Oahe. What seemed like victory was short-lived. The pipeline was completed, and the camps disbanded. Nonetheless, the protests that began at Sacred Stone Camp continue both at locations across the U.S. and online.

Discussion: Remaking the Map in the Environmental Crisis Era

Above, I have offered an abbreviated account of how four public visuals made rhetorical inclusions and exclusions, offering narrative frames about a particular place and crisis. These maps also indicate the potential roles that a defamiliarizing visuality can play in Anthropocene-era images, as well as the way that acts of rhetorical folding can address issues of time by allowing one events in one era to shadow those in another. Below, I wish to offer three invitations to rhetoric and technical communication scholars and practitioners about seeing and shaping visuals during the Anthropocene.

My first invitation is this: as professionals, we should recognize how rhetorical inclusions and exclusions can dramatize the silences within public and technical discourse. By rhetorically folding historical treaty boundaries into a map depicting contemporary crisis, the #NoDAPL map created literal space for a story about slow violence, a story then picked up by the *Times*, the *Post*, *Vox*, and other global media. This outcome suggests that even relatively small inclusions can disrupt fundamental tropes within dominant discourses. Similarly, the DCA map establishes a decolonized narrative frame by defamiliarizing the familiar tropes of Western cartography. Mapmakers seeking to change aspects of public visuality should not underestimate the challenge of so doing, however, particularly in a genre like Western cartography. Too much change and viewers may no longer perceive the genre

as itself; too little change and problematic binaries and silences are merely reinforced and maintained without question.

My second invitation concerns technical communication ethics. If we wish to bring an environmental ethos to our work, we must recognize unintended exclusions and silences in our own research and practice. For instance, the ETP map uses familiar Western tropes (colors, stars, dashed lines, highways, and topographic boundaries), but those tropes foreclose parts of a story relevant and necessary to understanding the DAPL conflict. Its omissions, even if unintended or the byproduct of file encoding and transmission, silence certain voices telling certain parts of the story. This is also true for the three maps that disrupt some aspect of Western vision—DCA, #NoDAPL, and the *Times*. Each addresses silences by manipulating our experience of time, clipping out part of a colonial history or bringing historical violence into the present. Parts of the story are lost to accommodate others.

Every mapmaker makes choices about what to include and exclude. Maps are created by selecting some bits of geography, slabs of highway, or swaths of forest, and excluding others. This selectivity is largely invisible because maps require the user to "attempt to understand the spatiality of knowledge from within the knowledge space that has been coproduced with that knowledge" (Turnbull, 2003, p. 89). In other words, the design designs us back. This practice becomes problematic when we become so comfortable with a set of inclusions and exclusions that they seem to us natural rather than possible, and we accept them as they are, rather than interrogate their placement and purpose within the rhetorical context. Ethical design in the environmental crisis era requires that we attend to that which has been excluded from our view, not just that which has been organized for us to see. This

is the heart of rhetorical folding: the idea that we can never afford to ignore that which is pushed out of view by bringing ideas into contact with each other. In an Anthropocene visuality, there can be no such thing as an action without a cost, and communicators must keep this reality in view with far greater adherence than has historically been true.

Finally, I wish to invite a challenge: to confront environmental crisis, we will need to innovate, returning to the arguments of Barton and Barton (1993/2004) from twenty-five years ago: "In short, what is really needed is a new politics of design, one authorizing heterodoxy—a politics where difference is not excluded or repressed, as before, but valorized" (p. 145). We will need new ways to represent exclusions that occur over vast distances of space and time as well as help users actively see these exclusions. How to do this remains an open question, but this chapter suggests at least one vital way: rhetorical folding time by overlaying one order or register of data onto another. Such overlays are not a new idea, but rather as a material strategy of Anthropocene visuality that can be made deliberate and strategic. In choosing to historicize and contextualize visualizations of particular events, technical communicators may find themselves become advocates, a position that may cause some to question the line between providing information that enables users to complete a task and actively arguing for a position. To address this concern, I would direct readers toward Cagle and Tillery's (2015) argument concerning technical communication and climate change:

> Particularly in the case of global warming, which faces a sustained campaign of denial and disinformation, there is a role for technical communicators to work as advocates to improve knowledge, concern, and self-efficacy, among targeted groups, or to help organizations with media campaigns. A global problem like climate change requires an informed and engaged citizenry, and TC researchers and professionals can advocate for and with that citizenry. (p. 160)

In arguing that practitioners should practice forms of rhetorical folding, I am suggesting that the many pitfalls of the Holocene—but particularly the signature human tendency toward a short-sighted understanding of cause and effect—must be addressed for a functioning civic and public life. If our underlying ways of seeing do not change, neither shall we. But we will be assured of committing past shortsightedness again. It is vital that those who study and practice rhetoric and technical communication understand their power as advocates, and allow historical, cultural, and social knowledge to shadow contemporary visuals.

Creating shadow rhetorics will not be easy. Although maps in this collection demonstrate the range of stories we can narrate from maps, consider the other stories that have no current visuals: LaDuke (1999) tells us about the relationship between indigenous people, bison, and grass, for instance. Maps that can convey the breadth and weight of a history of violence, revival, human and nonhuman life, and ecological symbiosis are not something we are trained to construct, but doing is critical work for Anthropocene communicators. Scholars and researchers might also study how the material production of visuals changes during environmental crisis. For instance, user experience (UX) testers draws on users' lifeworlds when designing visuals like interfaces and infographics. Slow violence may require that we develop a slow UX, a possibility discussed further in Chapter Four. Slow UX would account for how artifacts break down and circulate after disposal, returning to subtly reshape—and even degrade—users' experiences of environment years or decades later. Such long-term impacts matter. As I write this in Minnesota in 2019, headlines in my local newspaper report that common loons are dying from oil exposure after the Deepwater horizon rig exploded in 2010 (Marcotty, 2018). How do we map the way that oil disperses through water, is born aloft by migrating birds, and impacts ecosystems years later? Such

intractable invisibilities require our attention. After all, technical communication work has as much facilitated technological innovation as enabled systems that perpetuate environmental harm. More than ever, we must take an Anthropocene visuality as part of our foundational ethics and link ourselves to transdisciplinary work like the environmental humanities. I do not mean that we must all study the environment—only that we must all learn to study environmentally.

In the words of Le Guin (1982): "We have got ourselves into a really bad mess and have got to get out; and we have to be sure that it's the other side we get out to; and when we do get out, we shall be changed" (p. 98). Using an Anthropocene visuality, we might produce visuals that defamiliarize generic tropes that have rooted too deeply in our imaginaries. We might use overlays as advocates, shadowing our design work so that we tell more comprehensive stories. A new way of seeing would weave together the movement of human and nonhuman life, the migration of forests, the breaking of treaties, the extraction of oil, the retreat of ice, the rising of seas, and the planetary jeopardy of climate change. Let this be an invitation to create the kinds of maps that shall indeed leave us changed.

3 Glaciers, Monsters, and the Afterlife of Images: Charting Rhetoric's Evolving Role in Ideas of Nature

Introduction: A Rupture in the Bellwether

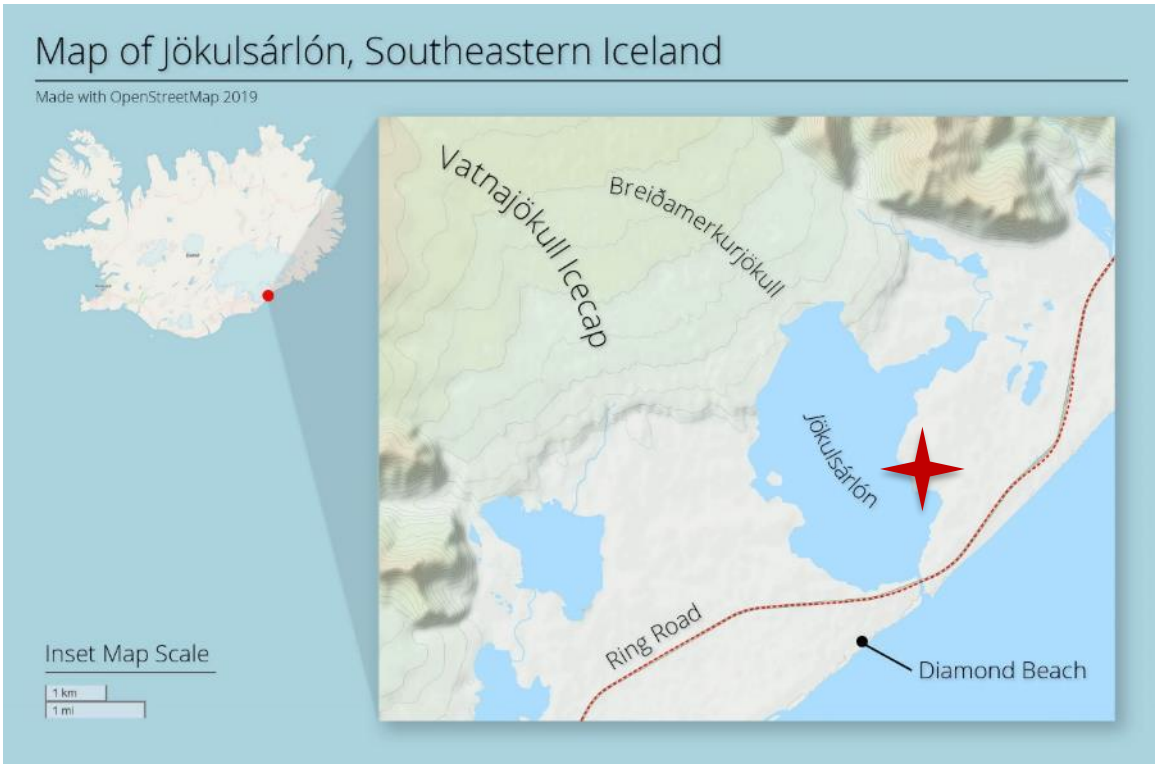

Figure 8: Map of Jökulsárlón, Southeast Iceland. The star marks the writer's location.

AT 2 A.M. ON A JUNE MORNING, I find myself standing on a scree slope with my back to the north Atlantic Ocean (See Figure 8). The midnight sun skims the black horizon, flashing pink across the surface of Breiðamerkurjökull, a glacial tongue of Iceland's Vatnajökull icecap. The glacier's sprawling, jagged bulk spills around the shoulder of the mountain Öræfajökull to a turquoise lagoon, Jökulsárlón, below me. There, broken chunks of Breiðamerkurjökull, some the size of small houses, drift across the lagoon, glide down a

narrow channel, and sail out into the Atlantic (See Figure 9). The ice, the fog, the Arctic terns circling overhead: everything is silent. Only a flock of common eiders breaks the slumber with their soft, sarcastic calls. Then there comes a rumble on the edge of hearing that grows into a thunder. Eiders wing out of the fog and head toward the Atlantic. With a long, yawning *boom,* a thirty-foot wall of ice levers ponderously forward and collapses into the lagoon. Waves lap the shore. The eiders coo. And the icebergs continue their long, silent journey into the Atlantic.

While stunning to me, an American who grew up in the Great Lakes basin, the experience is familiar to those who live around glaciers—and the millions of tourists who

Figure 9: Two viewers of the lagoon at Jökulsárlón, Southeast Iceland. At left, common eiders rest on the shore in the shadow of drifting icebergs that take on strange shapes. The icebergs calve off the Breiðamerkurjökull glacier and drift out into the Atlantic. At right, behind Jökulsárlón, Mount Öræfajökull can be seen.

travel to Jökulsárlón to see its picturesque icebergs each year. In its very visible retreat, Breiðamerkurjökull and other glaciers like it—almost forty on the Vatnajökull icecap alone—have become icons of environmental crisis (Williams, Hall, Sigurðsson, & Chien, 1997, p. 74). Headlines in popular publications declare the disappearance of glaciers "Horrifyingly fast" or admonish that "These stunning timelapse photos may just convince you about climate change" (Peters, 2017; Harvey, 2017). As an object of wonder, fascination, and foreboding, the glacier has become an icon of the Anthropocene. Yet such photographs also participate in a history of specular nature, a Romantic or utilitarian nature without human or nonhuman life. This might give us pause. Do such photos really inspire the fear that headlines ask us to feel? Or do we look at them not in terror but fascination, wonder—even desire? Do we look simply because we enjoy playing spot the difference?

These questions interest partly as an academic and partly because of my background in photography. Having trained in photojournalism, I would consider myself a landscape and wildlife photographer. Walking along Jökulsárlón, it is impossible for me not to see a profession I am passionate about called sharply into question. When I set up my tripod and look through my lens, what am I capturing in the age of climate change? Everywhere I travel in Iceland, I see a planet transforming before my eyes in troubling ways, yet I see also profoundly attractive images of spectacular nature. Is it possible, I wonder as I observe ice calving into the lagoon, to image these landscapes in a way that does more than merely aestheticize them? Can my lens capture precarity or the effects of slow violence? Are the images I create only about things ending? Visual rhetoric scholar Phil Eubanks (2015) writes:

> The melting of the glaciers is awe-inspiring not just because of the speed and scale of the destruction. And not just because of the photographic beauty. The melting is awe-inspiring because to witness the melting is to understand death—to experience the uncomfortable relationship between being and nothingness that once fascinated Jean-Paul Sartre. (p. 116)

Are my acts of witnessing anything more than a process of eulogizing a disappearing world? In the Anthropocene, we increasingly experience what Cunsolo and Ellis (2018) call ecological grief, "the grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems and meaningful landscapes due to acute or chronic environmental change" (p. 275). Although ecological grief has only begun to be studied, Ellis and Cunsolo (2018), writing for *The Conversation,* point out that the sensation is not new at all. For instance, Aldo Leopold, in 1949's *Sand County Almanac,* wrote about the experience of ecological loss: "One of the penalties of an ecological education is to live alone in a world of wounds" (p. 197). No one likes to realize that a thing they love has made them a documentarian of constant loss. As I sit with the eiders and watch the ice drift out to sea, I wonder: what can photography *do* in a world of environmental wounds?

The idea for this chapter began with these questions about photography as a genre and ecological grief, but genres rarely occur in perfect isolation. They are transgressive, messy, permeable, and opportunistic, and so out of these initial questions has spun a much larger story. To understand photography, mourning, agency, and climate change, we must understand the development of visual technologies and their resultant environmental images over three hundred years of European history. That story ends with the rise of photography and its entry into the digital age, but it begins with transatlantic tensions between native and imperialism rhetors, the censorship of science, and constantly shifting understandings of nature. In assembling that story from geological reports, explorers' travelogues, newspaper

reviews, and my own brief encounters with Icelandic glaciers, I examine how contemporary photography can answer one of the Anthropocene's provocations: the problem of Romantic nature.

But why focus on Iceland specifically? Although glaciers are a worldwide phenomenon, Iceland is a special case. Generating $466 billion ISK from about 360 million people annually in 2016—a 163% increase from 2012 (Oladóttir)—Iceland's booming tourism industry thrives largely on its landscapes: high craggy mountains, rolling green pastures, impossibly blue waterfalls, and white glacial peaks. This reliance on landscape tourism leaves Iceland in a precarious position: iconic vistas like the Jökulsárlón icebergs have been proliferated because of a warming climate, but those same anthropogenic changes threaten to eventually eliminate them altogether. Climate change generates spectacle even as it takes it away. This dynamic makes Iceland a compelling site of study, but even then the island nation is vast, with two hundred and sixty-nine named glaciers. Consequently, I focus particularly on two icecaps along 150 miles of Icelandic coastal range: Vatnajökull, which includes Breiðamerkurjökull and Jökulsárlón, and neighboring Mýrdalsjökull, home of Iceland's swiftest melting glacier, Sólheimajökull.

Thus, Iceland provides a rich location through which to understand the emergence of ideas of nature over several centuries. Four hundred years ago, humans throughout Europe lived in abject terror of glaciers, believing that the ice beget monsters. Three hundred years ago, Icelandic naturalists adapted the *techne* of colonization from Danish administrators and used it to document the snouts and tongues of native glaciers—even though their accomplishments would at times be censored. Two hundred years ago, continental European tourists stood on the heads of Icelandic glaciers and wrote home with

heroic adventures to entertain their compatriots. A hundred years ago, a young technology called photography opened up a new realm of art and science—and consternation about the relationship between them—while fueling the development of the glacier as a bellwether of twentieth and twenty-first-century environmental science. Today, an uncertain Anthropocene has ruptured that bellwether, calling into question its spectacle in a world of grief and uncertainty.

Snout, tongue, head, and flank: even the scientific terminology through which we talk about glaciers paints them as monsters lumbering through human history with both physical and rhetorical force. There is a behemoth under the surface of the language and imagery with which we represent environment. By examining that monster in our imaginative bedrock, we can understand the development of nature and where our environmental imaginary might develop from here.

Background: Fear and Wonder: Icelandic Nature Before 1772

Although its northernmost edge nudges the Arctic Circle, Iceland—*Ísland* in its native language—nonetheless formed through volcanic activity. The country remains heavily volcanic to this day, with much of its fire sheltered beneath icecaps. Although Irish monks visited Iceland during the eighth century, the official settlement of the country began around 870, when landless Norwegian Ingólfur Arnarson wintered on the southern coasts and subsequently decided to bring his family there (Lacy, 2000, p. 78; Ellwood, 1898, p. 3-4). Laws and a commonwealth followed, with the consensus-driven assembly known as the Alþingi being formalized in 930 (Lacy, p. 90-91). A farming nation, Iceland subsisted largely on milk, mutton, fowl, fish, cabbage, and barley, the latter being often in a state of shortage.

What initially seemed a rich and abundant land turned out to have "no slack in the system," however, and when farming failed few resources remained to help Icelanders support themselves (Edwards, Lawson, Erlendsson, and Dugmore, 2009, p. 78). Hardship brought political strife, and the commonwealth came to an end in the 13th Century, placing Iceland under the control of first Norway, then Denmark. Iceland would not gain formal independence until 1944.

From the beginning of the settlement, Icelanders were intimately familiar with glaciers, and indeed many of the first settlers knew about the great ice mountains from life in Norway. Björnsson (2017) notes that "Icelanders' knowledge of glaciers was much more extensive than that of many other nations and continued to remain so, despite the Middle Ages, until the end of the 18th century" (p. 130). At the time, the northern world was experiencing a period of relative warmth, and more arable land was available to the settlers. Yet glaciers were present. In a story from the time of the settlement, two warlocks near the Mýrdalsjökull icecap battle over where to magically diverted a jökulhlaup, a glacial flood caused by geothermal heating underground (Collingwood and Stefansson, 1899, p. 4). Such floods were dangerously unpredictable, washing out roads, swallowing meadows, and demolishing farms. Through these early encounters, Icelanders became familiar with glaciers in a way that continental Europeans were not (Björnsson, p. 131). Long before the underlying processes of glaciology were understood, Icelanders learned about the fickle nature of ice mountains, and sought to naturalize them through stories of folklore and magic. These mountains were, and are, hyperobjects—objects so excessive that they defy our ability to conceive of them (Morton, 2013, p. 1).

At least one early account suggests that Icelanders also felt wonderment toward

glaciers. The thirteen-century *Egil's Saga* describes how, upon beholding a certain river, the titular Egil declares it the White-river "because he and his companions had never before seen waters that fell out of glaciers, and the colour of the river seemed to [him and his companions] wonderful" (Green & Sturluson, 1893, p. 51). However, the dominant emotion in most early accounts is abject terror. Well into the nineteenth century, Icelanders spoke of the island's mountainous, isolated highland interior as a place of vengeful supernatural beings who swallowed farms or sent travelers to a watery grave. Such stories often involved trolls, outlaws, ghosts, elves, and witches. These stories suggest something about the environmental imaginary of the time: not only were glaciers a source of moral and geographic lessons for children (Thorvarðardottir, 1999, p 33.), but they were also an expression of perceived fearful truths (Wotherspoon, 2016; Sæþórsdóttir, Hall, and Saarinen, 2011, p. 255-256). The root of this fear stemmed largely from the advance of glacier margins during the Little Ice Age, which began around the 13th century and reached a maximum around 1890 (Grove, 2001, p. 156). Hence, in the 17th century:

> People knew at that time less about the uninhabited area of Iceland than in ancient times, they only knew the lower lying areas where they looked for sheep, but rarely dared to go further inland; they were afraid to travel in the uninhabited areas. That caused the superstition and everyone believed the stories about outlaws and trolls. (Thoroddsen, as cited in Sæþórsdóttir, et al., p. 256)

This fear led Icelanders to view the glacier as a forbidden wilderness separate from human farmsteads and pastures. With this shift came an epistemological stagnation that lasted until the eighteenth century (Björnsson, 2017, p 136.) In one account, the thirteenth century *Grettir's Saga*, titular outlaw Grettir—clever, superhumanly strong, and afraid of the dark—discovers a verdant troll valley "shut in on every side by the ice which overhung the valley," which had been preserved against the glaciers by volcanic hot springs among the grassy

sward (Hight, 1913, p. 164). Such legends became an essential part of the Icelandic environmental imaginary. When cartographer Björn Gunnlaugsson published an account of the interior highlands in the Reykjavík paper *Íslendingur*, noting the interior's general deficit of outlaws, an irate reader wrote back that Gunnlaugsson, despite his experience, was plainly wrong (Sæþórsdóttir, Hall, and Saarinen, 2011, p. 258). Combined with the persistent rumor of green, plentiful valleys beyond the ice, such stories speak to an Icelandic idea of nature rich with both wonder and fear.

The combination was not unique to Iceland, but resembles experiences recorded elsewhere. As Nicholson (1997) notes, "For hundreds of years most men who climbed mountains had climbed them fearfully, grimly, resenting the necessity," with little if any aesthetic pleasure taken in doing so (p. 2). Wilson (2003) notes that, to medieval Europeans, mountains were "as eerie as the moon and dangerous as the sea," a view supported by records at the time (p. 75). In an 1188 letter to his sub-Prior at Canterbury Church, England, Brother John de Bremble describes his time at the Hospice of the Great Saint Bernard, high in the Alps:

> To earn your forgiveness, let me explain why I have not written. I have been on the Mount of Jove, on the one side looking up to the heavens of the mountains, and on the other side shrinking from the depths of the valleys. The sky is so much closer that I am more confident now that my prayer would be heard: 'O Lord,' I said, 'Restore me to my brothers that I might tell them not to come into this place of torment.' For it is not without reason that they call this a place of torment, where the marble surface of the stony ground is only ice, where there is no place to set down your foot, where—strange to say—though it is too slippery to stand, you are given every chance to fall to certain death. I put my hand into my bag to jot down a word or two to you sincerely, and found my ink-bottle filled with a hardened mass of ice. My fingers will not move to write. My beard is solid with frost, and my breath a long icicle. I could not write. (p. 181, my translation)

Brother John's account features several reversals between heavenly sublime and something

hellish and fearful, ranging from mountains to valleys and places near God to those of torture. His words thus represent the general attitude toward ice, snow, and mountains throughout medieval times, and can be corroborated by other records. For instance, English writer John Evelyn (1901) wrote of his 1646 crossing of the Alps that he saw only "horrid and fearful craggs and tracts" (p. 228), while local stories near Kandersteg, Switzerland asserted that cursed residents were punished when a glacier swallowed a nearby town (Engel, 1950, p. 23). Such stories capture the perceived threat of mountains and glaciers, a sentiment that persisted until the late eighteenth century, when a shift in both Icelandic and continental European culture took place. Coupled with increasing mobility and exploration, this era would produce a range of visuals that spoke to a shifting interface between nonhuman nature and human philosophy.

Glaciology and Imperialism in Enlightenment-era Natural Histories

The transition from an age of glacial terror to one of glacial fascination occurred relatively quickly, and can be understood through the contrasting rhetorical choices made in three natural histories of Iceland during the eighteenth century: Danish lawyer Niels Horrebow's 1752 *Tilforladelige efterretninger om Island* (*The Natural History of Iceland*); Icelanders Eggert Ólafsson and Bjarni Pálsson's 1772 *Reise igiennem Island, (Voyage in Iceland);* and Icelander Sveinn Pálsson's unpublished manuscript *Jöklaritið* (*Glacier Treatise),* written between 1791-1795. To make sense of these three works, particular Pálsson's *Jöklaritið,* we must first look to a broader shift in European ideology and epistemology in the seventeenth century: the Enlightenment.

By about 1715, influenced by the writings of Bacon, Descartes, Locke, and others, a

program of systematized scientific knowledge-making had taken root in academies, gardens, and drawing rooms. The Enlightenment sought to tame wild nature by categorizing the world, finding in every fish, leaf, and beam of light an order at once proportional, rational, and regular. By relentlessly indexing an infinite universe, Enlightenment-era philosophers also found a sublime spirit. Nicholson describes how the English philosophers "transferred from God to Space to Nature conceptions of majesty, grandeur, vastness in which both admiration and awe were combined" (p. 143). We can see something similar in French thought at the time. Writing in the first discourse of his *Histoire Naturelle* in 1749, French naturalist Georges-Louis Leclerc, Comte de Buffon, captures the spirit of the time (my translation):

> Natural History, taken in its full extent, is an immense history; it embraces all the objects that the universe presents to us. This prodigious multitude of quadrupeds, plants, minerals, etc., offers to the curiosity of the human spirit a vast spectacle, the whole of which is so great that it appears, and indeed is, inexhaustible in all its details. (p. 3-4)

In both content and encyclopedic syntax, Buffon's statement captures the Enlightenment's emphasis on relentlessly, granular categorization as well as its celebration of infinite plenitude. The Enlightenment philosophy was not merely historical or observational, either; "by the middle part of the century, all the great houses of England were surrounded by carefully laid-out gardens, complete with fountains and neat lawns (and even the occasional obelisk) that seemed defiantly to reject the apparent randomness of the real countryside" (Beattie, 2006, 124). In effect, the Enlightenment brought a totalizing shift not only in science but in lifestyle, and thus in the underlying imaginary through which societies defined their relationship to nature.

As Nicholson notes, this shift was accompanied by transformations in the process of

communication. For example, when botanist Carl Linnaeus produced his *Systema Naturae* in 1735, a work that sought to categorize all known plant life into a system of taxonomy and nomenclature, it was shared widely as a printed work. As suggested by historian Mary Louise Pratt (2007), doing so enhanced "the authority of print" while also increasing the prestige of the class to whom print was available (p. 30). Works of Enlightenment-era taxonomy and classification also changed visual communication, particularly maps. Where in prior centuries mapmakers had been largely content to document the outlines of faraway continents, Enlightenment-era maps opted for dense "verbal representations" and "labeled grids" that infilled their geopolitical interiors (p. 30). The emphasis on detail and interiority became a European 'planetary consciousness,' described in Chapter 2, which coincided with a renewed program of Imperial expansionism. In short, Linnaeus and others who indexed the living world "epitomized the continental, transnational aspirations of European science" during the Enlightenment (p. 25). This urge to expand was driven not only by a desire for territory but by the belief that Europe could better both itself and the (to Europeans, less enlightened) natives with whom it made contact. Several such experiments in improvement were played out by Danish administrators in Iceland, who had become deeply interested in cataloguing Iceland as a set of economic assets and, so they thought, as a means of elevating a primitive people (Oslund, 2011, p. 74). To that end, Danish administrators sent lawyer Niels Horrebow to Iceland around the middle of the eighteenth century to update the state of knowledge about every aspect of the island's people, animals, plants, weather, and geology.

The original Danish text of Horrebow's 1752 account gives us a rich portrayal of the idea of nature in the middle of the eighteenth century. On the decorative title page, the name

of the work has been set over an engraved background in which a peasant figure gestures toward the title as hooded bird sits nearby. Both figures rest in the shadow of a large wall of ice or rock, appearing to be involved in the study of the world. In keeping with the concept of an infinite but organizable nature, the book is arranged from the broadest to most narrow topic, moving from the nature of Iceland's geology and landmass to its species. Each crystal, pumice stone, agate, fox, horse, hawk, and plungeon earns its own chapter even when the resultant sections are a single paragraph long. This precise categorization resembles a textual version of a museum collection. While suggesting the sheer multitude of an infinite universe, all materials have nonetheless been curated and compartmentalized. Each bird and stone are carefully placed in its own rhetorical box, categorized for easy retrieval later. Horrebow's textual collection becomes itself a small world, containing a nature immaculately inventoried and divided.

Horrebow's efforts in Iceland ended when he was recalled by the crown, but two Icelanders, poet Eggert Ólafsson and doctor Bjarni Pálsson, took his place. Their 1772 book *Reise igennem Island (Voyage in Iceland)* borrows its Enlightenment design philosophy from Horrebow, but the content differs in structure and intent (Ogilvie, 2005, p. 277). In contrast with Horrebow's soberly encyclopedic approach, Ólafsson and Pálsson offers their readers something more personal. *Reise igennem Island's* entries are not classified according to an Enlightenment schema of cosmic order, but situated by region. The result is something of a travelogue, with natural phenomena such as "Extraordinary hurricanes" or "On the passage of the masses of ice" occurring within chapters dedicated to particular geographical region. This organization suggests a different conceptual of the natural world and a different relationship between it and those who study it. Notably, Ólafsson and Pálsson's world is

based on an imaginary less defined by ideas of economic nature, which sought to preserve biota and raw materials for state development.

What, then, drives their work? Ólafsson and Pálsson appear to take issue with elements of the Icelandic worldview, using their book—although written for the Danish Crown—to disabuse their own people of what they perceive as outdated folklore. Consider, for instance, the way that Ólafsson and Pálsson flatly insult their compatriots:

> These insular people have, from the earliest times, entertained the most ridiculous ideas relative to sorcerers and ghosts; but even more enlightened persons in every part of the world have been subject to change. (Ólafsson and Pálsson, 1772, p. 93)

Later in the text, they relate the account of a water monster, which they debunk as a large cuttlefish (p. 126). These inclusions are a departure from Horrebow's work. As an example, Horrebow mentions glaciers—"Jokells"—only briefly to reiterate Icelanders' historic wariness of the ice and the treacherously shifting paths across Vatnajökull (Horrebow, p. 3). Although documenting Iceland as a place, Horrebow often captures an idea of Iceland shaped by the imagination of its people. In contrast, Ólafsson and Pálsson present Iceland as they wish Icelanders to see it, meticulously documenting hitherto undescribed glacial features, such as dirt cones on Mýrdalsjökull's surface.[2] They also describe the expansion of the icecaps, categorize them, and produce hypotheses about glacial mechanics that reflect modern glaciological thought. As an act of world-making, Ólafsson and Pálsson's work shifted Iceland's underlying self-perception, making it a "more ordinary place" (Oslund, 2011, p. 80). Björnsson (2017), an Icelandic scientist, credits the two men as having "helped remove much of the fear and superstition that many Icelanders held for the central highlands

[2] Dirt cones appear when a glacier ablates after particulate matter has mounded up inside of crevasses.

by climbing mountains and glaciers not far from human habitation" (p. 149). Oslund also describes how Icelanders such as Ólafsson and Pálsson learned the Danish "tools and voice of authority" to become experts in their own geography and nature (p. 81), setting a trajectory for future understandings of Icelandic identity:

> In Iceland no single elite or foreign power controlled and manipulated representations of the environment entirely. Rather, this process was negotiated, with different groups exercising different kinds of power and advancing their visions of Icelandic nature. Outsiders did not simply impose their views upon the natives and the land. Instead, Icelanders participated in shaping foreign visions and also created their own. (p. 62)

In Ólafsson and Pálsson's text, we can read this exchange of power. The two Icelanders established themselves as experts in their own island's nature, employing the tools of an Enlightenment worldview to perform a local, Icelandic world-making.

This Icelandic imagination found its zenith in the technical visuals of another Icelander, Sveinn Pálsson, who traveled to Copenhagen in 1788 to study medicine. When Pálsson first set foot in Copenhagen, he was exposed to a realm of natural history, science, and theatre. With a grant from the newly formed Natural History Society of Denmark, Pálsson returned to Iceland to perform his own natural history. Over the next three years, he would observe, document, and describe the glaciers he saw, including their movement and expansion.

Pálsson's manuscript follows Enlightenment semantics, moving from broad to narrow. As an example, the section called "About Ice Mountains in General" precedes "On the Ice Mountains in Particular" and "On the Eruptions and Devastations by the Ice Mountains." The contents of each chapter are arranged to be both cumulative, with fundamental information like the origins of *Jökull* ("glacier") being presented before more

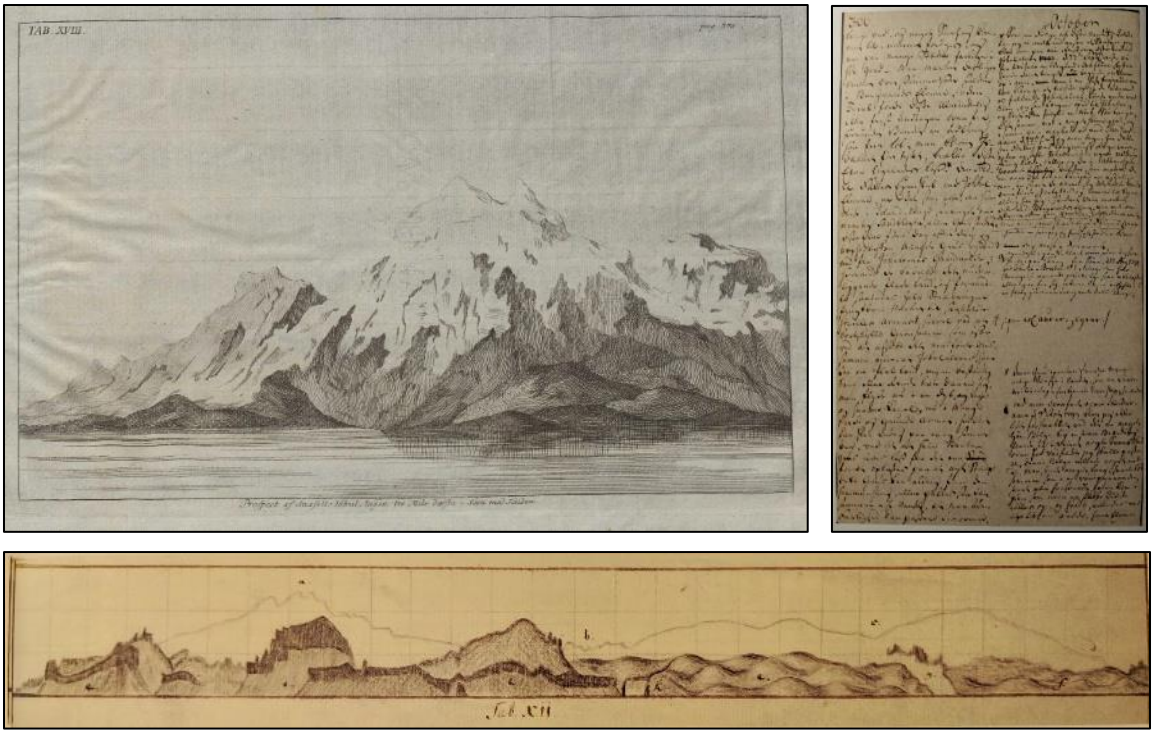

Figure 10: (Clockwise from top left) Drawing from Ólafsson and Pálsson's (1772) travelogue; page from Sveinn Pálsson's (2004) journal; Sveinn Pálsson's glacier diagram.

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complex material, like the classification of glaciers; and associative, with related topics like glacial rivers and fluvioglacial processes appearing close to each other. The approach is both rhetorically similar and different from Pálsson's predecessors—similar in its meticulousness and different in its rejection of a travelogue format.

However, Pálsson innovates in a way other Enlightenment-era texts do not: he provides diagrammatic views of glaciers that have no counterpart in his predecessor's texts (See Figure 10). In Ólafsson and Pálsson's earlier volume, a pictorial sketch depicts a glacier as one might see it while standing on the bow of a ship off the coast. Effort is made to depict the play of light across the mountains, the roots of which lie in shadow, with the sun catching the central and right peaks. As viewers, we understand this sketch to reflect the temporal specifics of a certain day and season, possibly as witnessed by the artist. In

contrast, Pálsson offers an elevation drawing of the Mýrdalsjökull icecap, including the Sólheimajökull glacier. Shaded atop a Cartesian grid, Pálsson depicts the glacier in profile, using three tones—the darkest for crevasses and ledges, the medium for exposed rock and moraine, and the lightest for snow and ice. The shapes of the mountains and glaciers themselves are simplified geometries, and other environments are omitted. The sketch employs vertical exaggeration to accentuate geographical features, producing a more digestible technical drawing, although the exaggeration might have suggested to continental European that Iceland had a craggier, more aggressive geography than in fact was the case. Nonetheless, the visual offers an idea of scientific nature that is decidedly non-romantic, casting the glacier as an intellectual subject for methodological inquiry.

Interestingly, while Pálsson's text is more ardently technical than any of his predecessors, and he was certainly deeply influenced by the culture and philosophies he encountered in Copenhagen, his book is at times very much written for Icelanders, like Ólafsson and Pálsson's before him. Amid exactingly precise technical observations about glaciers, Pálsson judiciously frames his science through local knowledge that hints at community, memory, and history:

> There is still a fenced-in path or road by which the people of Skjaldbreid drove their livestock to this particular common meadow in order not to trample or ruin the meadows of neighbors. One will still recall the following farm names. (2004, p. 119)

Pálsson's words are those of someone who knows well the soil of the place about which he is writing, doing so with an interest in the lives of people who dwell there. Given the precise nature of Pálsson's work, which is plainly meant to usefully advances scientific knowledge, it seems clear that Pálsson expects his readers to also take an interest in the lives and histories that his work remembers. Curiously, in the clearest example of a work of Icelandic technical

communication to that point in history, we find a manuscript that identifies scientific nature as a place where people can live. This, too, is world-making, a world in which social memory and the transformation of the land overlap each other. Horrebow, Ólafsson and Pálsson, and Pálsson each builds a different version of Iceland, but Pálsson offers perhaps the most sophisticated portrait. Today, his unpublished manuscript offers something to those who look for a record of the emergence of modern science as well as a cultural record of the place. In a world of environmental change, the characters in Pálsson's science do not live outside nature.

The fact that Pálsson's manuscript is an *unpublished* work leads us to a final and tragic coda on his story. After Pálsson meticulously compiled his manuscript on the precise geological and history of Icelandic glaciers, the Danish Society rejected his work as being too general. Furthermore, some members worked actively to prevent him from receiving further funding for research. Instead, Pálsson struggled to support his family as a doctor in Southeast Iceland, supplementing his meager wages by farming and fishing near his home in Suður-Vík. Although he attempted to get his work published, he was unsuccessful in doing at the time of his death in 1840. Pálsson would be remembered as a hero of Icelandic science whose work was unjustly censured, going unpublished until 1945 and robbing him of "a 50-year intellectual lead on his European scientific colleagues" (Sigurðsson, in Pálsson, 2004, p. xviii). Pálsson's sophisticated portrait of a nature in which humans belonged never entered the Icelandic environmental imaginary nor influenced its public commonplaces. However, his work was not without an effect. Prior to his death, Iceland's premiere glaciologist passed his manuscript to another man: the English missionary Ebenezer Henderson, who along with other explorers and artists would go on to supply Europe with a very different idea of

Iceland in the first half of the nineteenth century. The story that follows Pálsson's *Jöklaritið* is one in which foreign explorers cast Iceland as the stage for imperial dramas, nature emerged as a Romantic ideal, and traditions of painting and engraving set the groundwork for the inchoate technology of photography.

The Rise of Romantic Nature in European Travel Images

During the Enlightenment, continental Europeans began to travel more broadly. As the culture changed, so too did the general European fear of mountains and glaciers. The change can be read in the account of Swiss naturalist Conrad Gesner (1937), who in 1541 climbed Mount Pilatus to tempt a fabled dragon into wakefulness (Fleming, 2011, p. 7-8). Instead, he declared:

> [1] Men dull in mind find no cause for wonder anywhere; they idly sit at
> [2] home instead of going to see what is on view in the great theatre of the
> [3] world. Therefore I declare that man to be an enemy of nature who
> [4] does not esteem high mountains worthy of long study. Of a truth the
> [5] highest parts of the loftiest peaks seem to be above the laws that rule
> [6] our world below, as if they belonged to another sphere. Up there the
> [7] action of the all-powerful sun is not the same, nor is that of the air or
> [8] winds. There the snow is everlasting and this softest of substances that
> [9] melts between our fingers cares nothing for the fierceness of the sun
> [10] and its burning rays.

Gesner's exultant passage contains little dragon killing, but he does express a great deal of joy at summiting the mountain. Widely recognized as the first person to climb mountains for enjoyment in an age when regions like the Alps inspired abject terror, Gesner foreshadowed the development of ideas of nature over the next two centuries (Neate, p. 69, 1998; Beattie, p. 117, 2006; Fleming, p. 7). Gesner's account portrays the mountains as "above human laws," a place nearly of God and certainly one beyond human realms [lines 4-7]. Also present

is the notion that the peak is a place of eternal purity [lines 9-10] which the man who lives well seeks out through bold acts of discovery and exploration [lines 1-4]. Although Gesner was ignored in his own lifetime, by the eighteenth century, mountains were no longer the dwelling places of peril and evil, and "for the first time, the benevolent hand of God was seen to be at work in the mountains" (Beattie, p. 118). Suddenly, portions of European society were seeking out high places, bolstered by a growing culture of travel known as the Grand Tour.

Underwritten by imperialism, the Grand Tour was a practice among aristocratic young European men of appropriate wealth and status—women being disincluded—of making a circuit of European destinations such as the Rhine, the Alps, Paris, Geneva, and Rome. By the middle of the nineteenth century the tradition has died away—or, more accurately, transformed following Napoleon's 1818 defeat into something available to middle class travelers rather than being purely the purview of male elites (Young, 2006, p. 6; Towner, 1996, p. 114). As Europeans went abroad, they took their gaze with them, performing a kind of private rhetorical conquest in which a peak, lake, stone, or panorama was 'discovered' and claimed for the homeland no matter who might already be living there. The conquest was textual, a kind of "verbal painting" that Pratt describes with irony:

> The verbal painter must render momentously significant what is, especially from a narrative point of view, practically a non-event. As a rule the 'discovery' of sites like Lake Tanganyika involved making one's way to the region and asking the local inhabitants if they knew of any big lakes, etc. in the area, then hiring them to take you there, whereupon with their guidance and support, you proceeded to discover what they already knew. (p. 202)

Such experiences formed the basis of textual accounts written for continental European audiences. Pratt refers to the practitioners of this textual art as "Monarchs-of-all-I-survey,"

travelers whose gaze transformed ordinary landscapes into "peak moments" for audiences back home (p. 201). Travelers' itineraries were also increasingly informed by guidebooks, which continued to follow earlier established routes in key works such as Nugent's 1749 sensibly named *Grand Tour*. Although tourism was a largely continental practice, its imperialist practices, masculinity, and escalation of the value of print spread much farther afield, including Iceland. All such travel beyond the European cities centers was thus inflecting in some way by colonialism (Osborne, 2011, p. 18). The nineteenth century saw a flurry of European pens working a kind of rhetorical conquest of the island nation in journal, epistolary, manuscript, and visual form. The catch, of course, was that the Icelanders had already coopted the rhetoric and procedures used by Imperialist power, applied them to comprehensive analysis of their own biota and geology, and produced a local form of world-making through the works of Ólafsson & Pálsson and Pálsson. In ways both subtle and overt, Icelanders would play a role in shaping the discourse that spilled onto the pages of European society journals and flickered by lime-light in lecture halls by the century's end. The result is never a clear picture of the relationship between local and European knowledges. Particularly, in the first half of the century, European discourse would convert Icelandic knowledge into a continental commodity by romanticizing and reshaping as a quest of discovery in another world (Oslund, p. 15; Facos, 2018, p. 208). However, even Pálsson's unpublished manuscript would become a tool for the further development of glaciology in both text and image.

The act of exploration itself was fueled by the rise of Romanticism. By the turn of the nineteenth century, the desire for the sublime had eroded the neat taxonomies of a few decades earlier. The gardens had grown wild (Beattie, p. 124-125). Characterized by an

emphasis on solitude, sensation, and sentiment as the truest road to spiritual revelation, Romanticism favored dynamism, often disengaging from the world's material, technical, and social dimensions (Beattie, p. 126-127, Rosenthal, 2014, p. 30; 55). For European travelers, Iceland offered a stage for this spiritual awakening (Einarsson, 2011, p. 221). The foreigner to travel most widely in Iceland in the nineteenth century was Ebenezer Henderson (Björnsson, p. 578), missionary and self-styled explorer, a man "for whom rapture came easily" (Wawn, 2002, p. 166). As the inheritor of Pálsson's *Jöklaritið,* Henderson spent thirteen months traveled through Iceland, incorporating some of Pálsson's unpublished notes on glaciers into his own account, the two-volume *Iceland; or the Journal of a Residence in that Island, during the years 1814 and 1815, containing observations on the natural phenomena, history, literature, and antiquities of the island and the religion, character, manners, and customs of its inhabitants.* Arranged by regions, Henderson's (1818) *Journal* provides a straightforwardly chronological record of his travel from Copenhagen to Iceland, and then around the country, including his ecclesiastic activities, hardships, and discoveries. Henderson's trip is an example of what Pratt calls a "civilizing mission" (p. 74). When he is not working to furnish Icelanders with ecclesial reading material, Henderson may be found in the pages of the *Journal* fording treacherous glacial rivers—

> The foaming of the flood, the crashing of the stones hurled against one another at the bottom, and the masses of ice which, arrested in their course by some large stones, caused the water to dash over them with fury, produced altogether an effect on the mind never to be obliterated. (p. 247)

—reacting with some chagrin at not finding sites of ancient, bloody sacrifice—

> "We here instituted a strict search after the *Blot-steinn,* or Stone of Sacrifice, on which human victims were immolated to Thor; but sought in vain in the immediate vicinity of the booths, none of the stones in that quarter answering to the description which had been given of it. (p. 77)

—and being smote with sensuous rapture by the sight of exploding geysers, which he recounts as a possessive duel of two women for his attention:

> *Strockr* had not been in action above twenty minutes when the *Great Geyser,* apparently jealous of her reputation, and indignant at our bestowing so much of our time and applause on her rival, began to thunder tremendously, and emitted such quantities of water and steam, that we could not be satisfied with a distant view, but hastened to the mount with as much curiosity as if it had been the first eruption we had beheld. (p. 55)

Henderson's narrative is not scientific, but heavy with theatricality and showmanship. Unlike the precise eye with which Ólafsson & Pálsson and Pálsson approached their subjects, Henderson mines Iceland's dramatic potential with panache, providing a sensory experience that is a new kind of world-making. Unlike his predecessors, his text is not intended even partly for the eyes of Icelanders but designed to expand the sphere of the world as understood by continental Europeans. Whereas Pálsson in particular brought human life into the natural sciences, Henderson's landscape quite literally competes with itself for his attention. Henderson's Iceland enjoys no independent existence, but exists to delight, terrify, or move him.

Reviewers reacted favorably to the *Journal.* Printed in Scotland with a second printing in London, Henderson's two-volume adventure narrative circulated across the United Kingdom and the eastern United States. In a reaction emblematic of the times, reviewers praised his account of Icelandic peasants, who were "superior to what is generally observed in that class" and agreed that Henderson had provided an account that seemed to them believable—that is, "generally viewing things correctly, and describing them as they exist" (*Analectic Magazine*, 1819, p. 462; *London Quarterly Review*, 1819, p. 292). Henderson's adventure aesthetic was not lost on reviewers, and the *North American Review* stated that the

Journal was "not the product of a scientific traveller…the principle charm of his narrative arises from the fact, that it is a fireside picture" (*The North American Review*, 1832, p.92). The *Journal* would be remembered as late as the 1890s as "a capital book, which, on the whole, is more interesting than any other single book on the subject [of Iceland]" (Murray, 1883, p. 121).

Although the *Journal* was published with fifteen full-page engravings, reviewers made little comment about its art except to report that the pictures existed and were helpful. For instance, a reviewer for the *Eclectic Review* noted, "Not making first pretensions, on the score of art, they are, however, very neat and illustrative" (Stowell, 1818, p. 262). The great attraction of the *Journal* was not its visuals, and indeed the book itself treats its many engravings haphazardly, with one of four artists—including Henderson—listed for most but not all the paintings. Likewise, no mention of their material production is made within the text itself; in fact, we can reconstruct far more about their engraving—apparently done in parts by two different Edinburgh engravers, William Home Lizars and Robert Scott—than we can about the original creation of the paintings themselves. What becomes clear, then, is not that Henderson's visual aids are unimportant; rather, they are unmentioned because they are not his subject but his staging ground. They are purely scenes in which a traveler's heroic journey can unfold for a captivated audience.

Consider, for instance, the engraving "Öræfa Yökull as seen from the Breidamark River" (See Figure 11). In the engraving, a diminutive train of riders fords the Jökulsá River with the Breiðamerkurjökull glacier and Öræfajökull looming above the Atlantic Ocean, near the place where this chapter begins. Some light clouds drift behind the glaciers, while darker clouds loom near the top left. The view is wide and picturesque but not a scene of high

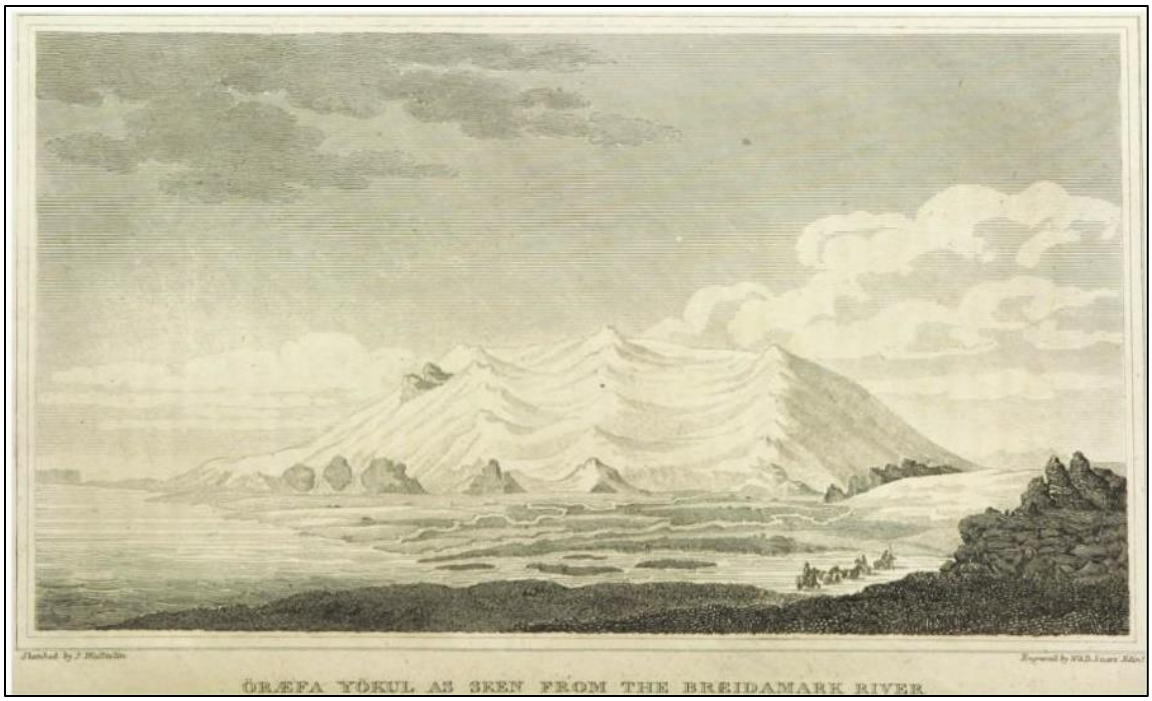

Figure 11: View from Henderson's (1818) *Journal* depicting Öræfajökull, Breiðamerkurjökull, and the glacial plains.

contrast. Rather, it telegraphs Henderson's course as described in the text, including the aforementioned passage of the treacherous river and his eventual ride to the foot of the mountain. The contrast between the scale of the landscape and the size of the riders confirms both the grandeur and challenge that Henderson's company faces. Thus, the image contextualizes and bolsters his account without competing with it. The real engagement and emphasis of the *Journal* is on Henderson's character, mission, hardship, and adventure, while the actual making of the painting is omitted. No moments are described in which Henderson or his company stops to sketch a view, and in fact the various artists of the paintings, such as a Captain Frisak and J. Hialtalin, are never named in the text itself. In other words, the *Journal* operates through a hermeneutics of transparency. Scenes are observed from a privileged third-person vantage point that does not represent that of the players in the

narrative, as though the reader were looking through a remote window on events as they unfold. The labor of production is made invisible, immaculate, as though to suggest that this is a genuine vision unmediated by human activity. Such rhetorical work encourages viewers to 'look through' the painting rather than at it as a surface. As the further history of Romantic nature will indicate, the ease with which viewers look through such images is both central to their aesthetic pleasure and a key issue that an Anthropocene visuality might address.

In the two decades after the *Journal,* other explorers ventured to Iceland and produced similar, if less celebrated, accounts of the people, landscape, and their adventures.[3] As Icelandic scholar Einarsson suggests, Icelanders did not find a clear national identity until the end of the nineteenth century, meaning that the nation's identity mostly came from foreign explorers who brought ideas of the Enlightenment or Romanticism to bear on their understanding of it (p. 233). One of the most impressive artists to venture to Iceland was Auguste Mayer, who is now mostly lost to history, appearing mostly in scholarship as a passing name attached to several maritime paintings. A painter fully immersed in Romanticism, Mayer's work was published in M. Paul Gaimard's 1838 *Voyage en Islande et au Groenland,* a four-volume account of the history, zoology, medical status, geography, and geology of Iceland. Through them, we can see another example of world-making as an act of 'looking through.' Like the *Journal, Voyage* presents a world without gesturing to the materiality of production, omitting mention of either artist or the labor of art. Mayer is not listed as a member of the company, nor is reference made to an artist or painter traveling

[3] The exception is English designer William Morris, who would capture his deep love for Iceland in his *Icelandic Journals.* Burns (1991) has suggested that Morris's descriptions of Iceland in turn influenced, among others, philologist John Ronald Ruel Tolkien in the writing of his classic work, *The Hobbit.*

with Gaimard. The only reference to Mayer is obligatory, appearing in the front and backmatter. Similar to Henderson, Mayer offers grand vistas peopled with tiny figures, as seen in "Glacier de Svinafells-Jökul" (See Figure 12). Here, Mayer composes a view of a man standing with his back to the viewer, leading the viewer's eye to several figures staggered into the plane of the painting, getting smaller and smaller. The figures direct our gaze toward towering teeth of glacial ice, which rear, stark and pale, against the dark cone of a mountain. There, birds wheel through gloomy fog, but a paler sky blooms with sunlight beyond.

Mayer's use of the staggered human body helps build the depth of the painting. I would say that this is an astute judgment on Mayer's part, as one of the difficulties of capturing Iceland in a composition is its sheer vastness of scale. Placing a figure too close to the viewer results in forced perspective that shrinks the surrounding landscape, and placing a figure too far away results in its becoming lost in the scene. By progressively shrinking his subjects, Mayer ensures that we too are aware of the landscape's scale. Mayer also uses the chiaroscuro lighting of the Romantic-era painters to enhance the ice's starkness. Although bright mountains can be found rising over dark skies in Iceland, they are not as regular a feature as depicted in Mayer's paintings. This arrangement of ideal landscape elements within a single painting was common in romantic landscapes of the nineteenth century and beyond. However, Mayer's work is presented as part of Gaimard's atlas, covering history, geography, zoology, and human culture, and is of academic interest. Thus, while the engravings in the *Journal* aim primarily at established a scene for drama, the *Voyage* offers an even more Romantic nature as a true record of the world. In Mayer's work, the Enlightenment-era

Figure 3: Mayer's Glacier de Svinafells-Jökul, one of many such pieces the artist produced for M. Paul Gaimard's (1838) *Voyage en Islande et au Groenland.*

scientific image finally way to an ideal sublime that had to be felt to be understood.

Thus, in the early middle nineteenth century, the practice of depicting Icelandic glaciers through an analytical frame had largely given way to more spectacular forms of vision. More importantly, the initial concatenation of science, memory, and a felt sense of Icelandic place exhibited in Pálsson's work has been replaced with an idea of Icelandic nature as a transnational stage on which continental Europeans played all the major roles. In these images, Iceland and its glaciers emerge primarily as obstacles, spectacles, and scenes—importantly, this is true even when they are objects of study within the text. They suggest not so much that scientific curiosity has been rejected as that the scientific commonplace has transformed to incorporate narrative and spectacular elements. In the nineteenth century—

at least before 1840—a natural philosopher might perform natural inquiry not by graphing lateral views of mountains as Pálsson did, but by giving in to nature's wild expressiveness.

Mayer and the Gaimard expedition published their account of Iceland in 1938. Less than a year later, a new technology, photography, would enter the public view and produce a "mind-numbing puzzlement" (Snyder, 2002, p. 175). In many ways, photography would mark a break from the painterly works of Mayer and Henderson, but in other ways it would continue and deepen the tension between looking at and looking through, between explorer and explored. In doing so, photography would ramp up the force of Romantic nature with which an Anthropocene visuality must contend.

Lime-Light and the Magic Lantern: Glacier Photography, 1890-1910

From the moment the first permanent picture was announced, photography was not just a means of reproducing a scene, but a social force brought into being by an assemblage of procedures, situations, and products. Like painting and engraving, some of those products would enjoy a lifetime far beyond the objects they recorded. However, photography differed in its ability to capture the details of a scene even when the artist did not notice them. Precisely because of this ability, photography initially struggled to find an identity as an art, being frequently thought of as a high-fidelity but unartistic record of truth. By examining the first known photographs of Icelandic glaciers, we gain a unique view of photography's hybrid public status alongside the fittingly hybrid ideas of nature which photography captured. Through these photographs and their afterlife as remediated art, new possibilities of imaging nature emerge at the beginning of the twenty-first century.

The New Affordances of Vision

The conditions for photography's emergence formed over three hundred years, brought about in part by the emergence of capitalism, European expansionism, and the rise of a program of scientific observation (Wilder, 2009, p. 7; Osborne, 2000, pp. 3-9). As early as 1809, English landscape painter Cornelius Varley had developed his graphic telescope, which enabled him to produce light that could be sketched and colored. By 1816, French inventor Nicéphore Niépce had fixed an image on a pewter plate (Facos, p. 194; Klonk, 1996, pp. 131-134). Around the same time, more egalitarian forms of travel emerged, fueling the rise of tourism. Thus, there was never a time in the history of photography when *travel* photography did not exist. Not unlike Enlightenment-era practices of taxonomy, photography took a chaotic universe and found order in it, often while subjecting those in front of the lens to an objectifying gaze. Unlike taxonomy, however, photography involved collecting objects that appeared to speak for themselves and arranging them within archives (Wilder, p. 79-80). Photography increased the availability of images, and so an increasingly mobile middle class was also more able to capture what they saw. In essence, photography "lowered the price of images" and was thus more available for consumption (Osborne, p. 9).

In its first decades, photography was generally understood as a means of unmediated technical observation (Wilder, p. 10). Here, people thought, was an arhetorical, perfectly scientific art. Art history often views this shift as a watershed departure from the kinds of looking that viewers experienced through painting, sketching, or engraving. However, I wish to suggest that, while photography was a new form of vision, it largely extended and deepened prior kinds of witnessing. Painters like Mayer sought to depict landscapes that elided the artist in favor of providing the viewer with a sense of primary, unfiltered vision;

photography did much the same, but with a technical sophistication that enabled spectators to embrace it as purely scientific and less rhetorically constructed.

Photography did enable two key transformations, however. First, the photograph could capture views of the world that science had previously been unable to capture. Pressing the shutter release could freeze motion that the human eye could not follow. It could also capture successive movement, trajectories, and transformations of objects. The most minute objects could be expanded to fill the screen of a lecture hall's magic lanterns, and the largest objects could be shrunk to fit on a single silver iodide negative (Wilder, p. 43). Such views captured particulate detail comprehensively and digestibly. Photography also had the ability to register incidental, mundane detail not intended by the photographer, giving it a forensic quality. While these transformations have been viewed as original to photography, it is more reasonable to see them as, once again, enhancing the precision of prior forms of representation rather than fully departing from them. For instance, the naturalist Alexander von Humboldt saw in Dutch Golden Age painters a sense of "the whole from the particulars" in which individual flora and geography holistically captured "a realism in the depiction of landscape elements that extended over and beyond individual elements" (Kwa, p. 59). Humboldt sent numerous landscape painters on voyages of so-called discovery, painting being seen as a "means of gaining knowledge about the natural world" (p. 60). Viewed in this tradition, photography very much picked up prior ideas about art's ability role in making sense of nature. In doing so, this emerging art also displaced some landscape painters from their scientific niche.

Second, photography offered a remote view of the world detached from first-person vision. Through photographs of other countries than one's own, viewers could experience

the world with an immediacy hitherto thought impossible (Osborne, p. 10; Facos, p. 208). Celebrations, funerals, war, the act of hanging up clothes on a washing line: events both grand and incidental could be collected and viewed, even if the viewer had not been present. This is, again, probably less the revolution suggested by photographers and more probably an extension and hardening of the precise processes of painting or sketching. The fundamental change here was not that people had never remotely viewed a scene before, but a change in perceived *ethos:* painting was understood to be an act of *poiesis,* of making; photography was not understood that way, being thought guileless, artless, and thus more credible.

Photograph's artlessness caused problems for those who viewed photography as an artform. In the first two decades of photography, landscape photographers found themselves questioning how to create art that was both aesthetically pleasing and scientifically rigorous (Wilder, p. 19). The truth, of course, was that the photograph was capable of both science and art at the same time, and capturing a shot required observation, planning, and rhetorical invention (Facos, p. 194). Photography's proper use remained contested through much of the nineteenth century, but this uncertainty did not prevent the new middle class from using photography to document their travels, in turn creating a market for travel pictures. Photography further grew with the Kodak revolution of the 1880s, which ushered in the birth of camera clubs and societies (Snyder, p. 177; Facos, p. 216). By the end of the century, it was possible to view photography as an emergent cultural project that placed tools for small world-defining acts in the hands of an ever-widening range of communicators. Iceland, too, became a subject of photography for the masses for the first time in the work of an Englishman, Frederick W. W. Howell.

Glacier Photography at the end of the Nineteenth Century

Frederick W. W. Howell, English schoolmaster and mountaineer, set sail for Iceland in 1890 to climb Iceland's highest peak, Öræfajökull. Howell was armed with his camera and an expertise built from "five-and-twenty books of Icelandic travel, and over thirty articles in other books pertaining to the North—transactions, magazines, and other papers" (Howell, 1893, p. 6). Howell's visit was the product of a (by then) well-oiled pipeline that input European travel and output the material products of that travel—manuscripts, lectures and lecture advertisements, book reviews, letters, and word of mouth—as well as the more abstract products: European self-worth, scientific knowledge, and imperialism. These in turn fed back into the machine, providing the capital by which future explorers planned their travel, and the cycle continued. Howell had read Henderson, who would be a frequent touchstone in his eventual manuscript, as well as Gaimard and others (p. 142). Consequently, Howell's vision of Iceland was partly informed by earlier works that had themselves been influenced by the works of Icelanders.

Textually, Henderson's 1893 *Icelandic Pictures Drawn with Pen and Pencil* shares much with his predecessors. Like Henderson, Howell begins his account with an overview of Icelandic history, arranging his work by the regions through which he traveled, similar to Ólafsson & Pálsson, Pálsson, and Henderson. There is no doubt that the work is a travelogue, and one even more focused on travel than Henderson's, whose first mission was ecclesiastical. Howell has no such mission. He is, as he calls himself, a mountaineer, describing his goal thusly:

> It is therefore hoped that *Icelandic Pictures* will be found to contain as complete a sketch of the island as its limits permit, and that it will prove useful to many who may be led to visit a land in which travel becomes more easy every year, but which permits the wayfarer to lose himself in the atmosphere and surrounding of an old world life. (p. 6)

Several points are worth noting here. First, Howell describes his book as a *sketch*, which seems significant when one's book title bluntly refers to *pictures*. Intentionally or not, for the first time in the history of visualizing glaciers, a writer has drawn attention to the fact that pictures do not just spring into being but are, in fact, material creations. Additionally, although Howell treats Icelanders more decently than Henderson, he clings to a tendency to view Iceland as a place from a fashionably simpler time. Europe is at the center of knowledge and culture; Iceland is charming because it is the periphery.

What may be noticeable at this point is that Howell, a photographer, has created a book of drawings. Although photography was soundly displacing traditional art for documenting travel by this time, printing photographs in 1893 was still limited by technical factors, with the process of halftone printing still an emergent art (Kwa, 2008, p. 60; Ponzi, p. 15). Such limitations likely made engraving a necessary choice for Howell. Nonetheless, the transformation required rhetorical choices on the part of Howell and the engravers. The resultant book is amply illustrated, with eighty full-page pictures and sketches. Some of these sketches are of artifacts, but many are of landscapes, including glaciers. Fulfilling the promise of his title, Howell again acknowledges the material production of his illustrations, albeit in passing. During his ascent of Öræfajökull, Howell writes:

> The ascent of his flank cost an hour-and-a-half, for the lower inclines were extremely steep, and above the ice had given way on a slope… However, here, where the ice walls joined each other, or there, where my camera legs were requisitioned to reinforce a doubtful snow-wreath, we slowly rose, until, at 6400 feet, the dome was gained by half-past seven. (p. 75)

Howell does not discuss the physical nature of his work in detail, but he does acknowledge that the pictures in his book required making rather than being inserted with third-party omniscience per Henderson or Mayer. This acknowledgement removes some of the conceit that Howell's images are unfettered by human influence. Why draw attention to the craft? Two answers are possible, and both are considered below through Howell's images of Breiðamerkurjökull, the site of Henderson's painting and my own description of Iceland at the beginning of this chapter.

Here, we see Howell's drawing of Breiðamerkurjökull, included in *Icelandic Pictures* (See Figure 13). In the drawing, the viewer gazes across a wide ice field dotted with dirt cones. The mounds dot the ice hills, and a dark line of rocky promontories march beyond, with distant mountains looming still deeper in the background. The drawing is not a particularly strong composition. Contrasted with Mayer's views of an outlet glacier of the same ice cap, this image lacks careful composition, a clear subject, or a pathway for the eye to follow through the field of view. It is, in other words, suspiciously photographic—more like the snap one takes to document a place than an attempt at aesthetically pleasurable art. And indeed, the drawing is based on a photograph held in Cornell University's Fiske Icelandic Collection. By placing the drawing alongside the photograph, we are given insight into the rhetorical moves needed to produce the drawing as it appears in the published book. In terms of composition, Howell has altered the photo to provide the drawing with a gentle downward slope from left to right. We can thus conclude one of three possibilities about the material conditions in which the photo was taken: the camera was tilted due to photographer error, the land itself were inclined, or the slope is a visual illusion resulting from viewer

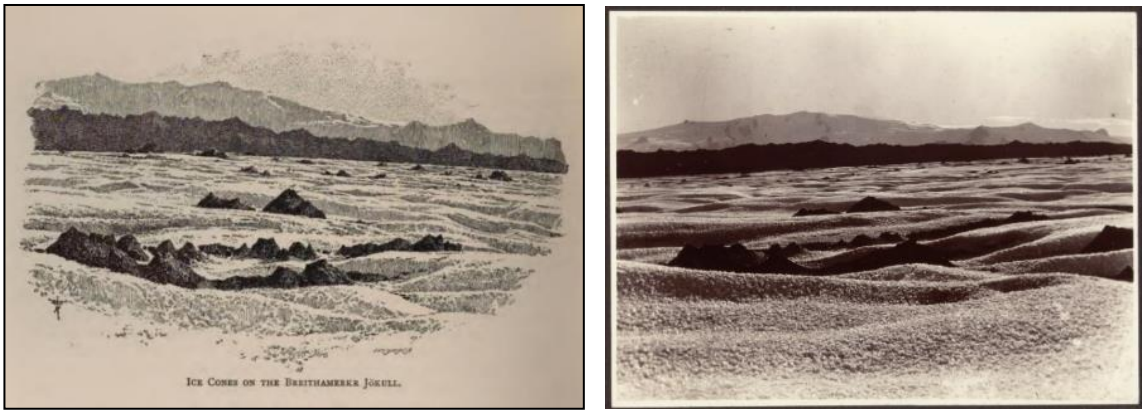

Figure 4: Howell's drawing of Breiðamerkurjökull (left) and the photograph Howell based the drawing on (right). Some small changes have been made between them (Fiske Icelandic Collection, 2002).

perspective. Regardless, the artist chose to reverse the incline, whether to correct an error or simply due to the Western convention that movement occurs left to right. We can also see that the drawing is lower in contrast, with shadowy portions of the photograph having been raised to reveal details in the cones and mountains otherwise invisible in the original. This makes sense, as the original appears to have been taken in direct sunlight, a typically undesirable time for landscape photography given its tendency to either wash out bright skies or underexpose dark shadows. Although the overall contrast has been reduced, the snow and ice has been made lighter to better reveal the shape of the cones. Most of the forms have been preserved, although some of the scenery has been gently exaggerated to give both mountains and cones greater height.

Although these changes are subtle, they transform the way viewers are encouraged to read the scene. In the original, the eye might be drawn first to the blotchy darkness of the dirt cones at middle left, and then along the dark middle line off the right side of the image. In the revised version, the cones have been given clearer geometry and contrast. Here, the eye may be drawn to the cones near the foreground, then to the twin cones in the center,

and finally to the cones in the deep background. This provides anchors that draw the viewer *through the scene* rather than *across the image*. The exaggeration of the cones and mountains mildly increases the sense of roughness and wildness. The effect is of greater scale and space within the frame.

The engraved illustrations in *Icelandic Pictures* provided different rhetorical resources to audiences than photographs might have. By Howell's time, continental Europeans had become interested in Iceland not only for its scenery and perceived quaintness, but for its sagas. The Icelandic sagas are largely prose narratives that combine historical events with some legendary elements, recounting the story of the island nation from its settlement through the eleventh century. While Ólafsson & Pálsson and Pálsson all drew on the sagas for historical data, they generally worked to reduce their folkloric and superstitious elements. Similarly, despite Henderson's interest in history, he showed limited interest in the more heroic and mythic aspects of the sagas, having visited the country before international interest in them grew (Wawn, p. 38). One night, staying with an Icelandic family, Henderson even observes matter-of-factly that a daughter was telling "some old saga, or such other histories as are to be obtained on the island" (p. 366). In contrast, Howell appears to revel in sharing verses from the sagas, which as he notes, have been "taken from the new translation of the Saga, by Morris and Magnússon, in which the epithets of the original are so happily reproduced" (p. 146). He falls into a heroic register himself when speaking of Iceland's storytelling national treasure:

> Famous for its birds, beasts, and fishes, and its thickly-peopled bogs and mountain slopes, which offer such a striking contrast to the rugged lavas we have quitted, the district every year receives its quota of sportsmen, fisherman, and travelers, who wander in the footsteps of those early colonists whose memory yet remains in mound and tomb, in place name, song, and saga. (p. 135)

The first half of this passage could be featured in a guidebook to Iceland, but the second half adopts a more mythic voice made possible through the use of polysyndeton, alliteration, the older sense of *yet* to mean *still,* and heroic imagery. The impression Howell gives is of someone caught up in—or aware that his readers might be caught up in—the romance of the scene. Such language differs markedly from Henderson's, and indeed from Pálsson's pragmatic use of the sagas as a source of records, or Ólafsson and Pálsson's none-too-gentle attempts to shake Icelanders from what they perceived as superstitions. The passage shares more with subsequent accounts of Iceland, such as Collingwood and Gershom's 1899 *A Pilgrimage to the Saga-Steads of Iceland,* which in title alone speaks to the increased reverence and allure of the sagas felt by continental Europeans toward the end of the nineteenth century. In *Saga-Steads,* the authors describe why they "undertook our pilgrimage" to create their book (emphasis in original):

> "[The book] is intended to supply the background of scenery which the ancient dramatic style takes for granted. The old saga-teller's audience knew the country, and needed no landscape descriptions, except here and there a word to fix the weather or time of year…And so the modern reader, out of Iceland, is left wholly at a loss when he tries to *stage* these dramas, to *visualize* the action and events." (p. v).

Here, we find explicit confirmation of nineteenth-century Europe's use of Icelandic nature as a stage for drama—this time Icelanders' own dramas as staged for continental audiences. Collingwood and Gershom further explain that the illustrations were based on sketches made on site, and that while they carried a Kodak, toting a large camera overland would have been too difficult. Of the various nineteenth century accounts of Iceland by Europeans, *Saga-Steads* is most transparent about its own construction. It is not hard to look at Howell's work and see a similar, if less developed, set of rhetorical effects in his own text. While

photography as a medium had garnered attention for scientific fidelity rather than artistry, line engravings spoke to a long literary tradition in which the doughty explorer ventured forth to strange lands with sketchbook in hand. It is not possible or fair to attribute intent to Howell beyond what is suggested in his own writing, but his visual choices do provide rhetorical resources for a more fabled, traditional interpretation of glaciers than photography might have. Photography shows us, or seems to show us, what is; ink and engraving are more equipped to show us what might have been, or what is imagined.

That Howell took photographs but included only illustrations in his book raised a secondary question: what use, if any, did he make of the photographs? The answer provides insight into the uses of photography at the end of the nineteenth century. Although Howell did not publish his photographs, he gave at least 20 lectures about his travels in Iceland throughout the 1890s. None of these lectures exist now, but at least forty-two newspaper reviews and dozens of ads published throughout the decade provide insight into their technical and performative aspects. These lectures were typically given as tours, with Howell visiting one or more lecture halls each week for several weeks at a time. His first lecture tour emphasized the glaciers of Southern Iceland and his ascent of Öræfajökull, while later lectures would describe an 1895 journey through the Central Highlands. Reviews indicate that Howell regularly used a projector during these lectures, with a few indicating that the projections were in fact of photographs ("Southern Iceland," 1892, March 4; "Southern Iceland," 1892, March 19; "A wild ride through Iceland," 1893; "Mountain climbing in Iceland," 1895; "The glaciers of Central Iceland," 1896). Reviews of his work were enthusiastic and favorable, praising his work for its "limelight exhibition of rare and beautiful views" ("Lecture on Iceland," 1892, p. 4). A 25 November, 1895 review in the *Birmingham*

Daily Post mentions that Howell had undertaken another journey to Iceland at the request of scientists, which suggests that his first trips earned attention and were seen as having technical merit ("The giant glaciers of Central Iceland," 1895). The review goes on to praise how the lecture was "illustrated by an excellent series of views taken on the journey, and displayed by the magnificent lantern belonging to the Birmingham Photographic Society" (p. 4). In the talk, Howell apparently discussed dirt cones, and his photos "formed a valuable aid in following the lecturer's description of his travels" (p. 4). Reviews from Yorkshire, Manchester, Edinburgh, Inverness, and Liverpool offer similar praise and wonder for Howell, who was described in newspaper advertisements for his talks as "the Enterprising Explorer" (YMCA, 1895, p. 4). Based on public record, Howell made himself a reputation by sharing his adventures, lectures, and pictures prolifically throughout the decade.

Some of the enjoyment audiences felt may relate to the technologies used in the lectures themselves. As Wilder notes of nineteenth-century projection, "The images cast by projection devices like the camera obscura and magic lantern were like jewels—the intense colours mysteriously heightened by the darkness in which they appeared" (pp. 10-11). In short, photography before a live audience using the material assets of the day would have been as much of scientific interest as of popular interest. Within these works, Howell recovered some of the scientific status that Icelandic glaciers had one hundred years earlier, while also retaining the romance cultivated by Henderson and others. What Howell ultimately offers is a view of the dual use of photography and illustration at a transitional point in visual culture. The experience of the glacier in a darkened lecture hall in 1895 England was the result of a new kind of participatory assemblage. It existed on the screen not simply because of the camera and shutter release and the glacier itself, but because earlier

Europeans had written treatises that enabled Howell to travel to Iceland. It existed also because Howell had produced work that led scientists to request that he return, and because people—scientists and non-scientists alike—showed up to listen to him speak and view his lime-lit images. It exists only in perpetuity because someone wrote a review. During the transition from illustration and engraving to photography, the glacier at the turn of the twentieth century had become a public project, powered by the many prior stories and studies of it, and intriguing enough to draw crowds. It lived simultaneously as a drawing in a book and an image on screen, and in that sense the glacier presaged the complex state of nature and its mediated liveliness in the twenty first century.

Lost in the haze of spectacle, however, was the glacier as a place in an ecosystem, having an impact on the livelihoods of those who lived in its presence. Icelanders have long had a complex relationship with portrayals of their island. Woven throughout most of nineteenth century European rhetoric, Icelanders feature largely as a class of better-than-average peasant—visitors being consistently surprised at their general competence—and as guides to lakes, mountains, and glaciers that foreigners arrived to see. Einarsson points to industrialization and independence in the twentieth century as forces that helped Icelanders find a voice, bridging the "glorious past" and "an ever changing present" (p. 233). Until that point, Icelanders were the Other in the European narrative, and that narrative—even when conducted with an interest in science—furthered the romance of place.

In 1901, at 44, Howell died while attempting to cross the Héraðsvötn River, Iceland. His gravestone stands in a churchyard on the northern peninsula (Ponzi, p. 177). However, his images, and those of Icelandic photographers around the turn of the twentieth century, would find a life beyond their artists, continuing to contribute to a portrait of Iceland and its

glaciers. Prior to Howell, the glacier had transformed several times throughout the centuries, each time according to changes in the perception of nature. Prior to the eighteenth century, the glacier had been an under-visualized place of fear and monsters. During the century, glaciers were documented partially by the Danish and more thoroughly by Icelanders like Ólafsson and Pálsson, who used the philosophies and rhetorics of imperial vision to compile indexical accounts of their island. Fear of the mountains and glaciers dwindled, and Icelandic nature became a source of scientific interest rather than terror. Later Sveinn Pálsson offered the first truly technical representation of an Icelandic glacier. In his writings, the glacier was an object of heightened status as an idea of scientific nature, but that notion of nature was coupled to situated cultural memory. Although censored, his account enabled explorers like Henderson to reshape Icelandic nature into a stage for European high drama, driven by Romanticism and the growth of tourism. In these images, the glacier invited a transparent witnessing that enhanced its romance while obscuring the role of the artist's labor in producing it. By the end of the nineteenth century, the first photographs of Icelandic glaciers indicated the increasingly multimodal, complicated nature of both nature and visualization. Nature had become increasingly a source of scientific interest, but a science woven with romance; photography emerged as a tool of inquiry and source of wonderment. The glacier was diversifying along with the new visual technologies that imaged it.

At the turn of the twentieth century, photography had never been as accessible, and Iceland was more widely photographed by those who visited it. However, foreign visualization continued to leave gaps in its portrayal. For instance, when Danish surveyors came to Iceland to map it between 1900 and 1910, they took 500 photographs, yet very few provided usable images of Iceland's glaciers ("Collection of 555 hundred-year-old images

opened," 2013). However, Icelanders did take their cameras out to the glaciers and photograph them. In a long-running example of citizen science, Icelanders spent the next one hundred years documenting the retreat of glaciers with lens, pencil, and paper (Dickie, 2018). The result was powerful photos by Magnús Ólafsson, Ólafur Magnússon, and other Icelanders, which would go on to become evidence in twentieth and twenty-first Icelandic climatology and glaciology scholarship. The final section of this essay surveys how these images and their reuse have persisted long after they were taken, and what glaciers and photography teach us about tempering Romantic nature in the early twenty-first century.

Discussion: The Afterlife of Images

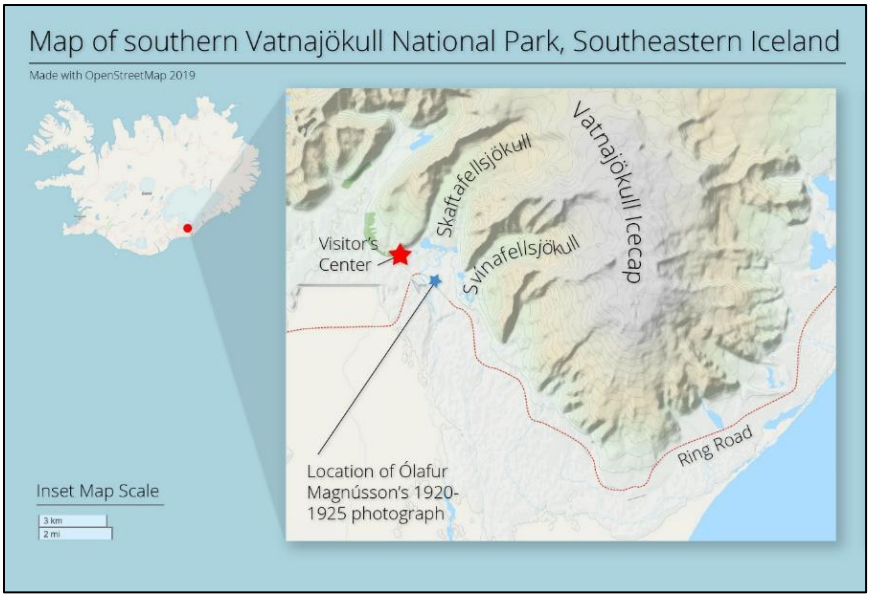

Figure 5: Map of southern Vatnajökull National Park, Southeast Iceland. The red star marks the writer's location. The blue marks Ólafur Magnússon's 1920-1925 photograph of Skaftafellsjökull glacier.

ON A BRIGHT MORNING IN JUNE 2018, my travel partner and I awake in our tent in a wooded campsite below the snout of Skaftafellsjökull, one of the southern outlets of Europe's largest glacier, Vatnajökull, which covers eight percent of Iceland. Nursing some aches from the rocky ground, we make our way to the Visitor's Center to pay our fees,

having arrived the prior night after closing time (See Figure 14). There, on the wall, a set of photographs depicts the retreat of nearby Skaftafellsjökull and its sister glacier Svínafellsjökull, which Mayer painted during his 1930s trip to Iceland. The display depicts the glaciers as they appeared in the lens of Icelandic photographer Ólafur Magnússon between 1920-1925 as well as that of another Icelandic photographer, Aron Reynisson, in 2012 (See Figure 15). For a few minutes, I consider again what photography can do when faced with disturbing, fascinating crises like climate change, which draw our eye as much out of concern as from a human enjoyment of comparison.

After breaking camp, we return to the Ring Road and head west, our plan being to circumnavigate Iceland. However, as we cross the wide floodplain beneath the icecap, we

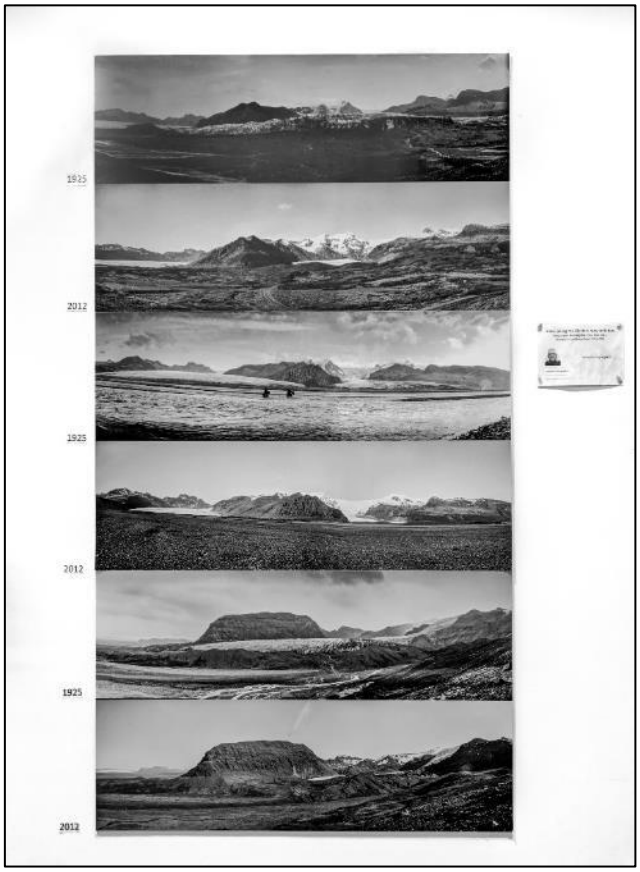

Figure 6: Rephotography display in Skaftafell Visitor Centre at Vatnajökull National Park in Southeastern Iceland.

pass a view of Skaftafellsjökull that resembles one captured by Magnússon almost one hundred years earlier. Pleading the patience of my partner, I take my camera, slide down an embankment, and, gingerly avoiding the floodplain's delicate heather, take in the scene. Trying to remember the photo I saw that morning, I quickly realize the futility of my task. What in the Magnússon photo had been a broad convex hump is now a flat, slightly concave ramp leading into the mountain pass. For a few minutes I wander back and forth in the sun, chasing ghosts across the gravel. At last, more out of resignation than any sense of rightness, I judged the relationship of the mountains to each other to be similar to what Magnússon's lens had seen and take a few shots of the glacier. Several weeks later, I postprocess the photograph and discover that I had captured a similar, if imperfect match to Magnússon's panorama a century earlier. As the 2018 photograph emerges alongside the much older image, I feel the weird sensation of two separate points of time coming into contact (See Figure 16). Sitting there, I am struck by a question. Jumping out of my car and taking the photograph was relatively simple. With more planning and data about the original photograph, could repeat photography represent a democratized form of Anthropocene

Figure 7: The researcher's 2018 attempt to recreate Magnússon's 1920-1925 Skaftafellsjökull photograph. Note that while the mountains are a close match, the glacier itself has significantly ablated.

visual, something any of us could go out and create, something that creates intimacy across expanses of time? Could the essential nature of such photographs be modulated to produce a more effective shadow rhetoric, one that tempers the power of Romantic and utilitarian nature? The coda to this long history seeks to answer this question, drawing on first-hand observation of Icelandic glaciers as well as the literature surrounding the practice of repeat photographs.

The Dialogic Art of Rephotography

First practiced by geologists, the process of repeat photography, formally known as 'rephotography,' involves the material act of placing a camera at the site where a prior photograph was taken and, quite simply, taking the picture again (Solnit, 2005, p. xi). However, rephotography is far more complicated that simply opening and closing the camera shutter, which is itself a complicated process. In *Yosemite in Time,* Rebecca Solnit describes the challenges involved in rephotographing shots taken by influential early landscape photographers such as Eadweard Muybridge, Carleton E. Watkins, and Ansel Adams in Yosemite Valley. With photographers Mark Klett and Byron Wolfe, Solnit set out to rediscover the precise locations of those artists' images, a task she frames as a protracted pursuit of evidence collected by reading both the artists' prior images and the landscape itself. Frequently, the team discovered locations much changed by time. Once-flourishing trees were now dead, rivers had meandered away from their prior courses, or spectacular views had become hidden behind forests that had grown due to long-term fire suppression (p. 21). Throughout the book, Solnit writes about the "strange slippage between reality and representation," and the sensation of being both in one place and "in two photographs of

two places in the past at once. The place in which we stood was turning into pictures, the pictures we had seen were leaping out as places" (p. 14). Rephotography enables a strange kind of viewership in which images of places leave traces of themselves in our experience of contemporary landscapes, telling us where to stand and how to look. As Solnit notes, we can read deep time in the striated cliffs of Yosemite, and such experiences facilitated Victorians' sensation of contact with the sublime. Although ideas of Romantic nature have been inflected by science, images of places like Yosemite or Iceland concentrate our fundamental ideas of wilderness, guiding how we see today.

Consequently, rephotography is palimpsestuous. The act of both taking and viewing repeat photographs is a game of reading the vestiges of lost landscapes in the world as we encounter it. Photographers like Klett go so far as to take their photographs in the same light and season as the photographs on which they base his work. Doing so has both cultural and scientific value, if those two things can be separated; precision enables direct comparison of ecological changes as well as a record that tells us about the practices of photographers who can now only speak to us through their pictures. In Iceland, scientists over the last decade have occasionally used rephotography as a strategic means to read climate change from the landscape (Schiefer & Gilbert, 2007; Guðmundsson, Hannesdóttir, and Björnsson, 2012; Guðmundsson, 2014). The work of photographers like Howell, taken at the Little Ice Age maximum, suddenly become a forensic means by which to judge glacial retreat over time. For instance, a study by Hannesdóttir, Björnsson, Pálsson, Aðalgeirsdóttir, and Guðmundsson (2015) studied glacial variation at southern Vatnajökull using methods that include rephotography. Among historical photographs, Howell's were the oldest on record, dating from 1891. By overlaying the old and new photos, the researchers compared

nunataks—isolated rocky peaks that project above the glacial ice—and were able to estimate changes in glacier coverage over the intervening century. The process of assessing glacial variation was a material processes, requiring the researchers to not only use software to transpose one image over another, but also to travel to farmsteads and interview residents who remembered the historic extent of the glacial margins. The photographic data enabled the researchers to estimate the maximums where scientific data were absent, but also presented difficulties. In particular, the season of the photograph had to be estimated, and the distance between the camera and the glaciers was uncertain. The article suggests that digital, rather than physical, copies of the photos were used, meaning that accuracy may also have been reduced by the lower dots-per-inch resolution of the online images.

Whether it is used in the scientific study of glaciers or in cultural studies like *Yosemite in Time* or Bromberg's (2001) *Wisconsin Then and Now: The Wisconsin Sesquicentennial Rephotography Project,* rephotography fundamentally alters the viewer's experience of time. Wilder elaborates:

> The cinematic and repetitious qualities of these types of rephotographs lends them an authority by way of invited comparison. One image stands next to another of the year before, or ten minutes later. The original image, self-contained as it was, is then broken out of its isolation to create a dialogue with both the past and potentially with the future. (p. 124)

Here, Wilder refers to the dialogic potential of photographs. Albers and Bear (2017) extend this notion, suggesting that rephotography challenges the explanatory power with which we often imbue images, pointing to the "missing pivot [that] is the implicit source of the development whose outer markers are imaged in the before-and-after pair" (p. 2). What is clear from the reuse of glacier photographs in Iceland is that images derive part of their power from their ability to be taken out of their archive, put into service for future,

unforeseen use, and remediated into new, hybrid forms of communication. Howell's photographs largely served his own goals during his life; in the afterlife of his images, however, they now serve a broader program of inquiry that he could not have anticipated.

Not only do such photographs facilitate our understanding of swiftly changing landscapes, but they also disrupt our sense of time in strategic ways. Rephotography not only puts the recent past in conversation with a deeper past but circumvents one of the essential realities of the photograph: it can be a snapshot of a moment or a long exposure of many moments, but it cannot show us both a moment and a sequence at once. However, a repeat photograph, once constructed, is not merely in conversation with another photograph. Instead, the repeat photograph is a distinct entity, capturing both the passage of time and the isolation of the moment together. Rephotography tells us not only about every detail a particular camera captured on a particular day but also about the comings and goings of those details over days, years, or centuries. If rocks, rivers, or dwellings remain in the second photograph in the sequence, we assume that they have been constant over the years. If they are significantly changed or have vanished entirely, we assume that some invisible action has occurred in the time between the first and second photo. In creating them, we reperform the actions of people who took photographs before us based not on a record of their action but a concatenation of their artistic expression and necessity. Even over one hundred years, the way to the top of a hill may have changed little; we may find ourselves walking up the same steps or paths to see not what they saw but what their image captured. In an inversion of what much of visual scholarship tells us, the image, not the place, becomes the anchor for action. We read the image and then find ways to position ourselves so that the landscape becomes something like what the image shows us. In effect, rephotography occasions us to

recreate our lived landscapes in the image of images themselves.

As such, setting out to create a repeat photograph is an act of intimacy. Rephotography is a uniquely participatory event, as it involves surrendering the completion of the rhetorical circuit to some later interlocutor—you or someone else, but someone who is not your present self, at any rate. Alternately, if you create rephotography by repeating someone else's photograph, you also choose to surrender some of yourself to the rhetor who came before you, constructing a mimetic visual in which choices about composition are constrained by those of your predecessor. In this sense, rephotography is a deeply Anthropocene practice, as it not only transgresses time but requires that you accept that your eyes, your vision, and your output are not yours alone, and do not happen in isolation. You are inextricably linked to others who influence you over the gulf of time. To take a repeat photograph is by default to acknowledge that we live, intimately, in a world of shadows.

Living "With"

At this point, it would be tempting to suggest that the rephotography is the perfect Anthropocene visual practice, a form of cultural and scientific memory that confronts the problem of distance and even provides forms of closeness between moments, people, and places. However, rephotography has complications. Most simply, rephotography is not always simple. Although I made a reasonable attempt at rephotographing Magnússon's work, I would contend that this involved a high degree of dumb luck more so that particular skills on the part of the photographer. Certainly, for a repeat photograph to have significant cultural *and* scientific value, it would need to be done with vastly more precision, accounting

for time of day, year, and geospatial position. As such, my photograph can only facilitate a tentative story about climate change. The photograph was also captured near Iceland's major thoroughfare, the Ring Road, which is convenient for capturing a tourist's view of climate change, but many sites of interest are not so easily accessible. There is also the matter of lens and cameras, as my own image was taken at a different aspect ratio than Magnússon's, and thus my photo presents a comparably limited view of the landscape. I was also able to shoot at 60 millimeters, effectively moving my image nearer to the glacier than my physical point in space. Given that most people will take photographs will mobile phones whose cameras have a focal length closer to 35 millimeters, rephotographing landscapes becomes an increasingly less accessible practice.

There are also the fundamental questions introduced at the start of this chapter. In public discourse about climate change, rephotography is commonly used like a litmus test, as if to say that if you are not alarmed by the glacial retreat depicted in this before-and-after photo pair, you do not care enough about global warming. However, based on this study, I am unconvinced that a repeat photograph of a glacier will reliably lead any significant portion of the population to jettison the comforts of their lifestyle in hopes of thwarting climate change. To be sure, rephotography is a powerful visual art, and the images in works such as *Yosemite in Time* reveal the world to us in new, incandescent ways. Likewise, cultural rephotography of cities before and after earthquakes, wars, and the simple passage of daily life provide us with a critical window on human existence. However, images of glaciers, one of the bellwethers of climate change, are perhaps a little different. The repeat photograph tempers the spectacle of the Anthropocene by placing grand landscapes such as glaciers in a dialogue, thereby facilitating critique, but it nonetheless emphasizes the sublimity of such

landscapes. These images perpetuate the *looking through* of the photograph, which in turn encourages us to image features of Romantic and utilitarian nature in which the complications of human and nonhuman life are absent or rendered only obliquely. As a landscape photographer, I will defend the value of an image without humans and the joy that viewers take in experiencing those views. However, I would also suggest that the tasks of photographers in the Anthropocene is to find ways to inflect those big stories with an awareness of nonhuman ecosystems and connections. This matters particularly because the history of visualizing glaciers shows us is that glacier as an icon has consistently inspired fascination, curiosity, and the desire to climb mountains. Rhetorically, the glacier has sunk into our popular culture as a spectacle worth witnessing, and as concerning as rephotographs of glaciers might be, the glacier's many iterations tell us that the process of looking at a repeat photograph of a glacier is more likely to inspire a game of comparison than sudden acts of environmental stewardship.

Such images also tend to direct our attention to loss narratives about global climate. While such narratives matter, being the basis for developing concepts of corporate accountability, they often omit the local communities who are most directly affected by those losses, foreclosing some possibility for their agency. As Garrard and Carey (2017) suggest, hearkening back to Hariman and Lucaites (2007): "it is important to consider not just what is photographed but also what is left out of the pictures" (p. 116). Without proper context, repeat photographs risk occluding slow violence rather than revealing it, and lessening human agency rather than facilitating it.

Hence, as a photographer, I would love to conclude this chapter by affirming that rephotography is a successful visual genre for the Anthropocene, and certainly it provides a

compelling, even moving visual dialogue about the time and world in which we live. Such comparative visuals form a necessary cultural and scientific record. Several hundred years of visualizing glaciers has presented us with a set of cultural artifacts that can be revisited and reimaged, reflecting not only changes in global land temperature but the shifting moods toward the nonhuman world of the societies that made them. We should not stop creating that record now. We should also recognize that imaging climate enables us to practice a small form of control over feelings of helplessness and mourning that define Anthropocene living. At the same time, I cannot avoid the reality that photographing Iceland leaves me with the sense that I have somehow failed as a photographer. Every picture I took participated in the romance of the place—a romance Iceland's tourism industry invites, to be sure—but romance nonetheless. Untempered romance is not a place where people in the Anthropocene can prosper. Thus, I will instead conclude that rephotography is not a perfect form of Anthropocene visuality. However, the preceding discussion does suggest two ways forward for visualizing during environmental crisis.

The first, drawing on Chapter Two, is to complicate the act of rephotography itself. For instance, consider this modified version of the photo pair shown earlier in this chapter (See Figure 17). Here, a second photo pair has been added, this time with one image overlaid onto the other. Whereas the first pair of photos were cropped so that they were as directly comparable to each other as possible, this new pair introduces some visual disparity between the two images. Rather than provide a 1:1 match with the original, I have included just a segment of my photograph, which I situate fully within Magnússon's original. In doing so, several rhetorical possibilities occur. First, viewers are encouraged to see the materiality of the photographs and thus to consider the making that went into the comparison. Rather

Figure 17: An alternate presentation of the researcher's 2018 attempt to rephotograph Magnússon's 1920-1925 Skaftafellsjökull photograph. This time, the photo pair has been combined with an overlay of the two photos.

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than a pair of twin windows through which we look, this format draws attention to its construction. In doing so, parts of the original are obscured, and parts of the new image are left out, meaning that while tones of Romantic landscape photography are present, they are not allowed to be completed. Second, the two photos are no longer in an equal dialogue with each other. Instead, my photo serves as an inflection point in the original, which now includes more information about the first moment in time. Two riders ford the flood at the base of the glacier, and these living subjects are allowed to exist in tension with the ablated

Skaftafellsjökull a century later. Here, time is not merely folded to permit a place to exist in conversation with itself, but the current glacier is allowed to shadow and haunt a scene that better gestures at an ecosystem. Third and finally, this form of intimacy yields more ground to native rhetorics, deferring more emphatically to an Icelandic image of Iceland. As an outsider, this version exerts less idealization on the country, and that too might be meaningful. Better versions of something like this practice can be found in other photography projects, such as on the cover of Senf & Pyne's 2012 *Reconstructing the View: The Grand Canyon Photographs of Mark Klett and Byron Wolfe* (See Figure 18). In the image, an old, sepia-toned photograph has been placed so that it aligns with the geography pictured in a contemporary one. In the old image, two figures sit on a rocky overhang above a river; in the new one, the shadow of two figures with a tripod are cast on the same rock. Together, four people occupy two disparate eras that are one. Such images bring both landscapes and people into contact over time, and in this case seem to suggest that the role of the second photograph-taker is to bear witness to their predecessors.

Forms of rephotography may also be particularly viable directions for future digital work. I envision a mobile app that connects to a global database of historical images contributed both world libraries, archives, and citizens. The app would use GPS to place users at the location where a photograph had previously been taken, then use the phone's internal gyroscope and augmented reality capabilities to help the user place the camera at the appropriate height to rephotograph the original image. The screen might display a translucent version of the image, for instance, allowing users to align the past image with the landscape in front of them. They could then take the picture and add notes particular to their experience at the time, although the app would prevent any major postprocessing to ensure

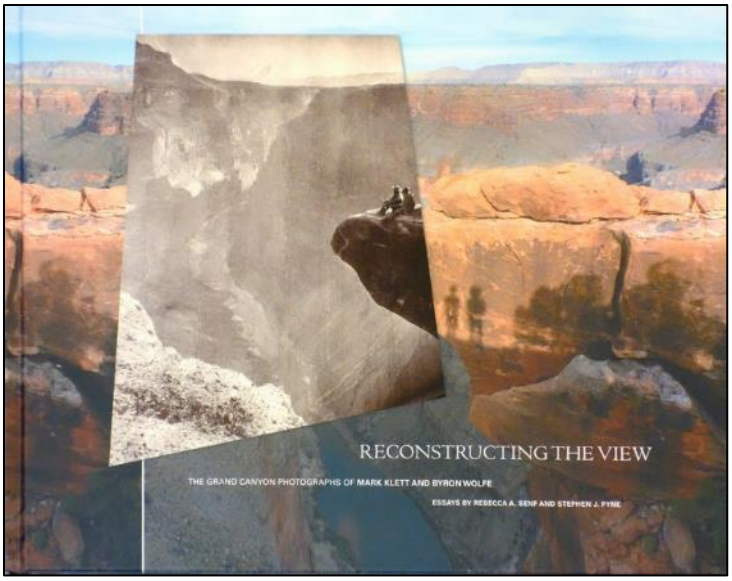

Figure 18: Cover of Senf and Pyne's *Reconstructing the View: The Grand Canyon Photographs of Mark Klett and Byron Wolfe.*

that the image was as unmediated as possible. The image could then be uploaded and shared, becoming available to other users to further replicate. Such an archive would provide rich data for researchers, whether they view the project as data generated from citizen science or artifacts for a cultural history. This kind of project could also afford users a sense of meaning when faced with the radical transformation of their world by forces like climate change.

Thus, rephotography has potential in the Anthropocene despite its shortcomings. If used strategically, the act of repeating old photos may be able to temper excessive sublimity and seek moments of temporary intimacy. However, rephotography may in fact be most meaningful as a form of Anthropocene *praxis*. Based on my own experience as a photographer, I would argue that the power of repeat photographs is not exclusively in their presentation, but also in their material execution. A repeat photograph is never more affecting than when you yourself scout for the place where someone else stood, or when you sit with the photo and editing to be directly comparable to that of someone else's before you. I suspect that my photography above is more haunting for me than for anyone else who

might view it simply because I have the experiences of excitement, loss, and temporal slippage involved in shooting and processing it. Thus, the real power of photography in the Anthropocene is its *experiential*—rather than visual—intimacy. After all, no photograph properly reveals what one discovers upon visiting a glacier: how alive they are and how paradoxical that life is. While in Iceland, we climbed roughly 600 feet up the glacier Sólheimajökull on a warm, bright day, seeking ruts and grooves in the surface, as these were the places where meltwater flowed from the upper reaches of the Mýrdalsjökull icecap (See Figure 19). The flow of water becomes a good sign when climbing a glacier: it means rough ice that you can slam a crampon into and find a foothold. All around, as far as we could see in any direction, the face of the glacier was a noisy melee of meandering rivulets and chortling streams. The disappearance of the glaciers is what enabled us to climb it.

From seven hundred feet up, we could look across the trough that had been carved out by the glacier before its retreat. I asked the guides about how climate change had affected their work. One guide told me about how they used to venture onto the ice to find safe paths once each month, but now they had to do so multiple times per week. The guide was concerned, too, that the glacier was destabilizing, that there was liquid water underneath

Figure 19: Two views of Sólheimajökull Glacier: from the ground (top), showing how far the ice has retreated since 2010, and from 600 feet up (bottom).

the ice, and that a time would soon come when the glacier was no longer be safe or accessible. Conceptually, understanding those uncertainties is one thing; understanding them while standing on the glacier's snout with meltwater rushing by under your feet creates a more haunting and urgent sense of time. No photograph can capture that. In still images, glaciers appear like immobile leviathans, but the technical terminology of glaciology reminds us that they are not so: *head*, *flank*, *snout*, *tongue*. When glaciers accumulate or melt, they *advance* or *retreat*. Even in their disappearance, they merely *withdraw* from us. Despite shifts in science, culture, and rhetoric, the liveliness of the glacier remains, sunk deep into discourse in a way that photographs of any kind obscure. The power of rephotography in the Anthropocene is partly as a visual but maybe more so in the process of practicing intimacy, of going, seeing, and making even if we are merely going out to our own backyards or cities.

One morning in Iceland, two bone-wearer hikers, cold with sweat, deeply dehydrated, and running thirty hours without sleep, stumbled onto the glacial river Brúarfoss, an hour and a half northeast of Reykjavík. Under the soft twilight, the waters were an unreal blue (See Figure 20). A few hours later, we would be on a plane back to the Great Lakes. As lovely as the place was, the real interest for me was that feeling, again, of connecting with others—Icelanders or foreigners—who had imaged this place before us. Its romance remained, but it was less wonderful than finding a human connection over nearly two hundred years of history. What I am suggesting here is that Romantic nature is not itself unproductive, but that it can be unhelpfully attractive, consuming our view and occluding human and nonhuman life. There are other, more productive intimacies. If we return now to Leopold's 1949 lament that "One of the penalties of an ecological education is to live alone in a world of wounds" (p. 197), we might see an alternative. In a world of environmental

mourning, rephotography shifts the source of intimacy from ideal nature to connectivity, providing us with a way to live in that wounded world together. Through rephotography, we live with our later or earlier selves, with people who have vanished a century before us or may be going to live a century later, with ecologies that have vanished or yet may be. Doing so requires that we give up some control rhetorically, but in so doing we gain agency to choose what we let go and what we keep, and where we situate power. We take it away from the image and give it to ourselves and each other. In the Anthropocene, allowing ourselves to be shadowed or to shadow the work of others provides opportunities for a kind of collective world-making and, perhaps more importantly, world understanding. Most importantly, we do not need to go to glaciers to discover rephotography's power to rearticulate our experience of nature, as we live surrounded everyday by places that have been imaged and which waiting for someone, maybe us, to image them again.

Figure 20: The bright blue glacial river, Brúarfoss, pictured over 180 years. Counterclockwise from top left: Mayer's Brúarfoss (Gaimard, 1838); Howell's 1891 Brúarfoss photograph (Fiske Icelandic Collection, 2002), and the the researcher's Brúarfoss (2018).

4 Adaptative Visualization on the Great Lakes Shoreline

ON A FRIGID JANUARY MORNING, we clamber over boulders of ice along the rocky Superior shoreline. The stars and wind are both up, and a faint light—dawn? Wisconsin?—is on the horizon. Every gust sends a surge of spray over us, and all the trees here are glassy with ice. The snow is thick, and the trail forms a dangerously slick slope directly to the place where the cliff plunges into the waves. I am not wearing the right boots for this. My companion is walking easily, but I've already fallen several times. I feel a momentary jolt of adrenaline each time, my eyes on the steep one-way path into the booming waves of the world's largest freshwater lake. Having grown up in Illinois, where parklands are carefully manicured places with railing and guardrails, Minnesota's willingness to leave public safety to the users seems uniquely its own. Just one day prior at Gooseberry State Park, we had joined crowds of laughing, grinning Minnesotans of all ages in sliding down a set of stairs that had been allowed to become a ramp of solid snow. As droves of puffy coats launched themselves enthusiastically down an obvious public safety threat, I couldn't help but see in this engagement with nonhuman nature something peculiar to the northern Great Lakes region. There's an undertone of the culture here that seems to say, "These are extreme conditions, but they're *our* extreme conditions."

Trudging along the strip of Superior shore known as Tettegouche State Park, I begin to think there's a question in this place that might contribute meaningfully to the project. At this moment, the prior two chapters are largely complete, and each has offered some guidance toward principles for an Anthropocene visuality. Faced with the pressing issue of distance—spatial, temporal, and scalar—both the Standing Rock maps and glacier

rephotography suggest ways that incomprehensible phenomena might be wrangled into visual space. The maps suggest the power of the overlay as a means of folding time, and they identify defamiliarization as a key strategy for making room to think differently about our engagements with the world. By analyzing these maps, it becomes clear how easily images that change genres can undermine the integrity of the worldviews they enable. Take your average mobile map, the kind that you might use to get from your house to a local business. Place that map in the middle of a public controversy, and a perfectly ordinary, perfectly accurate visual begins to lie by omission. In the Anthropocene, it seems to me, managing the transposition of information between genres will be paramount. Likewise, a vigilant appreciation for the silences created by rhetorical choices becomes doubly critical.

Meanwhile, the long history of glacier images points to the unique problem of the aesthetic and the sublime. As indicated in the prior chapter, the idea of sublime, wild nature has been a strong component of Western visuality. A visuality for the Anthropocene would need to temper the sublimity of nature. Although some environmental scholars have declared nature outmoded or dead, such declarations do not amount to public change. Indeed, ideas of the post-natural do not stop the public—nor, in fact, the scholar—from being drawn to images of landscapes. In fact, the more one centers climate change in the lens, the more spectacular the image becomes, as several centuries of notes, journals, and newspaper reviews attest. We find ourselves both thrilling at and mourning for the disappearance of parts of our world. However, the contemporary remediation of glacier images does suggest that there is power in dialogic visuals, and that overlays might again be one way to create shadow rhetorics for the Anthropocene. In this case, the result is not so much defamiliarization alone but intimacy. Instead of viewers connecting closely with

idealized visions of nature, forms of rephotography might enable both viewers and makers to experience the world a little more thoughtfully and resiliently. In a world of perceived losses, a shift from nature-as-spectacle to nature-as-connection offers a way to more directly engage with the joys and griefs of the Anthropocene. Finding even small ways to assert our agency and redefine human-nonhuman relationship matters because the Anthropocene is heavy with helplessness: as Buck (2015) writes, "The Anthropocene anthology offers the ultimate alienation: You did this and you didn't even know" (p. 372). Disenchantment and disempowerment are dangerous, but making and processing images may give some people a far more affective connection to global climate than simply by viewing them in books or on webpages. Hence, the central move of an Anthropocene visuality is a double consciousness made possible by finding ways to bring the shadows of the Anthropocene—injustice, loss, memory, history—into contemporary communication. Thus, the first two cases have led me to inductively construct some basic visual theory for the Anthropocene. This third case returns to the Great Lakes to further develop this theory and to offer insight into how it might transform rhetoric and technical communication.

Why the Great Lakes? Partly, the lakes are compelling as a place. The Great Lakes have the largest freshwater surface area on the planet, covering 244,160 km^2 and touching nine states and provinces (Environmental Protection Agency, 2019). As mentioned in Chapter One, that number does not encompass their full scale, either; in fact, they are part of a vast watershed, the Great Lakes basin, which covers 765,990 km^2 (Larson and Schaetzl, 2001, p. 518). Contrary to the clean lines with which they are depicted on most maps, the Great Lakes are a vascular web of rivers, kettle lakes, ponds, ditches, and temporary bodies of water ever shifting, sculpting, storming, and flowing in a permeable borderland between

two nations—a truly transnational negotiation between ecologies, industries, and conservation efforts. Critically, the Great Lakes have also experienced significant climatological change. From 1900-2012, these Midwestern waters saw a 2-degree temperature increase and an 11-degree precipitation increase (Great Lakes Integrated Science + Assessment, 2014, p. 1). Meanwhile, ice coverage decreased 71% between 1973 and 2010. A dramatic rise in severe weather and increasingly frequent algal blooms also pose threats to the biota, economy, and welfare of the region. Perhaps most alarmingly, as noted in the introduction, the Great Lakes are one of the key sites of future potential hydro-political conflict (Farinosi, 2018). In the ongoing story of global environment, how people manage the Great Lakes will affect lives, ecologies, and whole geographies. Consequently, the visual means by which people imagine and represent the lakes becomes a critical means to understand environmental world-making.

The Great Lakes are also compelling due to the forms that local visualization has taken. In 2014, the National Oceanic and Atmospheric Administration (NOAA) unveiled the Lake Level Viewer (LLV), an interactive data visualization tool designed to help shoreline residents picture and manage the potential impact of water level scenarios such as droughts and flood events on human geography (See Figure 21). Whereas the prior two cases have been assembled from a range of artifacts, the LLV emerges as a response to user dissatisfaction with other tools for visualizing lake level change. Its design reflects successive iterations and forms of user testing. Consequently, the LLV is positioned as a user-centered means of delivering comprehensive visuals in a time of environmental complexity. However, the LLV faces a particularly challenging scenario, needing to serve the interests of communities across nine states and multiple ecologies and biomes. The LLV also

Figure 21: The user interface for the NOAA's Great Lakes Lake Level Viewer, first deployed in 2014.

participates in a long history of representing the Midwest's third coast, which means that it must confront a range of commonplace identities. In examining its user interface, we can understand more clearly how the shadow rhetorics of an Anthropocene visuality, specifically defamiliarization, intimacy, and—of greatest interest in this chapter—belonging, might realistically transform public-facing design.

To make sense of the LLV, I draw on usability and user experience, areas in which technical communication professionals frequently work. Previously, I have discussed the idea that responsible decision-making will require us to rethink the environmental imaginaries through which we conceive of the world, and that this world-making will depend on changing the commonplace ideas of nature and culture that guide us through daily life. Here, I would like to introduce 'conceptual model,' a term coined by user experience designer Don Norman (2013). Conceptual models are the usability equivalent of commonplaces, the mental templates that people carry with them and pass to each other to "represent their

understanding of how things work" (p. 26). Like our underlying imaginaries, our conceptual models guide how we understand, adopt, and manipulate knowledge in and about the world. To understand the role the final component of an Anthropocene visuality, belonging, we must understand the way that tools, displays, and interfaces co-generate place and association with users—that is, how the world people know is mirrored (or not) in the systems they use.

Additionally, I draw upon a brief version of heuristic analysis to assess the LLV as a tool for environmental knowledge-making. User-experience testers regularly use a heuristic model to assess and analyze a design's efficacy. During the process, the tester interrogates its operation based on a set of predefined criteria. A common set are the ten principles defined by the Nielsen Norman Group (1994):

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

Here, I focus particularly on (1) visibility and user freedom, (2) the match between system and world, and (3) aesthetic design. These three heuristics form an interrogative trio of tools to help us assess the kinds of conceptual models that the LLV facilitates and mirrors. Through this selective heuristic analysis, I will suggest that the LLV, despite being a functional tool, nonetheless adopts a Holocene visuality that ultimately has several significant limitations in the Anthropocene. In doing so, I will indicate the ways that the system of

Anthropocene visuality might not only help us create better designs but revise Holocene visuals to meet Anthropocene needs.

Building on the discussion of UIs, place, and belonging, this chapter ends by offering a final conceptual idea, the 'slow rhetorical situation' or 'slow user experience.' As noted at the beginning of the project, if rhetorical shadows—defamiliarization, intimacy, and belonging—are the desired effects of visuals, and rhetorical folding is the process by which such effects are achieved, then slow situations and experiences are the contexts we observe to perform rhetorical work in the Anthropocene. In offering this term, I mean to suggest a counterpart to Nixon's (2011) idea of slow violence and a theoretical way forward for rhetoric researchers and practitioners. As I will indicate, user-centered design specifically and technical communication more broadly are critical practices for a society interested in rethinking its own commonplaces to better support environmentally and socially responsible decision-making. Consider, for instance, this passage from geographer Holly Jean Buck (2015):

> Whereas disenchanted Anthropocene stories are tales of hierarchical planning and control (or utter chaos), a charming Anthropocene will build on the peer-to-peer, distributed, open-source, rhizomatic notes of our time… Distributed food, energy, and information systems allow for more direct and intimate experiences. They can be worked on, tweaked, and customized. Connection could thus be not merely affective but built into the infrastructure of new systems. For example, an outdoor electric meter lacks intimacy, but with rooftop solar panels or neighborhood wind turbines, there is a relationship to develop there: with the weather, with the form. A sunny or windy day has a new importance. (p. 375)

Buck speaks of distributed, connected systems, and a relationality derived from the intimate intersection between objects and people. Such experiences are partly vested in the object and partly in the conceptual models upon which people draw. Technical communication's focus on audience and explanation make it a critical place for the Anthropocene work specified by

Buck. If through language and visualization we are able to redefine our relationship with objects, then technical communication is a means to do so.

Background: Commonplaces of the Great Lakes Basin

Because the LLV is designed for the region's residents, it responds in some sense to the existing commonplaces that those who live in the region have adopted or are familiar with. Thus, I wish to preface the heuristic analysis with some background about these Great Lakes commonplaces. I will especially focus on Lake Superior to help focus both the background and the heuristic analysis. Doing so will provide a point against which to compare the conceptual model articulated by the LLV.

As a region, the Great Lakes are sometimes eyed with skepticism by the rest of the American Midwest: "The tendency to define the Midwest exclusively in terms of agricultural landscapes and rural experience," writes Barillas (2006), "means that the Great Lakes states, with their heavy industry and large cities, are perceived as less midwestern, or not at all" (p. xiii). Barillas goes on to declare Michiganders "equivocal" about their regional allegiance, and the same might be said of Minnesotans who live near Superior. In fact, many residents of the Superior shore seem to view their geography as fickle and cruel—and yet worthy of devout loyalty. Here, for instance, is environmental historian and Great Lakes resident Nancy Langston (2017):

> The north is no longer as cold, as extreme, as bitter and brutal. To some people, luxuriating down south on their golf courses and cruise ships, it might seem like no great loss. But to those of us who live in the northern forest, we know it *is* a great loss. (p. 216)

The Great Lakes tendency to both mistrust and take pride in their waters is a characteristic

that goes beyond meteorology or experience and becomes one of the defining traits of the basin's imaginary: big storms, bad weather, and regional devotion. This devotion is captured in a variety of literature from or about the region. For instance, American novelist John Irving (1989), in *A Prayer for Owen Meany,* wryly observes that "it is occasionally necessary for me to tell Torontonians of the presence of the Atlantic and Pacific oceans; they tend to think of the Great Lakes as the waters of the world" (p. 316). Indeed, Midwesterners who write about the lakes regularly refer to them as seas, including Jane Johnson Schoolcraft (2007), also known as Bamewawagezhikaquay, the nineteenth century Ojibwa poet and storyteller. In a poem written at Castle Island, Lake Superior, she references "my native inland sea" (p. 92). Likewise, maritime historian Frederick Stonehouse also references the sea in his entry for Gidmark's (2001) *Encyclopedia of American Literature of the Sea and Great Lakes*.

In Danielle Sosin's (2011) *The Long-Shining Waters,* Lake Superior is an anchor around which the identities of three women in three different eras revolve. In a recurring series of vignettes, Sosin describes the persona and nature of Superior as both unknowable and mundanely familiar, a primordial darkness that she calls the "keepsake waters" (p. 102). Lake Superior takes all that is offered, both by literally subsuming matter—"A luffing sail. A lost crate of lemons. A silver button on the lake bed"—and by their passage over the horizon, where "Birds and boats disappear" (p. 37; p. 90). Through Superior's possessive nature, Sosin gives life to a longstanding piece of folklore: as Stonehouse remarks, it is "a long-held sailor's myth is that Superior never gives up its dead" (p. 172). Stonehouse cites several shipwrecks, like the 1918 disappearance of the *Inkermann* and the *Cerisoles* while departing Thunder Bay, in which the bodies of victims went unrecovered; the frigid Superior waters prevented the growth of bacteria that would cause the build-up of gases that cause buoyancy.

Hence, the notion of a possessive, cruel Superior forms a tradition of folklore and local belief, with a long procession of ghost ships appearing throughout the area's written history.

Sosin too writes of the wreckage of ships. "She lies on her side. Grotesque. Inert," says Sosin's narrator. "Cheek to frigid lake bottom. Everything and all hands entombed" (p. 193). In Sosin's novel, this underlying darkness is given mythic form. Sosin's narrator states, "There is a crack in the lake where boats disappear…A cold furrowed lair. Where a great horned serpent lies unblinking" (p. 263). Superior has a long history of such stories. Anishinaabe Ojibwe stories of Superior, ᑭᓵᒣ-ᑲᒣ (transliteration: Gitchi-Gami), tell of the Mishipeshu, the most important underworld being and one of several underwater panthers who live in the Great Lakes (Pomedii, 2014, p. 214). This horned, lynx-headed serpent appears in pictograms and oral stories throughout the region.

Such stories speak to a sense of deep time around the lakes, which is echoed in contemporary writing. In one passage of *The Long-Shining Waters,* Sosin writes what is effectively a geologic view of upheaval and transformation:

> I hear the beat of the primordial ocean. The submerged volcanoes building on themselves. The seas that bring the new islands down. There is the tumult of earthquakes. Underwater landslides. Laying new strata. Building new landmass….The grinding glaciers creep down from the north. It's the blunt smell of ice that lifts from these waters. The glaciers gouge debris from the sunken rift. Take the wieldable rock on retreating tongues. In their wake they leave this lake basin. Its northern rim still rebounding from the weight. In their wake. This billion-year-old cradle of rock. (p. 245)

In Sosin's words, we see one of the peculiar difficulties of the Anthropocene addressed through literary imagination. Superior, the "billion-year-old cradle of rock," is born from the Midcontinental Rift, sedimented, and glaciated, continuing to move with the rebound from vanished ice. This folding of vast distances creates immediate intimacy across epochs deftly.

In Anthropocene communication, making time knowable in this fashion is critical.

If dangerous waters and deep time characterize the literary imagination of the Great Lakes, then notions of sublime nature also permeate the way the region visualizes and markets itself. The Great Lakes were a beacon for nineteenth century landscape painters such as Toronto picturesque painter William Armstrong, who painted the lakes prolifically., In "Thunder Cape, Lake Superior" (Armstrong, 1867), the water is a shadowy surface under a massive, rocky headland. A party of tiny figures huddles in a boat before the massive promontory, which rears up through the shadow to catch the warm bloom of dawn. The play of light, the scale of the scenery, and the sense of remoteness all suggest the grandeur and wildness of Romanticism, echoing the kinds of light and shadow in Mayer's images of Iceland as well as those of other painters of Armstrong's era. In particular, few painters of Superior better embodied sublime nature than Hudson River School painter Thomas Moran (1864), whose "The Wilds of Lake Superior" offers a collage of visual elements that could each be a believable element in a real-life scene, but when presented together serve as a rapturous tribute to Superior's glory. In the painting, whitewater rapids curve through rocky terrain, tumbling down in a great waterfall (See Figure 22). A single spot of warm sunlight brightens the rocks, which otherwise rest in shadow. At top, a luminous, cloud-scudded sky gives way to a menacing storm, a rain curtain falling over a high, lush hillside. To the right, a bare, gnarled tree looms against the sky. As a whole, Moran's brush captures the landscape in a way that suggests both the glory and violence of Lake Superior—all without actually depicting the lake. In reality, so many arresting elements would not be found together in real life, reflecting Moran's process of painting itself. While literary scholar Thurman Wilkins (1998) describes the painting as depicting a view of "not unlike the leap Moran saw Chapel

Figure 8: Thomas Moran, *The Wilds of Lake Superior* (1864).

River make into the restless waters of Lake Superior" (p. 34), the New Britain Museum of American Art suggests that some of the painting's topography in fact resembles that of central Pennsylvania, through which Moran passed in 1864. Consequently, "The Wilds of Lake Superior" captures a deeply idealized idea of the Great Lakes with only a loose attachment to the specifics of place. Today, the gesture toward the sublime remains a distinct part of the culture; the official state travel campaign, Explore Minnesota, describes "the dramatic, rugged shoreline of Lake Superior, with forested hillsides, wilderness streams and waterfalls along the way," sounding very much like a description of Moran's painting a century and a half earlier.

Lake Superior has not only been imaged as the subject of sublime painters, however. As a region with a long mercantile and industrial history, Superior has frequently been

visualized for purposes of trade, safe passage, and exchange. These too underwrite components of the Great Lakes identity. For as long as people have lived in the Great Lakes basin, there has been a need to document and communicate its contours for purposes of commerce: before the arrival of Europeans, First Nations people established routes of trade and passage through the region, hugging the coasts due to unpredictable, savage squalls and winds (Lewis, 2004, p. 2). While they did not record these routes and geographies cartographically, they did construct them pictographically. However, when Europeans entered the region, they regularly reported map use among the First Nations. For instance, Lewis describes accounts of spatial diagrams supplied by Native people to explorers such as Champlain, although the role of Native knowledge frequently went unacknowledged or obliquely referenced on European maps (Lewis, p. 6-7).

Many of these early European maps were speculative. For example, a 1755 map by cartographer Jacques Nicolas Bellin places several large islands in Lake Superior and a mountain range through the lower peninsula of Michigan (See Figure 23). By the middle of the nineteenth century, however, the U.S. Congress had provided funds for a hydrographic survey of the Lakes. More detailed maps followed, such as the 1853 "Sketch of the Navigation Through East Neebish Rapids, River St. Mary," by Eliakin P. Scammon and published by the Army Corps. of Topographical Engineers, which depicted regular depths for commercial and recreational passage. Scammon's map is neat, precise, and rhetorically constructed to serve the needs of those who traveled the waterways. A concise set of "Sailing Directions" appear in the upper right corner, while the channel itself is filled with sounding depths indicating its user-centered orientation, such as "This passage is not navigable. The current is rapid – Bed rocky. Water 3 to 5 feet deep." Such maps supplied the

governing logic by which later cartography would be carried out, including digitally.

Taken as a whole, the literary and visual imagination of Superior assumes several distinct characteristics. Ideas of deep time are present, particularly in the literary imagination of the lake. Through this long history, Superior has been violent and unpredictable, a tempestuous and changeable presence in the region. Its reputation for killing, coveting the dead, leaving behind ghosts is woven into folklore. Nonetheless, the basin generally earns reverence and loyalty, with the prospect of vanishing boreal forests and milder winters being a growing anxiety for those who live along its shore. Ideas of this ruggedly sublime fastness have followed the lakes for two centuries, and they persist in contemporary marketing. Finally, a long history of mercantilism and industry leave behind a record of technical drawing designed for commercial and practice activities. These, then, are defining commonplaces in the Superior imaginary, and part of the rhetorical situation in which the NOAA's Lake Level Viewer emerges.

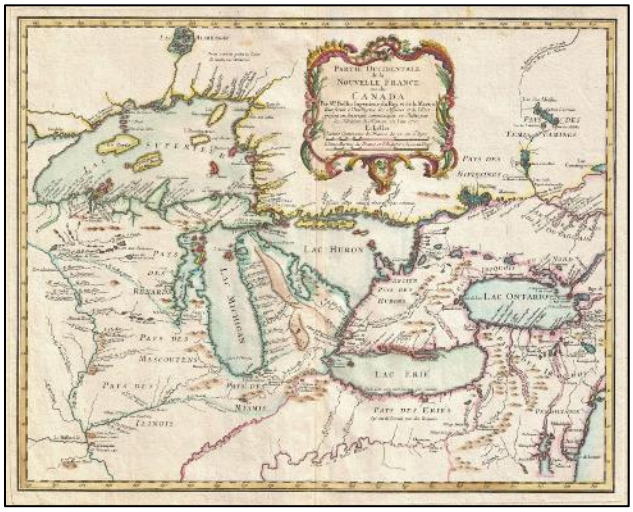

Figure 23: 1755 map by cartographer Jacques Nicolas Bellin (top), and "Sketch of the Navigation through East Neebish Rapids, River St. Mary" by Eliakin P. Scammon (right).

Designing the Lake Level Viewer

First released in November 2014 (Roth & Hart, 2016, p. 14), the Lake Level Viewer is a free, interactive, web-based user interface (UI) that allows users to raise or lower the visible water level on a map of the Great Lakes by +/- 6 feet. The UI includes two primary modes of visualization: a map, recalling the subject of Chapter 2; and a digital photograph, recalling Chapter 3. The map provides tiled full-color aerial satellite photography of the lakes, along with key cities, roads, and other toponyms. A digital elevation model based on topo-bathy LIDAR data is baked into the map, allowing it to realistically depict how changes in water level might impact cities and shorelines. The photograph can be activated by clicking select landmarks. When the landmark is clicked, a small ground-level photograph pops up. Any changes to the water level will alter the water level in the photograph, providing an alternate mode of visioning the impact of high or low waters on the shoreline. Additionally, the user can toggle on and off two choropleth map overlays, one of which depicts economic data and one which depicts social data.

Developed by the NOAA's Office for Coastal Management through the Digital Coast Initiative under the direction of lead developer Brandon Krumwiede, the LLV is made available to the public for adaptive management of coastlines, with a target audience of decision-makers in local government, business, academics, and the local public (Roth and Hart, p. 3). Any interested user can create hypothetical water events, however. These scenarios are not tied to specific dates or real-world occurrences, in contrast to the real-time weather mapping featured in other NOAA tools, such as nowCOAST. Instead, the LLV allow users to test differing water levels to view their effect on local infrastructure. These affordances make the LLV a hyperlocal form of world-making in which users imaginatively

visualize the dangers of water to their communities.

The LLV was called into being by public interest. In a 2013 Shoreline Change Workshop, only 26% of respondents declared that the existing water-level viewer, the Great Lakes Dashboard (See Figure 24), adequately served their visualization needs (Marcy and Krumwiede, 2016, p. 11). In keeping with Gould and Lewis's 1985 recommendation that users be engaged throughout the conception and design process to ensure that interactive systems serve them effectively, the LLV was extensively user tested. The NOAA development team, in conjunction with the University of Wisconsin Cartography Laboratory and Wisconsin Sea Grant Institute, created both low-fidelity wireframes to test the general layout of the GUI and high-fidelity wireframes to test the function of specific GUI components. Initial testing revealed that although users reacted positively to the CanVis simulation, they were unsure whether the main LLV satellite map represented the most recent shoreline or depicted a long-term average (as was actually the case). Users also voiced

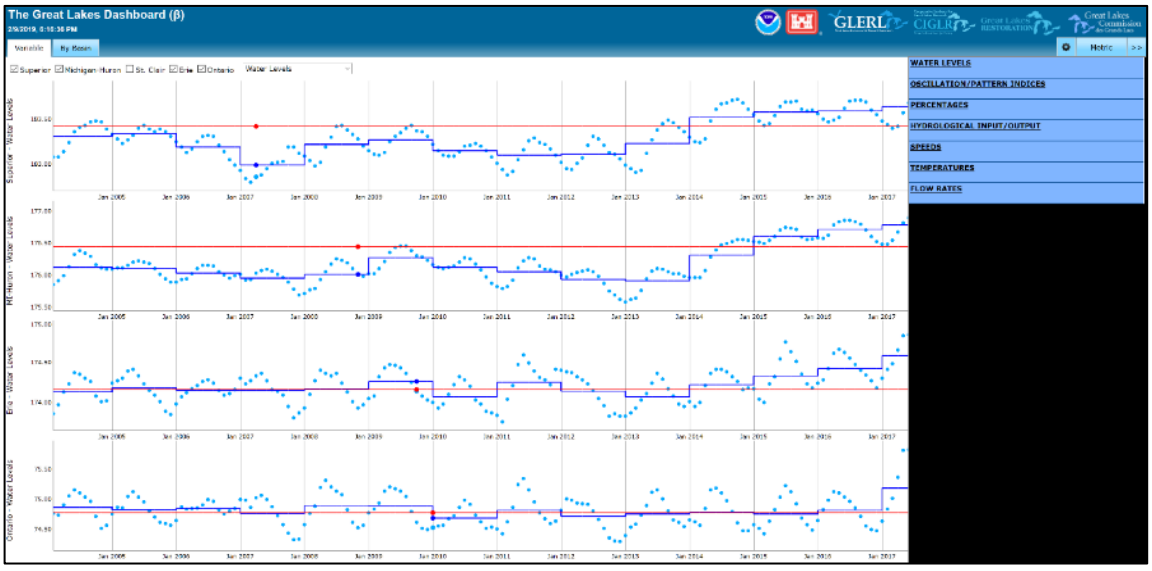

Figure 9: Great Lakes Dashboard. In testing, users found it to be inadequate, leading to the development of the Lake Lever Viewer.

conflicting concerns about whether +/- 6 feet were sufficient to support the tool's long-term viability or whether a greater range might cause public alarm. Notably, users reacted negatively to a contextual overlay that depicted social vulnerability, asking instead for a wide variety of built environment and 'natural' environment overlays. However, only 'society' and 'economy' overlays appear in the final design.

The final visualization rolled out in August 2014, with updates occurring subsequently. The LLV would go on to be demonstrated or included in at least thirty-five public forums and regional conferences, such as the Waukegan Harbor Citizens' Advisory Group meeting (2016), and a planning meeting of the Minnesota chapter of the American Planning Association (2015). In at least twelve such meetings, the LLV was featured as a core part of the conference agenda, with slides explaining its development, use, and further planned development. In these cases, users were instructed in how to make sense of the UI as well as use it to conceptualize their local environments. In ten more conferences and workshops, the LLV was included as a supplemental tool that attendees might use to better understand water level in their local communities. In these cases, documentation did not provide instructions for the tool's use. In the remaining cases, the LLV appeared as a passing reference or within a general list of further resources in a meeting's planning document. It is unclear to what degree the tool has been adopted for extensive infrastructure planning, but its presence in technical documents is limited largely to a supporting role as an available or recommended service.

Thus, the LLV served several roles depending on the public communication goal. In about half of cases, the LLV was provided to users with substantial instruction in its use. However, as the LLV made its way from regional conferences to town halls or city planning

meetings, the LLV received less dedicated instruction. To what degree the tool's conceptual models reached local users remains unclear, so the following heuristic analysis evaluates the kind of world-building and commonplaces the tool facilitated using several heuristics. Through this analysis, I argue that although the LLV is a functional Holocene tool, some fundamental shifts are needed if the LLV is to fully address the growing issues of the Anthropocene. I end with a discussion of what these shifts might mean for technical communication practitioners, as well as the broader implications of the Anthropocene for contemporary visual practices.

Analysis of the Lake Level Viewer

Visibility & User Freedom

As identified in Chapter One, responsible planning in the Anthropocene will require that we recognize hidden interconnectivity distributed across space, time, and scale. This may take some retraining, as our Holocene conceptual models have taught us to think of systems as being generally more local, involving a vector from present into the near future rather than (for example) from the past into the present or present into deep future. Simply put, we will need to cultivate a more sophisticated understanding of connection. For designers, this will mean finding ways to entangle immense time and space within the scope of a photograph, a chart, or a user interface. Such entanglements will operate within a different environmental imaginary and occur from the most granular forms of system control—such as what kind of information can be toggled or activated—to the more abstract—such as what social action systems afford or incline users to take.

For these reasons, forms of visibility and user freedom matter when evaluating the Anthropocene readiness of a given tool. According to the Nielsen Norman Group, *visibility* refers to how effectively a system lets users know its current state: "Ideally, systems should always keep users informed about what is going on, through appropriate feedback within reasonable time" (Harley, 2018). Visible responsiveness helps users see when their actions are meaningful or unmeaningful within the system, training them to value particular kinds of information and investigation. Visibility can also refer to the way that a system's "backstage" components can compel certain behaviors, such as a clothing retailer alerting users that stock is low and thereby motivating them to buy. In these cases, the system makes information visible based on invisible code, producing affective responses in users. The opposite must also then be true: what a system does not show can also motivate users to occupy certain likely orientations to the world that go well beyond their direct interaction with the system. For instance, the Energy Transfer Partners map made several exclusions that were perhaps expected in a map intended for navigation. However, when the map was placed in the midst of a public crisis, natural exclusions limited viewers' access to useful information, such as data related to zones at a high risk for oil spills. In doing so, the possibilities for informed user action also changed. Thus, we can evaluate visibility and user freedom both in terms of localized, granular UI functions such as buttons, toggles, and overlays, as well as higher-order functions like the extent and forms of user action. Understanding both reveals the Anthropocene readiness of the UI.

In terms of granular UI functions, the LLV makes its on-screen state clear. Buttons are large and clearly indicate their purpose. Hovering or clicking on them results in color changes to alert the user that action has taken place successfully. As an example, if a user

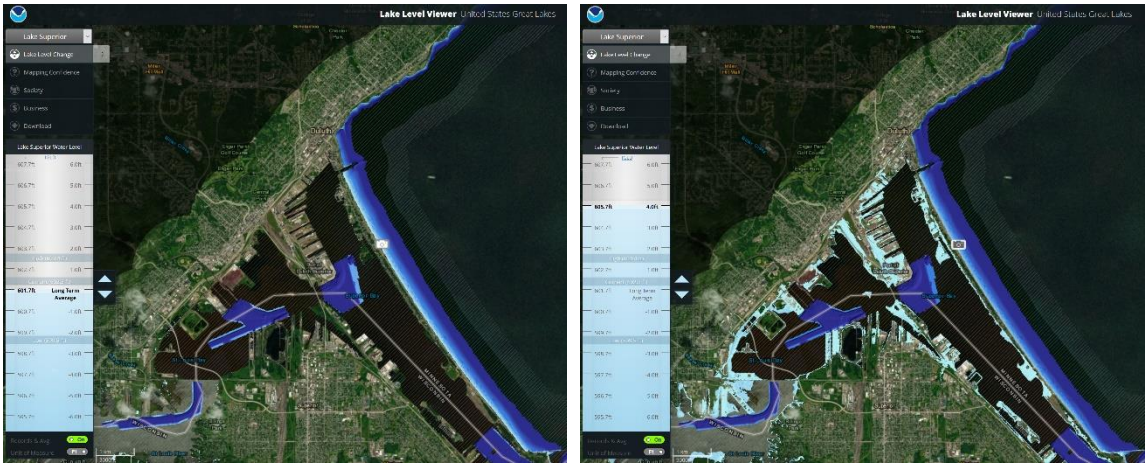

Figure 25: Using the water gauge to raise or lower the water level has a visible impact on the map.

wishes to see how a hypothetical 4-foot flood surge affect the Port of Duluth-Superior, they can simply click a toggle button to raise the water level. Doing so causes the water level to increase in two visible ways: through a skeuomorphic representation of a water gauge and through a sky-blue overlay that represents rising water on the map itself (See Figure 25). Toggleable overlays become highlighted when turned on and darken when turned off. These functions maintain a sense of liveliness, giving the impression that the system is present and attentive to the user and the user's actions within the UI. These features direct the possibilities for user action. Because the gauge is the largest interactive element other than the map, the LLV draws attention to the ability to change water levels as the premiere form of user action and interest.

Several other UI elements make backstage elements of the tool visible. For example, when users first enter the website, they are greeting by a splash page asking them to choose which lake they would like to visualize. Small print below the list of lakes explains that choosing a specific lake ensures that the correct elevations are loaded. In this context, the text acts as a critical 'constraint' on user freedom, preventing errors such as loading elevation

data for one lake and then choosing to drag the map view to reveal a different lake. In Norman's terms, constraints can be any of a range of physical, cultural, semantic, or logical limitations that limit the possibilities for meaning or action (p. 125-132). Constraints are the counterpart of 'affordances,' described by Norman as "a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used" (p. 11). Together, affordances and constraints provide the user with control, help prevent incorrect action, and manage errors. A strong system not only employs appropriate affordances and constraints to help users keep on task but makes at least some of those functions visible to its users. In other words, users should feel guided rather than coerced by the system. Through buttons, toggles, and textual warnings, the LLV helps ensure that users understand how the system functions and how they should interact with it.

The above forms of visibility are customary UI features, and thus familiar components of Holocene design. In the Anthropocene, systems must work beyond these granular features to frame how users orient themselves to higher-order concerns: how does climate change affect human and nonhuman systems? What kinds of planning should my community be undertaking? What a system makes visible implies the kinds of action that users should take; the Anthropocene asks us to retrain our sensitivities to appropriate actions within larger environmental pictures. In this sense, the LLV encounters a few challenges, particularly in terms of the kinds of practices it trains users to expect and undertake.

In recent studies of environmental visualization, questions about user action form a consistent undercurrent. For instance, several studies have praised user freedom within an interactive UI (Campbell, Journeavy, & Sheppard, 2009; Dockerty, et al., 2006; Sheppard, 2005; Sheppard, et al., 2011; Yi, et al., 2008), while others have expressed concern that too

much freedom enables users to misinterpret environmental data (MacFarlane, Stagg, Turner, Livesley, and Peering, 2005). Consequently, some researchers recommend that experts facilitate how users interact with visualizations, providing them with resources or instruction to understand the conceptual models that govern a given system (Salter, et al.; Meitner, 2005). In most cases, this expert guidance takes the form of an educational session or workshop (Salter, et al.). For the LLV, the designers have done exactly this through conference presentations and in-person and online workshops. However, a tool like the LLV is ultimately accessible to anyone with internet access, at any time and from any place. Particularly because it was designed for and serves local community in processes of deliberation, the LLV must train users in ways of seeing without expert intervention, relying only on cues within the UI. There is some evidence from shoreline community documents that the LLV has not make the relationship between system functions as clear as they need to be to facilitate meaningful user action, particularly within an Anthropocene frame. Specifically, early testing of the LLV wireframe indicated that some users experienced confusion about whether the water levels reflected real-time data or long-term averages. Consequently, the designers added a toggleable "Records & Avg." button, which makes high and low records and current average visible on the water gauge. This visual is enable by default. However, these interface elements may give users too much interpretive freedom. The toggle button is recessed at the bottom left corner of the screen, with grey text on a darker grey background, making its visibility low. Consequently, users may miss it. Additionally, the "high, "current," and "low" labels do not mention that they are records and averages, and only by making the association between the toggle and the on-screen labeling will users be able to parse an otherwise oblique relationship (See Figure 26). Indeed, some

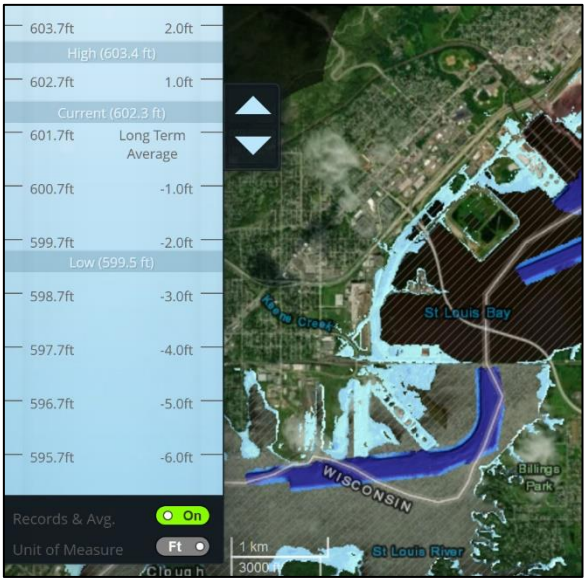

Figure 10: The LLV interface. Although the system includes a toggle button to display record and average water levels, these are not explicitly labeled as such on the water gauge itself, which only lists, "High," "Current," and "Low."

users appear to still experience confusion about this particular LLV function. In a Geologic Resources Inventory Report by the National Park Service and Department of the Interior (2015) concerning the Apostle Islands National Lakeshore, the LLV is described as a monitoring tool, implying that the tool reveals the current status of the lake. In fact, the LLV is not a monitoring tool and can be made to simulate any reality users wish to investigate, including but not limited to current water levels, which would first need to be identified using an outside data source. Because the system function is not as transparent as some users need, they gain the freedom of misinterpretation. If users interpret "Current" as referring to the current water level rather than the current average, they may in turn view the LLV a real-time reporting tool rather than one designed to support creative investigation. Thus, while the system appropriately tells users about the effect of granular actions like clicking buttons, it may inadvertently create alignment between the LLV and a set of environmental realities the tool is not actually aligned with.

This issue could be fixed by adjusting "Current" to read "Current Average," but

some difficulties remain. In particular, users may wonder just what a current average looks like in their material environments. While the blue flood overlay is readily visible, what it means on the more particulate level of, say, standing on a dock or walking along a beach is less clear. Furthermore, the Anthropocene may mean harsh, unpredictable climate scenarios beyond the historical norms. In that world, what does a current average mean for users? In an initial presentation by the NOAA Office of Coastal Management, one of the exigences that brought the LLV into being was the fact that the Great Lakes are slated to experience "significant drops" by 2100 (Marcy & Krumwiede, p. 8). That reality suggests that averages may need to be framed in terms of future projections to be more meaningful. Because such information is not made visible here, the LLV asks users to make decisions based on a model that presumes a static environment. In this sense, the LLV suggests the Holocene more than the Anthropocene; things tomorrow will be pretty much like today. For the LLV to become a truly Anthropocene-ready tool, it will need to make those broader narratives visible so that the possibilities of user action—within the UI and as members of communities—are framed by an awareness that tomorrow may in fact *never* look like today again. That knowledge, albeit uncomfortable, would help prepare users to develop and plan more resiliently for a deeply uncertain future.

Match between the System and the "Real" World

As argued in Chapter Three, our ability to build intimacies into our visual design will be an important form of Anthropocene action. By rhetorically folding disparate time periods together, we can entangle information in ways that offer audiences new rhetorical resources. But such entanglements are also necessary across species and orders of being. If we can

render a more vital, vivid interface between human, nonhuman, and geologic matter, we provide ourselves with useful assets for deliberation. Doing so matters in part because we are not naturally disposed to detect relationships that exceed our sense of distance in space, time, or scale. The Anthropocene concept makes us aware of how much we cannot readily sense: from plastics in our drinking water to the way our trash impacts species we will never ourselves encounter, we live in a time when our customary ways of witnessing the world are not an accurate metric for our experience of it. We are constantly shaped by phenomena too big or small, too slow or fast, to be apparent to us. Thus, Anthropocene technical design will need to make those hidden realities intimately visible while still providing audiences with usable information. The question might be this: how does a system help users experience the world from inside the system? For these reasons, questioning the LLV's match with the "real" world provides a further means to understand its Anthropocene readiness.

When we refer to the match between a system and the "real" world, we refer to the system's ability to "follow real-world conventions" and "speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms" (Kaley, 2018). A good match implies that designers have attended to users' experiences, and the LLV team has demonstrated an attention to users throughout the design process. The result of user testing is an interface that should be functional for anyone familiar with the ideas of the world, space, and navigation espoused by Google Maps or other UI-based mapping services. The familiar components are all here: zoom controls; gesture-based input such as the ability to pinch, zoom, click, and drag the map; satellite imagery and landmarks; and message boxes that supplement information given in standard UI. These elements follow familiar Western logics in which plus signs expand and minus signs contract, up and down

correspond to north and south, and moving one's fingers apart expands a view. Once again, the LLV generally succeeds at mapping its control logics to users' experiences in daily life, particularly motor operations. However, the Anthropocene forces us to confront the invisibilities of time, space, and scale. These are key issues. As Dockerty, Lovett, Appleton, Bone, and Sünnenberg (2006) contend, a "mismatch in time scales" is a central problem in garnering policy support for climate action (p. 103). Thus, to be a successful Anthropocene visual, the LLV must demonstrate these hidden dynamics in the world it presents.

Interestingly, the LLV does provide users with the tools to bend or rupture chronological time. Because the UI encourages users to raise or lower water levels, the LLV can be used to understand historical conditions to some degree. Users could simulate the near-historic water levels of 2013, for example. They could also investigate possible near-future flood or drought conditions. However, while this affordance allows users flexibility, it does not permit true temporal intimacy per a theory of rhetorical folding. This is largely because while the water levels are not fixed the satellite imagery is. Thus, the LLV is always anchored in the world as it was when the satellite imagery was taken, its ability to put users in contact with other times correspondingly limited. The LLV's world permanently, inevitably reflects patterns of geography, infrastructure, and conservation that have changed both visibly and imperceptibly through seasons of storms, surges, and freezes. In contrast, writers like Sosin are able to bring the reader into the deep past in a single paragraph. A complex, interactive system like the LLV nonetheless has constraints, the effortless recombination of time that can happen in a literary setting eludes the interface here.

Even within its near-past context, however, the LLV presents an idea of the world that is simplified in ways that limit rhetorical action. As noted earlier, the Anthropocene

requires that we understand the human place in a rich web of nonhuman factors, jettisoning familiar boundaries between nature and civilization. In the Anthropocene, good decision-making will require that we engage with a far more nuanced rhetorical situation. To be fair, the LLV makes gestures toward helping users see their connected with nonhuman ecosystems. For example, participants during testing reacted positively to the CanVis images depicting local landmarks. These visualizations were retained in the final design, providing users with an atmospheric perspective of local scenery. If users click on the Marquette Harbor Lighthouse, a small window pops up displaying a sparsely wooded promontory with a red-walled, black-roofed lighthouse against an open, blue sky. Raising the water level floods the view with blue water (See Figure 27). On the one hand, such visuals go some way toward providing users with a sense of place that transcends the remote, cartographic vision that mostly defines online mapping tools, and for that the designers should be commended. Such visualizations have been shown to heighten user engagement, such as in a study by Meitner, et al. (2005), which found that forest management visualizations containing local landmarks enhanced users' perception of the display's credibility.

However, this visual promotes what we might think of as tourist's view of the place, a three-variable system comprising the user, the island, and the water. CanVis may well help users feel emplaced, but the Anthropocene begs for a much deeper sense of emplacement. Too often in the Holocene, designers have engaged with environment as a discrete, isolated step, something that can be involved partway through a process of design and then set aside once a set of environmental needs have been met. In contrast, the Anthropocene suggests that engagement with environment is inevitable and not optional, both preceding and outlasting our awareness of it. As we strive to simplify our engagement and to reduce

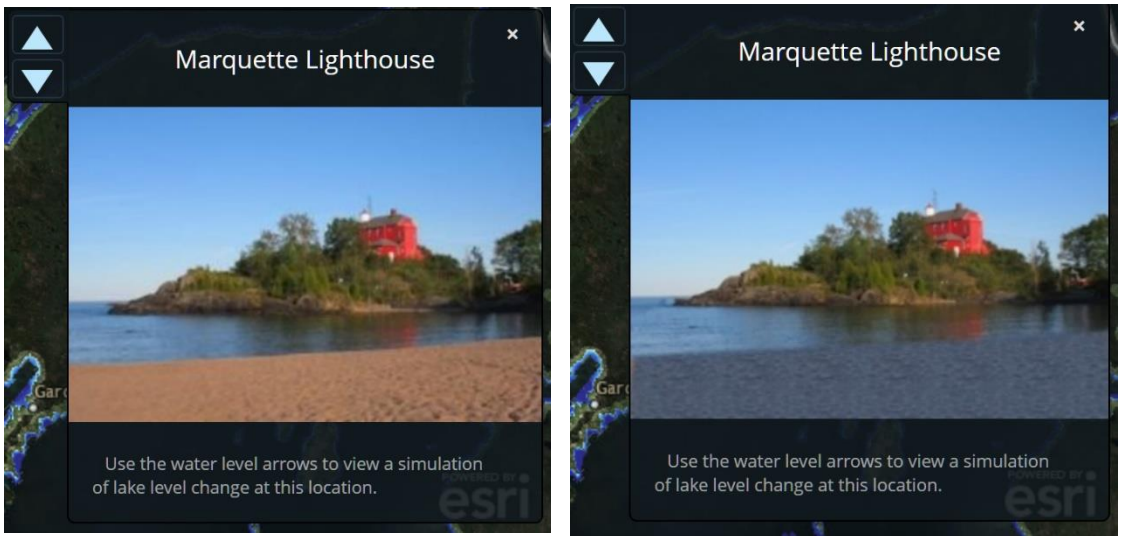

Figure 11: CanVis visualization of the Marquette Harbor Lighthouse at two different water levels.

complexity to a set of variables that users can manage, the complexity of environment engagement can be lost. Thus, CanVis provides a relatable view of the world but not a sufficient one for the Anthropocene. It asks users to be spectators rather than participants, to see major landmarks but not the complex flora and fauna of a nearby rock pool, the movement of industrial pollutants along the Iron Range, or long histories of felling and mining that create the shore as we see it today. To be fair, this is not an indictment of the LLV so much as the general procedures and tropes of contemporary design more broadly. We live in a world of toggles that obscures the persistence of that world. Were the LLV to be redeveloped for the Anthropocene, a more sustained, inevitable engagement with human and nonhuman species and matter would be necessary. Here, a question begins to emerge that should be critical for visual designers. In a Holocene visuality, we often retrofit human communication to address environmental concerns after initial conceptualization; how might a technical visual change if intimacy were the root of design rather than something injected during planning and development? What the Anthropocene really challenges us to do—and

which, as yet, our visuality struggles to accomplish—is a form of technical visual in which affect is irrevocably enmeshed, rather than belatedly engineered into, technical systems while nonetheless productively facilitating action. We return again to Buck's call for connection to be part of the infrastructure of design itself.

Interesting, a more nuanced Anthropocene worldview might well resonate with the LLV audience. In testing, users made a range of requests for content to be included in the final UI (See Table 2). In a traditional user-experience testing scenario, these data would be used to identify potential issues with the system being testing and determine which ones were critical to a large enough portion of the target population to act upon. The designer's tests suggest that several requests, particularly concerning marshlands, parcels, erosion rates, floodplain maps, critical infrastructure, and sedimentation, were shared by many users. In response, the LLV designers replaced an existing socioeconomic overlay with two distinct choropleths, "Society" and "Business" (Figure 28). Clicking the former overlay fills the interface shades and tints of red, where the deepest red indicates the highest social vulnerability "based on population attributes (e.g., age and poverty) and the built environment." A similar map for "Business" indicates number of employees in an area. Both choropleths can be toggled on, but not at the same time.

Certainly, the Anthropocene demands that we find ways to visually depict risk and vulnerability within our systems. Historically, risk was defined statistical and objective, but in the last three decades risk has been reconceptualized as socially situated and subject to constant redefinition (Beck, 1992; Slovic & Gregory, 1999; Finucane & Holup, 2005).

Table 1: Users' requests during testing of the LLV

Requested built environment context later	Number of requests	Requested natural environment context layer	Number of requests
Parcels	7	Wetlands/marshes	9
Critical Infrastructure	5	Erosion rates	6
Breakwalls/seawalls	4	Floodplain maps	6
Marinas/ports	4	Sedimentation/sandbars	5
Public access	4	Habitat types	4
Land use	3	Flood frequency	3
Bridges	2	Flood hazards	3
Parks	2	Lake bottom	3
Permitted structures	2	Rivers/streams	3
Slip layouts	2	Fisheries	2
Zoning	2	Ice cover	2
Hazardous facilities	1	Land cover	2
Navigation channels	1	Soil type	2
Poverty rates/ socioeconomic status	1	Wind direction/speed	2
Reservations	1	Beaches	1
Water use	1	Currents	1
		Evaporation scenarios	1
		Weather conditions	1

Other Requests	Number of requests
Historical water level gauges	1
Historic imagery	1
Locator maps	1
Oblique photos	1
Offshore surveys	1

(Table adapted from Roth, 2016)

During environmental crisis, a clear portrayal of risk can help users construct narratives that support decision-making, itself a subjective process dependent on beliefs, ideologies, and understandings of design. However, these two overlays offer a conceptually narrow, indeterminate portrait of risk due to oversimplified binning and an unarticulated data narrative. Binning, the process of grouping continuous data into discrete categories, is necessary when generating a choropleth, as opposed to a heat map, in which statistical changes in population attributes are depicted as a gradient. Nuances in the data are neutralized by these larger blocks of color, limiting the rhetorical resources they provide for deliberation. Additionally, the choropleth layers may confuse rather than clarify the overall map narrative. Because these shaded areas do not directly explain themselves, users might find themselves asking what exactly 'social vulnerability' means. A question mark near the layer toggle opens a tooltip box that attempts to clarify what the red parcels mean: "By

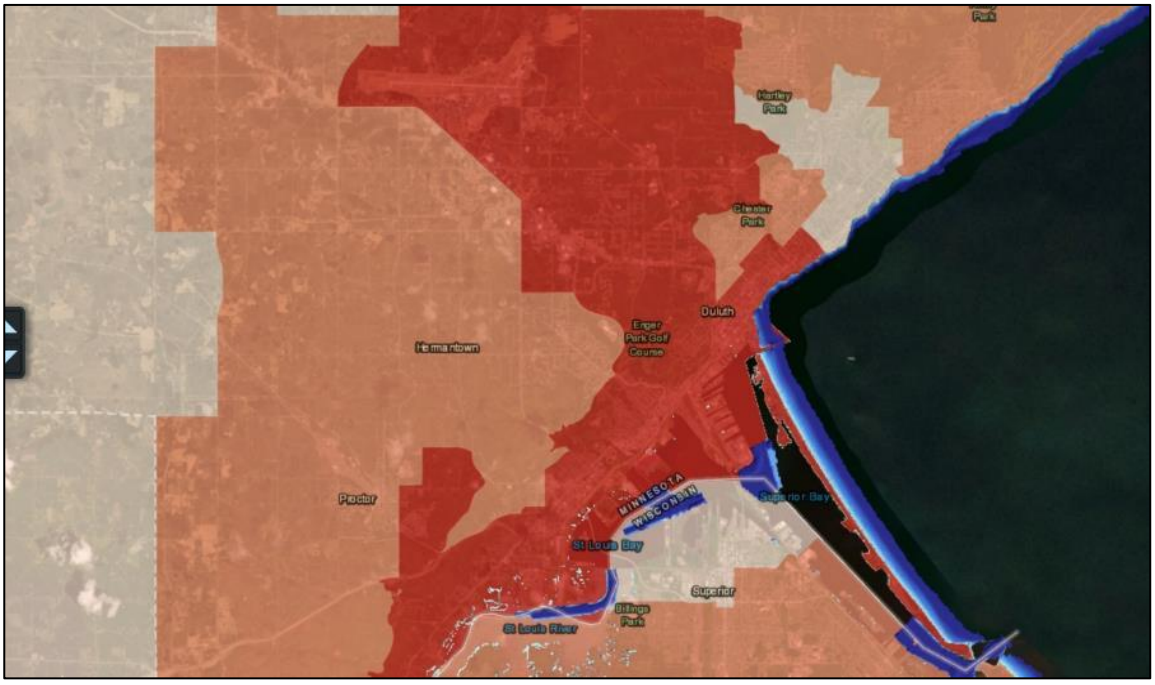

Figure 28: A choropleth map overlay depicting "Society" data in the Duluth, Minnesota area.

looking at the intersection of potential lake level change and vulnerable demographic groups, one can get an idea of how vulnerable populations might be affected by changing lake levels." But who are these vulnerable demographics? Is vulnerability within a certain red region equally distributed? Is vulnerability based on a shared set of factors? How, in fact, would these populations be affected by changing water levels? Some explanation can be found via a hyperlink to the University of South Carolina's Hazards & Vulnerability Research Institute, which produces a "Social Vulnerability" index based on determinants including socioeconomic status, gender, race and ethnicity, age, employment loss, residential property, and other factors. However, most LLV users are unlikely to browse deeply enough to find the link, let alone leave the LLV website to read about the index. Consequently, most users will see vulnerability expressed as a single variable divorced from any clear relationship to populations, conditions, or identities of the vulnerable. The choropleths in fact obscure people rather than reveal them, rendering an intersectional dataset largely non-actionable.

Perhaps the real loss of the choropleths, however, is that they provide a narrow set of deliberative assets that do not address the requests made by users. Three of the four most requested features during testing were nonhuman environmental data, but none of these appear in the LLV. Barring the UI's inclusion of water and LIDAR, the LLV does not provide any visible nonhuman data. This mismatch suggests a conflict between the world as perceived by the aggregate of users and the world as portrayed by the LLV.[4] Although user testing practices often lead designers to make choices about which issues are most pressing and which changes will benefit the most users, I would argue that this approach is perilous in

[4] The designers indicated in 2015 that they plan to roll out more overlays, although this is still pending.

the Anthropocene. The great variance in user requests does not reflect a lack of clear critical consensus but the multivariate reality of living in environmental crisis. A truly Anthropocene rendering of this data might find ways to bring requests such as bridges, fisheries, wetlands, and poverty rates together into the picture. Faced with the possibility that we tend to see only partial images of ecosystems, and that these partial views inhibit thoughtful decision-making, the LLV can only benefit users by encouraging an intermingled, composite picture of Great Lakes ecosystems and infrastructure. Fundamentally, the user testing data reveals the Superior shoreline as a place where people live and share complicated, affective experiences. That experience becomes reduced and generalized in the UI. This underlying simplification is both too familiar—it is, after all, the customary language of Holocene mapping—and too remote, lacking the intimacy produced by visuals that interweave or fold information together. If the LLV were to commit to a defamiliarizing, intimate Anthropocene visuality, the designers might introduce further and more nuanced overlays, allowing dynamic habitats and systems to rhetorically shadow the lakeshore as depicted.

Aesthetic design

From the LLV's granular functionality, we have turned to the ways that it engages with the world of the Great Lakes that users might know from firsthand experience. Finally, we turn to the underlying aesthetics that the LLV presents through its maps and atmospheric perspectives of landscapes. Questions about aesthetics have been central to landscape visualization scholarship, which has documented how users respond to varying levels of realism provided by 2D maps, low-polygon 3D landscapes, sophisticated renderings incorporating cloud cover and water reflections, and photo manipulations depicting potential

future landscapes. In a study of photo manipulation, Appleton and Lovett (2003) found that some respondents fixated on the object in a composition that most lacked detail, suggesting that elements with low modality realism might undermine overall persuasiveness. The researchers concluded that ground, vegetation, and foreground elements were most likely to enhance or detract from the user's experience. However, Spence and Pidgeon (2009) recommend simplifying complex visualizations to their salient details, limiting realism. In some cases, realism suffered when a visualization depicted an unrealistically high concentration of human and nonhuman features, such as a field, forest, hill, and house within one image (Dockerty, et al., 2005). Exaggerated future landscapes were considered alarmist by some users, while emotional anchors such as humans or animals were received favorably (Sheppard, 2005). In short, these differing research conclusions suggest just how profoundly individual and contingent people's reactions to environmental visualization can be. Although best practices for aesthetic representation remain an open question for scholarship, these studies do agree that a sense of place is important for users. This project concurs, further suggesting that what a UI should ultimately hope to achieve aesthetically is a sensation of 'belonging' in users, a sense of actionable investment or affinity that drives interest in interacting with the UI. In the precarious Anthropocene, our connection to place is at times all we have, and successful designs will help users invest in their world by facilitating these intimacies.

In the LLV, satellite imagery provides the dominant aesthetic experience, reflecting common features of Western visuality that many Great Lakes users will know well and be comfortable with: major highways and roads, blue rivers, scattered toponyms, and photographic imagery of geographic features. The UI largely hug the outside of the interface,

providing an unrestricted map reminiscent of a window or viewscreen. Despite its limited portrait of earth systems, users did respond positively to the CanVis visualization, which offers a deeper engagement with place. The resulting view reflects the experience of someone walking along the beach, but there are ways to improve the experience aesthetically. In the Marquette Harbor Lighthouse example above, note the appearance of the water (See Figure 27). When made to depict flood conditions, the additional water displays a regular, tessellated pattern indicative of a process called clone-painting. Clone-painting is a digital process available in most contemporary graphics editing software that allows users to select an area of an image and effectively stamp it onto other parts of the image. The process is used for image manipulation, including repairing blemishes in portraiture, fixing tears in old photos, or removing distracting elements. Here, the effect is regular and noticeable. The issue is not necessarily realism but focus: for some viewers, the repeated patterns will serve as a distraction and, in this case, an engagement with the materiality of the visual that will divert engagement with the lake shore toward engagement with the process of design. Although the Anthropocene asks for us to engage with the materiality of our made systems, interactive digital UIs do not command the same transparency as photography, and we are more aware of their construction and artifice by default. Here, CanVis is intended to put users in contact with their lived environments, and that goal might be undermined by flaws in the visual presentation that draw users' attention to the interface.

For some users, the LLV will appear to offer technical visuality without a strong sense of place. The map views are remote, and the atmospheric views are functional but at times somewhat roughly simulated. In short, the LLV reproduces the major features of a

place without the visual cues that facilitate user investment in the situations it portrays. As prior research has suggested the value of place, a future iteration of the LLV could benefit from drawing on the Great Lakes' cultural imaginary and the concrete requests made by users to better foster investment. While we might not expect a technical visual to include, say, ghost ships, underwater panthers, ancient mythological cataclysms, and views reminiscent of the Hudson River School painters—and these might not all be equally productive in the Anthropocene, anyway—the LLV presents an aesthetic vision that sometimes struggles to engage with the Great Lakes as what they are: a transnational borderland, permeable and changeable, a force that shapes ecology, weather, culture, and multispecies entanglements across the basin. To be clear, the NOAA designers who put a great deal of effort into the tool should be commended for a largely functional tool that has been taken up in some local decision-making and worlding, albeit often in a supplementary role. Rather, the ways that the LLV falls short of Anthropocene visuality speak to the intense difficulty of imagining an alternative to Holocene images. We are all trained in rote forms of visuality that, this study argues, cut us off from the world rather than place us in it, allowing us to see our environments only in partial fragments. The first chapter in this project suggested what an Anthropocene visuality might do to address the Anthropocene's provocations; the second and third chapters explored how forms of rhetorical folding, defamiliarization, and intimacy might facilitate better forms of seeing. What this chapter has provided is a heuristic examination of contemporary visuals through an Anthropocene lens, revealing how Holocene visuality can limit users' practical and felt experiences in digital systems. In the remainder of this chapter, I wish to discuss the broader implications of the Anthropocene for user experience and visual design, drawing on the collected insights of this

chapter and the prior three.

Discussion: Belonging, Resilience, and the Anthropocene

AT THE END OF THIS PROJECT, I wish to provide a final provocation for those who study writing, rhetoric, and communication. This provocation will be framed in terms of user experience, but I believe it can and should be relevant to anyone who involves an idea of the rhetorical situation in their work. The rhetorical situation, of course, is according to Bitzer (1968) the "complex of persons, events, objects, and relations presenting an action or potential exigence which can be completely or partially removed if discourse, introduced into the situation, can so constrain human decision or action as to bring about signification modification of the exigence" (p. 3). In other words, rhetorical situations are the contexts in which talking, writing, imaging, and all other communication happens, the group of factors to which rhetors must be attentive if they are to convey ideas successfully. I mention this definition here because this project has been covertly about rhetorical situations throughout—about the confluence of events, lives, matter, geographies, and ecologies that inflect the present in which we find ourselves and the possibilities for action. In the Anthropocene, the wall between nature and culture crumbles; so does the rhetorical situation, which can no longer have clear boundaries. How deep runs the history, the sequence of the events, the chains of being that must be understood to package the overwhelming problems of the world into functional text or image? The world inscribes shadows on us; the question is whether we allow our scholarly and public production to likewise speak those shadows.

And so the provocation is this: in a world of slow violence and hidden, accretive

phenomena, perhaps what we need now is ideas of a 'slow rhetorical situation' in our work. Here, I use the more acute example of a 'slow user experience' to help illustrate what I mean. User experience teaches us to design for users—for their actions, for their desires, for their environments, for the broader social contexts in which objects are used. Consequently, designing an effective user experience hinges on capturing users' perceptions through quantitative and qualitative metrics. Product reaction cards tell us how users actively perceive themselves experiencing a design, for instance. However, the Anthropocene takes away perception as an accurate indicator of experience. A broad range of Anthropocene phenomenon are effectively invisible to us, and we are hard pressed to evaluate, let alone report, say, the subtle way that microplastics leeches from sea salt into our food. Minute, incremental changes in our bodies happen due to the things we use. These nongenetic influences go on to shape our experience of living in unaccountable ways, occurring beyond the range of reportable sensory input. Additionally, our commonplaces further limit our ability to care about health or environmental consequences deferred by years or decades. None of this is new. In user experience testing, eye-tracking software can tell us details about how users interact with a system in ways they themselves could not begin to describe. The place on a screen to which the user's eye darts repeatedly is often beyond the range of conscious reporting.

However, the Anthropocene greatly expands that problem of perception. The Anthropocene experience does not have easy boundaries at which our user experience ends. Our health is shaped by factors accumulated over decades; our trash and byproducts contribute incrementally to drowning islands on the other side of the world. If the way I use a product today helps to produce a world I would not want to live in in a decade, or prevents

my children from living in a healthy world, are those outcomes also part of a product's user experience? Following Nixon's slow violence, we might think of slow UX as a provocation to push the ethical configuration surrounding everyday objects further. Nixon writes of slow violence as the product of "unequal attention given to spectacular and unspectacular time," and something similar might be true of user experience in the Anthropocene (p. 6). What we usually consider user experience takes place in spectacular time—spaces and places we can witness. User experiences in unspectacular time—when the bag gets thrown away, when the plastic begins to degrade, when the button falls off—are some of the most consequential parts of a user's experience with an object, and some of the hardest to account for. A process of design for the Anthropocene will need to engage with the unenviable problem of representing, theorizing, and extending our awareness of user experience to encompass some of the global experiences that begin with persons doing things: dropping, breaking, throwing away, transforming, and leaving behind. More broadly, the scope of rhetorical situations must expand to consider how these entrenched, invisible relationships inform the possibilities of communication work.

If shadow rhetorics are the signatures of a complicated world that we express through our work, then forms of rhetoric folding—rotating, including, excluding, overlaying, and so on—are the ways we work with information in the Anthropocene. Using these tactics strategically can produce meaningful rhetorical effects: defamiliarization, intimacies, and belonging. In this scheme, slow rhetorical situations and user experiences are the raw material, the world itself, that we draw upon to produce those shadow rhetorics.

In simpler words, I propose that good communication in the Anthropocene will begin by observing the world with fresh eyes, understanding that the planet is impossibly

complicated, deeply connected, and rife with systemic issues. Design will move forward from there. Environment and equity will not be something retrofitted into the design process solely through, for example, environmental impact statements or a discrete phase in which we ask ourselves, "How green is this product?" or "What can we write about environment?" Design will begin with the messy, overwhelming, fraught connections and experiences that we would rather cordon off and simplify. We will face them up front, at the beginning of the conceptualization, rather than editing them into a design successively or only through testing for along the way. This provocation will be central to an Anthropocene visuality, building on Buck's own provocation, quoted earlier, that connection be "built into the infrastructure of new systems" (p. 375). Buck cites solar panels as an opportunity to create intimacy between ourselves and the sunlight. Such work requires a shift in vision, and thus a shift in visuality that enables us to see differently. Thinking like this is about pragmatic optimism: once more, we find that rhetoric and communication have a critical opportunity to remake and define our social vision so that, to quote Sagan and Druyan (2011), we emerge as "a species very like us, but with more our strengths and fewer of our weaknesses…more confident, far-seeing, capable, and prudent" (p. 329). If nothing else, it is an ideal which we might reach for in coming decades in which ecological mourning, disaster, and disparity will likely characterize many of our lifeworlds.

The central challenge in all work, as I see it, is for both scholars and practitioners to recognize that the Anthropocene needs advocates, and that rhetorical practitioners and scholars are positioned to perform that advocacy. Whereas Cagle and Tillery suggest that we can "advocate for and with that citizenry" (p. 160) I would like to suggest that we can advocacy for and with citizens, species, biota, and places—anyone and whatever lacks voice

or has been obfuscated by contemporary imaginaries. The role of scholars and practitioners as advocates will be to bring greater environmental empathy, connection, and belonging into rhetoric as well as technical and public communication. To this end, I would suggest that bringing even a small dose of chaos into our work can help suffuse it with rhetorical shadows and a deeper sense of place. Consider, for instance, two alternative visualizations of the Great Lakes basin, from the genres of scientific scholarship and public art, respectively. The first occurs in an architecture and urban planning study by Maria Arquero de Alarcón, Jennifer Maigret, Susan Landfried, and Bin Zhang (2016), titled "Visualizing the Dynamic Shorelands of the Great Lakes." The study advocates for "technically 'simple' techniques" of visualization that can be applied by local communities to envision shoreline changes, suggesting that they "can make a profound contribution as a component of holistic resilience planning" (p. 48). The study includes photo comparisons that depict changing Great Lakes shorelines along Grand Haven, Michigan throughout the twentieth and twenty-first century. The photos are taken at relatively close range to the shore, with visible houses, yards, roads, forests, and water in most images. The waters change, as we might expect, but so do the houses, the colors of the beaches, and the trees. Whereas the LLV presented a static reality, this image set observes and affirms the changing nature of place, providing a repeat photographic view that, much as in Chapter Three, implies a wealth of unnarrated stories and events in the intervening time between images. Thus, these visuals are subtly but immediately more empathic. They encourage us to spend time with them.

The second example I will point toward is an exhibit called *Invasive* by artist David Luke, who photographed Minnesota's northern woods and southern prairies in 2016, combining them to create "altered landscapes that reflect potential changes in Minnesota's

diverse ecology due to climate change and invasive species." In one photograph, a deer stands on a wide prairie with the distant land fading into a blue sky. Reflected in water in the foreground, the thick boreal forest of the Boundary Waters appears. In another image, a tall oak looms over open grassland while rows of craggy pines reflect in the water. In each photograph, Luke puts two landscapes into conversation to reveal what we will gain and lose in the coming decades of climate change. His work both defamiliarizes the landscape and places it in intimate contact with possible future itself. There is perhaps a sense of mourning here, recalling environmental historian Nancy Langston's sentiment earlier in the chapter. Langston elaborates:

> Lake Superior is one of the fastest warming lakes in the world, leading to enormous changes in its limnology, so that it may not remain a very cold, oligotrophic lake for much longer. For those of us who love the basin, it is hard to comprehend—even for people who don't know what oligotrophic means. You don't need to understand the details of limnology to understand something key is changing when Lake Superior begins to warm so quickly that algal blooms become common. (p. 217)

Luke's *Invasive* is not a tool that would enable users to understand water level rise, but it is predictive. Instead, his work is affective, crafted with an eye to residents' fears and feelings of loss. Those concerns are expressed in Luke's photographs, Langston's quote, and even the results of the LLV user testing. Choosing a more complex and nuanced reading of user experience or rhetorical situation enables us to sensitize our work to the concerns expressed by Luke and others. I am not suggesting that all technical communication must become an art project—only that art has something to teach us about design in the Anthropocene. We must find ways to make room for connectivity, loss, and belonging across time and space if our work is to be a functional part of public discourse and deliberation in the coming decades.

And if such intense belonging in technical diagrams and visuals sounds too impossible, strange, or idealistic, it is worth considering that while we can ignore environmental crisis, it will not spare us. We might say, "Yes, but not everyone's work focuses on environment," to which I would reply, "As our collective situation grows direr, we will all need to think environmentally regardless of what our work focuses on." Such focus is not only theoretically powerful but completely possible. As a final example, I will point to one of the finest examples of technical-visual design in recent years, Richard Misrach and Kate Orff's book *Petrochemical America.* In the book, referenced in Chapter 1, we see what happens when design begins with place and belonging first and technical communication second. Misrach and Orff explain the project in a 2012 interview with not-for-profit photography foundation *Aperture.* The book began when Misrach, a photographer, visited the southern United States in 1998 on commission to produce a series called "Picturing the South" for the High Museum of Art in Atlanta. During the trip, he found himself in Cancer Alley, where the toxic environment made him ill. A decade later, the museum asked Misrach to revisit his work, and he did so on the condition that he could return to Cancer Alley "Had it gotten better or worse?" Misrach asks. "What was the condition ten years later?" (Harris, 2012). More than that, he wanted to create "some sort of intervention," and began to work with architect Kate Orff to "unpack" the photographs. In Misrach's photos, Orff saw "phantom stories within every image," such as a photography of a sugar cane refinery along the Mississippi River Corridor. Overlaid on Misrach's photographs, Orff inscribes words, charts, graphs, and architectural renderings. For example, one photo depicts a sugar cane refinery. Its ghostly angles loom out of a thick white fog, which hangs over a broad, grassy field. Over the grass, a diagram of clean lines and icons

depict the nitrogen cycle and the lifeforms involved in it. Drawings of nitrogen-fixing bacteria are overlaid on the grass. A drawing of a bird, which uses and transports the nitrogen, is positioned as though flying over the field. Off to the side, spilling out of the image, a diagram of the *industrialized* nitrogen cycle is shown producing a variety of toxic phenomena. Viewers can compare the two cycles, but they cannot do so without the haunting shadow of the sugar cane refinery informing their experience of the data. The overlay is an inclusion, serving to defamiliarize the photograph. The photograph, in turn, provides a sense of intimacy. Together, they create a work of shadows in a way many of our contemporary design tools do not. In images like this one, *Petrochemical America* develops a tight, inextricable relationship between place, data, and belonging that is distinctly rooted in the artists' experiences. In the Anthropocene, this work might be one model for the kinds of rhetorics that will matter.

At the outset of this project, I asked whether we as a field had indeed successfully fulfilled Dragga and Voss's (2001) call to "humanize the visual display of information" (p. 269)? While not all the artifacts in this project have done so, Misrach and Orff present us with an empathetic revision of our environmental commonplaces that can very much reshape how we imagine data—and thus the imaginary we draw upon to make critical decisions. In directing our attention to Misrach and Orff, I direct us also to the final part of an Anthropocene visuality, which I have mentioned obliquely throughout but only begun to define explicitly in this chapter. I began this project by identifying three key issues for the Anthropocene: (1) the historic human inability to see ecosystem connections, (2) problematic ideas of nature, particularly spectacular Romantic nature, and (3) issues of distance, including time, space, and scale. I have proposed a rhetorical schema in which we

produce forms of shadows within our work, providing them with the nuance they have historically lacked. If I were to summarize the goal of all these moves, it would be as 'belonging.' In Chapter Three, I suggested that connectivity helps us shift away from a need for spectacle, and doing so was a way to live, paraphrasing Leopold, in a world of wounds. Belonging is an ideal form that such connectivity might take. By belonging, I mean something like kin or kinship, terms used by Donna Haraway (2015) to describe multispecies relationships, but perhaps with a greater sense of place (something often composed in one way or another of beings). Belonging implies connection, which is made by destabilizing familiar linkages and inking new ones. Belonging between data or information helps us see context. Belonging where no belonging was before gives us new possibilities for action. Belonging helps us conceptualize a new nature in which we place ourselves alongside other life, human and otherwise. Being, and being together, is one of the best things that thinking through the Anthropocene lens can give us back, given that we have for a long time cordoned ourselves off from the world. This would be the project for the third coast: shifting our energy and enthusiasm from what is immediate and spectacular to that which is social and locational by building systems based in belonging.

In a sense, to talk about emplaced, multispecies belonging is really to suggest the 'subjectification' of the world. In her 2014 keynote address to the Arts of Living on a Damaged Planet conference, American writer Ursula K. Le Guin spoke about subjectification in the Anthropocene. "To use the world well," said Le Guin, "we need to relearn our being in it, renew our awareness of belonging to the world. How do we go about it?" For Le Guin, speaking to a crowd of scholars, that meant reading from her short story, "The Author of the Acacia Seeds," written as an academic journal article announcing a

successful attempt at reading ant language. Toward the end of piece, Le Guin's academic narrator suggests research directions after the entomological linguistic turn: "We have not faced the almost terrifying challenge of the Plant," Le Guin says. "If a non-communicative, vegetative art exists, we must rethink the very elements of our science, and learn a whole new set of techniques." Le Guin's academic audience chuckle at the gentle needling and the fantastical absurdity, but her humor is pointed. Le Guin goes on suggest:

> It seems as if nothing is single in this universe and nothing goes one way. In this view, humans appear as particularly lively, intense, aware nodes of relation in an infinite network of connections, simple or complicated, direct or hidden, strong or delicate, temporary or very long lasting, a web of connections infinite, but locally fragile, with and among everything, all beings, including what we generally class as things, objects.

Le Guin's goal, then, is to "subjectify the universe…not to co-opt and colonize and exploit." For Le Guin, science allows us to describe from "outside," to "explicate," and poetry allows us to describe from "inside," to "implicate." She notes, however, that "We need the language of both science and poetry to save us from ignorant irresponsibility." In Le Guin's words, we see an echo of Buck's move to enchant the relationship between people and sunlight by way of solar panels, and the visual alembic of species, landscapes, industries, and people in Misrach and Orff *Petrochemical America.* I believe we see a growing transdisciplinary consensus emerging that connection and belonging are our route through a difficult time. Having pushed ourselves to a brink, we have no room left for convenient but artificial divisions. Science and art must be co-inhabitants of our rhetorics. This means a fundamental shift in how we see and communicate, and a terribly inconvenient one to be sure. But as it is inconvenient, so too is it necessary. And if it is necessary, so too is it possible. Over two hundred years ago, the naturalist Alexander von Humboldt—ecologist, science

communicator, climatologist, and antislavery advocate—climbed the mountain Chimborazo in the Andes and created the *Naturgemälde,* which Wulf argues "would change the way future generations perceived the natural world" (p. 93). Depicting the mountain itself, the *Naturgemälde* places the name of each plant species where Humboldt found it as he climbed, from the foothills to the snowline (See Figure 29). On either side of the mountain, columns of weather and atmospheric data are arranged so that the viewer can cross-reference them with the position of the mountain's flora. The *Naturgemälde* also included the heights of other mountains, enabling global comparison. A distinctly technical drawing, Humboldt's work is deeply rooted in place and haunted by a network of belonging that is both local and global. Two centuries later, we should be just as capable of mixing registers as Humboldt.

What I am suggesting is that belonging is a small way to make sense of a complicated world in what might well be a dark time. We live in a moment in which we are caught between finding happiness by ignoring disaster or allowing cataclysm to fill our vision from end to end. But we shouldn't live in ignorance, and fatalism and shame aren't a productive space either. Somehow, there must be a middle ground. Here, again, is Le Guin:

> Increasingly often in these increasingly hard times I am asked by people I respect and admire, "Are you going to write books about the terrible injustice and misery of our world, or are you going to write escapist and consolatory fantasies?" I am urged by some to do one — by some to do the other. I am offered the Grand Inquisitor's choice. Will you choose freedom without happiness, or happiness without freedom? The only answer one can make, I think is: No. (p. 98)

I believe I am with Buck and Le Guin in believing that we are drawn to the paralyzing extremes of environmental narrative, but that ignorant bliss and fearful terror both cripple action. A system of visuality based in belonging is a means of coping with the wild swings in our desire and awareness, a way of teaching ourselves to both recognize violence without

falling apart and enjoy being alive without acting irresponsibly. More than that, an Anthropocene visuality is a call to rhetorical resilience: an invitation to reintegrate nature and culture by finding connections between data and art, two realms that were also never really separate. For a long time, our broken ideas of civilization and wilderness have caused us to live outside the world, a safer and less painful place, but not a place meant for long-term living. What we need now is to pick up the pieces of language and vision and use them to guide us back into the world we left behind.

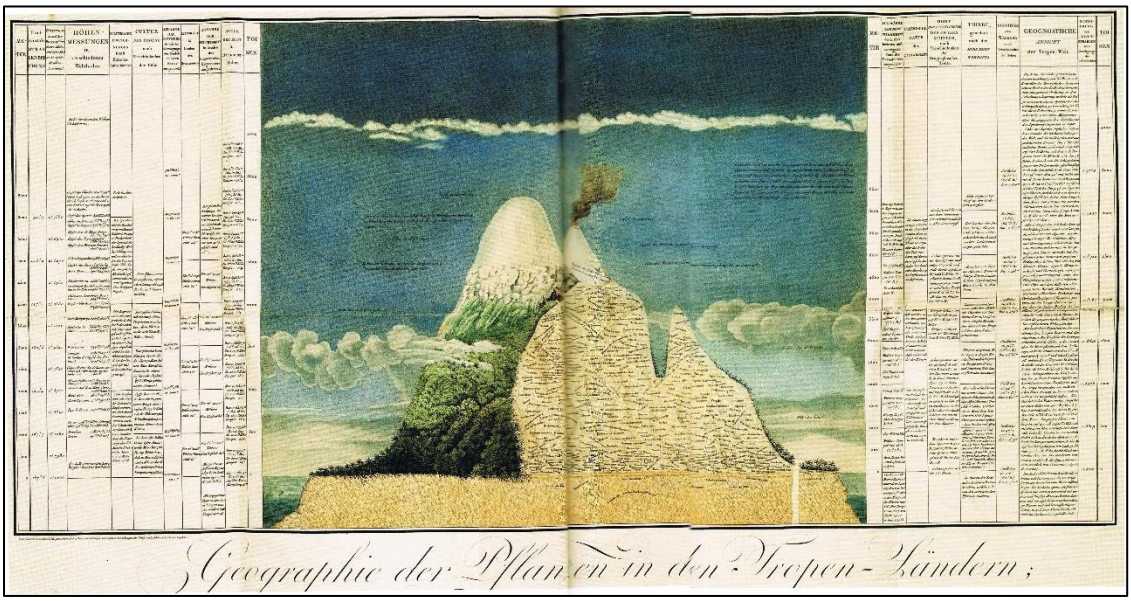

Figure 29: Alexander von Humboldt's *Naturgemälde,* depicting a world both local and without end (Bouquet & von Humboldt, 1807).

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