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America's National Parks and the Anthropocene: Addressing the Present to Accommodate the Future in Acadia National Park

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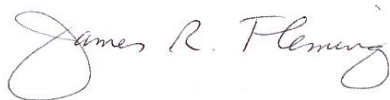
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America's National Parks and the Anthropocene: Addressing the Present to Accommodate the Future in Acadia National Park

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*Like the choice between competing political institutions, that
between competing paradigms proves to be a choice between
incompatible modes of community life*

—Thomas Kuhn, *The Structure of Scientific Revolutions*

Introduction

The relationship between humankind and nature has shifted drastically over the course of human history. For the past 11,700 years, Planet Earth has existed in the Holocene, a classification that geologists have ascribed to the most recent epoch in the stratification of geologic time (International Commission on Stratigraphy). Myriad geologists, archaeologists, and environmental scientists, in addition to scholars from a number of other disciplines, have proposed that the Earth has moved on from the Holocene to the Anthropocene; a new, human-dominated epoch in the geologic strata. Although it is not yet official, the effort to declare the new age of the Anthropocene has acquired strong support across the globe. In fact, proposals to acknowledge the epoch's formal existence have been under review by the International Commission on Stratigraphy. Ultimately, debates over the Anthropocene's presence continue, though it has certainly been gaining significant backing since the idea was formally proposed in 2000.

Those in favor of its distinction from the Holocene estimate that the Anthropocene started either right after the Industrial Revolution in the late eighteenth century, or around the Nuclear Era of the 1940s. Whatever the case, the Anthropocene emerges as a consequence of increased

technological development employed to accommodate an anthropocentric human existence. That is, rapid advancements in technology have driven the transformation from a primarily naturally controlled planet to an artificially dominated one, as landscapes became irreversibly transformed, species hunted to extinction, and atmospheric carbon dioxide concentrations amplified to unprecedented levels. While mainstream society continues to advance technology rapidly, the natural world has not been able to withstand the resulting constant, magnified anthropogenic stressors. Thus, the Anthropocene is characterized—if not defined by—the domestication of the Earth.

The Anthropocene presents a suite of challenges not only to the natural environment, but also to society, as humankind depends on natural processes and resources to sustain our species. Although domestication improves human wellbeing in many aspects, “over-domesticating” the Earth leads to the problems that define the Anthropocene. Extensive domestication degrades the natural world, in turn jeopardizing humankind’s health. The Anthropocene manifests itself in various changes, from flooded cities due to climate change, to threats to food security as a result of fishery exploitation. Human existence is, of course, inherently anthropocentric. The knowledge and understanding of anthropocentrism’s scaled impact, however, delineates substantial societal responsibility. To combat this trend of domestication that can be so damaging to humans and nature, conservation efforts have also come to characterize the Anthropocene. Since its humble beginnings, conservation has come a long way. Conservation science now stands as a prominent interdisciplinary field, integrating new technologies to mitigate Anthropocene-defining problems and encouraging society to engage in such efforts. Some of the best known protected areas, national parks function as hybrid conservation areas by carefully integrating humans and the natural world. As such, they serve not only as recreational spaces, but

also as effective educational institutions concerning the public's understanding of humankind's relationship with nature. National parks have been designated across the globe since the United States first declared Yellowstone National Park in 1872. In the U.S. in particular, the national parks are staples of American culture and a testament to the country's connection to the outdoors. Thus, America's national parks provide a sound case study of the relationship between humans and nature in this new age. Many parks are at least one hundred years old, offering a look into how they have changed yet remained relevant one century later.

Despite the overwhelming evidence supporting the Anthropocene, no major geologic body has officially recognized this epoch. Failing to accept the human-driven transformation into this new epoch has broad implications for implementing efforts to preserve the threatened world upon which humankind relies. Public opinion dictates political action, rendering society's understanding of the Anthropocene absolutely imperative. Therefore, recognizing the Anthropocene is the first step towards mitigating its negative impacts. The National Park Service (NPS) presents an opportunity to address the Anthropocene effectively and introduce the concept to mainstream society. In order to explore how the Anthropocene might be addressed within the national parks, I evaluate one specific park. This work investigates Maine's Acadia National Park in the context of the Anthropocene, maintaining that this new epoch does, indeed, exist at present. From increasing numbers of visitors trampling vegetation to warming sea surface temperatures, the park faces its fair share of Anthropocene-defining issues. By analyzing Acadia's past and present, I illustrate how the park can effectively communicate the Anthropocene to its broader audience.

In light of Acadia's facilitation of human interactions with nature, integrating the concept of the Anthropocene into the park's future operations has the potential to enhance a cultural

paradigm shift. One may draw an analogy between the various issues that characterize the Anthropocene and the challenges facing Acadia. Thus, this research has implications beyond the state of Maine—and even the United States. As a microcosm of the world, where humans and nature are fundamentally bound, Acadia serves as a local lesson for a global problem. Through examining the history of the American conservation movement and the National Park Service, I seek to understand how Acadia National Park can present the concept of the Anthropocene to the public. In other words, this work aims to illustrate how Acadia can address the present in order to accommodate the future. Adequately communicating humankind’s pervasive influence on a national park, as it manifests itself in the Anthropocene, may help transform mainstream society’s understanding of the parallel challenges facing the Earth.

CHAPTER ONE: Welcome to the Anthropocene

Rapid technological development and growing concerns over anthropogenic effects on the environment have left mainstream society attempting to define how humans relate to the natural world. In 2000, atmospheric chemist, Paul J. Crutzen, and limnologist, Eugene Stoermer, formally proposed the idea of “the Anthropocene,” a new geologic epoch in which humans are the dominant force shaping the Earth. To consider the Anthropocene as a new epoch in the stratification of geologic time is to claim that humans impact the Earth in such a way “that it can be distinguished using geologic indicators despite natural variability in these across the Holocene” (Ellis, 2013). Crutzen and Stoermer’s claim was revolutionary, as it depicted the inherent connection between human societies and natural systems—ultimately, humans and nature constantly influence each other. A consequence of increased technological development employed to accommodate an anthropocentric human existence, the Anthropocene presents

various challenges both to society and to the environment. Accommodating a rapidly increasing population and mitigating the subsequent problems is a defining point of concern in the Anthropocene. From climate change to polluted waterways, the human influence on Planet Earth is pervasive. Although humankind's relationship with nature in this new age has stimulated a culture of domestication, it has also subsequently fostered a philosophy of environmentalism that manifests itself in conservation efforts.

Humans have not always exerted such a permeating influence on the natural world. Early hunter-gatherer civilizations of the Pleistocene—an epoch that ended around 12,000 years ago—did not produce vastly different ecological effects than did the other communities with whom humans shared these lands (Krall, 2010). Thus, humankind remained in balance with the natural system—in fact, humans slowly evolved alongside nature. For over ten thousand years, little changed with regard to the technologies humans utilized to acquire necessary resources (Jeffries, 2009). During this time, these nomadic hunter-gatherers transitioned to the agriculturally reliant, settled societies known to the Holocene epoch. It is in the Holocene that the human impact on the planet began to accelerate (Trischler, 2016). New technologies enhanced human capabilities, perpetuating the domestication of animals and cultivation of plants. Agrarian societies subsequently underwent a notable shift in consciousness. According to Shepard (1982), the change in the human ethos dictated future interactions between humankind and the natural world. The distinction between controlled and uncontrolled nature took on a new meaning, as plants, animals, and even entire landscapes became potential acquisitions (Wuerthner, 2014). This shift in human culture stimulated the perceived difference between wilderness and civilization. In discussing the wild, Cronon (1996) notes, however, that one should not consider wilderness a place that has always separated humans and nature as contrasting forces. Instead, wild areas have

long been influenced by civilization—just not always in such a damaging way. Both humankind and the natural world adapt and change in response to one another. The ability to control nature meant that these societies were freed from a number of considerable natural pressures. Rolston III (1991) states that, in the Anthropocene, “[a]nimals are adapted to their niches; humans adapt their ecosystems to their needs.” Indeed, with early civilization’s novel transition to an agrarian society, humans took the first steps towards adapting nature to *their* needs. Considering the relatively static nature of societal progress in the previous millennia, such self-reliance was revolutionary; however, human impacts on nature were not yet globally significant. Gradual technological development in the Holocene still retained a balance between humans and nature.

Today, there are a number of indicators suggesting that humans are the planet’s most dominant environmental force, from anthropogenic climate change to widespread pollution in Antarctica (Wuerthner, 2014). The human influence extends far past lands directly transformed by humankind, into the atmosphere, hydrosphere, and uninhabited areas of the biosphere (Figure 1). Because of the interconnected nature of these spheres, anthropogenic impacts to one sphere are inevitably extended to the other two—and the cycle continues. It is not immediately evident how humans impact all of the areas listed in Figure 1, so to understand this pervasive influence better, let us consider ocean salinity as an example. The Atlantic Ocean’s Thermohaline Circulation (THC), which moves seawater throughout the world’s oceans, depends on differences in temperature and salinity in order to circulate water. Warm water is less dense than cold water, and more salty seawater is denser than less salty seawater. The THC operates based on warm equatorial seawater that moves to the poles, cools, sinks, and is then replaced by warmer surface waters, which then continue the cycle. As anthropogenic carbon emissions have amplified global climate change, Arctic sea ice has been melting at an unprecedented rate. This

cold melt water dilutes seawater, reducing salinity and, therefore, its density. The denser the water, the more it sinks, which is crucial for the THC and its influence on weather patterns, species migrations, and even human food security—as fish communities may migrate elsewhere. Thus, human actions are magnified throughout the world, therefore placing a considerable responsibility on our anthropocentric society. In this age, it seems that the planet is primarily shaped by humankind's successful attempts to control as much as possible—but how did we accomplish such dominion?

Human Influences Apparent in Many Aspects of the Changing Climate

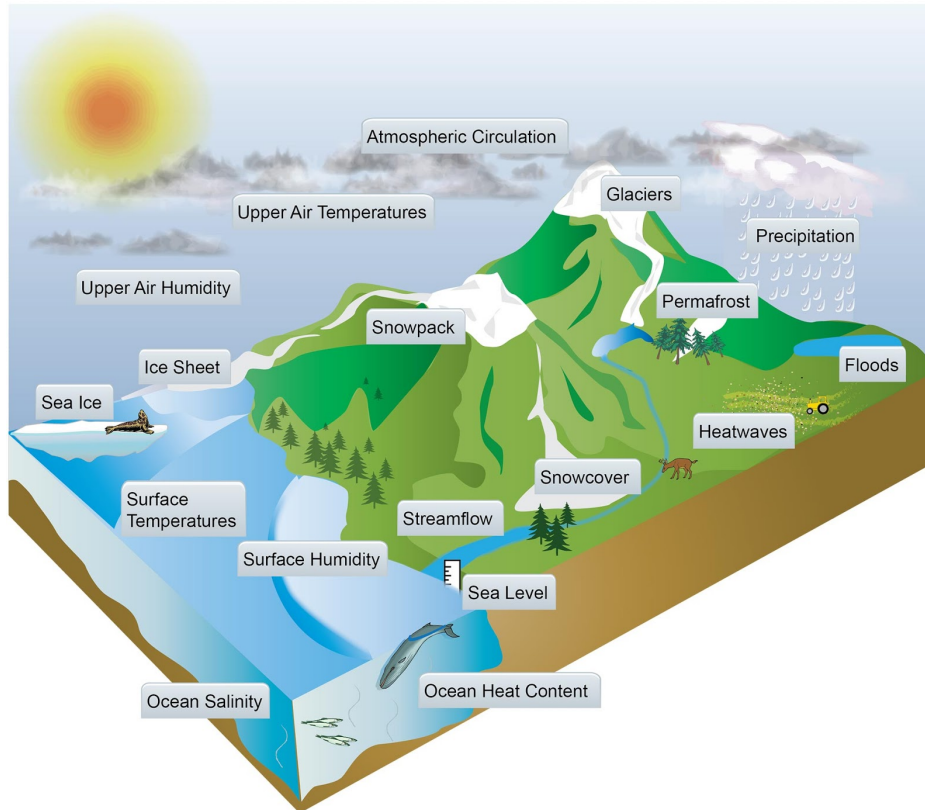


Figure 1. Illustration of just some of the current human impacts to the atmosphere, hydrosphere, and biosphere. Although this illustration highlights a single hypothetical area, natural phenomena such as ocean currents extend these impacts the global scale (globalchange.gov).

Humans are consumed by natural instincts, in particular, those to hunt and technologically develop, as these endeavors help us increase fitness. Of course, the innate drive

to improve and achieve fitness is natural; all living things operate on this fundamental truth. Developing new technologies allow humans to hunt more easily and successfully for sustenance, land, jobs, power; anything. Essentially, the human species has become unbound by the natural world—that is, the natural world is nearly incapable of hindering technological growth and artificial expansion. Because artificial—human—technology has progressed so rapidly, it seems that nature has not had the chance to respond. Human-made technology can be considered an artificial adaptation, just as an evolutionary adaptation, such as that of Darwin’s famous finch beaks, may be considered a natural technology. It is as if humankind is facilitating our own species’ evolution by way of *artificial* selection, while the natural world waits for the process of *natural* selection to occur.

To better understand how the progression of artificial technology has driven the shift into the Anthropocene, it is necessary to consider the three levels at which both technological and natural systems operate. Braden Allenby and Daniel Sarewitz describe these technological levels in their work, *The Techno-Human Condition*. Level I (the technology itself) is supported by Level II (subsystems), which shapes Level III (the world), then driving more Level I technology (Figure 2). A light bulb, for example, is supported by sub-systems such as power lines, which shape the world as it is today, in turn driving further manufacturing and innovation of the light bulb, requiring a greater supporting network—and the cycle persists. As a result of the light bulb’s influence on Level III, this innovation has been further developed into technologies such as the underwater flashlight, allowing humans to explore the deep ocean. The underwater flashlight requires a supporting network, such as factories to manufacture batteries, and ultimately impacts the natural world as previously mentioned. The newly shaped Level III drives more Level I innovation, and so on. It is not so much a chain of causes and effects, as Allenby

and Sarewitz claim, but rather a cycle that functions simultaneously (Figure 2). Level II does not just come after Level I, but is necessary at the same time in order for the first level (the actual technology) to be effective. Thus, we understand that technological innovation is a process—it is a highly complex system that cannot exist merely as one dimension.

In examining the three levels of the technological system, we can draw a parallel to the natural world, as Levels I, II, and III also function within nature (Figure 2). Within the natural system, Level I is an adaptation—the result of mutations that create fitness-improving features. Just like a technological innovation, an adaptation is defined by its effectiveness in accomplishing something. If the adaptation accomplishes the goal of increasing one's fitness and aiding in meeting the challenges of the day, then it is successful. Likewise, if a light bulb works correctly and increases our fitness by helping us meet the challenges of the day, then it is effective. Therefore, technology acts as an artificial adaptation, accomplishing the same natural goals as do naturally occurring adaptations—humans have merely created these adaptations on our own. In the natural system, Level II is the ecosystem that supports an adaptation, in the same way that technological sub-systems support Level I technology. As a mutation improves an individual's capacity to persist within its ecosystem, it proliferates through subsequent generations. The immediate environment by which one is surrounded drives natural selection, in turn supporting an adaptation and its continuing existence in future generations. Without the ecosystem supporting it, the adaptation cannot continue to exist, just as a light bulb will not work without Level II technology. Level III in the natural system is no different from the third level of the technological system. There is no separate technological human world from the natural planet—there is only one earth upon which humankind, and indeed all life, exists and therefore relies. To define humans as an entity separate from the rest of the natural world would be a vast

oversimplification. The inherent connection between artificial and natural systems reveals humankind's capacity to alter the earth in such a way as to enter the Anthropocene.

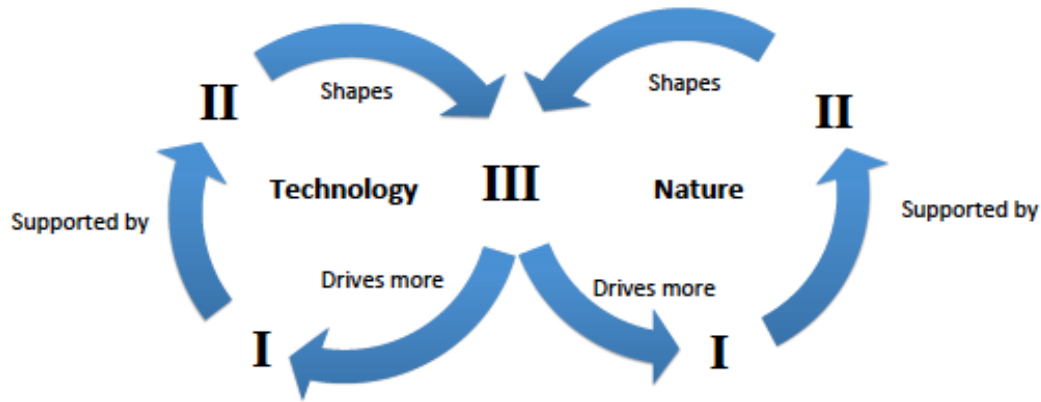


Figure 2. Diagram illustrates the three levels of the technological and natural systems. Both technology and nature share the same Level III. This dual cycle indicates the interconnected character of both systems to highlight their inherent influence on each other.

This concept sheds new light on Rolston III's (1991) claim that "humans adapt their ecosystems to their needs" in the Anthropocene. Humans are therefore no longer so inherently confined by other, natural pressures. Without environmental restraints, the human population continues to climb, artificially transforming natural landscapes as society demands more resources and increased technological development. As mainstream society dramatically alters the technological system's levels, those of the natural system are subsequently altered as well. As a result of society's unbound instincts and successful technologies, humans are on a course towards completely domesticating the Earth.

While some are skeptical, many scientists and academics accept the Anthropocene as a legitimate time period. At present, the greatest uncertainty is not whether or not we have entered the Anthropocene, but, rather, *when*. That is, at what point did technological development reach a tipping point that resulted in human dominion over the wilderness? Evaluating wilderness is a

matter of scale; the ecological influence of smaller, less technologically advanced societies were, indeed, congruent to that of other animals (Krall, 2010). Even with the interconnected systems of technology and nature, these historical societies exerted an impact modest enough for the natural system to tolerate—nature could keep up with the pace of societal development. Humans had dwelled in the wilderness for thousands of years without exercising the debilitating influence that mainstream society does today. According to Steffan *et al.* (2007), “preindustrial humans did not have the technological or organizational capability to match or dominate the great forces of nature.” As such, the Anthropocene must have begun relatively recently.

A number of scholars agree that this new epoch likely began sometime around the onset of the Industrial Revolution in late eighteenth century America, when rapid technological development drastically amplified human impacts on natural processes (Ellis, 2013). Increased industrialization meant burning coal to meet energy requirements, subsequently altering natural atmospheric carbon dioxide concentrations. Others maintain that the Anthropocene began during the Nuclear Era of the mid twentieth century—a time period that consisted of lasting consequences not just socially, but environmentally, too (Waters *et al.*, 2016). For example, radiation from nuclear weapons still persists in the environment, today. Combining these estimates, some claim that the Anthropocene exists in two stages—the first being the Industrial Era of 1800-1945, and the second referred to as the “Great Acceleration,” lasting from 1945 to the present (Steffan *et al.*, 2007). For example, the dramatic increase in carbon dioxide shown in the geologic record since the Industrial Revolution supports the first theory (Figure 3). This rapid increase has been correlated to significant temperature anomalies in the Northern Hemisphere that began around the same time (Figure 4). By the late eighteenth century, a few academics were already arguing for the existence of some kind of anthro-centered age (Trischler, 2016).

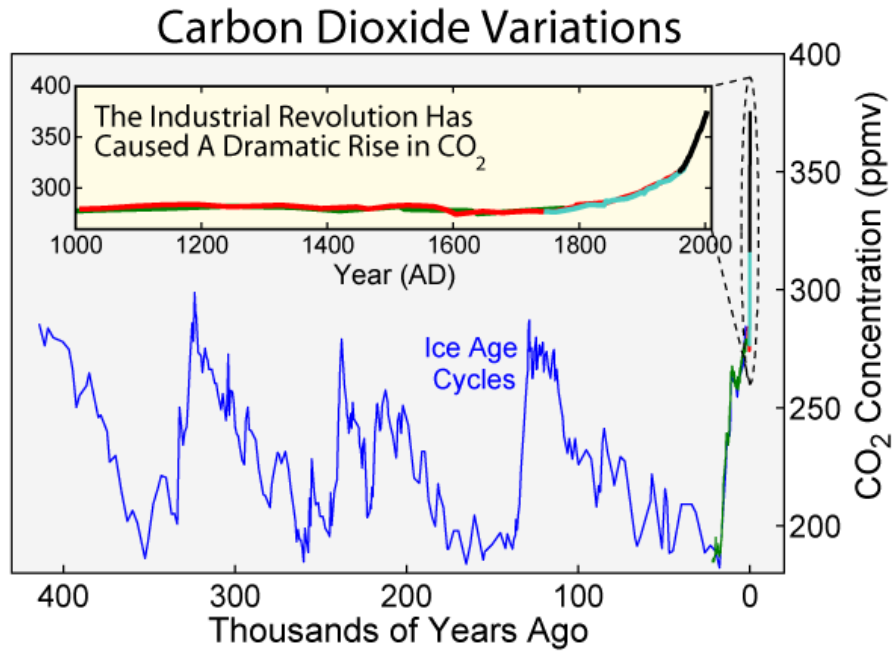


Figure 3. Historical global carbon dioxide concentrations in ppmv. Graph indicates a dramatic increase in carbon dioxide caused by the Industrial Revolution (Wheeling Jesuit University).

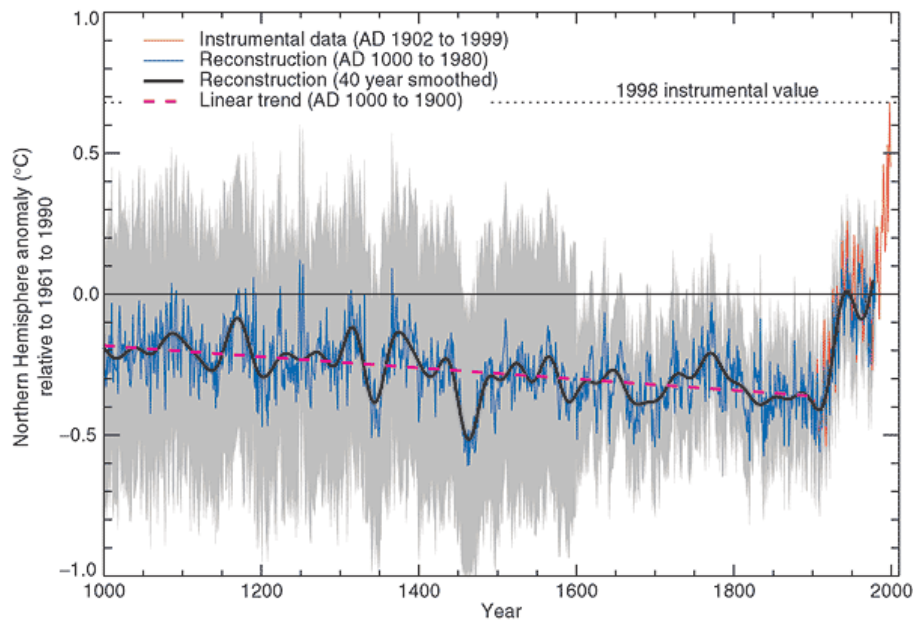


Figure 4. Historic Northern Hemisphere temperature anomalies relative to the period from 1961 to 1990. Included is instrumental data from 1902-1999, reconstructed data from 100-1980, reconstructed data (40 year smoothed), and the linear trend from 1000-1900 (IPCC Third Assessment Report).

Enlightenment ideals that were popularized in the eighteenth century ultimately lead to modernism, a cultural paradigm that drove the Industrial Revolution—and still dictates mainstream society in the twenty-first century (Oelschlaeger, 1991). Economic thought emerged from the modernist approach, as wild nature came to be seen as potential material resources; a natural means to a social end. With the Industrial Revolution, therefore, “applied science (technology)...drastically altered the relations, in force since the agricultural revolution, between culture and nature” (Oelschlaeger, 1991). Such a description of modernism aligns with Krall’s (2010) investigation into the human relationship with nature. She emphasizes the existence of an “ethos of domestication” in America that came about from employing economic liberalism in such a vast and uninhabited country at the onset of the Industrial Revolution. Consequently, wild lands were artificially transformed at an unprecedented rate. On a more fundamental level, this domestication ethos can be attributed to the “extraordinary intellectual revolution in recent centuries that has transformed [human cultures’] view of wilderness from a liability to an asset” (Wuerthner, 2014). Because artificial technologies began to outpace natural technologies, humankind came to perceive nature as less of an entity to be feared and more so an object of potential monetary value. The unbound nature of American society—culturally, economically, philosophically, and environmentally—coupled with the demands of an increasingly industrial world truly signifies the tipping point at the border between the Holocene and the Anthropocene. As other societies followed this trend, humankind tipped the geologic scale into the Anthropocene.

George Perkins Marsh’s 1864 work, *Man and Nature: Or, Physical Geography as Modified by Human Action*, detailed the diversity of ways in which humans had already altered the Earth. Marsh highlights that humankind modified the woods, the waters, and the sands, as

well as the flora and fauna therein. Writing that humans are “a power of a higher order than any of the other forms of animated life,” Marsh lends support for the Anthropocene. He additionally explains the present as well as future threats likely to arise from existent and potential human alterations such as construction of the Suez and Cape Cod Canals, draining the Netherlands’ Zuiderzee saltwater basin, and engaging in expansive mining practices. Not only does Marsh emphasize the manifestation of society’s ethos of domestication, but he also warns of its dangerous symptoms. Just under thirty years later, Historian Frederick Jackson Turner, at a meeting of the American Historical Association, claimed that, “[t]he existence of an area of free land, its continuous recession, and the advance of American settlement westward, explain American development” (National Humanities Center). That is, extensive domestication that defines American development is a direct result of such an ethos of domestication. Such ultimately explains the relationship between this cultural paradigm’s significant influence on the progression of American society and the Anthropocene’s inception.

Indeed, it was the societal and environmental changes stimulated by the Industrial Revolution in the 1800s that impacted the world so radically as to enter a new epoch (Trischler, 2016). Yet, the Anthropocene began over two centuries ago—where does the world stand after two hundred years of humankind’s dominion? Currently, an estimated 35% of the planet’s ice-free land is composed of domesticated ecosystems, and the trend is only expected to continue as the Anthropocene progresses (Keulartz, 2016). This may not seem like an issue, but such domestication requires both exploitation and depletion of the natural resources upon which we rely. With global populations predicted to continue growing at an exponential rate, societies require even greater consumption of natural resources; even more extensive domestication. Furthermore, domestication leads to ecosystem simplification. To explain this phenomenon,

Crook & Clapp (1998) emphasize that domesticating landscapes—often in order to acquire natural resources—almost always results in a loss of diversity. As their research focuses on timber harvest, in particular, Crook & Clapp highlight that economically and socially incentivized over-harvest of timber resources decreases both structural and species diversity. Domesticating these forests leaves the desired tree species the most abundant—and with only one dominant species, the entire ecosystem becomes vulnerable to that which might harm this tree. Losing rarer species and genetic diversity, “endangers the redundancy that allows ecosystems to adapt to stress and climatic change” (Crook & Clapp, 1998). In other words, such redundancy is imperative for ecosystems to deal with natural and unnatural stressors. Of course, this is applicable beyond forest ecosystems. As humans alter the environment for our own benefit, we end up decreasing, or even eliminating, the ecological function necessary for sustaining the resources so important to society.

From domestication’s significant decrease in ecological function and debilitating impacts to natural processes, larger-scale threats emerge. A human-dominated world is considered by many scientists to subsequently increase society’s susceptibility to extreme events and even natural variation (Messerli *et al.*, 2000). In the case of domesticating forests for timber, trees become less resistant to diseases and natural climate variability. If the resources on which humans rely weaken, then humankind weakens, as well. Thus, simplifying ecosystems is not just ecologically endangering, but also socially and economically unsustainable (Crook & Clapp, 1998). In posing significant risks to our economies and societies, such anthropocentric actions are self-destructive. Mainstream society’s anthropocentric interactions with the natural world in this epoch simply cannot be sustained for humankind’s future—as domestication proliferates, both humans and nature will become even more vulnerable.

Despite rampant domestication in the Anthropocene, Krall (2010) argues that the strongest connection between humankind and nature is our inherent affinity to the wilderness. Nature has long been of great impact to humans. Its majesty and mystery is simultaneously inspiring and frightening. Human encounters with, and observations of, the natural world have inspired countless works of art, scientific endeavors, and momentous explorations. Wild landscapes are credited with shaping American culture, society, politics, and even economics (Flad, 2009; Sellars, 1997). They are therefore integral parts of humankind for reasons beyond the purely ecological or material. That which led to the domestication ethos in the Industrial Revolution subsequently fueled a contrasting “wilderness ethos” (Krall, 2010). Around the end of the eighteenth century, Americans began to witness the depletion of crucial resources and destruction of the majestic landscapes that symbolized their nation’s values of freedom and opportunity. This sent humans into the wilderness in search of natural beauty and inspiration (Wuerthner, 2014).

As concerns grew regarding the future of wilderness, a greater commitment to preserving nature blossomed. The infatuation with the natural world popularized outdoor recreation—a prevalent aspect of American society even today. To facilitate the human integration into nature by way of recreation requires increased infrastructure—and, thus, domestication (Sellars, 1997). Nineteenth century mountain-resorts constructed to accommodate the public acted as “parlors in the wilderness,” allowing humans to engage in nature while also maintaining protection via the integration of artifice (Flad, 2009; Figure 5). The facilitation of humans and nature—although partially artificial—has long been crucial for shaping conservation ideals and affirming the importance of natural preservation. It was at these crossroads of the natural and the artificial that important themes in conservation were born (Flad, 2009). For example, many artists that stayed

in these mountain-resorts developed a profound appreciation for nature. Asher Durand, founder of the art magazine, *The Crayon*, wrote that artists should stay in America to document a wilderness that was “yet spared from the pollutions of civilization,” but rapidly disappearing (Flad, 2009). These artists hoped that beautiful depictions of the natural world would captivate mainstream society and stimulate preservation efforts. Cultural manifestations of the wilderness ethos—from the writings of John Muir to Ansel Adams’ photographs—ultimately appeared to bring about a new fascination and thirst for nature.



Figure 5. Brochure from 1893 for the Mohonk Mountain House, Lake Mohonk, New York. Resorts like the Mohonk Mountain House are considered parlors in the wilderness, as they attracted wealthy families and individuals that sought to recreate in the outdoors (Flad, 2009).

CHAPTER TWO: Conserving the Natural World

In the Anthropocene, human demand for the wilderness and the desire to preserve it are amplified. Conservation efforts have increased in the last century, as society has slowly begun to

treat the Anthropocene's human dominance as a dominion of stewardship rather than one of domestication (Liberati *et al.*, 2016). That is, mainstream society has come to attempt to utilize its dominion to prevent further degradation by exercising stewardship for the natural world. Employing both traditional and modern arguments for protecting the natural world, conservation has become more recognized, respected, and utilized on a global scale (Western & Pearl, 1989). Figure 6 illustrates this trend with a graph of the journal articles in the Scopus database that include the topic of conservation. Since 1909, the database's earliest record of literature matching the search criteria, the number of articles has increased exponentially, truly taking off in the 1960s. Although there was a decrease in articles from 2015 to 2016, the difference does not appear significant considering the diversity of factors contributing to these values. Because of humankind's "entirely new level of planetary importance," we have become "*de facto* planetary managers" (Keulartz, 2016). It is therefore mainstream society's responsibility not to abuse our power, but rather employ it for the planet's benefit. If we are the ones shaping the Earth, then we should also be the ones managing it.

Focusing in on the United States, the American conservation movement ultimately emerges as a consequence of the Anthropocene, as those involved have sought to preserve and restore spaces negatively impacted by the extensive human influence. Although conservation's pioneers had not heard the term, "Anthropocene," their actions were direct responses to observations of nature's degrading state. Conservationists were aware that these problems stemmed from human actions. Therefore, conservation efforts sought to counter problems resulting from the shift into a human-dominated epoch.

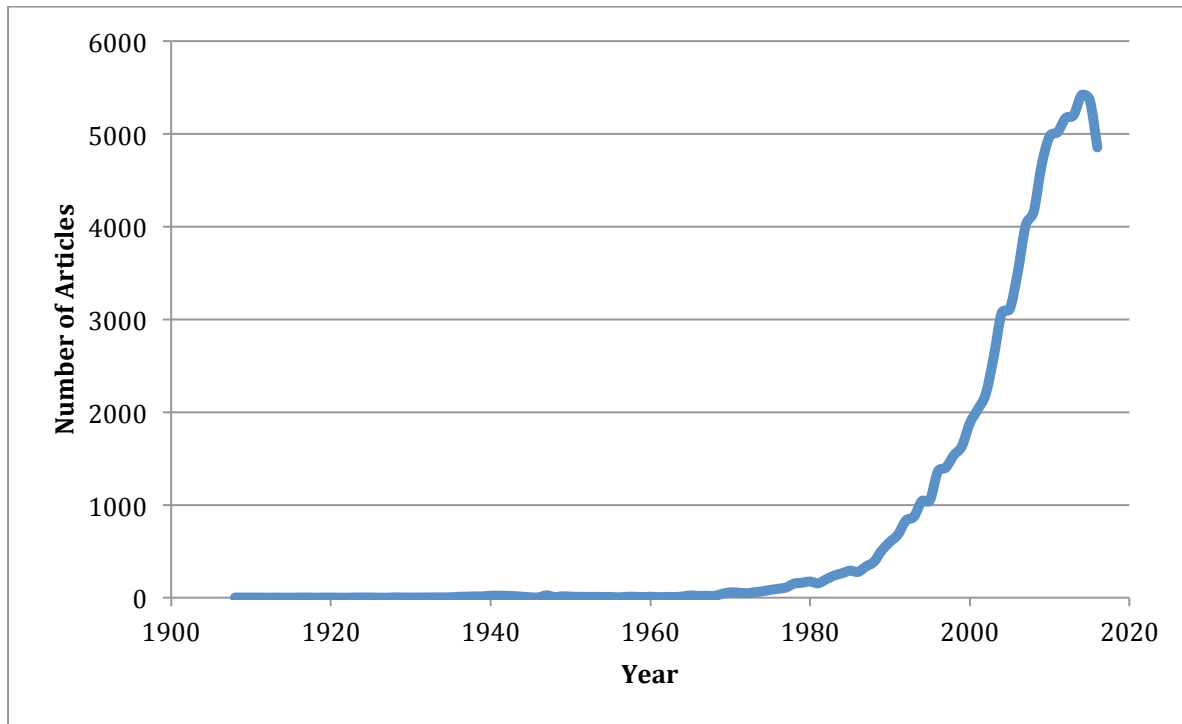


Figure 6. Graph of the number of articles in the Scopus database that include the word “conservation” in the title, abstract, or keywords. Results were filtered to articles in five subject areas (Agricultural and Biological Sciences; Environmental Science; Biochemistry, Genetics, and Molecular Biology; Earth and Planetary Sciences; and Energy). The affiliated country was also limited to the United States. (Scopus.com)

Investigating the movement’s roots reveals that initiatives to protect nature in the U.S. first began with urban elites. Rapid urbanization associated with the Industrial Revolution—indeed, the onset of the Anthropocene—brought about myriad problems. By the nineteenth century, cities were no longer small, but instead overcrowded, riddled with disease and pollution, and in generally poor sanitary conditions (Taylor, 2016). Thus, those who could afford to, left the city whenever possible in search of more pristine nature and a break from the ills of the urban environment. It was these individuals who often became involved in environmental affairs and even attempted to bring nature back to the city. Wealthy elites clustered their homes around public parks and eventually established private parks when space became scarce (Taylor, 2016). Some of the first conservation efforts occurred in urban areas, as residents desired to protect and develop common parks. Efforts to improve environmental conditions that were damaged by

industrialization, such as air and water quality, also began in the nineteenth century. Thus, the conservation movement took its first steps in response to the issues that we now know to define the Anthropocene.

Still, wealthy individuals desired larger spaces where they could engage in sports such as fishing and hunting. This brought city-dwellers farther into the countryside and out west to explore the wilderness. At the turn of the nineteenth century, considerable destruction had already occurred from “over-loving” nature—although the wild lands of the western U.S. had become much more accessible, the wildlife therein had become significantly scarcer (Taylor, 2016). This destruction motivated works such as Marsh’s *Man and Nature*. With wealthy outdoorsmen witnessing nature’s degradation, efforts to conserve emerged in the early 1800s. Fearing overexploitation of game species, hunter Jesse Kester published *The American Shooter’s Manual* in 1827. His work aimed to guide sustainable and ethical hunting during a time when the sport was taking off, and those involved typically did not think about the repercussions of their actions. Kester maintained that hunting is an intellectual pursuit, where hunters consequently hold a responsibility to become naturalists by studying the “habits of the game and environments in which they live” (Taylor, 2016). A number of other sportsmen took the same stance, insisting that declines in wild fish and game stocks were caused by those who did not care to hunt and fish sustainably. These recreational outdoorsmen were ultimately arguing for the conservation of wild animals and their natural habitats. Just as humans are responsible for studying and protecting the earth they now dominate, Kester—in the early years of the Anthropocene—insisted that hunters are responsible for understanding and protecting the species over which they hold dominion.

As wealthy families that wished to enjoy nature dwelled in the parlors of the wilderness, surrounded by increasing infrastructure, recreationists went to even greater lengths to preserve

the wildlife that they so enjoyed. Simply promoting minimally damaging hunting practices was not adequate for the growing population of wildlife advocates that emerged at the beginning of the nineteenth century. Taking matters into their own hands, groups of environmentally conscious individuals began establishing private game parks. These areas were created in order to conserve wildlife by developing breeding and stocking programs, instilling conservation concern among members, and—most controversially—excluding nonmembers from utilizing the grounds (Taylor, 2016). As such, the private game parks of the nineteenth century encompassed that which one might imagine as current conservationists' goals. They were hugely successful in promoting the importance of conservation among their members, and typically did end up benefitting wild stocks. As the public witnessed their success, game parks and other attempts to preserve prized fish and game species became even more popular at the start of the twentieth century (Marchetti & Moyle, 2010).

Although some were successful, early private game parks seemed to resemble domesticated playgrounds for hunters and anglers. With hunting serving as the basis for private game parks, however, Taylor (2016) notes that the clubs' annual meetings evolved into "little more than trap shooting contests." These selective access areas additionally created a significant class separation, where only the wealthy were permitted to interact with the natural world. Taylor (2016) writes that the residents surrounding private game parks "feared that New England was being turned into a game preserve for the wealthy." Even with the overarching goal to protect declining species, this conservation approach was ultimately an elitist endeavor. Wealthy urbanites that sought to conserve these areas did not consider the surrounding community that benefitted from the ecosystem services therein. Locals that fished and hunted for subsistence were excluded from game parks on account of their seemingly unsustainable use of these

species. As a result, those who lived around the parks viewed conservation less as a desire to protect nature, and more as an attempt to further separate the rich from the poor (Taylor, 2016). Ultimately, the failure to include those who relied on the natural resources within private game parks fueled a negative attitude towards conservation.

Advocates for the conservation of nature had been working on spreading their ideals and putting them into action throughout the nineteenth century. The likes of Henry David Thoreau, John Muir, and Frederick Law Olmstead—among many, many others—made the case for preserving nature by writing about anthropogenic damages to the environment, forming conservation clubs, and urging the federal government to intervene. Distributing scientific knowledge to the public has broad implications for conservation. With the primary mission to involve and educate regular citizens about the natural world, John Muir spearheaded the creation of the Sierra Club in 1892. Muir’s inclusive approach recognized that access to the wilderness should not be so selective as in private game parks. The sharp distinction between humans and the wilderness perplexed Muir. He believed that *all* citizens, even urban folks who may never see wilderness, could be convinced to care about nature (Marchetti & Moyle, 2010).

From this desire to protect healthy ecosystems and restore damaged wilderness came an important milestone for the field of conservation. In 1899, outdoorsman and elitist Edward H. Harriman embarked on an “all-expenses-paid” expedition to Alaska, bringing with him over twenty specialists, including notable conservationists such as John Muir, John Burroughs, and George Grinnell (Taylor, 2016; Burroughs & Wyatt, 1995). These individuals were pioneers of the American conservation movement—they were naturalists, writers, historians, and overall advocates for nature’s preservation. Unlike other similar expeditions that preceded Harriman’s, the trip focused primarily on scientific research (Burroughs & Wyatt, 1995). Thanks to

Harriman's funding, the group ultimately made landmark contributions to the scientific knowledge of the area, additionally gaining a better understanding of the ecosystems home to the species they fished and hunted so often. While outdoorsmen had been advocating for sustainable hunting and fishing practices for decades, the expedition's crew uncovered new information concerning ecological interactions in the wild. Harriman's journey fueled the growing trend towards scientific inquiry into the natural world. This trip, and similar ones that followed, provided the individuals that we now know to be pioneer conservationists with the necessary resources to study the dramatic and romantic wilderness they so idolized. It was these pioneers that worked with politicians to transform conservation ideals into legislation—without research into the ecosystems that one aims to protect and scientific evidence to support action, effective conservation remains an arduous challenge.

Knowledge concerning the intricate nature of the environment has proved crucial for conservation; however, it is not enough just for scientists to understand how the natural world functions and responds to anthropogenic influences. Educating the public about environmental issues that have emerged throughout the Anthropocene is critical for putting conservation into action. President Abraham Lincoln emphasizes the value of public opinion in a quotation from 1858: "Public opinion is everything. With it, nothing can fail. Without it nothing can succeed. He who molds public opinion goes deeper than he who enacts statutes and pronounces decisions." To convince the public of the destructive domestication that defines the Anthropocene is to succeed in driving conservation action. In other words, educating the public on the Anthropocene should lead to greater efforts to combat its deleterious impacts. During the nineteenth century, researchers realized that deforestation was related to environmental degradation, poor water quality, and disappearing wildlife—yet forest protection only gained popularity as society was

exposed to this new knowledge (Taylor, 2016). Finally, the public was beginning to recognize the interconnected nature of the Earth, as human impacts to one aspect of the environment are reverberated throughout the ecosystem, and even across communities.

When awareness of the nation's deteriorating environment increased among the American people, largely as a result of scientific knowledge that informed groups like the Sierra Club, conservation efforts subsequently became much more common. A notable example, it was under the advice of the environmental groups that formed from this progression of knowledge that President Theodore Roosevelt made landmark contributions to the conservation movement. Throughout his Presidency in the early 1900s, Roosevelt added millions of acres of forest reserves, withdrew millions more acres of land from coal and oil exploitation, formed federal groups to manage and protect natural areas, and amplified wildlife laws' enforcement (Marchetti & Moyle, 2010). The intentions of the growing number of groups and individuals who sought to educate the public were essential in making conservation a political endeavor. From these historic contributions, the trend of environmental stewardship carried over to other presidents that followed Roosevelt in the following decades. Thus, we find evidence for Lincoln's claim—if the greater public can agree on an issue, then it is worth working into policy.

The following period, referred to as the “era of environmental management” by Marchetti & Moyle (2010), saw the creation of a number of landmark policies that still remain today. Between the 1960s and late '70s, the Wilderness Act, Endangered Species Act, National Environmental Quality Act, and dozens more conservation-focused policies were passed. The Environmental Protection Agency (EPA), credited with passing both the Clean Air and Clean Water Acts, was also established (Environmental Protection Agency, 2016). In a monumental cultural moment, the nation celebrated its first “Earth Day” in 1972, solidifying a significant

concern for the environment. A considerable portion of America's population was now worried about the natural world's future, and policy responded. The legislation that arose in these two decades provided some hope for the state of the environment, as people felt that environmental problems could be solved with management (Marchetti & Moyle, 2010). At the same time, however, the U.S. was rapidly continuing to develop, expanding highways, increasing energy consumption, and industrializing agriculture. So even as American society hoped to help the environment, the nation failed to do so. Such a contradiction in action results from the segregation of humans and nature. The attitude that setting aside conservation land allows for expansive domestication and degradation presents the question at the heart of the Anthropocene: how is humankind to support both society and the natural world?

In the early- to mid-twentieth century, the American conservation movement saw considerable progress concerning scientific knowledge of wildlife populations and ecosystems (Marchetti & Moyle, 2010). Scientists, and eventually the public, were becoming more and more aware that it was not just game species that required protection. This understanding is a major aspect of the basis for much of today's conservation efforts, as many managers disagree with single-species approaches (Keulartz, 2016; Liberati *et al.*, 2016; Marchetti & Moyle, 2010). Aiming only to protect one species ignores nature's inherent complexity. Managers must instead consider the intricate connections within and between ecosystems if they are to effectively design conservation methods. It is this complexity that has brought us into the Anthropocene—thus, combatting the problems that have driven this new epoch requires that society recognize the Earth's connected nature. Yet, we often fail to remember that humans are a part of this complex system—it is ignorant, at best, to claim that humankind is separate from nature. In recognizing the need for conservation, one simultaneously recognizes the existence of the Anthropocene.

This must be addressed—educating the public on the Anthropocene is the first step towards enacting change to protect the Earth on which society relies. Humans are not only part of this complex system, but are now its primary drivers. As a result, conservation cannot leave humans out of the picture.

To understand how to effectively conserve nature, a new field of scientific research emerged in the 1980s. Conservation science made its mark in 1980 with the publication of its first textbook, *Conservation Biology: An Evolutionary-Ecological Perspective* (Marchetti & Moyle, 2010). Since then, researchers have come up with a number of methods for preserving Earth's biodiversity. Table 1 presents the primary methods and what they entail. In the end, Marchetti & Moyle (2010) write that when it comes to making decisions concerning conservation, one must base those decisions on “a mixture of historical, evolutionary, community, and species approaches blended with a dose of reality.” From these fundamentals comes the most recent development in conservation science. Restoration ecology is noted as a process where managers alter a location in such a way as to reestablish its historic ecosystem, which includes its ecological structure, function, and diversity. The most notable aspect of restoration ecology is its direct involvement of humans—managers continually alter the area throughout the restoration process in order to carefully oversee its recovery.

Table 1. The types of conservation efforts and their descriptions as explained in Marchetti & Moyle, 2010.

Conservation Method	Description
Species-level	<ul style="list-style-type: none"> • <i>In-situ</i>: preserving the habitat of a single species • <i>Ex-situ</i>: taking a single species out of its habitat (as a last-ditch effort to save it)
Community-level	<ul style="list-style-type: none"> • Protecting an entire community of species
Ecosystem-level	<ul style="list-style-type: none"> • Protecting an entire ecosystem in order to conserve ecosystem function and services • Emerged as scientists realized protecting one aspect of the ecosystem required protecting it in its entirety
Landscape-level	<ul style="list-style-type: none"> • Conserving multiple ecosystems by protecting large landscapes
Restoration Ecology	<ul style="list-style-type: none"> • Process of intentionally altering an area to reestablish a historic ecosystem • Seeks to restore ecological structure, function, and diversity • Directly involves humans

Conservation has been described as a method for restricting human interference in order to preserve imperative ecological characteristics and natural functions (Liberati *et al.*, 2016). For about half a century, the philosophy of conservation was primarily based upon a “hands-off” policy (Keulartz, 2016). Although today a multitude of scientists and scholars from a variety of disciplines have widely accepted the proposition that the earth now exists in the Anthropocene, Wuerthner (2014) highlights that there are large gaps in “the human footprint.” Natural, wild landscapes do still exist. Just as Durand encouraged the artist community to document such uninhabited places in the nineteenth century, Wuerthner (2014) similarly insists it is imperative

to identify and protect those ecosystems that remain healthy enough to perform critical ecological functions. This, however, should not mean *completely* restricting human interaction with conservation areas, though. While setting aside wilderness preservations has created patches of wild land, it has not done much to mitigate the aggressive domestication trend of the Anthropocene (Krall, 2010). Rather, it is absolutely imperative to promote the well-managed integration of humans and nature through the public's involvement in conservation efforts. Echoing the concept of a dominion of stewardship, many early conservation actions—up until the latter half of the twentieth century—were grounded in the philosophy that humans could improve upon nature, and that wilderness must be under human control (Marchetti & Moyle, 2010). For example, fish species have historically been introduced in waterways for angling. In such cases, the goal was to improve natural waters by controlling the fish present. Yet introduced species often result in a whole suite of environmental problems, such as exploitation of lower level species and alterations in water quality. The natural world does not *need* to be under human control; however, earth's transition into the Anthropocene means that it is. Thus, it is humankind's job to conserve nature.

In considering Liberati *et al.*'s (2016) definition of conservation, one can conclude that humans must be restricted in conservation areas, but not entirely. The ever-changing nature of the Anthropocene requires society's consistent involvement in protecting natural areas. Still, only allowing managers into conservation areas fails to recognize the societal structure that dictates the relationship between humans and nature. In their work, *Conservation for the Twenty-first Century* (1989), Western & Pearl ask, "how can we ensure that our sense of what is best for nature is not merely what is best for society?" Perhaps the real question is how can one ensure that society understands that what is best for nature—or at least what is better than business as

usual—truly *is* what is best for society. Human perspectives on the degree to which the environment is in danger are largely influenced by exposure to the natural world (Clayton & Myers, 2015). Spaces that enrich the public in nature are more effective conservation areas than hands-off policies because they facilitate public appreciation and valuation of nature¹. In their work, *Conservation Psychology*, Clayton & Myers (2015) describe the significance of “psychological distance” to the field of nature conservation. Psychological distance refers to one’s perceived distance from an issue or threat—in this case, one pertaining to the natural world. Four major categorizations of psychological distance explain varying perceptions of one’s distance from the issue:

1. **Spatial:** The perception that the effects of the problem will be elsewhere, rather than the environment with which one interacts.
2. **Temporal:** The perception that the effects of the issue will not be felt for a considerably long time, most likely beyond one’s lifetime.
3. **Social:** The effects of the issue are perceived to be felt only by others and not one’s self.
4. **Conceptual:** The effects of the issue are perceived to be uncertain.

The distance of the problem is negatively related to one’s concern about it as well as an individual’s preparedness to take action (Clayton & Myers, 2015). Consider excessive drought and global climate change on the U.S. west coast, for example. Significant droughts in the west have harmed agriculture, public access to water, and amplified the severity and rate of wildfires (Mieszkowski, 2014). From the perspective of an individual on the east coast, the problem is so spatially and socially distant that there is little to no incentive to be concerned. From the drought’s effects, however, agricultural products that are shipped to the east coast can become scarcer and more expensive. Furthermore, who’s to say that the east coast will not eventually

¹ Brown E., personal communication, March 8, 2017.

suffer from climate change-driven drought in the future? If one understands that the problems currently plaguing the west coast have broad implications that may impact the individual, then one's psychological distance to the issue will be much closer. This psychological phenomenon plays a critical role in risk perception, which often directs public motivation to consider environmental issues (Clayton & Myers, 2015). Thus, the problem with creating a sharp distinction between human society and the natural world becomes evident.

Shortening the psychological distance that so many individuals perceive of the problems associated with the Anthropocene has the potential to positively alter humankind's relationship with the earth. Indeed, it is imperative that mainstream society understands the true distance of such issues. Careful integration of humans into nature can occur without debilitating domestication and damage. One way to shorten the psychological distance to environmental problems is by employing an ecosystem services approach to conservation. Society has certain limiting resources without which it cannot subsist. Some managers insist that conservation essentially comes down to protecting these key ecosystem services (Keulartz, 2016). Because of the inherently complex interactions within and between ecosystems, however, targeting even just one service can mean preserving a larger network of the environment. Informing the public of the myriad ecosystem services society relies on, their value, and their risk of extirpation as the Anthropocene progresses, is crucial. Without access to the wilderness, the public is nearly incapable of forming an opinion on the value of the natural world—and without informed public opinion, nothing can succeed.

Most conservationists consider mass domestication and the associated impacts to be an ecological disaster, but humankind has reached a point where restoring ecosystems to their pristine state is ultimately an unrealistic goal (Keulartz, 2016). Even Muir, one of the fathers of

the environmental conservation movement, came to realize that to preserve the nation's wild lands, he would need to employ a more human-focused rhetoric and approach (Philippon, 2005). Like other environmentalists, Muir ultimately found that more pragmatic arguments centered on nature's benefits to humans were most effective in communicating the necessity of nature preserves. It is this concept that brought about the national parks idea, as Muir himself expressed the importance of maintaining a benevolent relationship with the natural world by way of carefully integrating the public into the wilderness (Philippon, 2005). Mitch Hauptman, Park Ranger for the National Park Service, emphasizes the danger in completely separating humans from nature. In his opinion, one cannot remove human beings from the equation of the natural world—separation risks fueling an “us versus them” attitude that pins humans against nature. The public plays a critical role in conservation efforts, and thus their engagement in the natural world is a high priority (Wuerthner, 2014).

Conservation has sought to mitigate anthropogenic impacts to the planet by setting aside natural areas, but creating a divide between humans and nature does not cure the spread of domestication. Alternatively, society must look to hybrid conservation areas that integrate humans into the natural world. In this way, conservation areas can serve as catalysts for initiating fundamental shifts in humankind's interactions with nature in the Anthropocene.

CHAPTER THREE: America's Best Idea Yet

National parks are some of the best known conservation areas in the United States, serving as facilitators of human interactions with nature. For one hundred years, the national parks have existed as culturally and ecologically valuable entities. They provide access to America's most majestic vistas, fascinating natural structures, and expansive outdoor recreation

areas. National parks maintain a diverse range of values, including educational and economic benefits, recreation, and public support that safeguards ecological function (Wuerthner *et al.*, 2015; Sellars, 1997). By carefully facilitating human engagement in the natural world, the parks effectively serve as hybrid conservation areas. Humankind's role in the Anthropocene ultimately presents a fundamental problem for both the planet and the national parks: maintaining a balance of accommodating both people and nature—that is, national parks struggle to accommodate public recreation while preserving natural landscapes' ecological integrity. At its inception, the National Park Service's goal was much more focused on human utilization rather than conservation (Sellars, 1997). As with private game parks of the nineteenth century, the national parks' original intention seemed more to control nature rather than conserve it. Such can be observed in past actions within the parks. For example, fire policy used to focus on putting out all fires, which ultimately led to even larger fires. Although fire suppression likely occurred due to a lack of knowledge concerning fire ecology, an ethos of domestication still appears present. A more shocking example, managers used to feed bears in Yellowstone National Park to bring them to the people². From around 1890 to the 1930s, Yellowstone visitors were treated to “bear shows,” where the public could observe black and grizzly bears eating at a provided “lunch counter” (Figure 7).

² Hauptman M., personal communication, March 13, 2017



Figure 7. Photograph circa 1930 of a Park Ranger speaking to the audience during a Yellowstone National Park “bear show.” The sign at far left reads, “Lunch Counter For Bears Only.” (National Park Service).

National parks were originally established in order to accommodate an increasing number of visitors in America’s scenic areas. The expansion of the U.S. railroad system allowed a greater proportion of the population to leave the city and enter the wilderness. Railroad companies capitalized on the nation’s natural beauty by attracting tourists to these stunning outdoor areas (Sellars, 1997). As such, railroad executives were big supporters of the parks, considering them an opportunity to increase business—and, indeed, they were. Referred to as “pleasuring grounds” at their inception, the national parks sought to prevent development and domestication of popular scenic and recreation areas. Sellars (1997) highlights the threat of “wholesale settlement” that led to the creation of the national parks—the hope was to ensure that a great number of people could utilize these spaces, not just those who won the rat race to claim them. To provide the best experience possible, proponents of the parks intended to preserve such areas in their “natural state.” This objective soon became especially challenging to uphold, as World War I brought the

need to acquire metals and timber located within park boundaries. Of course, those who advocated for maintaining the parks in their pristine condition opposed exploiting them for natural resources. It was from controversies such as these that the Organic Act was created.

The Organic Act of 1916, which established the National Park Service, states that it aims, “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” While the parks founding doctrine does mention the goal to leave the parks undamaged, the motivation for such preservation is fundamentally anthropocentric—the national parks were created for human enjoyment. The basis of this aforementioned goal mirrors Krall’s (2010) claim of an ethos of domestication that has dictated the human relationship with nature. As witnessed with other areas such as private game parks, the motivation for establishing a conservation area has a lasting influence on its operations. Indeed, exploring the parks’ history reveals their flaws. National parks have long been referred to as “America’s best idea yet”—but are they?

The national parks serve as a case study of a more wilderness-ethos oriented human relationship with nature. Yet, America’s national parks maintain the potential to alter society’s psychological distance from the natural world and the many problems that plague it. By merging societal interactions, scientific inquiry, and technological development, national parks occupy a crossroads of the natural and the artificial. In essence, the parks resemble a microcosm of our human-dominated world. After investigating the history of America’s national parks, it is understood that their progression mirrors that of humankind’s relationship with the natural world. The National Park Service’s evolution represents the ongoing cultural paradigm shift

from an ethos of domestication to that of environmental stewardship in response to the Anthropocene.

The decades following the National Park Service's formal establishment yielded substantial progress for land conservation in the United States. Before the Organic Act was passed, five national parks existed. In between 1916 and 1960, however, over twenty new parks were added to the National Park Service's repertoire. A group made up of public officials, scientists, and educational leaders, among others, formed the National Park Service Association in 1919. The goal was to make sure the public learned about the national parks while experiencing them (National Park Service, 2017). Founders additionally sought to bolster support for protecting and growing America's national parks while fostering responsible enjoyment by the increasing number of visitors. With the Association's establishment, the National Park Service started the movement towards its current state. One of the greatest contributions to the national parks came from President Franklin D. Roosevelt's Civilian Conservation Corps (CCC) and Emergency Conservation Work (ECW) Act. Implemented as part of FDR's New Deal during the Great Depression, the CCC took on a number of conservation-oriented field projects. Many of these took place within National Park Service boundaries, as the CCC worked on forest management, trail cutting and maintenance, and even biological surveys (National Park Service, 2017). From its extensive efforts, the Civilian Conservation Corps dramatically aided in shaping America's national parks into accessible areas, while also amplifying scientific research and infrastructural development. Still, it has been noted that CCC workers were not typically well-trained in conservation work. Without ample supervision, CCC teams did not always place the natural environment as the first priority, instead focusing most on recreation access.

The parks' mission then shifted to follow more of a wilderness ethos in the 1960s, aiming to represent “a vignette of primitive America” (Keiter, 2013). At present, the National Park Service focuses more towards well-managed integration of humans into the landscape (Ibid). According to Wuerthner *et al.* (2015), national park designation is incredibly beneficial for providing permanent preservation. So while three primary methods exist for protecting natural areas—transferring land ownership (purchase or donation), changing its purpose (such as park designation), and restriction of deed (easements that allow conservation practices on private lands)—park designation appears to be one of the most effective (Liberati *et al.*, 2016). The parks maintain a range of values, such as educational, economic, recreational, and environmental health benefits (Wuerthner *et al.*, 2015). Within national parks, humans can satisfy the natural affinity to the wilderness under the guidance of the Parks Service—our actions are more restricted, and therefore less damaging. In this way, humankind can observe the benefits of self-regulating the natural drive for artificial development. Research has shown that alternative conservation methods to national parks ultimately exhibit overall weaker protection. Areas protected under such methods are also often much smaller (Wuerthner *et al.*, 2015). By acting as vast, outdoor laboratories, the national parks help stakeholders better understand nature and, in turn, increase successful management to prevent further degradation (Keiter, 2013).

Each fiscal year, NPS's Natural Resource and Sciences Directorate takes requests from individual parks for conducting specific research concerning those parks. Emma Brown works in the division of Sound and Night Skies, conducting research to inform parks of what their mitigation options are. Her work also focuses on outreach to educate the public on anthropogenic threats to our night skies and natural sounds. As with many of the other human-caused impacts to national parks, all of the threats to natural sounds and night skies come from outside park

boundaries. Since the division was formed in the late 1990s, however, Brown notes that literature focusing on sound's effects on wildlife has increased exponentially. Viewed in this light, the national parks exist as microcosms of the world—they are laboratories for researching how humankind should engage with nature to prevent the detrimental domestication that characterizes the Anthropocene.

The National Park Service mission states that the parks are “set apart for the use, observation, health, and pleasure of the people” (Keiter, 2013). By designating these areas for human utilization, national parks may ultimately and inadvertently guide an anthropocentric perspective of conservation and preservation that endorses nature's exploitation. Keiter (2013) argues that we are currently at risk of taking the national parks for granted and losing sight of what such natural areas truly represent and provide. Both scientists and the public generally agree that national parks are valuable and worthy of protection, yet most disagree on what one actually constitutes. This lack of clarity can have implications for management, especially in planning for the Anthropocene's constant change (Keiter, 2013). The National Park Service states in their management policies, that in conflicts between conserving resources and providing for public enjoyment, “conservation is to be predominant” (Wuerthner *et al.*, 2015). This is not always the case—it is not rare for efforts to accommodate the public to outweigh those that preserve the park (Keiter, 2013). For example, in the early years, managers introduced non-native fish species into the waterways of a number of parks so that visitors could fish recreationally (Sellars, 1997). While this new opportunity fostered public engagement in nature, the introduction of these invasive species was ecologically debilitating.

Protected areas with greater management such as national parks are considered the most successful, yet there is currently a growing recognition that cultural traditions play a role in

shifting baselines in terms of mainstream society's perception of nature (Liberati *et al.*, 2016; Keulartz, 2016). Shifting baselines refer to the trend in which resource managers consider the state of their managed resource or area at the beginning of their careers to be the baseline upon which to evaluate future changes (Pauly, 1995). In this way, natural spaces within the parks can degrade from generation to generation without managers realizing. With this in mind, it is worthwhile to consider the human-induced ecological alterations to the parks throughout their early years. From fire suppression in Yosemite to bear shows in Yellowstone, national parks historically carried on operations with a shifted baseline perspective for management (Sellars, 1997; National Park Service, 2017).

Even with their negative aspects, however, the national parks are still net positive for humankind in light of trends associated with the Anthropocene. The creation of the National Park Service was a notable revolution for the world of conservation. As Sellars (1997) states, “the national park idea embraced the concept of nurturing and protecting nature—a remarkable reversal from the treatment of natural resources typical of the times.” Muir noted that the national parks allowed the public to witness that nature is not only a “fountain of timber and irrigating rivers,” but also a “fountain of life” (Philippon, 2005). In other words, public parks exposed the value of nature beyond merely a wealth of natural resources. Educating mainstream society about the natural world's value presents a unique opportunity. With the ability to capture the public's attention, the National Parks System can work to spread the knowledge of the Anthropocene. In doing so, the parks can help close the gap between the psychological and true distances of the problems associated with this novel epoch.

It is imperative to recognize that humankind's concurrent dependence and destruction of the natural world is playing one of the largest roles in global change (Messerli *et al.*, 2000). As

the human population continues to skyrocket, and society fails to halt development in order to accommodate an anthropocentric lifestyle, Anthropocene-defining phenomena such as climate change, pollution, and invasive species will only proliferate. The Anthropocene may indicate human dominion, but this does not mean society's impact on nature has to be negative. Instead, humans can employ a dominion of stewardship. Because national parks seek to accommodate both humans and nature—as does the planet—they can work towards instilling this dominion of stewardship in park visitors. At the very least, the parks exist as protected natural lands—but exhibit profound potential as both scientific and cultural laboratories.

August, 2016, marked the centennial celebration of the United States National Park Service's founding doctrine. As parks across the country celebrated the first one hundred years of the Organic Act, this event offers society the chance to think about the next century. Rather than generalize all of the diverse areas governed by the National Park Service, the next chapter employs a case study to illustrate a national park's potential to spread the concept of the Anthropocene and subsequently fuel a cultural paradigm shift.

CHAPTER FOUR: Acadia National Park

A local lesson for a global problem, Maine's Acadia National Park exists as a microcosm of the world—integrating humans and nature as it attempts to persevere through Anthropocene-defining phenomena. Like all national parks, Acadia is dynamic—both with regard to its ecosystems and its engagement with humans. The park faces changes that range from shifts in how the public perceives the park to how it should be managed (Keiter, 2013). These changes reflect that which drives and defines the Anthropocene, such as the perception of wild nature, an increasing base of scientific knowledge, and the inexorable pressures of population growth and

economic development (Ibid). Acadia faces two particularly opposing issues that are also globally prevalent in the age of the Anthropocene: accommodating humankind's generally anthropocentric actions and accommodating the environment (Sarnacki *et al.*, 2016b). In fact, Acadia National Park's Science Coordinator, Abraham Miller-Rushing, identifies the two greatest threats climate change and increased visitation. As the climate warms, Miller-Rushing expects visitation to increase even more—so as climate-driven problems manifest themselves in the region's ecology, this phenomenon additionally magnifies the pressures of accommodating a growing number of visitors. If we cannot sustain a national park in light of problems associated with accommodating the public, then we certainly cannot sustain a planet that is experiencing parallel challenges.

I: Acadia's Early Years

Acadia National Park's history essentially begins in the mid-1800s, when artists known as the “rusticators” popularized Mount Desert Island through paintings of its dramatic coastal scenery. Downeast Maine, as the region is known, lies where the boreal forests descend into rocky seacoasts. As the rusticators captured MDI's unique majesty, their works inspired people from urban areas to come witness it for themselves. Although they were originally comprised mostly of artists, rusticators included writers, naturalists, students, sportsmen, and adventurers; all seeking to engulf themselves in Mount Desert's rugged splendor (Coffin, 1993). Local farmers and fishermen provided rusticators with simple, inexpensive room and board—the rustic conditions for which these individuals got their name. Coffin (1993) describes the relationship between these visitors and the local community as a symbiotic relationship where both parties ultimately relied on each other.

By the nineteenth century, Mound Desert's growing popularity had completely changed the island. In fact, thirty hotels had already been built to house summer vacationers. This time period saw growing wealth among certain elite Americans, many of whom came to MDI to construct lavish estates quaintly referred to as "cottages." As these affluent communities sought recreation in the "true outdoors" they started the movement towards protecting the island's enchanting natural landscapes. George Bucknam Dorr, a wealthy conservationist from Boston, tirelessly pushed to preserve Mount Desert's inspiring lands. Captivated by MDI's beauty after spending summers Downeast in his youth, Dorr decided to permanently move to Bar Harbor. In 1901, fellow Bostonian and Mount Desert cottager Charles W. Eliot established the Hancock County Trustees of Public Reservations with the mission of "acquiring, owning and holding lands and other property in Hancock County for free public use" (National Park Service, 2017). Naturally, Dorr became a leading member of the Trustees, donating much of his own land for the organization's governance. After obtaining 5,000 acres of the island, the Trustees donated it to the public. While the National Park Service did not yet exist, Dorr continually acquired land and offered it up to the federal government (National Park Service, 2017). In 1916, he made a proposal to the Secretary of the Interior to establish Sieur de Monts National Monument, named after the French General that colonized MDI. For this, Dorr offered about 5,000 more acres of land that he described as, "rich in historic association, in scientific interest, and in landscape beauty" (Dorr, 1942). After some convincing, President Wilson signed the Proclamation on July 8th, 1916. With the new park came an opportunity to explore an area that had yet to be scientifically studied. Dr. Alfred G. Mayer of the Trustees noted, at the Monument's opening celebration, that Sieur de Monts could serve as a novel biological laboratory, additionally citing the need to study the region's fisheries. Evidence of the Anthropocene and attempts to mitigate

them had been recognized on Mount Desert, as Mayer lamented the unusually low catches of Cod and insisted on expanding such research (Dorr, 1942).

Yet, Dorr considered National Monument status as merely a step towards his true goal. National Monuments only received \$150 each year, a small sum in comparison to the \$5000 annually allocated to National Parks—an amount that would allow for more expansive wildlife protection than the few Sieur de Monts Park Rangers could provide (Dorr, 1942). Although Dorr and the other Trustees could certainly afford to pay for Rangers and other projects, themselves, national park designation meant stronger protection measures under the federal government (Hale Jr., 1949). Dorr therefore continued working towards gaining national park status in order to adequately protect MDI's natural treasures. Former President Teddy Roosevelt urged the Secretary of the Interior to designate Sieur de Monts as a national park in 1917, citing how its “striking ocean frontage makes it unlike any other [park] that we have.” Furthermore, and perhaps more importantly, Roosevelt highlighted that it was the only eastern national park (Dorr, 1942). Thus, Sieur de Monts was the sole park within the National Park Service that offered eastern city-dwellers the opportunity to engage in the natural world. On February 26th, 1919, President Woodrow Wilson established Lafayette National Park in place of Sieur de Monts National Monument. One decade later, the park's name changed to recognize the colonists who likened Mount Desert to the Greek region of Arcadia.

Although the Great Depression of the 1930s exhibited some of America's worst years, President Franklin D. Roosevelt's Civilian Conservation Corps was hugely beneficial for Acadia. For nine years, the CCC cut trails in the park and worked on disease control projects, among other things (National Park Service, 2017). Their work has left a lasting mark on Acadia, as the park was struggling to stay afloat prior to the CCC's arrival. Until then, Acadia was overgrown

and, for the most part, inaccessible to the public. Although the park's path committee—shown in Figure 8—worked to create trails throughout Acadia, their resources were limited. The Corps was instrumental in bringing society deep into the park's natural beauty, allowing the public to engage in and appreciate nature. In a sense, the CCC laid the groundwork for closing the psychological distance gap between humankind and Mount Desert's natural lands.



Figure 8. George B. Dorr (far right) with the Acadia National Park Path Committee on Jordan Pond in 1923 (National Park Service).

As Acadia became more accessible and increasingly popular, managers and the public alike started to notice degradation within the park. One particular example highlights the accelerated nature of such degradation. Sea Anemone Cave, located on the east end of Mount Desert Island, was previously a popular spot in Acadia, showcasing a wealth of biological diversity and impressive geologic formations (Motley & Rambach). Even before Sieur de Monts National Monument was established, visitors flocked to the cave to witness enchanting tide pools

rich with spectacular colors. Unfortunately, exponential surges in visitation after World War II raised concern over the apparent decrease in anemones and other species within the cave. In the 1960s, Acadia's Sea Anemone Cave was "hidden" by managers—signage, as well as the railing that led to the cave, were removed with the hopes of decreasing awareness of the spot. In this way, the cave remained accessible, though mostly hidden from the general public's eye. Still, Sea Anemone Cave's ecological integrity—particularly in terms of biological diversity—has had a difficult time recovering from human disturbances (Motley & Rambach). Such presents the central problem that continues to plague Acadia National Park: accommodating the public while simultaneously preserving the natural environment. This is only a single example, yet analogous cases have been observed throughout the park³. Indeed, Acadia echoes the larger, global paradox of the Anthropocene—supporting both mainstream society's anthropocentric, domesticating existence as well as the natural world upon which humankind so heavily depends.

Over the years, aristocrats such as John D. Rockefeller, Jr., son of Standard Oil tycoon Rockefeller, Sr., expanded Acadia's boundaries by donating tens of thousands of acres to the park. Conservation-minded individuals like Rockefeller and Dorr hoped that they could protect the area's ecological integrity while facilitating the greater public's engagement in nature (Dorr, 1942). For one hundred years, the park has been dedicated to protecting and maintaining its "scenic, ecological, historical, archeological, [and] cultural resources" (USCODE 2011). As with the National Park Service as a whole, Acadia's history has broad implications for where it stands today. The demographic of Acadia's founders appear to match that of those who established private game parks; however, the elite summer cottagers of Mount Desert Island exhibited a more welcome and inclusive attitude towards conservation. A century later, the Rockefeller family continues to support the park by donating land and monetary funds in order to ensure that

³ Miller-Rushing A., personal communication, March 13, 2017

Acadia can continue to accommodate its fragile ecology as well as its bounty of visitors (Schoodic Institute, 2015). Their investment is not for their own benefit, but that of the natural land and the public who engages in it.

II: Contemporary Acadia

Since its inception, much has changed, yet Acadia's mission remains steadfast—to protect the area's scenic, ecological, historical, archeological, and cultural resources. Acadia now offers myriad educational opportunities, conducts research in a number of scientific fields, and provides a place for the public to roam in nature, all while prioritizing conservation. Of course, conservation is not a simple task in a national park like Acadia, where visitation appears to be approaching an unknown carrying capacity⁴. While some national parks have started working on determining their carrying capacities, they have yet to publish conclusive estimates³. Manning (2009) maintains that, much like the Earth, parks can only be well managed within their carrying capacity, raising the question of what happens when this capacity is exceeded—and for that matter, what this capacity is. Acadia's Sea Anemone Cave provides an example of what can result from exceeding carrying capacity in certain areas of a national park. Over-visitation may mean substantial damage to the park's natural areas, depending on how management can adapt. Such damage would likely result in ecological impacts from human trampling, but could also include air, noise, or water pollution due to excessive automobile traffic and increased infrastructure.

⁴ Miller-Rushing A., personal communication, March 13, 2017; Roy A., personal communication, March 9, 2017.

Acadia is considered one of the most intensively used parks in the country, hosting roughly 2.5 million visitors each year on only 47,000 acres (Manning & Anderson, 2012). The park's annual visitation has jumped by over 50% in the last decade alone, from nearly 2.1 million in 2006 to about 3.3 million in 2016 (National Park Service, 2017; Sarnacki *et al.*, 2016b). These increases in the number of people exploring Acadia has meant eroded soil, trampled vegetation, polluted water, and disturbed wildlife (Manning, 2009). Infrastructure has had to grow in and around the park to accommodate more visitors, only contributing to domestication (Sarnacki *et al.*, 2016a). The park also struggles with other, more indirect, Anthropocene-defining problems. In the 1999 First Annual Report of Polluted Parks in Peril, Acadia National Park was listed as the fifth-most air-polluted park in the country (Ayers, 1999). A reassessment one decade later showed that Acadia's air quality had improved substantially; however, the park is still listed as an area of significant concern in some subcategories of air pollution (Natural Resource Program Center, 2010).

Research has found that Acadia experiences significant threats from anthropogenic climate change (Monahan *et al.*, 2016). Such include a decrease in the number of "cold" winter days, a longer summer season, an increase in storm frequency, and sea level rise. In turn, Acadia's ecosystems may lose up to 20% of their plant species, while experiencing an increase in invasive species migrating north (Star *et al.*, 2015). Miller-Rushing insists that climate change's impact is likely to be greater in Acadia than in other places because of the park's location at the boundary between temperate and boreal biomes. In the next seventy-five years, researchers expect a shift from the coniferous trees that characterize Acadia to deciduous forests. Consequently, Miller-Rushing explained that such a shift would change "just about everything" in Acadia. Its location at the intersection of boreal forests and the ocean is what sets Acadia apart

from other parks. The rugged pine-covered coastline that inspired nineteenth century rusticators may no longer exist in the future. Acadia's water quality is another concern in light of sea level rise potential, as saltwater intrusion can impact the quality of drinking water as well as the habitat of the species therein. One hundred years of the national parks presented a great cause for celebration—but with such damaging shifts in the coming century, will there be reason to celebrate the bicentennial?

While researchers from a number of organizations work on studies related to environmental health all over the world, Miller-Rushing insists that research done in a national park resonates more. The value that American society places on national parks defines how they are managed. Because the national parks really do belong to the people, a greater incentive exists to care for them than with land that is not designated. Citing Acadia's monumental research concerning mercury in the 1980s, Miller-Rushing explains the influence that national parks research has on policy. When one study revealed that shockingly high mercury levels in the fish within Acadia National Park were coming from coal-burning power plants, the government took action. This research informed Environmental Protection Agency emissions regulations for power plants that still apply today. When the public witnesses the true distance of Anthropocene-defining damages, concern grows, and the government responds. In the end, the public cares more for a national park than for inaccessible land. Should Acadia visitors understand the other ways in which the Anthropocene deleteriously manifests itself in the park, one can expect a similar response from policy-makers.

Scientific research within the park has been instrumental for uncovering these threats. It has also been critical for understanding how to solve such human-driven problems and continually plan for them in the future. Since 1988, the National Park Service has monitored for

“vital signs” in the parks. These include climate, water quality, and wetland and forest health (National Park Service, 2017). Managers were recognizing significant changes in their parks, and therefore sought to understand ecosystems’ health in order to effectively manage them. Using a historical ecology approach, researchers examined archives and historical records to compare past and present conditions, as well as interpret trends for the future. This method sheds light on the necessity to consider history when analyzing the current state of the natural world—in other words, sound research and management requires eliminating the shifting baseline syndrome. In December of 2016, the National Park Service instituted a new director’s order to address such change. Director’s Order 100: Resource Stewardship for the 21st Century, mandates that sites operating under NPS recognize that the environment is changing and that management must therefore shift from “preserving vignettes of primitive America” to managing for future change (NPS Director’s Order 100). In light of these changes, the order insists that management should aim to maintain ecological and cultural integrity by enhancing resilience. In considering whether or not efforts like the Director’s Order 100 make NPS more conservation-oriented, Miller-Rushing claims that it at least makes the parks *smarter* conservation-oriented. That is, they now take a more modern, sensible approach to conservation. Acadia seems to have taken this approach for over a decade, however. With rapid environmental change and the need to address it, The Schoodic Institute was founded in 2004 for monitoring Acadia’s natural environment and conducting research within the park (National Park Service, 2017). The Institute works to involve the public in science and conservation, integrating education and research in Acadia. Schoodic states that “[e]ngaging the public in science is rapidly advancing research and offers hope as we face complex challenges in a changing environment” (Schoodic Institute, 2015).

Whether managers realize it or not, Acadia, along with other parks, has slowly begun the movement towards communicating the Anthropocene to the public. As part of the 2016 centennial celebration, the park installed an exhibit that illustrated the potential impacts to Acadia from climate change (Figure 9). Still, Miller-Rushing explains that even though Acadia is beginning to look at future changes, it is hard to plan for them because nobody really knows what is going to happen in the next century—all he can be sure of is that the next century will be significantly different from the first. “The Acadia that was there one hundred years ago is gone,” and according to Miller-Rushing, it is not going to be possible to return to that state. Instead, the park is expecting to learn a significant amount in the next twenty years or so. While the recent Director’s Order “kind of defined” the ecological integrity it hopes to preserve, it did not really provide a precise description—there is much that needs to be better-understood, and Miller-Rushing hopes to see big changes in the coming decades.

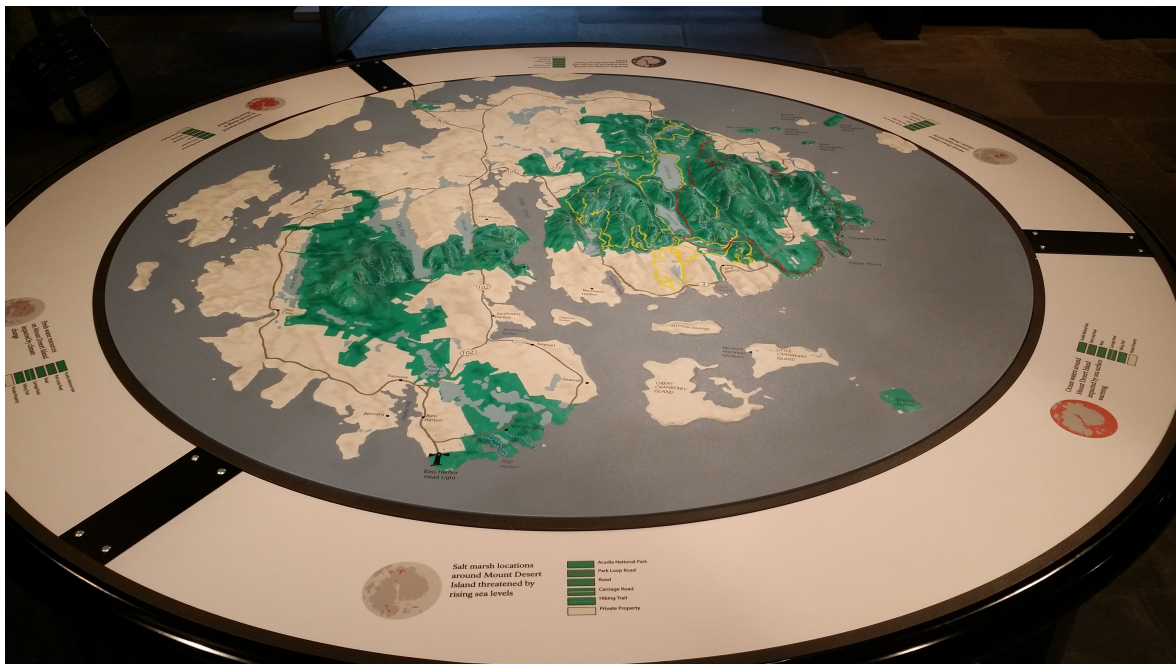


Figure 9. Display included in the climate change exhibit located in Acadia National Park’s Sieur de Monts Nature Center. The display shows a map of the potential impacts of climate change in the park. The exhibit was unveiled at Park Science Day as part of Acadia’s centennial celebration in June of 2016 (Photo: Bangor Daily News)

III: Initiating a Paradigm Shift by Educating the Public

The integration of science and education with regard to a changing planet is particularly pertinent as NPS managers plan for the future. In the Anthropocene, human involvement in conservation is critical—merely blaming humankind’s unsustainable actions is not a solution. Informing society of the basis of environmental change is the first step towards a paradigm shift where humankind does not just look at nature as a material resource, but a limiting resource that is, indeed, in jeopardy. With the cultural paradigm shift of the late eighteenth century, society understood what could be extracted and utilized from the natural world—the challenge now is to recognize how human dominion and technological development has exhausted ecological function on a global scale. Society has, in effect, over-adapted the planet’s ecosystems to humans’ needs to an unhealthy magnitude. Humankind has over-worked the Earth. Yet, recognizing the Anthropocene does not mean treating conservation as a lost cause; to inform mainstream society is to insist on a dominion of stewardship. Figure 10 illustrates this necessary cultural paradigm shift, as over time, mainstream society’s attitude shifts from primarily considering nature as a potential resource for human use to one where society primarily considers the natural world’s finite character.

At present, mainstream society is juggling two contrasting cultural paradigms. Thomas Kuhn, author of *The Structure of Scientific Revolutions*, emphasizes that the choice between two competing paradigms—such as those illustrated in Figure 10—is ultimately a choice between “incompatible modes of community life.” That being said, the novel cultural paradigm we should approach does not completely ignore nature’s potential for human utilization. Rather, this new paradigm emphasizes nature’s finite and sensitive character while noting our inevitable dependence on its wealth of resources. For example, humanity should recognize the need to

harvest timber in a sustainable manner. This is crucial in for preserving the forest’s other critical components as well as its capacity for continual harvest. Such a paradigm shift can prove to be critical for adjusting society’s future actions to meet both our own needs and those of the natural world. Although humans and nature are often seen as contrasting forces, both parties find common ground in the necessity to preserve the planet’s ecological function—a new cultural paradigm for the Anthropocene.

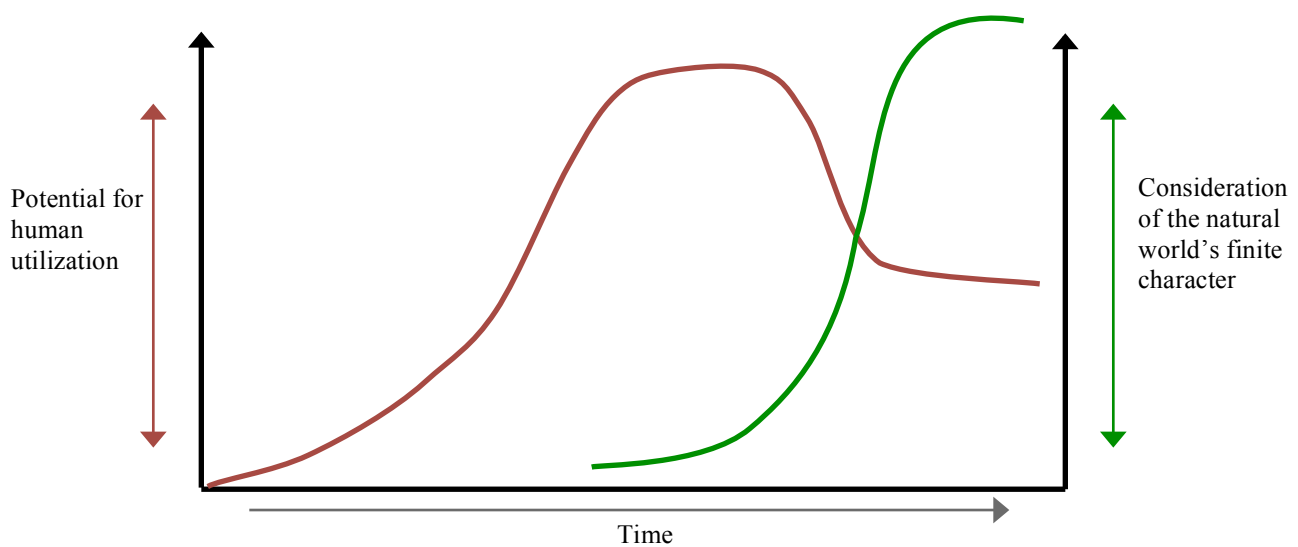


Figure 10. Illustration of the cultural paradigm shift that is necessary for mainstream society to address the Anthropocene adequately. On the left y-axis (red) is mainstream society’s attitude concerning nature as a potentially utilized resource. On the right y-axis (green) is mainstream society’s attitude towards considering the natural world’s finite character. These measurements are of the proportion of mainstream society with these attitudes towards nature, as well as the magnitude of such attitudes.

Manning & Anderson (2012) explain that education programs can effectively inform visitor attitudes to increase support for and adherence to park management policies. In this way, education can help visitors understand the basis for certain policies that would otherwise not be so evident to the general public. With this in mind, the value of education within national parks becomes evident. As we examine Acadia and the myriad threats that the park faces—threats that ultimately stem from anthropogenic domestication on a global scale—there is an opportunity to

educate the public. Informing visitors about past, ongoing, and future research, such as that concerning air and water quality, as well as potential sea level rise, allows them to comprehend the basis for these complex studies. In the end, that basis is the Anthropocene. Acadia can educate the public about this new epoch, facilitating visitors' recognition and ability to address the problems that arise from anthropocentric human dominion. Those who utilize Acadia National Park may simultaneously perceive the true distance to such issues, as the Earth is in the Anthropocene *now*. Revealing how the Anthropocene manifests itself within Acadia nullifies justification for any of the kinds of psychological distance described in Chapter Two. As a visitor to Acadia, one can understand that the problems that characterize the Anthropocene are in the park in which one currently stands and enjoys (spatial and social distance), they are there now (temporal distance), and there is, indeed, evidence of them (conceptual distance).

Interdisciplinary involvement in this educational movement is critical because the nature of the problem is not purely scientific; it is psychological, sociological, historical, and technological. To communicate the legitimacy of these claims generally requires a source that the audience judges to be highly credible (Manning & Anderson, 2012). Thus, effectively explaining how the Anthropocene relies on a diversity of accomplished scholars.

At present, the National Park Service does not utilize the term, "Anthropocene," to describe the changes that managers and visitors alike have witnessed. Some NPS staff claim that this is because of the word's foreign terminology, others because of its convoluted message⁵. Nevertheless, Miller-Rushing explains that Acadia's biggest role is acting as a communicator, bringing people into nature so that they might understand why people like him protect these lands. With this in mind, I propose a number of fundamental methods for incorporating the

⁵ Miller-Rushing A., personal communication, March 13, 2017; Brown E., personal communication, March 8, 2017; Roy A., personal communication, March 9, 2017.

Anthropocene into Acadia National Park's visitor experience in the coming decades. The following approaches are broad, and do not all have a specific application, as Acadia's park managers, themselves, know how to best incorporate them into the park's existing operations. Still, these approaches can be amended in the future in such a way that best-integrates them into the visitor experience of Acadia National Park.

i. *Advertising the Anthropocene*

Anthropocene-defining phenomena, such as anthropogenic climate change, have already been incorporated into education in Acadia. These phenomena shall be discussed in the context of the Anthropocene. Including the term itself is fundamental for effective education. This means providing key background information into how human-dominion has led to these problems. To do so, Acadia's Sieur de Monts Nature Center can include a section dedicated to the Anthropocene. Within this area, there may be extensive information concerning significant anthropogenic impacts to Acadia. For example, this section can educate visitors on the findings about mercury levels in Acadia's fish species. Illustrating that mercury entered park waterways from power plants far beyond Acadia's boundaries sheds light on industry's pervasive influence. In this case, the public witnesses the Anthropocene's impact on the fish species that not only benefit park diversity and ecological structure, but are also found in restaurants and grocery stores. To advertise the Anthropocene in Acadia National Park is to reveal its true distance to society.

ii. *Illustrating changes within Acadia*

This method seeks to inform visitors of the various ways in which the Anthropocene manifests itself in Acadia National Park. That means searching deep into historical records of Mount Desert Island and the surrounding area to uncover photographs, anecdotal evidence, and scientific measurements. In doing so, one might reveal how certain aspects of the park have changed, such as landscape alterations from infrastructure or decreases in air quality. For example, one fifth of the species that inhabited Acadia at the time of the park's inception are now gone⁶. Thus, education initiatives can discuss historical animal population records to reveal declining populations due to human exploitation.

On a number of paths within Acadia, signs indicate the species one can expect to see there. These can be modified to reveal those that are no longer present—as well as those that are currently threatened or may become so in the future—due to anthropogenic impacts. Acadia is currently planning for the disappearance of coniferous tree species and their replacement by deciduous ones. This presents the opportunity to illustrate what this will look like as well as inform visitors of what this means for the park, ecologically. A number of media may be utilized to visualize past and future changes, such as interactive maps, animations, or historical photographs. Additionally, ongoing monitoring programs can be better advertised within the park to highlight trends that have been determined to stem from anthropocentric actions. As a result, visitors can directly see how the Anthropocene affects Acadia National Park.

iii. *Descriptions of psychological distance*

The term, “psychological distance” may be introduced in the appropriate visitors centers. This concept can then be applied to the various issues that one witnesses in the park. The goal is

⁶ Miller-Rushing A., personal communication, March 13, 2017

to express to visitors that psychological distance plays a significant role in one's perception of Anthropocene-defining phenomena. Additionally, explaining psychological distance in the context of the Anthropocene may emphasize that myriad factors have led to domestication and degradation in this epoch. It is not just that society domesticates nature, but also that humankind generally fails to understand our proximity to such issues. Various cases may highlight how psychological distance plays a role in how the public perceives environmental damage in the park. For example, Acadia can illustrate its problems with air quality. Many may consider Acadia's air quite clean, although this perception may just be in comparison to more urban environments. Air quality in Acadia is notably poor for a national park—visitors might exhibit conceptual psychological distance should they perceive problems with clean air in Acadia as nonexistent. Ultimately, the explanation of psychological distance intends to subsequently shed light on the true distance of these problems that threaten Acadia.

iv. Combatting the Anthropocene

To avoid a “doom and gloom” attitude towards the Anthropocene, the park may highlight ways to combat the debilitating aspects of this novel epoch. The focal point would be conservation, expressing the importance of adaptive management. Visitors centers should identify the major projects—past, present, and future—intended to combat Anthropocene-driven issues in Acadia. It is also crucial to emphasize the necessity of hybrid conservation areas that integrate humans and nature in the Anthropocene—however, that means doing so in an undamaging way. According to Miller-Rushing, research has shown that Acadia's forests are healthier than surrounding forests outside of the park. Revealing this information to visitors provides a more optimistic perspective on the Anthropocene.

The park may also illustrate how current and future projects intend to benefit Acadia's natural areas—for example, an interactive map can indicate what will change, or remain the same, with these projects in place. This can be compared to a map which depicts what Acadia will look like without adaptive management practices and restoration programs. Acadia is thus shown as an effective conservation area, highlighting the merit of the park's adaptive management policies. Additionally, current projects that close off areas of the park may post signage explaining the work and how it relates to the Anthropocene. This communicates to visitors that action is, indeed, in place to combat some of the Anthropocene's deleterious impacts.

v. Signage

One of the most accessible education tools in Acadia National Park is the expansive signage located at major attractions within the park. My research reveals a number of opportunities to address the Anthropocene through these informational signs. Already, Acadia has shown visitors the impacts that human activity has on the park—to include the term, “Anthropocene,” in discussions of dramatic human influence has the potential to spread awareness of this new epoch and how it manifests itself both within and beyond Acadia. The following is a collection of signs found throughout the Mount Desert Island portion of Acadia National Park. I propose a number of amendments to these signs that would address the Anthropocene as well as reveal its local, and in some cases, global, significance. With Mount Desert Island the most popular expanse of Acadia—in 2016 MDI attracted over 85% of the 3,350,393 park visitors—the educational signage therein can reach a considerable proportion of visitors (National Park Service, 2017).

Sign 1. “From Sea to Shining Stars” (Cadillac Mountain Summit)

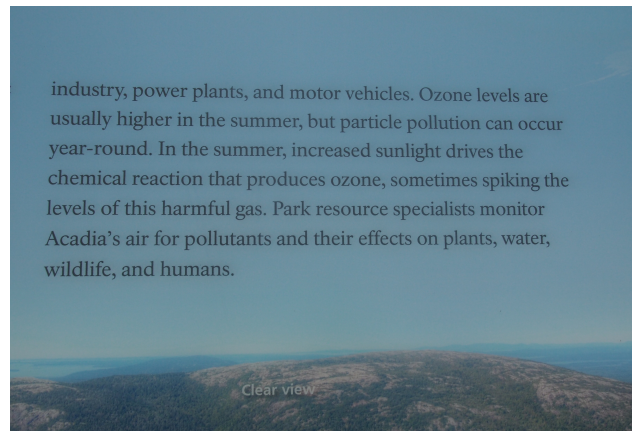
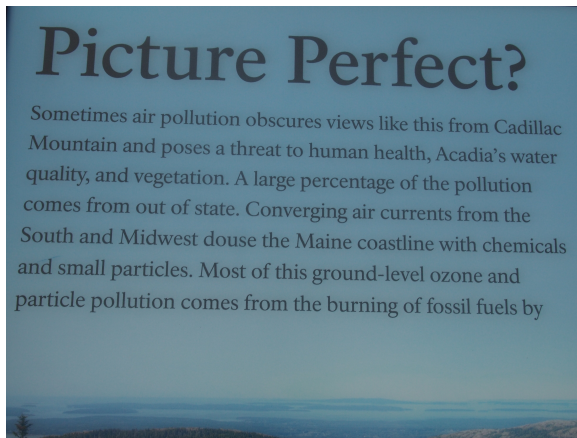


Located at Cadillac Mountain’s summit, one of the most popular destinations in Acadia National Park, this sign discusses the importance of conservation action for preserving the park’s scenery. This presents the opportunity to note how the Anthropocene comes into play with regard to changing sceneries. As landscapes are dramatically altered in this epoch, conservation proves critical for mitigating subsequent impacts on our own aesthetic preferences. Additionally, the sign may be amended to mention how visually displeasing changes also damage critical natural systems. In the right-hand corner of Sign 1, a paragraph reads:

When was the last time you noticed your moon shadow, a shooting star, or the Milky Way? Two-thirds of Americans cannot see these once-common night sights from their homes due to light pollution.

This portion references further evidence for the Anthropocene, as anthropogenic light pollution has hindered mainstream society's ability to witness "once-common night sights." Besides damaging the inherent aesthetic enjoyment of starry skies, light pollution is also associated with various environmental impacts⁷. Nocturnal species, for example, are particularly affected by light pollution, often interfering with reproduction. Such information should be included in Sign 1 to indicate how conservation efforts and national parks are critical for mitigating these Anthropocene-defining problems.

Sign 2. "Picture Perfect?" (Blue Hill Overlook)



Blue Hill Overlook is located just below the summit of Cadillac Mountain. It is a popular destination for sunset views and a frequent pit stop on the drive up to the Cadillac Mountain Summit. Sign 2 discusses threats to Acadia's scenery from air pollution, notably mentioning how much of the damage is caused by activity hundreds of miles away. Although not pictured above,

⁷ Brown E., personal communication, March 8, 2017

the sign includes a comparison of a clear and hazy view from Blue Hill Overlook, indicating another way that the Anthropocene manifests itself in Acadia. The first sentence in the image on the left states that air pollution not only threatens the view, but also “human health, Acadia’s water quality, and vegetation.” As such, visitors witness humankind’s pervasive influence. This presents a near-perfect scenario for introducing the Anthropocene. Explaining how human activity impacts natural processes in such a way that pollution in the Midwest causes pollution in Acadia can lead into how this illustrates the Anthropocene’s existence.

Sign 2 also contains a section (not pictured) that reads, “Your actions at home can affect Acadia’s air quality. Can you reduce your carbon footprint?” By insisting that the public can, indeed, help, this reassuring statement helps to avoid fueling a pessimistic attitude. To improve upon this message, it would be useful to include a short list of simple ways that visitors can reduce their carbon footprint in order to combat this aspect of the Anthropocene. The concept of psychological distance may also be incorporated into this section, noting that the Anthropocene’s impact on Acadia is caused in part by those who visit. “Psychological distance,” itself will not be explicitly stated on a sign, but describing how visitors are closely connected to the roots of such problems can inform action to try reducing one’s impact.

Sign 3. “Drink in the View” (Jordan Pond)



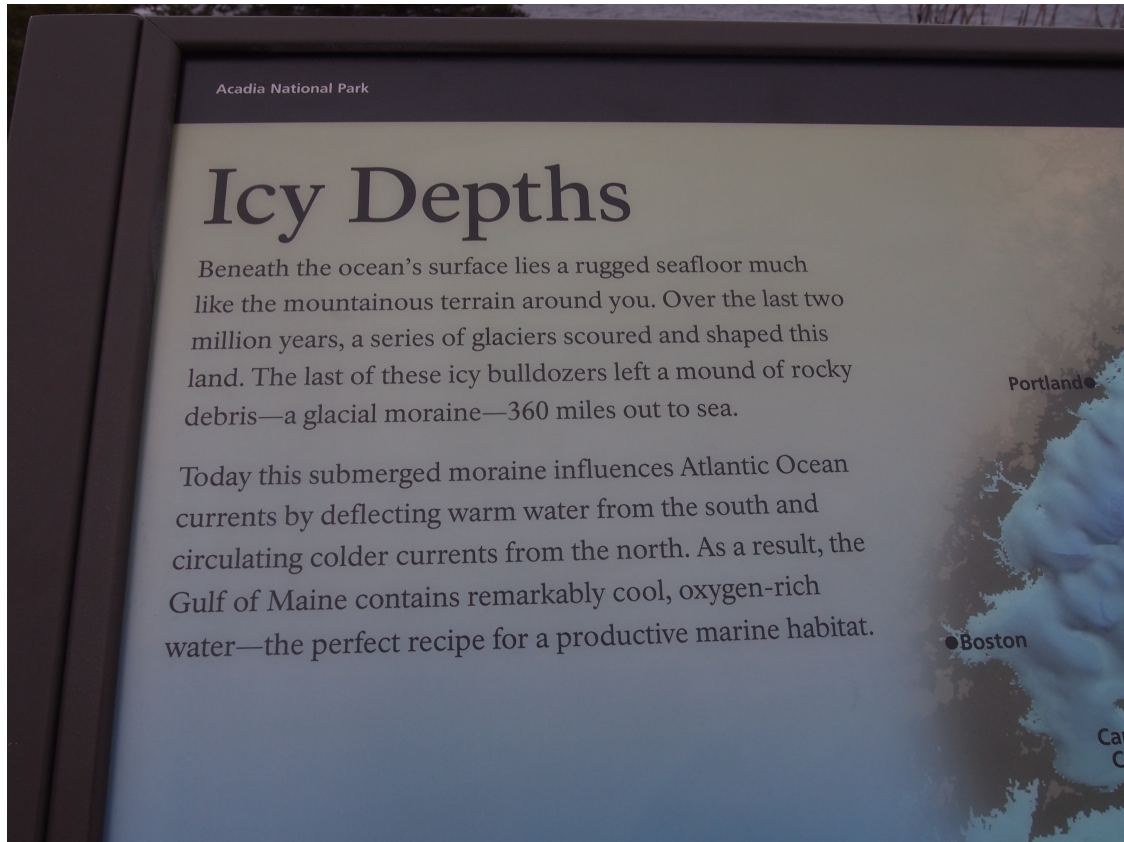
Sign 3 sits at the south end of Jordan Pond, another major destination for Acadia National Park visitors. Jordan Pond is home to a major visitors center, restaurant, and occupies a crossroads of Acadia’s expansive carriage road bicycle and footpaths. This sign contains a number of opportunities for introducing diverse aspects of the Anthropocene. First, the left-hand side indicating common species may indicate the potential threats from problems associated with the Anthropocene as well as species that can no longer be found in this area as a result of human actions. Under the heading, “Drink in the View,” Sign 3 reads:

Jordan Pond’s clear waters nourish an array of life—including humans. Besides serving as a wildlife habitat, the lake—Acadia’s deepest at 150 feet—provides drinking water for

nearby communities and Jordan Pond House. The water here is so clear that you can normally see into it at least 45 feet (14 m) below the surface, making it the clearest lake in Maine. To safeguard the waters' purity, wading swimming, and any other body contact are not permitted. So stay on the shore and look for dragonflies, loons, brook trout, frogs, beavers, and eagles.

A smaller section beneath then asks, "If this is drinking water, why are boats allowed? Because they keep humans—the greatest threat to drinking water—out of the pond." This portion should be more centrally located on Sign 3 in larger font, possibly as the third-to-last sentence in the "Drink in the View" section. Highlighting that humans present the greatest threat to drinking water reveals how the Anthropocene not only threatens other species, but also poses a significant risk to humankind. To further depict the Anthropocene's impact on water, managers may add information regarding other less direct human influences on water quality (such as that which is mentioned in Sign 2).

Sign 4. “Icy Depths” (Thunderhole)



Thunderhole is another intensely visited area of Acadia. Visitors come to Thunderhole to witness a fascinating natural phenomenon—at a certain tidal level, waves smack the ceiling of a rocky, coastal cavern to create a loud, thunderous sound. Sign 4 presents multiple opportunities to address anthropogenic climate change’s predicted impact on Acadia National Park. As ocean temperatures warm, the Gulf of Maine will subsequently warm the land that its currents reach. The Gulf of Maine is currently considered one of the fastest warming bodies of water in the world. Including this information, as well as a section about the associated implications, in Sign 4 helps close the psychological distance gap concerning impacts from anthropogenic climate change. Sign 4 can additionally address sea level rise in another section, describing how rising sea levels may mean that Thunderhole can no longer produce its namesake’s noise. If water

levels exceed the cavern's ceiling, then Thunderhole will only indicate a lost piece of Acadia's character.

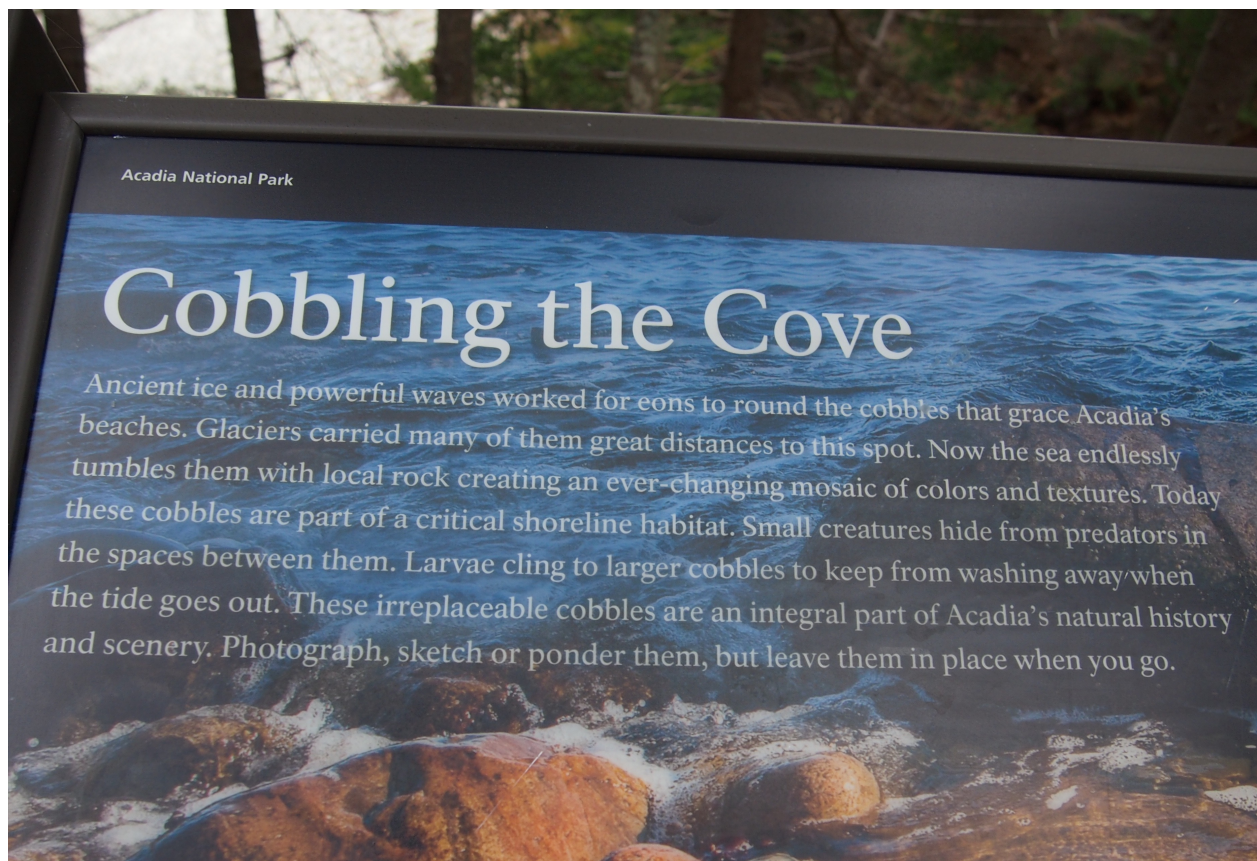
Sign 5. "Sounds of the Seasons" (Jessup Path)



Found along the Jessup Path, adjacent to the Sieur de Monts Nature Center, Sign 5 notes the natural sounds one can expect to hear while on the trail. Signs 1, 2, and 3 noted threats to the park, however Sign 5 fails to do so. Not only do unnatural noises disrupt visitors' general experience, but they also affect wildlife. Emma Brown notes that when it comes to wildlife, there is a big difference between natural sounds and *noise*—noise being artificial sounds such as that of cars driving on a road. Human-caused noise can impact wildlife, and thus Sign 5 should

educate the public of threats posed by human noise. Such can highlight a more obscure aspect of the Anthropocene that poses a risk to the natural world in order to reveal how individuals can play a large role in noise pollution. Considering the scale of human-caused noise pollution subsequently lends evidence for the Anthropocene.

Sign 6. “Cobbling the Cove” (Little Hunters Beach)



Little Hunters Beach is easily accessed from Acadia's National Park's popular loop road. This area of the park presents a fascinating analogy for natural resource depletion that characterizes the Anthropocene. Because Little Hunters Beach is entirely comprised of cobbles, or stones, that formed over ancient time scales, Sign 6 encourages visitors to “leave them in place when [they] go.” These near-perfectly-shaped rocks practically beg visitors to take them—and the seemingly

endless bounty appears to justify stealing just one. Yet, as with natural resources such as fossil fuels, it is difficult to avoid extracting an unsustainable amount on the scale of populations. The parental phrase holds meaning—if everyone took one, there would not be any left. Sign 6 should include this information in order to shed light on natural resource exploitation. It may additionally reference how resources can be extracted sustainably. As such, Sign 6 can reference how renewable energy sources, such as solar, are self-sustaining and therefore cannot be depleted by continual harvest. With visitors considering the finite nature of natural resources, they can better-understand how mainstream society may work to mitigate certain Anthropocene-defining problems. Raising the subject with a specific and visible analogy has the potential to help inform a cultural paradigm shift.

While the concepts introduced are broad in nature, employing park-specific cases presents stronger evidence for the Anthropocene and its debilitating influence. With access to well-designed educational signage, one has the opportunity to consider these expansive concepts on a highly specific scale. As education in Acadia reveals the park's position as a microcosm of the world, the public can understand how recognizing the Anthropocene is imperative for preserving the park for the next one hundred years. Ultimately, Acadia National Park serves as a local lesson for a global problem—if humankind cannot sustain a national park, then a planet that is experiencing parallel, yet magnified, challenges certainly cannot be sustained.

CHAPTER FIVE: Conclusions of a Local Lesson for a Global Problem

Recognizing the ability to control nature through technological advances, humankind has developed an ethos of domestication that continues to dictate mainstream society. As modernism

emerged at the advent of the Industrial Revolution, this cultural paradigm shift dramatically altered the human-nature relationship. American society became significantly less bound by natural pressures, resulting in an anthropocentric lifestyle that demands domestication. With an increasingly industrial world and an unbound society, the Earth has moved from the Holocene into the Anthropocene. Mainstream society's anthropocentric interactions with the natural world ironically fuel both humankind and nature's vulnerability. Such a cultural axiom cannot be sustained for the future.

As the main driver of global change, humankind maintains a significant responsibility that is yet to be addressed properly. Society continues to employ an anthropocentric lifestyle, utilizing and domesticating the environment for societal benefits with little regard for the natural world. To preserve the planet upon which our species relies, humankind must embark on a dominion of stewardship, where mainstream society both recognizes the need for a sustainable existence and seeks to achieve as much.

The cultural paradigm shift from a dominion of exploitation to one of stewardship has already begun in the United States with the conservation movement. As the extensive and debilitating human influence proliferates, conservation emerges as a response to the Anthropocene. Educating the public of the conservation movement's rationale has been incredibly influential for political action. It is absolutely imperative for conservation to work towards closing the gap between the psychological and true distances of environmental degradation. As the public learns, the demand for government involvement in protecting the natural world amplifies—public opinion is, indeed, everything. Including mainstream society in conservation has thus initiated a cultural paradigm shift that considers the Earth's sensitive and finite character, as well as humankind's inherent reliance on it.

America's national parks demonstrate conservation areas that work to accommodate humans while conserving the natural areas that they encompass. The struggle to maintain the parks lies in their inability to accomplish both tasks while operating within a society dictated by an outdated cultural paradigm. National parks are laboratories—they provide an opportunity to better understand how humankind should interact with the natural world in order to prevent debilitating domestication that defines the Anthropocene. Threats to the environment raise greater concern with the public when a national park is at stake. America's national parks consequently serve as effective vehicles for presenting the concept of the Anthropocene to mainstream society.

In Acadia National Park, this movement has already begun, as educational programs and management plans indeed focus on the Anthropocene, although without explicitly stating the term. The park has already decided that recognizing human-driven changes to Acadia is necessary for preserving it for the next century. This can be interpreted to mean that recognizing the Anthropocene and implementing adaptive management is imperative for maintaining Acadia National Park for another one hundred years, and beyond. With Acadia currently planning for present and future Anthropocene-defining changes, the park has the potential to integrate the concept of this new age into its management efforts. In concurrently educating visitors, managers can effectively close the psychological distance gap that has truly proliferated Anthropocene-defining problems since the Industrial Revolution. Indeed, it was education and increased awareness that popularized the American conservation movement over a century ago. Revealing the true distance to these issues is the first step towards initiating a societal paradigm shift. This is not to say that development of artificial adaptations that have brought humans into this age should be halted. Rather, addressing the Anthropocene presents an opportunity to consider how

artificial adaptations can continue to benefit society without impacting the planet on such an expansive and pervasive scale.

The goal of this educational movement is not to present despair, but to utilize Acadia National Park as an instrument for spreading information and generating public attention on the polarizing topic of the Anthropocene. As Abraham Miller-Rushing poignantly notes, “scientific research done inside of a national park resonates more with the public.” If Acadia effectively addresses the Anthropocene’s impact on the park, itself, then it can work to inform public opinion. Visitors may acquire new perspectives and a renewed appreciation for nature’s valuable, albeit fragile, character. As the cultural paradigm continually shifts towards recognizing the Anthropocene and the need to combat it, policy will follow. Ultimately, Acadia’s microcosmic nature, in concert with both its existing and future management plans, renders the park an optimal case study for addressing the present to accommodate the future. Indeed, Acadia National Park serves as a local lesson for a global problem.

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