Climate Change and Threatened Heritage: Archaeology's Burden

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Climate Change and Threatened Heritage: Archaeology’s Burden

by

Barry Gordon

Submitted in partial fulfillment
of the requirements for the degree of
Master of Arts Anthropology, Hunter College
The City University of New York

2018

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Climate Change and Threatened Heritage: Archaeology’s Burden

By

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Walakpa at night, facing northwest (photo credit: Barry Gordon)
Dedicated to my parents Joe and Bonita Gordon. Thank you for your endless support.
Acknowledgments

First I would like to thank Dr. Thomas McGovern for his enthusiastic approach to the very scary subject of climate change archaeology, and limitless support getting me involved with both the projects discussed in this paper. Since I started at Hunter College Dr. McGovern’s door was always open for questions or conversation. I would also like to thank Dr. Anne Jensen. Thank you for allowing me to help excavate Walakpa as well as discuss it in this thesis. To Lília Pálsdóttir, so much thanks for your support and knowledge of Gufuskálar. I hope to come back to Iceland someday and visit to see what’s become of the Viking Long house we made the front page excavating. To Megan Hicks, your guidance in the lab and in the field taught me more than any class ever could. Lastly, I would like to thank Ceecee Cesario, Stephen Venner, Kathleen Rust, Dylan Lewis, Sam Rose, Sant Mukh Khalsa, and Brenda Prehal. Thank you for your friendship throughout these last few years and here’s to many more years to come. Lastly, a big thank you to Rachel Herron without you this report would never have been completed.
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Abstract

Climate change and archaeology are currently intertwined, as more and more archaeologists around the world must deal with the effects it causes on the sites they work on. Threatened cultural resource sites are being swept away at alarming rates, and excavation projects are becoming more and more like salvage digs. This paper will discuss two case studies that occurred in the summers of 2015 and 2016, both out of the same vein of interest. They were rescue projects intended to excavate as much archaeological data as possible within a field season from sites vulnerable to the effects of climate change. This thesis will also examine climate change archaeology and climate change preservation, as they exist today, and delve into the inevitable issues that will arise as archaeologists prioritize excavation and their data backlogs grow.

I. Introduction

A. Cultural Heritage Preservation/ Climate Change

Humans are adaptive. Ever since the onset of the Neolithic revolution humankind has found a way to hone this resilient quality as populations spanned across many different types of climates zones. In fact, some Arctic cultures did not experience a Neolithic revolution and relied on different means to sustain resilience (Jensen 2018). Archaeologically speaking, civilizations were able to sustain giant empires stretching between North Atlantic climate zones to Sub Arctic climates and still implement successful, albeit different, resilience methods (Dugmore, et al. 2009).

Currently, we are facing something not necessarily unfamiliar to our history as a species, but science has now shown anthropogenic involvement in the fluctuation of our climate. Sea level rise and coastal erosion rates are a universal problem that is increasing astronomically all over the world. Increasing carbon concentrations in the Earth’s atmosphere is leading to rising temperatures, causing
sea levels to rise an anticipated 200 centimeters during the remainder of this century (Erlandson 2008). A more alarming case is that of the melting ice sheets in Greenland. Since the 1990’s, researchers documented the rate of year-to-year loss via the comparison of ice core (Graeter, et al. 2018). The documented amount of change in the past ten years has sparked debates among multiple scientific branches – each arguing the best course of action when a community's resilience is threatened (Walker and Salt 2012). In the grander scheme of the climate change debate, there has been a struggle among archaeologists to present the discipline as a viable source of information. We as archaeologists face the burden of understanding the severity of the threat posed to valuable cultural resources. We now have to choose between sites based on a series of checklists then discern what to do with the collected data after excavation.

Archaeology provides a unique view of past instances where the fluctuation of paleo-climates resulted in threshold change for cultures to either persevere or succumb. For instance, the history of Norse Greenland is a well-documented case where no amount of successful adaptation can guarantee survival. Norse Greenlanders shifted their subsistence methods to deviate from a European agricultural framework, and rely more on the hunting of marine mammals (Dugmore, et al. 2009; McGovern 2000). However, in spite of managing their yearly intake of sea mammal protein, they were unable to survive when their source of food ran dry. This prospective analysis of the Norse Greenlanders management is vital to the contemporary climate change discussion because highlights the failure of a culture despite their effort to adapt.

The looming threat to cultural heritage sites is comparable to the burning of libraries. This comparison warranted a session at the 2017 Society for American Archaeology (SAAs), and archaeologists involved in cultural heritage preservation spoke at the president’s welcome ceremony to begin the conference. Over the past ten years, even more archaeological projects have to shift
focus to an environmental approach due to climate change, making conversations occur more as necessity. The role of archaeologists in climate change research remains uncertain, but several examples indicate the discipline's role acts as a bridge between communities and researchers, many of whom serve the bridging function through various aspects of historical ecology (Jensen 2018). Most communities harbor innate, intangible, ties to their specific region, a connection or identity that provides useful data for climate change research. This means we’re forced to decide which sites to salvage while facing pressure from limitations of time and funding. There’s no real way to know if one site will last a storm season, and now archaeologists have to excavate viable data samples in the event that climate change destroys a site.

As mentioned above, the 2017 SAA conference designated its Presidential forum talks to the discussion of archaeological approaches to curb, or better understand, the rate of climate change based effects on sites, as well as incorporate community engagement. Climate change's impact on cultural resources is not an isolated event, but a global issue. The preservation of cultural landscapes is essential. While it may not be indicative of contemporary climate change, it still provides helpful information as to how past societies adapted or failed in the face of a shifting climate. Coastal archaeological sites are facing the bulk of climate change’s effects. Intensified storminess and erosion rates increase with each passing year, and destroy these coastal sites. (McGovern 2016).

B. Management Strategies

Effective management requires tough decision-making and the rationing of resources. My thesis will continually explore how archaeology bears a heavy burden with its role in the study of climate change. To know the inevitable is to accept that not all sites can be saved or efficiently monitored. Dr. Kieran Westly describes different types of model-based approaches archaeologists have implemented into their management strategies. One particular model is the Scottish Coastal
Archaeology and the Problem of Erosion (SCAPE) Trust, designed by Dr. Tom Dawson and his colleagues in Scotland. While his project will be detailed in a later section of this paper, it’s imperative to note how the program briefly defines an initiative to use locals to document at-risk sites along Scotland's coastlines. SCAPE mapped nearly one-third of Scotland's shoreline with the help of an app. Approximately 11,500 sites — 3,500 of which are at risk — have been documented at the time of Westly's 2011 article (Westley, et al. 2011). A less time-consuming strategy is desk-basked survey. Desktop survey involves a pre-fieldwork assembly of information, such as looking at the changes in coastlines from year to year (via photos, evidence from prior fieldwork, remote sensing data, and logistical information). This method allows for large areas to be covered and mapped quickly. However, the status of a site’s vulnerability is not fully diagnosable from mapping alone. In fact, most sites in remote areas are not documented. Even if researchers are able to map coastal loss, there is no way to translate that information to site vulnerability without surveying.

Other details archaeologists observe to make an informed decision on a management strategy include: the sites inherit characteristics, the accessibility to the site, as well as its visibility. Visibility is a double-edged sword; while erosion makes potentially previously unknown sites evident, the archaeology is inescapably put at risk. There are many triggers for site erosion, such as overgrazing herds, as well as those initiated by climate change. One example is warming temperatures melting the permafrost, which layers causing sites to slump. This is why it is important to understand the sediment type of a region when considering management strategies. ²

In a 2015 Skype interview with Dr. Dawson, he defines an archaeologist’s five options after a decision has been made to begin salvaging an endangered site.

1. **Excavation**: standard excavating procedures that have concrete goals of what needs to be recovered within a set timeframe.
2. **Relocation**: Destroyed sites can be relocated in some instances.

3. **Digital Copy**: Dawson mentions how they created a 3D model of an 8000-year-old cave system in Fife, Scotland. The cave is affected by erosion, so this 3D rendering of the cave in a stable state allows archaeologists to mold the 3D images into what it may have looked like in the past.

4. **Defense**: preservation in the form of manmade protections to the site, such as walls or a structure that shields it from heavy winds and rising sea levels. However, this is a highly expensive route, and in some cases diverts the effects to different areas not necessary solving the problem.

5. **Justifiable Abandonment**. This is probably the most difficult decision to make but is usually inevitable. Knowing when it is time to move on and let nature take its' course. (SCAPE 2018).

**C. Communities and their Heritage**

Cultural Heritage is an ineffable term that can have a broad range of meaning varying from region to region. Heritage is built throughout time and has both tangible and intangible concepts. UNESCO world heritage sites are an example of the tangible. For instance, the Egyptian pyramids are iconic and continuously draw people to the region to learn about the heritage. On a smaller scale, there are cultural resource sites all over the world. Most known to local communities and harbored for how embedded they are into the traditions of the area. They're often still used to instill traditions into youth and preserve their heritage. Archaeologists can benefit from local knowledge with their management strategies (Markham 2017). Contemporary communities consistently have to adapt and change due to environmental factors. America's first climate refugees of the Isle de Jean Charles in south Louisiana had to relocate in the Spring of 2016 because of sea level rise (Davenport and
The collective knowledge of communities is an essential tool for cultural resource preservation. There are many ways archaeologists have been spreading awareness of climate change’s effects to cultural resources to local communities. Additionally, archaeologists can avidly market themselves and their research; this has been standard practice for archaeology/social sciences for years. There is a recurring theme in recent archaeology publications of empowerment to indigenous groups and local communities by involving them in the research. (Markham 2017, Dawson, et al. 2017). Dr. Dawson and SCAPE utilize local knowledge as an insight, by helping to manage at-risk sites along Scotland's coastlines. Through empowering shoreline communities, Dr. Dawson and his colleagues have compiled their vast database of monitored sites. There are two aspects to the SCAPE program ShoreUpdate and ShoreDig (Dawson 2015). ShoreUpdate allows locals or interested individuals to register as a surveyor. Dawson uses this as a baseline for their knowledge of sites and their various levels of vulnerability. ShoreDig lets community members get their hands dirty through projects ranging from excavations, films, and 3D rendering as mentioned earlier.

D. Building a Collective Knowledge

Similar to Dawson’s efforts in Scotland, Georgina Endfield and Simon Naylor write about their weather-based memory experiments in the book *The Future of Heritage as Climate Change: Loss, Adaption, and Creativity* (Harvey and Perry 2015). In essence, their analysis compartmentalized "everyday experiences" from UK based location regarding day-to-day weather patterns. This knowledge is pertinent to the importance of climate threatened archaeological sites. Archaeologists rely on local communities to understand local weather patterns.

Weather based memory (WBM) research was collected through an online database
encouraging the formation of weather-based narratives via video interviews, and surveys. Endfield and Naylor gathered individual recollections that provided a diversity of information including, public perspectives, attitudes, and beliefs towards climate change and its impacts on their community. Endfield and Naylor also found that it worked as a way to spread climate change awareness (Endfield and Naylor 2015).

The main conclusion from this research realized that individual recollection of weather patterns tend to focus on extremes, such as long winter storms, heavy rains, or the lack of rain for an extended period. The extremes were more recognizable to people because modern livelihoods don't require people to be outside for extended periods, meaning weather is often noticed while people walk to their car, drive to work, and become comfortable in their office space (Endfield and Naylor 2015). It’s important to keep that perspective open for rescue sites no matter the time frame. The involvement of communities in the preservation of their cultural resources is becoming a facet of cultural heritage preservation.

This paper will continue the discussion through an in-depth look at two salvage projects I was a part of during the 2015 and 2016 field seasons. Both sites are visibly affected by climate change and erosion. The first case study involves an Icelandic Medieval fishing settlement and the second case on one of the Northern most parts of Alaska's North Slope.

II. Gufuskálar

A. Snaefellsness Peninsula

The summer of 2015 was the first time I was able to put into perspective the effects climate change based erosion could have on an archaeological site. Gufuskálar is situated around 5 kilometers west of the village of Hellisandur along the Atlantic Ocean on Iceland's Western
Snaefellsness peninsula. The most defining feature of the peninsula is the volcanic glacier Snaefelljokul, which looms over the region. The weather that summer was about as ideal as you can find working in the North Atlantic. Modest temperatures with high winds easily escapable by lying along the natural hilly landscape defined the field season. This seemed a clear contrast to the intensified winter storminess the regions experienced the last few years. But during that summer we were grateful to the Snaefelljokul glacier for attracting most of the rainy weather.

The state of the site was the first indicator to me of the severity of the erosion. Sandbags scattered around the grassy areas, ranging up to 100 meters away from the mound sites where attempts had been made the prior field season in efforts to protect the architectural walls uncovered. The crew consisted of archaeologists from CUNY (City University of New York), FSI (Icelandic Institute of Archaeology), and NABO (North Atlantic Biocultural Organization). We were attempting to keep pace with the deteriorating site before all data was swept into the Atlantic.

The erosion at Gufuskálar is caused by a combination of wind and water, similar to other regions in the North Atlantic climate zone. Since the 1950’s wave variability in the North Atlantic has increased the amount of erosion on coastal sites. Woolf and Wolf write of how the warming climate causes the increasing amount of storminess in the North Atlantic regions and are impacting Iceland’s coastlines with a constant battering effect. The winds are strong enough to disrupt any form of cultural heritage preservation (Woolf and Wolf 2013).

B. 2008

The rate of erosion at Gufuskálar initially became apparent in the mid-2000's (Dawson, et al. 2017; Feeley and Pálsdóttir 2017). Archaeology became visible, and under threat, as erosion undercut the two mounds along the coast. The volcanic soils on the Snaefellsness peninsula are highly susceptible to wind erosion.
The Institute of Archaeology: Island initiated work at the site in 2008. The preliminary work consisted of a systematic survey of the surrounding area. This identified two mounds along the coastline, as well as two additional farmhouse mounds, and roughly 150 fish drying huts located in the lava fields south of the coast. Immediate action shifted focus to the coastline, as it became apparent that the site’s vulnerability was increasing. Radiocarbon data was collected and dated the site to around the early to mid 15th century a pivotal point in Iceland's history, as they shifted from being an afterthought ruled by the Danish States to a significant influence in the European trade market (Pálsdóttir 2011).

1. A Brief History of Iceland

_The Saga of the People of Laxardal_ tells of one of the first instances in Icelandic fishing culture. The story follows that of a 9th-century family fleeing Norwegian tyranny that settled Iceland, as the father begrudgingly explains how he'd prefer not to "spend [his] old age at that fishing camp" (Karlsson 2000; Kunz and Kristjánsdóttir 2008).

Icelandic fisheries big boom occurred during the 14th century, as famine in Europe welcomed their highly preservative methods of drying fish. Cod, a fish from the Gaddod family, was Iceland's main commodity as they "lasted longer than any other salted fish" (Karlsson 2000). During the late medieval period, fishing was Iceland's primary export. Atypical snow falls in the 13th century caused food shortages. In response an amendment made in by King Eirikr Magnusson of Norway allowed for the exportation of goods from Iceland (Karlsson 2000). By the turn of the 15th century, European influencers began to root their way into Icelandic's fishing economy. The preserved salted fish was a significant source of protein for Europeans, which subsequentially caught the eye and coin purse of European nations.

The English were major influencers during this period. Their presence and involvement in
every aspect of the process gave them a leg up on their German and Dutch competitors (Karlsson 2000). Radiocarbon data suggests that Gufuskálar was constructed during this period, and was likely surrounded by the European transplant fisherman (Feeley and Pálsdóttir 2017).

C. 2011 - 2015

Initial excavations at Gufuskálar took place in 2011 as a combined effort between members of NABO and FSI. Lilja Pálsdóttir (FSI) and Frank Feeley (CUNY Grad Center) led the project. A lot had changed at Gufuskálar since the 2008 survey. Roughly two to three meters of the coastline was lost in the two years. Much of the two coastal mounds were undercut in areas closest to the shore. Excavators began by hand digging trenches along these erosion scars. Truncation on the mound faces exposed the now vulnerable stratigraphy, where midden layers were visible showing thick lenses of faunal remains and artifacts. You could walk along the shoreline and find artifacts from these truncated sides of the mounds, as data was falling to the lava rock beneath.

I was a part of the final excavations in 2015 where we completed the excavation on one of the fishing booth mounds, an area that was severely undercut by a harsh winter in 2014. The context of this mound went through several iterations. Windblown sand deposits found between floor contexts suggest seasonal occupation, much like most fishing settlements at this time (Dawson, et al. 2017). Notable finds include: stone line sinkers, fish hammers, bone needles, whale vertebrae with noticeable chop marks (suggesting its use as a chopping block) intricate carvings, and walrus ivory.5

Excavators between FSI and CUNY favor the notion that Gufuskálar could have been an area that produced high-level trade goods, like the walrus ivory (Feeley 2012). The ideal scenario for an excavation plan would be to implement a combination of an invasive and non-invasive sampling into the two coastal mound sites. This will make stakeholders happy, as this is a protected region of Iceland being a national park. The obvious dilemma with doing invasive sampling would be that the
conclusion of permanent damage to the site would be inevitable.

D.  Methods of Site Protection Between Field Seasons

Between each field season, crewmembers — with occasional aid from the National Park Service of Iceland — lined any vulnerable sections of the site with barricades that weighed around 30 to 50 pounds each. While backfilling is an undesired aspect of the work, it is essential in order to "ensure" the uncovered contexts' preservation onto the next field season. Cooperation was crucial, not only because it guaranteed the backfilling requirements were accomplished, but it also established communication between researchers, local communities, and governmental entities.

1.  Icelandic Archaeology Outreach

FSI utilizes a form of public archaeology called The Kid's Archaeology program in other regions of the island. Site days were hosted at Gufuskálar to incorporate the local communities whom still hold a stake in the area. Current fishers living on the peninsula, and those whose relatives were from the region were among those who visited. Field days and new reports appealed to the interests of community members and allow the cultural heritage and knowledge of the site to be shared.

E.  Future Work at Gufuskálar

Following the conclusion of the 2015 field season, the vulnerability of the site had been consistently promoted on social media outlets such as Instagram, Facebook, and Reddit as well as featured in Archaeology Magazine (Zorich 2012). The information gathered was then implemented the curriculum of local schools. The project's principal investigators Feeley and Pálsdóttir recently published an article in Public Archaeology and Cultural Heritage providing insight into where they plan to expand their research. They hope to uncover a greater understanding as to who worked at the site. They want discover how Gufuskálar fit into the culture of Iceland in the 15th century and
continue to build upon the open dialogue between community members and the archaeology (Dawson, et al. 2017; Feeley and Pálsdóttir 2017). There are still questions to be answered at Gufuskálar, but this case study demonstrates how archaeologists can overcome the burdens of heritage loss.

III. Walakpa

A. The Alaskan North Slope

Roughly the size of Michigan, the Alaskan North Slope has a deep cultural history dating back to when people first migrated to the Americas. Throughout the years multiple cultures have inhabited 230,508 square kilometers of land, which mostly made up of tundra and wetland, is connected to the Chukchi and Beaufort Seas (Streever, et al. 2011). Underneath the tundra is a layer of permafrost, which has an active layer that thaws out seasonally and can be up to 610 meters deep in its entirety. Diverse flora, fauna, and sea life have drawn people to the area in spite of the harsher climate. The area is also heavily sourced for its natural oil reservoirs.

1. A Brief History of the Alaskan North Slope

The earliest accounts of cultural traditions date back to the Late Pleistocene. Denbigh Flint Complex an arctic small tools tradition. This stone tradition has been found at sites along the coastlines, including Walakpa (Stanford 1976). North Slope past cultures are known for their elaborate ivory carvings, fishing traditions, and stone tool complexes. The Inupiat are currently still living in the North Slope, and have inhabited the region for hundreds of years.

B. Walakpa Bay

In the summer of 2016, a NSF funded salvage project funded by Ukpeagvik Inupiat Corporation (UIC) was conducted over the period of 4 weeks on the coastal site of Walakpa located
in Alaska's North Slope. The Walakpa Archaeology Salvage Project (WASP) directed by Dr. Anne Jensen was quickly assembled as the nature of excavation called for a limited timetable for archaeologists to work with. The initial excavations at Walakpa began in 1968 by Dr. Stanford, the now director of the Paleo-Indian at the Smithsonian in Washington D.C. Dr. Stanford's work detailed the history of a site that's heritage dates back to 4,000 years (Stanford 1976). The site has seen a steady increase in land loss due to erosion instigated by climate change. However, the severity of the erosion has increased astronomically in the past two years. Over 13 m of rich stratified deposits on a several hundred-meter fronts were lost in a single storm. Local hunters from nearby Utqiaġvik noticed the initial slumping of the bluff. The foundation of an old house structure was jutting from the edge of the erosion face along with archaeological materials.

Walakpa is located roughly 20 kilometers south of Utqiaġvik, also known as Barrow. It's a quick boat trip or a bumpy ATV ride out from Utqiaġvik and is situated along the Walakpa bay, an inlet of the Chukchi Sea. Similar to the situation at Gufuskálar, high waves truncated the bluff; causing collapse Dr. Jensen estimates around one-third of Stanford's excavated area has been lost, as well as a 20-meter deep layer of stratigraphy (Jensen 2015; Jensen 2017a). Dr. Stanford's 1969 dissertation provides stratigraphic evidence dating back to the Neo-Eskimo and the small tool traditions. (Stanford 1976).

The Walakpa site represents heritage roots for the Inupiat and Alaskan North Slope. Local hunters utilize the site to this day for temporary marine mammal hunting and fishing camps due to its idealistic location. During the 2016 field season, hunters on their ATV's frequented the site, even getting stuck in the bay from time to time. The bluffs provided unobstructed views of the beach and the tundra to the south, a hunter's vantage point. Working there for the two weeks it was effortless to see the appeal of settling the bay.
The first signs that Walakpa was in danger of extensive erosion came about during the late summer of 2013. The erosion face of the bluff was documented on public Facebook accounts, and quickly drew the attention of UIC. Dr. Jensen recorded the significance of the sudden land loss and utilized geotextile tarps to prevent further slumping, and hopefully deters scavenging. Unfortunately, the awareness made from public posts on Facebook was a double-edged sword. The information supplied local's knowledge of the severity, but also notified people that deposits of cultural material were tumbling down the edge of the bluff. The inevitability of looting is what deters most archaeologists from actively posting about archaeological sites on social media platforms. It should be noted that most of the looting was not done by community members or local decedents. Following the social media posts, UIC shareholders collected much of the archaeological materials from the erosion scars (Jensen 2017a).

C. 2016 Excavations

The 27 members came from different countries as far as France and as close as Barrow. A total of 9 institutions/universities, from 2 continents collaborated in efforts to salvage the inundated coastline (Dawson, et al. 2017). Following the work done in 2015, there was another storm that undercut the bluff even further and caused the profile excavated to slump. Jensen lays-out in her 2017 article in *Public Archaeology and Cultural Heritage* two primary goals for the 2016 field season. One, recover as much material as possible for analysis, in the case of the site being destroyed in the interim between field season and two, define what remains of the site after the intense storms of 2014 (Jensen 2017; (Dawson, et al. 2017).

The stratigraphic layers supported the botanical analysis, displaying numerous cultural deposits that were mapped by Dr. Benjamin Fitzhugh. I was part of the excavation efforts of a previously unexcavated area known as BE-Balk. We excavated down through the permafrost
uncovering more of the house previously exposed in 2013, as well as a house tunnel likely dug in the near past. This is where we found two mummified seal carcasses, as this was likely an ice cellar long forgotten. The artifact and flotation analysis are still underway at the UIC compound. Dr. Jensen continued excavations the following summer and documented everything on her blog “Out of Ice and Out of Time” (Jensen 2017b).

Walakpa holds equal amounts of significance between cultural heritage ties and scientific data for community members and archaeologists alike. The permafrost layers preserve artifacts, and organics, unlike many regions. The cold helps the identification of faunal remains and artifacts without much conjecture on the archaeologist's behalf (Jensen 2017).

D. Science Lectures

Dr. Jensen describes the loss of the region's heritage as mainly due to European contact (Jensen 2017). The fear of losing the region's cultural heritage is not just an idle thought for community members. Utqiaġvik has been noted in the past to be a hub for scientific research. Since its inception in the early 1970s, the Utqiaġvik Inupiat Corporation focuses on incorporating the Inupiat heritage and values in their many endeavors. In 2002 UIC held science talks each week at the NARL compound, called the Barrow Schoolyard Project, a public outreach program with the intent of teaching youth about their local heritage. The event was funded by the National Science Foundation's Long-term Ecological Research program (George and Jensen 2004). However, NSF has since shifted funding. The science talks are much less frequent, but their message remains the same.

While the program's focus was on reaching out to students, George and Jensen note that students weren't the only ones in attendance. Most attending were non-natives, and at the time of the article Jensen was sorting out ways in which they can alter the timing, or topics of the lectures to
appeal to native community members. The program’s participation had blown up so much since it’s inception the project changed venues multiple times to accommodate the growing audience. The subjects of conversation ranged from a number of topics, from dog sledding to erosion. The faculty was made up of a mix of teachers and scientists from the Barrow Arctic Science Consortium (BASC). The main goal was to make the science approachable, engaging, fun and something that these students want to look into further.

Dr. Jensen continues to discuss coastal erosion on a much smaller scale with community members at the Tuzzy library in Utqiaġvik. The importance of community member's hearing these lectures cannot be understated. Their knowledge of the severity of coastal erosion will help researchers in the area work on a weather memory bank. This program is an example of how archaeologists can extend their reach beyond that of the field or lab. It’s with initiatives like this that demonstrate how climate change’s effects are no longer a burden archaeologists must bear on their own.

The only way for an archaeologist to get the help they seek, whether it be through funding, published articles, or news pieces is through outreach and transparent conversation about cultural resources. The Walakpa site is a demonstration the success interdisciplinary cooperation can have in a short time frame. As archaeologists, we're at the mercy of the weather, crew size, and funding. There are so many aspects that are out of our control at Walakpa that are similar to other salvage projects, such as Gufuskálar.

IV. Closing Remarks/Discussion

A. Where to Now?

So, again we have to ask. Where to now? These case studies described only two sites out of
a global issue. Many unanswered questions remain. For example, will more projects try to incorporate local communities within their research goals? Or, will there be a defined plan of action for archaeologists racing against the inevitable destruction of their site? In 2015 the Society for American Archaeology (SAA) members formed the Climate Change Strategies and Archaeological Resource Committee (CCSAR). Working alongside international agencies, such as Integrated History and Future of People on Earth (IHOPE), each year this committee meets to discuss the year in review, and define new goals for the year to come. In 2016 it was forming a framework of cooperation with international agencies, and interdisciplinary researchers. 2017 saw an increased focus on integrating indigenous groups and local communities within a project's framework. Dr. McGovern writes how 2016-17 saw many successes in each of the goals they set out to achieve. He defines that time frame as having been fruitful years for expanding networks of cooperation internationally, and between disciplines (McGovern 2018b). McGovern also notes how many of the publications and projects that had been produced in that same period highlight community and indigenous involvement.

In 2017, the SAA conference in Vancouver hosted a session rightfully titled “Burning Libraries: Environmental Impacts on Heritage and Science” where committee members discussed their individual experiences preserving cultural resources. Locations were ranging from Alaska, Puerto Rico, Florida, California, Scotland, as well as elsewhere in Europe. 8

McGovern notes how the phrase "burning libraries" was repeated in numerous publications and media outlets after the conference. Citing the outcome of those sessions as successful (McGovern 2018a). In spite of the success, McGovern talks about how more can still be done. The rate of threatened cultural resource sites does not seem to be decreasing. Puerto Rico even witnessed a massive hit due to the Fall 2017 hurricanes. Essentially, the outlook for 2018 is to continue to build
upon what the CCSAR been forming these past few years.

B. The National Park Services

The U.S. National Park Services (NPS) is one of the leading federal institutions that are advocating and re-defining their ethos as a response to climate change threats. In fact, they lead the nation in care and management of our national heritage sites, through programs such as the National Registrar of Historic Places, Historic Landmark Programs, and the Federal Historic Preservation Tax (NPS 2014). Marcy Rockman, an archaeologist for the NPS, provided me with memorandum 14-02, a document first issued in 2012, and lays out the strategies the NPS implements in response to threatened sites (Rockman 2015).

The National Park Service website lists the four goals that memorandum 14-02 is based upon (NPS 2014).

Goal 1 - Connect Impacts and Information: Set the broad scope of cultural resources and climate change response by connecting the concepts of impacts and information with the four pillars of climate change response: science, adaptation, mitigation, and communication

Goal 2 - Understand the Scope: Coordinate science, management, and communication to identify and improve understanding of the effects of climate change on cultural resources

Goal 3 - Integrate Practice: Incorporate climate change into ongoing cultural resources research, planning, and stewardship

Goal 4 - Learn and Share: Collaborate with partners to grow and use the body of knowledge and practice for cultural resources and climate change (NPS 2014).

Browsing the NPS website leads to linked examples of archaeological projects that fit in one of their listed goals. Some of which are mentioned previously. The NPS not only sets a robust framework for a reactionary effort in cultural heritage preservation, but it also demonstrates a federal institutions willingness to adapt to change. They define adaptation as "an adjustment in the natural or human systems that moderates harm or exploit beneficial opportunities in response to change" (NPS 2014). The NPS has even recommended that every park service program engage their faculty
in sharing their personal climate stories, building local climate narratives similar to what the Enfield started in England.

Rockman, along with Dr. George Hambrecht of the University of Maryland, discusses the four goals with case studies in which researchers incorporate these methods when facing the pressures of climate change at their sites. The pillars described in their article reflect the NPS's four goals and are labeled concisely as science, mitigation, adaptation, and communication (Hambrecht and Rockman 2017). They write of how cultural heritage sites entangle the identities of the local communities, and how this traditional knowledge is useful to the four pillars (Hambrecht and Rockman 2017). Being informed and open to change as well as making the data available, and being able to share the burden between disciplines and agencies, is the mentality of the NPS approach. As McGovern mentioned in the 2017 CCSAR report, many archaeologists agree on the points the NPS makes in their memorandum and further explains how in 2018 the goal is to build upon the successes of the past two years. I argue that archaeologists must adopt something similar to the NPS framework in order to keep pace with the effects of climate change.

C. Another Problem and Shifting Baselines

Archaeology, as a discipline, has always instilled the belief that the best way to preserve a site is in situ. The severity of climate change has challenged this belief, as this is not possible at sites like Gufuskálar and Walakpa, to leave it in the ground. We now have to shift focus and supply more resources on excavating. The new goal is to collect enough bulk samples from a site so that we have enough data so that it can inform us about a site long after it has been destroyed. This adaptation, or shifting baselines, was again noted as one of Dr. Jensen's primary goals for the 2016 field season at Walakpa. Dr. McGovern writes in a 2016 blog on the website Arctic Horizons how "we are losing evidence at an unprecedented rate, and this generation may be the last to be able to
organize an effective response" (McGovern 2016). Cultural heritage is our primary data for determining human interaction with past instances of environmental change. That's why it's so important to preserve (NPS 2014). Right now, cultural heritage management means excavating endangered sites for generations to analyze. This comes with two caveats, however. For instance, with the focus now on expedited excavation, the backlog of artifacts is sure to become too much for current curation. The National Park Services have already advocated for improved collection facilities in their memorandum, but curation is expensive and when funding resources have shifted to excavation what funding will remain to ensure curation of bulk samples?

D. The New Deal.

Franklin D. Roosevelt's New Deal in the 1930s formed one of the most extensive archaeological efforts the United States has ever seen. Creating thousands of excavator job openings for projects in the Tennessee Valley and other Southern states (Wilson 2014). Often during these excavations, archaeological sites were underreported or outright destroyed (Wilson 2014). Archaeological sites were not recorded to current standards, and frequently contexts containing artifacts and site features were never recorded. However, this effort uncovered mass amounts of archaeological data, which has yet to have been properly analyzed.

Current efforts for cultural resource preservation shares relations with New Deal archaeology only in the fact that we're currently building a backlog of data that will eventually get out of hand. Archaeology can say they've learned from the mismanagement mistakes of New Deal archaeology, and ensure that the data we collect will be organized and adequately curated for future research, but how can it provide this with no active plan?

E. Long-Term Storage of Mid-Latitude Ice Cores

Archaeology can ensure this by looking elsewhere. Interdisciplinary communication and
network building have been a critical component in recent efforts. For instance, Dr. Lonnie Thompson, of Ohio State University, has been at the forefront of climate change science, through his paleoclimate research of mid-latitude ice cores. Recent problems arose at the Byrd Polar and Climate Research Center where the stored ice cores began to melt. Fearing they’d be lost for good, Thompson and colleagues mitigated the situation through a collective effort, and substantial funding, by digging a trench in Antarctica to store the ice cores (McGovern 2018a).

Dr. Thompson already had a foothold in Antarctica due to previous research endeavors and colleagues, but this example demonstrates the power of cooperative curation efforts. I’m not suggesting that archaeologists allocate funding to dig an extensive ice cellar for storage, but following their example and focusing on cooperating and attaining funding for a sustainable long-term storage effort is the essential next step for cultural heritage preservation.

F. tDAR, the Online Record

There is obvious red tape when it comes to logistically moving artifacts around the world to be curated. Antiquity laws for one vary from country to country and restrict the amounts and types of artifacts that can leave the country of origin. Digital archiving can be the way to get around these setbacks. The Digital Archaeological Record, or tDAR, is an NSF backed online archive for archaeological data that is free to use. Multiple academic institutions already support tDAR and the servers are hosted at Arizona State University (McManamon, et al. 2010).

The website navigates quickly, and anyone can search the previously archived data. The program registration allows for its members to upload multiple types of documents. For example, PDFs, word documents such as data sets, virtual files like 3D scans, images, and geospatial data. This program helps organize and manage datasets in a consolidated and easy to locate format. It allows its users to keep datasets private, as well as publishes data coinciding with their respective
articles or books. Federal agencies, universities, cultural resource management firms are already making use of this data storage system. For instance, the Society for American Archaeology is a registered member and the discussions given at the 2017 SAA meeting in Vancouver have already been compartmentalized into the system's archive.

TDAR is an easily accessible, shareable, format that researchers can use long after sites have been destroyed. As it stands, an archaeologist's job is not done after excavation; tDAR ensures that the inevitable backlog of data would be organized and readily available.

V. Conclusion

In conclusion, archaeologists must continue to learn from their collective knowledge, acquire help through the empowerment of local communities, and continue to raise awareness at conferences. The introductory keynote session at the 2017 SAA's were a dominant win for climate change archaeology. More research projects continue to follow SCAPE's strategy and work alongside coastal communities. It would be a remarkable learning experience for both the archaeologists and community alike. The possibilities are endless, however; no progress can be made without the support of state legislation and these combined efforts.

Archaeologists must also look to the future and engage in an active long-term curation initiative. The increased focus on excavation will inevitably lead to backlogged data. By looking at how Lonnie Thompson and tDAR solve these issues, archaeology should be able to adapt to the changing paradigm. With any luck, this paper demonstrates the opportunities for salvaging vulnerable archaeological contexts through cooperation and instills the hope that archaeology can overcome the time constraints and pressures of climate change.
Appendix A: Images

**Image 1.** Erosion scar at Gufuskálar, lenses of faunal remains can be seen. Summer 2015. (photo credit: Barry Gordon)
Appendix A: Images

Image 2. Setting up the site grid at Gufuskálar, summer 2015. The lava stones were removed tumble. Sandbags thrown from prior storms can be seen in the distance. Photo facing South East. (photo credit: Barry Gordon)
Appendix A: Images

*Image 3.* Coastlines at Gufuskálar, photo facing North West excavated mound summer 2015 (photo credit: Barry Gordon)
Appendix A: Images

Appendix A: Images

**Image 5:** Photograph of the eroding bluff facing North East. (photo credit: Dr. Anne Jensen) (Jensen 2017).

**Image 6:** The bluff before clearing off recent collapse, summer 2016. (Photo credit: Dr. Benjamin Fitzhugh.)
Appendix A: Images

Image 7: Clearing of collapse and removal of the geotextile covering. Summer 2016 facing North West. (photo credit: Dr. Benjamin Fitzhugh)
Appendix B: Maps

Map 1. Gufuskálar shown it's about 5 kilometers East of Hellisandur. (Map taken from Google Maps 4.18.18).

Map 2. Walakpa shown it's a little over 20 kilometers South West of Utiqiaġvik. (Map taken from Google Maps 4.18.18).
Appendix C: Charts

Chart 1. The four pillar framework of NPS cultural resource management created by Marcy Rockman, and George Hambrecht (Hambrecht and Rockman 2017).
Works Cited

Davenport, Coral, and Campbell Robertson

Dawson, T., et al.

Dawson, Tom

Dugmore, Andrew J, et al.

Endfield, Georgina, and Simon Naylor
2015 Climate and cultural heritage: an experiment with the ‘weather memory bank'.

Erlandson, Jon M

Feeley, Frank
2012 Mammal Consumption at the Medieval Fishing Station at Gufuskálar. NORSEC Zooarchaeology Laboratory Report.

Feeley, Frank , and Lilja Björk Pálsdóttir

George, JC, and Anne M Jensen

Graeter, KA, et al.
2018 Ice Core Records of West Greenland Melt and Climate Forcing. Geophysical Research Letters.

Hambreicht, George, and Marcy Rockman
Harvey, David, and Jim Perry
2015 The future of heritage as climates change: loss, adaptation and creativity: Routledge.

Jensen, Anne
2015 Eroding Site at Walakpa.

—
2017a Discussion of the status quo of North Slope Archaeology. B. Gordon, ed.

—
2017b Out of Ice and Time. In Arctic Archaeology as seen from Utqiaġvik (Barrow), Alaska., Vol. 2018.

Karlsson, Gunnar

Kunz, Keneva, and Bergljót S Kristjánsdóttir
2008 The Saga of the People of Laxardal and Bolli Bollason's Tale: Penguin UK.

National Park Service
2014 Climate change and stewardship of cultural resources. US DOI National Park Service Policy Memorandum 14-02.

Markham, Adam

McGovern, Thomas H

—
2016 IHOPE and SAA initiatives on climate change threats. In Arctic Horizons.

—

—
McManamon, Francis P, Keith W Kintigh, and Adam Brin
2010 Digital antiquity and the digital archaeological record (tDAR): broadening access and ensuring long-term preservation for digital archaeological data. CSA Newsletter 23(2).

Pálsdóttir, Lilja Björk
2011 Under the glacier: 2011 archaeological investigations on the fishing station at Gufuskálar, Snæfellsnes.

Rockman, Marcy

SCAPE

Stanford, Dennis J

Streever, B, et al.

Walker, Brian, and David Salt

Westley, Kieran, et al.

Wilson, Charles Reagan

Woolf, David, and Judith Wolf

Zorich, Zach
2012 Letter from Iceland: Surviving the Little Ice Age. In Archaeology Vol. 65: Archaeology Institute of America.
End Notes

1 Participants at the president’s forum: Sandra Pentney, Margo Schwadron, Joanna Hambly, Isabel Rivera-Collazo, and Paul Blackhouse.

2 Volcanic soils are more susceptible to wind erosion than others.

3 Here is the link to the SCAPE/Shorewatch website: http://www.scapetrust.org/, http://www.scapetrust.org/html/shorewatch.html

4 “In all regions of Iceland individual farmsteads were largely self-sufficient economic (though not political) units. Coastal fishing from small boats, manned sometimes by only two men, was practiced widely. The richest catches were taken at the cod-spawning grounds off the south-western and western coasts in late winter and early spring, but abundant fish stocks were available in many places off Iceland’s long coastline” (Byock 2001).

5 Frank Feeley continues analyses of the faunal remains excavated at Gufuskálar. The collection is currently curated at CUNY Hunter College. There is over a metric ton of faunal remains

6 Dr. Anne Jensen’s blog Out of Ice and Time: Arctic archaeology as seen from Utqiagvik (Barrow), Alaska https://iceandtime.net/.

7 Here is a detailed account of all that was collected during that field season: 182 artifacts, 451 faunal samples (1 sample = multiple bones), 115 flotation samples, ten ceramic samples, and an intact marine mamma. (Jensen 2017).

8 Following the 2017 SAA conference in Vancouver the Climate Change Strategies and Archaeological Resources Committee (CCSAR) members spoke to Federal representatives in Washington DC. (McGovern 2017).

9 Here’s the link to the tDAR webpage: https://www.tdar.org/