Northern Alaska National Historic Landmark Condition and Vulnerability Assessment Project

Final Report

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EXECUTIVE SUMMARY

The purpose of this cooperative Portland State University (PSU)–National Park Service (NPS) project is to evaluate climate change and other threats to Alaskan National Historic Landmark (NHL) archaeological sites and to raise awareness at a national level of the significance of northern NHL sites and their vulnerability to climate change impacts. The goal is to develop methods for assessing site condition and climate change vulnerability that can be used in evaluating other Alaskan NHLs and archaeological sites. Project objectives were to: 1) conduct outreach and collaborate with local communities and NHL landowners in assessing site condition and vulnerability, 2) to develop and implement a project research design, 3) to develop site condition and climate change vulnerability assessment methods and field forms, 4) to conduct site visits at three to six NHLs to assess condition and vulnerability, and 6) to produce this final technical report that summarizes project findings and makes recommendations for future work.

Over the course of three years, project objectives were largely met. Achievements include: conducting general outreach (local, regional, and national) on the problem of climate change threat to Alaska NHL sites; collaboration with local communities (Shaktoolik, Wales, Kivalina, and Nome) and NHL landowners in assessing site condition and vulnerability; developing and implementing a project research design and assessment methods; and conducting site visits to two NHLs, the Ipiutak and Wales NHLs. An attempt was made to assess two additional NHLs, Gallagher Flint Station and Iyatayet, but factors beyond the research team's control made these assessments impossible. Other outreach efforts include production of project-related posters for community distribution, several conference talks associated with the project, and production of an article for the Arctic research community.

Adjustments were made to the methodology and associated forms following field testing of assessment methods. The final forms and methods are provided in this report. This report also details specific management, education/interpretation, and outreach recommendations for the NHLs included in the current study, as well as more general recommendations on the topic of future NHL and archaeological site assessment. General recommendations include: developing community-specific monitoring programs at remote NHLs, collaborating with communities to study materials collected from NHLs, working on a variety of community-based education and interpretation projects, enhancing existing NHL-related web and social media outlets to share research results and educate the general public on the problem of climate change impacts and archaeology in the north, and developing region-specific predictive models to aid in prioritization and working towards region-specific site prioritization systems. Coordinating a regional or state-wide response to the problem of climate change and cultural resources is also recommended.

1 PROJECT OVERVIEW

The purpose of this cooperative Portland State University (PSU)–National Park Service (NPS) project is to evaluate climate change and other threats to Alaskan National Historic Landmark (NHL) archaeological sites and to raise awareness at a national level of the significance of northern NHL sites and their vulnerability to climate change impacts. For our purposes, climate change vulnerability is defined as the potential that climate change–induced hazards will have an adverse impact on archaeological sites. Archaeological sites are particularly vulnerable to climate change impacts in that each site is unique, non-renewable, and context specific. Archaeological sites cannot be moved or even easily defended from climate change impacts. As a result, sites at risk of destruction in the near to more distant future must be identified and potential negative impacts mitigated through future monitoring, research, or data recovery. To do so, the NPS needs a process for prioritizing the most significant and most threatened archaeological sites.

Current and future climate change impacts in Alaska are synthesized extensively elsewhere (ACIA 2004; Calloway 2007; Jezierski et al. 2010a, 2010b; Moerlein and Carothers 2012; Whiting 2002), as are their potential impacts to Arctic and high latitude archaeological sites (Anderson 2013; Blankholm 2009; Callanan 2016; Dixon et al. 2014). Melting sea ice, coastal erosion, storm surges, unpredictable weather, inland drying and warming, animal migration shifts, and resource distribution and abundance changes all pose new challenges for local residents and also threaten the archaeological record of past lifeways. Archaeologists have a longstanding interest in the study of past human-environment interactions, particularly with respect to the diverse ways people manipulated their environment and also responded to episodes of past environmental change. This research is being applied more and more frequently to contemporary environmental issues and future sustainability planning (Hardesty 2007).

While archaeologists have always worked in applied contexts, there is a growing movement towards demonstrating how archaeological research can contribute to broader social and scientific issues (Rockman and Flatman 2011; Smith 2010; Smith et al. 2012). Some of this work is explicitly directed at applying archaeological research to contemporary climate change issues (e.g., Barnes et al. 2013; Cooper 2012; Cooper and Peros 2010; Hudson et al. 2012; Rockman 2011; Sandweiss and Kelley 2012; Van de Noort 2013). Hudson et al. (2012) and Rockman (2011) summarize the various ways that archaeology can contribute to climate change research. These include providing a social indicator of climate change over the long term, establishing a historical baseline against which we can measure current and future climate change, and giving temporal context to modern beliefs and practices around climate change. Archaeology can contribute a new perspective on traditional nature/culture divisions in climate change research. We can also use public archaeology to add to public education and awareness of climate change issues, contribute historical data on the relationship between social injustice and social disparity in responses to the environment, and help construct "intercultural" responses to climate change issues in the future. Archaeology has significant potential to contribute information to the study of contemporary climate change in the Arctic, but this potential is virtually untapped.

This project is one of several efforts in the Alaska region that are directed at planning for climate change impacts to archaeological sites. While the current project is focused on a small sample of northern NHLs, the goal is to develop methods for assessing site condition and climate change vulnerability that can be used in evaluating other Alaskan NHLs and archaeological sites. Project objectives were to: 1) conduct outreach and collaborate with local communities and NHL landowners in assessing site condition and vulnerability, 2) develop and implement a project research design, 3) develop site condition and climate change vulnerability assessment methods and field forms, 4) conduct site visits at three to six NHLs (Figure 1) to assess condition and vulnerability, and 6) produce this final technical report that summarizes project findings and makes recommendations for future work.

These project objectives were achieved through two seasons of fieldwork and through consultation with local communities and NHL owners. Fieldwork was conducted at two NHLs, Wales and Point Hope, in 2014; our attempt to carry out fieldwork at a third NHL in 2015 was thwarted by wildlife issues. We carried out outreach and collaboration with the communities of Wales, Shaktoolik, and Kivalina. Methods and forms developed for assessing site condition and climate change vulnerability were field tested and subsequently modified for future use. This report details project activities, methods developed over the course of this project, fieldwork, and findings. Management, interpretation, and education recommendations are made for the sites investigated over the course of the project, as are recommendations for future approaches for other archaeological sites in similar environments.

2 CLIMATE CHANGE HAZARD AND VULNERABILITY ASSESSMENT

2.1 Previous Work

Archaeologists link the study of past human ecodynamics with contemporary climate change issues. Study and planning for the negative impact of climate change on archaeological sites is, however, only in the early stages. While archaeologists recognize the need to address climate change impacts to archaeological sites (e.g., Blankholm 2009; Erlandson 2008), models for how to do so are limited. Language and concepts from disaster management are often employed in archaeological literature on site vulnerability to a variety of natural and cultural forces (Cooper et al. 2012; Flaming 2013; Sharples 2006; see also Gonzalez and Hoffman 2016). This same framework is applied here. Specifically, archaeological site *risk* for negative climate change impacts is seen as a combination of both *hazard* and *vulnerability*. *Hazards* are physical processes or events, while *vulnerability* is the degree of site exposure to hazards. While this study is focused on site vulnerability, hazards must be considered in determining site vulnerability. A third factor, *site significance*, is critical for prioritizing sites for mitigation.

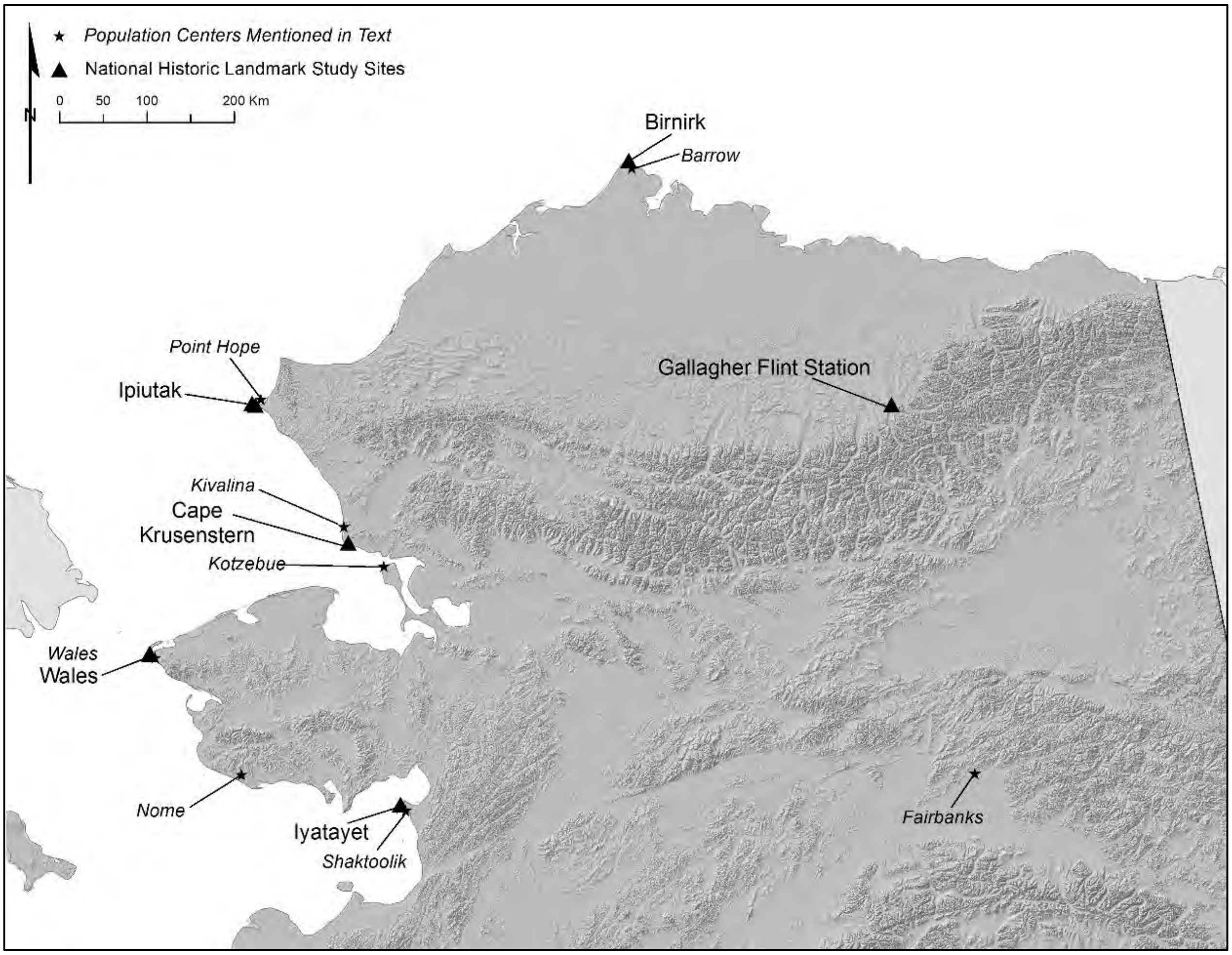

Figure 1. Study sites and other locations mentioned in text.

Review of existing literature on climate change assessment and mitigation planning indicates that there are two broad approaches that are often used in combination: 1) predictive modeling of climate change impacts to archaeological sites, and 2) site-level assessments of vulnerability, risk, and current conditions (

Table 1). For example, English Heritage is already undertaking a program of rapid coastal zone assessment in response to increased threats to coastal resources by future climate change, because existing national records were inadequate for protecting coastal archaeological sites (Cassar and Heritage 2005; Murphy 2009; Murphy et al. 2009). As a result, a two-stage coastal zone risk assessment program was undertaken in the United Kingdom in the late 1990s/early 2000s. Phase I consisted of study of site records and various sources of remote sensing data to identify and prioritize coastal areas for further investigation. Phase II involved rapid field assessment of coastal areas; these surveys are still underway but many are now complete. Combined, the two phases of research provide a strong basis for archaeological site management (Murphy 2009). Similar assessment programs are underway in other parts of the United Kingdom and northern Europe (see Milner 2012:229 for summary).

Table 1. Strengths and Weaknesses of Different Site Assessment Methods

	Predictive Modeling	Site Level Assessments
Strengths	• Can use existing data • Spatial format • Multidisciplinary	• Current information on site status • Fine-grained data • Can use new data to refine predictive model
Challenges	• Data availability and resolution • Too coarse at large scales • Requires complex multidisciplinary data/teams	• Consistency in data collection • Hard to decide factors/weighting • Only accounts for *archaeological* significance of sites

Other useful models for the current project include a geomorphological geographic information system (GIS) model developed to assess the vulnerability of coastal landforms to climate change and rising sea levels in Tasmania (Sharples 2006) and a GIS predictive model for coastal Newfoundland archaeological site vulnerability to climate change impacts (Westley et al. 2011). These predictive GIS models combine two sources of information: 1) a model of anticipated climate change hazards based on a variety of environmental, climatological, and geological data, and 2) a model of archaeological site locations derived from characteristics of known site locations. The strength of these models is in their ability to combine large amounts of existing data in a spatial format that works well for planning purposes. At the same time, predictive models are hampered by the availability and resolution of data—both cultural and environmental—that can be input into the model. In addition, modeling of larger geographic areas tends to yield coarser outputs. Both Sharples (2006) and Westley et al. (2011) emphasize the need for multiple scales of analysis to address the shortcomings of predictive modeling and to obtain higher precision data on site condition and vulnerability that are needed for long-term resource management planning purposes. This can be achieved both by modeling at multiple scales, and by combining model predictions with the result of regional field studies, as was done in the English Heritage approach described above. Note that these predictive models combine a variety of data (e.g., geomorphological, climatological, and cultural) and therefore often require the combined efforts of experts from various disciplines to create a robust model (Canuti et al. 2000; Howard 2012).

At both the national (James 2014; NPS 2010, 2012; Rockman 2015) and regional level (Jezierski et al. 2010a, 2010b), the NPS is planning a response to climate change. National guidance on assessing cultural resource vulnerability to climate change and prioritizing mitigation efforts is under development but not yet available (Gonzalez and Hoffman 2016; Rockman and Cordell 2016; Rockman and Marissa 2016). An effort is underway to develop a strategy for assessing coastal areas of northwest Alaskan parklands for current and future climate change impacts

(Anderson 2013). NPS archaeologists are developing a predictive model for the area to guide field assessment efforts (Dael Devenport and Jeremy Karchut, personal communication, 2012; see also Prentice 2013b). Discussion of climate change impacts are included in region-wide development of composite archaeological management standards; transition to composite archaeological management standards includes an emphasis on systematically identifying significant and vulnerable archaeological sites (Birkedal and Carter 2013). As part of this effort, Flaming (2013) discusses the development of a resource risk code matrix specifically for analyzing the vulnerability of cultural resources to various hazards, including climate change impacts. The resource risk code approach is hazard specific and includes an evaluation of the probability for exposure and vulnerability (Flaming 2013:22) (Table 2). Note that this approach does not allow for a calculation of cumulative risk although each potential hazard would have its own resource risk code matrix. Carter (2013b) proposes an aggregated risk model (Table 3) as preferable over a principle risk model, as an aggregated risk model takes into account multiple hazards to a site, the likelihood that a hazard will actually impact the site (likeliness), the time frame for this (imminence), and the severity of the impact.

Table 2. Resource risk code matrix (Flaming 2013)

		Susceptibility			
		A	**B**	**C**	**D**
Probability	**A**	1	1	2	3
	B	1	1	2	3
	C	2	2	2	3
	D	3	3	3	

Table 3. Hypothetical aggregated risk assessment model (Carter 2013b)

Site	**Threat**	**Likeliness (1–10)**	**Likeliness Weight (x2)**	**Imminence (1–10)**	**Imminence Weight (x2)**	**Severity (1–10)**	**Severity Weight (x3)**
08JeX	Water Erosion	10	20	5	10	10	30
	Sea Level Rise	5	20	5	10	10	30
	Looting	10	20	10	20	4	12
Site Total			**60**		**50**		**72**

These NPS models draw on existing site significance data from National Register of Historic Places (NRHP) eligibility evaluations and site condition and vulnerability information reported in the Archaeological Site Information Management System (ASMIS) (Carter 2013a, 2013b; Prentice 2013). It is logical to develop climate change risk assessment methods for the current project that both draw on, and fit within, these existing sources of data given the large amount of available information on site condition and vulnerability. This will also facilitate the comparison of newly collected assessment data with the results of prior assessments conducted for ASMIS or NRHP eligibility determination purposes.

An overall framework for assessing climate change impacts and prioritizing Alaskan archaeological sites for treatment has not yet been finalized by the NPS. It is apparent from this literature review, however, that an overall approach will likely include the following factors: 1) climate change hazards, 2) climate change vulnerability, 3) other hazards to site condition, 4) the time frame for hazards, 5) current site condition, and 6) site significance. A system of scoring of these factors for each site based on a set of established criteria will yield an overall ranking for each site that will facilitate prioritization of sites for additional treatment. Note that this will be somewhat subjective in that the process will rely on assessment by professional archaeologists of site significance, hazards, vulnerability, etc. Carefully defined criteria for ranking within each factor will mitigate the subjectivity of this approach to some extent. In addition, combining field assessment with predictive modeling of site vulnerability that draws on geomorphic and other environmental data in defining site vulnerability would greatly enhance the utility of the resulting database.

The following methodology for the current project anticipates a regional system similar to that described above for assessing and prioritizing Alaskan archaeological sites threatened by climate change.

2.2 Methods for NHL Assessment

The goal of this project was to develop methods for assessing northern NHLs, but to do so in a way that the methods could be further developed and/or factors altered for assessing NHL sites, and other archaeological sites, across a large region composed of many geographic settings, i.e., all of Alaska. In general, the approach here involves qualitative description of climate change hazards, other hazards, site condition, and vulnerability. Forms for field recording during site assessment were designed to maintain utility in a wide variety of environmental and archaeological settings, and are intended for use by archaeologists with varying degrees of prior training and experience in gathering geomorphic and environmental information. Other factors taken into consideration were facilitating consistency in data collection so that the resulting database is robust, and developing a methodological approach that can be easily modified for use in other region-specific studies.

Site assessment for climate change and other impacts requires collecting data on site vulnerability and on potential and current hazards. This information is combined to establish site risk with respect to climate change and other potential hazards. An assessment of site significance (using NRHP guidelines for defining significance) is also made to aid in prioritizing high risk sites for future mitigation efforts. A system of qualitative evaluation that draws on existing NPS ASMIS concepts is used where possible; these qualitative data could be converted into quantitative data as needed for a large-scale prioritization effort (see Section 7 for additional discussion of site prioritization). Several specific considerations related to assessing site vulnerability and hazards are detailed in the following sections. A condition and climate change vulnerability assessment (CCVA) form and associated guidelines (Appendix A) were developed to standardize the collection of qualitative data.

Assessing Site Vulnerability

Archaeological site vulnerability exists in the context of specific physical hazards and is determined primarily by a site's environmental setting and the nature of the archaeological site itself (e.g., presence/absence of aboveground artifacts, features, and/or structures). For example, a periglacial setting makes a site more prone to glacial melt impacts than to forest fire (Table 4). A wooden standing cabin is more vulnerable to forest fire than a semi-subterranean house. Site vulnerability assessment therefore involves collecting data on the archaeology and on the site's environmental setting; much of this information is already available on existing site forms, NRHP and NHL nomination forms, and past condition assessments and can then be updated during field visits. Most commonly used terms for northern Alaskan sites and environmental conditions are provided in CCVA guidelines to improve standardization of data collection (see Appendix A).

Assessing Climate Change and Other Hazards to Sites

Potential climate change hazards and their impacts on Alaskan archaeological sites in a variety of environmental settings were derived from existing syntheses of current/known, predicted, and possible Alaskan climate change impacts (ACIA 2004; Jezierski et al. 2010a, 2010b) (Appendix A). Climate change issues that are unlikely to directly impact archaeological sites (e.g., changing wildlife distributions) are not considered here. A consideration of the relationship between site setting and various likely northern Alaskan hazards was helpful in developing the CCVA guidelines (Table 4). This list is not comprehensive, but a similar nationwide matrix will soon be available for use in assessing sites and as an aid in mitigation prioritization (Rockman and Marissa 2016).

Table 4. An Example of Climate Change Hazards, Impacts, and Factors that Increase Archaeological Site Vulnerability to Hazards

Hazards	Anticipated Impact	Vulnerability Factors – Site Setting
Decreased snow cover	• Increased opportunity for wind deflation and other erosional forces to act on sites over a longer snow-free season • Longer period of time when unauthorized digging is possible	• Aspect • Landform
Decreased ice cover	• Longer period of exposure to storms and rising river levels at coastal and riverine sites • Longer period of time when unauthorized digging is possible	• Coastal setting • Riverine setting

Table 4. An Example of Climate Change Hazards, Impacts, and Factors that Increase Archaeological Site Vulnerability to Hazards

Hazards	**Anticipated Impact**	**Vulnerability Factors – Site Setting**
Increased glacial melting	• Increased surface water runoff and rising river levels during season of melt causes site erosion • If mass wastage occurs, could cause large solid earth responses through isostatic rebound. Would have an impact on regional faulting and seismic activity, which could damage or destroy archaeological sites located in seismically active zones • Previously unknown sites/artifacts could be exposed by glacial melt off, and quickly decompose if not identified and stabilized • *Note that isostatic rebound could counteract rising sea levels in some cases, making sites less vulnerable*	• Periglacial setting • Proximity to known fault zone/seismically active area
Permafrost thawing	• Increased surface water runoff, increase in depth of active layer of permafrost where annual freezing and thawing occurs	• Currently located in a region of continuous or intermittent permafrost • Sediment type – unconsolidated sediments increase vulnerability
Increased precipitation	• Increased water levels and runoff throughout the water system, contributing to surface erosion of sites • When coupled with other forces (e.g., glacial and permafrost melt) could cause mass wasting events	• Slope • Current water levels/water table • Sediment type – consolidated sediments, high clay content, and/or minimal soil development increase vulnerability
Changes in vegetation growth patterns	• Decreased vegetation cover would increase site vulnerability to erosion • Increased vegetation cover could cause subsurface damage to sites	• % vegetation cover
Rising sea level	• Submersion of coastal sites • Increased coastal mass wasting events, particularly when combined with other forces (e.g., increased storm frequency, permafrost melting)	• Coastal setting • Sediment type – unconsolidated sediments, minimal soil development increase vulnerability
Increased coastal and riverine erosion rates	• Mass wasting of sites • Burial of sites	• Coastal setting • Riverine setting • Aspect • Landform type • Sediment type – unconsolidated sediments, minimal soil development increase vulnerability

Table 4. An Example of Climate Change Hazards, Impacts, and Factors that Increase Archaeological Site Vulnerability to Hazards

Hazards	Anticipated Impact	Vulnerability Factors – Site Setting
Increased storm power and frequency	• Contributes to wind and water erosion (surface, mass wasting) rates in a variety of environmental settings	• Proximity to coast or river • Aspect • Fetch • Landform type • Sediment type –unconsolidated sediments, minimal soil development increase vulnerability
Increased fire frequency and intensity	• Contributes to reduction in permafrost thickness • Differential return of vegetation to burnt areas that can cause increased vulnerability to erosion • Burning of aboveground cultural resources • General acceleration of other climate change impacts	• Aspect • Slope • Vegetation

Note: This list is not comprehensive.

For the most part, factors that determine site climate change vulnerability are the same or similar to those that make sites vulnerable to a variety of natural forces that act in both positive and negative ways on archaeological sites. In the field, an archaeologist often cannot determine with certainty if a particular hazard or impact to the site is specifically related to climate change; this inference is most often made based on a larger understanding of current research on climate change impacts in northern Alaskan and predictions for future climate change impacts. As a result, in conducting a CCVA an archaeologist is essentially assessing current site condition and vulnerability to natural and human hazards.

In addition to potential climate change hazards, a variety of other natural and cultural hazards to archaeological sites exist (see Appendix A for more details) and should be taken into consideration in assessing site condition and vulnerability beyond climate change specific issues. These include: animal activities, visitor or other human activities, park operations, unauthorized collecting, vandalism, neglect, fire suppression/control, previous scientific research, and development/construction.

Site Risk and Mitigation Recommendations

The assessment concludes with a narrative discussion of each sites' vulnerability to each potential and current hazard. This discussion includes consideration of site environmental setting and conditions, as well as the nature and condition of the site itself. This discussion is followed by a qualitative assessment of each sites' risk for climate change impacts and other threats or hazards to the integrity of the site. Risk is a combination of vulnerability, hazards, and hazard likelihood. Specific recommendations for mitigating site risk for various hazards identified during the assessment will be made.

Site Significance

By definition NHLs are sites deemed “to possess exceptional value or quality in illustrating or interpreting the heritage of the United States” (NHL Program https://www.nps.gov/nhl/). Site significance data will aid in future site prioritization for mitigation. NRHP eligibility recommendations take into account a combination of factors including local, regional, and national significance of the site, site data potential, and integrity. Reassessment of a site for the NRHP should be conducted at the time of condition assessment because eligibility may never have been assessed in the past or may have changed.

3 NATIONAL HISTORIC LANDMARK STUDY SITES

A total of six sites were targeted at the outset of the project for field investigation, with the goal of visiting at least three of the six sites over the course of the project. The selected sites were Ipiutak, Wales, Iyatayet, Birnirk, Gallagher Flint Station, and Cape Krusenstern National Monument (see Figure 1).

3.1 Ipiutak

The Ipiutak site (XPH-3) was discovered by archaeologists in 1939 on the Point Hope, or Tikigaq, Peninsula (Figure 1 andFigure 2). Helge Larsen, Froehlich Rainey, and J.L. Giddings conducted excavations at the site from 1939 to 1941 (Larsen and Rainey 1948). Larsen and Rainey identified more than 500 houses at the site complex and described it as one of the largest known prehistoric settlements in the Alaskan Arctic (Larsen and Rainey 1948) (Figure 3). There were four primary sites identified at Tikigaq: Ipiutak (XHP-3), Old Tigara (XPH-1), Tigara or New Tigara (XPH-8), and Jabbertown (XPH-2). Based on research at these and other local sites, two primary periods of occupation are known from Tikigaq; an earlier, Ipiutak, occupation (approximately 1,700–1,000 radiocarbon years before present [BP]) and a later Neo-Inuit[1] occupation (1000 BP to contact era). Earlier Near-Ipiutak occupations are also reported (Larsen 1968, 1982). Together these occupations represent more than 2,000 years of continuous occupation at Tikigaq. The NHL is currently owned by various individuals, the Tikigaq Native Corporation, the Arctic Slope Regional Corporation, and the State of Alaska Department of Natural Resources.

[1] I use the terms Paleo-Inuit and Neo-Inuit instead of the terms Paleoeskimo and Neoeskimo in accordance with Inuit Circumpolar Council Resolution 2010-01 regarding the use of the term Inuit in scientific and other circles.

[redacted]

Figure 2. Major sites identified at Tikigaq.

[redacted]

Figure 3. Map of Ipiutak site (Larsen and Rainey 1948:21).

The site was designated an NHL in 1962 on the basis of its size, importance in defining the Ipiutak archaeological culture, the temporal extent of occupation at the site, and the significant research potential of the site complex. There were no boundaries established in the original NHL nomination but in 1975 the NPS established the NHL boundaries around all four of the significant sites that now make up the Ipiutak archaeological district. The boundaries of the NHL were revised in 1986 to include only the Ipiutak site, which now consists of approximately 327 acres that fall within the Ipiutak archaeological district (Figures 4 and 5). The Ipiutak archaeological culture was unknown prior to Larsen and Rainey's work at the site, and the Ipiutak site at Point Hope is the type site for the Ipiutak culture. The Ipiutak culture is considered unique in its elaborate burial goods, is interpreted as the first clear evidence of the development of social inequality in this region, and provides early evidence of the use of iron that likely came from Northeast Asia (Mason 2006, 1998). After the initial discovery and definition of the Ipiutak culture at Tikigaq, Ipiutak materials were identified at several other sites in the Northwest and Northern Alaska region, including Cape Krusenstern (Giddings and Anderson 1986), Cape Espenberg (Schaaf 1988), Point Spencer (Larsen 1979/1980), Deering (Bowers 2006; Larsen 2001; Reanier et al. 1998;), to the south at Golovin Lagoon (Mason et al. 2007), and more recently at the Nuvuk site near Barrow (Jensen 2009a). Most of the known Ipiutak sites are on the coast, although Ipiutak components are known from interior areas of northwest Alaska such as Onion Portage (Anderson 1988), Hahanudan Lake (Clark 1977), Feniak Lake, and Tukuto Lake (Mason 2000). Many questions remain about the Ipiutak culture. For example, the relationship between Ipiutak people and earlier and later cultures of northern Alaska remains poorly understood, with material evidence pointing to both continuity and change across this time period. Other details of people's lifeways during the Ipiutak phase are debated, with much more research needed to establish patterns of mobility, settlement systems, and social organization (see Mason 1998, 2000, 2004 for more information). The potential remains at the Ipiutak NHL type site to address these questions, despite many years of erosion and subsistence digging at the site.

Only limited fieldwork has taken place at the Ipiutak site since Larsen and Rainey's work in the mid-twentieth century. Edward Hosley revisited the site in 1967, with the primary goal of evaluating the impact of erosion on the Ipiutak site and other sites at Tikigaq (Hosley et al. 1968:1). At this time, the impact of erosion on the [redacted] peninsula was already apparent and there were concerns about the threat of erosion and coastal flooding to the modern community and local archaeology (Hosley et al. 1968:4). At Old Tigara, Hosley estimated that in the 30 years since prior research at the site, 30% of the site was lost to erosion at a rate of about 8.8 feet/year (Hosley et al. 1968:11); erosion rates at the Ipiutak site were slightly lower, 8.3 feet/year, with approximately 50 houses lost to erosion since Larsen and Rainey's work in the 1930s and 40s. Hosely also identified some inaccuracies in the original site map and noted that several houses had been excavated since Larsen and Rainey's work (Hosley et al. 1968:13); whether this was done by local subsistence diggers or archaeologists is not clear from Hosley's report. Hosley conducted fieldwork at both Old Tigara and the Ipiutak site. At the

Ipiutak site, Hosely's team partially excavated three adjacent houses and carried out surface collections. The purpose of the excavations is not entirely clear, but based on the recovery of a variety of faunal remains, artifacts, and other cultural materials, Hosley concluded that considerable research potential remained at the site and recommended a season of salvage work at the site to mitigate the eventual loss of data to erosion.

Figure 4. Pre-project boundary and datum (orange triangle) of Ipiutak NHL. Note that the NHL boundary in the top map is drawn using the 1986 NRHP form description and there is some uncertainty regarding its accuracy. Figure by Rhea Hood.

[redacted]

Figure 5. Map of Ipiutak site (XHP-3) and other sites within the Ipiutak Archaeological District (XHP-111). Note differences between Ipiutak site boundary and NHL boundary in previous figure. Figure by Rhea Hood.

Anne Shinkwin (1977) worked at Tikigaq in the 1970s. Her effort included survey of the new village location at the center of the Tikigaq spit; the contemporary village needed to move away from the eroding village of New Tigara, which at that time was located [redacted]. Shinkwin excavated Beach Ridges [redacted] at the Old Tigara mounds and carried out limited testing at the Ipiutak site itself. She completed a NRHP nomination for the Ipiutak Archaeological District (XPH-00011), which includes all four of the major Tikigaq sites (Ipiutak, Old Tigara, New Tigara, and Jabbertown). In 1977, Elizabeth Andrews conducted subsurface testing at 18 Ipiutak features in addition to some work at the Jabbertown site (Andrews 1977). This effort was one in a series of similar projects that followed NPS aerial photography of northern parklands (e.g., Zimmerman 1978, 1981). Andrews' goals were to field test a predictive archaeological model based on aerial photography analysis, to determine the nature of cultural features remaining at Ipiutak and Jabbertown, and to assess the feasibility of mapping features from aerial photographs (Andrews 1977:16). Field testing, which included both surface survey of the site and excavation of 50 by 50–cm square units in 18 features, identified 106 of the more than 300 possible archaeological features identified on aerial photographs.

Several compliance projects were conducted within the NHL boundary between 1979 and 1984. This included a two-day survey of proposed road construction locations in 1979 (Cook 1979), monitoring of construction in the new town site area by Peterson and Newell (Dekin and Cassedy 1986), and a study of sod houses at Tigara by Newell that began in 1984 (Newell 1985). Albert Dekin conducted a brief field study in 1984 that included test excavations at Tigara and Ipiutak (Dekin and Cassedy 1986). More recently, Hall (1990) assessed several construction areas at Tikigaq, including areas within the Ipiutak site. This assessment involved survey and testing of proposed construction areas to evaluate whether or not any archaeological sites would be damaged by construction. Hall also investigated an existing and heavily used all-terrain vehicle (ATV) trail along the north side of the site to determine whether or not any part of the site had already been damaged. Various features were identified and tested over the course of Hall's work and recommendations were made to mitigate the impact of construction and other activities on the Ipiutak site. Hanson (1993) analyzed human bones [redacted] based on Hanson's affiliation of the remains with the Tigara occupation of Tikigaq though Hanson did not specify the bones' exact location. Other compliance projects were carried out in the vicinity of the Ipiutak site by Jensen (1998), Gal (1990), and Clarus Environment Services (2006). Research on existing Ipiutak collections continues (e.g., Hilton et al. 2014; Mason 2004; Newton 2002), but there have been no recent efforts at renewed field research at the site.

The NPS has tracked the condition of the Ipiutak NHL since 1978, when the first condition assessment was conducted (NPS 1978). Erosion and illegal digging at [redacted] the site was reported at this time. No impacts to the site were reported in when NPS archaeologist Floyd Sharrock visited the site in 1982 (Saleeby 1997; Sharrock 1982). Only limited impacts (erosion on south shore of Ipiutak Lagoon and limited construction impacts) were reported in 1986 when NPS archaeologists Susan Morton and Kathleen Lidfors visited the site to assess its condition (NPS 1986a; Saleeby 1997). Similar concerns were reported in a 1989 status report but the NHL was reportedly in good condition overall at this time. Revegetation had stabilized excavated features and there was no evidence of illegal digging although rodent burrowing in cultural features was reported. When the NPS returned to the site in 1997, archaeologist Becky Saleeby reported extensive subsistence, or illegal, digging at the site (Saleeby 1997). Saleeby observed eight pits, approximately 1 m^2 or less in size, at the time of her visit. The NPS recommended providing more assistance to the NHL owner, the Tigara Corporation, to protect the NHL. In 2005, the NPS received a report from two archaeologists, Owen Mason and Bruce Ream, who visited the site. They reported a reduction in subsistence digging at the NHL although there was still evidence of digging and collection activities [redacted] (Saleeby 2005). In 2011, severe fall storms and related flooding were identified as a threat to the site.

3.2 Wales

The Wales NHL, located adjacent to the community of Kinegan, or Wales (see Figure 1), was designated an NHL in 1962, revised in 1965, and nominated for the NRHP in 1966 (NPS 1985). The NHL currently includes two non-contiguous sites, the Hillside Site (also known as the Upper Village and Beach Midden) (TEL-25) and Kurigitavik Mound (TEL-79). The original nomination also included the Birnirk Burial Mound (TEL-31) but this site could not be relocated in 1983 or 1985 and is no longer considered part of the NHL (NPS 1985). The NHL is part of the Wales Archaeological District (TEL-10), which also includes Kiatanamiut/the Beach Site (TEL-26). Note that there has been some confusion over the years with regard to sites in the NHL versus the Archaeological District (Saleeby 2007). The Wales area sites were designated an NHL because it was the location of the first *western* Arctic Thule site and the first Birnirk phase site identified outside of the Point Barrow region, where the Birnirk type site is located.

The first systematic archaeological investigation north of the Aleutians was undertaken by Diamond Jenness in 1926 at Wales (Jenness 1928). Jenness' work provided the first archaeological evidence that there were multiple periods of pre-eighteenth century ancestral Iñupiat occupations in northern Alaska (Collins 1937). In the 1930s, Collins identified the first Thule site in the western Arctic at Wales. This discovery confirmed the west to east migration of Thule (or Neo-Inuit) peoples across the North American Arctic and established that Birnirk people were the ancestors of the Thule (Collins 1937; see also Dumond and Collins 2000).

Several extensive excavations have taken place within the Wales NHL. Diamond Jenness excavated at the Kurigitavik (TEL-79) and Hillside (TEL-25) sites in 1926 (Jenness 1928) and Collins conducted excavations at the Kurigitavik (TEL-79), Hillside (TEL-25), and Birnirk (TEL-31) sites (Collins 1937). Years later, Harritt undertook a research project from 1996 to 2004 at Wales that involved excavations at the Kurigitavik (TEL-79), Hillside (TEL-25), and Kiatanamiut/Beach sites (TEL-26). The results of Harritt's research are summarized in several publications (Harritt 1995, 2003, 2004, 2013, 2015). Kurigitavik Mound (TEL-79), [redacted], is thought to contain up to five occupations dating to the Birnirk, Thule, and Historic Iñupiat phases. Radiocarbon dates range from AD 1270 to 1500 (Harritt 2003:57). The Hillside Site, [redacted] (Figure 6), consists of multiple midden deposits [redacted]. The site is dated to between AD 770 and 1220 and includes both Thule and historic era occupations (Harritt 2003:57). Various cultural resource management projects (e.g., Williams and Pottery 2004) have taken place in recent years. These consisted of survey, limited testing, and monitoring activities within the NHL.

The NPS has records on the Wales NHL condition dating back to 1982. The Wales Birnirk site could not be identified during site visits in 1982 and 1985; NPS archaeologists hypothesized that the site was destroyed by erosion (NPS 1985; Sharrock 1982). In 1982, NPS archaeologist Floyd Sharrock reported extensive damage to the Hillside Site (TEL-25) by subsistence digging. There

Figure 6. Wales NHL sites (Harritt 2003:33).

was no evidence of recent digging at the Kurigitavik site (TEL-79) (note that the site was mistakenly identified as the beach site TEL-26). In 1985, Kurigitavik was reportedly in excellent condition while subsistence digging continued at the Hillside Site. While Sharrock (1982) thought that both sites had lost data potential and could potentially be delisted from the NHL, both sites were viewed by the archaeologists conducting condition assessments in 1985 as maintaining significant scientific potential (NPS 1985). Rain, snow, ice, and erosion were reported as causing ongoing damage to sites in 1986 (NPS 1986b); the Wales NHL was thought to be approximately 25% disturbed, with the majority of damage in the Hillside Site (TEL-25) where subsistence digging for artifacts was also reported. NPS archaeologists recommended a program of public education, site monitoring, and the development of a data recovery program. The current NHL boundary information also needs to be updated, as the existing boundary measurements are based on older mapping methods (Figure 7).

[redacted]

Figure 7. Pre-project Wales NHL boundaries and datum (orange triangle). The site boundaries are based on georeferenced maps generated by R. Harritt, and the figure is by Rhea Hood.

3.3 Iyatayet

The Iyatayet site (NOB-2) is located at the southern periphery of the current project area, on Norton Sound (see Figure 1). The site was designated as an NHL in 1961 and placed on the NRHP in 1966. The justification for NHL status was the significance of the site to our larger understanding of pre-contact human lifeways in the Arctic; Iyatayet is the first site where several archaeological cultures—Norton and the Denbigh Flint Complex—were identified. Occupation of the site extended over approximately 5,000 years, and has three components: Denbigh Flint Complex–, Norton-, and Thule (known locally as Nukleet)-age deposits. When the site was discovered in 1948, the Denbigh Flint complex was the oldest known occupation in coastal Alaska and dating of the site extended the timeline of coastal Alaskan occupation back in time, from 2,000 to 5,000 years ago (Morton 1985; NPS 1960). Furthermore, the Denbigh Flint complex was recognized as a regional variant of the Arctic Small Tool Tradition (ASTt), a tradition and related people that extended along the Subarctic and Arctic coast from the Alaska Peninsula to the northernmost tip of Greenland. The Norton phase occupation of the site represents a period of significant change in the Arctic. Settlement patterns indicate increased population in coastal areas and long-term cold season occupation of coastal areas with a focus on marine mammal hunting and fishing; the latter was particularly important south of the Seward Peninsula. Technological shifts, such as the growing importance of pottery and adoption of slate tool technology, further point to major shifts in subsistence. When the site was first discovered, the archaeological information recovered from Iyatayet was a key part of untangling the puzzle of Alaska's past. The site continues to be important because of its size and integrity, and because of its place in the history of contemporary Native Alaskan communities.

Despite the importance of Iyatayet to Arctic archaeology, research at the site has been fairly limited. J. Louis Giddings conducted fieldwork in 1948–1950, and again in 1952. Giddings excavated numerous trenches and house features in an effort to understand the antiquity of occupation at the site and the relationship among the groups of people who occupied the site (Figure 8). Giddings relied heavily on local residents and experts in his surveys for sites around the region and in his excavations at Iyatayet (Figure 9). His research results are summarized in a monograph (Giddings 1964) and series of papers (Giddings 1951, 1955, 1960, 1966, 1967). No further research was conducted at the site until Andrew Tremayne and a team from the University of California, Davis (UC-Davis), revisited the site in 2012 and 2013 to reopen and expand Giddings' excavations. Tremayne obtained several new radiocarbon dates for the site, reanalyzed existing collections, and analyzed new collections in a study of the development of Arctic Maritime Traditions during the Denbigh phase (Tremayne 2015a, 2015b). As part of this project, soils from the site were subjected to residue analysis; the results of this work provide direct evidence of use of marine mammals in the absence of preserved faunal material (Buonasera et al. 2015).

[redacted]

Figure 8. Iyatayet site map (Giddings 1964).

Figure 9. Local experts were key to Giddings' research at Iyatayet. Saul Sokpilak (left) and Lewis Nakarak (right) and son at Cape Denbigh (Giddings 1967).

Past condition information from Iyatayet is limited. A status report from 1978 indicates that there was no current information about the site available (NPS 1978). In 1985, an NPS archaeologist visited the site and reported that it was in excellent condition (Morton 1985). Morton mentioned the potential for artifact collecting at the site and recommended monitoring. The NPS planned a site visit in 2000 but did not carry it out due to travel disruption caused by airport construction in the nearby village of Shaktoolik. Tremayne reported some erosion along the coast at the site in 2012 and 2013, as well as evidence of past subsistence digging at the site (Andrew Tremayne, personal communication 2014). Previous condition reports indicate that erosion and subsistence digging are likely ongoing threats to the site. There is currently some confusion about the location of the NHL boundary at Iyatayet; the only source of information is a low-quality photocopy of a U.S. Geological Survey map and the 1986 NRHP form (Figure 10); site boundary information needs to be updated.

3.4 Birnirk

The Birnirk (or Pigniq) NHL (BAR-1) is located on the north slope of Alaska, [redacted] modern town of Barrow (see Figure 1). The site is currently owned by the Upkeagvik Iñupiat Corporation (UIC) (NPS 1984, 1985). The Birnirk site was listed as an NHL in 1962. NHL listing and boundary information were updated by NPS staff in 1986; some confusion remains about the actual boundaries of the Birnirk NHL due to differences in boundary descriptions for the site on various NHL forms (Figure 11). The site is one of many well-known coastal archaeological sites in this region (e.g., the Walakpa, Nuvuk, and Coffin sites), but it was nominated as an NHL because it represents the earliest manifestation of modern Iñupiat culture in northern Alaska. Prior research at the site (Ford 1959) identified both Birnirk and Thule components in 18 mounds that contain house, activity, and burial features dating back to as early as approximately 1250 BP (Figure 13 andFigure 12). BAR-1 is the Birnirk archaeological culture type site. Identification of a culture antecedent to Thule, the Birnirk culture, at this site was crucial to linking Thule development to the western rather than eastern Arctic (Ford 1959; Stanford 1976), although there is still some debate over exactly where this development occurred (e.g., Taylor 1963).

Jensen (2009a, 2009b) and Stanford (1976) summarize the history of local archaeological research in the area. The earliest scientific expedition to the region was the International Polar Year Expedition undertaken by Lieutenant Patrick Henry Ray and Sergeant John Murdoch in 1881 (Jensen 2009b). Murdoch purchased objects from local people, including both contemporary goods and artifacts collected by villagers from nearby archaeological sites (Murdoch 1988). Vilhjalmur Stefansson (1914) carried out the first archaeological investigation of the Birnirk site, excavating at BAR-1 for about a day before purchasing additional artifacts from the site from villagers. These materials are curated at the American Museum of Natural History and were partially analyzed by Wissler (1916), who focused on the harpoons. The most extensive investigations at the site were carried out by James A. Ford in 1931 and

[redacted]

Figure 10. Pre-project understanding of Iyatayet NHL boundary and datum (orange triangle). The possible NHL boundaries are drawn using the 1986 NRHP form description, which are difficult to interpret and result in the four possible boundaries pictured here. Figure by Rhea Hood.

[redacted]

Figure 11. Pre-project Birnirk NHL boundaries and datum (orange triangle). The boundary is based on the 1986 NRHP form descriptions and maps and includes all known archaeological remains. Two other boundary descriptions—aliquot and Universal Transverse Mercator (UTM) points—do not encompass the site area. Figure by Rhea Hood.

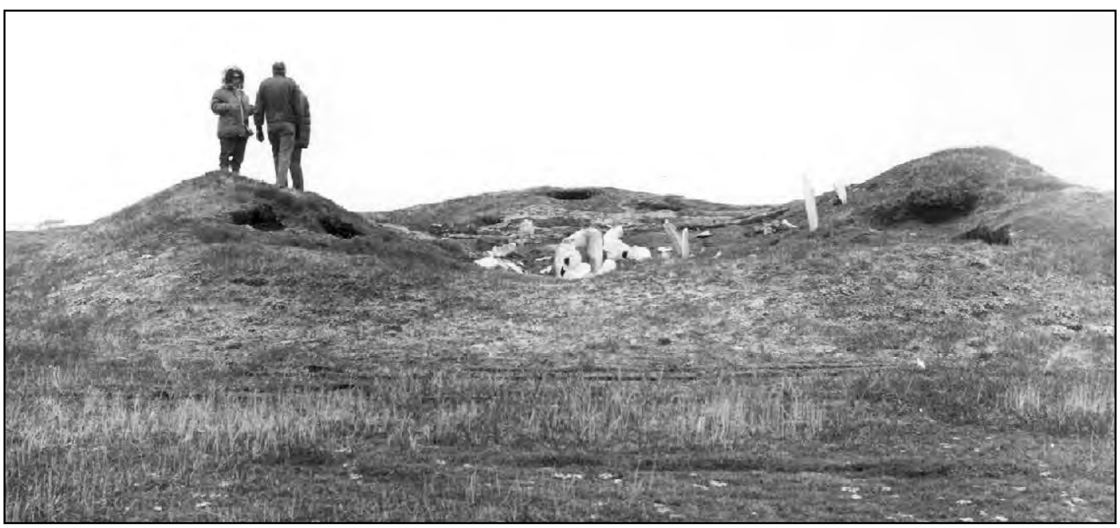

Figure 12. Photo taken at the Birnirk site in the 1950s (Saleeby 2011).

[redacted]

Figure 13. Map of Birnirk site from 1953 (Ford 1959:34).

1932, and by Wilburt Carter, from 1951 through 1953 (Carter 1953a, 1953b, 1962, 1966). Ford joined Carter's 1953 expedition and completed his report soon thereafter (Ford 1959). Ford excavated seven of the 18 mounds identified at the Birnirk site, and was able to identify links between Birnirk material culture and the Okvik and Old Bering Sea cultures of the Bering Strait region. Carter excavated in an additional six mounds at the site, but his reports have never been formally published. Carter's collections recently returned to Alaska for curation at the University of Alaska museum in Fairbanks (Bakker 2011).

The earliest site condition information available for the Birnirk site dates to a 1978 NHL status report (Baker 1978). Negative impacts to the site condition reported at this time included coastal erosion, subsistence digging, and dumping on the site by people camping nearby. The same concerns were detailed in the 1979, 1982, and 1983 status reports (Cohen 1979; Estus 1982a, 1984a). Frost heave impacts are also mentioned in a 1982 status report (Estus 1982a). In 1984, a study of aerial photographs indicated that erosion was not as big of a threat to the site as previously thought, although the negative impacts of subsistence digging were still considered problematic (Estus 1984a). By 1985 the site area was conveyed from the Bureau of Land Management (BLM) to the UIC; the establishment of a permit system for subsistence activities in the vicinity of the site seemed to have curtailed those activities at the site itself (NPS 1985). An assessment of site status was recommended in 1985, as was stabilization work in areas of the site that were previously excavated and never backfilled. In a 1993 assessment (UIC 1993) the UIC reported the proximity of buildings to the site as a threat or cause of damage to the site. Off-road vehicle (ORV) traffic was identified as the primary threat to the site and illegal collecting of archaeological resources on-site a secondary threat. Illegal collecting activities were reported as

Figure 14. Photo taken at the Birnirk site in 2003 (Saleeby 2011).

ongoing and as having damaged between 0% and 25% of the site. Natural forces acting on the site were not noted as a threat or cause of damage to the site in 1993. Surface clean-up has occurred on site in recent years (NPS Birnirk NHL files)(Figure 14), and a large research and recovery project was undertaken at the nearby Nuvuk site by Jensen and UIC (Jensen 2009b, 2009a). Possible current threats to the site are: subsistence digging, incidental damage due to local use (e.g., trash, ORV trails), and coastal submergence and/or erosion.

3.5 Gallagher Flint Station

The Gallagher Flint Station (PSM-50) is a relatively small NHL, located on the north slope very near the Dalton Highway (see Figure 1). The site was originally identified in 1970 (Bowers 1983), during survey for the Trans Alaska Pipeline System. The Gallagher Flint Station was subsequently nominated for the NRHP in 1975, and as an NHL in 1978. Shallow deposits at the site contain a remarkable record of Paleoarctic, Northern Archaic, and ASTt lifeways, including inland Denbigh, Choris, Norton, and Ipiutak cultural phases; radiocarbon dates from the site span the last 10,000 years (AHRS Card; Bowers 1983), making it the oldest known site in northern Alaska. The site was listed as an NHL because of this long occupation history, and because it contains evidence of inland occupation of the area by Iñupiat groups that are primarily understood, and associated with, coastal areas. The site was thought to have significant potential for addressing questions about cultural evolution and development of inland lifeways by northern peoples (NPS 1975). Gallagher Flint Station is currently owned by the State of Alaska; there remains some confusion about the NHL boundaries due to variable descriptions in nomination forms (Bowers 1983:15) (Figure 15).

Research at the Gallagher Flint Station has been fairly limited. After its initial discovery, the site was studied by Dixon (1972, 1975), who conducted multiple seasons of fieldwork at the site. Dixon's analysis yielded numerous radiocarbon dates from the site and included an analysis of the lithic assemblage from the Gallagher Flint Station. After Dixon left the pipeline project, additional analysis and reporting was conducted by Cook (1977) as part of continued archaeological work related to pipeline development. More recently, Ferguson (1997) undertook additional fieldwork at the site and reanalysis of the oldest locality at the site, Locality 1. The results of this work suggests that the oldest date from the site is erroneous (Dixon 1975; Ferguson 1997); the revised chronology is somewhat shorter, dating to the early to mid-Holocene, approximately 7,000 years ago. The site has remained relatively stable since its initial discovery in 1970, despite the visibility and relatively easy access to the site from the Dalton Highway. Excavations at the site were never backfilled, further increasing site visibility. In 1979 a field crew at the site reported that there was evidence of some site visitation and collecting activities, and that wind and frost erosion were acting on exposed areas of the site (Bowers 1983:6–7). The BLM conducted a site assessment in 1983 (Bowers 1983); they also placed permanent site datums and photogrammetry panels, and backfilled portions of the site.

[redacted]

Figure 15. Pre-project Gallagher Flint Station NHL boundary and datum (orange triangle). The site boundary was drawn using the UTM coordinates from the NRHP form site location map. Figure by Rhea Hood.

Overall, the site was thought to have remained fairly stable since 1974 and the additional efforts at the site (e.g., backfilling) were designed to mitigate the concerns about site condition and possible impacts identified in 1979 (Figure 16). On a 1987 site visit, NPS archaeologist Morton (1987) noted that the BLM efforts at the site in 1983 had stabilized erosion in excavated areas. Cryoturbation and ground squirrel activity continued to impact the site but there was no evidence of recent human activity (e.g., illegal digging) on site and Morton felt that the site was in stable condition.

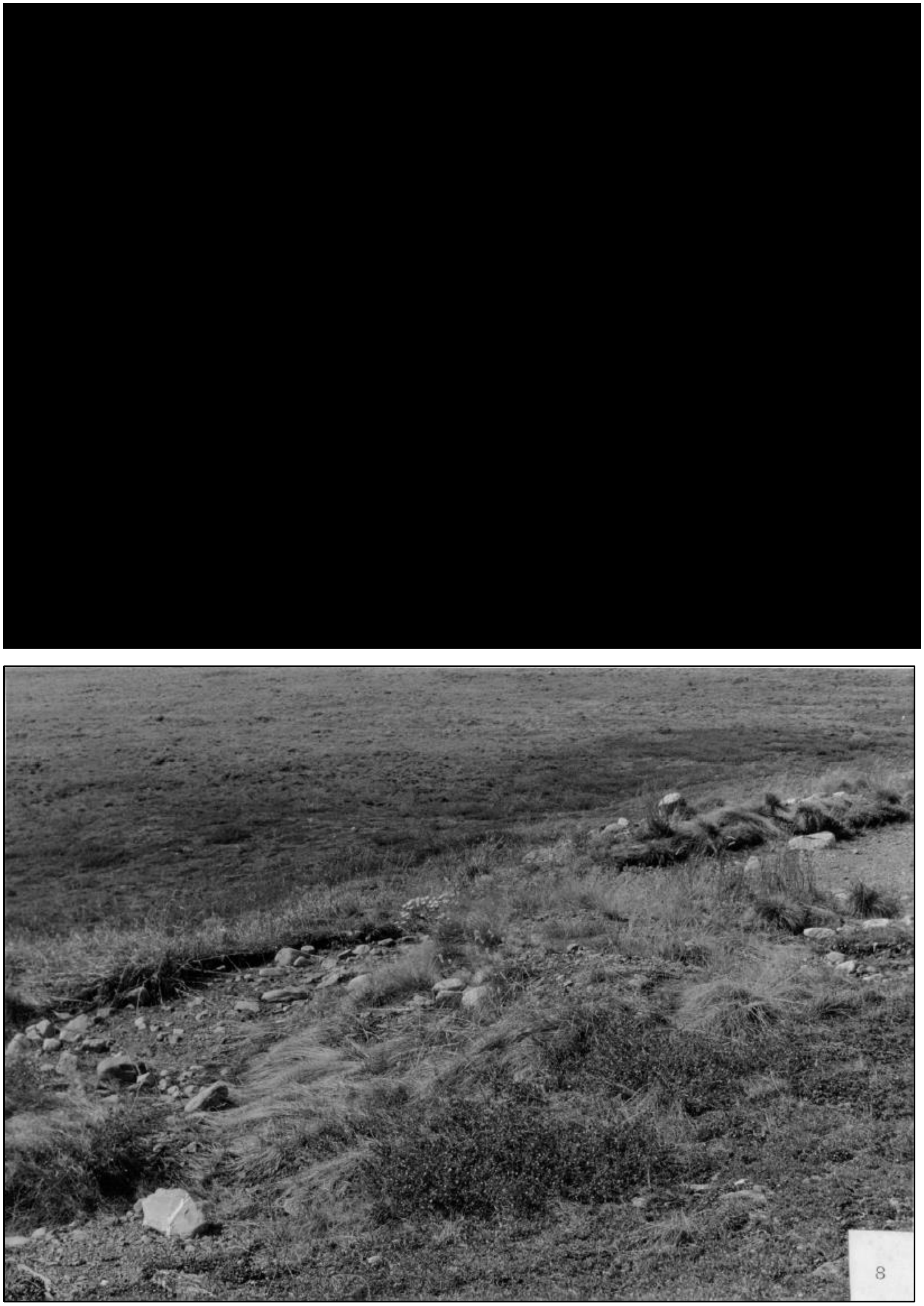

Figure 16. Gallagher Flint Station site overviews (Bowers 1983).

3.6 Cape Krusenstern

The Cape Krusenstern NHL is vast, encompassing the entire Cape Krusenstern National Monument and adjacent areas. The NHL was designated in 1973, before the National Monument was established in 1978. NHL designation is based on the overall significance of the region to understanding the prehistory of the Arctic; this significance was established primarily through a series of research projects that took place in the area between the 1940s and 1970s (e.g., Anderson 1972; Giddings 1960; Giddings and Anderson, 1986). The NHL currently has many landowners (e.g., NPS, BLM, NANA Corporation, and private Native allotment owners). The boundaries of the NHL have long been a subject of debate. The NHL was initially limited to the Cape Krusenstern beach ridge system (Figure 17) but was expanded in size by the advisory council during the process of considering the nomination of the region as an NHL (Payne 1973). This decision was controversial at the time (e.g., Smith 1974) and continues to be viewed by some as problematic from a management perspective (e.g., Gal 1986).

Figure 17. Boundary of Cape Krusenstern NHL (orange), National Monument (green), and beach ridge system (black). Figure by Rhea Hood.

Both because of its size, and because of several important concentrations of archaeological sites within the NHL, Cape Krusenstern has been the subject of numerous investigations over the last 50-plus years (see Anderson 2013 for a detailed summary). Perhaps most well known is Giddings' (Giddings and Anderson 1986) research at the Cape Krusenstern beach ridges in the [redacted] NHL. The beach ridge system encompasses nearly 5,000 years of human coastal occupation and research here was central to establishing the regional cultural historical framework prior to the availability of radiocarbon dating. Older sites were identified by Giddings [redacted] Palisades Lagoon and [redacted] the Noatak River (Anderson 1972; Hall 1974), further extending the time span encompassed by the NHL. Several surveys and test excavations were done in the 1970s and 80s (Hall 1986, 1988; Hall and Hall 1983) in northern part of the NHL in relationship to the development of Red Dog Mine (see also Gilbert-Young, 2004; Hall 1971, 1974; Hickey 1968, 1977). The NPS conducted survey and assessment of archaeological resources in the monument in the 1980s (McClenahan 1993; McClenahan and Gibson 1990), and carried out a threatened sites project in coastal areas of the monument in the 1990s (Anderson 2013; Klingler 1996). Several threatened sites on the [redacted] coast of the NHL were subsequently excavated (NPS 1997; Young 2000). The Bureau of Indian Affairs (BIA) conducted investigations on Native allotments [redacted] (BIA ANCSA 1989); a search of BIA records would likely uncover additional projects within the NHL. An undocumented survey was conducted on the Noatak River by the NPS in the 1990s (Dan Odess, personal communication, 2006) and Brown University carried out excavation at the Sapun Creek Site during the same time period (DeAngelo 2001). In 2006, the NPS carried out an excavation at the Maiyumerak site on the Noatak River (Shirar 2007, 2009, 2011). The NPS and University of Washington undertook a collaborative project between 2008 and 2012 at the beach ridge complex that resulted in the identification of new sites, reanalysis of previously collected data, and a refined chronology for the region (Anderson and Freeburg 2014, 2013; Freeburg and Anderson 2012). There was also a recent effort to carry out geophysical investigation of several sites at the beach ridge complex (Wolff and Urban 2013).

Condition reports on the Cape Krusenstern NHL are often somewhat vague, most likely due to the difficulty of assessing and managing such a large NHL. In 1977, the condition of the NHL was reported as fine (Harry 1977). The report author noted that the NHL size may be reduced in the future in relationship to changing ownership (e.g., the establishment of the National Monument, land transfer to Native corporations, etc.). In 1982, illegal digging and collecting was reported but was viewed as a minor threat to the NHL (Estus 1982b). There was some concern about the development of the proposed Red Dog Mine and its possible impact on the condition of the NHL; the NANA Corporation requested either a transfer of land or right-of-way for mine related activities. In a 1984 status report, Estus (1984b) reported some concern over the potential impact on archaeological sites within the NHL if some lands within the NHL were transferred out of federal ownership. Damage and potential future damage to the NHL by the ongoing use of ATVs/ORVs on sand dunes was also reported in 1984, as well as ongoing concerns about the potential impact of mine development. In 1986 damage due to mining activities was reported, as well as continued ATV/ORV impacts and continued illegal collection of archaeological materials (Schoenberg 1986). Wind, ice, erosion, and animal burrowing were also reported as negatively impacting archaeological resources across the NHL. Status report authors were concerned about mine construction and land selections causing increased damage to the NHL. They recommended a boundary review for the NHL "as large areas containing resources of less than national significance are included in the NHL. This tends to make the boundary meaningless, and the entire landmark suffers" (Schoenberg 1986:7). Other recommendations were to develop a data recovery program to mitigate damage to archaeological resources during mine construction and cooperation with the NANA Corporation and other Native corporations to discourage artifact sales (NPS 1986c).

4 COMMUNITY OUTREACH

Many of the NHLs are owned and managed by individuals or local Native corporations. The significance of many NHLs tend to be phrased in archaeological terms. In practice these places were and are important community cultural and subsistence sites. Community collaborative efforts, therefore, are an essential aspect of this project. Prior to fieldwork, the NPS obtained permission from landholders to visit NHLs. The NPS also organized community meetings when possible given community and project personnel schedules. The goal of these visits was threefold: 1) to exchange information about NHL sites, 2) to discuss our current project, and 3) to offer NPS assistance in NHL management and in other areas related to cultural resources that may be of interest to communities. The research team was able to participate in community visits in Shaktoolik, Wales, and Kivalina. A presentation and community meeting was held in Nome but could not be scheduled in Kotzebue. Anderson created posters summarizing project goals for each NHL that were left with each community the research team visited. The purpose was to create another medium for sharing project information with community members who could not attend the scheduled meetings.

4.1 Wales

The research team (Shelby Anderson and Rhea Hood) met with the Wales Native Corporation Land Committee on June 17, 2014. The council was very supportive of the current project. They shared many observations about the impact of climate change locally on the environment, subsistence resources, and people. Examples of local climate change included changes in local flora and fauna. Specifically, more brown bears in the area, a new kind of mushroom and difference in the appearance of greens that people gather and eat. There were no polar bears in the area in winter of 2014, which is unusual, and people are noticing new insects, butterflies, birds, and an increase in the number of mosquitos in recent years. There are more seagulls in the area now, and tundra flowers and plants are changing. We spent some time talking about how coastal erosion is changing the shape of the coastline; waves are now reaching the edge of archaeological sites in town when they never did in the past and the community is concerned about increased erosion of nearby cliffs ([redacted]).

The council commented on increased erosion at other area sites, mentioning several places [redacted] The community has also noticed an increase in Japanese and Russian trash in the area, perhaps related to changing ocean systems. We also discussed specific concerns about climate change impacts to the Wales NHL. These included erosion at the Hillside Site (TEL-25) and subsistence digging activities, which are permitted by the community at the Hillside Site (TEL-25) but not at Kurigitavik (TEL-25). The council also mentioned that they were interested in investigating artifacts found [redacted] which could be coming from NHL sites or other local archaeological sites that are not part of the NHL. There were no specific requests or suggestions regarding sharing the results of the current project.

The council was also interested in working with the NPS on other local cultural resource and heritage projects, which we discussed at length. Some examples include constructing a sod home, restoring a commemorative whale bone monument, carrying out maintenance on the historic church, documenting the site at the community laundry, and educating children and adult on community history, archaeology, and climate change. The council would also like to create an online history project for the community.

4.2 Nome

Anderson gave a talk about the project at the NPS visitor center on June 18, 2014. Following the talk, attendees and research team members discussed the project and related topics. The discussion centered primarily around ideas for further outreach about the project and local archaeology in general. Ideas included working with local schools, organizing KNOM recordings about heritage and culture, developing interpretive displays, setting up community monitoring programs of NHLs, and using NPS social media to share information about the current project and other heritage issues.

4.3 Iyatayet and Community of Shaktoolik

Anderson and Hood met with the Shaktoolik community on June 19, 2014. NPS Bering Land Bridge National Park Superintendent Jeanette Koelsch also attended the meeting. The community meeting was attended by community members, as well as mayor Eugene Asicksik and Teresa Sockpealuk-Perry, the President of Shaktoolik Native Corporation. Community response to our project was mixed in Shaktoolik. The mayor and some community members were understandably more concerned about the impact of climate change on the contemporary community than on an archaeological site. We discussed local climate change impacts; the primary concern is currently coastal erosion of the village and ongoing construction of coastal rip-rap and other reinforcements to slow these processes. Some concern about Iyatayet was also expressed, however, and there are community members interested in further collaboration to preserve the Iyatayet NHL.

We learned about several recent impacts to the Iyatayet NHL from community members. Fall storms recently caused erosion at the base of the site and there is a new creek from the uplands at the site draining down to the beach; this creek may be impacting the NHL site. The beach is wider today than it was in Giddings' time, approximately 150 feet wide now compared to about 50 feet wide in the 1940s and 50s based on photographs. There may also be some recent digging at the site, although community members in attendance at the meeting were not confident that these reports were reliable. Eugene Asicksik expressed a more general concern that the local prohibition on subsistence digging was problematic because of the depressed local economy; selling artifacts is a way for people to improve their economic situation. We also discussed the history of the current Shaktoolik community in relationship to the Iyatayet site. Current community members moved to the region fairly recently, most likely in the last 200 years, after the local population deserted the area (Giddings 1964:3). The current community, therefore, has no direct ancestral ties to the Iyatayet site although it is obviously still a source of pride and viewed as an important place. It was suggested that community members most likely feel a closer tie to late pre-contact and contact era sites around Shaktoolik that were inhabited by community members' direct ancestors.

The community wanted results of this study to come back to the community. Ideas generated by meeting attendees included using Iyatayet as part of student cultural education and working with the NPS to recreate and study a sod house as a model for economic housing. There was interest in documenting other sites closer to the current village (note that there is an ongoing project by UC-Davis archaeologists at one local site). Jeff Rasic (NPS) suggested creating an interpretive poster to go with the NHL plaque and display of artifacts from the site that are currently housed at the school. After the meeting, we visited the school with tribal council president Teresa Sockpealuk-Perry to look at the collection; she requested NPS assistance in curating the collection.

4.4 Cape Krusenstern and Community of Kivalina

Anderson and Hood met with the Kivalina tribal council on June 21, 2014. The elders and other members of the Kivalina City Council shared information and resources for further research on the Cape Krusenstern NHL region. We also discussed potential heritage projects in the vicinity of the village of Kivalina that the community would appreciate NPS technical assistance in funding and carrying out; there is a strong interest in doing additional archaeology in the vicinity of Kivalina. Specifically, the council was interested in investigating old sod houses located between the current village of Kivalina and Cape Thompson. Elders at the meeting shared stories about how the current village of Kivalina was established and how the site at Kivalina is related to other sites north and south of the current village.

5 OTHER OUTREACH ACTIVITIES

Anderson shared preliminary project results with the professional archaeological community, giving a talk on the project at the 2014 Alaska Anthropological Association Meetings and participating in a forum on climate change and archaeology at the 2014 Society for American Archaeology Meetings. Anderson also prepared an article for Witness the Arctic in 2014 (Anderson 2014a); the article summarized several current collaborative PSU-NPS projects related to climate change issues and archaeology. This journal is published by the Arctic Research Consortium of the United States (ARCUS) and has a wide, cross-disciplinary, distribution. Anderson also gave a talk that included project data for the NPS archaeology webinar series in Fall 2014 (Anderson 2014b).

6 FIELD RESULTS

Fieldwork was initially planned at the Ipiutak, Wales, Iyatayet, Gallagher Flint Station, and Birnirk MHLs. NPS restrictions on boat contracting led us to cancel fieldwork at Iyatayet, and NPS archaeologist Jeff Rasic volunteered to do a field assessment at the Birnirk NHL in place of Anderson and Hood. Fieldwork at Gallagher Flint Stations was obstructed by wildlife. Fieldwork was completed at the Ipiutak and Wales NHLSs in 2014. See Appendix B for CCVA Forms with additional site details and photographs.

6.1 Ipiutak

Ipiutak NHL fieldwork was conducted June 22–23, 2014 by Shelby Anderson and Rhea Hood. This NHL is large, 327 acres, and survey of the NHL should be considered reconnaissance level because of wide survey transect spacing. Nearly every beach ridge was, however, surveyed for climate change and other impacts to the site. The condition of the vast majority of the site was assessed. We did not assess a small portion of the NHL located on state owned land because the permit was not approved in time for fieldwork. New global positioning system (GPS) data were collected for the NHL boundaries (Figure 18).

Current hazards vary across the Ipiutak NHL, but most significant are the heavy impact of storm erosion on the [redacted] boundary of the NHL (Figure 19), wind deflation [redacted] and community use of trails and roads that cross the NHL (Figure 20). Snow fence construction and village development has impacted the NHL as well. Rodent digging was observed in the majority of cultural features. Some very recent digging in disturbed areas of the site along the [redacted] boundary was observed while we were in the field (Figure 21), and there were excavation areas on private land visible from our survey area. The overall site

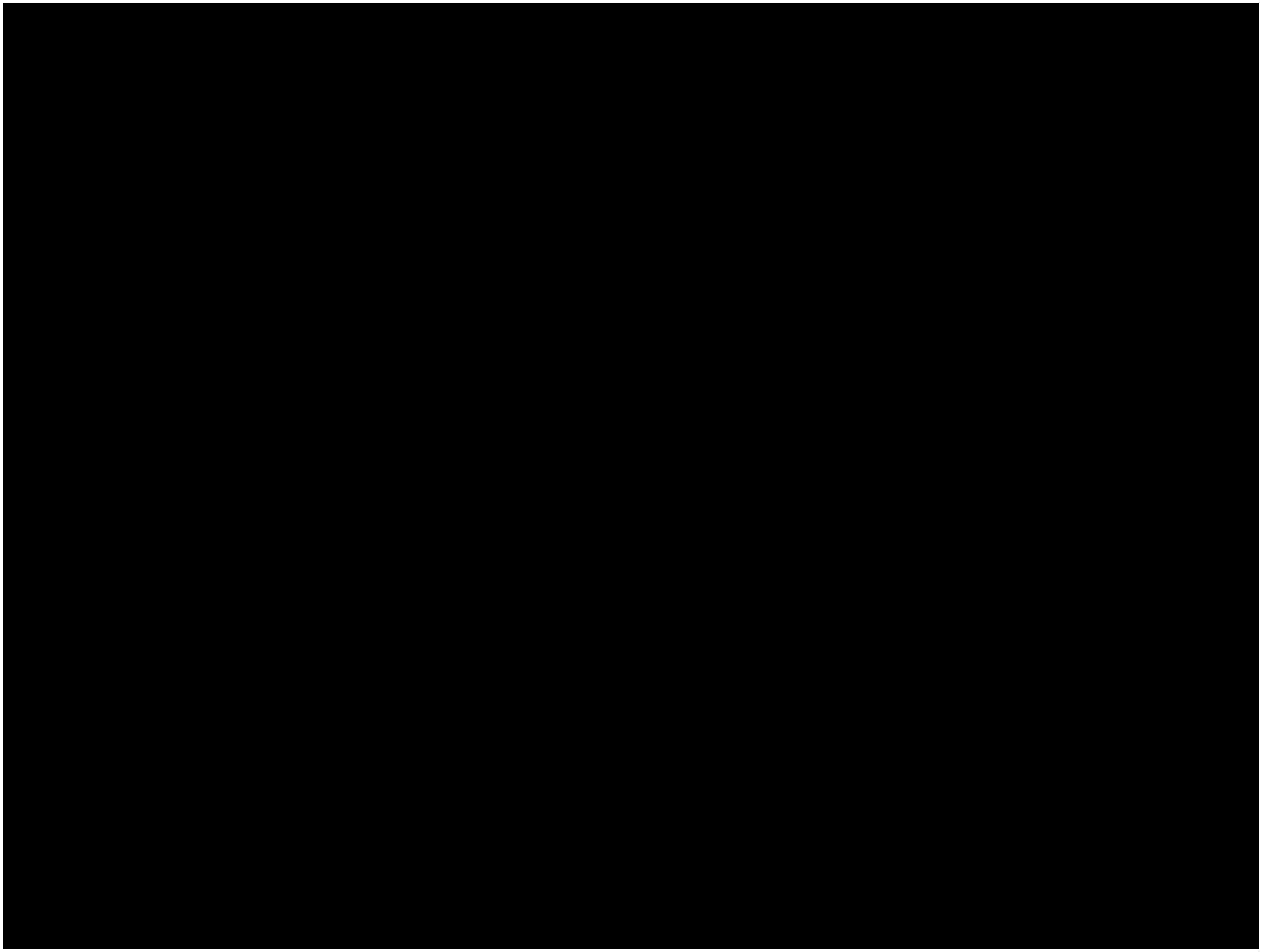

Figure 18. Hazards and disturbances noted during survey of Ipiutak NHL; new boundary also indicated. Figure by Rhea Hood.

[redacted]

Figure 19. Storm erosion of [redacted] boundary of Ipiutak NHL; view to the south. Photos by S. Anderson.

Figure 20. Heavily utilized trails [redacted] Photos by S. Anderson.

[redacted]

Figure 21. Recent digging in areas disturbed by storm erosion at Ipiutak NHL. Diggers stacked discarded faunal material from site deposits in backfill. Photo by S. Anderson.

condition was deemed fair, with substantial depositional integrity remaining. The level of site disturbance is moderate.

Potential future impacts include: increased coastal erosion along the [redacted] boundaries as sea level rises and/or storm frequency increases and as there is a shortening in the period of time when the site is protected by ice and snow; increased wind deflation (Figure 22) and water erosion and unauthorized digging in the site due to increased site visibility caused by erosion.

The low-lying coastal beach ridge landscape makes the NHL vulnerable to erosion, flooding, and wind deflation. The NHL location near the tip of the Tigara Peninsula increases the potential impact of these natural forces. In addition, the NHL is located in close proximity to the current community of Point Hope. This, coupled with the history of research and collecting at the site (Larsen and Rainey 1948), means that unauthorized collection will likely continue and may increase as erosion continues to expose site deposits and artifacts. Construction and community activity impacts will likely also continue and increase in the future if the village expands. The entire region is vulnerable to permafrost thaw; at Point Hope permafrost thaw could cause loss of large areas of the Ipiutak NHL if combined with increased coastal erosion.

Figure 22. Wind deflation in vicinity of cultural features [redacted] of the Ipiutak NHL. Photo by S. Anderson.

The NHL is deemed to be at high risk for climate change and other impacts on the basis of the negative effect of current impacts on site integrity, as well as the overall vulnerability of the NHL to potential future hazards.

6.2 Wales

Fieldwork at Wales was carried out by Anderson and Hood on June 17 and 18, 2014. At both sites (TEL-25 and TEL-79) that make up the NHL (Figure 23Figure 25), we were able to walk the entire site area and collect data on site condition. Both sites and specific impacts to the sites were photo documented and mapped, and new boundary location data were collected. Multiple climate change and other impacts were noted at the two sites within the NHL.

[redacted]

Figure 23. Map of Wales NHL with revised boundary and datum information. Figure by Rhea Hood.

[redacted]

Figure 24. Map of Kurigitavik (TEL-79) site with revised boundary and datum. Previous excavation areas noted, where they could be clearly identified. Figure by Rhea Hood.

[redacted]

Figure 25. Map of Hillside Site (TEL-25) with revised boundary and datum. Areas of disturbance also noted. Figure by Rhea Hood.

Kurigitavik (TEL-79)

The location of TEL-79, [redacted], make it less vulnerable to water, wind, and coastal erosion than TEL-25, [redacted]. Extensive vegetation cover likely further protects the site (Figure 26 andFigure 27). The most significant ongoing impact at TEL-79 was meltwater ponding in depressions (Figure 28), primarily from Harritt's excavations, and rodent digging (Figure 29). Old excavation units were apparently incompletely backfilled or eroded by natural forces following backfilling; meltwater is ponding in these excavated areas and causing additional erosion to presumably intact areas of the site. Extensive rodent digging was also observed across the site. The overall level of site disturbance is moderate, with depositional integrity of the site well preserved. The extent of previous research at the site, however, has left it in only fair condition overall.

The site is at risk for future permafrost thaw, continued animal digging, and reduction in vegetation, which would make the site more vulnerable to erosive forces. The problem of flooding or ponding at the site will likely continue and could cause severe damage to remaining intact deposits. The site is vulnerable to unauthorized digging, but community rules regarding digging seem to be keeping this in check. The overall risk of the site to climate change and other impacts are considered moderate.

The Hillside Site (TEL-25)

The Hillside Site is larger and much more vulnerable to natural forces than TEL-79. The site consists of clusters of cultural features and associated activity areas on natural lobes of a high bluff [redacted] (Figure 30). The site is bisected by seasonal/intermittent streams that drain water from the uplands, cutting through the site and creating convoluted local topography.

At TEL-25, the most significant impact is ongoing digging at the site by community members (Figure 31–Figure 34). This digging was noted during past condition assessments, but the current scope of activities is impressive and much more destructive than other ongoing impacts to the site such as permafrost melt, storm erosion (Figure 35), and water runoff. Artifacts and other cultural materials were observed at the base of the site in eroding areas along the modern shore and in drainages that bring water down from the uplands and cut through, and erode, the site itself. Previous research excavations have also impacted the site as people may have started by digging in excavation areas. The site disturbance level is severe, with moderate to poor depositional integrity remaining. The overall condition of the site is poor and it will likely be destroyed in the near future if current collecting activities continue.

Figure 26. TEL-79 overview; view to the north-northeast. Photo by S. Anderson.

Figure 27. TEL-79 overview from top of site; view to the south. Photo by S. Anderson.

Figure 28. Ponding in old excavation units at TEL-79. Photos by S. Anderson.

Figure 29. Overview of TEL-79. Note rodent digging in foreground. View to the west. Photo by S. Anderson.

Figure 30. TEL-25 overview from village. Areas of subsistence digging visible along hillside. View to the south. Photo by S. Anderson.

Figure 31. Disturbed cultural features in at TEL-25, Area D. View to the north (top) and east (bottom). Photos by S. Anderson.

[redacted]

Figure 32. Recent digging at TEL-25 in Area A. In top photo, note seal skin poke, between the archaeologist and the rake leaning against the wall. Close-up of seal poke in bottom photo. Photos by S. Anderson.

Figure 33. Rhea Hood mapping recent digging at TEL-25. Photo by S. Anderson.

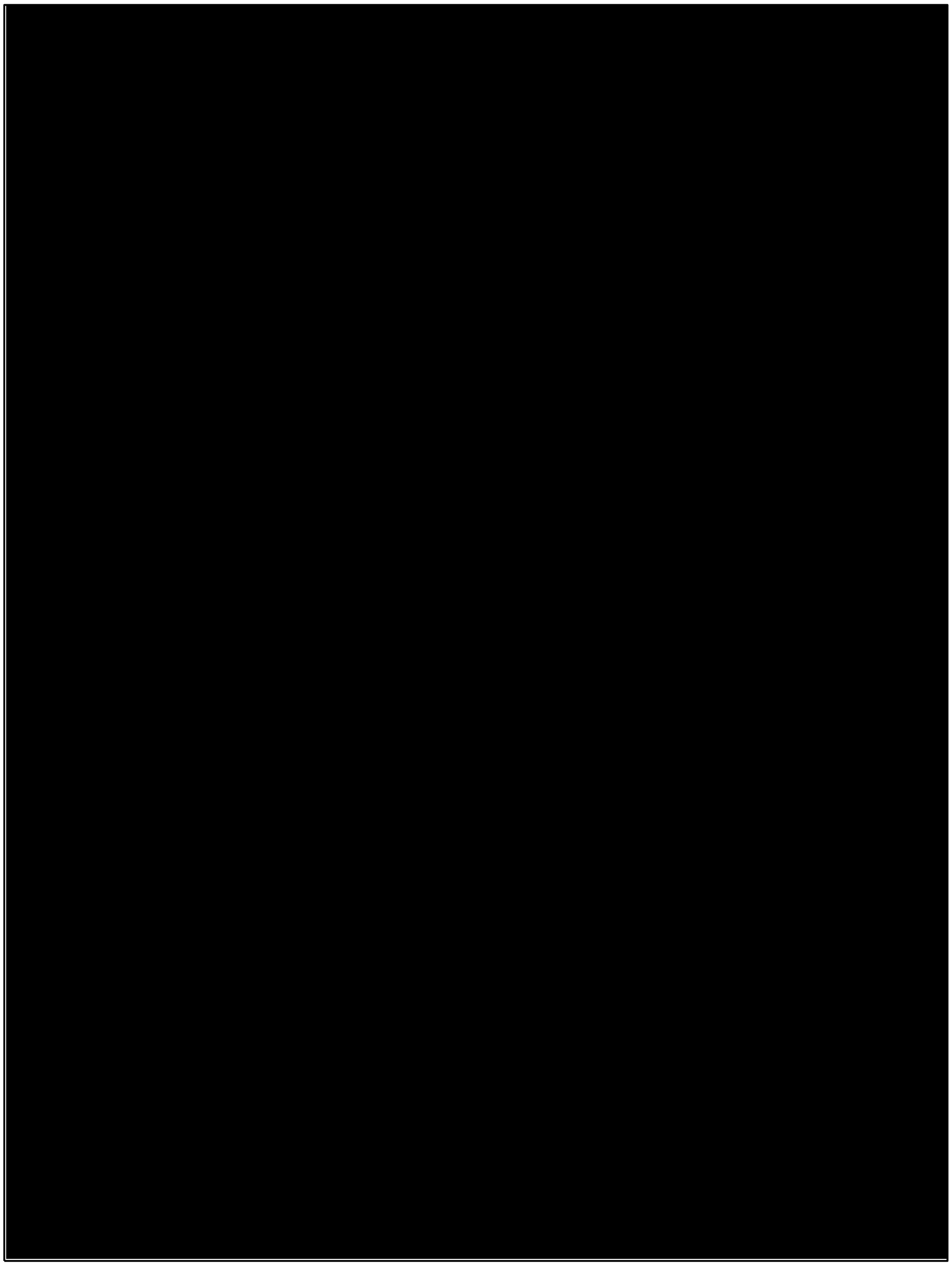

Figure 34. Artifacts stacked by subsistence diggers in Area D. Photo by S. Anderson.

[redacted]

Figure 35. Shoreline erosion at base of TEL-25 could undermine site stability in the long term. Photo by S. Anderson.

The site is vulnerable to future permafrost thaw, sea level rise and associated coastal erosion. If water runoff from melting snow and ice increases in the future, increased water runoff over the site will likely further increase erosion of the site deposits near drainages and at the bluff edge. The overall risk of the site is considered high, primarily due to the pace and extent of digging and collecting activities.

6.3 Birnirk

The goals of field work at the Birnirk NHL were to more clearly establish the site boundaries and to assess the condition of the site. Anderson originally planned to carry out a site visit but NPS archaeologist Jeff Rasic had fieldwork planned at the site in summer 2015; Rasic and his team agreed to conduct a site assessment and report the results to the NPS.

Fieldwork was conducted in early August 2015. In an interim report on site condition, Rasic reported the site was in decent and fairly stable condition (Jeff Rasic, personal communication, 2015). There are threats to the site from inundation and thermokarsts, but these threats are not severe or imminent. Inundation is happening at a low rate on the protected lagoon at the [redacted] site and coastal erosion is not a current threat. Archaeologists have had the greatest impact on the site over the years, although there is also some evidence of unauthorized digging on a small scale. This digging does not seem to be active. Rasic recommended using the verbal description boundary to redefine the site boundary. The community is still regularly engaging with the site and general locale; the field team happened to be on site the same day that Iñupiaq language teachers were conducting an orientation for new teachers on Iñupiat culture. They were hunting ducks, cooking food, singing, and teaching, with the NHL serving as both a backdrop and discussion topic of the orientation (Rasic, personal communication, 2015).

6.4 Gallagher Flint Station

The goals of field work at Gallagher Flint Station were to more clearly establish the site boundaries and to assess the condition of the site, as an assessment has not been carried out since 1987. Anderson and Hood attempted to conduct a field assessment of the Gallagher Flint Station NHL between August 4 and 6, 2015, but were obstructed from carrying out the site visit by a young bear that would not leave the site area. On September 7, 2015, William H. Schneider carried out a site visit while conducting fieldwork in the area. A comparison of photographs taken by Schneider of the site to those in the 1983 site assessment report (Bowers 1983) indicate that little has changed on site (Figures 36–39); the site is relatively stable and has not been significantly disturbed by natural or human forces. New NHL boundaries were established based on GPS data collected by Schneider (Figure 40).

Figure 36. Overview of Gallagher Flint Station NHL from Locality 5 towards site datum; view to the north. Photo by William H. Schneider.

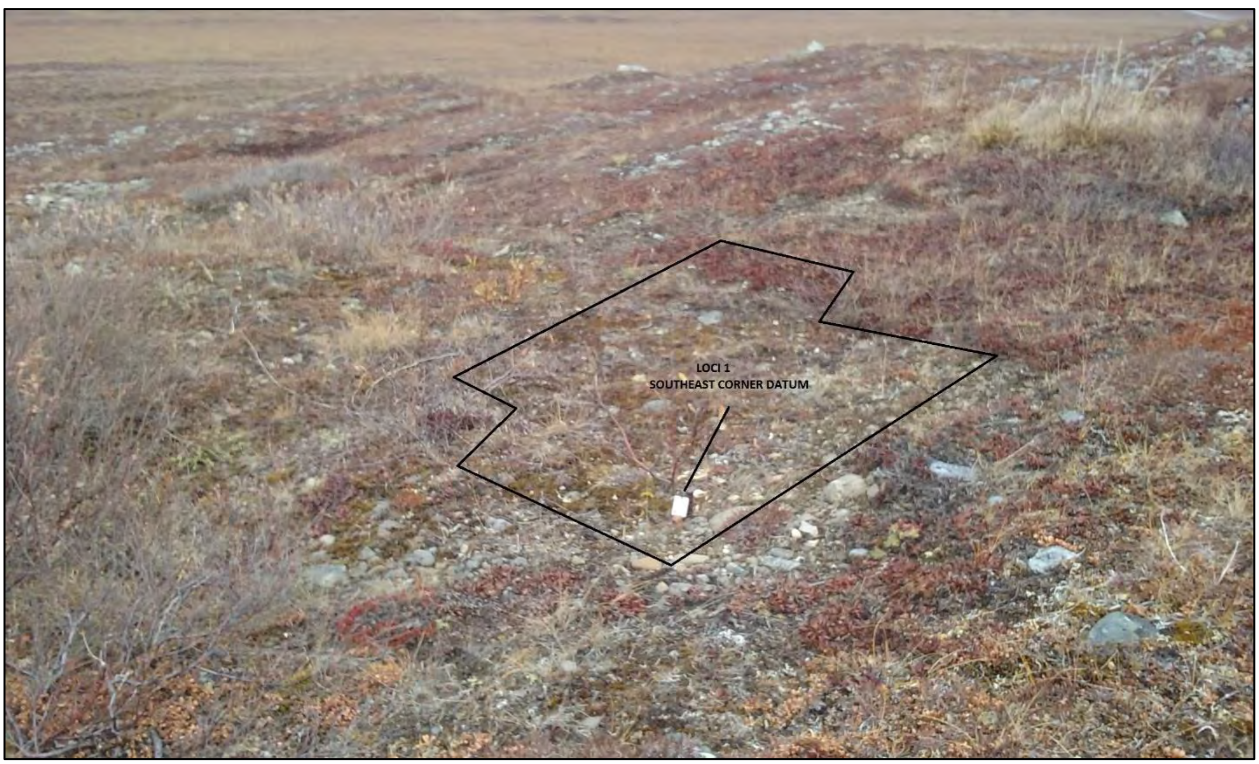

Figure 37. Overviews of Gallagher Flint Station Localities 13 (top) and 1 (bottom). Photos by William H. Schneider.

Figure 38. Gallagher Flint Station Locality 8 overview in 1983 (top) and 2015 (bottom). Bottom photo by William H. Schneider.

Figure 39. Gallagher Flint Station Locality 6 overview in 1983 (top) and 2015 (bottom). Bottom photo by William H. Schneider.

[redacted]

Figure 40. Revised boundary and datum (orange triangle) for Gallagher Flint Station NHL. Figure by Rhea Hood.

6.5 Cape Krusenstern

No fieldwork was conducted at Cape Krusenstern. Review of recent reports, archives, and aerial images from projects in the region identified several current and potential hazards:

- Coastal erosion is occurring in several areas of the Cape Krusenstern beach ridge system (S. Anderson, personal observations, 2008–2010) and along the northwest coast of the monument (Klingler 1996). Other areas of erosion are highly likely but have not been recently assessed, particularly outside the boundary of the National Monument.
- Riverine erosion is occurring in the vicinity of the Maiyumerak site (S. Anderson, personal observation, 2006) and is most likely impacting other sites along the rivers and creeks of the NHL.
- Unauthorized digging is occurring in some places (e.g., the Kayak site, possibly in the Sisualik region). The extent of this activity is not currently understood.

Many sites within the NHL have not been visited for many years, perhaps since the 1970s (e.g., Anderson 1972). As a result, it is impossible to establish site specific disturbances or changes in site condition, or to establish overall NHL risk for climate change impacts. Based on the local geography and what is known about the archaeology, many or all of the climate change impacts anticipated for northern Alaska (Jezierski et al. 2010a, 2010b) could impact archaeological sites within the NHL.

7 RECOMMENDATIONS

7.1 NHL Management Recommendations

Ipiutak

- Georeference existing maps of the site so as to better understand the relationship between past archaeological research and site assessments, and to aid in tracking future impacts to the NHL.
- Conduct additional survey of the site. Create a high resolution map of the NHL that can be used to track site condition and to facilitate research on existing collections, which currently cannot be connected to specific, on the ground, locations.
- Set up a coastal erosion monitoring program in collaboration with the community. This could consist of measuring or qualitatively assessing the extent of erosion at the NHL, and working with the community to monitor erosion and collect data on any archaeological materials uncovered by erosion.
- Work with the community to record information (e.g., photos, GPS data) on artifacts collected from eroding areas and other parts of the NHL.
- Work with landowners and the community to evaluate the value and need for conducting limited fieldwork in eroding areas of the site. The majority of prior research at the site was carried out in the 1940s and many of the recovered materials were lost in transit to the lower 48 and Denmark. The remaining materials from the site were recovered using old methods (e.g., no/limited screening, lack of systematic collection of fauna and other artifacts); these antiquated methods, coupled with poor provenience data, limit the research that can be done with existing collections. Considering that the Ipiutak NHL is the type site for NearIpiutak and Ipiutak cultures, some additional rescue excavation could be valuable from a research/archaeology perspective in areas of the site that are rapidly eroding.

Wales

- Consider backfilling old excavation areas at Kurigitavik (TEL-25) to eliminate ponding and ponding related erosion.

- Work with the community to record information (e.g., photos, GPS data) on artifacts collected from the NHL.
- The impact of subsistence digging at Hillside Site (TEL-25) are severe. The NPS could consider delisting the site as an NHL although it is not clear what purpose delisting would serve, other than as a possible additional deterrent (beyond community rules) of digging at other local sites. Digging at TEL-79 seems to be accepted by the community; mitigating its impact may not be a community priority and would certainly require community collaboration to be successful.
- Establish a coastal erosion monitoring program at the Hillside Site (TEL-25) in collaboration with the community.
- Create a small interpretive display in collaboration with the community that complements the current archaeology display on local sites in the community center.

Iyatayet

- Work with NPS staff and UC-Davis archaeologists who have recently visited the site to reestablish the NHL boundary.
- Collaborate with the community on adding to the existing artifact display at the school; the current display includes only artifacts and very little contextual information from Iyatayet.
- Establish a local site monitoring program so that the condition of the NHL can be tracked in future years.

Birnirk

- Establish the NHL boundary based on results of fieldwork and compile photos and maps generated by 2015 NPS field team.
- Compile difficult to access background information for the site (e.g., Carter's reports) and make available to community and archaeologists, perhaps via NPS website.
- Work with the community to establish a monitoring program focused on the long-term possibility of inundation of portions of the site as sea level rises.
- Establish through consultation whether or not the community would appreciate NPS support for cultural activities at the NHL and/or in surrounding area.

Gallagher Flint Station

- No action is necessary at this site, although another site visit should take place in the near future (<15 years from now).

Cape Krusenstern

- The NHL is too large to assess or manage as a single unit. The NHL should be divided into priority areas, perhaps based on current density of known archaeological sites and areas where recent assessments indicate impacts or threats, and establish a monitoring program in these specific areas (Figure 41). Suggested priority areas also include several different environmental settings (e.g., coastal, upland, and riverine settings), so as to establish a better understanding of climate change impacts across the NHL.

- Interview past and present NPS staff who worked in the region (e.g., Bob Gal, Eileen Devinney, Chris Young, Sabra Gilbert-Young) regarding unpublished work in the project area. Anderson (2013) compiled data based on archival research for the Western Arctic Parklands but there are known projects (e.g., survey conducted in the 1990s that identified the Maiyumerak site) for which data were not found in the archives. Given the size of the NHL, and the dearth of resources for managing it, a comprehensive list and associated archive of projects completed in the NHL and adjacent areas are important for more fully evaluating the extent of current impacts to the sites within the NHL.

- Work on community engagement beyond Kivalina. It is unlikely that local people understand the extent of the NHL and areas included. Reach out to the Noatak community and increase outreach and engagement efforts in Kotzebue.

- Reconsider how the significance of the NHL is expressed in NHL documentation and in related interpretation. The emphasis is currently on the archaeology, but the region has cultural significance beyond this that could be interpreted. This would likely enhance local connection to the NHL and benefit future collaboration with regard to managing the NHL.

- Collaborate with staff in Kotzebue to determine whether or not further interpretation of the NHL is possible in displays at the NPS visitor center.

[redacted]

Figure 41. Suggested priority areas within the Cape Krusenstern NHL. Areas are based on current known site density data from the Alaska State Historic Preservation Office records.

7.2 Recommended Community-Related Actions

- *Data sharing*: The results of this project, particularly the NHL assessments and recommendations, should be shared with relevant communities and landowners.
- *Monitoring:* The northern Alaskan NHLs are all remote and relatively difficult and expensive to access even when located near communities. Realistically, it is unlikely that the NPS will be able to fund a regular program of monitoring NHL site conditions (e.g., site visits every five years). Instead, the NPS could work with local communities to establish and support a simple process for monitoring site condition; perhaps a small stipend could be provided to local personnel on an annual basis to collect data (e.g., photos, short descriptions) of impacts to NHLs. In the long term, this would have the added benefit of improving communication between communities and the NPS regarding cultural resources.

- *Document local collections:* The problem of unauthorized and/or subsistence digging within NHLs is a complex one. From an archaeological perspective, this digging is problematic and undesirable. From a community perspective, however, unauthorized or subsistence digging can be an important source of income and/or an enjoyable hobby or cultural activity (e.g., Staley 1993). In at least some cases, digging is authorized at a community level (e.g., at the Hillside Site in Wales). A collaborative approach to documenting local private collections would add to the record of the NHLs and mitigate, to some extent, the damage done by digging.

- *Collaborate on local education efforts:* In several cases (e.g., Wales, Shaktoolik, Kotzebue, Nome), communities already have local displays that interpret and share information about local cultural resources. The NPS could collaborate with local communities to further highlight NHL sites. The NPS could also work with local communities to integrate NHL sites into local school and other education programs. The community of Shaktoolik specifically requested assistance with local educational activities.

- *Revisit NHL significance statements*: The current NHL significance statements are all written from an archaeological perspective, with the prevailing argument for listing as an NHL being the significance of a site to archaeological understanding of past Arctic lifeways. The NPS could work with local communities to re-frame these significance statements so that they also incorporate local and indigenous perspectives, perhaps emphasizing continuities between the past and present.

7.3 Public Education and Interpretation

- *Increase online presence:* update regional and national NHL websites with recent photos and status updates. Consider updating non-NPS sites, e.g., Wikipedia, that the public commonly uses as a source of information.

- *Enhance NPS collaboration:* share the results of this project on the NPS climate change website (https://www.nps.gov/subjects/climatechange/effectsinparks.htm) to further within NPS collaboration on issues of climate change assessment and mitigation.

7.4 Future Site Assessment, Prioritization, and Mitigation Efforts

Site Assessment

The methods for site assessment developed as part of this project can be used to assess other northern Alaskan NHLs and archaeological sites. The methods and forms could easily be modified for use in other regions of Alaska or beyond; all that is required is editing or addition to some of the standardized lists in the guidelines (e.g., site type, landform type). The forms, etc., could also be shared with non-NPS archaeologists in an effort to assess NHLs that the NPS does not currently have resources available to visit, and to expand climate change impact assessment efforts beyond NPS interests.

Planning and Prioritization

Site level assessments of climate change impacts will continue to play an important role in management of climate change impacts to cultural resources. However, the number of sites likely to be impacted by future northern climate change is immense. A process for prioritizing sites for mitigation is needed. A potential approach for using the results of assessment to prioritize sites for future treatment could involve combining and ranking various measures of site hazard, vulnerability, and significance using a subjective scoring of each criterion for each site and multiplying that score by a "site significance" score (e.g., Table 5). These scores could be combined across the region and sites with high scores prioritized for mitigation efforts. An initial effort at site prioritization could be conducted without field assessments by mining regional archives, site forms, reports, and NPS ASMIS records. Another important resource for assessing climate change impacts will be the NPS Cultural Resources Climate Change Impacts Table (Rockman and Marissa 2016); this table will summarize how climate change may impact different types of climate change resources in a manner similar to, but much more detailed than, Table 4 in this report. The Impacts Table could be used to more specifically assess potential hazards to resources prior to fieldwork.

Table 5. Possible Site Prioritization System Using the Ipiutak NHL as an Example

	3	2	1	Totals
Hazard	High	Moderate	Low	3
Site Vulnerability	High	Moderate	Low	3
Aggregated Hazard Time Frame	Imminent (or unknown)	Moderate term	Long term	3
Site Condition	Good	Fair	Poor/Destroyed	2
			Overall Site Risk	**11**
Site Significance	High (or unknown)	Moderate	Low	3

Site Risk*Site Significance = Ipiutak Site Prioritization Score **33**

The development of regionally specific predictive models, combining climate change impact predictions with site location prediction models, would further enhance efforts to prioritize assessment and mitigation efforts across Alaskan parks (see Friesen 2015; Westley et al. 2011 for examples).

Coordinate a Response

The problem of climate change impacts to archaeological resources is an emergent one. As a result, there are many archaeologists simultaneously working on methods, strategies, and approaches for climate change planning, assessment, and mitigation. And, little information about these ongoing projects is publically available at this time; as a result, considerable duplication of effort is likely occurring. Furthermore, while Alaska is at the forefront of U.S. climate change impacts, there is no state-wide or region-wide group focused on climate change and cultural heritage. Such a group could serve as an information sharing resource amongst Alaskan archaeologists, thereby reducing individual and agency-specific effort around the issue of climate change impacts to archaeological sites. An Alaskan climate change response group could also serve to link regional cultural resource specialists with those working in other parts of the country and the world (e.g., Society for American Archaeology Climate Change Committee, Scottish Shorewatch project, etc.), to further enhance information exchange and highlight the visibility of the problem of climate change in Alaskan archaeology. In other states, such groups also coordinate teams of volunteers and community members to assess archaeological sites. The Society for California Archaeology has a climate change program that focuses in part on assessing sites for climate change impacts (Newland 2014). A similar model would work well in Alaska given the difficulty and expense of accessing many NHLs and sites. Given the strength of the NPS climate change response program, NPS Alaska cultural resource staff could be important contributors to the development of a regional climate change group.

8 SUMMARY AND CONCLUSIONS

Over the course of three years, project objectives were largely met. Achievements include: conducting general outreach (local, regional, national) on the problem of climate change threat to Alaska NHL sites; collaboration with local communities and NHL landowners in assessing site condition and vulnerability; developing and implementing a project research design and assessment methods; and conducting site visits to two NHLs. An attempt was made to assess a third NHL but factors beyond the research team's control made this assessment impossible.

Following field testing of assessment methods, additional adjustments were made to the methodology and associated forms. The final forms and methods are provided in this report. This report also details specific management, education/interpretation, and outreach recommendations for the NHLs included in the current study, as well as more general recommendations on the topic of future NHL and archaeological site assessment. General recommendations include: developing community specific monitoring programs at remote NHLs; collaborating with communities to study materials collected from NHLs; working on a variety of community based education and interpretation projects; enhancing existing NHL-related web and social media outlets to share research results and educate the general public on the problem of climate change impacts and archaeology in the north; developing region-specific predictive models to aid in prioritization and working towards region-specific site prioritization systems. Coordinating a regional or state-wide response to the problem of climate change and cultural resources is also recommended.

The majority of identified or anticipated climate change impacts to archaeological sites in the north are negative, but several potential positive impacts were also identified by this project. First, climate change presents an opportunity to find new sites that are exposed by erosion, thawing, fire, and other natural forces. While the window to act to investigate these sites is relatively short, there is also tremendous potential for new discoveries important to understanding past and present Arctic cultures. Second, several specific areas where cultural resources managers can collaborate with local Alaskan communities in site assessment, mitigation, and preservation were uncovered through the process of outreach and consultation over the course of this project. There is great opportunity for working together to mitigate the impact of climate change to northern archaeological sites, and on the issues of cultural education and interpretation.

9 ACKNOWLEDGEMENTS

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10 DATA AVAILABILITY

Copies of field notes, photographs, and other archival material associated with the project are curated by the NPS at the Anchorage Regional Office curation facility.

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Appendix A: Archaeological Site Condition and CCVA Assessment Form and Guidelines

Site #:_______________

Archaeological Site Condition and Climate Change Vulnerability Assessment Form

Date Recorded:______________ Recorder(s):____

GPS File:__________________________Camera:____________________Photo #s:___________________

Date of Last Site Assessment: _______________ Last Site Assessor(s): ______________________________

Site Name:____

SITE LOCATION

USGS 1:63,360 Quad Map Name:____

GPS type:_________________________________ Datum: ____________________________________

National Historic Landmark (NHL) Boundaries (UTM):

Zone	Northing	Easting	Description

Property Owner(s):____

Location Description (general to specific):____

____

____

____

____

____

____

SITE VULNERABILITY

Archaeology

Site Type(s): ____

Approximate Site Age (circle all that apply): pre-contact / contact / post-contact

Environment

General Setting: ____

Landforms (local):____

Landforms (regional):____

Site Slope: ____

Site Aspect: ____

Site Elevation: ____

Local soil/sediment type: ____

Water Resources (type, distance, permanence):_____________________________________

Local Vegetation :____

Estimate % vegetation ground cover on site: ______________________________________

____

Permafrost Zone: ____

Notes on site vulnerability in relationship to environmental setting and type of archaeology?____________

____
____
____
____
____
____
____
____
____
____
____

Overall Site Vulnerability:_Unknown / Low / Moderate / Severe

Site #:_______________

HAZARD AND CONDITION ASSESSMENT

Assessment Type (circle one): Baseline 1 YR 5 YR 10 YR 15+ YR

Potential/Current Hazard Type:____________________________________

Time Frame:__________________Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:____________________________________

Time Frame:__________________Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:____________________________________

Time Frame:__________________Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:____________________________________

Time Frame:__________________Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:____________________________________

Time Frame:__________________Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:____________________________________

Time Frame:__________________Area of Site Disturbed (m^2/%): _____/______

Total area of site disturbed (m^2/%): _______________________

Site Condition (circle one): Good / Fair / Poor / Destroyed / Inundated / Uncertain

Depositional Integrity (circle one):

Exceptional / Well Preserved / Substantial / Moderate / Poor / Lacking / Unevaluated

Site Disturbance Severity Level: Unknown / Low / Moderate / Severe / Not Applicable

Notes on hazards and site condition:

RISK ASSESSMENT AND RECOMMENDATIONS

Site Risk: Unknown / Low / Moderate / Severe

Overall Assessment of Site Risk to Climate Change and Other Hazards (consider vulnerability, potential/current hazards, and site significance: ____

Mitigation Recommendations:____

NRHP ELIGIBILITY EVALUATION

Prior Eligibility Determination for the NRHP:________________________ Date: _______________

Current Recommendation (Eligible/Not Eligible/Unevaluated):__________________________________

Justification for Current Recommendation:____

Comments on Eligibility for NHL Listing:____

Archaeological Site Condition and Climate Change Vulnerability Assessment Guidelines for Form Completion

DEFINITIONS

Archaeological site **risk** is a combination of *hazard(s) and vulnerability*.

Hazards are physical processes or events

Vulnerability is the degree of site exposure to hazards.

Site Significance is the importance of a site locally, regionally, and or nationally (as defined by NRHP guidelines). Significance is a crucial factor in prioritizing high risk sites for mitigation.

BASIC SITE INFORMATION

Site name: List existing site names if relevant.

GPS type: include make and model of GPS used for current site recording activity

Datum: record site/NHL datum(s) (if present)

National Historic Landmark (NHL) boundaries (UTM): Record the corners of the NHL and describe each location.

SITE VULNERABILITY ASSESSMENT

Archaeology

Site Type(s): Choose from the following list or write in a type if none of these common site types are applicable.

Site Type	*Description*
Semi-permanent settlement	Multiple dwellings
Semi-permanent dwelling	Single dwelling
Seasonal campsite	Includes evidence of temporary shelters, e.g. tent rings, tent depressions, hearths and associated activity scatters, etc.
Surface scatter	Same as seasonal campsite but *no* evidence of temporary shelter. E.g. lithic, ceramic, historic scatter of artifacts
Cemetery	Multiple graves (indicate surface or sub-surface)
Grave	Single grave (indicate surface or sub-surface)
Cave/Rockshelter	Site located in cave or rockshelter
Rock cairn(s) or alignment(s)	
Hearth	

Activity Area	Lithic, ceramic, bone, or other scattered material associated with past human activity
Rock art	Petroglyphs or pictographs

Environment

General Setting: Choose from the following list or write in a type if none of these common settings are applicable.

Coastal
Coastal plain
Riverine (adjacent to river)
River valley (within river valley)
Lowland
Highland
Mountain - foothills
Mountain
Mountain - periglacial

Landforms (Local and Regional): Describe the local/on-site and regional landforms. Possible common Alaskan landform descriptors include:

<ins>Coastal Landforms</ins>
Coastal bluff/terrace
Barrier bar or island
Spit
Beach
Beach Ridge
Cape
River delta
Wave cut platform

<ins>Aeolian Landforms</ins>
Dune(s)
Dry lake

<ins>Fluvial Landforms</ins>
River terrace
River levee (natural)
Alluvial fan
Cutbank
Confluence
Esker
Floodplain
Fluvial island

<ins>Slope Landforms</ins>
Bluff
Butte
Cliff

<ins>Erosional Landforms</ins>
Cave
Cliff
Mesa
Ridge
Valley
Bedrock knob
Rock shelter/cave

<ins>Lacustrine Landforms</ins>
Beach
Dry lake
Lacustrine terrace
Oxbow lake
Proglacial lake

<ins>Mountain and Glacial Landforms</ins>
Glacial kame terrace
Glacial moraine
Pass
Outwash fan or plain
U-shaped valley
Hanging valley

<ins>Volcanic Landforms</ins>
Caldera
Crater lake
Lava flow (tube, dome)

Hill
Knoll
Mesa
Ridge

Maar

Site Slope: Estimate the slope on site. If the site covers multiple hills/sloped areas, estimate the slope of different areas of the site.

Site Aspect: Estimate the aspect of the site using a compass. If the site covers multiple hills/sloped areas, describe the aspect of different areas of the site.

Site Elevation: Measure on-site and/or use topographic map

Local Soil/Sediment Type: Use available soils maps and on-site observation to determine local soil type(s).

Useful soil spatial resource: http://www.nrcs.usda.gov/wps/portal/nrcs/main/ak/soils/surveys/

Water Resources (Type, Distance, Permanence): list all of the on-site and local water resources. Note their distance from the site and their permanence (intermittent, seasonal, permanent).

Local Vegetation: note local vegetation types. Note specific plant species if known and/or use general descriptors for vegetation from following list (Viereck et al. 1992):

<u>Tundra</u>
Dry
Moist
Wet
Aquatic

<u>Forest</u>
Needleleaf
Broadleaf
Mixed forest

Scrub
Dwarf tree scrub
Tall scrub
Low scrub

<u>Herbaceous</u>
Graminoid herbaceous
Forb herbaceous
Bryoid herbaceous
Aquatic herbaceous

Vegetation resources, including more detailed descriptions and information for above vegetation types:
http://www.fs.fed.us/pnw/publications/pnw_gtr286/pnw_gtr286a.pdf

Vegetation spatial data: http://nsidc.org/data/ggd639

Estimate % Vegetation Ground Cover: estimate the area and % of the site that is covered by vegetation.

Permafrost Zone: Use circumpolar permafrost map to determine permafrost zone: http://nsidc.org/data/ggd318

Notes on Site Vulnerability: If applicable, describe potential or actual site vulnerability to climate change and other hazards in relationship to the environmental setting.

Overall Site Vulnerability: Evaluate based on setting and type of archaeology.

Unknown	Information is insufficient to make an evaluation.
Low	For Vulnerability to be considered low, the landform/environmental setting and archaeology must be relatively stable and anticipated to remain stable in the face of predicted climate change and other natural hazards.
Moderate	For Vulnerability to be considered moderate, the landform/environmental setting and archaeology must lack stability; the site, or major parts of it, will likely be irretrievably lost if actions to protect and/or preserve it are not taken within five years
Severe	For Vulnerability to be considered severe, the landform/environmental setting and archaeology must be unstable; the site, or major parts of it, will likely be irretrievably lost if actions to protect and/or preserve it are not taken within two years.
Not Applicable	The site has been completely excavated or destroyed and nothing remains.

HAZARD AND CONDITION ASSESSMENT

Assessment Type: Choose one from list based on time since last assessment. Baseline = first assessment.

Potential/Current Hazard Type: circle *potential* or *current* hazard to the site. *Potential hazards* are anticipated hazards to the archaeological site (similar to threats under the NPS ASMIS system). *Current hazards* are on-going observable hazards (or disturbances under ASMIS scheme) to the archaeological site, i.e. natural or human forces acting on the archaeological site. Choose from the following list or write in a hazard if none of these common hazards are applicable.

Decreased snow cover
Decreased ice cover
Increased glacial melting
Permafrost thawing
Flooding or inundation
Increased precipitation
Rising sea level
Wind erosion
Water erosion
Increased storm frequency
Fire – Hazard Fuel Build-Up
Vegetation growth
Vegetation reduction/death

Animal activities
Visitor/human activities
Park operations
Unauthorized collecting
Vandalism
Neglect
Fire suppression/control
Previous scientific research
Development/construction

Estimate Time Frame for Potential Hazards: Use the ASMIS threat times frame categories:

Immediate	Potential hazard is predicted to cause damage or harm during the next several weeks or months.
1 Year	Potential hazard is predicted to cause damage or harm after approximately one year.
3 Years	Potential hazard is predicted to cause damage or harm after approximately three years.
5 Years	Potential hazard is predicted to cause damage or harm after approximately five years.
10 Years	Potential hazard is predicted to cause damage or harm after approximately ten years.
20 Years	Potential hazard is predicted to cause damage or harm after approximately twenty or more years

Estimate the Area of Site Disturbed by Current Hazards and Total Area of Disturbance: measure and map the area of the site disturbed by specific forces or estimate area disturbed. Calculate % of total site area disturbed by each force and determine total area of disturbance.

Site Condition: Use the following ASMIS classification system to describe the site condition.

Good	The site, at the first condition assessment or during the time interval since its last condition assessment, shows no evidence of noticeable deterioration by natural forces and/or human activities. The site is considered currently stable and its present archeological values are not threatened. No adjustments to the currently prescribed site treatments are required in the near future to maintain the site's present condition.
Fair	The site, at the first condition assessment or during the time interval since its last condition assessment, shows evidence of deterioration by natural forces and/or human activities. If the identified threats continue without the appropriate corrective treatment, the site will degrade to a poor condition.
Poor	The site, at the first condition assessment or during the time interval since its last condition assessment, shows evidence of severe deterioration by natural forces and/or human activities. If the identified threats continue without the appropriate corrective treatment, the site is likely to undergo further degradation and the site's data potential for historical or scientific research will be completely lost.

Destroyed	The site is destroyed or so severely damaged that the data potential/scientific research value was deemed insufficient to warrant further archeological monitoring or investigation.

Depositional Integrity: use the following ASMIS classification system to describe the depositional integrity of the site.

Exceptional	Virtually all archeological deposits are completely intact and retain all of their original archeological integrity. Preservation is exceptional and all indications are that the archeological deposits are entirely in situ and unaltered.
Well preserved	The archeological deposits have suffered some minor degradation due to natural forces and/or human activities, but this has not appreciably reduced the overall integrity of the extant archeological deposits. The existing archeological deposits are mostly intact and complete.
Substantial	The archeological deposits have clearly suffered as a result of natural forces and/or human activities, but only a minor portion of their original archeological value has been significantly compromised. Despite the loss, the majority of the archeological deposits remain relatively intact and complete.
Moderate	The archeological deposits have clearly suffered as a result of natural forces and/or human activities and a majority has been compromised. Despite the loss, a sizable portion of the remaining archeological deposits are relatively intact and complete.
Poor	The greater majority of archeological deposits have been severely disturbed by natural forces and/or human forces, but a small portion remains relatively intact.
Lacking	All of the archeological deposits, as a result of natural and/or human impacts, have lost all archeological integrity and are insufficiently intact to address any currently conceptualized spheres of archeological research that would warrant further investigation.
Unevaluated	The archeological deposits have not been sufficiently assessed to evaluate their archeological integrity.

Site Disturbance Severity Level: use the following ASMIS classification system to describe the severity of <u>current</u> disturbance at the site.

Unknown	Information is insufficient to make an evaluation.
Low	For Disturbance Severity to be considered low, the continuing effects of disturbances are minimal, and are not yet resulting in significant damage to the site.

Moderate	For Disturbance Severity to be considered moderate, disturbances are causing significant site damage; the site, or major parts of it, will likely be irretrievably lost if actions to protect and/or preserve it are not taken within five years.
Severe	For Disturbance Severity to be considered severe, disturbances are causing major site damage; the site, or major parts of it, will likely be irretrievably lost if actions to protect and/or preserve it are not taken within two years.
Not Applicable	The site has been completely excavated or destroyed and nothing remains.

Notes on Hazards and Overall Site Condition: How has a particular disturbance impacted the site (e.g. animal activity created trails that damage surface and subsurface site integrity)?

RISK ASSESSMENT AND RECOMMENDATIONS

Risk to Climate Change Impacts: use the following modified ASMIS classification system to describe the overall level of site *risk* (combination of vulnerability, potential/current hazards, and site significance) at the site.

Unknown	Information is insufficient to make an evaluation.
Low	For Risk to be considered low, the continuing effects of hazards/disturbances are minimal, or predicted to be, minimal, and are not yet resulting in significant damage to the site. Site vulnerability is also considered low.
Moderate	For Risk to be considered moderate, hazards/disturbances are causing, or threat of disturbance may soon cause, significant site damage; the site, or major parts of it, will likely be irretrievably lost if actions to protect and/or preserve it are not taken within five years. Site vulnerability is also considered moderate.
Severe	For Risk to be considered severe, hazards/disturbances are causing, or threat of disturbance may very soon cause, major site damage; the site, or major parts of it, will likely be irretrievably lost if actions to protect and/or preserve it are not taken within two years. Site vulnerability is also considered severe.
Not Applicable	The site has been completely excavated or destroyed and nothing remains.

Overall Assessment of Site Risk: Make an overall qualitative assessment of the site's risk (combination of vulnerability, potential/current hazards, and site significance) to climate change impacts and other threats or hazards to the integrity of the site.

Mitigation Recommendations: Make specific recommendations for mitigating site risk to various hazards and disturbance identified in during the assessment.

NATIONAL REGISTER OF HISTORIC PLACES (NRHP) ELIGIBILITY EVALUATION

Prior eligibility determination for the NRHP and NHL: List the prior eligibility determination for the NRHP and the date of the determination.

Current recommendation: Make a new NRHP recommendation if needed based on current site condition, new research, etc.: eligible, not eligible, unevaluated.

Justification: If it has changed, justify the eligibility recommendation and include a discussion of specific eligibility criteria. An eligible site possesses integrity of location, design, setting, materials, workmanship, feeling, and association and:

a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

b) that are associated with the lives of persons significant in our past;

c) that embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d) that have yielded, or may be likely to yield, information important in prehistory or history.

Comments on NHL Listing and Site Significance: Make any applicable comments or recommendations on the continued eligibility of the site for NHL status and the site's significance.

Appendix B. Completed CCVA Forms

Archaeological Site Condition and Climate Change Vulnerability Assessment Form

Date Recorded:6/22-23/2014 Recorder(s): Shelby Anderson (PSU) and Rhea Hood (NPS)

GPS File: on file at NPS Anchorage office Camera: PSU Camera Photo #s:584-666

Date of Last Site Assessment: 1997 Last Site Assessor(s): Becky Saleeby (NPS)

Site Name: Ipiutak Site

SITE LOCATION

USGS 1:63,360 Quad Map Name: Point Hope B-3

GPS type: Trimble GeoXH Datum: NAD 83

National Historic Landmark (NHL) Boundaries (UTM):

Zone	Northing	Easting	Description
3N	[redacted]	-[redacted]	A
3N	[redacted]	-[redacted]	B
3N	[redacted]	-[redacted]	C
3N	[redacted]	-[redacted]	D
3N	[redacted]	-[redacted]	E
3N	[redacted]	-[redacted]	F
3N	[redacted]	-[redacted]	G
3N	[redacted]	-[redacted]	H
3N	[redacted]	-[redacted]	I
3N	[redacted]	-[redacted]	J
3N	[redacted]	-[redacted]	K
3N	[redacted]	-[redacted]	L
3N	[redacted]	-[redacted]	M

The boundary of Ipiutak National Historic landmark has 13 intervals between corner vertices (or points) A through M. [redacted]

[redacted]

Property Owner(s):Tikigaq Native Corporation, State of Alaska, various private landowners

Location Description (general to specific): The NHL is located on the Chukchi Sea Coast North of Kotzebue Sound, on the Tigara Peninsula. [redacted]

SITE VULNERABILITY

Archaeology

Site Type(s): Large, semi-permanent village site and associated activity areas

Approximate Site Age (circle all that apply): pre-contact

Environment

General Setting: Coastal

Landforms (local): Coastal beach ridges

Landforms (regional): Beach Ridges, Coastal, Peninsula

Site Slope: 0

Site Aspect: 360 degrees (relatively flat terrain)

Site Elevation: 0-5 m above sea level

Local soil/sediment type: Variable, from sand and beach cobbles to sandy loam

Water Resources (type, distance, permanence): Lagoon, inlet, ocean, all 0 km from the NHL

Local vegetation: A variety of both dry and wet (along nw margin of NHL) tundra lichens, mosses, grasses, and wildflowers common to the coastal plain of northern Alaska

Estimate % vegetation ground cover on site: Highly variable. Further inland there is less vegetation cover, approximately 75% coverage, with up to 100% vegetation coverage in other areas of the site.

Permafrost Zone: Continuous permafrost

Notes on site vulnerability in relationship to environmental setting and type of archaeology?:

Environmental setting suggests site is vulnerable to coastal processes (erosion, inundation) and to reduction in sea ice and snow. Vegetation cover provides some protection against wind and water erosion, but exposes artifacts/cultural materials to collection and to natural forces. Semi-subterranean houses are vulnerable to erosion, thawing, and erosion/decomposition caused by meltwater ponding in features.

Overall Site Vulnerability: Severe

HAZARD AND CONDITION ASSESSMENT

Assessment Type (circle one): 15+ YR

Potential/Current Hazard Type: Water Erosion Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx.. 20-25%

Potential/Current Hazard Type:Wind Erosion Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx.. 30%

Potential/Current Hazard Type: Animal Activities Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx. 15-20%

Potential/Current Hazard Type: Flooding Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx.5 %

Potential/Current Hazard Type: Unauthorized Collecting Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx. 5%

Potential/Current Hazard Type: Visitor activities (ATV trails, roads) Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx.. 10%

Potential/Current Hazard Type: Construction (snow fence) Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx.. 3-5 %

Potential/Current Hazard Type: Previous Research Time Frame: On-going
Area of Site Disturbed (m^2/%): _____/approx.. 30%

Potential/Current Hazard Type: Rising Sea-level Time Frame: Unknown
Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type: Increased storm frequency Time Frame: Unknown
Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type: Permafrost Thaw Time Frame: Unknown
Area of Site Disturbed (m^2/%): _____/______

Total area of site disturbed (m^2/%): Difficult to estimate because of the nature of onsite disturbance (e.g. rodent digging in previously excavated features, flooding and erosion occurring in same area of site). Estimated at 30-40% disturbed.

Site Condition: Fair

Depositional Integrity: Substantial

Site Disturbance Severity Level: Moderate

Notes on hazards and site condition: Current impacts include water and wind erosion, particularly in lower vegetation areas (SW of NHL), animal activities (specifically rodent digging), flooding of cultural features, unauthorized collecting [redacted] community activities (ATV trails and roads), construction, and previous archaeological research (many features were not backfilled). Potential future impacts include: increased coastal erosion [redacted] as sea level rises and/or storm frequency increases and as there is a shortening in the period of time when the site is protected by ice and snow; increased wind deflation and water erosion and unauthorized digging in the site due to increased site visibility caused by erosion.

RISK ASSESSMENT AND RECOMMENDATIONS

Site Risk: Severe

Overall Assessment of Site Risk to Climate Change and Other Hazards (consider vulnerability, potential/current hazards, and site significance:

The low-lying coastal beach ridge landscape makes the NHL vulnerable to erosion, flooding, and wind deflation. The NHL location [redacted] increases the potential impact of these natural forces. In addition, the NHL is located in close proximity to the current community of Point Hope. This, coupled with the history of research and collecting at the site (Larsen and Rainey 1948) means that unauthorized collection will likely continue and may increase as erosion continues to expose site deposits and artifacts. Construction and community activity impacts will likely also continue and increase in the future if the village expands. The entire region is vulnerable to permafrost thaw, which could combine with increased coastal erosion and cause loss of large areas of the Ipiutak NHL. The NHL is deemed to be at high risk to climate change and other impacts on the basis of the negative effect of current impacts on site integrity, as well as the overall vulnerability of the NHL to potential future hazards. The site is highly significant, and research potential remains.

Mitigation Recommendations:

Establish a system for monitoring the rate of coastal erosion and collecting activities in collaboration with the community. Map the entire site to both facilitate future research and to aid in tracking changes to the site; it is currently unclear precisely what is eroding away because there are no detailed maps or documentation of features within the site.

NRHP ELIGIBILITY EVALUATION

Prior Eligibility Determination for the NRHP: Listed Date: 1966

Current Recommendation (Eligible/Not Eligible/Unevaluated):Eligible, criterion D

Justification for Current Recommendation: The current justification is based on archaeological importance of the Ipiutak site as the type site for Ipiutak culture. Consider updating this justification to expand on the relationship between the site and the community, and the continuing cultural importance of the site.

Comments on Eligibility for NHL Listing: Negative impacts to site are not extensive enough to consider de-listing.

[redacted]

Figure 1. Pre-project boundary and datum (orange triangle) of Ipiutak NHL (Figure by Rhea Hood). Note that the NHL boundary in the top map is drawn using the 1986 National register form description and there is some uncertainty regarding its accuracy.

[redacted]

Figure 2. Map of Ipiutak site (XHP-3) and other sites within the Ipiutak Archaeological District (XHP-111)(Figure by Rhea Hood). Note differences between Ipiutak site boundary and NHL boundary in previous figure.

[redacted]

Figure 3. Hazards and disturbances noted during survey of Ipiutak NHL (Figure by Rhea Hood). New boundary also indicated.

Figure 4. [redacted] view to the west (Photo by S. Anderson).

[redacted]

Figure 5. Shoreline erosion along northeast boundary of NHL (Photo by S. Anderson).

[redacted]

Figure 6. Shoreline erosion along northeast boundary of NHL (Photo by S. Anderson).

[redacted]

Figure 7. Overview of disturbed area of NHL north of the modern village. View to the east (Photo by S. Anderson).

[redacted]

Figure 8. North-South trail across NHL. View to the South (Photo by S. Anderson).

[redacted]

Figure 9. Overview of NHL from northwest corner. View to the east (Photo by S. Anderson).

Figure 10. Recent digging in areas disturbed by storm erosion at Ipiutak NHL. Diggers have stacked discarded faunal material from site deposits in backfill (Photo by S. Anderson).

[redacted]

Figure 11. Storm erosion along [redacted] boundary of Ipiutak NHL. View to the south (top) and east (bottom)(Photos by S. Anderson).

[redacted]

Figure 12. Wind deflation along [redacted] boundary of the site. View to the east (Photo by S. Anderson).

Figure 13. Wind deflation in vicinity of cultural features in [redacted] Ipiutak NHL (Photo by S. Anderson).

Figure 14. North-South road across NHL. View to the north from southern boundary of site (Photo by S. Anderson).

Archaeological Site Condition and Climate Change Vulnerability Assessment Form

Date Recorded: 6/18/14 Recorder(s): Shelby Anderson (PSU) and Rhea Hood (NPS)

GPS File: on file at NPS Anchorage office Camera: PSU Red Camera Photo #s: 454-544

Date of Last Site Assessment: 1985 Last Site Assessor(s):Susan Morton (NPS)

Site Name: Wales Hillside Site

SITE LOCATION

USGS 1:63,360 Quad Map Name: Teller C-7

GPS type: Trimble GeoXH Datum: NAD83

National Historic Landmark (NHL) Boundaries (UTM):

Zone	Northing	Easting	Description
3N	[redacted]	[redacted]	A
3N	[redacted]	[redacted]	B
3N	[redacted]	[redacted]	C
3N	[redacted]	[redacted]	D
3N	[redacted]	[redacted]	2014 Site Datum

The boundary of the Hillside site of the Wales National Historic Landmark has four sides with corner vertices (or points) A through D and has an area of 5.8 acres. This boundary was determined by georeferencing boundary maps of the NHL illustrated in 1985 and verifying the accuracy in Wales during the 2014 site condition assessment. Using GIS software to measure the boundary's dimensions provides the current description higher accuracy. [redacted]

Property Owner(s): Wales Native Corporation

Location Description (general to specific): TEL-25 is located at the modern village of Wales, at the western extreme of the Seward Peninsula on the Bering Sea Coast. [redacted] The bench landform has an abrupt slope that drops down to the more recent coastal plain and modern beach. [redacted]

SITE VULNERABILITY

Archaeology

Site Type(s): semi-permanent settlement

Approximate Site Age: pre-contact, contact, post-contact

Environment

General Setting: coastal

Landforms (local): coastal terrace

Landforms (regional): Beach, beach ridge, mountain

Site Slope: Top of terrace/bench = 15-20 degrees; Edge of terrace/bench = approx.. 30 degrees

Site Aspect: Northwest

Site Elevation: 20-40 m above sea level

Local soil/sediment type: silty to sandy loam

Water Resources (type, distance, permanence): Bering sea coast (0 km); unnamed creek (approx.. 3 km)

Local Vegetation: Typical dry tundra mosses, lichens, small shrubs (willow, birch), grasses, and berries.

Estimate % vegetation ground cover on site: in disturbed areas, 0-50%; 90-100% across rest of site

Permafrost Zone: continuous permafrost

Notes on site vulnerability in relationship to environmental setting and type of archaeology?

The site consists of clusters of cultural features and associated activity areas on natural lobes of a high bluff [redacted] The site is bisected by seasonal/intermittent streams that drain water from the uplands, cutting through the site and creating convoluted local topography. It is vulnerable to various erosive forces.

Overall Site Vulnerability: Severe

Site #:TEL-25, Hillside Site, Wales NHL

HAZARD AND CONDITION ASSESSMENT

Assessment Type (circle one): 15+ YR

Potential/Current Hazard Type: Human Activities/Subsistence Digging and Construction
Time Frame: on-going Area of Site Disturbed (m^2/%): _____/approx.. 20%

Potential/Current Hazard Type: Water Erosion_Time Frame: on-going
Area of Site Disturbed (m^2/%): _____/approx.. 5-10 %

Potential/Current Hazard Type: Previous scientific research Time Frame: on-going
Area of Site Disturbed (m^2/%): Cannot estimate due to extent of subsistence digging

Potential/Current Hazard Type: Perma-frost thawing Time Frame: Unknown
Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type: Sea level rise Time Frame: Unknown
Area of Site Disturbed (m^2/%): _____/______

Total area of site disturbed (m^2/%): approx.. 30%

Site Condition: Poor

Depositional Integrity: Moderate - Poor

Site Disturbance Severity Level: Severe

Notes on hazards and site condition: The most significant on-going hazard at the site is the severe impact of subsistence digging/collecting activities. Although prior research undoubtedly impacted the site and contributed to current collecting activities, old excavation areas can no longer be identified due to extensive digging. Every feature on-site is disturbed to some extent by digging activities, which are clearly on-going. Construction of several houses at the north end of the site have also disturbed site deposits. Slope and water erosion is also currently impacting the site; these natural forces are exacerbated by digging activities and related vegetation destruction. Potential future impacts include permafrost melting, increased erosion of the slop and base of the site, with the latter caused by sea level rise. While some intact areas of the site remain, the majority of the site has been damaged by digging activities.

RISK ASSESSMENT AND RECOMMENDATIONS

Site Risk: Severe

Overall Assessment of Site Risk to Climate Change and Other Hazards (consider vulnerability, potential/current hazards, and site significance:

The site is vulnerable to continued subsistence digging, future permafrost thaw, sea level rise and associated coastal erosion. If water run-off from melting snow and ice increases in the future, increased water run-off over the site will likely further increase erosion of the site deposits near drainages and at the bluff edge. The overall risk of the site is considered high, primarily due to the pace and extent of digging and collecting activities.

Mitigation Recommendations:

If the community feels that digging on-site is problematic, work with the community to decrease digging activities and mitigate their impact through data recovery and/or documentation of local collections. Establish a community monitoring plan to help monitor erosion.

NRHP ELIGIBILITY EVALUATION

Prior Eligibility Determination for the NRHP: Listed Date: NHL (1962), NR (1966)

Current Recommendation (Eligible/Not Eligible/Unevaluated): Eligible – but soon to be ineligible

Justification for Current Recommendation: The current justification for listing the site on the national register and as a NHL is its archaeological importance. Consider working with the community to expand the significance statement for the NHL to better connect with local culture, both past and present, and the site location at the nexus of cross-continent/international interaction over millennia.

Comments on Eligibility for NHL Listing: If subsistence digging continues, the site may no longer be eligible for the national register or for NHL designation.

[redacted]

Figure 1. Map of Wales NHL with revised boundary and datum information (Figure by Rhea Hood).

[redacted]

Figure 2. Map of Hillside Site (TEL-25) with revised boundary, datum, and areas of significant disturbance caused by subsistence digging (Figure by Rhea Hood).

[redacted]

Figure 3. TEL-25 overview from village. Areas of subsistence digging visible [redacted] (Photo by S. Anderson).

[redacted]

[redacted]

Figure 4. Overviews of TEL-25 from north end, disturbance area E. View to the south (top) and southeast (bottom)(Photos by S. Anderson).

[redacted]

Figure 5. Modern houses at [redacted] TEL-25 area. [redacted] (Photo by S. Anderson).

[redacted]

[redacted]

Figure 6. Disturbed cultural features in areas D. at TEL-25 View to the north (top) and east (bottom) (Photos by S. Anderson).

[redacted]

Figure 7. Artifacts stacked by subsistence diggers in area D at TEL-25 (Photo by S. Anderson).

[redacted]

Figure 8. Disturbed features in area C at TEL-25 (Photos by S. Anderson).

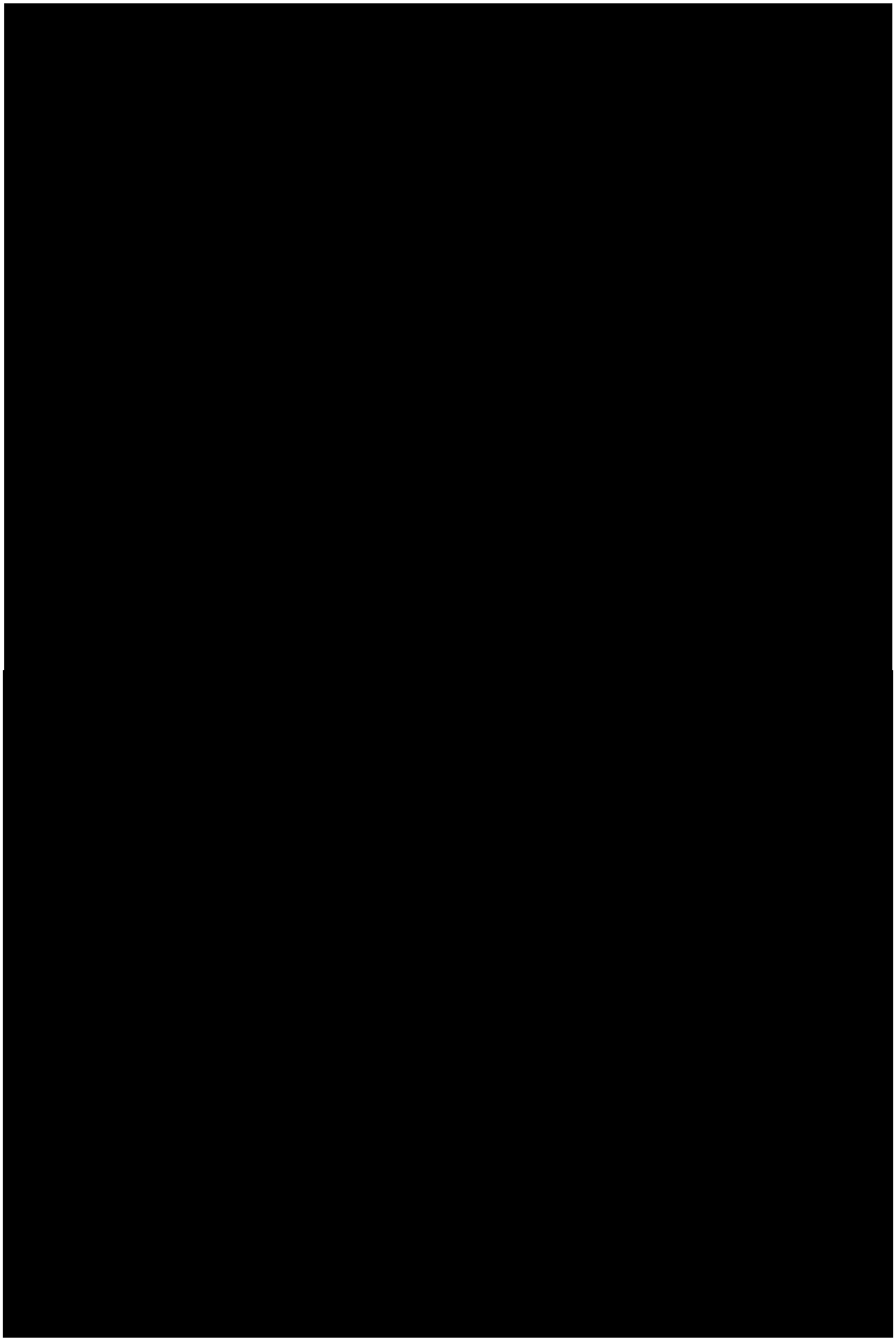

Figure 9. Subsistence digging (top) and other disturbance (bottom) in area C at TEL-25 (Photos by S. Anderson).

[redacted]

Figure 10. Overview of area C from beach at TEL-25 (Photo by S. Anderson).

[redacted]

Figure 11. Overview of disturbance area A from disturbance area B at TEL-25. View to the south (Photo by S. Anderson).

[redacted]

Figure 12. Subsistence digging in area A at TEL-25 (Photos by S. Anderson).

[redacted]

Figure 13. Subsistence digging in area A at TEL-25. Note seal poke on ground to right of RH (Photo by S. Anderson).

Figure 14. Close up of seal poke and contents in area A at TEL-25 (Photos by S. Anderson).

[redacted]

Figure 15. View of area A from beach at TEL-25 (Photo by S. Anderson).

Archaeological Site Condition and Climate Change Vulnerability Assessment Form

Date Recorded: 6/17-6/18/14 Recorder(s): Shelby Anderson (PSU) and Rhea Hood (NPS)

GPS File:806180813 Camera: PSU red camera Photo #s:350-453

Date of Last Site Assessment: 1985 Last Site Assessor(s): Susan Morton (NPS)

Site Name: Kurigitavik

SITE LOCATION

USGS 1:63,360 Quad Map Name: Teller C-7

GPS type: Trimble GeoXH Datum: NAD83

National Historic Landmark (NHL) Boundaries (UTM):

Zone	Northing	Easting	Description
3N	[redacted]	[redacted]	A
3N	[redacted]	[redacted]	B
3N	[redacted]	[redacted]	C
3N	[redacted]	[redacted]	D
3N	[redacted]	[redacted]	2014 Site Datum

Property Owner(s):Wales Native Corporation

Location Description (general to specific): TEL-79 is located at the modern village of Wales, at the western extreme of the Seward Peninsula on the Bering Sea Coast. [redacted]

SITE VULNERABILITY

Archaeology

Site Type(s): Semi-permanent settlement and associated activity areas

Approximate Site Age: pre-contact

Environment

General Setting: Coastal

Landforms (local): Low mound on either a relic beach ridge or dune, built up by human occupation

Landforms (regional): Razorback Mountain [redacted] and coast [redacted]

Site Slope: 0 degrees

Site Aspect: n/a

Site Elevation: Approximately 7.5 m above sea-level

Local soil/sediment type: sandy loam apparent in rodent digging, erosion faces, and backdirt

Water Resources (type, distance, permanence): Bering Sea coast [redacted] and the outlet of Village Creek [redacted]

Local Vegetation: Predominantly sphagnum moss and beach grass. Wet tundra vegetation common in surround area.

Estimate % vegetation ground cover on site: 100%

Permafrost Zone: Continuous

Notes on site vulnerability in relationship to environmental setting and type of archaeology?

Low elevation and poor drainage makes the site vulnerable to erosive forces and, in the long-term, inundation if sea level rises significantly. Vegetation is protecting any surface materials on site, although sub-surface deposits are vulnerable to permafrost thaw.

Overall Site Vulnerability: Low

HAZARD AND CONDITION ASSESSMENT

Assessment Type: 15+ YR

Potential/Current Hazard Type: Animal Activities (rodent digging) Time Frame:on-going
Area of Site Disturbed (m^2/%): _____/3-5%

Potential/Current Hazard Type: Flooding Time Frame:on-going
Area of Site Disturbed (m^2/%): _____/10%

Potential/Current Hazard Type: Previous Research Time Frame:on-going
Area of Site Disturbed (m^2/%): _____/20%

Potential/Current Hazard Type:Permafrost Thawing Time Frame: unknown
Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:Vegetation Reduction/Wind Erosion Time Frame: unknown
Area of Site Disturbed (m^2/%): _____/______

Potential/Current Hazard Type:Human Activities/Unauthorized Collecting Time Frame: unknown
Area of Site Disturbed (m^2/%): _____/______

Total area of site disturbed (m^2/%): approx.. 35%

Site Condition: Fair

Depositional Integrity: Well Preserved

Site Disturbance Severity Level: Moderate

Notes on hazards and site condition: The primarily current hazard acting on the site is flooding or ponding of melt water in depressions on the site, particularly in previous excavation areas. Flooding is causing erosion and making the site more vulnerable to animal digging activities. Erosion could be exacerbated by freeze/thaw cycles in spring and fall. Potential future hazards include a reduction of vegetation on site, which would increase the site's vulnerability to wind and water erosion. No one is digging in the site at this time but there is the potential for digging given the proximity of the site to the community. There is some potential for additional slumping and sub-surface damage to the integrity of the site due to permafrost thawing in the future; thawing could already be occurring.

RISK ASSESSMENT AND RECOMMENDATIONS

Site Risk: Moderate

Overall Assessment of Site Risk to Climate Change and Other Hazards (consider vulnerability, potential/current hazards, and site significance: The overall vulnerability of the site is moderate, given the distance of the site from the modern shoreline and the nature of the landform it is located on. The most significant on-going impact is local flooding and ponding and related erosion.

Mitigation Recommendations: Old excavation units could be refilled and vegetation encouraged to grow to stabilize areas of the site that are currently eroding. The highly active rodent activity could be curtailed by trapping. The council could continue to discourage digging on-site, which seems to be protecting TEL-79 from the levels of digging and disturbance observed at other local sites.

NRHP ELIGIBILITY EVALUATION

Prior Eligibility Determination for the NRHP: Eligible Date: 1966 (1962 NHL)

Current Recommendation: Eligible

Justification for Current Recommendation: The current justification for NHRP and NHL listing is the archaeological significance of the site. This could be amended to make the cultural importance of the site to the modern people of Wales clearer; the link to the Hillside site could be emphasized, the continuity of occupation and connection of people across the Bering Strait represented at the site.

Comments on Eligibility for NHL Listing: No change

[redacted]

Figure 1. Map of Wales NHL with revised boundary and datum information (Figure by Rhea Hood).

[redacted]

Figure 2. Map of Kurigitavik (TEL-79) site with revised boundary and datum (Figure by Rhea Hood). Previous excavation areas noted where they could be clearly identified.

[redacted]

Figure 3. TEL-79 overview. View to the north-northeast (Photo by S. Anderson).

[redacted]

Figure 4. TEL-79 overview from top of site. View to the south (Photo by S. Anderson).

Figure 5. TEL-79 overview. Note rodent digging in foreground. View to the west (Photo by S. Anderson).

[redacted]

Figure 6. Ponding in old excavation units at TEL-79 (Photo by S. Anderson).

[redacted]

Figure 7. Walrus skulls placed near old excavation unit at TEL-79 (Photo by S. Anderson).

[redacted]

Figure 8. On-site erosion at TEL-79 (Photo by S. Anderson).