# Department of Defense

Legacy Resource Management Program

Climate Adaptation Guide for Cultural Resources

**A Guide to Incorporating Climate Considerations into Integrated Cultural Resources Management Plans**

*June 2023*

**DISCLAIMER: Any findings or recommendations of this report are that of the principal investigator and contributors. This report should not be construed as official Department of Defense policy or position unless so designated through other issuances.**

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*Cover photo: Quarters 5, Fort Shafter, Honolulu, Hawaii, 2020 (Source: U.S. Department of Defense)*

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**Executive Summary**

*Department of Defense Instruction (DoDI) 4715.16, Cultural Resources Management*, establishes the requirement for DoD to prepare Integrated Cultural Resources Management Plans (ICRMPs). The content for ICRMPs is found in Enclosure 6 of DoDI 4715.16. Also, *DoD Directive 4715.21, Climate Change Adaptation and Resilience* (2018), as well as the *DoD Climate Adaptation Plan* (2021), requires that all operations, planning activities, business processes, and resource allocation decisions include climate change considerations. Therefore, this guidance document presents as methodology for considering and integrating climate change risks into cultural resources management and the potential ways to improve resiliency for cultural resources. This guide then presents ways to integrate these climate adaptation strategies into the ICRMP. This document is a DoD Legacy Program work product and, as such, does not represent official policy, position, or opinions of the DoD.

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# APPENDIX C

## ICRMP CLIMATE ADAPTATION WORKSHEETS

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#### ICRMP Adaptation Planning Worksheets

The following worksheets support installation-level application of the ICRMP planning process and are modeled after the worksheets in the Climate Adaptation for DoD Natural Resource Managers (Stein et al. 2019). They provide a structured

means for managers to gather, evaluate, and analyze adaptation-relevant information.

The worksheets are designed to build on and draw from one another with earlier

sections in the process informing subsequent worksheets. Because adaptation planning

is an iterative process, the worksheets also provide an opportunity to “show your work” to document decisions and facilitate future assessments or refinements.

**The worksheets are intended to serve as an aid for carrying out adaptation planning; they are not intended to be prescriptive.** Although the worksheets are designed to be used sequentially, users should not feel compelled to fill out all

of the worksheets or each cell in a given worksheet. Additionally, the level of detail

that users entered into the worksheets may vary, depending on the availability of relevant information, and on whether the worksheets are being used to inform a preliminary screening of adaptation needs

and options, or to support in-depth decision- making and allocation of resources. Users may adapt or modify these worksheets (for instance, adding additional rows or columns) to support the planning needs of particular installations most effectively.

Managers may also find it useful to initially focus on a limited number of resources, risks, or strategies and keep a “parking lot” of items to address in subsequent passes through the adaptation planning process. At any point in filling out the worksheets, do not linger— for instance, due to incomplete information or knowledge—instead, make an informed conjecture (documenting assumptions) to keep moving through the planning process. Should additional information become available, then revisit and refine the relevant worksheet and outcomes.

**ICRMP Worksheets**

The point of the worksheet exercise is to consider the resources, the mission and what is realistic climate change adaptation strategies that could realistically be implemented by the installation.

MSWord Worksheets – This Appendix provides worksheets in MSWord for each of the four major ICRMP “sections” described in Chapter 5. The supporting worksheets to use to develop the sections of the ICRMP, and include:

* ICRMP Section 1: Introduction/General Information/Overview

ꟷ Worksheet 1 – Background Information

* ICRMP Section 2 – Installation Profile/ Physical/Natural Setting

ꟷ Worksheet 2 – Climate Concerns and Projections

* ICRMP Section 3 – Installation Areas of Concern/Actions Impacting Cultural Resources

ꟷ Worksheet 3 – Cultural Resources and Climate Risks

* ICRMP Section 4 – ICRMP Goals and Develop Climate Risk Strategies

ꟷ Worksheet 4.1 – Identification of Possible Adaptation Strategies and Actions

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ꟷ Worksheet 4.2 – Evaluation and Selection of Adaptation Strategies and Actions

ꟷ Worksheet 4.3 – Implementation of Adaptation Strategies and Actions

These worksheets were created in MSWord. Due to the software limitation, they have limited pull-down menu function. However, in MSWord, they are more easily integrated into the body of ICRMP, especially if including in an appendix. Users can cut and paste from one worksheet to the next if needed. The worksheet illustrated in this appendix can be used if MSWord is preferred over Excel.

Both the MSWord and Excel versions of the worksheets are provided in a separate Appendix C folder.

Excel Worksheets - As stated above, a separate folder is provided that includes the worksheets in Excel and MSWord.

The Excel file contains worksheet 2, 3a- c, and 4a-c worksheets with “pull down menu” capabilities. These worksheets are arranged differently (by cultural resource

type) compared to the Word versions of the worksheets. Users can manually adjust the height of rows in Excel if needed. Although different than the Excel versions, these worksheets will provide the same data and information outcome to include in the ICRMP.

These worksheets have also been created in Excel to add “pull-down menu functionality.” In Excel, the worksheets were re-organized by resource type and include:

* ICRMP Section 1: Introduction/General Information/Overview (MSWord only)

ꟷ Worksheet 1 – Background Information. This worksheet is not included in the Excel versions. Use the Word version since it is text to

be integrated in various sections of the ICRMP.

* ICRMP Section 2 – Installation Profile/ Physical/Natural Setting

ꟷ Worksheet 2 – Climate Concerns and Projections – Is provided in the Excel file

* ICRMP Section 3 – Installation Areas of Concern/Actions Impacting Cultural Resources – This is organized by resource type

ꟷ Worksheet 3a – Historic Resources and Climate Risks for Historic District, Cultural Landscape and Ethnographic resources

ꟷ Worksheet 3b – Cultural Resources and Climate Risks for Archeological resources

ꟷ Worksheet 3c – Cultural Resources and Climate Risks for Historic Buildings and Structures

* ICRMP Section 4 – ICRMP Goals and Develop Climate Risk Strategies – the three worksheets are merged into one and organized by resources type

ꟷ Worksheet 4a – Strategies and Actions for Historic District, Historic Landscape and Ethnographic resources

ꟷ Worksheet 4b – Strategies and Actions for Archaeological resources

ꟷ Worksheet 4c – Strategies and Actions for Historic Buildings and Structures

Use the appropriate resource type spread sheets. An installation may not be managing all resource types.

The case studies in Appendix D and E and in the Excel file folder provide examples of completed worksheets.

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#### MSWord Worksheets

**ICRMP Section 1: Introduction/General Information/Overview**

Section 1 sets the context for incorporating climate change considerations into the

installation’s ICRMP. The Section 1 worksheet is intended to help identify stakeholders

and expertise, and available information resources.

Worksheet 1. Planning Scope and Background Information offers a framework for identifying key stakeholders and available information and expertise. Taking climate into consideration often necessitates planning at larger geographic scales and longer time frames than are typically represented in ICRMPs.

**Instructions for Worksheet 1.**

1. **The Introduction/General Information/Overview** (or comparable) section of the ICRMP is intended to set the overall context for the plan. It usually includes the purpose of the plan, organization of the ICRMP, overview of laws and regulations, cultural resources management, and roles and responsibilities. It may also include a section on relationships

to other installation plans and stakeholders. The overview section lays the framework for why climate change is included in the ICRMP.

1. **Stakeholders/Partners: *Identify key stakeholders/participants to engage in the adaptation planning process.*** Relevant participants are expected to come from within and

outside of the installation. To the extent feasible, identify individuals or specify organizations to engage. Involving knowledgeable climate scientists and other relevant experts early on can help installations navigate the process more effectively.

1. **Available Information/Expertise: *Compile existing background information and identify available expertise.*** Identify and compile any existing studies or resources for understanding regional or local climate projections and cultural resource responses. Existing information can include regional climate summaries, such as included in the National Climate Assessment, state-level assessments, and other adaptation plans. Many state and federal agencies and universities have climate science and adaptation experts available. Chapter 4.2 and Appendix A of the guidance manual offer starting points for available information.

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**Worksheet 1. Background Information Section of ICRMP – Introduction/General Information/Overview:**

**Section number(s) in existing ICRMP (these could be all under one section heading or**

**slightly different section headings):**

In the following bullets, add the appropriate section number and draft statements to be added to those sections of the ICRMP. Pick from statements provided or write new ones:

* Purpose of the Plan section # .

Add statements about preservation and /or management in a dynamic environment.

New threats to cultural resources are emerging from climate-driven changes in the environment, which could compromise the capacity of military facilities and lands that support the military mission. This updated ICRMP includes adaptation strategies for managing these risks.

* Goals and Objectives is in section # .

*Note: May need to work through additional worksheets prior to developing plan goals.*

Assess emerging risks and vulnerabilities to cultural resources from climate-driven changes in the environment.

Incorporate climate risk strategies into best management practices and into the cultural resources management program. Share information with other departments on the effects of climate change on cultural resources and potential strategies to counter these effects.

* Organization of the ICRMP section # .

Add statements about where specific information can be found. This might include any of the following:

*Overview of Laws and Regulations* section # .

Add overarching climate change Executive Orders, DoD directives, DoD guidance, and Service- specific guidance. Descriptions can be found in Sections 2.1 (DoD directives and Executive Orders); and Service-specific guidance in Section 4.1.

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Select the appropriate requirements to be added to the ICRMP:

###### Executive Orders, DoD directives, DoD guidance

Executive Order (EO) 13653, 1 November 2013, *Preparing the United States for the Impacts of Climate Change*

EO 13693, 19 March 2015, *Planning for Federal Sustainability in the Next Decade* EO 14008, 27 January 2021, *Tackling the Climate Crisis at Home and Abroad* DoD Directive 4715.21, *Climate Change Adaptation and Resilience* (2018)

*DoD Roadmap* (DoD 2014)

Updated Unified Facilities Criteria (UFCs)

Other Other Other

###### Service-Specific Guidance on Climate Adaptation

Army Climate Resilience Handbook, 2020

NAVFAC Climate Change Planning Handbook Installation Adaptation and Resilience, 2017

Air Force Civil Engineer Severe Weather/Climate Hazard Screening and Risk Assessment Playbook, 202

*Relationships to Other Installation Plans* section # .

These plans would include master plans, sustainability plans, INRMPs, range management plans, and/or building maintenance procedures. The two most likely plans are the INRMP and facilities maintenance plans. These other plans will identify program goals and strategies. Some of these goals and strategies may be applicable to cultural resources. For example, restoring the function of a wetlands may reduce erosion of an archaeological site. However, some goals or strategies may conflict with cultural resources management goals. For example, installation of a seawall may impact submerged cultural resources, or replacing the siding on a historic building could impacts its eligibility for listing in the NRHP. It is important for the CRM to work with other program leads to ensure common goals and that program-specific strategies to not conflict or inadvertently inflict harm to other resources or program areas.

Review of any climate-related assessments carried out for other installation planning processes, and any strategies developed. Complete the following table with relevant plans. Delete those that are not appropriate. This process can be time consuming, so users may want to focus on the most relevant for an installation. If more archaeological sites, the INRMP may be a good start. If most historic buildings and structures, the maintenance plans may be more important. Also, the State Historic Preservation Office may have climate change guidance for cultural resources.

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In some cases, these plans may already be included in the installation ICRMP and describe relationship to cultural resources management. Add a statement describing any climate strategies that might benefit cultural resources management.

|  |
| --- |
| **Relationship to Other Plans** |
| **Plan Title/ Originating Department** | **How it relates to CR management***Identify plan goals and strategies that are applicable to cultural resources management.* | **Does plan address climate change and Strategies?**List any strategies that would be appropriate for cultural resources. |
| Integrated Natural Resources Management Plan (ICRMP) |  |  |
| Building Maintenance Plans |  |  |
| Sustainability Plan. |  |  |
| Range Management Plans |  |  |
| Installation Master Plan |  |  |
| State Climate Change cultural resources strategy |  |  |
| Others |  |  |

* Cultural Resources Management Responsibilities section # .

Add additional Cultural Resources Manager’s responsibilities those that apply. Add any additional responsibilities or edit those below as needed:

* Assess climate change risks and threats to cultural resources.
* Discuss climate vulnerabilities and risks with installations planners, engineers, maintenance personnel, range managers, natural resources managers, and tenants.
* Assist with developing strategies to manage climate change risks with installation planners and managers.
* Stakeholders section # .

The ICRMP should already identify stakeholders with cultural resources interests. This step would be to identify additional key internal and external stakeholders for assessing climate impacts and carrying out adaptation planning. This step can also be to add the subject of climate change and potential impacts into the existing dialog with current stakeholders. Both internal and external partnerships provide an important mechanism for acquiring expertise, building capacity for climate adaptation, and implementing climate adaptation strategies in the ICRMP. Implementation of climate adaptation initiatives can benefit greatly from the subject matter expertise of other federal and state agencies and other non-governmental organizations.

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Collaborative partnerships with internal stakeholders can also greatly facilitate the implementation of climate adaptation projects. The expertise of internal stakeholders in their subject matter will be crucial for identifying opportunities to adapt to climate change. For example, facilities engineers may have innovative ideas about reducing erosion under the threat of increasing storm intensity. Leveraging these types of projects may provide an engineered solution for preservation or restoration projects.

* Internal stakeholders could include personnel from public works, facility maintenance, range control, environmental programs (natural resources), and emergency responders. Educate internal stakeholders on plans and strategies, what to look for as far as resource degradation, and who to contact. Also provide training on what to do and not do during emergencies and what to do post-emergency. Maintenance staff may have input on current climate effects to historic structures, buildings, and infrastructure.
* External stakeholders include the SHPO, neighbors, communities, and tribes and Native organizations. Develop strategies and inform the stakeholders on approaches and strategies. If the installation is engaged in on-going, periodic consultation meetings

or other forms of regular communication, the CRM can use these forums to inform stakeholders of climate change concerns and risk-reduction strategies. If a strategy or action falls under the definition of an “undertaking” as defined in 36 CFR 800.16, consultation is required with the SHPO, ACHP, and tribes. Other opportunities for consultation with external stakeholders would arise during revisions and updates to the ICRMP, or development of a master plan, sustainability plan, INRMP, or range

management plan. NEPA and Section 106 of the NHPA have consultation requirements. Some installation may also have annual or ongoing meetings with external stakeholders. These meetings also offer opportunities to discuss climate concerns, strategies, and lessons learned that may also benefit the community.

* Determined that particular cultural resources cannot be saved. Stakeholders can then weigh in on mitigation strategies that benefit the stakeholder group, or plan for the loss.

|  |
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| **Stakeholders** |
| **Stakeholder** | **Climate Change Interest or Expertise** | **Internal or External** | **POC Information (Name, Email, Phone)** |
| Public health officials and local emergency planners | Emergency preparedness | External |  |
| NOAA | Climate change forecasting tools | External |  |
| USACE | Coastal hardening; sea level rise strategies | External |  |

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###### Section 2. - Installation Profile/Physical/Natural Setting

The purpose of this ICRMP section is to identify key climate concerns for the

installation and understand how relevant climatic factors are projected to change over time. Installation-specific climate change information may already be available through other plans, such as an Integrated Natural Resources Management plan or Sustainability Plan. This information would be including the section of the ICRMP that describes the installation and its physical and natural setting.

Section 2 is supported by this worksheet:

* Worksheet 2. Climate Risks, Effects and Trends

**Worksheet 2. Climate Risks, Effects and Trends** assists with documenting the higher-level elements of climate concerns and projections drawing from existing

information and forecasting tools (see section 4.1 of the guidance). The amount of detail

the installation is able to complete will likely vary. For all factors, be sure to document the source for the specific projections, whether literature, data sets, organizations, DoD offices or analyses, individual experts, in sufficient detail to allow for future validation and updates.

**Instructions for Worksheet 2**

1. **Key Climate Risks: *Identify climate- related change risks of particular concern for the installation.*** These will typically be articulated as the specific threats or impacts of concern (e.g., increased droughts, increased heat, land degradation, and/or increased flooding). Existing regional or local climate assessments may help in identifying climate-related risks that should be of concern to the installation in the context of cultural resource management. See Table 2-1 in guidance for climate change risks.
2. **Climatic Factors: *Identify the specific climatic effects associated with those risks.*** These effects should be as specific as possible to an installation and resources. They can include physical variables (e.g., air and water temperature, precipitation, sea level changes, flood levels and frequency, etc.). Depending on the variable it

may be appropriate to consider both averages and extremes. NOTE: Some of these will overlap with the identified “climate concerns” (e.g., sea-level rise), whereas others may reflect underlying physical drivers of those impacts

(e.g., both changes in precipitation patterns and rising temperatures may contribute to drought; rising average winter temperatures may be a driver of expansion of invasive species). The purpose of identifying the specific climatic effect is to help determine what climate-related variables may be relevant for future projections. To the degree possible, focus on those variables that are relevant to the cultural resources of interest (e.g., the height of storm surge may be more important than timing of storms). See

Table 2-1 in guidance for climate effects.

1. **Describe climatic change trends: *Based on current available information, what are the trends and future projections for the climatic factors identified in column 2 of the worksheet.*** Section 4.2 of this guide includes resources for gathering this information. The DCAT, in particular, provides a screening-level exposure assessment of DoD installations for eight different climate-related hazards (including installation exposure to coastal and riverine flooding, drought, desertification, wildfire, and permafrost thaw).

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**Trend.** Knowing the directionality or trend of a climate factor can be informative, even without detailed projections of rate or magnitude. If possible, indicate the trend or directionality (e.g., hotter/cooler, drier/wetter, more variable,

shift in seasonality). To the degree possible, note how these climatic factors are projected to change in the future. Such

projections usually will be derived from existing sources. Multiple scenarios of future conditions

are often appropriate (e.g., low vs. high), as are projections

for different timescales (e.g., 30– 50 years vs. 70–100 years).

However, if possible, use the same timescales for each climate risk in order to prioritize strategies.

1. **Indicate whether or not the installation has completed a climate change assessment.** If so, indicate where this information is available and use that information to describe future climatic conditions. It would

be beneficial to copy the information from the previous assessment into the Natural Setting section of the ICRMP if not done already.

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###### Worksheet 2. Climate Risks, Effects, and Trends

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The following information should be included in Section # of the ICRMP.

Provide description from previous or current climate assessment. This worksheet can be inserted as a table and also included to summarize the risks and trends.

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| **Worksheet 2. Climate Risks, Effects, and Trends** |
| Has the installation completed a climate change assessment? Note: If yes, indicate where the results are available. | Example: INRMP |
| Information SourcesList sources of information used to fill in this table. | Website, Other installation plan, etc. |
| **Key Climate Change Risk***What is the key climate change–related risks or threats to the installation, and more specifically for the cultural resources? See table 2-1.* | **Climatic Change Effects***What are the climatic effects related to those concerns that are relevant for the installation and the resources being managed? See table 2-1 (Best to copy from table to select all that apply.)* | **Trend/Projections***What is the trend or directionality for this factor, if known? What are available projections for this variable?**Notes: Knowing the directionality or trend of a climatic factor can be informative, even without detailed projections of rate or magnitude.*Use consistent timeframes for each climate risk if possible. |
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**Section 3 - Installation Areas of Concern/Actions Impacting Cultural Resources**

The purpose of Section 3 is to identify target cultural resources; describe internal and/

or external threats on the installation’s cultural resources; assess the impacts of the resulting climate vulnerabilities to those resources; and finally, determine how those resource vulnerabilities may pose risks to the installation’s ability to sustain specific military mission requirements.

**Instructions for Worksheet 3**

* 1. **Installation Cultural Resource(s):** List the cultural resources to be assessed for climate vulnerability. Cultural resource may be archaeological sites, building, structures, historic districts

or landscapes, or items. The resources identified here should reflect resources that are of particular management concern for exposure to climate change.

Notes: Users may want to consider listing each resource in a separate row or grouping like resources.

Archaeological sites that are grouped geographically and exposed to similar climate risks could be bundled on one line. Users can add additional lines as needed. Users may also need to add

a single resource on multiple lines to identify all climate risks to that single resource. Word pull-down menu function is limited to one selection pr line.

* 1. **Key Climate Change Risk:** For each of the cultural resources listed, identify the key climate change–related risks or

threats to this cultural resource. Chapter 4 of this guide present the types of climate-related risks to DoD cultural resources, including archaeological sites (Table 4-1); buildings and structures (Table 4-2); and historic landscapes, historic districts, and ethnographic resources (Table 4-3). Understanding

the risk and potential consequences to cultural resources will allow managers to determine appropriate strategies for addressing the impacts.

* 1. **Climate-Related Impacts:** For each resource listed, identify the impacts that may occur due to the climate change risk. This information may be derived from Tables 4-1 through 4-3 in Chapter 4 of this guide, as well as through input from resource experts both within and outside of the installation, and existing vulnerability assessments or other scientific literature.
	2. **Degree/Reason for Vulnerability:** Estimate the relative degree of vulnerability for individual cultural resources and describe why they are considered vulnerable. Being specific about the reasons a resource is vulnerable will be useful in identifying possible risk reduction approaches and developing management responses. To assess vulnerability, estimate how and to what degree the resource would be affected by and respond

to expected climate-related changes (sensitivity), and estimate the degree to which the cultural resource is likely to be subjected to the change to which it is sensitive (exposure). What is

the overlap between the threat and the exposure? For example, buried archaeological sites may be highly sensitive to flooding, but if it is found outside current and projected flood zones on the installation, it would not

be considered vulnerable to that threat.

* 1. **Military Mission Risks from Cultural Resource Vulnerabilities** links the risks and vulnerability of cultural resources to the sustainability of military mission and its requirements. Based on the cultural resource

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vulnerabilities identified in the worksheet below, consider what effect these vulnerabilities may have on the mission requirements. Although there may be direct climate impacts affecting the installation’s ability to meet its mission (e.g., temperatures too hot for training, wind damage to structures), the focus here is how climate-vulnerable cultural resources may pose risks to the mission. This could be high, medium, low, or no risk. In worksheet #4, users

may choose to only carry forward the high and medium rated items. This could be due to limited funding or manpower to carry out a strategy.

Describe how the cultural resource is important to the installation’s military mission. For example, historic coastal infrastructure could be used for vital training, or the military logistics activities.

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Complete the worksheet and include in Appendix .

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| **Worksheet 3A. Archeological Resources and Climate Risks** |
| **Cultural Resources***What are the cultural resource features (e.g., archaeological sites, buildings, historic district) that are managed at the installation?* | **Key Climate Change Risk***What is the key climate change–related risks or threats to archeological resource? See Table 4-1 in guide.* | **Climatic Change Impacts***What are the climatic factors or variables related to those concerns, and which are relevant for the installation and**the resources being managed? See Table 4-1 in guide. (Best to copy from table to select all that apply.)* | **Degree/Reason for Vulnerability***Rate the relative vulnerability (e.g., Very High, High, Medium, Low) and describe the reason for that rating.*It also may be useful to highlight any uncertainties in the assessment. | **Risks to Installation Mission Requirements***Is the preservation of this cultural resource important to sustaining military mission?**How might this cultural resource vulnerability affect the ability of the installation to deliver its military mission (e.g., training, testing, access, house important function, etc.)?* |
| *Notes: List each resource on a separate row below.**Archaeological sites that are grouped geographically and exposed to similar climate risks could be bundled on one line.**Add additional lines as needed**May need to add single resource in multiple times to identify**all climate risks to a single resource. Word menu function limited to one selection.* | *Word has very limited function for drop down. Only one item can be selected from a drop- down menu.* | *Table 2 contains numerous potential impacts per risk to choose from.* |  |  |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |

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| **Worksheet 3B. Historic Buildings and Structures and Climate Risks** |
| **Cultural Resources***What are the cultural resource features (e.g., archaeological sites, buildings, historic district) that are managed at the installation?* | **Key Climate Change Risk***What is the key climate change–related risks or threats to historic building and structures? See Table 4-2 in guide.* | **Climatic Change Impacts***What are the climatic factors or variables related to those concerns, and which are relevant for the installation and**the resources being managed? See Table 4-2 in guide. (Best to copy from table to select all that apply.)* | **Degree/Reason for Vulnerability***Rate the relative vulnerability (e.g., Very High, High, Medium, Low) and describe the reason for that rating.*It also may be useful to highlight any uncertainties in the assessment. | **Risks to Installation Mission Requirements***Is the preservation of this cultural resource important to sustaining military mission?**How might this cultural resource vulnerability affect the ability of the installation to deliver its military mission (e.g., training, testing, access, house important function, etc. )?* |
| Notes: List each resource on a separate row below. | Add additional lines as needed. | *Table 2 contains numerous potential impacts per risk to choose from.* |  |  |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |

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| **Worksheet 3C. Historic Landscape, Historic Districts, or Ethnographic Resources and Climate Risks** |
| **Cultural Resources***What are the cultural resource features (e.g., archaeological sites, buildings, historic district) that are managed at the installation?* | **Key Climate Change Risk***What is the key climate change–related risks or threats to these cultural resources? See Table 4-3 in guide.* | **Climatic Change Impacts***What are the climatic factors or variables related to those concerns, and which are relevant for the installation and**the resources being managed? See Table 4-3 in guide. (Best to copy from table to select all that apply.)* | **Degree/Reason for Vulnerability***Rate the relative vulnerability (e.g., Very High, High, Medium, Low) and describe the reason for that rating.* It also may be useful to highlightany uncertainties in theassessment. | **Risks to Installation Mission Requirements***Is the preservation of this cultural resource important to sustaining military mission?**How might this cultural resource vulnerability affect the ability of the installation to deliver its military mission (e.g., training, testing, access, house important function, etc. )?* |
| Notes: List each resource on a separate row below.A historic district could be on one line with importantbuildings and features identified. May want to list individually, if have differing risks (a building in an area prone to flooding would need different strategies than one in a fire prone area. | Add additional lines as needed. | *Table 2 contains numerous potential impacts per risk to choose from.* |  |  |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |
|  | Choose an item |  | Choose an item | Choose an item |
| Reason | How is it important to mission |

**Section 4: Evaluate Implications for ICRMP Goals and Develop Strategies and Actions to Reduce Climate Risks**

The purpose of Section 4 is to help managers evaluate whether and how climate change might compromise the installation’s ability to meet key ICRMP goals and objectives, based on the information gathered from assessing the vulnerabilities of target cultural resources and the associated risks to the military mission. This section will also help installations identify, evaluate, and select appropriate adaptation strategies and actions. As stated above, users may carry forward all of the cultural resources, or just those that are of high and medium risk to military mission.

Section 4 is supported by three worksheets:

* **Worksheet 4.1. Identification of Possible Adaptation Strategies and Actions**
* **Worksheet 4.2. Evaluation and Selection of Adaptation Strategies and Actions**
* **Worksheet 4.3. Implementation of Adaptation Strategies/Actions**

**Worksheet 4.1 Identification of Possible Adaptation Strategies and Actions** is designed to help managers articulate a range of potential management strategies/actions to address climate-related vulnerabilities

to specific cultural resources. The concept here is to be as inclusive as possible and not be constrained by factors such as cost (that comes in Worksheet 4.2). Here,

strategies are the broadest level management efforts (e.g., avoidance, minimization, mitigation measures, adopt a historic landscape approach), and actions are specific activities/projects in support of the strategy (e.g., develop maintenance plans, harden a shoreline, relocate a resource, documentation). Managers may identify current management actions, potential modifications to those actions, and/or new

actions that may enable the installation to meet climate-informed goals for those resources and then articulate the specific

assumptions and rationale for why proposed strategies and actions will reduce relevant risks and vulnerabilities.

As possible adaptation strategies and actions to reduce climate risks are being identified and evaluated, “no action” could also be considered. Depending on the magnitude of risk and level of uncertainty, passive (hands- off) or status quo management may be the most prudent approach.

1. **Risk: *Identify the specific climate- related risks to be addressed.*** Copy the specific climate change risk from worksheet 3, column 2 for strategies and actions are being designed.
2. **Adaptation Reduction Strategies/ Actions: *Identify potential strategies to reduce the climate risks identified in Worksheet 3.*** Strategies constitute general approaches for addressing a problem, and are supported by specific actions, which are identified in the first and second columns on Worksheet 4.1. Strategies are in Table 4-4 of the guide, although this list is not all inclusive. List all that are feasible.
3. **Project Details: *Describe what is to be done. Identify specific projects that would help to achieve the strategies/ action identified under Column 2 in the worksheet.*** Again, the projects identified in this column may include existing efforts, modifications of those efforts, and/or new projects that might be capable of reducing the relevant risks and enabling the installation to meet its climate-informed goals. There may be one or more projects available to support a given strategy. List all the

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projects that are appropriate. See Table 4-4 for ideas, although this list is not all inclusive. List all that are feasible.

If details are unknown, describe what needs to be accomplished (i.e., prevent erosion.)

1. **Rationale and Assumptions: *Describe why a given strategy or action could be effective in addressing the risk***

***or vulnerability.*** Laying out how the strategy/action is designed to reduce a specific risk, along with the assumptions

behind that hypothesis, are key for evaluating the likely effectiveness of the strategy in Worksheet 4.2. Additionally, being able to “connect the dots” by linking actions to climate impacts is

an overarching principle for effective climate adaptation. Documenting the rational also provides a record of this thought process for future managers and decision makers.

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Include this table in Appendix to document thought process.

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| **Worksheet 4.1. Identification of Possible Adaptation Strategies and Actions** |
| **Cultural Resources***Copy cultural resources column (column 1) from worksheet 3 and paste in this column* | **Climate Change Risk***Copy the specific column 2 from Worksheet 3)* | **Risk Reduction Strategies/ Actions***What strategies/action could reduce these vulnerabilities and risks? Columns 1 and 2**Table 4-4* | **Project***What projects could be carried out to realize a given strategy/action? Table 4-4. What is the intention of the project?* | **Rationale and Assumptions***How is this strategy or set of actions likely to reduce these vulnerabilities or risks?* |
|  | *Notes: Describe the specific vulnerability (to cultural resources) or risk (to military mission) to be addressed**by the strategy and their**associated actions/projects.* | *Notes: List possible strategies for reducing the vulnerability or risk. Strategies can be general in nature, since more detailed supporting actions/ projects are listed in the next column. Additional rows can be added if needed.* | *Notes: For each strategy/ action identified in the column to the left, list the project details that could help to achieve its intended risk reduction benefits. Be as specific as possible. These can be existing, modified, or new projects.* | *Notes: Describe why this strategy (and its associated actions/projects) may be capable of reducing the stated vulnerabilities and risks. Note any assumptions or uncertainties.* |
|  | Choose an item | Strategy 1Choose an item |  |  |
| Strategy 2Choose an item |  |  |
| Strategy 3Choose an item |  |  |
|  | Choose an item | Strategy 1Choose an item |  |  |
| Strategy 2Choose an item |  |  |
| Strategy 3Choose an item |  |  |

**Worksheet 4.2 Evaluation and Selection of Adaptation Strategies/Actions/Projects** is intended to help installations reduce a broad list of possible actions down to those that

are most likely to be successful at reducing climate risks, achieving ICRMP goals,

and supporting broader military mission requirements. The intent of this “consequence table” is to identify those strategies or actions that should be considered as priorities for incorporation into the ICRMP and subsequent implementation. A separate worksheet

or consequence table can be filled out to evaluate strategies that address each different risks/vulnerabilities. Similarly, users can fill out a separate consequence table to evaluate each different actions that may support a given strategy.

**Instructions for Worksheet 4.2**

1. ***Focus of worksheet.*** Users can note on the worksheet what the consequence table is being used to evaluate. Users can use the worksheet on a particular risk/vulnerability, comparing potential strategies for reducing that risk. Users can also use the worksheet to carry out a more in-depth exploration of a particular action/project, comparing potential actions or projects that might

support implementation of that strategy. As noted above, users can create multiple versions of this worksheet can be filled out, focusing on different risks or strategies, depending on specific installation planning needs.

1. ***List a set of management strategies/ actions/projects for evaluation*** (derived from Worksheet 4.1). Users should insert these strategy/action/ project in the head the columns (i.e., “Strategy/Action/project 1”) on the worksheet. Modify the worksheet to include as many columns as needed to accommodate all strategies or actions to be evaluated, including taking no action,

if appropriate. These strategies/actions can reflect options where the intent is to select the best among them, or they may reflect a suite of strategies or actions where the intent is to include multiple actions that meet certain criteria.

1. ***Create criteria for evaluating the strategies/actions.*** Insert the criteria for evaluating the strategies/actions in the left-hand columns. Modify the worksheet to include as many rows as needed to accommodate all criteria to be used in the evaluation. Choosing among adaptation strategies will

depend on a range of factors, including the installation’s particular needs, interests, and resources. Defining explicit criteria for use in evaluation and comparison of alternatives helps clarify what really matters, not just with respect to desired ecological outcomes, but also in terms of other important values or benefits. In particular, it is important to make sure users address risk, tradeoffs, and uncertainties.

Illustrative evaluation categories are included on Worksheet 4.2.

1. ***Evaluate and score the strategies/ actions based on agreed-upon criteria.*** Worksheet 4.2 is based

on a structured decision-making

“consequence table” approach and is designed to help managers evaluate options or alternatives identified in Worksheet 4.1. There are many ways in which to conduct scoring under this approach. For example, rank options on a relative scale (e.g., low, medium, high) for how the options meet the criteria. In these instances, it is important to be clear about whether higher scores are “better” or “worse.” For transparency, it may also be useful to qualify one’s choice with a reason for choosing the particular rank. This type of “consequence table” is just one

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approach for evaluation and comparison of options; installations should feel

free to use other approaches based on their existing capacities and planning procedures.

1. ***Determine which strategies/actions merit incorporation into the ICRMP.*** Based on evaluation against the agreed- upon criteria, managers are in a position to select the strategies/actions that best meet their needs and are feasible to implement. Selecting which strategies/ actions to include in the ICRMP can be based on a number of techniques, which

can range from quantitative techniques (i.e., highest total values) to selecting alternatives that optimize one or more particular criteria. There is no right or wrong way but use of a consequence table such as this allows managers to be transparent and explicit about their selection process. Identify the action to be carried forward.

An example of a completed worksheet 4.2 is included after the blank worksheet.

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Include this table in Appendix to document thought process.

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| **Worksheet 4.2. Evaluation and Selection of Adaptation Strategies/Actions/Projects** |
| *Focus of Worksheet: Resource and Specific Risk (create additional tables for each resource and risk)* |
| **Strategy/Action/Project to Evaluate**List strategy/action/project to be evaluated in columns at right. These should carry over from Worksheet 4.1. Add columns for additional strategies/actions as needed. | **Action/Project 1** | **Action/Project 2** | **Action/Project 3** |
| Notes: Choosing among adaptation strategies will depend on a range of factors, depending on the installation’s particular needs, interests, and resources. Major categories below are illustrative. |  |  |  |
| **Criteria for Evaluation**Identify and list below relevant criteria for evaluating/comparing proposed strategies-actions/projects. Add rows for additional criteria as needed. |
| Effectiveness at meeting climate-informed cultural resource goals/ provide reasoning for choice | Choose an item | Choose an item | Choose an item |
|  |  |  |
| Effectiveness in meeting other installation objectives/provide reasoning for choice | Choose an item | Choose an item | Choose an item |
|  |  |  |
| Feasibility/provide reasoning for choice | Choose an item | Choose an item | Choose an item |
|  |  |  |
| Recommend for Inclusion in INCRMP? | Choose an item | Choose an item | Choose an item |

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| **Worksheet 4.2. Evaluation and Selection of Adaptation Strategies/Actions/Project - Example** |
| *Focus of Worksheet: Example: Archaeological and burial site along eroding shoreline – create additional tables for each resource and risk* |
| **Strategy/Action/Project to Evaluate**List strategy/action/project to be evaluated in columns at right. These should carry over from Worksheet 4.1. Add columns for additional strategies/actions as needed. | *Action/Project 1* | *Action/Project 2* | *Action/Project 3* |
| Notes: Choosing among adaptation strategies will depend on a range of factors, depending on the installation’s particular needs, interests, and resources. Major categories below are illustrative. | Example: Offset Stress - Hardened the shoreline with riprap (shells or local stone) | Improve resiliency - Construct a seawall | Relocate resource |
| **Criteria for Evaluation***Identify and list below relevant criteria for evaluating/comparing proposed strategies-actions/projects. Add rows for additional criteria as needed.* |
| Effectiveness at meeting climate-informed cultural resource goals | High | Medium | Low |
| Protect buried graves from erosion | Would protect from future erosion, but may impact some site features during construction | Would impact site |
| Effectiveness in meeting other installation objectives | High | Medium | Low |
| Protect beach training area from erosion | Protect beach training area from erosion | Would not provide any additional protections to natural resources or training area |
| Feasibility | High | Medium | Low |
| Costs relatively low and installation could be a training exercise. | Costs higher | Low to moderate cost depending on mitigation |
| Recommend for Inclusion in INCRMP? | Best | Adequate | Worst |

###### Worksheet 4.3 Implementation of Adaptation Strategies/Actions

provides a general framework to help installations identify: who will carry out the implementation of the adaptation strategies and actions/projects; whether and how the relevant strategies and actions fit within existing DoD program implementation; what decisions are especially relevant to get the strategies and actions ready to implement; and when various element of the strategies and actions should be implemented. The order is to go from strategy to action to projects.

**Instructions for Worksheet 4.3**

1. **Recommended Strategies/Actions: *List the strategies, actions, or projects identified in Worksheet 4.1 for incorporation into the ICRMP.***
2. **Responsible Parties: *Identify who has responsibility or needs to be involved in carrying out this action or project.*** For example, can it be done in-house, or will it be done via contract?
3. **Relationship to Existing ICRMP Strategies: *Determine whether and how the action or project fits into existing efforts.*** Is the action within

the installation’s authority or will it fit within an approved project or program?

1. **Project Planning Needs: *Identify what needs to be done to get this project ready to implement.*** Note here what would be necessary to put in place prior to projection implementation, such as regulatory permits, funding mechanisms, engineering work, detailed project design, or scientific research to validate the approach or solve technical issues. Are there any unique adaptation barriers to implementing the action or project (e.g., legal, social)?
2. **Timing and Sequencing: *Identify when the project is needed or should be carried out.*** Identify when the project should be started. Are there any dependencies that would influence the timing or sequencing of implementation? In some cases, specific dates may be relevant (e.g.,

start “phase 1” in FY 19). In others, it may be necessary to identify specific management trigger points (e.g., actions to be implemented in response to a specific climate threshold, such as a certain increase in sea-level rise).

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***Incorporate into ICRMP Implementation Table.*** Once a project has been adequately defined, incorporate it into the ICRMP’s

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implementation table or the ICRMP Program Planning objectives. Section # 7.1

|  |
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| **Worksheet 4.3. Implementation of Adaptation Strategies/Actions** |
| **Cultural Resources** *From column 1 in worksheet 4.1* | **Recommended Strategies/Actions***List selected strategies/ actions recommended for incorporation**into the ICRMP (from Worksheet 4.2).* | **Responsible Parties***Who would have responsibility for or be involved in implementing the strategy/action?* | **Relationship to Existing ICRMP Strategies***Does this fit within a current ICRMP effort, or is it a new activity/ project?* | **Project Planning Needs***What preparations or requirements would be necessary before carrying out the recommended strategies/ actions?* | **Timing and Sequencing***When should the action/project**be implemented (immediately or at some future time)?* |
|  |  | *Notes: Identify whether this project could be done in- house, via contract, or through partnering.* |  | *Notes: List permitting, funding, design, methods development, scientific research, etc. Are there any unique implementation challenges (e.g., legal, social, technical)?* | *Notes: Identify when the project should be started. Consider dependencies that may require project sequencing, or any ecological thresholds that may trigger needed action.* |
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# APPENDIX E

## WAKE ISLAND – ICRMP ADAPTATION WORKSHEETS

##### Note: This case study was developed to test the worksheets in Word and for another Service. It has not been vetted by the Air Force.

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#### ICRMP Adaptation Planning Worksheets

The following worksheets support installation-level application of the ICRMP planning process and are modeled after the worksheets in the Climate Adaptation for DoD Natural Resource Managers (Stein et al. 2019). They provide a structured

means for managers to gather, evaluate, and analyze adaptation-relevant information, and the worksheets are designed to build on and draw from one another with earlier

sections in the process informing subsequent worksheets. Because adaptation planning

is an iterative process, the worksheets also provide an opportunity to “show your work” to document decisions and facilitate future assessments or refinements.

The worksheets are intended to serve as an aid for carrying out adaptation planning; they are not intended to be prescriptive.

Although the worksheets are designed to be used sequentially, users should not feel

compelled to fill out all of the worksheets or each cell in a given worksheet. Additionally, the level of detail entered into the worksheets

may vary, depending on the availability of relevant information, and on whether

the worksheets are being used to inform a preliminary screening of adaptation needs and options, or to support in-depth decision- making and allocation of resources. These worksheets may be adapted or modified (for instance, adding additional rows or columns) to support the planning needs of particular installations most effectively.

Managers may also find it useful to initially focus on a limited number of resources, risks, or strategies and keep a “parking lot” of items to address in subsequent passes through the adaptation planning process. At any point in filling out the worksheets do not linger—for instance, due to incomplete information or knowledge—make an informed conjecture (documenting any assumptions) to keep moving through the planning process. Should additional information become available, then revisit and refine the relevant worksheet and outcomes.

**ICRMP Section 1: Introduction/General Information/Overview**

Section 1 sets the context for incorporating climate change considerations into the

installation’s ICRMP. The Section 1 worksheet is intended to help identify stakeholders

and expertise, and available information resources.

Worksheet 1. Planning Scope and Background Information offers a framework for identifying key stakeholders and available information and expertise. Taking climate into consideration often necessitates planning at larger geographic scales and longer time frames than are typically represented in ICRMPs.

###### Instructions for Worksheet 1.

1. The Introduction/General Information/ Overview (or comparable) section

of the ICRMP is intended to set the overall context for the plan. It usually includes the purpose of the plan, organization of the ICRMP, overview of laws and regulations, cultural resources management, and roles and responsibilities. It may also include

a section on relationships to other installation plans and stakeholders. The overview section lays the framework for why climate change is included in the ICRMP.

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1. Stakeholders/Partners: Identify key stakeholders/participants to engage in the adaptation planning process. Relevant participants are expected to come from within and outside

of the installation. To the extent feasible, identify individuals or specify organizations to engage. Involving knowledgeable climate scientists and other relevant experts early on can help installations navigate the process more effectively.

1. Available Information/Expertise: Compile existing background information and identify available

expertise. Identify and compile any existing studies or resources for understanding regional or local climate projections and cultural resource responses. Existing information can include regional climate summaries, such as included in the National Climate Assessment, state-level assessments, and other adaptation plans. Many state and federal agencies and universities have climate science and adaptation experts available. Chapter 4.2 and Appendix A of the guidance manual offer starting points for available information.

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**Worksheet 1. Background Information**

**Section of ICRMP – Introduction/General Information/Overview:**

**Section number(s) in existing ICRMP (these could be all under one section heading or slightly different section headings):**

In the following bullets, add the appropriate section number and draft statements to be added to those sections:

* Purpose of the Plan section # 1.0 .

Add statements about preservation and /or management in a dynamic environment.

New threats to cultural resources are emerging from climate-driven changes in the environment, which could compromise the capacity of military facilities and lands that support the military mission. This updated ICRMP includes adaptation strategies for managing these risks.

* Goals and Objectives is in section # 1.1.2 .

Add Goal: Assess emerging risks and vulnerabilities to cultural resources from climate-driven changes in the environment.

Objective: Develop strategies for adapting to climate risks.

* Organization of the ICRMP section # N/A .

Add statements about where specific information can be found. This might include any of the following:

*Overview of Laws and Regulations* section # 1.2.3 Regulatory Framework .

Add overarching climate change Executive Orders, DoD directives, DoD guidance, and Service- specific guidance. Descriptions can be found in Sections 2.1 (DoD directives and Executive Orders); and Service-specific guidance in Section 4.1.

Select the appropriate requirements to be added to the ICRMP:

Executive Orders, DoD directives, DoD guidance

x Executive Order (EO) 13653, 1 November 2013, *Preparing the United States for the Impacts of Climate Change*

x EO 13693, 19 March 2015, *Planning for Federal Sustainability in the Next Decade*

x EO 14008, 27 January 2021, *Tackling the Climate Crisis at Home and Abroad*

x DoD Directive 4715.21, *Climate Change Adaptation and Resilience* (2018)

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x DoD Roadmap (DoD 2014)

x Updated Unified Facilities Criteria (UFCs)

Other Other Other

###### Service-Specific Guidance on Climate Adaptation

Army Climate Resilience Handbook, 2020

NAVFAC Climate Change Planning Handbook Installation Adaptation and Resilience, 2017

Air Force Civil Engineer Severe Weather/Climate Hazard Screening and Risk Assessment x Playbook, 202

*Relationships to Other Installation Plans* section # 1.1 .

These plans would include master plans, sustainability plans, INRMPs, range management plans, and/or building maintenance procedures. These other plans will identify program goals and strategies. Some of these goals and strategies may be applicable to cultural resources. For example, restoring the function of a wetlands may reduce erosion of an archaeological site.

However, some goals or strategies may conflict with cultural resources management goals. For example, installation of a seawall may impact submerged cultural resources, or replacing the siding on a historic building could impacts its eligibility for listing in the NRHP. It is important for the CRM to work with other program leads to ensure common goals and that program- specific strategies to not conflict or inadvertently inflict harm to other resources or program areas. Complete the following table with relevant plans. Delete those that are not appropriate.

Review of any climate-related assessments carried out for other installation planning processes, and any strategies developed.

These plans are already included in the Wake Island ICRMP and describe relationship to cultural resources management. Add a statement in section 4.2 describing any climate strategies that might benefit cultural resources management.

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| **Relationship to Other Plans** |
| **Plan Title/ Originating Department** | **How it relates to CR management***Identify plan goals and strategies that are applicable to cultural resources management.* | **Does plan address climate change and Strategies?***List any strategies that would be appropriate for cultural resources.* |
| General Plan | ICRMP is a source plan for the General Plan (GP). The Wake Island GP is a document that brings together data from three component areas: Composite Constraints and Opportunities, Infrastructure, and Capital Improvements. Combined with the Integrated Natural Resources Management Plan, this ICRMP provides essential data forthe Composite Constraints and Opportunities Component of the GP | ? |
| Integrated Natural Resources Management Plan (INRMP) | The Integrated Natural Resources Management Plan and the ICRMP provides essential data for the Composite Constraints and Opportunities Component of the GP | ? |

* Cultural Resources Management Responsibilities section # 4.0 . CRM (611 CES/CEIE/CRM) –

Add additional Cultural Resources Manager’s responsibilities to address climate change to

installation cultural resources. This may include creating additional awareness for climate vulnerabilities; assisting with developing strategies to manage this risk; and consulting with installations planners, engineers, maintenance personnel, range managers, and natural resources managers on these strategies.

Section 3.3.2.6 - Cultural Resources Managers would be responsible for creating additional awareness for climate vulnerabilities and assist with developing strategies to manage this risk. This would be done in consultation with base planners, engineers, maintenance personnel, and natural resources manager.

Add to other responsibilities:

* Assess climate change risks and threats to cultural resources.
* Discuss climate vulnerabilities and risks with base planner, engineer, maintenance personnel, natural resources manager, BOS Wake Environmental Manager.
* Assist with developing strategies to manage climate change risks with base planner and manager.

*Stakeholders – Other consulting parties 7.9* ***Management and Coordination*** - Identify key internal and external stakeholders for assessing climate impacts and carrying out adaptation planning. To the extent feasible, identify specific individuals or organizations. Involving climate scientists and other relevant experts early on may help installations navigate the process more effectively.

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Consider adding:

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| **Stakeholders** |
| **Stakeholder** | **Climate Change Interest or Expertise** | **Internal or External** |
| NOAA | Climate change forecasting tools | External |
| USACE | Coastal hardening; sea level rise strategies | External |
| Other US DoD military installations on islands | Climate adaptation strategies | External |

**Section 2. - Installation Profile/Physical/Natural Setting**

The purpose of this ICRMP section is to identify key climate concerns for the installation and understand how relevant climatic factors are projected to change over time. Installation- specific climate change information may already be available through other plans, such as an Integrated Natural Resources Management plan or Sustainability Plan. This information would be including the section of the ICRMP that describes the installation and its physical and natural setting.

Section 2 is supported by this worksheet:

* Worksheet 2. Climate Risks, Effects and Trends

**Worksheet 2. Climate Risks, Effects and Trends** assists with documenting the higher- level elements of climate concerns and projections drawing from existing information and forecasting tools (see section 4.1 of the guidance). The amount of detail installations is able to complete will likely vary. For all factors, be sure to document the source for the specific projections, whether literature, data sets, organizations, DoD offices or analyses, individual experts, in sufficient detail to allow future validation and updates.

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###### Worksheet 2. Climate Risks, Effects and Trends

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The following information should be included in Section # 5.1.1 of the ICRMP. Also, may want to include in Appendix P The following table (Table 5-1) summarizes the potential climate change risks and trends.

|  |
| --- |
| **Worksheet 2. Climate Risks, Effects, and Trends** |
| Has the installation completed a climate change assessment? Note: If yes, indicate where the results are available. | ? |
| Information SourcesList sources of information used to fill in this table. | ICRMP.https://openknowledge.worldbank.org/bitstream/handle/10986/35881/Legal-Dimensions-of- Sea-Level-Rise-Pacific-Perspectives.pdf?sequence=5Predicting Sea Level Change at Wake Atoll (Wake Island Airfield), 611th CES/CEIE, Joint Base Pearl Harbor Hickam, HI 13 November 2018 |
| **Key Climate Change Risk***What is the key climate change–related risks or threats to the installation, and more specifically for the cultural resources? See table 2-1.* | **Climatic Change Effects***What are the climatic effects related to those concerns that are relevant for the installation and the resources being managed? See table 2-1* | **Trend/Projections***What is the trend or directionality for this factor, if known? What are available projections for this variable?**Notes: Knowing the directionality or trend of a climatic factor can be informative, even without detailed projections of rate or magnitude.*Use consistent timeframes for each climate risk if possible. |
| Heat | * Increased incidences of heat stress
* Vegetation transition (species and biome shifts)
* Electrical grid stress
* Degradation of equipment performance
 | Increase in Pacific by about 2.7 to 6.7 degrees F |

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| **Worksheet 2. Climate Risks, Effects, and Trends** |
| Land Degradation/Drought | * Increases in extent and duration of droughts
* Loss of vegetative cover
* infrastructure damage
* Water supply constraints
* Protected species stress
* erosion
 | 5 to 10% decrease |
| Increasing storm frequency and intensity | * Increases in number and severity of extreme precipitation events
* Increased flooding
* Water quality issues
* Soil and vegetation loss
* Damage to physical infrastructure (roads, buildings, runway)
* Habitat loss & damage
 | Increased intensity of storms |
| Flooding/Sea level rise | * Loss of coastal land
* Damage to physical infrastructure (roads, targets, ranges) and protected ecosystem resources
* Land subsidence
* Saltwater intrusion
* Habitat loss & damage
 | Broad range of 7 to 10.2 feet (0.2-3.1m) for expected sea level rise and coastal flooding. Wake Airfield will be moderately to severely impacted by Global Climate Change and sea level rise by the turn of the century. |

**Section 3 - Installation Areas of Concern/Actions Impacting Cultural Resources**

The purpose of Section 3 is to identify target cultural resources and existing goals for the installation; describe internal and/ or external threats on the installation’s cultural resources; assess the impacts of those changes on cultural resources and the resulting climate vulnerabilities of those resources; and finally, determine how those resource vulnerabilities may pose risks to the installation’s ability to sustain specific military mission requirements.

###### Instructions for Worksheet 3

1. Installation Cultural Resource(s): List the cultural resources to be assessed for climate vulnerability. Cultural resource may be archaeological sites, building, structures, historic districts or landscapes, or items. The resources identified here should reflect resources that are of particular management concern for exposure to climate change.
2. Key Climate Change Risk: For each of the cultural resources listed, identify the key climate change–related risks or threats to this cultural resource. Chapter 4 of this guide present the types of climate-related risks to DoD cultural resources, including archaeological sites (Table 4-1); buildings and structures (Table 4-2); and historic landscapes, historic districts, and ethnographic resources (Table 4-3). Understanding the risk and potential consequences to cultural resources will allow managers to determine appropriate strategies for addressing the impacts.
3. Climate-Related Impacts: For each resource listed, identify the impacts that may occur due to the climate change risk. This information may be derived from Tables 4-1 through 4-3 in Chapter 4 of this guide manual, as well as through input from resource

experts both within and outside of the installation, and existing vulnerability assessments or other scientific literature.

1. Degree/Reason for Vulnerability: Estimate the relative degree of vulnerability for individual cultural resources and describe why they are considered vulnerable. Being specific about the reasons a resource is vulnerable will be useful in identifying possible risk reduction approaches and developing management responses. To assess vulnerability, estimate how and to what degree the resource would be affected by and respond

to expected climate-related changes (sensitivity), and estimate the degree to which the cultural resource is likely to be subjected to the change to which it is sensitive (exposure). What is

the overlap between the threat and the exposure? For example, buried archaeological sites may be highly sensitive to flooding, but if it is found outside current and projected flood zones on the installation, it would not

be considered vulnerable to that threat.

1. Military Mission Risks from Cultural Resource Vulnerabilities links the risks and vulnerability of cultural resources to the sustainability of military mission and its requirements. Based on the cultural resource vulnerabilities identified in the worksheet

below, consider what effect these vulnerabilities may have on the mission requirements. Although there may be direct climate impacts affecting the

installation’s ability to meet its mission (e.g., temperatures too hot for training, wind damage to structures), the focus here is how climate-vulnerable cultural resources may pose risks to the mission.

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Describe how the cultural resource is important to the installation’s military mission. For example, historic coastal

infrastructure could be used for vital training, or the military logistics activities.

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Complete the worksheet and include in Appendix P

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| **Worksheet 3A. Archeological Resources and Climate Risks** |
| **Cultural Resources***What are the cultural resource features (e.g., archaeological sites, buildings, historic district) that are managed at the installation?* | **Key Climate Change Risk***What is the key climate change– related risks or threats to archeological resource? See Tables 4-1,**4-2, and 4-3 in**guide.* | **Climatic Change Impacts***What are the climatic What are the climatic factors or variables related to those concerns, and which are relevant for the installation and the resources being managed? See Tables 4-1, 4-2, and 4-3 in guide.* | **Degree/Reason for Vulnerability***Rate the relative vulnerability (e.g., Very High, High, Medium, Low) and describe the reason for that rating.**It also may be useful to highlight any uncertainties in the assessment.* | **Risks to Installation Mission Requirements***What are the climatic factors or variables related to those concerns, and which are relevant for the installation and the resources being managed? See Tables 4-1, 4-2, and 4-3 in guide* | **Rate the Risk to Mission** |
| *Notes: Combined all resources into one spread sheet* |
| National Historic Landmark – 335 features | Heat | * Microcracking of site contents from thermal stress
* Faster deterioration of newly exposed features
* More rapid decay of organic materials
* Increased risk of damage due to decline/loss of protective vegetation or soil
 | Temperature increase is in the long term is moderate. Risk to resources from heat damage is low, as resources are already exposed a marine climate. | Loss or damage to the features would not jeopardize military mission; however, it would not be into compliance with cultural resources policy to preserve and protect the cultural resources, in particular – a national landmark Would also result in less effective and efficient operations and compliance. | Low |

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| **Worksheet 3A. Archeological Resources and Climate Risks** |
|  | Land Degradation/ Drought | * Fracturing of concrete resources
* Paint oxidation, color change
* Physical damage, loss of integrity and spatial coherence
 | Added risk to resources is currently low to medium as resources are already exposed to harsh marine environment and climatic conditions.As the land degrades, the risk to sites from heat, exposure, and fire will increase, and could cause damage or destruction to some features. | Loss or damage to the features would not jeopardize military mission; however, it would not be into compliance with cultural resources policy to preserve and protect the cultural resources, in particular – a national landmark Would also result in less effective and efficient operations and compliance. | Low |
| Increasing storm frequency and intensity/ increased winds | * Erosion, deflation, or abrasion to features due to stronger winds
* Disturbance or removal during emergency response and clean-up
* Increased moisture penetration into porous materials
* Increased susceptibility to erosion and flooding
* Burial or exposure through redistribution of soil
 | Extreme weather events such as drought, heavy rainfall, and severe winds, are projected to increase in frequency, though precipitation projections are less certain. Risk to resources from storm events is medium, but less certain. | Loss or damage to the features would not jeopardize military mission; however, it would not be into compliance with cultural resources policy to preserve and protect the cultural resources, in particular – a national landmark Would also result in less effective and efficient operations and compliance. | Low |
| Sea level rise | * Erosion, deflation, or abrasion to features due to higher tides
* Increased moisture penetration into porous materials
* Inundation, permanent flooding
 | Risk to resources from rising sea level is medium to high considering the low profile of the atoll. | Loss or damage to the features would not jeopardize military mission; however, it would not be into compliance with cultural resources policy to preserve and protect the cultural resources, in particular – a national landmark Would also result in less effective and efficient operations and compliance. | Low |

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| **Worksheet 3A. Archeological Resources and Climate Risks** |
| Two historic buildings | Heat | * Microcracking of site contents from thermal stress
* Faster deterioration of newly exposed features
* More rapid decay of organic materials
* Increased risk of damage due to decline/loss of protective vegetation or soil
 | Temperature increase is in the long term is moderate. Risk to buildings from heat damage is low to medium in the short term, as resources are already exposed a marine climate.High increases in temperature could cause damage to buildings. | Loss or damage to the buildings would not jeopardize military mission but could impeded operations. It would also not be into compliance with cultural resources policy to preserve and protect the cultural resources. Would also result in less effective and efficient operations and compliance. | Medium |
| Land Degradation/ Drought | * fracturing of concrete resources
* Paint oxidation, color change
* infrastructure damage
* Water supply constraints
* Physical damage, loss of integrity
 | Added risk to resources is currently low to medium as resources are already exposed to harsh marine environment and climatic conditions.As the land degrades, the risk to sites from heat, exposure, and fire will increase, and could cause damage or destruction to the buildings. | Loss or damage to the buildings would not jeopardize military mission but could impeded operations. It would also not be into compliance with cultural resources policy to preserve and protect the cultural resources. Would also result in less effective and efficient operations and compliance | Medium |
| Increasing storm frequency and intensity/ increased winds | * Erosion, deflation, or abrasion to features due to stronger winds
* Disturbance or removal during emergency response and clean-up
* Increased moisture penetration into porous materials
* Water damage, structural damage
 | Extreme weather events such as drought, heavy rainfall, and severe winds, are projected to increase in frequency, though precipitation projections are less certain. Risk to resources from storm events is medium, but less certain. | Loss or damage to the buildings would not jeopardize military mission but could impeded operations. It would also not be into compliance with cultural resources policy to preserve and protect the cultural resources. Would also result in less effective and efficient operations and compliance. | Medium |

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| **Worksheet 3A. Archeological Resources and Climate Risks** |
|  | Sea level rise | * Structural damage
* Increased moisture penetration into porous materials
* Inundation and flooding, water damage
 | Risk to resources from rising sea level is medium to high considering the low profile of the atoll. | Loss or damage to the buildings would not jeopardize military mission but could impeded operations. It would also not be into compliance with cultural resources policy to preserve and protect the cultural resources. Would also result in less effective and efficient operations and compliance. | Medium |
| 6 shipwrecks | Increasing storm frequency and intensity/ increased winds | * Destabilization/damage to underwater sites through movement of sediment and/ or protective vegetation
* Erosion of coastal sites due to higher, stronger storm surges
* Disturbance/exposure/burial due to stronger wave action
 | Extreme weather events such as drought, heavy rainfall, and severe winds, are projected to increase in frequency, though precipitation projections are less certain. Risk to resources from storm events is medium, but less certain. | Loss or damage to the shipwrecks would not jeopardize military mission; however, it would not be into compliance with cultural resources policyto preserve and protect the cultural resources. Could result in increased compliance efforts. | Low |
| 5 memorials | Heat | – Microcracking of site contents from thermal stress | Temperature increase is in the long term is moderate. Risk to resources from heat damage is low, as resources are already exposed a marine climate. | Loss or damage to the memorials would not jeopardize military mission; however, it would not be into compliance with cultural resources policyto preserve and protect the cultural resources. Could result in increased compliance efforts. | Low |

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| **Worksheet 3A. Archeological Resources and Climate Risks** |
|  | Land Degradation/ Drought | * fracturing of concrete resources
* Paint oxidation, color change
* Physical damage, loss of integrity
 | Added risk to resources is currently low to medium as resources are already exposed to harsh marine environment and climatic conditions.As the land degrades, the risk to memorials will increase, and could cause damageor destruction to some memorials. | Loss or damage to the memorials would not jeopardize military mission; however, it would not be into compliance with cultural resources policyto preserve and protect the cultural resources. Could result in increased compliance efforts. | Low |
| Increasing storm frequency and intensity/ increased winds | * Erosion, deflation, or abrasion to features due to stronger winds
* Disturbance or removal during emergency response and clean-up
* Increased moisture penetration into porous materials
* Increased susceptibility to erosion and flooding
 | Extreme weather events such as drought, heavy rainfall, and severe winds, are projected to increase in frequency, though precipitation projections are less certain. Risk to resources from storm events is medium, but less certain. | Loss or damage to the memorials would not jeopardize military mission; however, it would not be into compliance with cultural resources policyto preserve and protect the cultural resources. Could result in increased compliance efforts. | Low |
| Sea level rise | * Erosion, deflation, or abrasion to features due to higher tides
* Increased moisture penetration into porous materials
* Inundation, permanent flooding
 | Risk to resources from rising sea level is medium to high considering the low profile of the atoll. | Loss or damage to the memorials would not jeopardize military mission; however, it would not be into compliance with cultural resources policyto preserve and protect the cultural resources. Could result in increased compliance efforts. | Low |

**Section 4: Evaluate Implications for ICRMP Goals and Develop Strategies and Actions to Reduce Climate Risks**

The purpose of Section 4 is to help managers evaluate whether and how climate change might compromise the installation’s ability to meet key ICRMP goals and objectives, based on the information gathered from assessing the vulnerabilities of target cultural resources and the associated risks to the military mission. This section will also help installations identify, evaluate, and select appropriate adaptation strategies and actions.

Section 4 is supported by four worksheets:

* Worksheet 4.1. Identification of Possible Adaptation Strategies and Actions
* Worksheet 4.2. Evaluation and Selection of Adaptation Strategies and Actions
* Worksheet 4.3. Implementation of Adaptation Strategies/Actions

**Worksheet 4.1 Identification of Possible Adaptation Strategies and Actions** is designed to help managers articulate a range of potential management strategies/actions to address climate-related vulnerabilities

to specific cultural resources. The concept here is to be as inclusive as possible and not be constrained by factors such as cost (that comes in Worksheet 4.2). Here,

strategies are the broadest level management efforts (e.g., avoidance, minimization, mitigation measures, adopt a historic landscape approach), and actions are specific activities/projects in support of the strategy (e.g., develop maintenance plans, harden a shoreline, relocate a resource, documentation). Managers may identify current management actions, potential modifications to those actions, and/or new actions that may enable the installation

to meet climate-informed goals for those resources and then articulate the specific

assumptions and rationale for why proposed strategies and actions will reduce relevant risks and vulnerabilities.

As possible adaptation strategies and actions to reduce climate risks are being identified and evaluated, “no action” could also be considered. Depending on the magnitude of risk and level of uncertainty, passive (hands- off) or status quo management may be the most prudent approach.

1. **Risk: *Identify the specific climate- related risks to be addressed.*** Copy the specific climate change risk from worksheet 3, column 2 for strategies and actions are being designed.
2. **Adaptation Reduction Strategies: *Identify potential strategies to reduce the climate risks identified in Worksheet 3.*** Strategies constitute general approaches for addressing

a problem, and are supported by specific actions and projects, which are identified in the next column on Worksheet 4.1. Strategies are in Table 4-4 of the guide, although this list is not all inclusive. List all that are feasible.

1. **Supporting Actions/Projects: *Identify specific actions and/or projects that would help to achieve the strategies identified under Column 3 in the worksheet.*** Again, the strategies and actions identified in these columns may include existing efforts, modifications of those efforts, and/or new strategies/ actions that might be capable of reducing the relevant risks and enabling the installation to meet its climate- informed goals. There may be one or more actions or projects available to support a given strategy. List all the actions/projects that are appropriate.

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1. See Table 4-4 for ideas, although this list is not all inclusive. List all that are feasible.
2. **Rationale and Assumptions: *Describe why a given strategy or action could be effective in addressing the risk***

***or vulnerability.*** Laying out how the strategy/action is designed to reduce a specific risk, along with the assumptions behind that hypothesis, are key for

evaluating the likely effectiveness of the strategy in Worksheet 4.2. Additionally, being able to “connect the dots” by linking actions to climate impacts is

an overarching principle for effective climate adaptation. Documenting the rational also provides a record of this thought process for future managers and decision makers.

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Include this table in Appendix P to document thought process.

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| **Worksheet 4.1. Identification of Possible Adaptation Strategies and Actions** |
| **Cultural Resources***Copy cultural resources column (column 1) from worksheet 3 and paste in this column* | **Climate Change Risk***Copy the specific column 2 from Worksheet 3)* | **Risk Reduction Strategies/ Actions***What strategies/action could reduce these vulnerabilities and risks? Table 4-4* | **Project***What projects could be carried out to realize a given strategy/action? Table 4-4.* | **Rationale and Assumptions***How is this strategy or set of actions likely to reduce these vulnerabilities or risks?* |
|  | *Notes: Describe the specific vulnerability (to cultural resources) or risk (to military mission) to be addressed**by the strategy and their**associated actions/projects.* | *Notes: List possible strategies for reducing the vulnerability or risk. Strategies can be general in nature, since more detailed supporting actions/ projects are listed in the next column.* | Notes: For each strategy identified in the column to the left, list the actions or projects—or suite of actions—that could helpto achieve its intended risk reduction benefits. Be as specific as possible. These can be existing, modified, or new actions/projects. | Notes: Describe why this strategy (and its associated actions/projects) may be capable of reducing the stated vulnerabilities and risks. Note any assumptions or uncertainties. |
| National Historic Landmark – 335 features | Heat | NA | NA | Risk from heat low, other strategies would be sufficient to cover impacts |
|  | Land Degradation/ DroughtIncreasing storm frequency and intensitySea Level Rise | Strategy 1. Mitigate for the loss | No Action - monitoring of resource condition and climate change | With uncertainty in change and magnitude of risk, may be prudent to monitorchange and determine mostvulnerable features. |
|  |  | Strategy 2. Mitigate for Loss | Document and release | Not all sites may be able to be preserved or protected. |
|  |  | Strategy 3. Adapt to reduce the vulnerability of the features | improve resiliency - repair or replace damaged or degraded materials with in- kind materials | Action will enhance survival of a resource while minimizing changes to the physical materials. |

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| **Worksheet 4.1. Identification of Possible Adaptation Strategies and Actions** |
| Two historic buildings | HeatLand Degradation/DroughtIncreasing storm frequency and intensity/increased windsSea Level Rise | Strategy 1. Mitigate for the loss | No Action - monitoring of resource condition and climate change | With uncertainty in change and magnitude of risk, may be prudent to monitor change and when a threshold is reached implement a new strategy. |
| Strategy 2. Mitigate for Loss | Document and release | Not all sites may be able to be preserved or protected. |
| Strategy 3. Adapt to reduce the vulnerability of the property and its environs | Improve Resilience. Examples include:Treatment of structural materials to better withstand increased moisture and wind.Incorporate design measures for temporary flooding.Incorporate shade structures or plants | May result in possible impacts on the integrity of the resource, but ultimately save the historic property. |
| Shipwrecks | Increasing storm frequency and intensity/increased winds | Strategy 1. Mitigate for the loss | No Action - monitoring of resource condition and climate change | With uncertainty in change and magnitude of risk, may be prudent to monitorchange and determine most vulnerable sites. |
| Strategy 2. Mitigate for Loss | Document and release (data recovery, excavation) | Not all sites may be able to be preserved or protected. |
| Strategy 3. Prevent hazards from happening | Relocate wrecks into protected lagoon | Action will enhance survival of the remaining portion of the resource. Although the resource would no longer have integrity of location. All resources may not be able to be moved. |

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| **Worksheet 4.1. Identification of Possible Adaptation Strategies and Actions** |
| Memorials | Land Degradation/ Drought/fireIncreasing storm frequency and intensity/increased windsSea Level rise | Strategy 1. Mitigate for theloss | Document and release | Not all memorials may be able to be preserved or protected. |
| Strategy 2. Mitigate for Loss | Interpret the change | Not all memorials may be able to be preserved or protected. As part ofinterpretation, include story of climate change |
| Strategy 3. Adapt to reduce the vulnerability of the property and its environs. | Improve Resilience – maintain finishes, repair damage, explore treatmentsAdd erosion controls, manage water runoff, install wind breaks. | Action will enhance survival of a resource while minimizing changes to thephysical materials and settingof the resource. |

**Worksheet 4.2 Evaluation and Selection of Adaptation Strategies and Actions** is intended to help installations reduce a broad list of possible actions down to those that are most likely to be successful at reducing climate risks, achieving ICRMP goals,

and supporting broader military mission requirements. The intent of this “consequence table” is to identify those strategies or actions that should be considered as priorities for incorporation into the ICRMP and subsequent implementation. A separate worksheet

or consequence table can be filled out to evaluate strategies that address different risks/vulnerabilities. Similarly, a separate consequence table can be filled out to evaluate different actions that may support a given strategy.

###### Instructions for Worksheet 4.2

1. Focus of worksheet. Note on the worksheet what the consequence table is being used to evaluate. The worksheet can be used to focus on a particular risk/vulnerability, comparing potential strategies for reducing that risk. The worksheet can also be used to carry

out a more in-depth exploration of a particular strategy, comparing potential actions or projects that might support implementation of that strategy. As noted above, multiple versions of this worksheet, focusing on different risks or strategies, may be filled out depending on specific installation planning needs.

1. List a set of management strategies/ actions for evaluation (derived from Worksheet 4.1). These strategies or actions should be inserted in the head the columns (i.e., “Strategy/Action 1”) on the worksheet. Modify the worksheet to include as many columns as needed to accommodate all strategies or actions to be evaluated, including taking no action, if appropriate. These strategies/ actions can reflect options where the

intent is to select the best among them, or they may reflect a suite of strategies or actions where the intent is to include multiple actions that meet certain criteria.

1. Create criteria for evaluating the strategies/actions. Criteria for evaluating the strategies/actions should be inserted in the left-hand columns. Modify the worksheet to include as many rows as needed to accommodate all criteria to be used in the evaluation. Choosing among adaptation strategies will depend on a range of factors, depending on the

installation’s particular needs, interests, and resources. Defining explicit criteria for use in evaluation and comparison

of alternatives helps clarify what really matters, not just with respect to desired ecological outcomes, but also in terms of other important values or benefits.

In particular, it is important to make sure users address risk, tradeoffs, and uncertainties. Illustrative evaluation categories are included on Worksheet 4.2.

1. Evaluate and score the strategies/ actions based on agreed-upon criteria. Worksheet 4.2 is based on a structured decision-making “consequence

table” approach and is designed to help managers evaluate options or alternatives identified in Worksheet

* 1. There are many ways in which to conduct scoring under this approach. For example, either rank options on a relative scale (e.g., low, medium, high) for how the options meet the

criteria, or rank them numerically and tally scores (e.g., low = 1, medium = 2, high = 3). In these instances, it is important to be clear about whether higher scores are “better” or “worse.”

For transparency, it may also be useful to qualify one’s choice with a reason

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for choosing the particular rank. This type of “consequence table” is just one approach for evaluation and comparison of options; installations should feel

free to use other approaches based on their existing capacities and planning procedures.

1. Determine which strategies/actions merit incorporation into the ICRMP. Based on evaluation against the agreed- upon criteria, managers are in a position to select the strategies/actions that best meet their needs and are feasible to

implement. Selecting which alternatives to include in the ICRMP can be based on a number of techniques, which can range from quantitative techniques (i.e., highest total values) to selecting alternatives that optimize one or more particular criteria. There is no right or wrong way but use of a consequence table such as this allows managers to be transparent and explicit about their selection process. Identify action to be carried forward.

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Include this table(s) in Appendix P to document thought process.

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| **Worksheet 4.2.A Evaluation and Selection of Adaptation Strategies and Actions** |
| *Focus of Worksheet: Resource and Specific Risk (create additional tables for each resource and risk)* |
| **Strategy/Action/Project to Evaluate**List strategy/action/project to be evaluated in columns at right. These should carry over from Worksheet 4.1. Add columns for additional strategies/actions as needed. | Strategy/Action 1 | Strategy/Action 2 | Strategy/Action 3 |
| Notes: Choosing among adaptation strategies will depend on a range of factors, depending on the installation’s particular needs, interests, and resources. Major categories below are illustrative. | Mitigate for the loss/ No Action - monitoring of resource condition and climate change | Mitigate for the loss/ Document and release | Adapt to reduce the vulnerability of the feature/ improve resiliency - repair or replace damaged or degraded materials with in-kind materials |
| **Criteria for Evaluation**Identify and list below relevant criteria for evaluating/comparing proposed strategies-actions/projects. Add rows for additional criteria as needed. |
| Effectiveness at meeting climate-informed cultural resource goals/ provide reasoning for choice | Low | Low | Medium |
| Would allow for additional data collection and monitoring to determine better approach in the future when change is more certain. | Would preserve information for future study, but would not protect resource in situ | Would enhance survival of the landmark features while minimizing changesto the physical setting of theresources. |
| Effectiveness in meeting other installation objectives/provide reasoning for choice | Medium | Low | Low |
| Would provide additional information about climate change trends to info other program decisions. | Would not provide any additional protections to natural resources although may lessen restrictions on other uses in site-specific areas | Would not provide any additional protections to natural resources although may lessen restrictions on other uses in some areas |
| Feasibility/provide reasoning for choiceNote: Wake Island is a very remote island. Here costs are for comparison to each strategy. In general, costs are higher on Wake than other installations. Logistics are more complex. | Yes | Yes | Yes |
| Costs relatively low. | Costs moderate - will depend on the level of recordation and number of sites | Moderate to high cost depending on number of sites and access to sites. |
| Recommend for Inclusion in INCRMP? | Adequate in short-term | Adequate | Best |

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| **Worksheet 4.2.B Evaluation and Selection of Adaptation Strategies and Actions** |
| *Focus of Worksheet: Two historic buildings – Heat/Land Degradation/ Increase storm intensity/sea level rise* |
| **Strategy/Action/Project to Evaluate**List strategy/action/project to be evaluated in columns at right. These should carry over from Worksheet 4.1. Add columns for additional strategies/actions as needed. | Strategy/Action 1 | Strategy/Action 2 | Strategy/Action 3 |
| Notes: Choosing among adaptation strategies will depend on a range of factors, depending on the installation’s particular needs, interests, and resources. Major categories below are illustrative. | Mitigate for the loss/ No Action - monitoring of resource condition and climate change | Mitigate for the loss/ Document and release | Adapt to reduce the vulnerability of the property and its environs/ Improve resiliencyExamples include:* Treatment of structural materials to better withstand increased moisture and wind.
* Incorporate design measures for temporary flooding.
* Incorporate shade structures or plants
 |
| **Criteria for Evaluation**Identify and list below relevant criteria for evaluating/comparing proposed strategies-actions/projects. Add rows for additional criteria as needed. |
| Effectiveness at meeting climate-informed cultural resource goals | Low | Low | Medium |
| Would allow for additional data collection and monitoring to determine better approach in the future when change is more certain. | Would preserve information for future study, but would not protect resource in situ | Would enhance survival of the buildings minimizing changes to the physical setting of the resources. |

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| **Worksheet 4.2.B Evaluation and Selection of Adaptation Strategies and Actions** |
| Effectiveness in meeting other installation objectives | Low | Low | Moderate |
| Would provide additional information about climate change trends to info other program decisions. | Would not provide any additional protections to natural resources although may lessen restrictions on other uses in site-specific areas | Would not provide any additional protections to natural resources. Would support on-going mission activities that are housed within these buildings. |
| FeasibilityNote: Wake Island is a very remote island. Here costs are for comparison to each strategy. In general, costs are higher on Wake than other installations. Logistics are more complex. | Yes | Yes | Yes |
| Costs relatively low. | Costs low to moderate - will depend on the level of recordation and number of sites | Moderate to high costs - can partially be incorporatedinto overall maintenance andrepairs. |
| Recommend for Inclusion in INCRMP? | Adequate in short-term | Adequate | Best |

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| **Worksheet 4.2.B Evaluation and Selection of Adaptation Strategies and Actions** |
| *Focus of Worksheet: Shipwrecks/storm intensity* |
| **Strategy/Action/Project to Evaluate**List strategy/action/project to be evaluated in columns at right. These should carry over from Worksheet 4.1. Add columns for additional strategies/actions as needed. | Strategy/Action 1 | Strategy/Action 2 | Strategy/Action 3 |
| Notes: Choosing among adaptation strategies will depend on a range of factors, depending on the installation’s particular needs, interests, and resources. Major categories below are illustrative. | Mitigate for the loss/No Action- monitoring of resource condition and climate change | Mitigate for the loss/Document and release (data recovery, excavation) | Prevent hazards from happening/ Relocate wrecks into protected lagoon |
| **Criteria for Evaluation**Identify and list below relevant criteria for evaluating/comparing proposed strategies-actions/projects. Add rows for additional criteria as needed. |
| Effectiveness at meeting climate-informed cultural resource goals | Low | Low | Low |
| Would allow for additional data collection and monitoring to determine better approach in the future when change is more certain. | Would preserve information for future study, but would not protect resource in situ | Would enhance survival of the ship remains, would result in adverse effect to integrity of location, and could cause damage to fragile shipremains. However, may provide better opportunities for interpretation. |
| Effectiveness in meeting other installation objectives | Low | Medium | Medium |
| Would provide additional information about climate change trends to info other program decisions. | Would not provide any additional protections to natural resources or mission although may lessen restrictions on other uses in site-specific areas | Would not provide any additional protections to natural resources or mission although may lessen restrictions on other uses in site-specific areas |

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| **Worksheet 4.2.B Evaluation and Selection of Adaptation Strategies and Actions** |
| FeasibilityNote: Wake Island is a very remote island. Here costs are for comparison to each strategy. In general, costs are higher on Wake than other installations. Logistics are more complex. | Yes | Yes | Yes |
| Costs relatively low. | Costs low to moderate depending on the level of data recovery and number of sites | High costs and could result in damage to the resource. |
| Recommend for Inclusion in INCRMP? | Adequate in short-term | Adequate | Adequate |

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| **Worksheet 4.2.B Evaluation and Selection of Adaptation Strategies and Actions** |
| *Focus of Worksheet: Memorials – land degradation/ increased storm intensity/sea level rise* |
| **Strategy/Action/Project to Evaluate**List strategy/action/project to be evaluated in columns at right. These should carry over from Worksheet 4.1. Add columns for additional strategies/actions as needed. | Strategy/Action 1 | Strategy/Action 2 | Strategy/Action 3 |
| Notes: Choosing among adaptation strategies will depend on a range of factors, depending on the installation’s particular needs, interests, and resources. Major categories below are illustrative. | Mitigate for the loss/No Action– document and release | Mitigate for the loss/Interpret change | Adapt to reduce the vulnerability of the property and its environs / Improve ResilienceMaintain finishes, repair damage, explore treatments Add erosion controls, manage water runoff, install wind breaks |
| **Criteria for Evaluation**Identify and list below relevant criteria for evaluating/comparing proposed strategies-actions/projects. Add rows for additional criteria as needed. |
| Effectiveness at meeting climate-informed cultural resource goals | Low | Low | High |
| Would preserve information for future study, but would not protect resource in situ | Would preserve information for future study, also provide opportunity to educate about climate change | Would enhance survival of the memorials. |
| Effectiveness in meeting other installation objectives | Low | Medium | Low |
| Would not provide any additional protections to natural resources or mission | Would not provide any additional protections to natural resources although may also allow for additional interpretation regarding natural resources and climate change | Would not provide any additional protections to natural resources or mission |

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| **Worksheet 4.2.B Evaluation and Selection of Adaptation Strategies and Actions** |
| Feasibility | yes | yes | yes |
| Costs relatively low. | Costs low to moderate depending on the level of data recovery and interpretation methods | Higher and on-going costs. Could be part of on-going maintenance. |
| Recommend for Inclusion in INCRMP? | Adequate | Adequate | Best |

###### Worksheet 4.3 Implementation of Adaptation Strategies/Actions

provides a general framework to help installations identify: who will carry out the implementation of the adaptation strategies and actions/projects; whether and how the relevant strategies and actions fit within existing DoD program implementation; what decisions are especially relevant to get the strategies and actions ready to implement; and when various element of the strategies and actions should be implemented. The order is to go from strategy to action to projects.

###### Instructions for Worksheet 4.3

1. **Recommended Strategies/Actions: *List the strategies, actions, or projects identified in Worksheet 4.1 for incorporation into the ICRMP.***
2. **Responsible Parties: *Identify who has responsibility or needs to be involved in carrying out this action or project.*** For example, can it be done in-house, or will it be done via contract?
3. **Relationship to Existing ICRMP Strategies: *Determine whether and how the action or project fits into existing efforts.*** Is the action within

the installation’s authority or will it fit within an approved project?

1. **Project Planning Needs: *Identify what needs to be done to get this project ready to implement.*** Note here what would be necessary to put in place prior to projection implementation, such as regulatory permits, funding mechanisms, engineering work, detailed project design, or scientific research to validate the approach or solve technical issues. Are there any unique adaptation barriers (e.g., legal, social)?
2. **Timing and Sequencing: *Identify when the project is needed or should be carried out.*** Identify when the project should be started. Are there any dependencies that would influence the timing or sequencing of implementation? In some cases, specific dates may be relevant (e.g.,

start “phase 1” in FY 19). In others, it may be necessary to identify specific management trigger points (e.g., actions to be implemented in response to a specific climate threshold, such as a certain extent of sea-level rise).

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***Incorporate into ICRMP Implementation Table.*** Once a project has been adequately defined, incorporate it into the ICRMP’s

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implementation table or the ICRMP Program Planning objectives. Section # 10.1 and 10.2

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| **Worksheet 4.3. Implementation of Adaptation Strategies/Actions** |
| *Cultural Resources From column 1 in worksheet 4.1* | **Recommended Strategies/Actions***List selected strategies/ actions recommended for incorporation**into the ICRMP (from Worksheet 4.2).* | **Responsible Parties***Who would have responsibility for or be involved in implementing the strategy/action?* | **Relationship to Existing ICRMP Strategies***Does this fit within a current ICRMP effort, or is it a new activity/ project?* | **Project Planning Needs***What preparations or requirements would be necessary before carrying out the recommended strategies/ actions?* | **Timing and Sequencing***When should the action/project**be implemented (immediately or at some future time)?* |
|  |  | *Notes: Identify whether this project could be done in- house, via contract, or through partnering.* |  | *Notes: List permitting, funding, design, methods development, scientific research, etc. Are there any unique implementation challenges (e.g., legal, social, technical)?* | *Notes: Identify when the project should be started. Consider dependencies that may require project sequencing, or any ecological thresholds that may trigger needed action.* |
| National Landmark Historic buildings Shipwrecks Memorials | Strategy 1. Mitigate for the loss/ No Action - monitoring of resource condition and climate change | Cultural Resources Management | new action | develop protocol for consistent monitoring | short-term, 0 – 10 years |
| National Landmark Historic buildings Shipwrecks | Strategy 2. Mitigate for Loss/ Document and release | Cultural Resources Management | new action – some smaller items could be included as part of Museum/visitor center displays, as appropriate | Develop programmatic agreement with SHPO and for level of data recovery and curation | Short-term, 0 – 10 years, as individual sites are at risk of loss |

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| **Worksheet 4.3. Implementation of Adaptation Strategies/Actions** |
| Memorials | Strategy 2. Mitigate for Loss/ Interpret change | Cultural Resources Management | new action – could be included as part of Museum/visitor center displays, as appropriate | Develop programmatic agreement with SHPO and for message and methods | Short-term, 5 – 10 years, as individual sites are at risk of loss and budget allows |
| National LandmarkHistoric buildingsMemorials | Strategy 3. Adapt to reduce the vulnerability of the feature/ improve resiliency - repair orreplace damaged or degraded materials with in-kind materialsTreatment of structural materials to better withstand increased moisture and wind.Incorporate design measures for temporary flooding.Incorporate shade structures or plantsMaintain finishes, repair damage, explore treatmentsAdd erosion controls, manage water runoff, install wind breaks | PRSC Detachment 1, Program Manager, USAF BOS Contractor, Cultural Resources Management; and Natural Resources Management | New action | * Plan and design
* Environmental compliance (NEPA, NHPA)
* Identify funding
 | Short-term: Planning and design should begin in upcoming years to determine appropriate building materials.On-going: Implementation should occur as materials or planting needs to be repaired or replaced.Long-term: Monitor for changing climatic conditions. Establish climate change thresholds and implement when thresholds are reached. |

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| **Worksheet 4.3. Implementation of Adaptation Strategies/Actions** |
| Shipwrecks | Strategy 3. Prevent hazards from happening/ Relocate wrecks into protected lagoon | PRSC Detachment 1, Program Manager, USAF BOS Contractor, Cultural Resources Management; and Natural Resources Management | New action | * Plan and design
* Environmental compliance (NEPA, NHPA)
* Identify funding
 | Short-term: Planning and design should begin in upcoming years to determine appropriate methods and equipment needed for move, and fragility of the resources.Implementation medium to long- term (5 to 20 years), as funding and equipment are available. |

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