



# DoD Natural Resources Program

## Enabling the Mission, Defending the Resources

Climate Adaptation for DoD Natural Resource Managers  
October 8, 2019

*Please mute your phones.*

Audio Dial-In: 1-877-885-1087  
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DoDNaturalResources.net  
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# Climate Adaptation for DoD Natural Resource Managers



Dr. Bruce Stein  
National Wildlife Federation  
May 7, 2019





WXCHASING  
TYNDALL AIR FORCE BASE



**AIR FORCE: EVERY BUILDING AT BASE DAMAGED**

**URGENT**



GUNNER SGT. JAYSON PRICE

STORM RECOVERY

**HURRICANE FLORENCE DAMAGE**

CAMP LEJEUNE AND ONSLOW BEACH



48°  
5:35



**BREAKING NEWS**

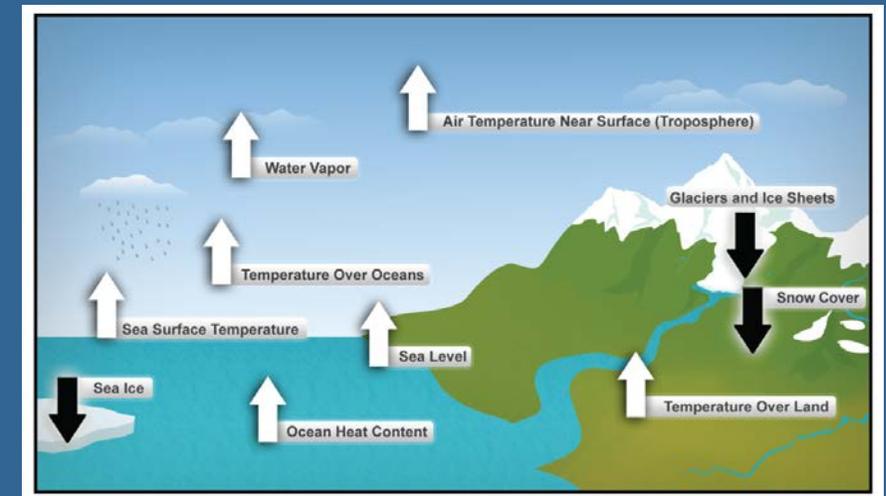
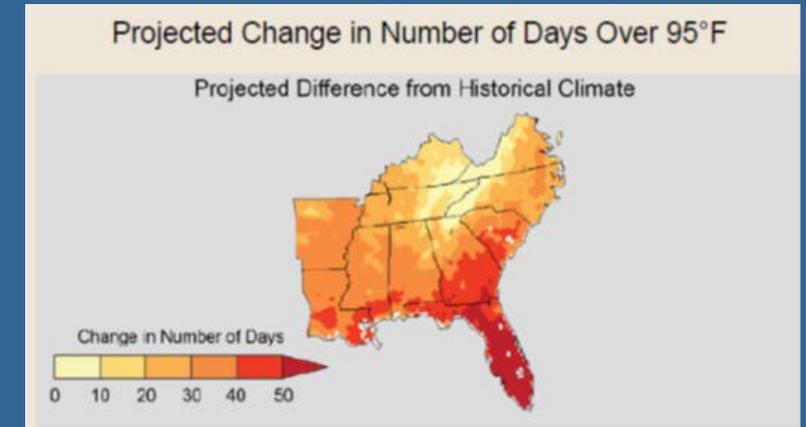
STORIES  
THAT  
MATTER

**WILDFIRE ON CAMP PENDLETON THREATENS HOMES  
SAN CLEMENTE**



# Climate Change Concerns Affecting DoD Installations

- Rising temperatures
- Changing precipitation patterns
- Increasing frequency or intensity of extreme weather events
- Rising sea levels and associated storm surge
- Melting permafrost and sea ice

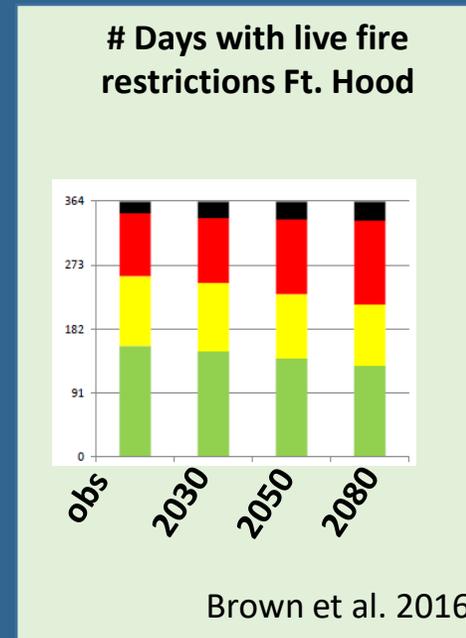


# Climate Risks to Installations

- Effects on the **suitability** of training and testing sites
- Limitations on the **timing** of training and other activities
- Increased **damage** to facilities and operational assets
- Higher **regulatory compliance** costs and restrictions



Photo credit: Cpl Orrin G. Farmer

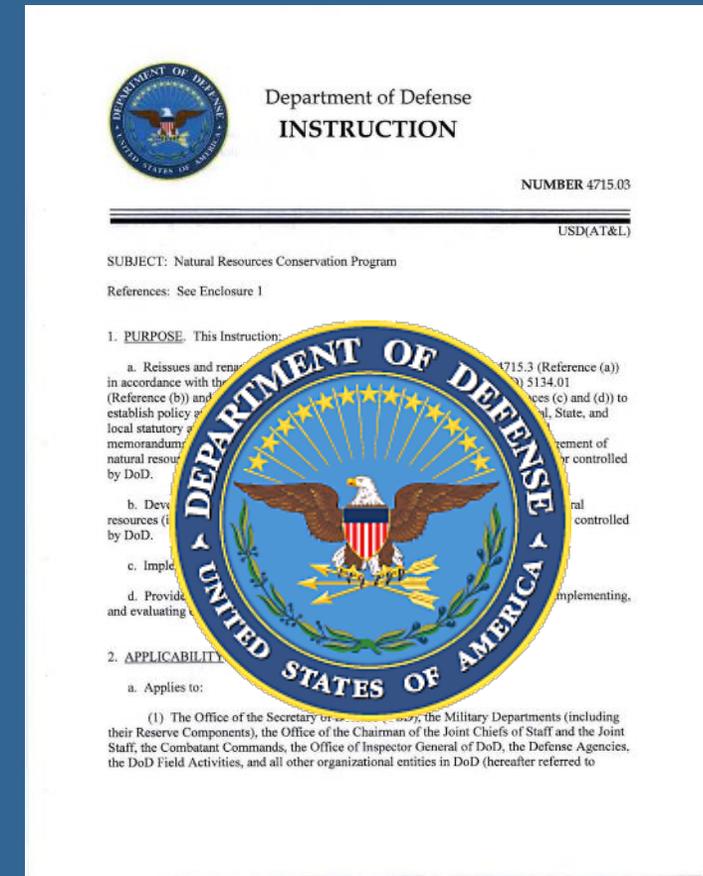


credit: Dawn Lawson



# DoD Guidance on Climate Change and INRMPs

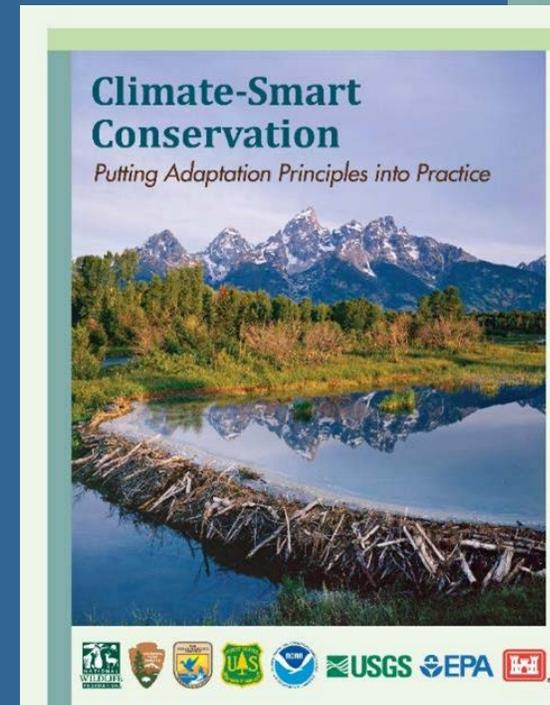
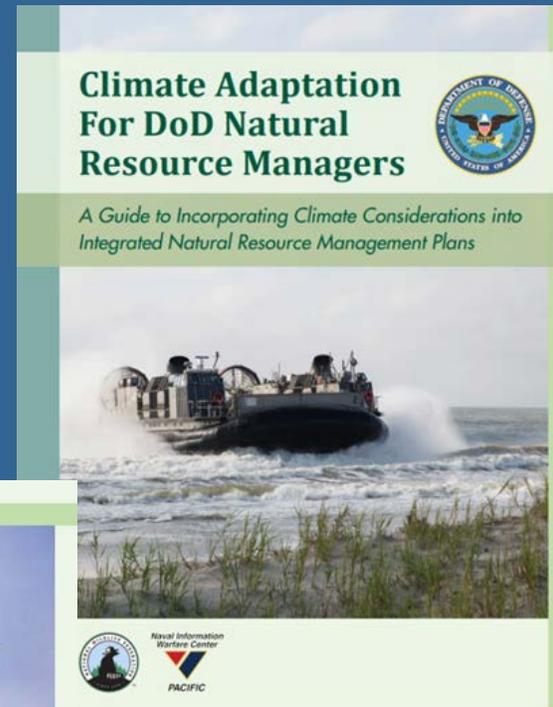
- DoDM 4715.03 (2013) INRMP implementation manual (Encl 8)
  - Calls for installations to address potential climate impacts when revising or updating INRMPs
- Service-specific guidance
  - Air Force, Army, Navy, and Marine Corps all have specific guidance for assessing climate risks and adaptation planning (see p. 31 of guide)



# DoD Climate Adaptation Guide

Funded by DoD Resources Legacy Program to:

- Support INRMP Implementation Manual guidance on climate change
- Develop a user-friendly climate adaptation guide for DoD natural resource managers
- Develop and deliver associated outreach and training based on the guide
- Builds on Existing NWF/Interagency Adaptation Guide
  - Climate-Smart Conservation



# Structure of the Adaptation Guide

## Part I

- Introduction
- Climate Risks to DoD Natural Resources and Mission
- Adaptation Principles and Practices
- Understanding Climate Science Basics
- Incorporating Climate Considerations in INRMPs
- Exploring INRMP Program Elements



## Part II

- Step-by-Step Process for INRMP Adaptation Planning

## Appendices

- A. Acronyms
- B. Key Resources for Information and Expertise
- C. Supporting Worksheets



# Guide Released for DoD Use by Assistant Secretary McMahon on June 3, 2019



ASSISTANT SECRETARY OF DEFENSE  
3500 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3500

JUN - 3 2019

SUSTAINMENT

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS,  
ENERGY AND ENVIRONMENT)  
ASSISTANT SECRETARY OF THE NAVY (ENERGY,  
INSTALLATIONS AND ENVIRONMENT)  
ASSISTANT SECRETARY OF THE AIR FORCE (INSTALLATIONS,  
ENVIRONMENT AND ENERGY)

SUBJECT: Climate Adaptation for Department of Defense Natural Resources Managers

This memorandum releases the guide on, "Climate Adaptation for Department of Defense (DoD) Natural Resources Managers." DoD installations will experience significant impacts from a changing climate which could compromise their capacity to support readiness and undermine DoD's ability to protect and restore the native ecosystems needed to conduct realistic training and testing activities. Although DoD Instruction 4715.03 requires DoD natural resources managers to incorporate climate adaptation strategies into installation Integrated Natural Resources Management Plans (INRMPs), there are few tools available to help them do this.

This guide provides an overview of how a changing climate may affect military lands and other resources, and offers a six-step process for incorporating adaptation strategies into INRMPs. It introduces installation managers to overarching concepts and principles, and is structured around a generalized, yet flexible, INRMP adaptation planning process.

We developed this guide in collaboration with headquarters and installation DoD Component staff. Please accept my thanks for your staff's efforts to review and edit this guide.

My point of contact is Ms. Alison Dalsimer, at [allyn.a.dalsimer.civ@mail.mil](mailto:allyn.a.dalsimer.civ@mail.mil), or 571-372-6893.

Robert H. McMahon

Attachment:  
As stated



# Adaptation Guide Development Team

## Principle Investigators

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## Additional Team Members

- **Patty Glick** – National Wildlife Federation
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- **Navy** - Tammy Conkle, Christy Wolf
- **National Guard** - Michelle Richards



# Design Considerations

- Cross-Service
  - Air Force, Army, Marine Corps, National Guard, Navy
- Diversity of geographies and ecosystems
  - Coastal, desert, mountain, arctic, etc.
- Varying sectors/program elements
  - T&E species, wetlands, BASH, fire management, invasives, forestry, etc.
- Varying levels of technical capacity
  - Large and small installations



# Responses to Climate Change

- Climate Mitigation

- Addresses *causes* of rapid climate change
- Focus on reducing atmospheric greenhouse gas concentrations



- Climate Adaptation

- Addresses *impacts* of climate change on people and nature
- Focus on preparing for and managing change





I skate to where the puck is going to be, not where it has been.

-- Wayne Gretzky



# What is Climate Adaptation?

The process of adjustment to actual or expected climate and its effects

--- IPCC AR5 (2014)

The process of adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects

--- DoDD 4715.21 (2016)



Focus is on reducing climate-related vulnerabilities and risks



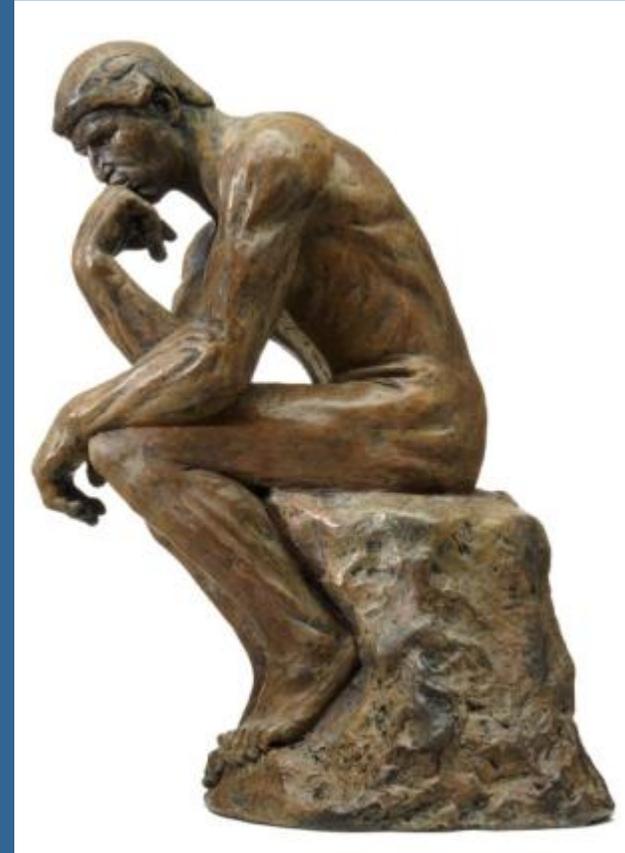
# Principles for Effective Adaptation

- Act with intentionality; link actions to climate risks
- Manage for change, not just persistence
- Reconsider goals, not just strategies
- Integrate adaptation into existing work



# Acting with Intentionality

- Link Actions to Climate Risks
  - How will actions address key vulnerabilities and risks?
  - What is the risk reduction rationale for actions?
- Show your work!
  - Transparency/traceability important
  - Whether novel approaches are indicated
  - Or existing approaches and actions validated



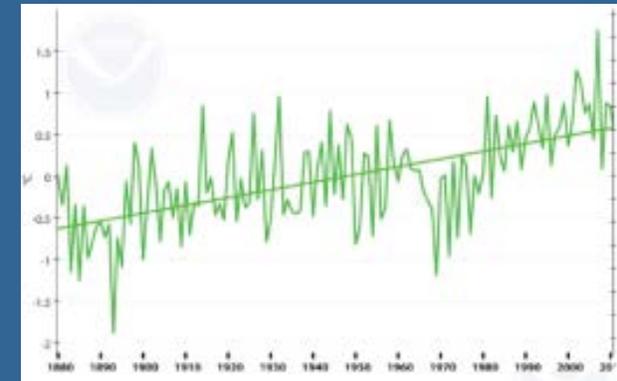
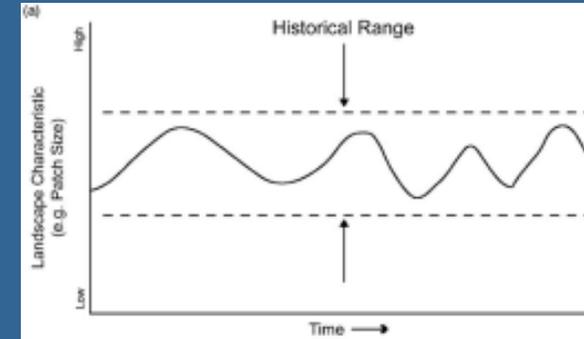
# Assessing Vulnerability and Risk

- Reducing vulnerability and risk is the essence of climate adaptation
  - Understanding vulnerability is key to designing effective adaptation strategies and actions
- Vulnerability – 3 Components
  - Sensitivity to a change
  - Exposure to the change
  - Adaptive Capacity – ability to cope with or adjust to the change
- Risk
  - Likelihood an impact will occur
  - Consequence if it does



# Manage for Change, Not Just Persistence

- Stationarity is dead!
  - Directional changes exceeding “historical range of variability”
- Adaptation will largely be about preparing for and managing change
- Adaptation is a process, not an end point



# A Continuum of Change

Persistence

Transformation

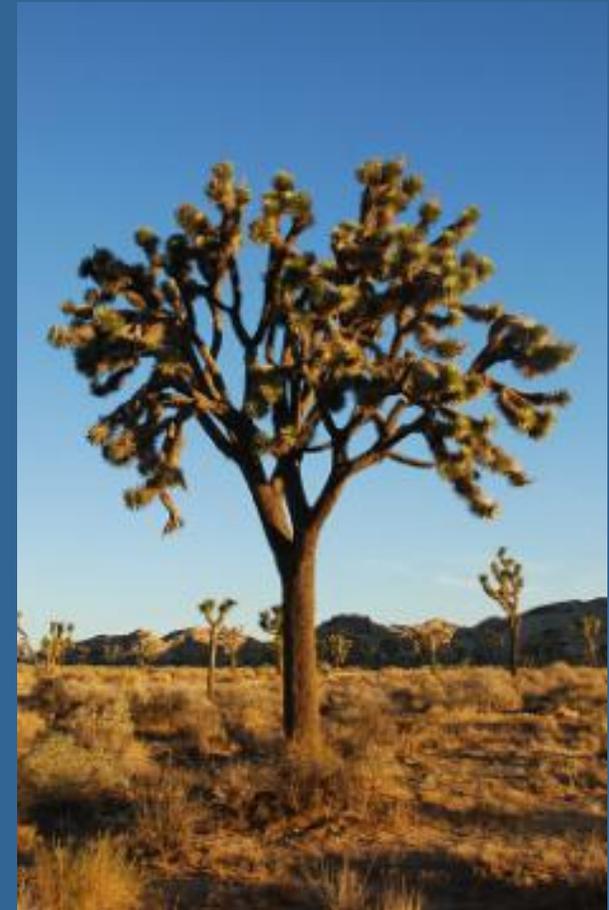


- Conservation now mostly focused on persistence of current conditions, or restoration to historical conditions
- Adaptation will increasingly be concerned with determining:
  - when to manage for persistence
  - when to manage for change
  - When (and how) to cycle between the two



# Reconsider Conservation Goals Not Just Strategies

- Goals are the *ends*; strategies the *means*
- Goals are a reflection of human values and can evolve
  - Many goals and objectives may no longer be achievable with rapid changes
- Need for forward-looking rather than retrospective goals



# Aligning Goals and Strategies in Climate Adaptation



\* Review and update as needed, based on climate vulnerability and risk



# Example of Climate-Altered Goals: Marine Corps Recruit Depot, Parris Island

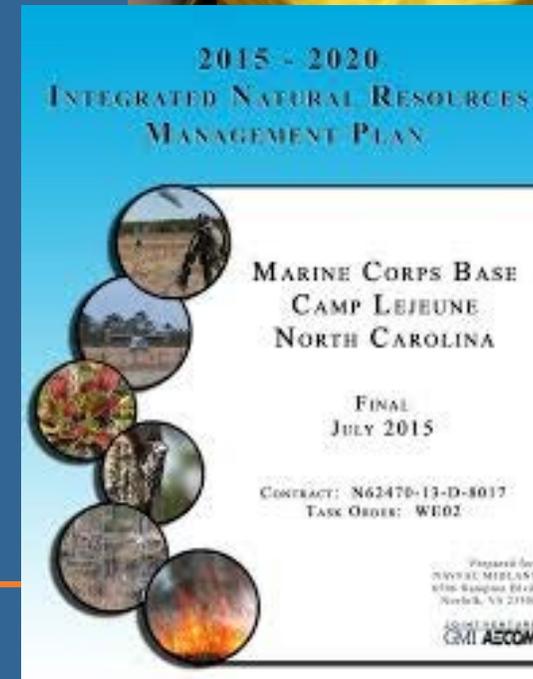
Slash pine forests on the installation are vulnerable to projected climate impacts

- Existing forest management goals
  - Provide shade and realistic terrain for recruit training
  - Provide revenue from timber harvest
  - Provide habitat for wildlife habitat
- In the future
  - May need to prioritize shade for training over revenue from timber production
  - May need to refocus forest management from slash pine to more climate-resilient hardwoods
  - May need to look at alternative areas for meeting wildlife objectives (and possibly training needs)

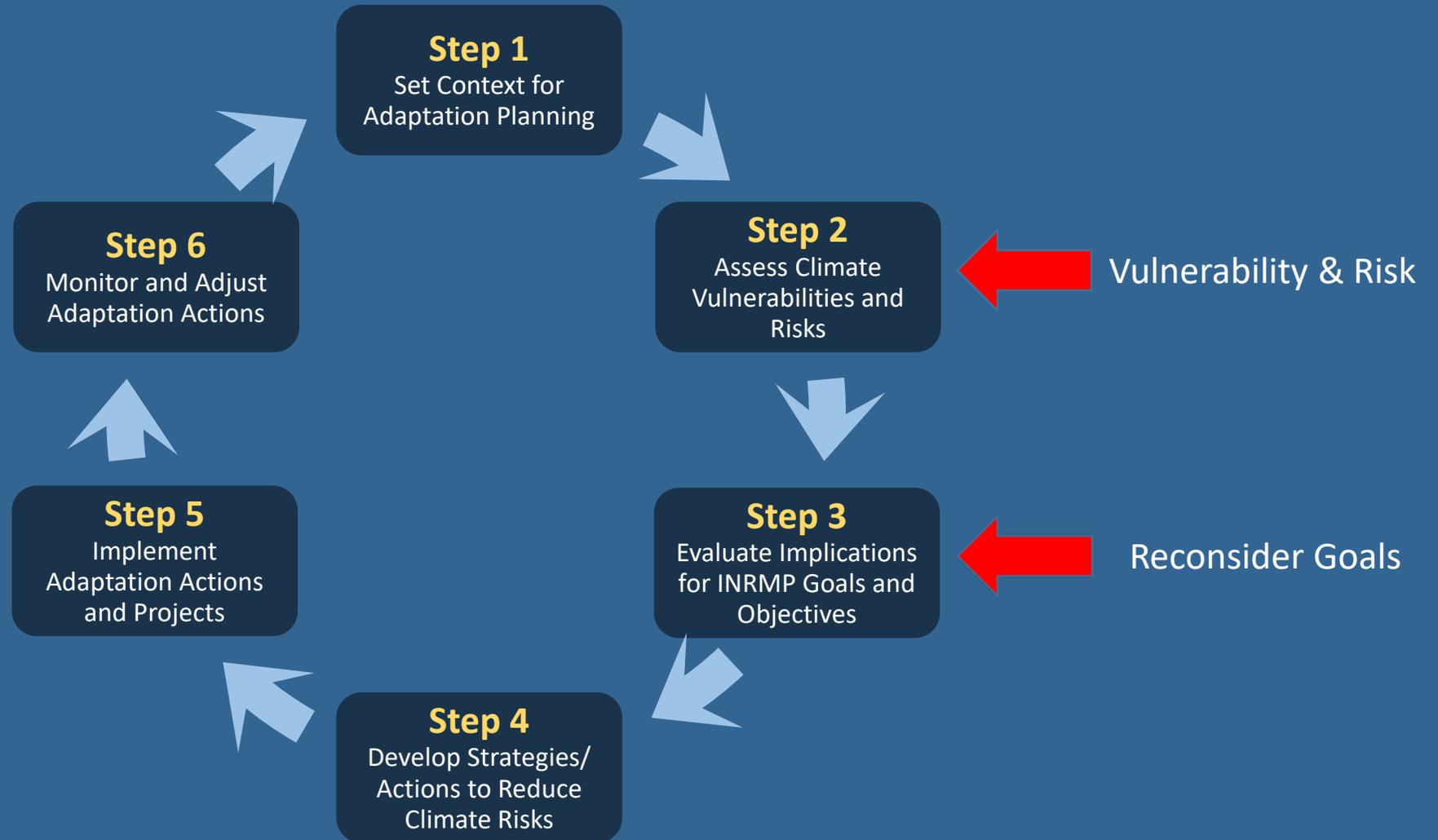


# Integrate Adaptation in Existing Work

- Adaptation planning can both
  - Support purpose-built adaptation plans
  - Inform existing planning processes
- Emphasis here is on incorporation into INRMPs
  - Should also be incorporated into other installation plans (e.g., facilities, master plans, etc.)



# INRMP Adaptation Planning Process



# Generating and Evaluating Adaptation Strategies and Actions



Be realistic!



Step 4  
Develop Strategies and Actions to Reduce Climate Risks

Be creative!



# Detailed Outline of INRMP Adaptation Planning Process

## Step 1. Set Context for Adaptation Planning

- Conduct project scoping
- Assemble planning team/engage stakeholders
- Compile background information

## Step 2. Assess Climate Vulnerabilities & Risks

- Project future conditions
- Assess vulnerability of target natural resources
- Assess resulting risk to military mission

## Step 3. Evaluate Implications for Goals

- Evaluate continued achievability
- Update climate-compromised goals & objectives

## Step 4. Develop Strategies to Reduce Risks

- Identify potential adaptation strategies and actions
- Evaluate for effectiveness/feasibility
- Select priority risk-reduction measures

## Step 5. Implement Actions and Projects

- Identify project requirements and dependencies
- Incorporate actions into INRMP implementation table

## Step 6. Monitor and Adjust

- Define expected results of adaptation strategies
- Monitor project effectiveness and ecological responses
- Adjust strategies and plans as needed



# Supporting Worksheets for Each Step in the Adaptation Planning Process

## Worksheet 2.1. Climate Concerns and Projections

Key Climate Concerns	Climatic Factors	Historical/Current Conditions	Trend	Projections	Confidence/Uncertainty
<i>What are the key climate change-related impacts or threats to the installation, and more specifically for the target natural resource?</i>	<i>What are the climatic factors or variables related to those concerns, and which are ecologically</i>	<i>What are the historical/current values for this climate factor?</i>	<i>What is the trend or directionality for this factor, if known?</i>	<i>What are available projections for this variable?</i>	<i>What is the level of confidence or certainty in the trend or magnitude of change for this variable?</i>

## Worksheet 2.2. Climate Vulnerabilities of Target Natural Resources

Target Natural Resource(s) <i>What are the target natural resources to be evaluated (from Worksheet 1.2)?</i>	Climate-Related Threats			Other Threats <i>What existing or “non-climate” threats to the resource may be exacerbated by or amplified due to projected changes in in climatic factors?</i>	Degree/Reason for Vulnerability <i>Rate the relative vulnerability (e.g., Very High, High, Medium, Low) and describe the reason for that rating.</i>
	Sensitivity <i>How and to what degree might this resource respond (negatively or positively) to expected climate-related changes?</i>	Exposure <i>To what degree is the resource likely to overlap with and be exposed to conditions to which it is sensitive?</i>	Adaptive Capacity <i>Does the target resource have the ability to accommodate, cope with, or adjust to projected changes in climate conditions? If so,</i>		

## Worksheet 2.3. Military Mission Risks from Natural Resource Vulnerabilities

Vulnerabilities of Target Natural Resources <i>List the most consequential natural resource vulnerabilities identified in the last column of Worksheet 2.2.</i>	Risks to Installation Mission Requirements <i>How might this natural resource vulnerability affect the ability of the installation to deliver its military mission (e.g., training, testing, etc.) and long-term sustainment?</i>	Degree of Risk <i>Rate the relative risk this vulnerability poses to the installation’s ability to meet its military mission requirements (e.g., Very High, High, Medium, Low).</i>



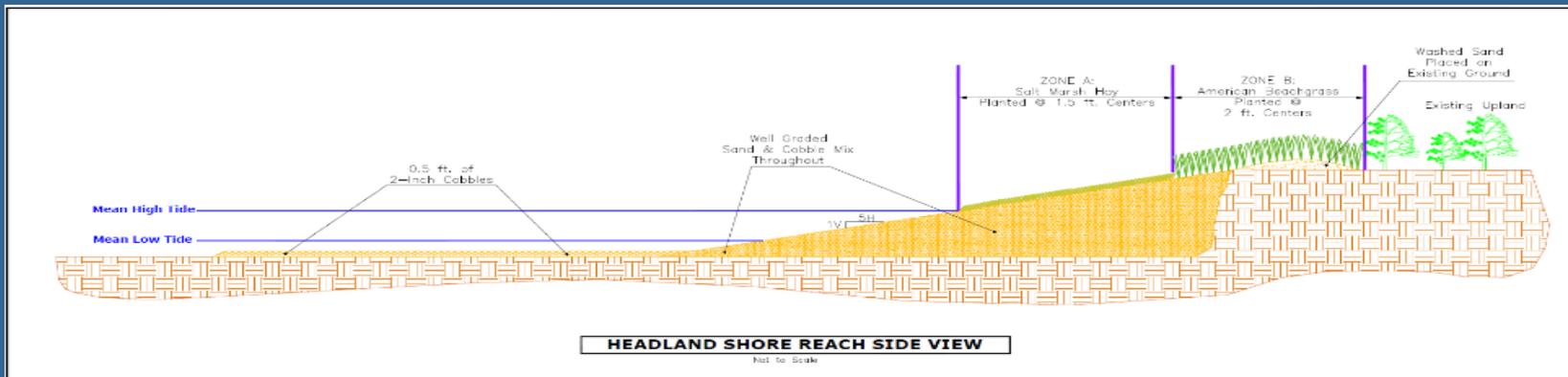
# Adaptation in Action: Wet Meadow Restoration for Gunnison Sage Grouse

- Successful breeding of Gunnison sage grouse requires riparian wet meadows
  - Climate-driven aridity and stream erosion resulting in loss of suitable breeding habitat
- Targeted riparian restoration designed to address this climate vulnerability
  - Simple but strategically placed rock sills slow water flow and allow restoration and expansion of wet meadow habitat

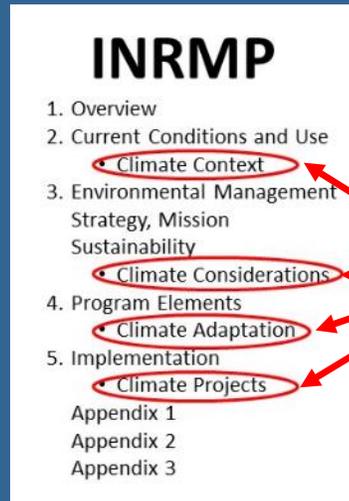


# Adaptation in Action: Shoreline Protection that Accommodates Sea-Level Rise

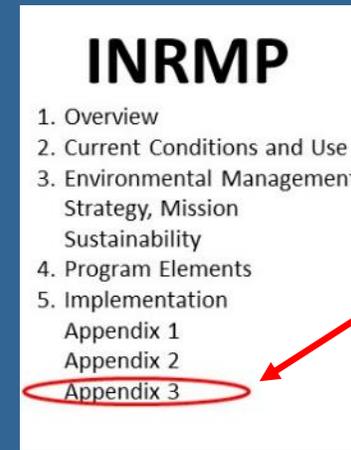
- “Living shoreline” project to address shoreline erosion and habitat loss
- Innovative design allows for rising sea levels and inland habitat migration



# Options for Incorporating Climate Adaptation into INRMP



Full Integration



Appendix-Only

- Choice depends on multiple factors
- Can transition from Appendix-Only to Full-Integration in future



# Considering Climate Implications for Program Elements

## 19 program elements, 3 general types:

- Threats-based (e.g., Invasive Species, Pest Management)
- Target Resources (e.g., T&E Species, Migratory Birds, Wetlands)
- Practices-based (e.g., Agricultural Outleasing, Recreation)

## Consider:

- Will projected climate exacerbate existing stressors?
- Will changes in management strategies be needed?
- Are climate-vulnerable ecosystems at-risk of type conversion?

## Chapter 6 of adaptation guide...

- Discusses climate and adaptation issues for each program element
- Provides pointers to program element-specific adaptation resources



# Implementing Adaptation Strategies in INRMP projects and actions

- Existing INRMP projects may have climate adaptation benefits
  - Little to no change may be necessary
  - Prioritization or timing may need adjusting
  - However, important to validate adaptation benefit through INRMP adaptation planning process
- Existing projects may need modification or refinement
- New or novel projects may be necessary
  - Project timeline and phasing can help keep manageable



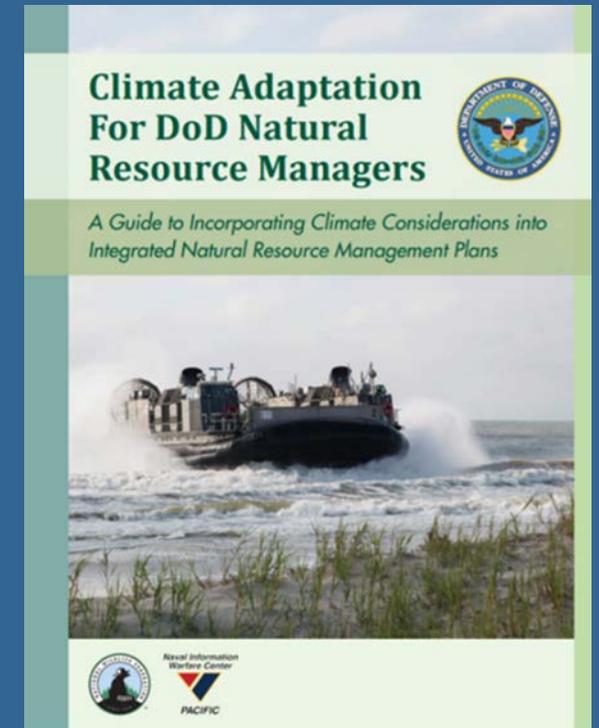
# Training

- Training based on the guide now being offered
  - Workshops previously held at Sustaining Military Readiness (SMR) and NMFWA conferences
  - Course is based on adaptation curriculum NWF developed with other federal partners (USFWS, NPS, NOAA)
- Next training expected to be held at March 2020 NMFWA annual workshop (Omaha, NE)



# Obtaining the Guide and Worksheets

- Available online:
  - On DoD Denix website: [www.denix.osd.mil/nr/DoDAdaptationGuide](http://www.denix.osd.mil/nr/DoDAdaptationGuide)
  - On NWF website: [www.nwf.org/DoDAdaptationGuide](http://www.nwf.org/DoDAdaptationGuide)
  - On NMFWA website: [www.nmfwa.org/climate-change.html](http://www.nmfwa.org/climate-change.html)
- Print copies soon to be available:
  - Through individual Service liaisons
  - Through Legacy Resource Management Program
- “Commanders Guide” in preparation
  - Brief summary version of guide to be available in 2020



# Questions?

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