REPI

READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION PROGRAM

2021 WEBINAR SERIES

Resilience Tools and Technology

30 June 2021| 1:00 PM ET

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Speakers

- Moderator:
  - **Andy Porth**, Office of the Assistant Secretary of Defense (Sustainment)
- Presenters:
  - **Dr. Shubhra Misra**, DoD Climate Action Team – Climate Preparedness and Resilience
  - **Kristen Byler,** National Fish and Wildlife Foundation
  - **Maria Abadie**, REPI/Booz Allen Hamilton

Defense Climate Assessment Tool (DCAT)

Shubhra Misra, PhD, PE, DCE, DPE
Climate Action Team (POC: Kathleen White, PhD, PE)
Office of the Deputy Assistant Secretary of Defense (Environment and Energy Resilience)
30 Jun 2021

Defense Climate Assessment Tool

- Defense Climate Assessment Tool (DCAT)
- DCAT Need
- DCAT Purpose
- DCAT Access
- DCAT Overview
- DCAT User Guide
- Defense Installations Spatial Data Infrastructure (DISDI) Portal Overview
- Key Takeaways
- Summary

Defense Climate Assessment Tool

WHAT IS THE DoD CLIMATE ASSESSMENT TOOL (DCAT)?

A CAC-enabled, web-based collection of scientific climate data to support research, analysis, and decision making about exposure to historical extreme weather and reasonably foreseeable climate effects.

WHAT IS THE PURPOSE OF THE DCAT?

Enables Military Departments and their installation personnel to deliver consistent exposure assessments and identify regions or installations for additional climate-related studies.

HOW WILL DCAT SUPPORT ANALYSIS AND DECISION MAKING?

The tool uses data from past extreme weather events (e.g., hurricanes, tornado tracks) and the effects of future changes in sea levels, riverine flooding, drought, heat, land degradation, energy demand, and wildfires to produce hazard indicators. The data supports a screening-level assessment of installation vulnerability expressed as a combination of exposure (designated by the tool) and sensitivity.

WHO SHOULD BE USING DCAT?

Climate Assessment Tool Users	Impacts on Decision Making
Installation-level Planners and Engineers	▪ Analyze an installation's exposure or susceptibility to climate and extreme weather events. ▪ Use this information to help inform planning and land use recommendations, and support resilient design, engineering, and construction. ▪ Add separate geographic information system (GIS) layers (e.g., flooding) available for Military Department-specific GIS systems used at the installation level.
Military Department Headquarters	▪ Identify regions or installations for focused attention, such as performing detailed studies to determine mission impacts and strategies to mitigate exposure.
DoD Leadership	▪ Compare exposure across the Department to answer questions from Congress. ▪ Inform investment and policy decisions.

Defense Climate Assessment Tool (DCAT) Need

DoD Requirements

- DoD Quadrennial Defense Review (2014)
- DoD Climate Change Adaptation Roadmap (2014)
- DoD Directive 4715.21 Climate Change Adaptation and Resilience (2016)
- FY 18-19-20 National Defense Authorization Acts
- USD(AS) Memo Improving Defense Installation Resilience to Rising Sea Levels, 24 Feb 2020

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

- Emphasis on national security, climate mitigation (energy and sustainability), climate adaptation, and environmental justice
- Deliverables:
  - DoD Climate Risk Assessment 120 days
  - DoD Climate Action Plan 120 days

Climate Data provides input to:

- Real Property Master Plans
- Installation Natural Resources Master Plans
- Installation Energy & Water Resilience Plans

Unified Facilities Criteria Updates

DoD Climate Assessment Tool (DCAT):

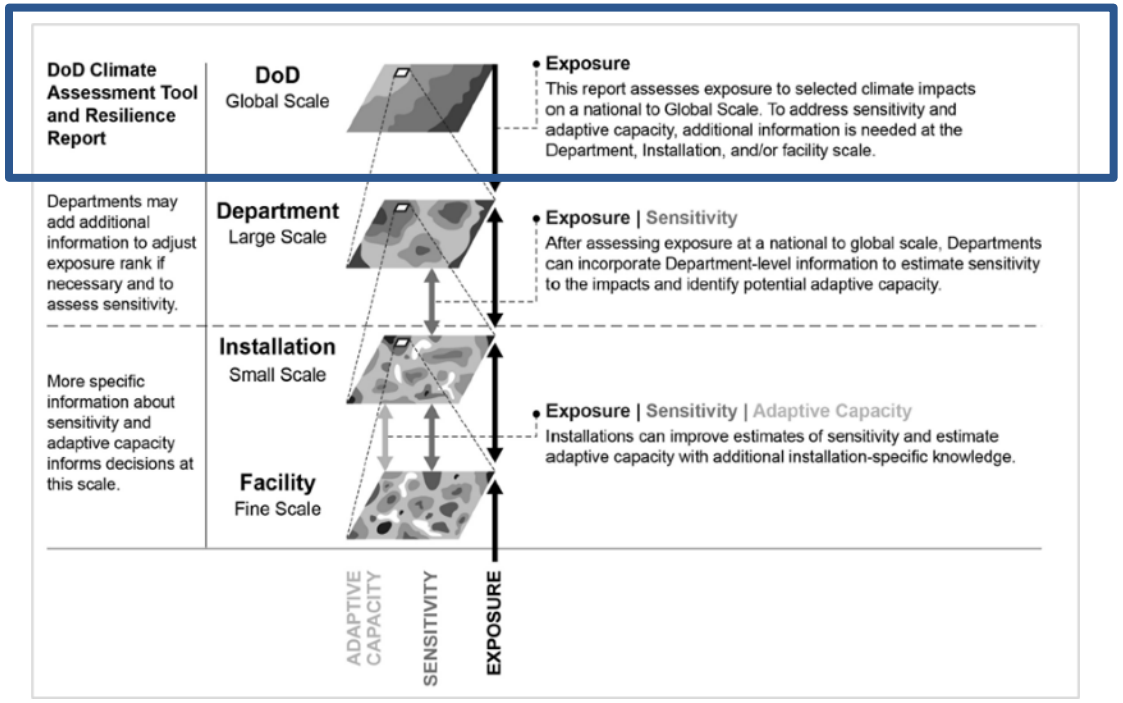
Provides screening level to guide further studies where mission and operations are sensitive to these hazards, and the resulting investments in resilience measures

Based on best available and actionable science – USACE aggregates, integrates and translates best available science into actionable information for decision-makers

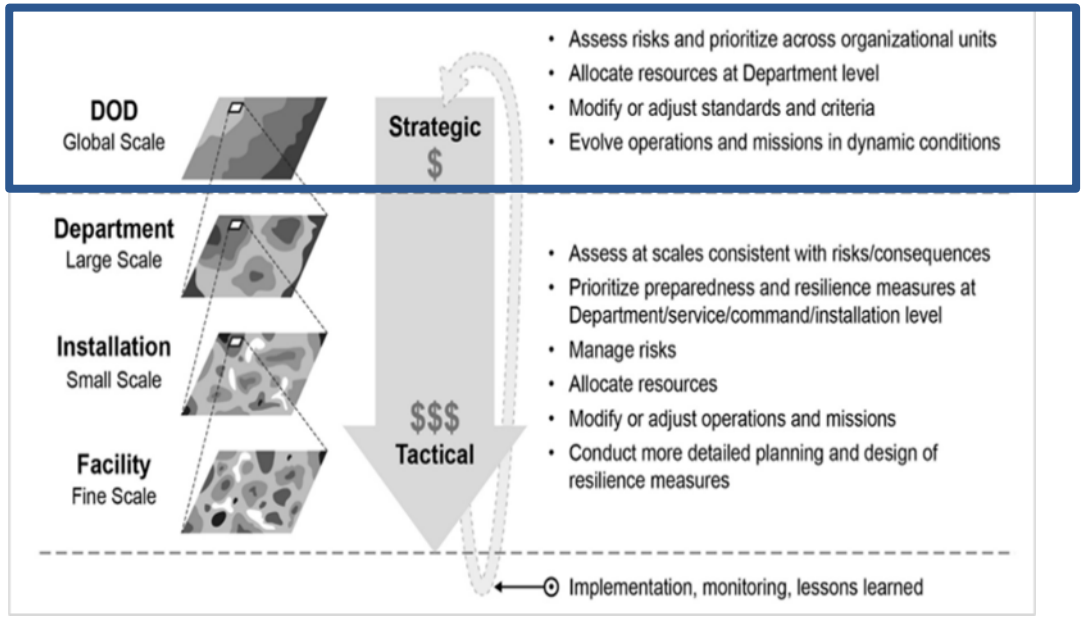
Results indicate there is no epoch-scenario under which installation exposure to climate hazards is projected to decrease

Defense Climate Assessment Tool (DCAT) Purpose

- **Leverage nationally consistent, authoritative data to provide robust, screening-level assessments of exposure across DoD installations**
- **Vulnerability = {exposure x sensitivity x adaptive capacity}**

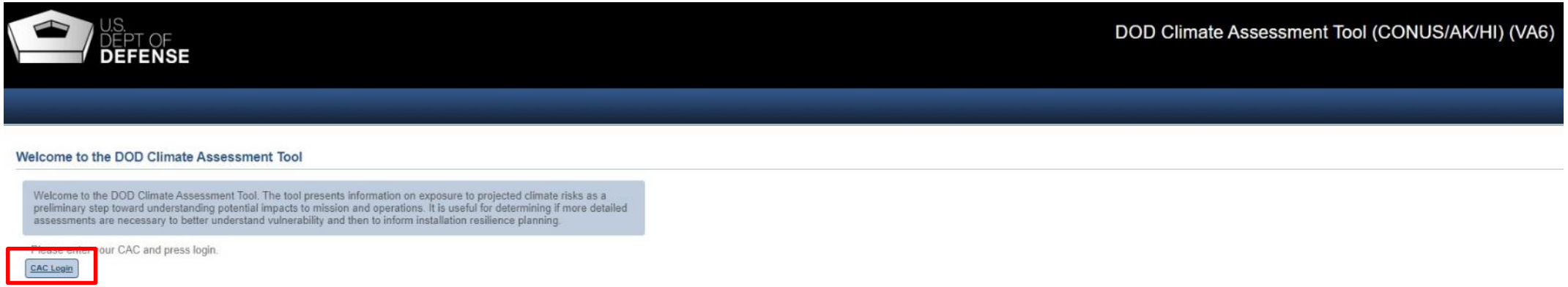


- **Exposure screening help prioritize further investments to determine sensitivity and adaptive capacity using more detailed and site-specific data**

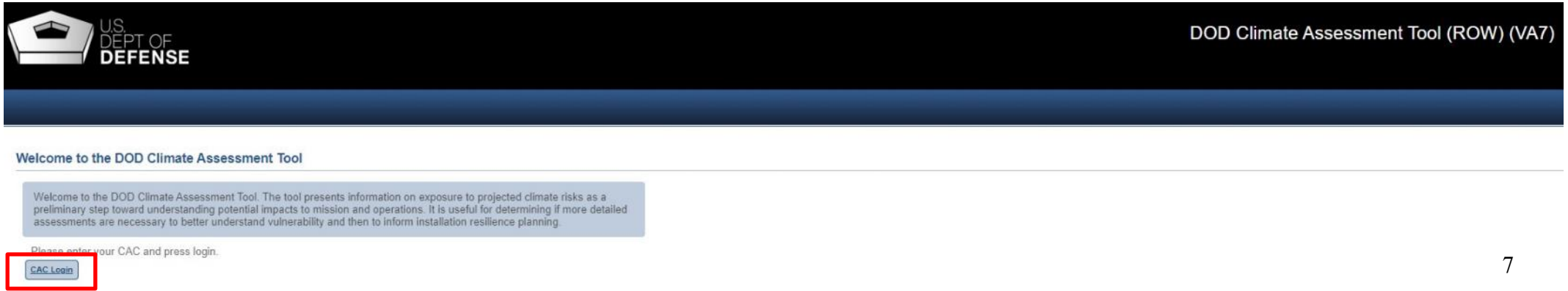


DoD Climate Assessment Tool (DCAT) Access

CONUS/AK/HI:
Public CAC-enabled Site - https://corpsmapr.usace.army.mil/cm_apex/f?p=118
(Read-only access except those with permissions)

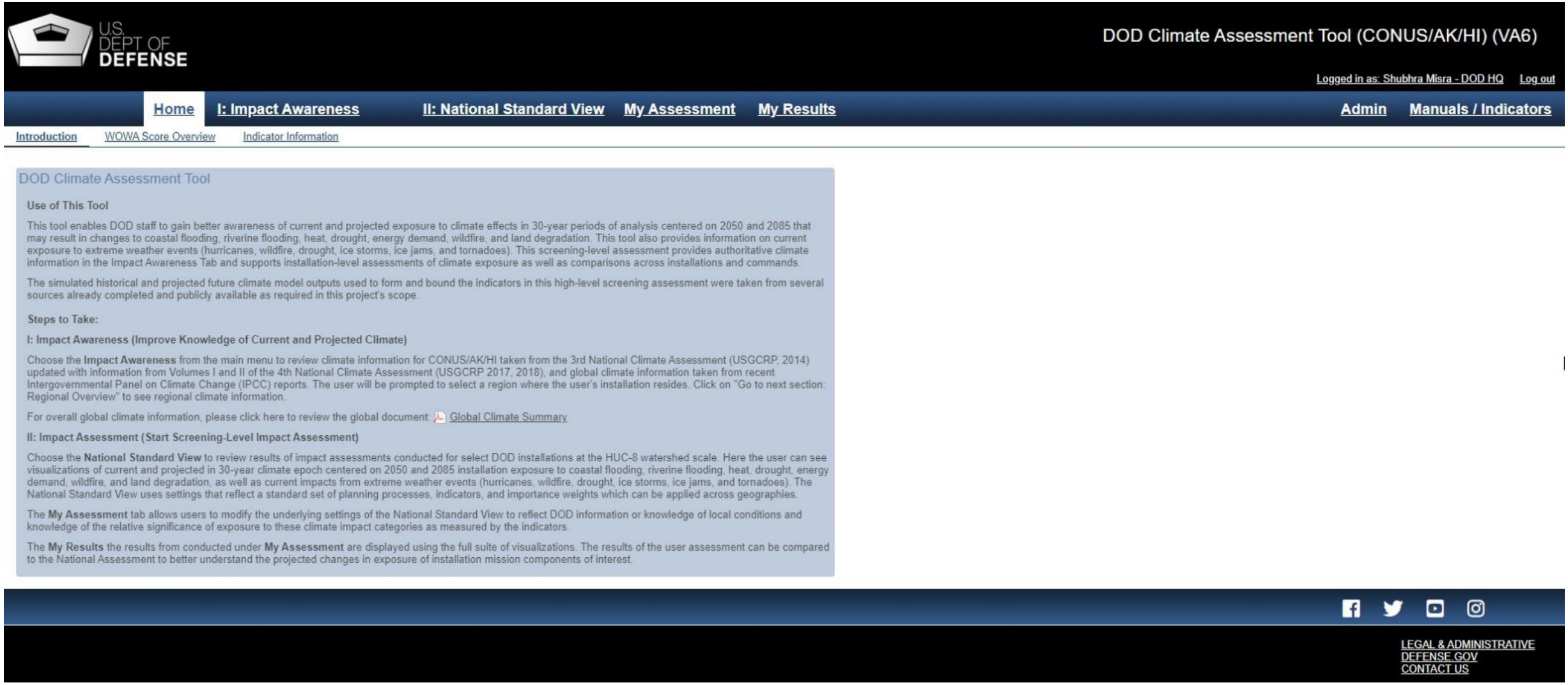


Rest of World (ROW):
Public CAC-enabled Site - https://corpsmapr.usace.army.mil/cm_apex/f?p=119
(Read-only access except those with permissions)



DoD Climate Assessment Tool (DCAT) Access

DCAT Home Screen (CONUS/AK/HI)



DoD Climate Assessment Tool (DCAT) Overview

- **Calculates projected exposure to eight hazard areas**

Drought	Riverine Flooding	Coastal Flooding	Heat
Energy Demand	Land Degradation	Wildfire	Historical Extreme Conditions

- **Calculates historical exposure for which climate projections are not yet possible**

Tornado Frequency	*Hurricane Wind >50Kts*	*Hurricane Max Precipitation*	*Hurricane Frequency*
Ice Storms	*Historic Drought Frequency*	*Ice Jams*	*Wildland Fire Interface*

- **Provides for two time periods and two GHG emissions pathways; so, can evaluate four scenarios**

Epoch: Time period of indicator data

Future 1: 2035-2065, centered on 2050

Future 2: 2070-2100, centered on 2085

Climate Scenarios: Future climate scenarios according to emissions pathway

Lower greenhouse gas (GHG) emissions

Higher GHG emissions

Therefore user can evaluate:

2050 Lower, 2050 Higher, 2085 Lower, or 2085 Higher

- **1391 locations (1055 CONUS-AK-HI (Army – 439, Navy – 326, AF - 258; 336 ROW (Army – 128, Navy – 110, AF – 98)**

- **Aggregates exposure across the hazard areas and indicators to attain a "score"**

DCAT User Guide – Step 1

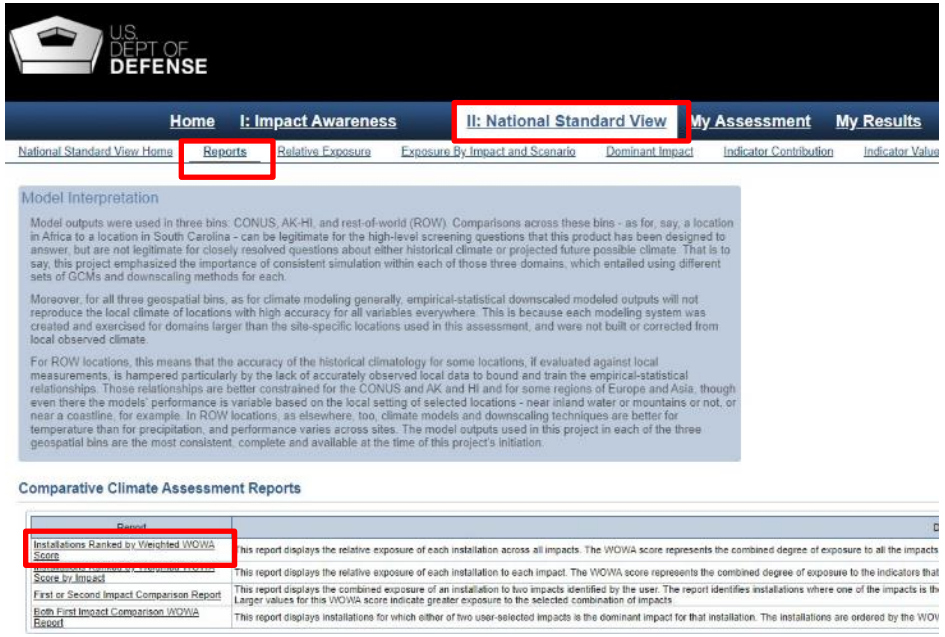
Review Background Information and Reports:

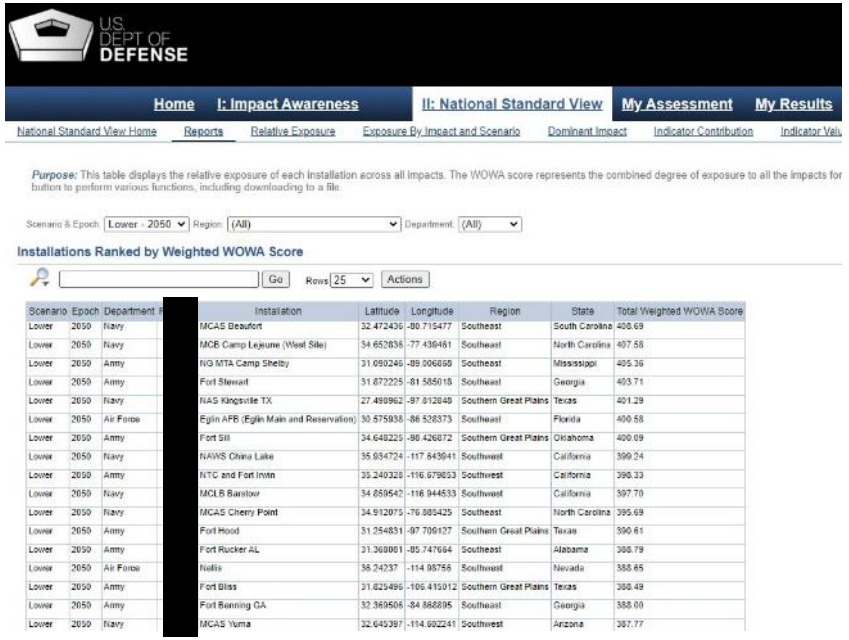
- DoD "Report on Effects of a Changing Climate to the Department of Defense" (https://media.defense.gov/2019/Jan/29/2002084200/-1/-1/1/CLIMATE-CHANGE-REPORT-2019.PDF)
- DCAT Report "DoD Installation Climate Exposure At Home and Abroad" (https://media.defense.gov/2021/Apr/20/2002624613/-1/-1/1/DOD-INSTALLATION-EXPOSURE-TO-CLIMATE-CHANGE-AT-HOME-AND-ABROAD.PDF)
- Army Climate Resilience Handbook, Change 1 (https://www.asaie.army.mil/Public/ES/doc/Army_Climate_Resilience_Handbook_Change_1.pdf)
  - Note where climate information would fit into Army climate planning (e.g., Figure 2)
  - Read through the notional installation example
  - Think about how you might approach a climate assessment on your own
  - Review Appendix C, Climate Preparedness and Resilience Measures
- Review DoD Requirements and Component Guidance in the Background section of this primer to see the kinds of information that might be important in a report for each of the requirements
- Review the Installation Success stories in the Background section of this primer to get an idea of the kinds of resilience actions are occurring
- Review Global Climate Summary (available from within DCAT) (https://corpsmapr.usace.army.mil/rccinfo/va4/docs/Global_Climate_Summary.pdf)

DCAT User Guide – Step 2

- Go to the DCAT Portal and Log in using CAC:
  - CONUS/AK/HI: https://corpsmapr.usace.army.mil/cm_apex/f?p=118
  - ROW: https://corpsmapr.usace.army.mil/cm_apex/f?p=119

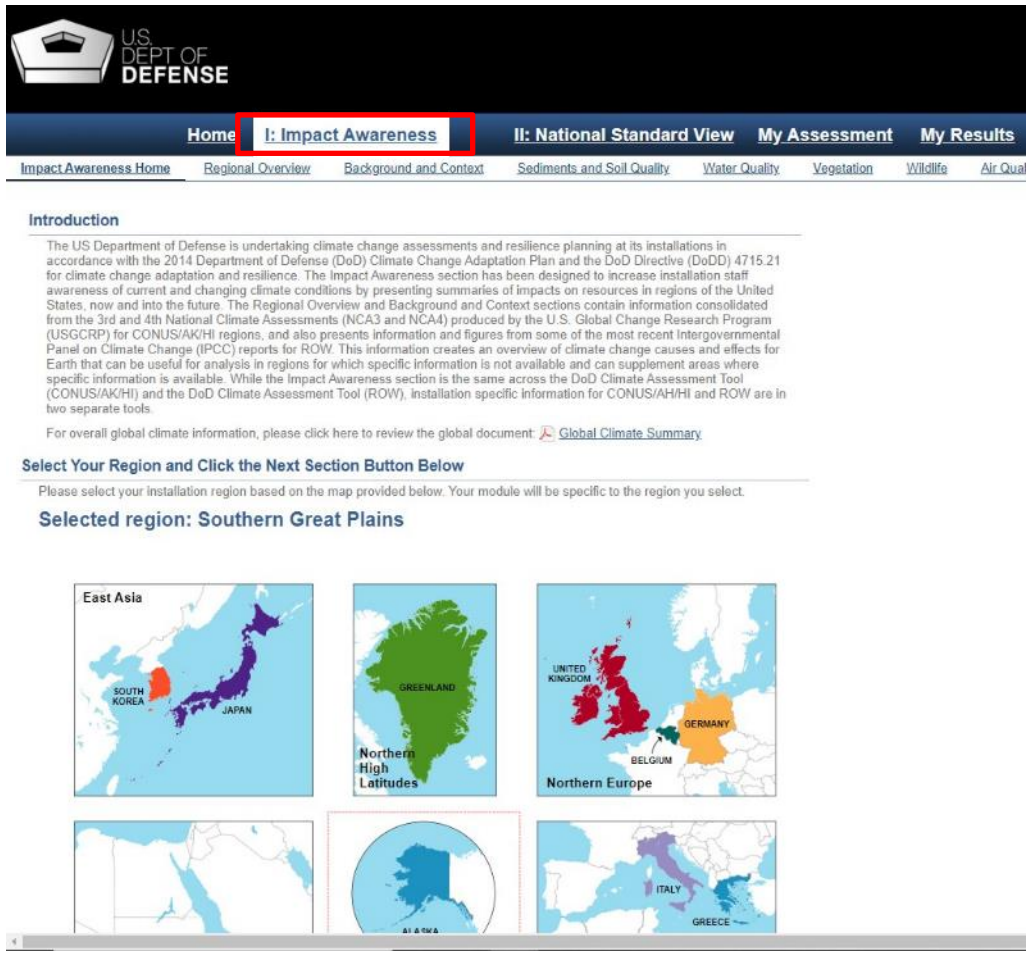
- Within the DCAT Tool:
  - Go to "National Standard View", Select "Reports", then click on "Installations Ranked by Weighted WOWA Score" to compare your Installation's score relative to others.

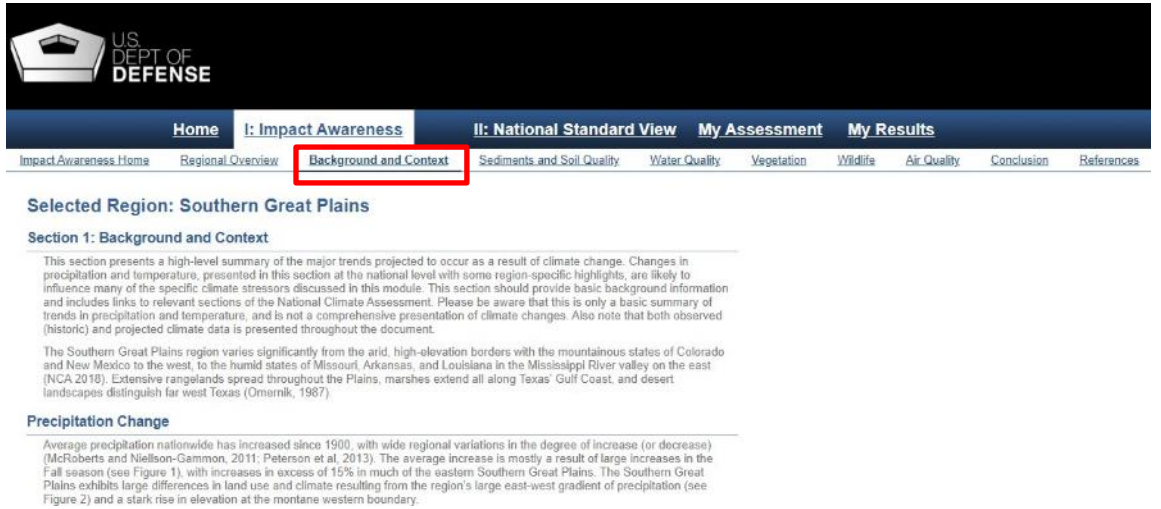




DCAT User Guide – Step 3

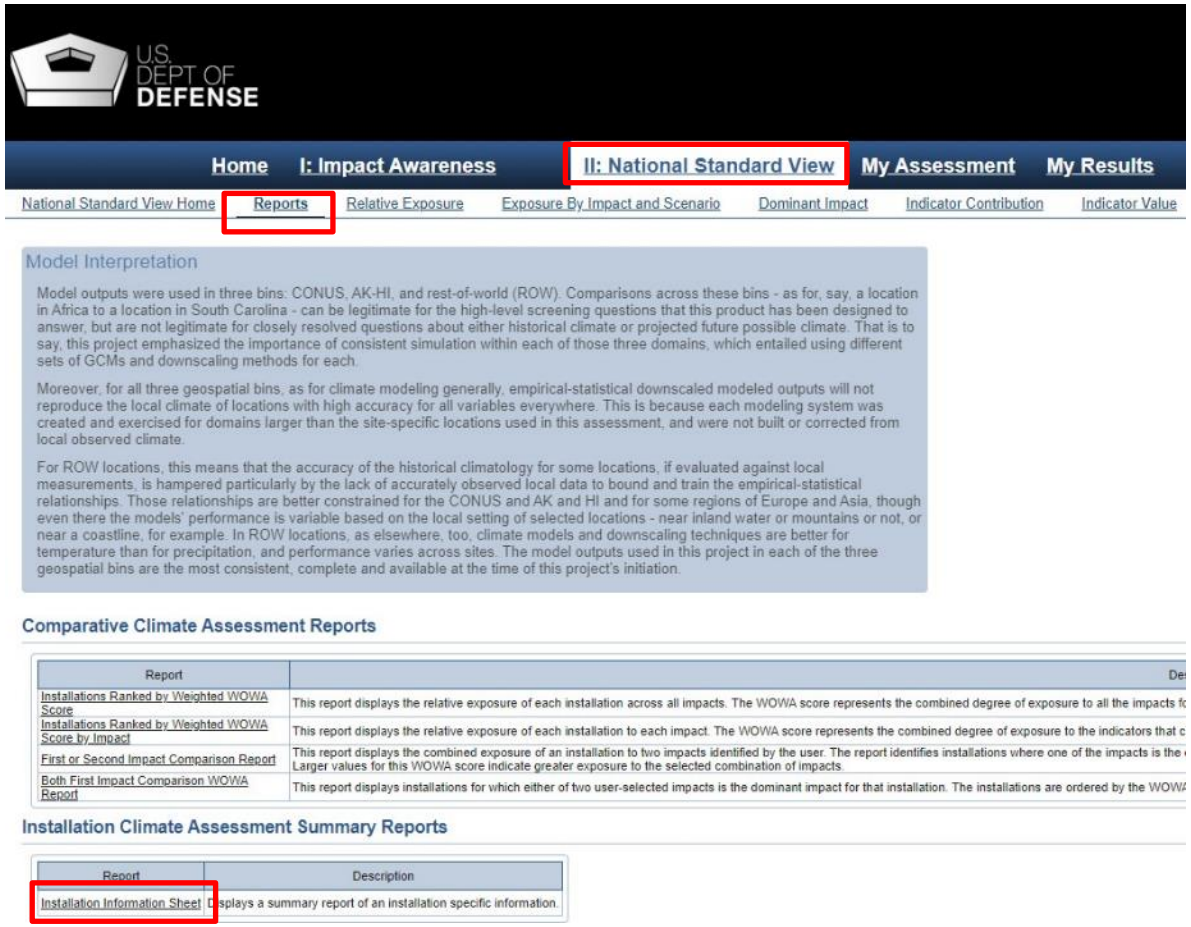
- Click on “Impact Awareness” tab, select your region, and work through each of the tabs (“Regional Overview”, Background and Context”…. “References”) and collect what seems to you to be significant climate information and/or graphics you might use in a report

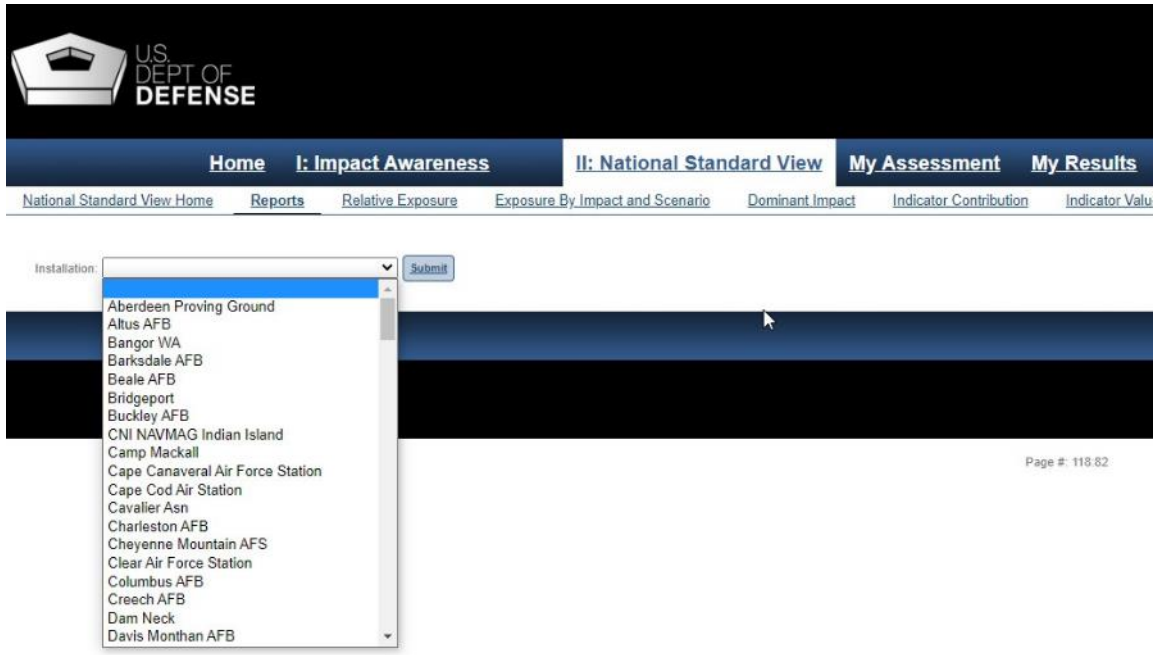




DCAT User Guide – Step 4

- Under “National Standard View”, “Reports”, click on “Installation Information Sheet” at the bottom of the page. Select your Installation from the drop-down menu and click “Submit”.





DCAT User Guide – Step 4 (Continued)

- The "Key Messages" and Installation hazards (for all four scenarios) including coastal and riverine flood inundation percentages (percentage of Installation area inundated for that scenario), if applicable, are displayed

This table identifies the hazards to this installation due to climate and climate change across all eight impact categories.

Hazards

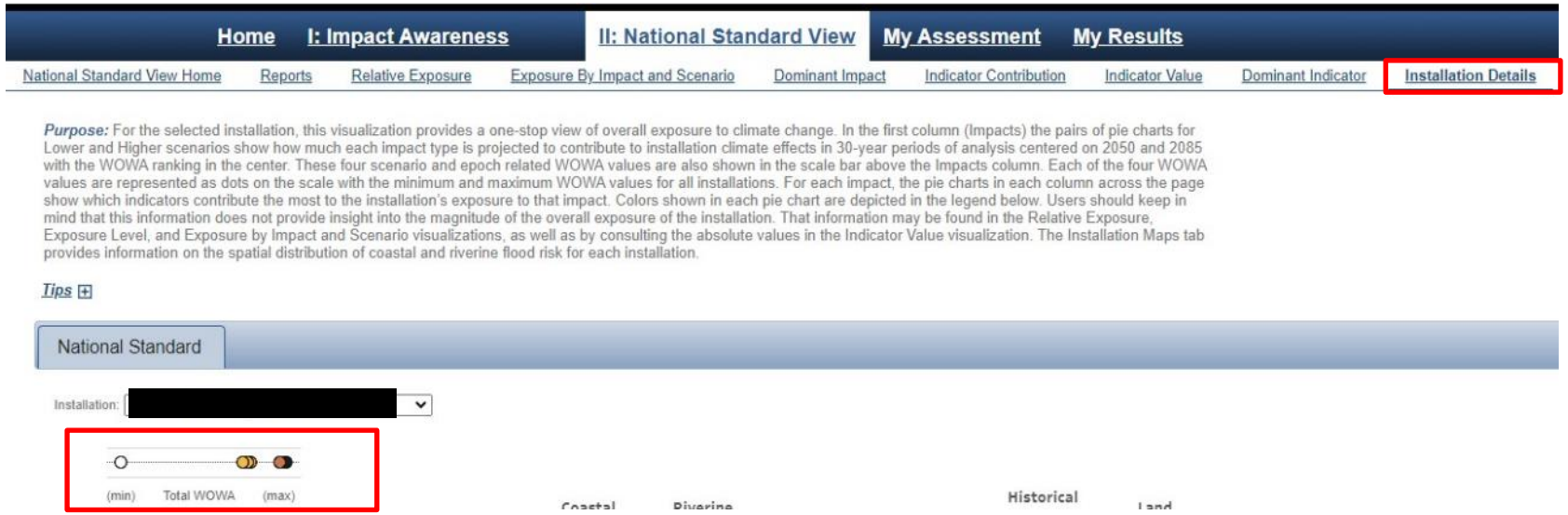
Impact Category	2050 - Lower	2050 - Higher	2085 - Lower	2085 - Higher
Coastal Flooding	X	X	X	X
Drought	X	X	X	X
Energy Demand	X	X	X	X
Heat	X	X	X	X
Historical Extreme Conditions	X	X	X	X
Land Degradation	X	X	X	X
Riverine Flooding	X	X	X	X
Wildfire	X	X	X	X

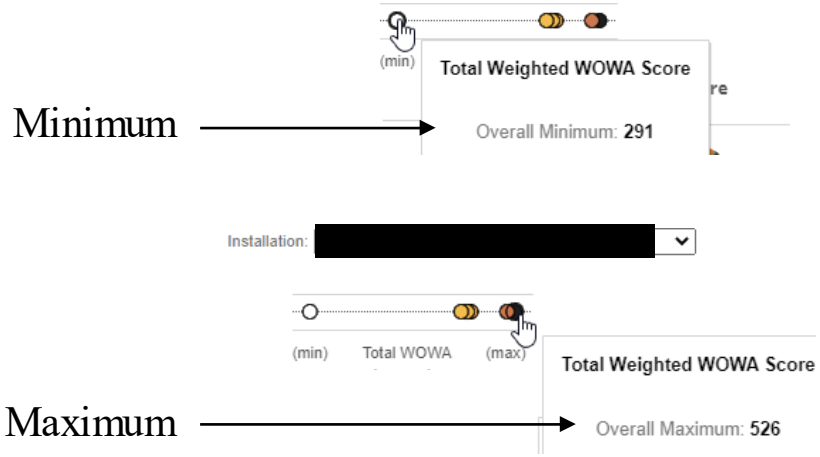
Flood Inundation Percent

Indicator	2050 - Lower	2050 - Higher	2085 - Lower	2085 - Higher
Coastal Flood Extent	[redacted]			
Riverine Flood Extent				

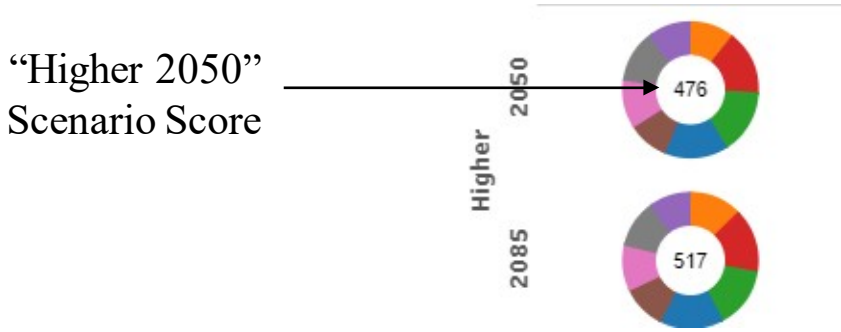
DCAT User Guide – Step 5

- Click on "Installation Details". Identify where your Installation falls, for each of the four scenarios, relative to others, in the slider bar at the top left above the "doughnuts".



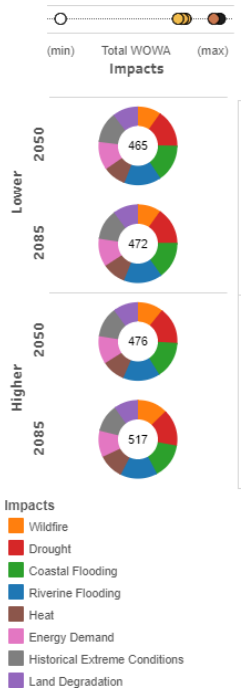


- In this example, the overall minimum and maximum scores among all Installations is 291 and 526, respectively. Therefore, for scenario "Higher 2050" with a score of 476, this Installation falls in the 79th percentile of all Installations, i.e., 79 percent of all installations have a score lower than 476.

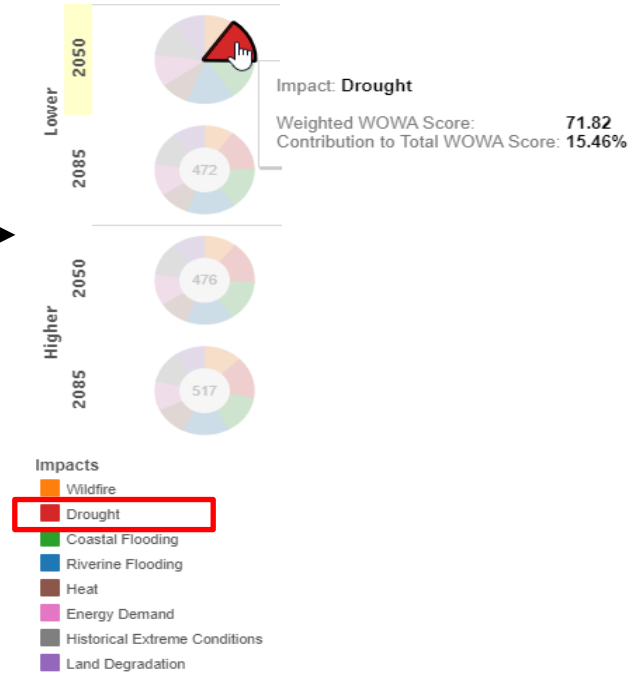


DCAT User Guide – Step 5 (Continued)

- On "Installation Details", review the information in the doughnuts and the pies to get a feel for the major contributors of exposure for your location and how these might change over time and between scenarios (or not).
- In the first column ("Impacts") the pairs of "donuts" for Lower and Higher scenarios show how much each of the eight (8) hazard types is projected to contribute to installation climate effects in 30-year periods of analysis centered on 2050 and 2085 with the score in the center of the "donut".

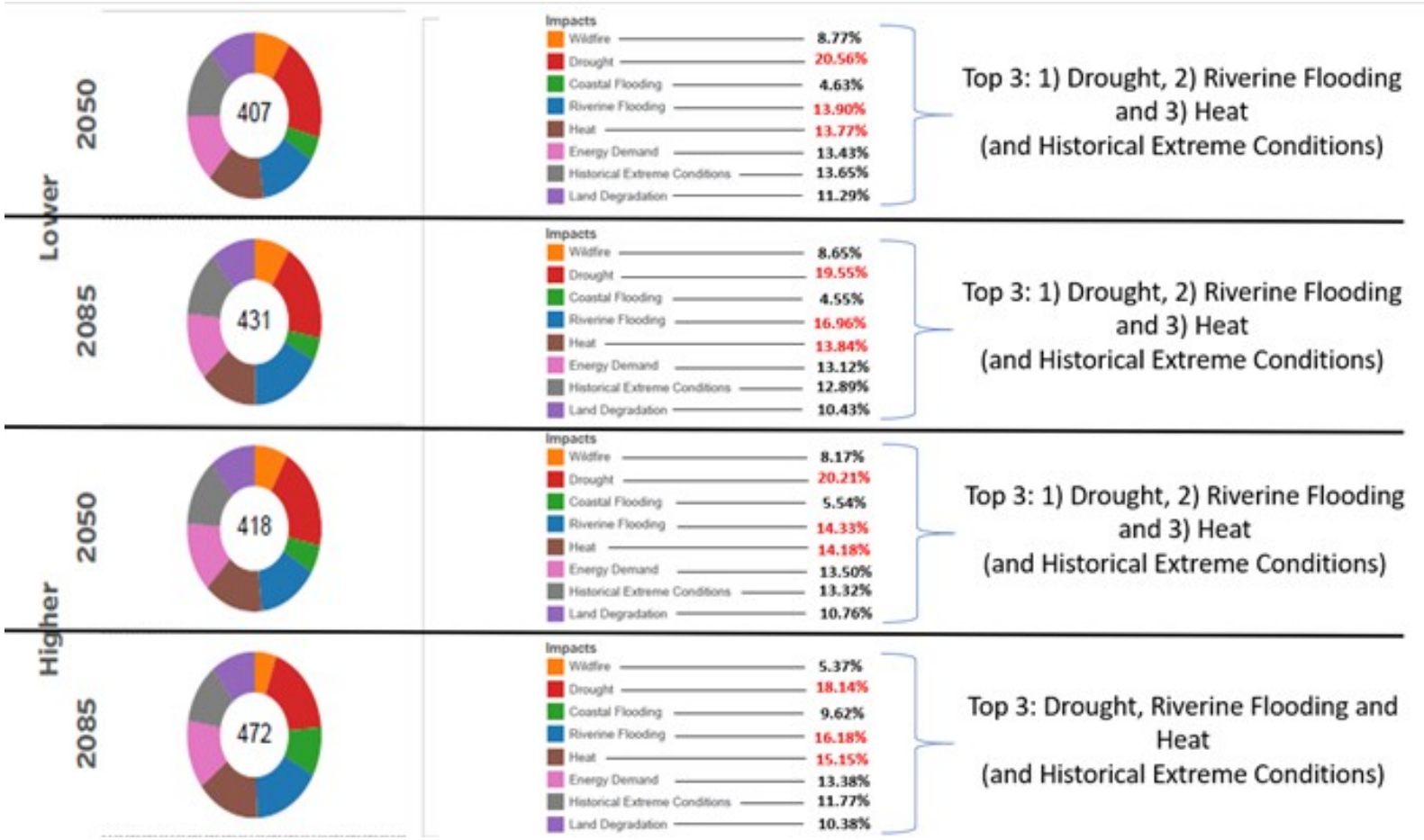


- Clicking on any of the "pie slices" of a donut will provide the contribution of that hazard to the total score for that scenario, both as a score and as a percentage. In this example, for the "Lower 2050" scenario, clicking on the "Drought" hazard shows the score for Drought to be 71.82, which is 15.46% of the total score (465) for this scenario. As the Drought hazard has the largest percentage contribution among the eight hazards, it is the dominant hazard for this Installation and for this scenario.



DCAT User Guide – Step 5 (Continued)

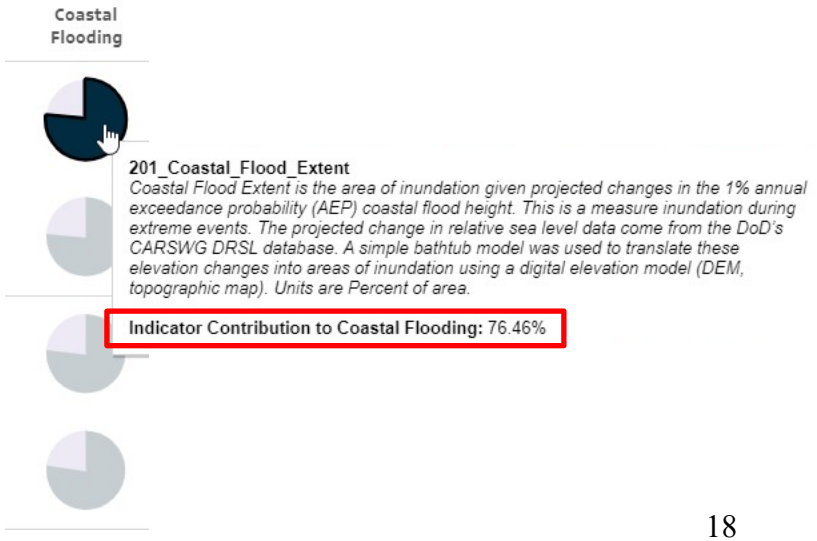
- On "Installation Details", while reviewing the information in the donuts, it is useful to produce a chart like the one shown here to summarize the major hazards and their relative influence, including any change, across the four scenarios. For example, this chart shows that the top three hazards (Drought, Riverine Flooding and Heat) do not change across the four scenarios, and neither does the order of importance (Drought being always dominant) but their relative contributions change (Drought changes from 20.56% in Lower 2050 to 18.14% in Higher 2085).



DCAT User Guide – Step 5 (Continued)

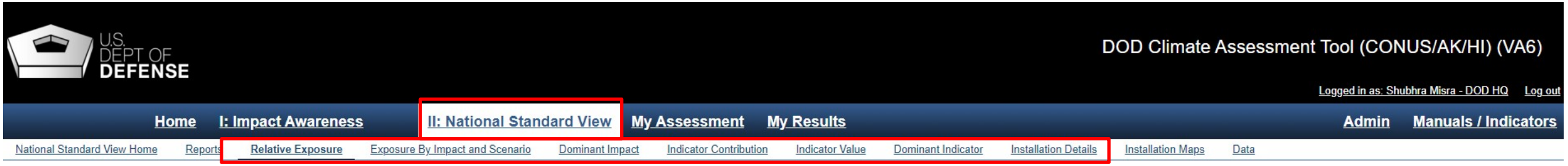
- On “Installation Details”, review the information in the Hazard pies to get a feel for the major contributors (“Indicators”) of exposure for your location and how these might change over time and between scenarios (or not).
- Clicking on the Hazard at the top of the pies will show the Indicators (listed below) to the hazard

- Clicking on the Indicator(s) on the pie will show the percentage contribution of that Indicator to that Hazard. In the example below, for scenario “Lower 2050”, “Coastal Flood Extent” Indicator contributes 76.46% to the “Coastal Flooding” Hazard.

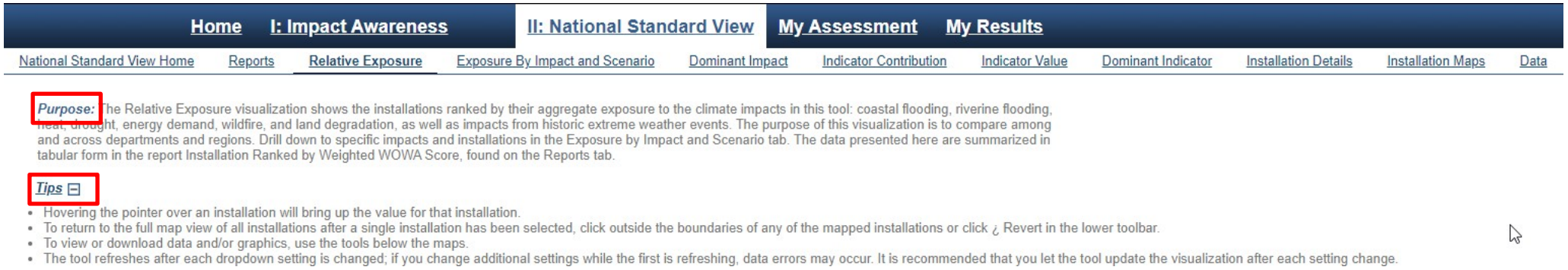


DCAT User Guide – Step 6

- Move through each of the "National Standard View" tabs ("Relative Exposure", "Exposure by Impact and Scenario", "Dominant Impact", "Indicator Contribution", "Indicator Value", Dominant Indicator") collecting downloads (or screenshots) as you go for later use in write-up whenever you feel these might be pertinent for decision-making. Each tab has drop-down menus for selection of scenarios, Installation etc. and additional instructions on interpreting the graphics



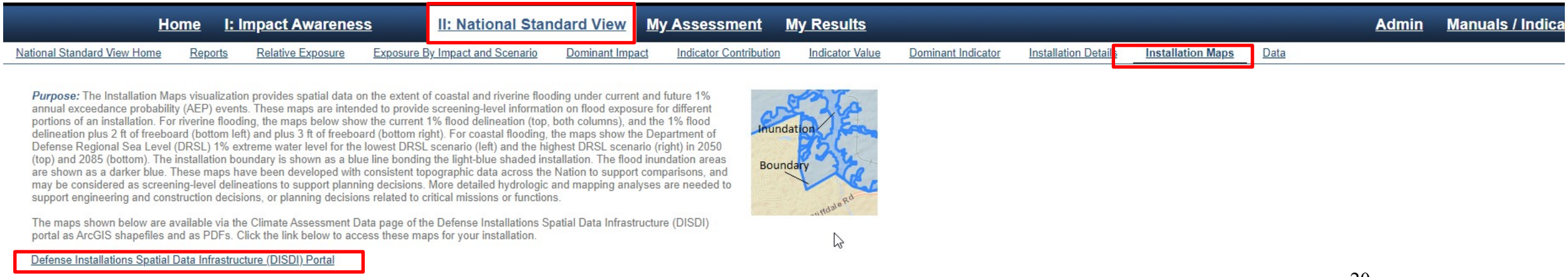
- Each tab has a "Purpose" description of the contents, as well as "Tips" for interpreting the results/graphics, drop-down menus for selection of Installation, scenarios etc.



DCAT User Guide – Step 7

- Within the "National Standard View" tab, click on the "Installation Maps" tab.
- The visualization provides spatial data on the extent of coastal and riverine flooding under current and future 1% annual exceedance probability (AEP) events. For riverine flooding, the maps show the current 1% flood delineation (top, both columns), and the 1% flood delineation plus 2 ft of freeboard (bottom left) and plus 3 ft of freeboard (bottom right). For coastal flooding, the maps show the Department of Defense Regional Sea Level (DRSL) 1% extreme water level for the lowest DRSL scenario (left) and the highest DRSL scenario (right) in 2050 (top) and 2085 (bottom).

- The maps shown are available via the Climate Assessment Data page of the Defense Installations Spatial Data Infrastructure (DISDI) portal as ArcGIS shapefiles and as PDFs. Click the DISDI Portal link.



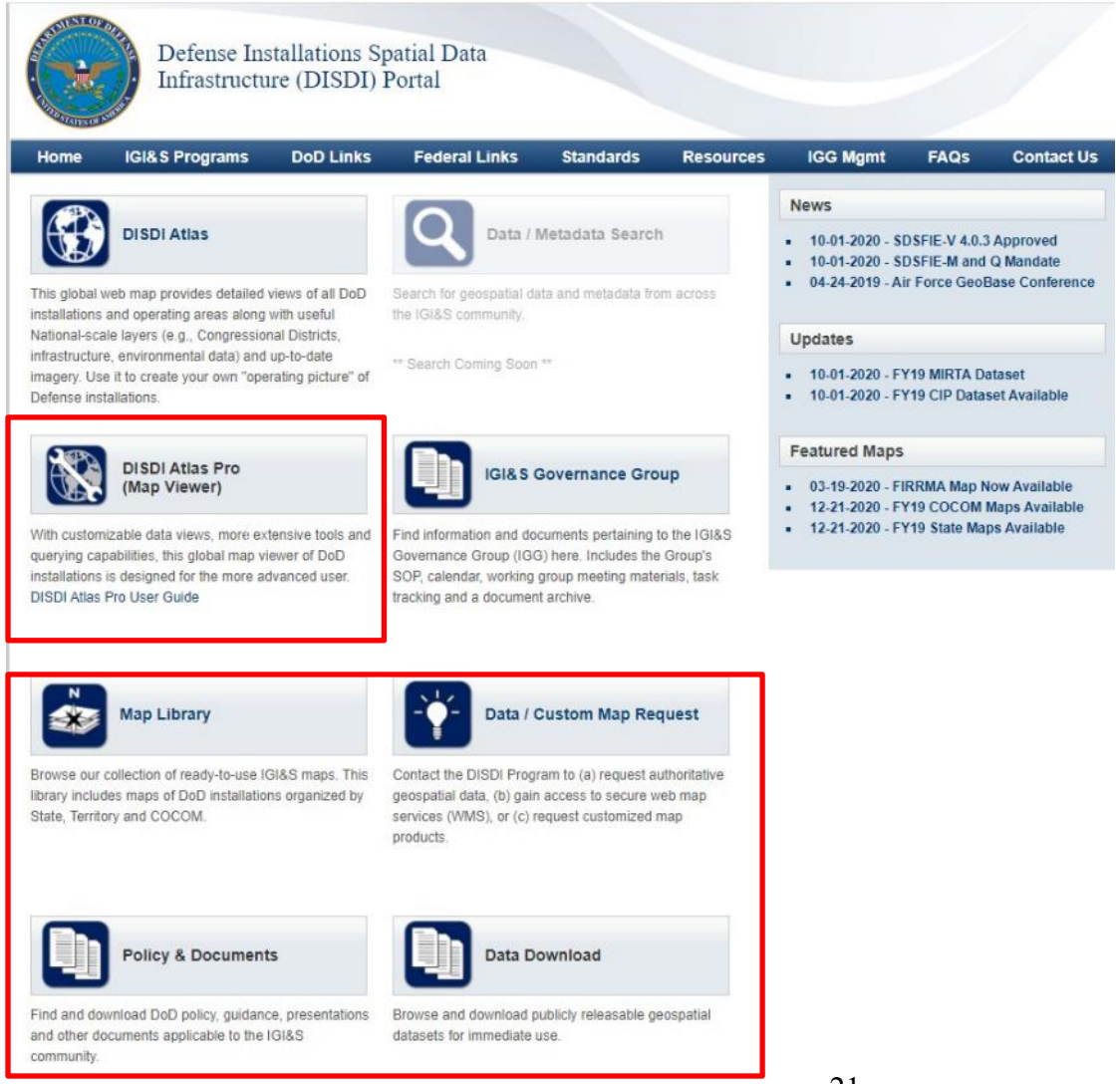
Defense Installations Spatial Data Infrastructure (DISDI) Portal

DISDI Portal provides data and information supplementary to DCAT

https://rsgisias.crrel.usace.army.mil/disdiportal/f?p=166:5: (CAC-enabled access)

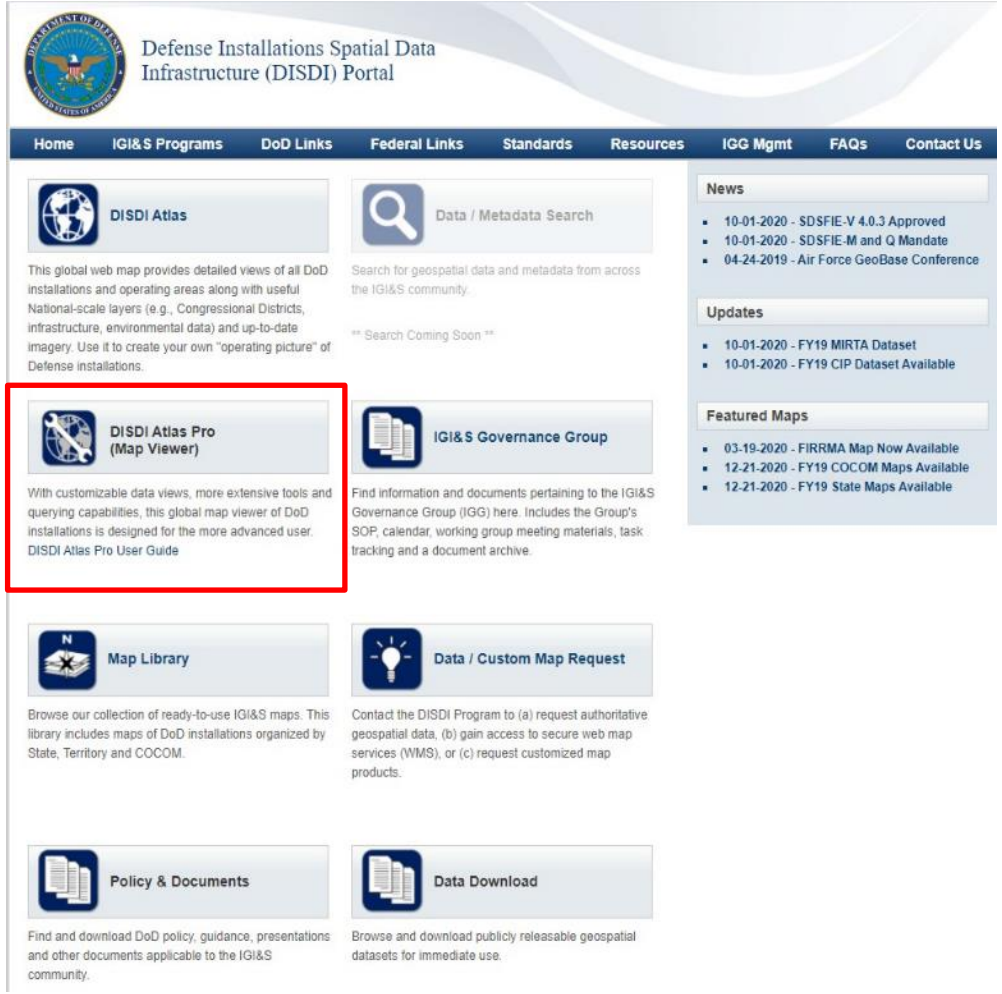
The DISDI Atlas Pro web map provides detailed views of all DoD installations and operating areas along with useful National-scale layers (e.g., Congressional Districts, infrastructure, environmental data) and up-to-date imagery. The user can create their own "operating picture" of Defense installations. A User Guide in pdf format is available for download.

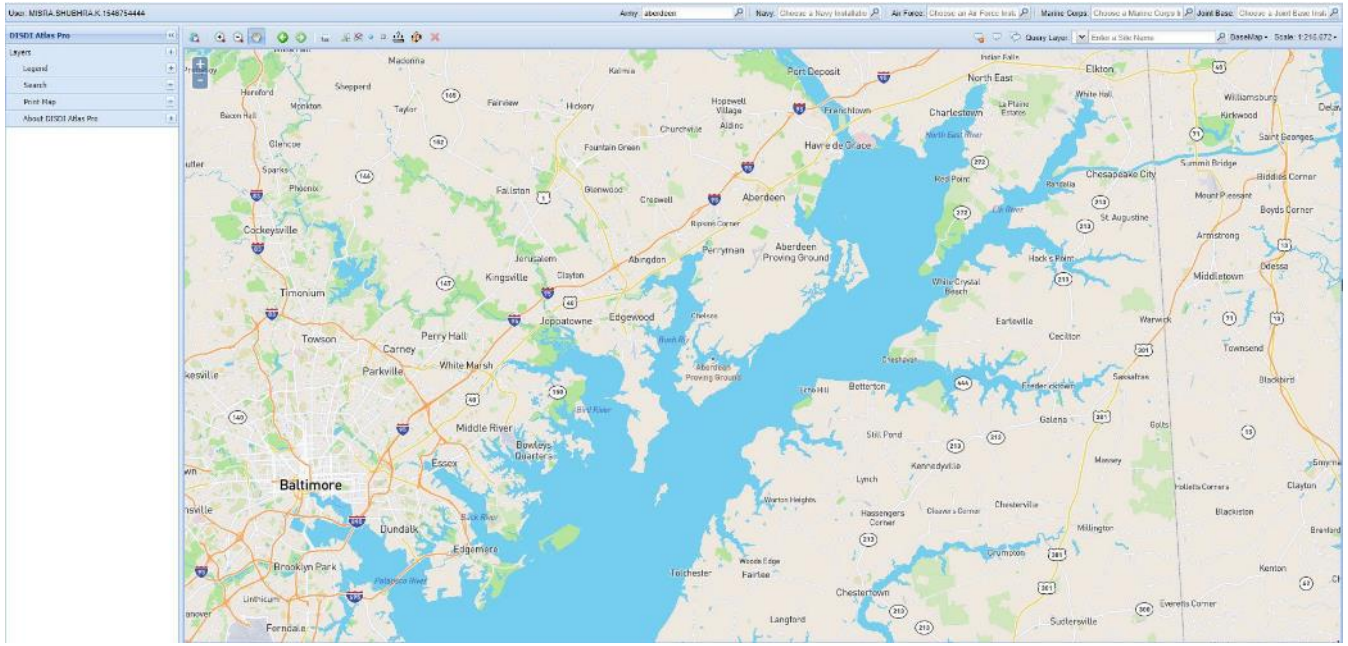
Installations and climate exposure data and maps are also available for download; custom maps and data can also be requested



DCAT User Guide – Step 8

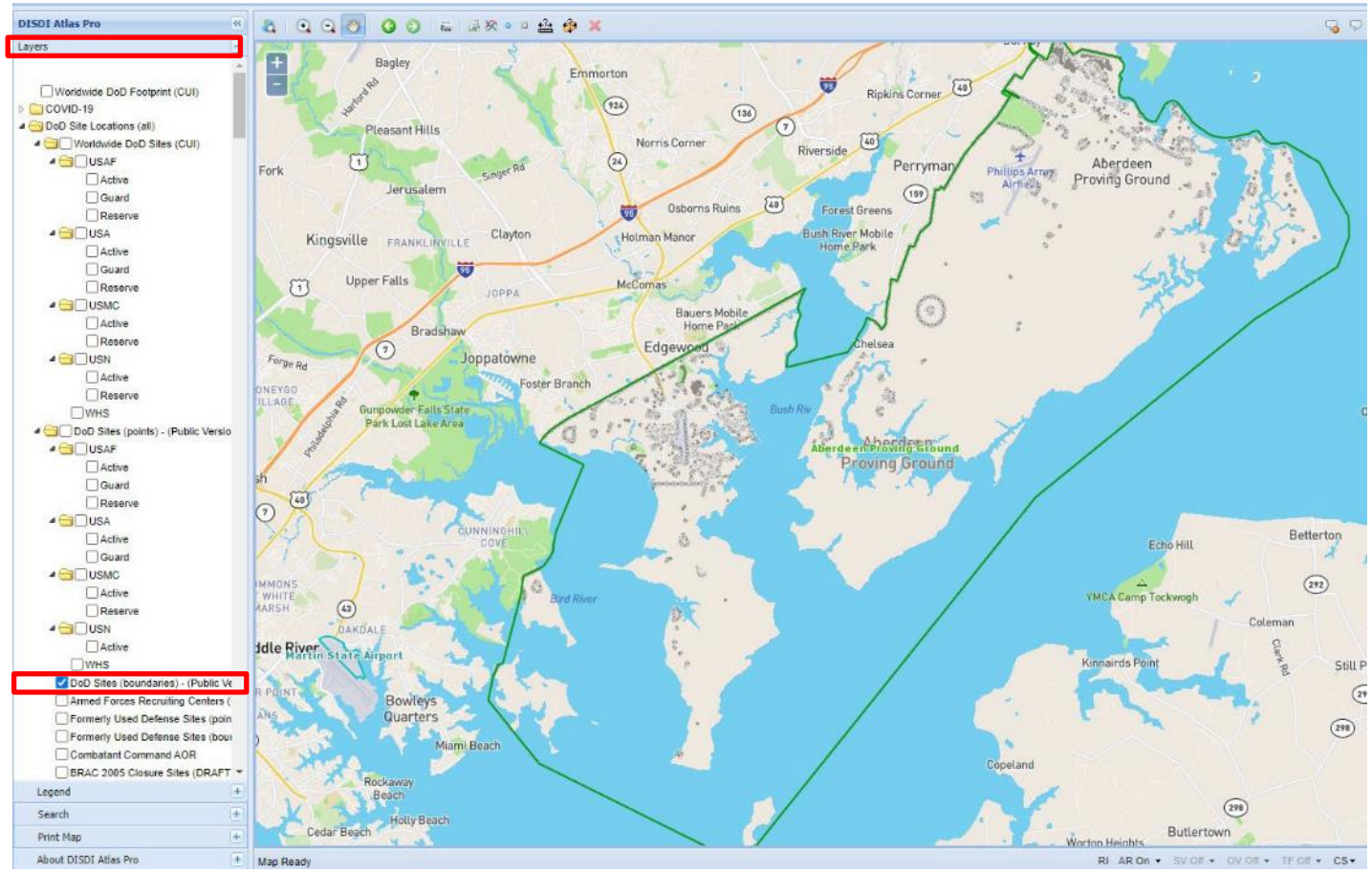
- On the DISDI portal, click "DISDI Atlas Pro (Map Viewer)". Either zoom in to your Installation area or search for your Installation





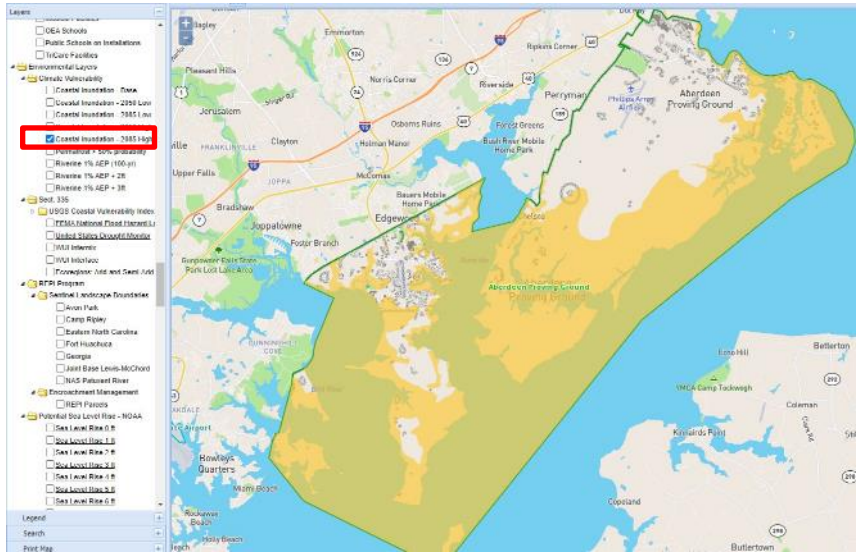
DCAT User Guide – Step 8 (Continued)

- Click on “Layers” to expand the “Layers” tab and select one or more sub-layers to show on the map. In the example to the right, the sub-layer “DoD Site Boundaries (Public Version)” has been selected to highlight the Aberdeen Proving Ground Installation boundary.
- A variety of layers are available to be superimposed on the Installation boundary layer to assess the exposure of the Installation to the hazard. For example, Coastal Inundation extents for all four scenarios, and Riverine Inundation extents at 1% AEP (100-year) can be visualized. See next slide for inundation extent visualizations.

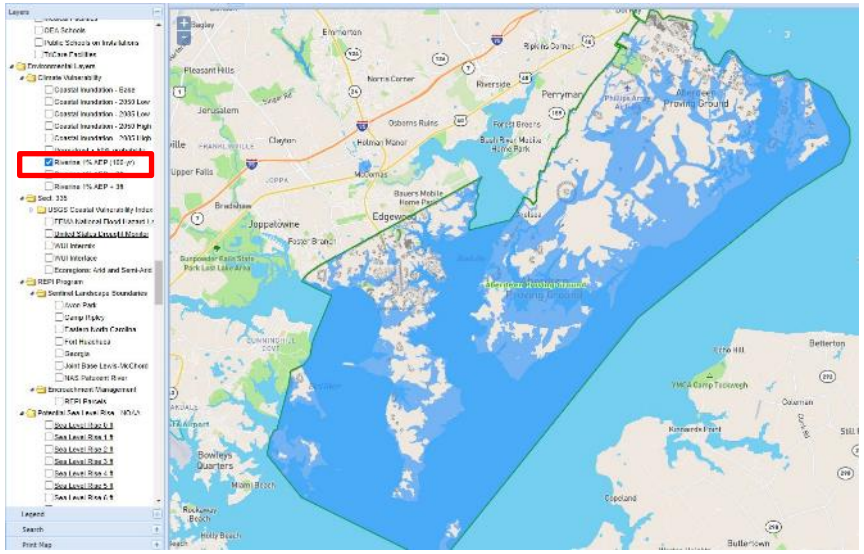


DCAT User Guide – Step 8 (Continued)

- Coastal Inundation (2085 High) layer superimposed on Installation boundary layer

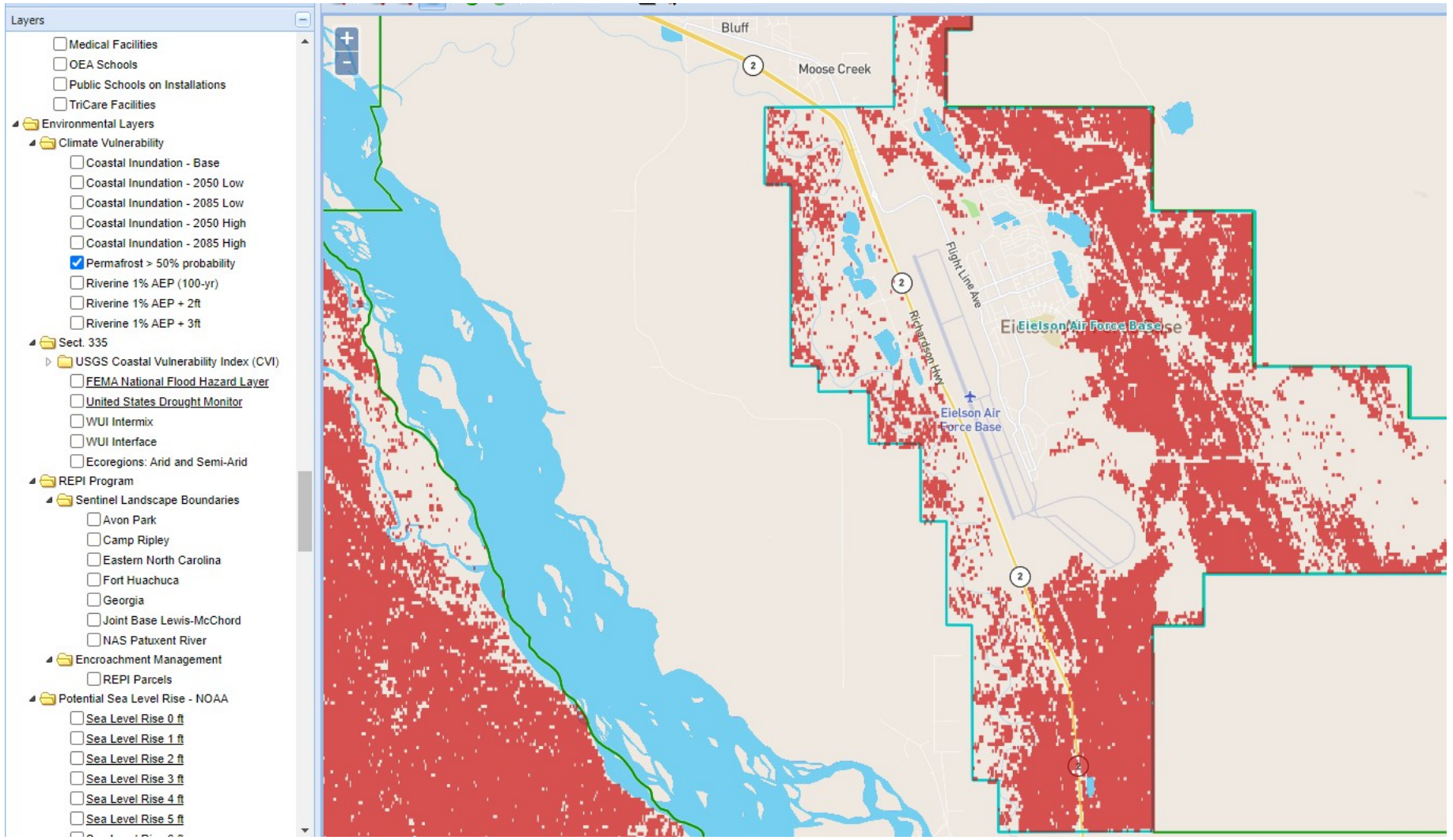


- Riverine Flooding (1% AEP/100-year) layer superimposed on Installation boundary layer



DCAT User Guide – Step 8 (Contd.)

- Permafrost potential (likelihood of permafrost > 50%) overlain on Installation boundary



Key Takeaways

1. Climate hazard exposure across all installations increases through time for scenarios of both lower and higher warming.
2. Climate hazard exposure is more pronounced for the later epoch (2085) and the scenarios of higher warming.
3. For most hazards, there is close similarity in values between the 2085 lower and 2050 higher conditions.
4. Differences in the degree of exposure to hazards are similar across both scenarios until mid-century, when they diverge.
5. Hazards more directly tied to temperature change (e.g., heat, drought, wildfire) show larger increases in exposure under the 2085 higher scenario than other hazards.
6. Slower increases in exposure with time are evident for other hazards (e.g., coastal flooding, energy demand, land degradation).
7. Drought is the dominant indicator across all epoch-scenarios for DoD and for the individual Departments.
8. There is no epoch-scenario combination under which installation exposure to climate hazards is projected to decrease.

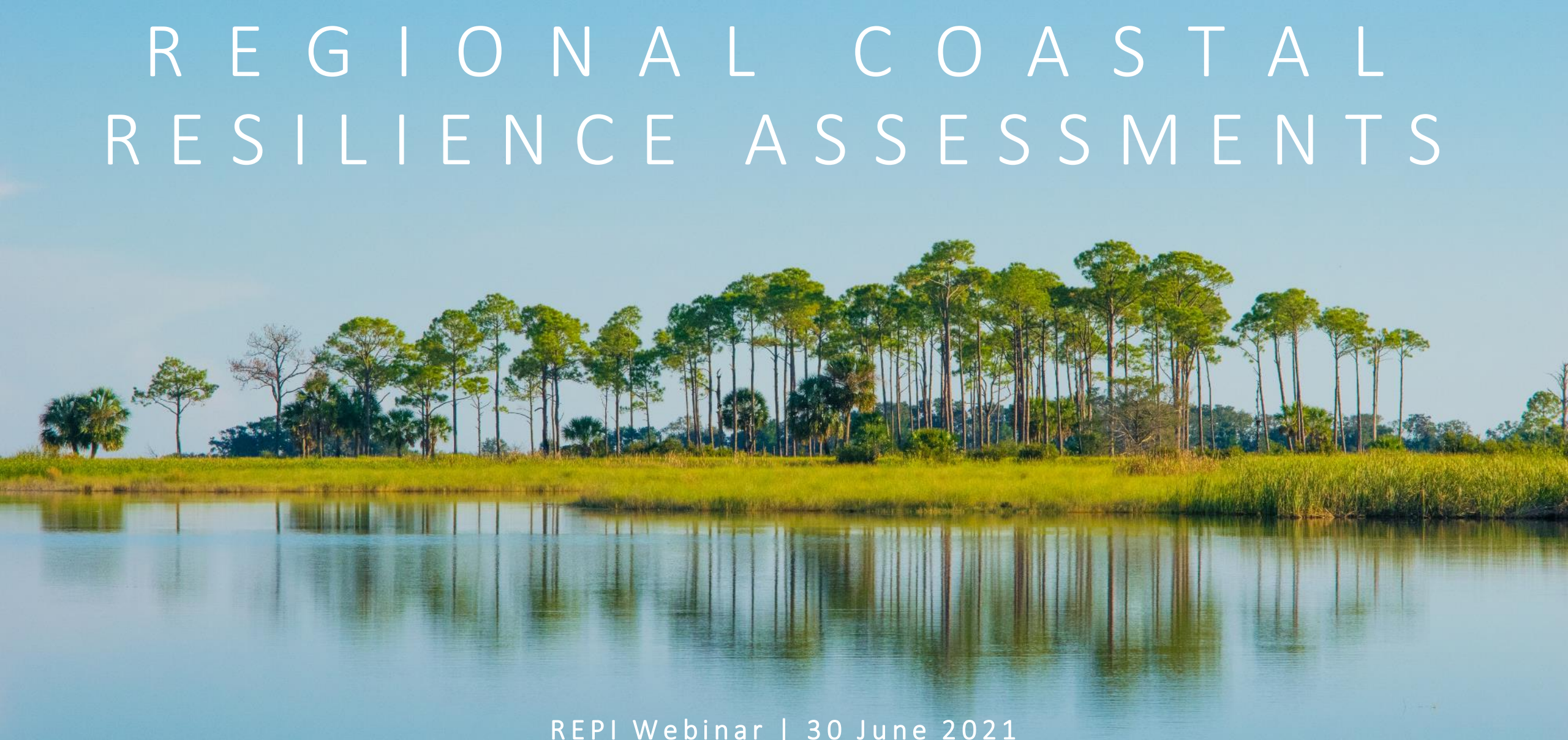
Summary

- Exposure to climate change hazards is not a new problem for DoD installations, but **the nature and severity of the problem is changing**.
- The **costs and consequences for failing to adapt are increasing, as are the benefits of improved climate resilience**.
- The **DCAT provides an important new capability** for assessing and responding to these threats.
- Identifying the climate hazards to which DoD installations are most **exposed is the first step** in addressing the potential physical harm, security impacts, degradation in readiness, and increased humanitarian deployment needs resulting from global climate change.
  - Site-specific information can be difficult and expensive to obtain.
  - Fortunately, DoD has undertaken a number of site-specific climate-related studies through its Strategic Environmental Research and Development Program (SERDP, 2013) and the Environmental Security Technology Certification Program (ESTCP).
- **Climate change exposure and impacts do not stop at the installation boundary.**

Speakers

- Moderator:
  - **Andy Porth**, Office of the Assistant Secretary of Defense (Sustainment)
- Presenters:
  - **Dr. Shubhra Misra**, DoD Climate Action Team – Climate Preparedness and Resilience
  - **Kristen Byler,** National Fish and Wildlife Foundation
  - **Maria Abadie**, REPI/Booz Allen Hamilton

REGIONAL COASTAL RESILIENCE ASSESSMENTS

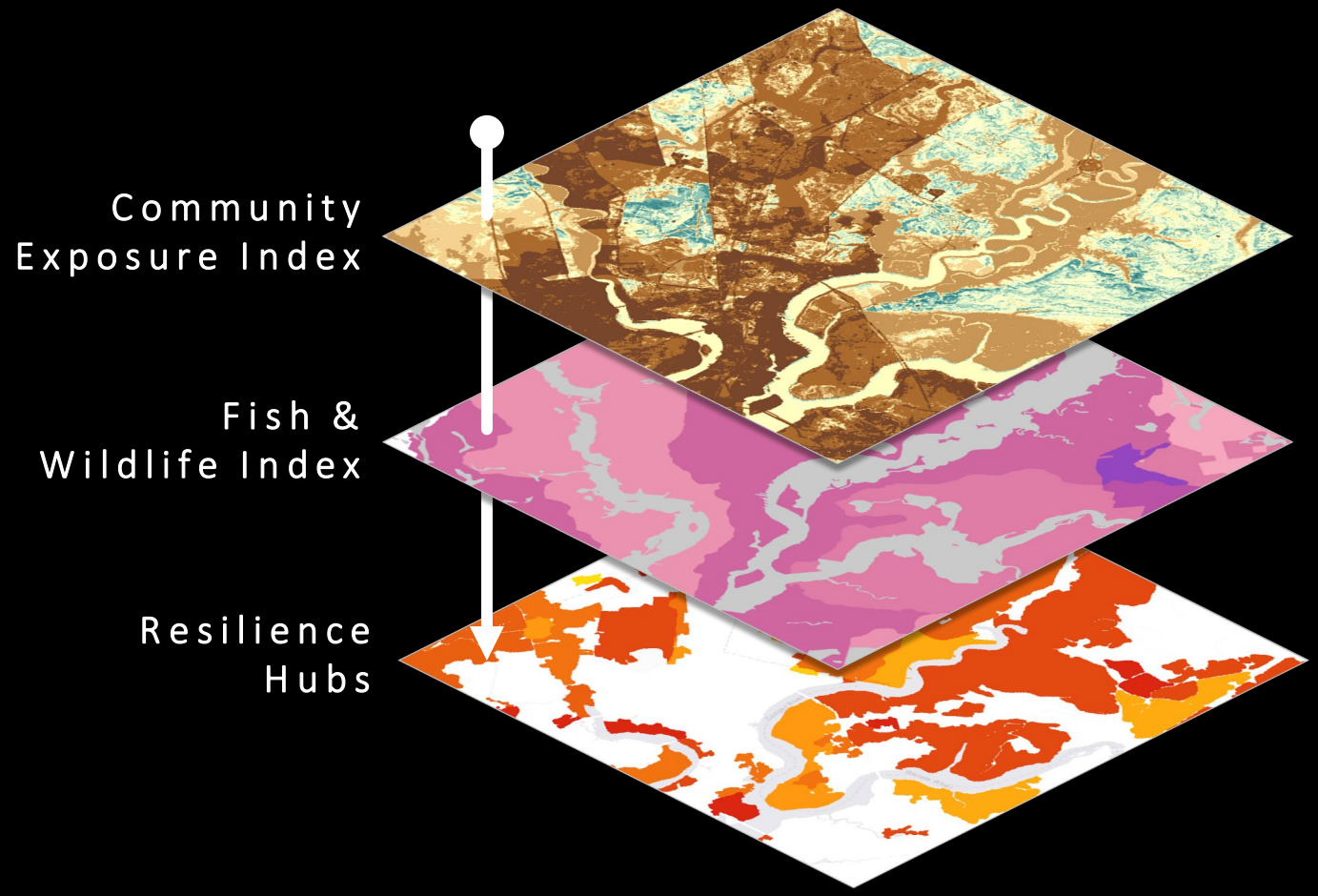


REPI Webinar | 30 June 2021

NFWF | NOAA | UNC Asheville | NEMAC National Environmental Modeling & Analysis Center

St. Marks Wildlife Refuge, Florida

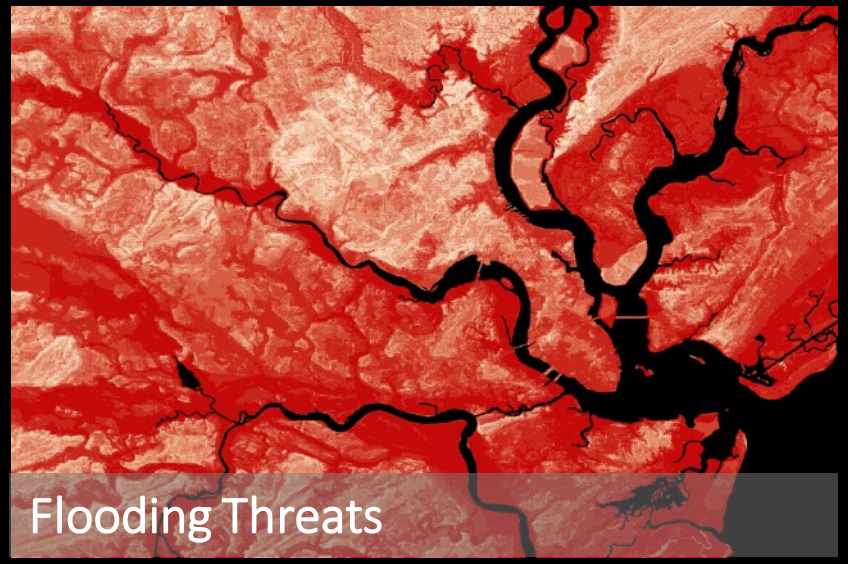
REGIONAL COASTAL RESILIENCE ASSESSMENTS



Identify areas on the landscape where nature-based solutions may maximize *fish and wildlife* benefits and *human community resilience* to flooding threats.

COMMUNITY EXPOSURE INDEX

helps identify where the most people and assets are exposed to flooding threats



Flooding Threats

X

Community Assets

Threat Inputs

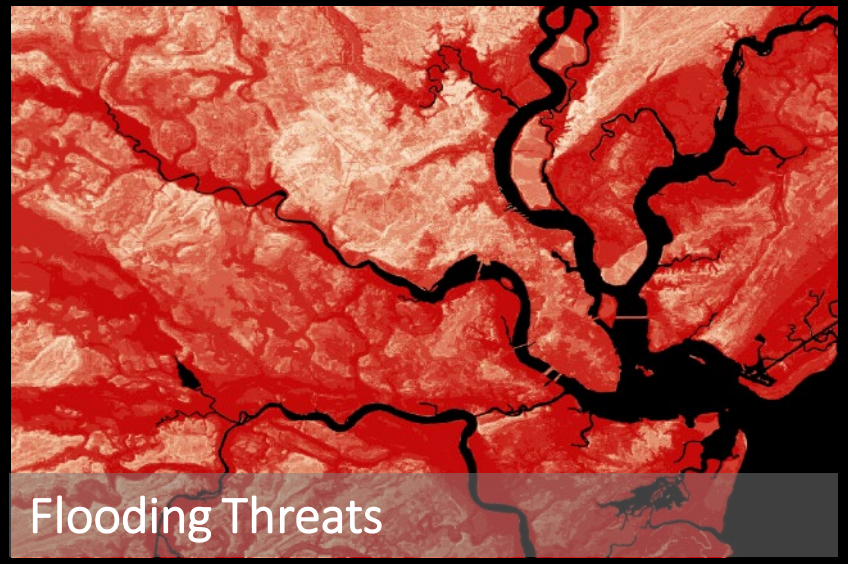
- Storm Surge
- Sea Level Rise
- Flood-prone Areas
- Soil Erodibility
- Impermeable Soils
- Areas of Low Slope
- Geologic Stressors
- Other Regional Stressors

Community Asset Inputs

- Population Density
- Critical Facilities
- Critical Infrastructure
- Social Vulnerability

COMMUNITY EXPOSURE INDEX

helps identify where the most people and assets are exposed to flooding threats



Flooding Threats

x

Community Assets

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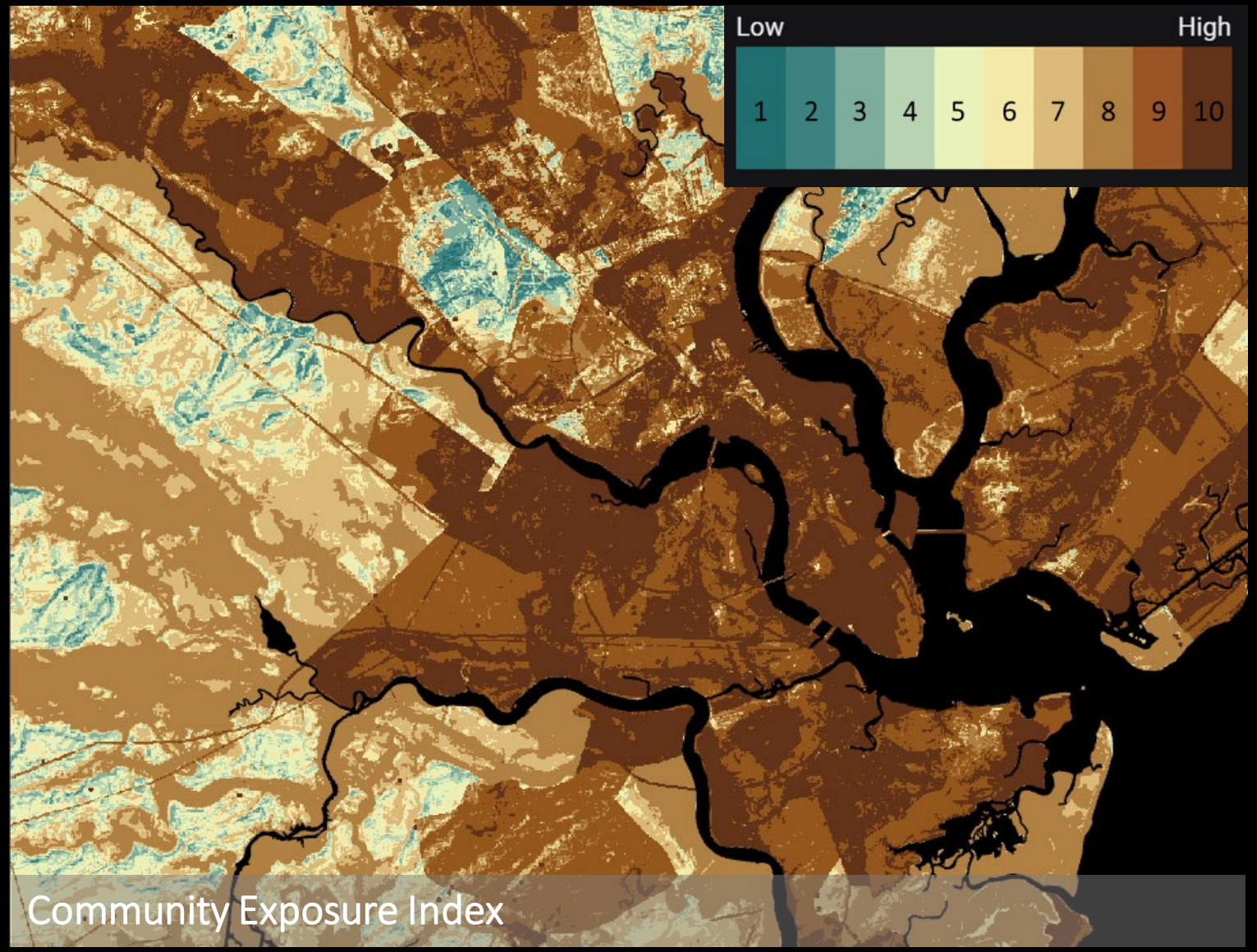

Community Exposure Index

FISH & WILDLIFE INDEX

helps identify where aquatic & terrestrial species of concern are located

+

Terrestrial Inputs

- Species occurrence & habitat suitability
- ESA-Designated Critical Habitat
- BirdLife International Important Bird Areas
- Other Priority Conservation Areas

Aquatic/Marine Inputs

- Species occurrence & nearshore habitat extent
- ESA-Designated Critical Habitat
- NOAA Essential Fish Habitat
- Marine Protected Areas

FISH & WILDLIFE INDEX

helps identify where aquatic & terrestrial species of concern are located

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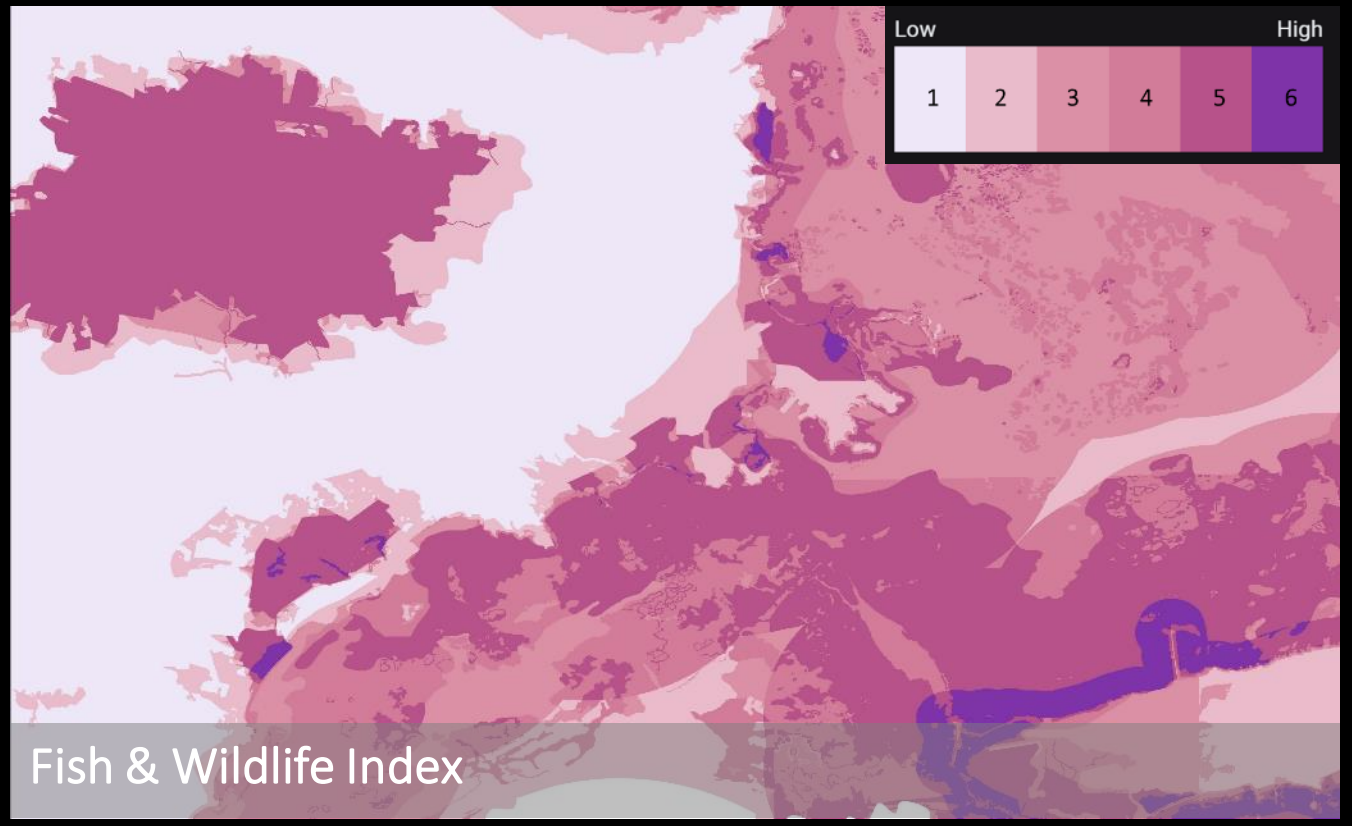
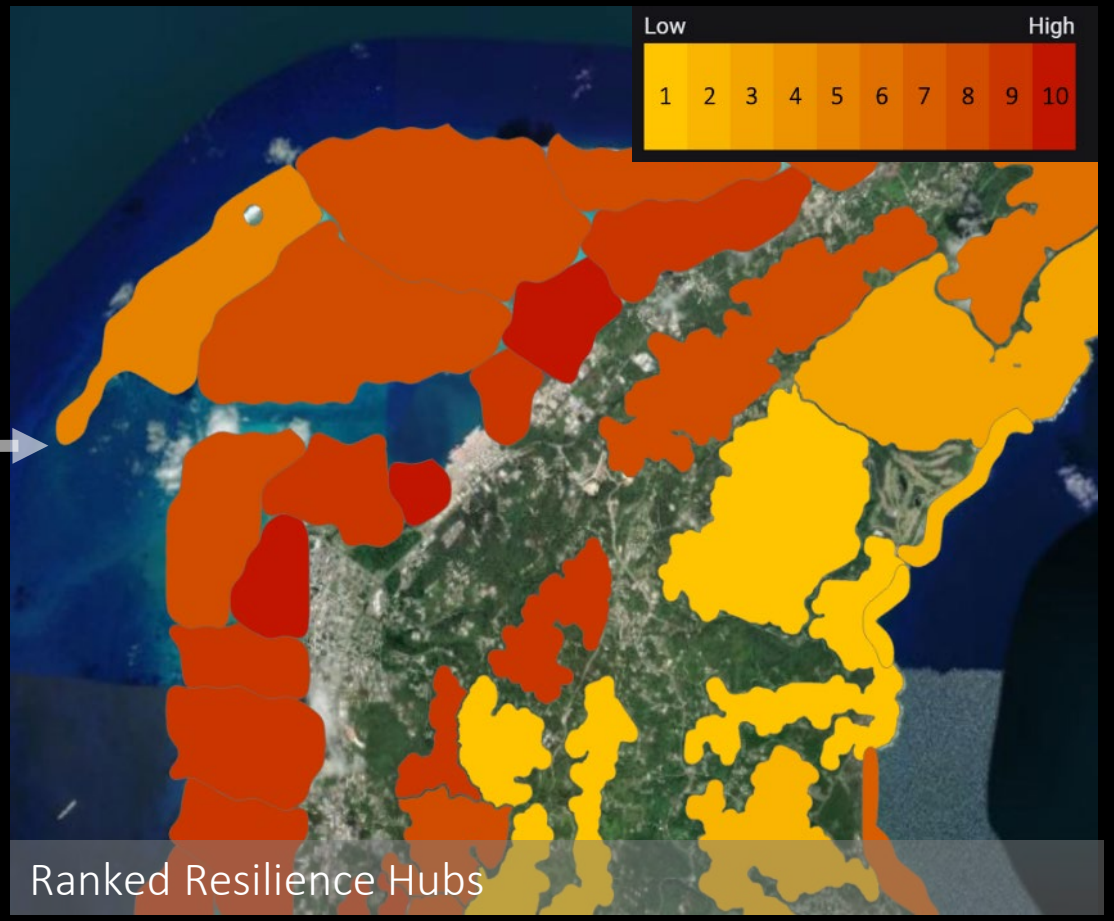


RESILIENCE HUBS

areas of open space where conservation projects may have the greatest potential to benefit both human community resilience and fish and wildlife



Coastal Resilience Evaluation and Siting Tool (CREST)

Home | Where Should I Do a Resilience Project? | Analyze Project Sites | Targeted Watersheds | Examples | Data & Reports | About

Coastal Resilience Evaluation and Siting Tool (CREST)

CREST is used to make informed decisions about the siting of coastal restoration and resilience projects. The tool identifies Resilience Hubs, which are areas of open space where projects may have the greatest potential to benefit both human community resilience and fish and wildlife. Resilience Hubs incorporate multiple indices, all of which are available in CREST.

Select a region to start using CREST

Continental U.S.

Continental U.S

Hawai'i

Hawai'i

Northern Mariana Islands

Northern Mariana Islands

Puerto Rico

Puerto Rico

U.S. Virgin Islands

U.S. Virgin Islands

resilientcoasts.org

THANK YOU

Kristen Byler
kristen.byler@nfwf.org

Red mangrove & seagrass

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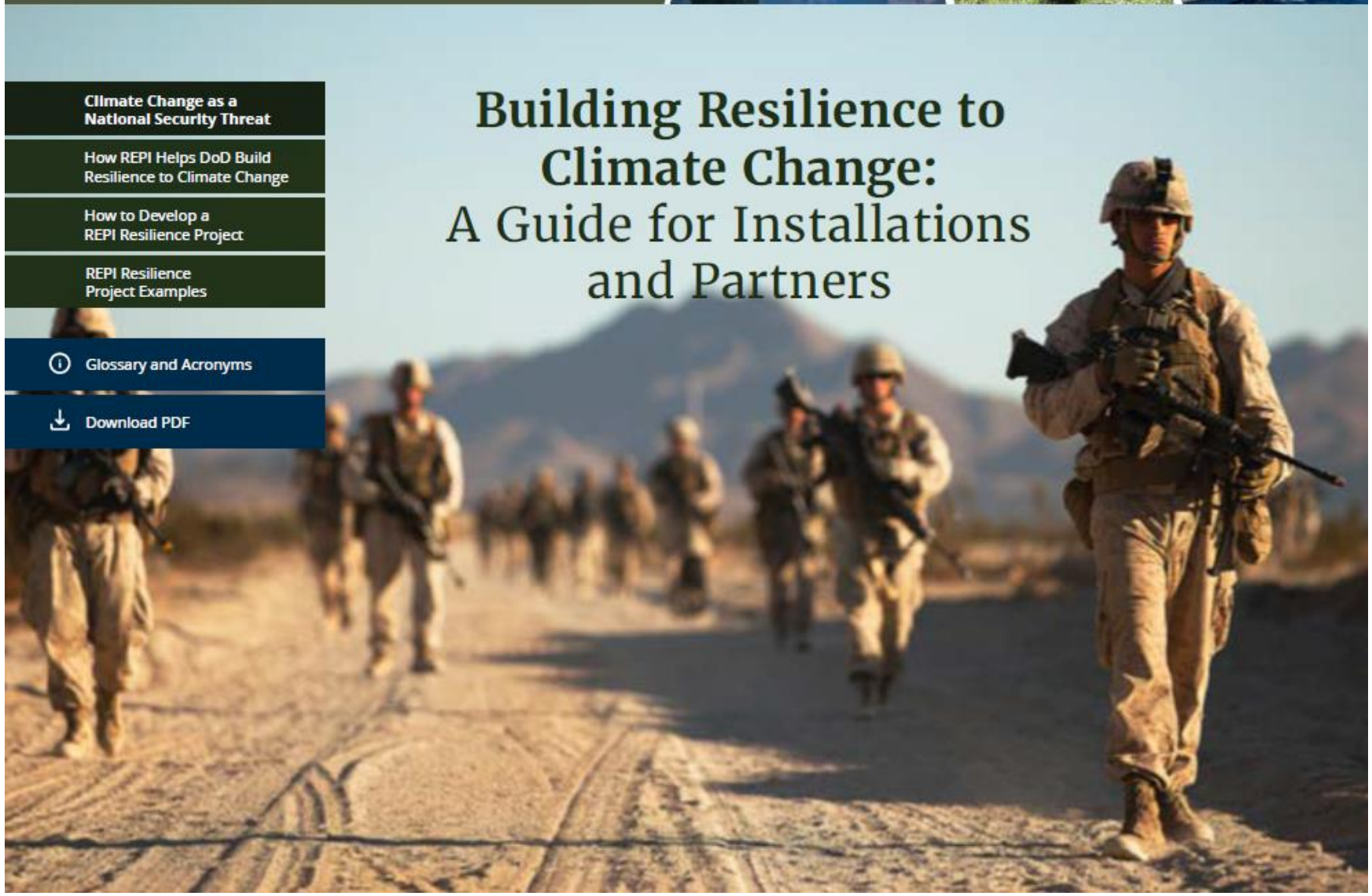
UNITED STATES DEPARTMENT OF DEFENSE

REPI READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION PROGRAM

Building Resilience to Climate Change: A Guide for Installations and Partners



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Climate Change Impacts That Threaten Military Activities

Numerous climate change impacts threaten military installations. The most common are:

Coastal and Riverine Flooding

Common Causes
- Extreme weather events
- Prolonged rainfall
- Storm surge
- High tides
- Sea level rise

+ Learn More

Desertification

Common Causes
- Land degradation
- Overgrazing
- Urbanization

+ Learn More

Drought

Common Causes
- Little or no rain fall
- Warmer temperatures
- Depleted soil moisture levels

+ Learn More

Thawing Permafrost

Common Causes
- Warmer temperatures
- Infrastructure emplacement
- Climate variability

+ Learn More

Wildfires

Common Causes
- Human-caused fires
- Warmer temperatures
- Lightning
- Unmanaged forests

+ Learn More

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Desertification

Common Causes
- Land degradation
- Overgrazing
- Urbanization

Effects on Military Operations
- Increased soil fragility, which limits future testing exercises
- Increased runoff from precipitation events, which affects the suitability of the landscape for off-road use

Installation Examples

About 27 percent of **White Sands Missile Range**, NM, is covered by grasslands. Desertification from past grazing practices and changes in precipitation patterns has led to an increase in the number of shrubs and cacti, which are highly vulnerable to wildfire spread.

Close

Common Causes
- Human-caused fires
- Warmer temperatures
- Lightning
- Unmanaged forests

+ Learn More

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Examples of Natural Infrastructure Solutions

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Natural Infrastructure Solutions

CONSTRUCTING LIVING SHORELINES

Solution: Constructing Living Shorelines

Climate Impact: Recurrent Flooding

A living shoreline is a stabilized shoreline made of plants or organic materials, such as oyster shells. Living shorelines protect the coast from storm surge and erosion, by absorbing wave energy and acting as a natural buffer to upland areas. They also store carbon, improve water quality, and provide habitat for species.

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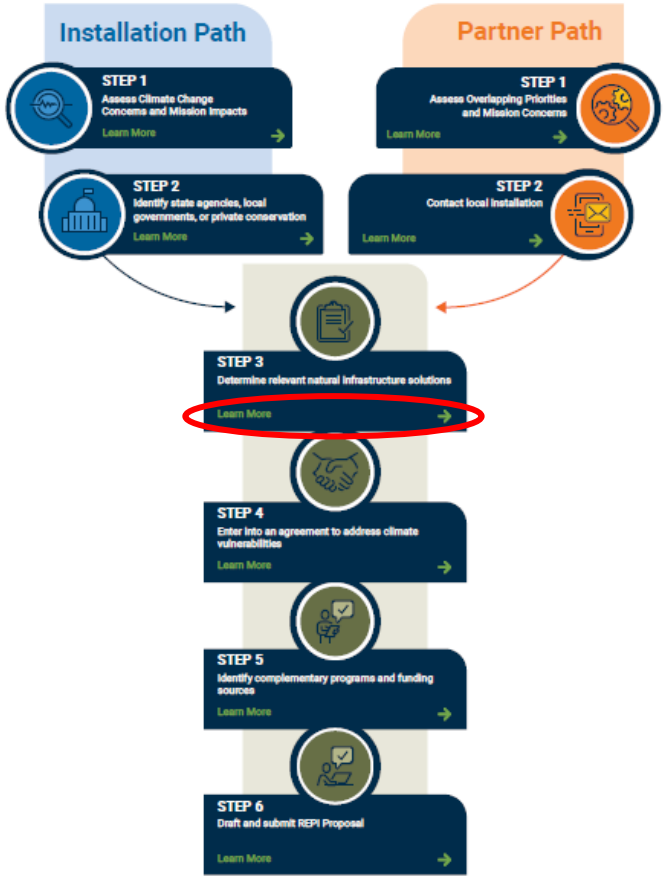

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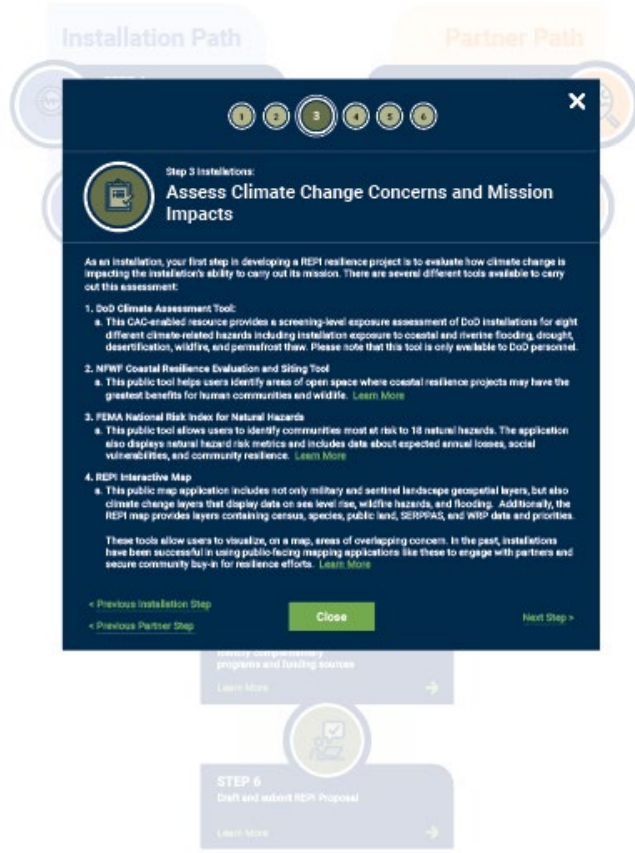

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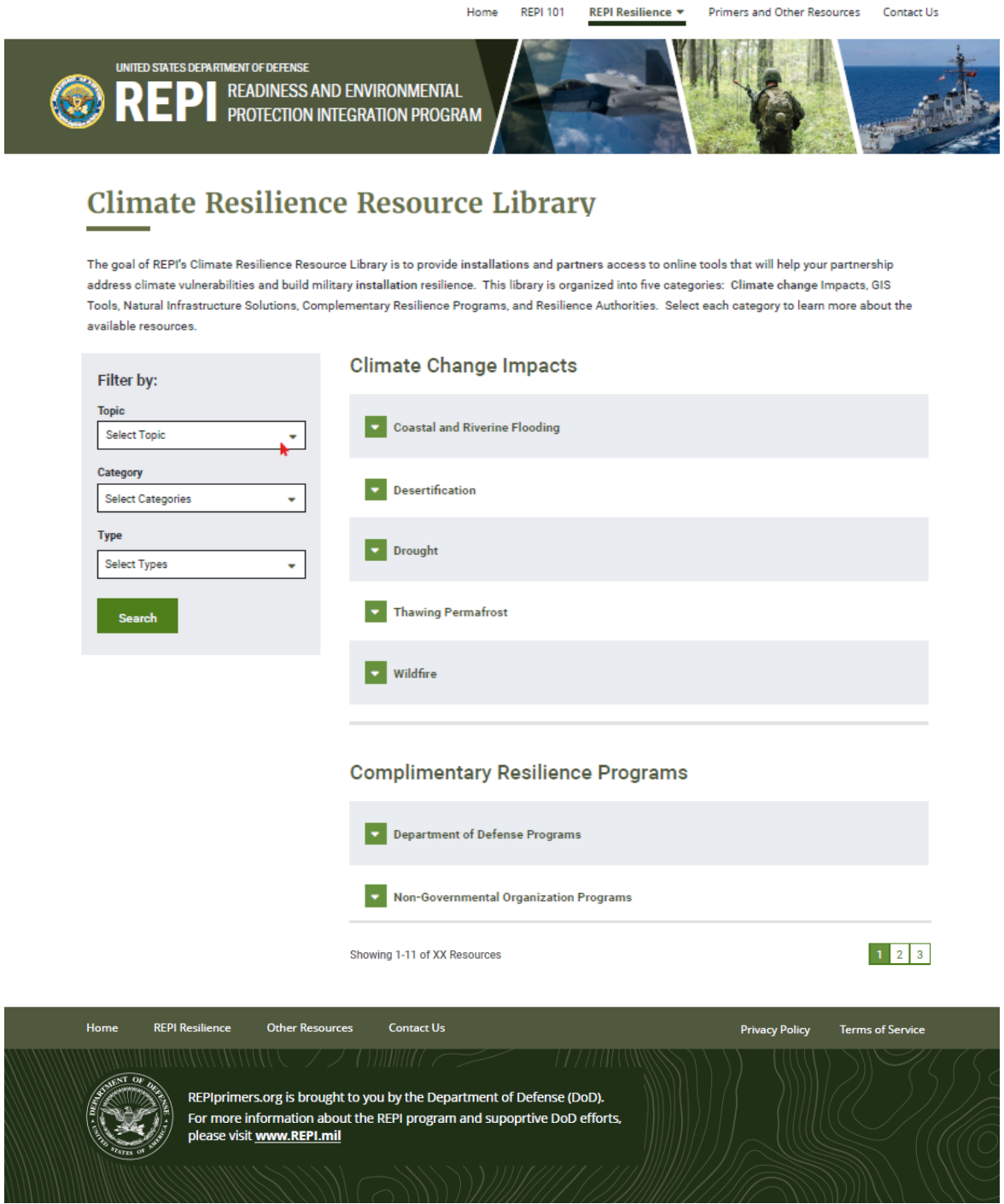

- Climate Change Impacts
  - Category
    - Type
- Complementary Resilience Programs
- GIS Tools
- Natural Infrastructure Solutions
- Resilience Authorities

UNITED STATES DEPARTMENT OF DEFENSE
REPI READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION PROGRAM

Climate Resilience Resource Library

The goal of REPI's Climate Resilience Resource Library is to provide installations and partners access to online tools that will help your partnership address climate vulnerabilities and build military installation resilience. This library is organized into five categories: Climate change Impacts, GIS Tools, Natural Infrastructure Solutions, Complementary Resilience Programs, and Resilience Authorities. Select each category to learn more about the available resources.

Filter by:

Topic
Climate Change Impacts

Category
Coastal and Riverine Flooding, Tha...

Type
Federal Grants and Programs, Web...

Search

Climate Change Impacts

Coastal and Riverine Flooding x | Thawing Permaftrost x | Wildfire x | Federal Grants and Programs x | Webinar Clips x | Clear All

3 Results:

Coastal and Riverine Flooding

Thawing Permafrost

Wildfire

FEDERAL GRANTS AND PROGRAMS

The Federal Emergency Management Agency's Fire Management Assistance Grants: Fire Management Assistance Grants support the mitigation, management, and control of fires on publicly or privately owned forests or grasslands.

WEBINAR CLIPS

REPI Resiliency and Readiness Virtual Workshop: Matt Walsh, Fort Huachuca, Wildfire Threats

Showing 1-3 of 3 Resources

REPI

READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION PROGRAM

2021 WEBINAR SERIES

Please join us for our next REPI webinar:

2021 REPI Challenge Funding Recipient Spotlight

21 July 2021| 1:00 PM ET

- Description: During this webinar, participants will learn more about a selection of the 2021 REPI Challenge funding recipients. The 2021 REPI Challenge focused on innovative projects that limit incompatible development, enhance military installation resilience, and relieve current or anticipated environmental restrictions on military testing, training, or operations at installations across the country.
- Please respond to the audience polls posted, if you have not already.
- Please contact the REPI office at osd.repi@mail.mil with any questions about this webinar or any other REPI-related topics.