DoD Climate Assessment Tool

Presentation for May 2023 SERPPAS Principals Meeting

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Office of the Deputy Assistant Secretary of Defense of Environment and Energy Resilience


No entity can opt out of the effects of climate change.
-Department of Defense Climate Adaptation Plan
The Department must take bold steps to accelerate adaptation to reduce the adverse impacts of climate change.
-Department of Defense Climate Adaptation Plan

Manage Unavoidable Climate Change Effects

Operations:

- Increased global insecurity – “Failed States”
- International Humanitarian Response
- Defense Support to Civil Authorities

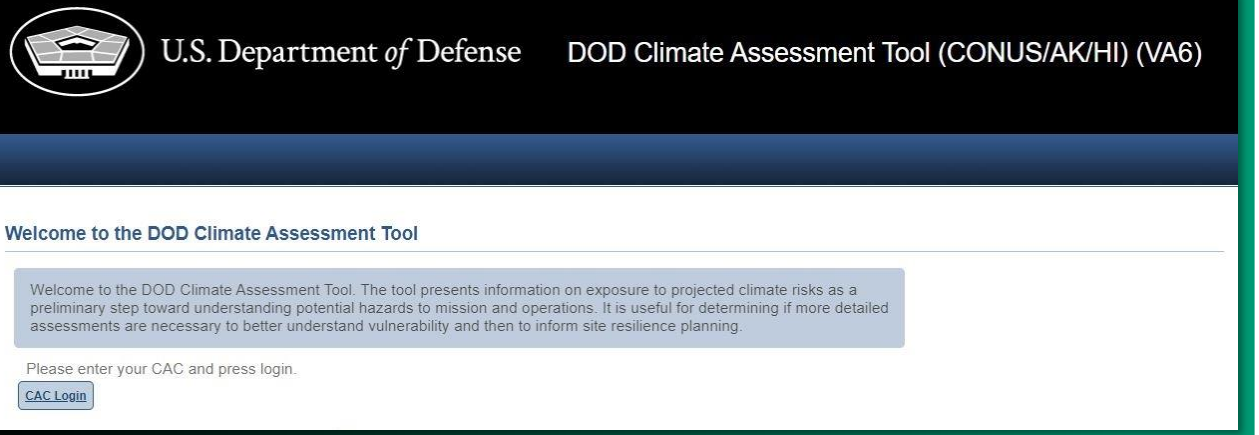
Installations and Infrastructure

- Sea level rise
- Loss of access to training areas
- Flash floods and erosion
- Severe weather

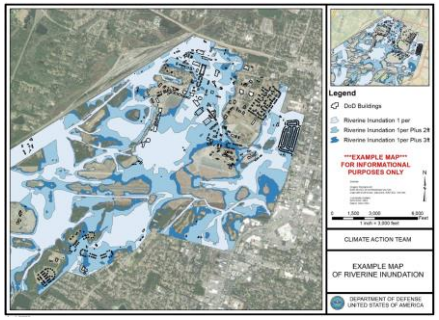
People and Equipment

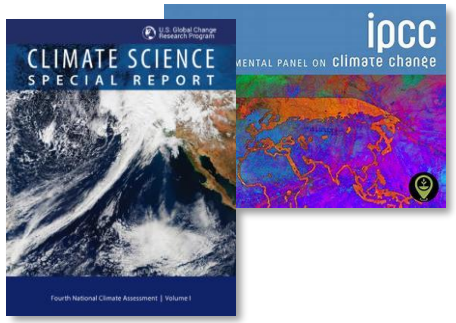
- Heat stress
- Performance Degradation

DoD Climate Assessment Tool

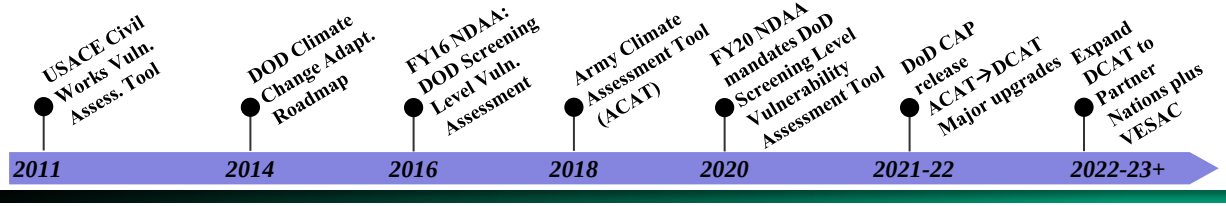


Screening-level assessment of **exposure** to climate and extreme weather events…





…based on the **best available, authoritative, and actionable science**.



Users include…

4

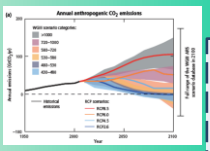
DCAT: Climate Data Pipeline

SCIENCE

Climate Science

SERDP DOD • EPA • DOE
ESTCP

Research



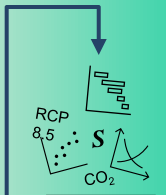
Emissions Scenarios

Using scenarios accounts for uncertainty in the data

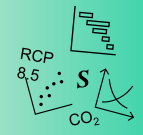
Global Climate Models

Downscaled Output

AGGREGATE & INTEGRATE



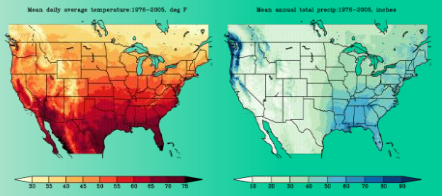
Climate Data and Information



Hydrological Model

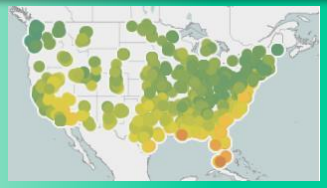
TRANSLATE

Projected Meteorological Information (Temperature, Rainfall)



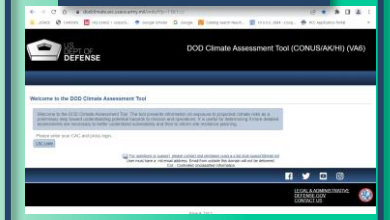
Projected Hydrological Information (Routed Runoff, Streamflow)

Hazards and Indicators



ACTIONABLE INFORMATION

DCAT



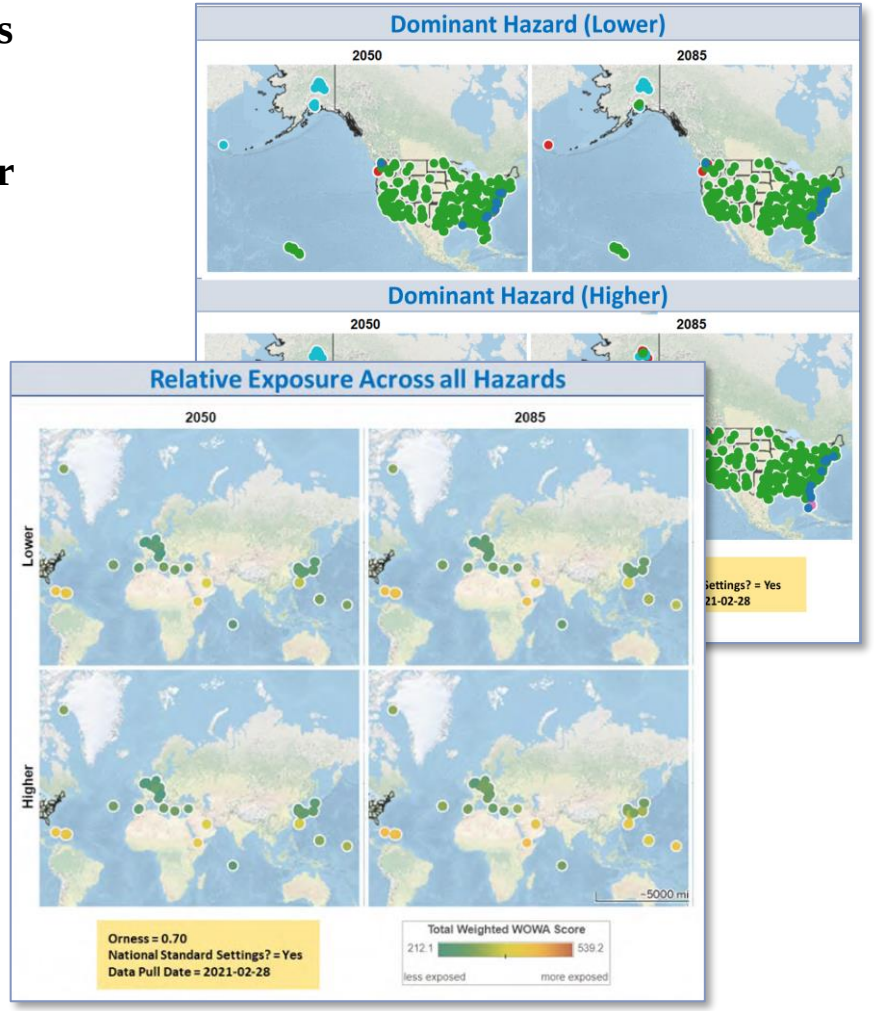
DCAT Data Features:

- **Place-Based**
- HUC8 sub-basin + point data
- Two 30-year projected epochs
- Two GHG Emission Scenarios

DRSL

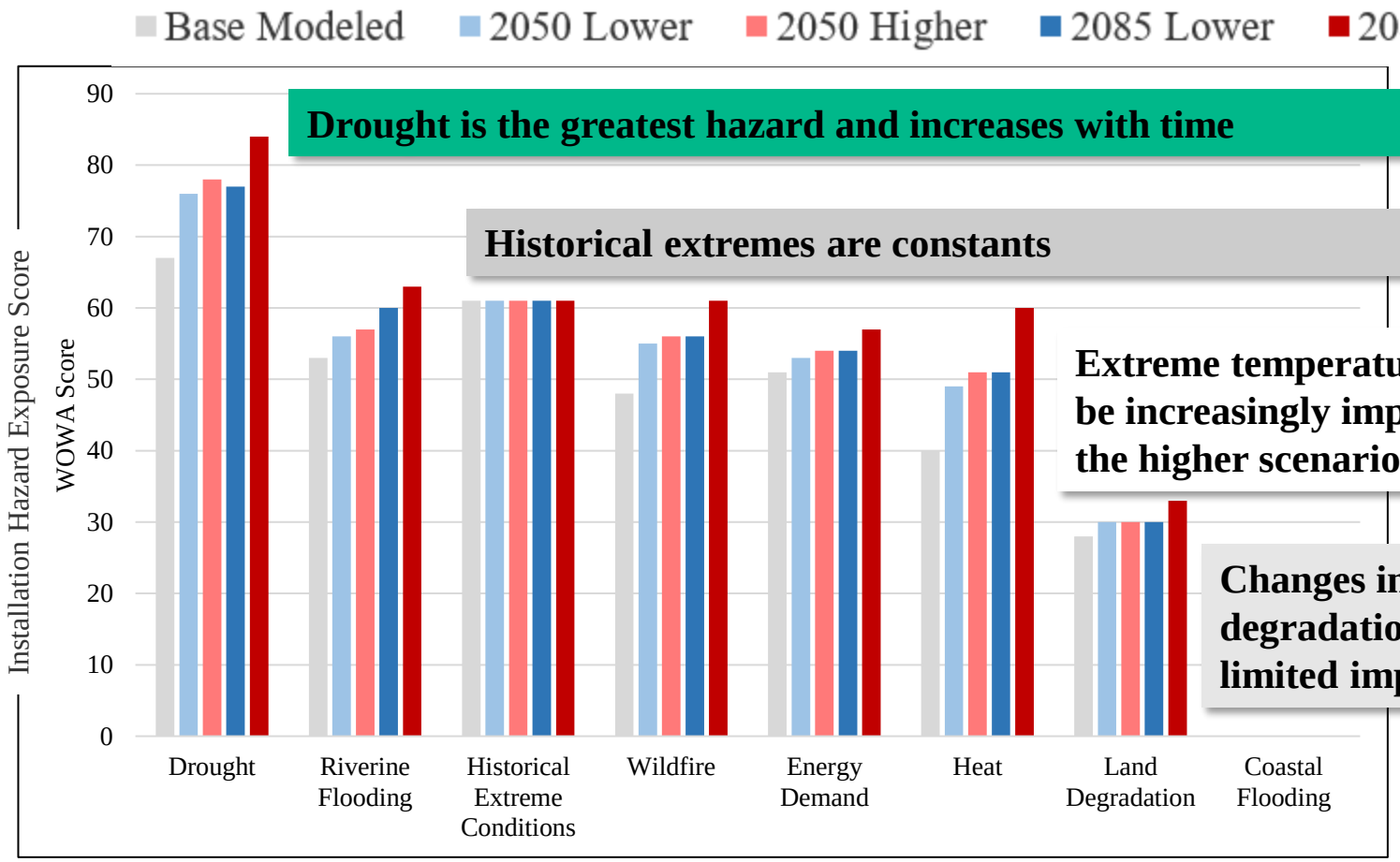
DCAT Findings

- Climate hazards increase over time; **drought is the dominant hazard**
- Exposure is greater for the **late century higher emission scenario**
- Hazards directly tied to **temperature** (e.g., heat index) are **increasing fastest in intensity and frequency**
- Near-term **adaptation planning and investments** expected to be **similar regardless of emissions scenario through 2050**
- **Additional climate adaptation may be needed after 2050** – further analysis and planning could necessitate different strategies



How Hazards are Assessed in the DCAT

Across eight hazards and five epoch-scenarios…



Drought is the greatest hazard and increases with time

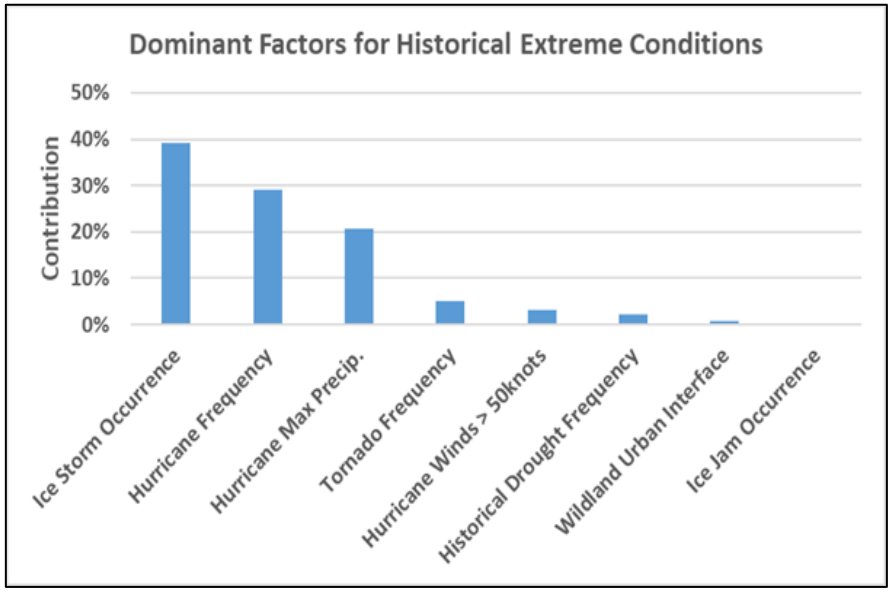
Historical extremes are constants

Extreme temperature exposure will be increasingly important, esp. in the higher scenario

Changes in land degradation will be of limited importance

Historical Extreme Conditions

- Historical extreme conditions do not get projected to future epoch/scenarios as data to do so does not exist.

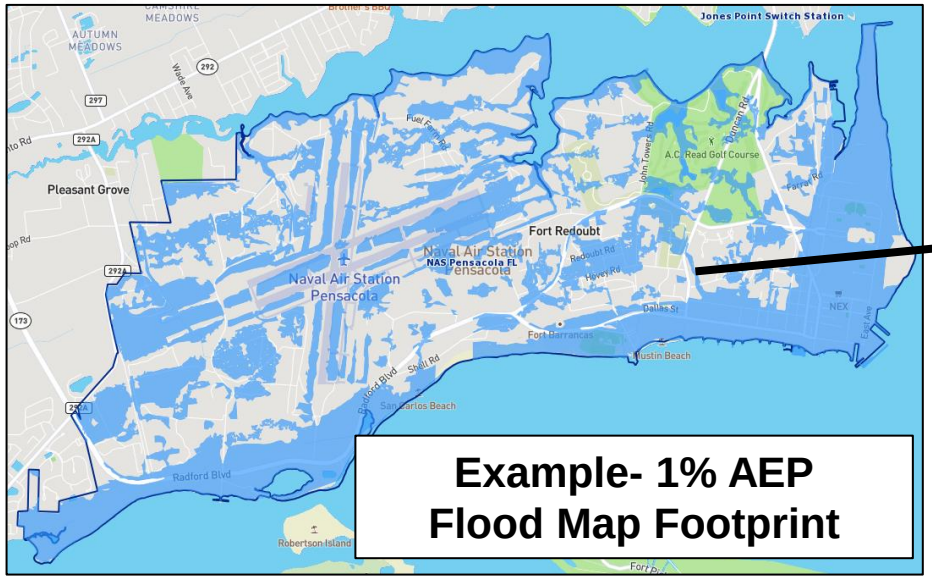


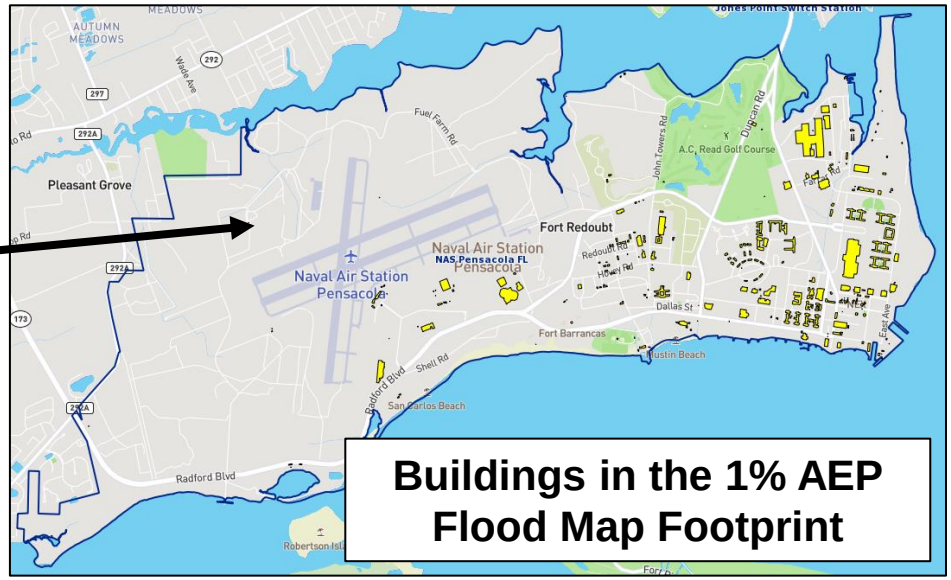
- Fort Bragg Extreme Weather and Wildfire damage

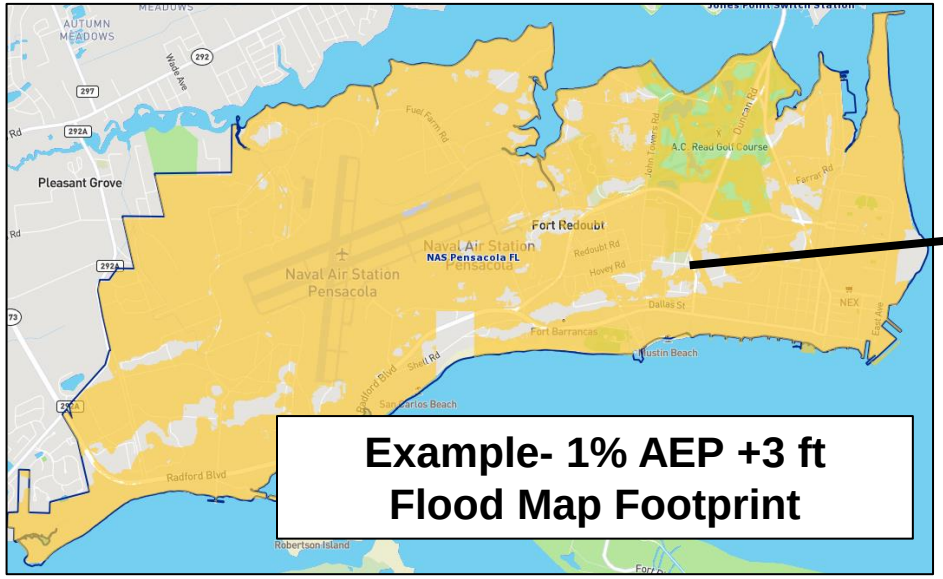
Damages from Extreme Weather and Wildfire, 2000-2021
Administrative Unit(s): Cumberland, NC; Harnett, NC; Hoke, NC; Moore, NC

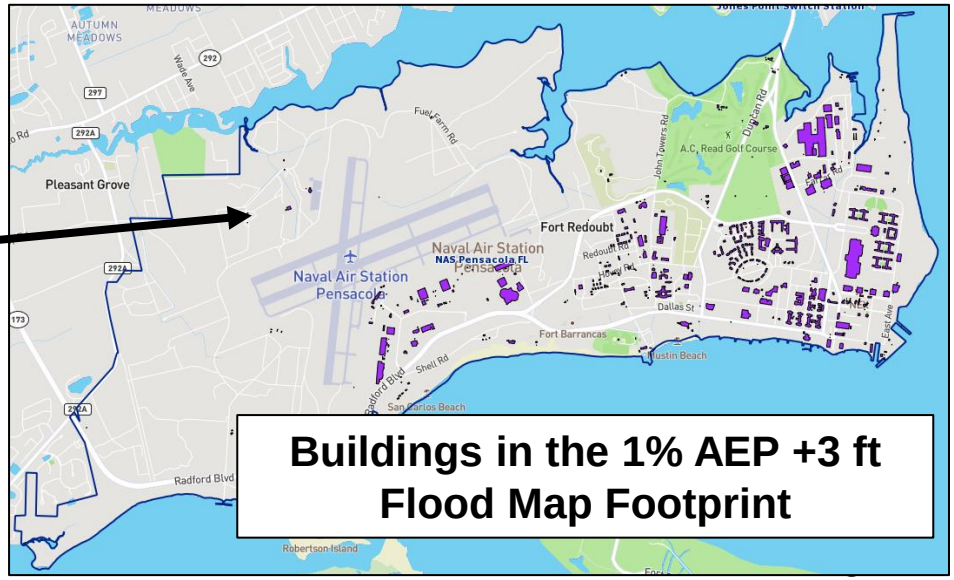
Type	# of Events	Property Damage Estimate	Direct Deaths
Riverine and Lakeshore Flooding	139	$135,249,000.00	3
Tornadoes and Waterspouts	29	$116,895,000.00	2
Hurricanes, Typhoons and Tropical Storms	22	$43,115,000.00	0
Coastal Flood	9	$12,226,000.00	0
Wind Damage	631	$4,774,000.00	0
Hail	265	$3,055,000.00	0
Heavy Rain	16	$1,500,000.00	0
Wildfire	2	$1,000,000.00	0
Snowstorms	62	$0.00	0
Drought	32	$0.00	0
Ice Storms, Freezing Fog and Sleet	3	$0.00	0
Cold Temperature Extremes	13	$0.00	0

Riverine Flood Map Crosswalks

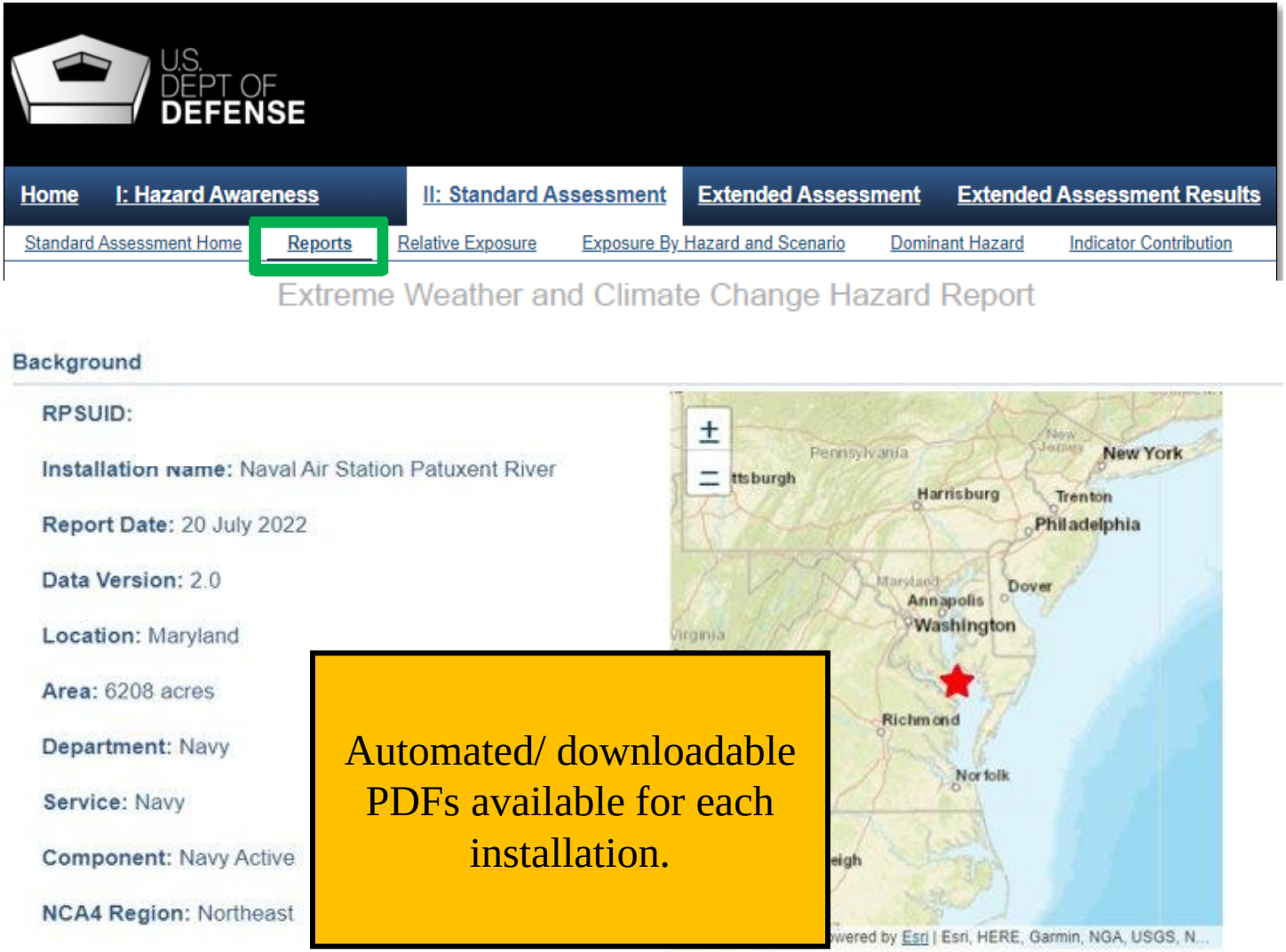








DCAT Hazard Reports



DCAT-Threatened and Endangered Species

DoD provides table (if available)

Threatened and Endangered Species

DoD Observed Threatened and Endangered Species

The following table lists the Threatened and Endangered Species (TES) observed on this site from the DoD's TES list.

Climate vulnerability data is not currently available and may be provided in a future release.

Climate Change Vulnerability of Natural Resources

The following figure summarizes the anticipated vulnerability of natural resources on this installation to seven climate-related hazards (drought, wildfire, extreme temperature, coastal flooding, riverine flooding, land degradation, and historical extreme conditions).

For the purposes of this analysis, natural resources are defined as the subset of highly imperiled species that are known or predicted to occur on the installation – these are referred to as potential Threatened, Endangered, and At-Risk Species (TER-S).

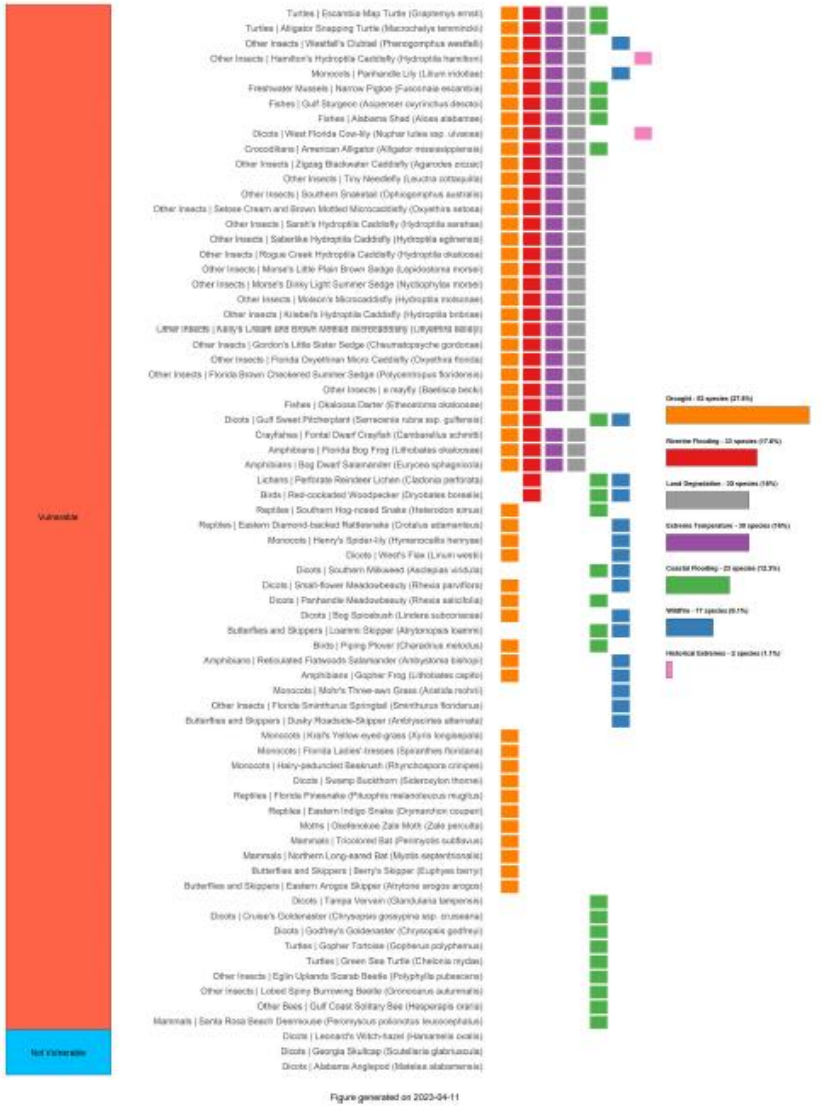
- On the left side of the figure, a single bar shows the percent of species that are vulnerable to at least one climate-related hazard (red) versus the percent that are not vulnerable to any climate-related hazard (blue).
- In the center of the figure, the list of potential TER-S is provided (including their broad taxonomic group, common, and scientific names) and the climate-related hazards to which each species is vulnerable are indicated by small colored boxes (colors indicate the corresponding climate-related hazard shown on the right of the figure).
- On the right side of the figure, vulnerability to each climate hazard is summarized using the number and percentage of all species vulnerable across all hazards.

Vulnerability of each potential TER-S to each climate-related hazard has been assessed based on a combination of: 1) known threats to the species, as highlighted during the NatureServe conservation status ranking process; 2) the particular habitats the species is associated with and their known susceptibility to climate-related hazards, 3) ecological characteristics of the species and their implied effect on vulnerability to climate-related hazards.

Please note that certain restrictions on the identity of species may apply in this figure, based on the restrictions placed by the local NatureServe Network program. Evidence of the occurrence of species indicated with "(Restricted Species)" is based on restricted data, which do not allow the precise identity of the species to be shared.

All data collected and/or compiled, analyzed, and visualized by NatureServe. For a more detailed breakdown of the conservation status and distribution of actual and potential TER-S on this installation, please contact NatureServe's Applied Data Science team(data_science@natureserve.org) to get access to NatureServe's DoD TER-S Explorer (https://natureserve.shinyapps.io/explorer-dod)).

NatureServe provides modeled data

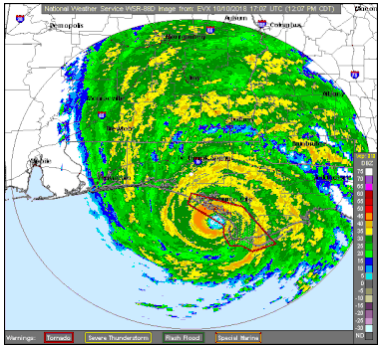


11

Two Responses to Climate: Adaptation & Mitigation

DEPARTMENT RESPONSES

1 ADAPTATION



Manage unavoidable climate impacts
by adapting, changing mission, and/or relocating where appropriate

2 MITIGATION

Avoid unmanageable impacts
through rapid greenhouse gas (GHG) reduction

Integrating Adaptation & Mitigation: Heat Morbidity and Mortality

Hazard

Adaptation

Behavioral change (activity, time, duration, acclimation)

Temporary/mobile solutions: canopies, portable misting stations

Enduring solutions: cooling shed, vegetation planting, change mission, relocate

Mitigation

Lowest GHG Emitting Adaptations: change activity, location, duration, time of day, or allow for participant acclimation, native vegetation (if appropriate dimensions and water is not an issue)

Less GHG Emitting Adaptations: Reusable canopies, portable misting stations, advanced clothing technology, repurpose existing facility

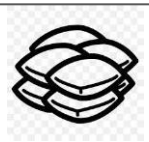
Higher GHG Emitting Adaptations: Create new or upgrade using recycled materials, use white or reflective roofing, employ renewable/netZero energy, use cross-laminated timber, build to LEED criteria, minimize water consumption/use greywater.

Integrating Adaptation and Mitigation: Floods

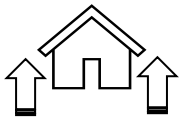
Hazard

Riverine Flooding

Adaptation



Expedient flood risk reduction



Elevate facilities, HVAC, power, services

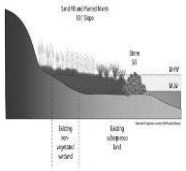
Floodproof facilities

Water resources management

Both

Low-carbon structural flood risk reduction

Low-carbon nature-based flood risk reduction



Low-carbon hybrid flood risk reduction

Mitigation

Low-impact development measures

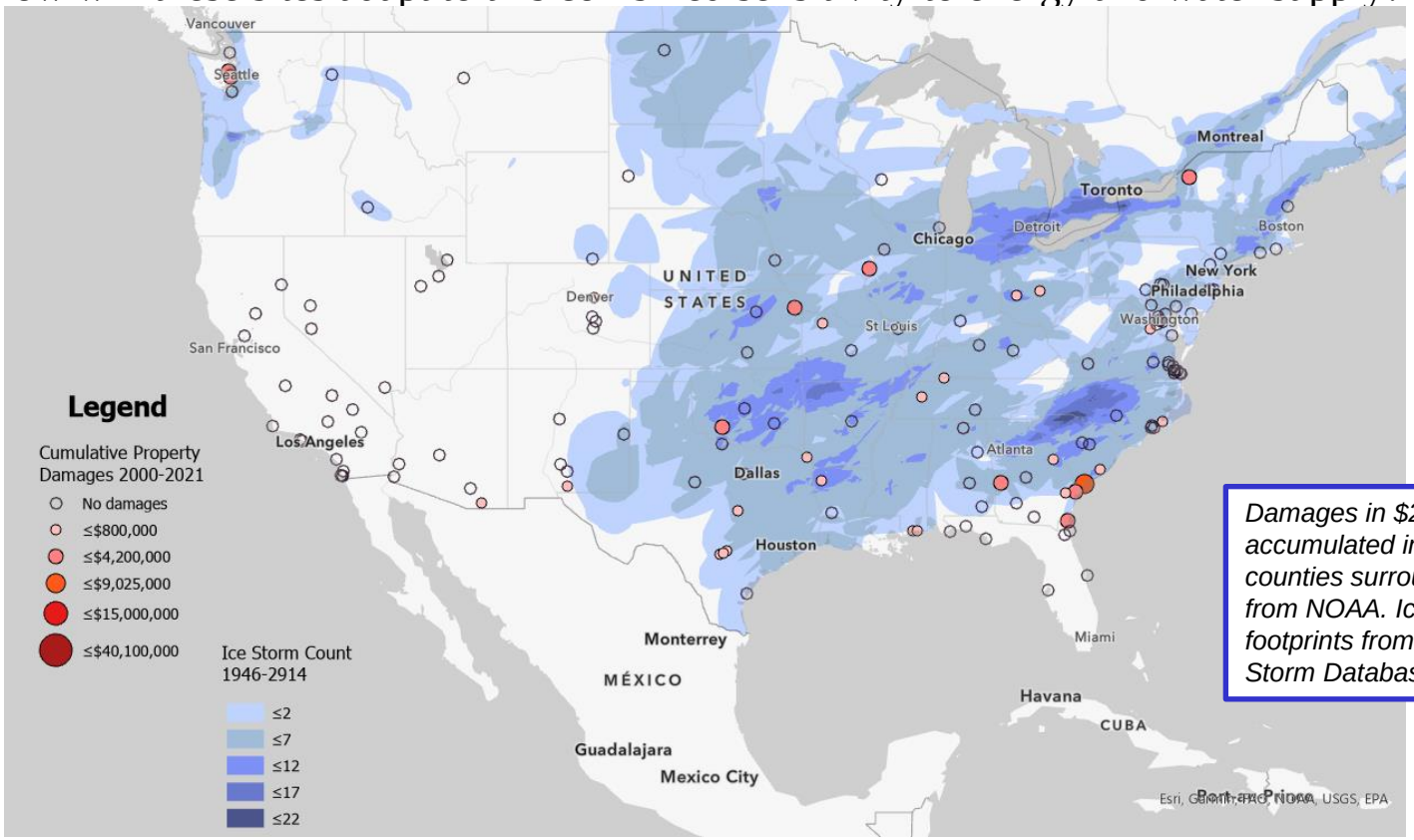
Reuse existing facilities out of floodplain

Use recycled materials

Climate Exposure and Energy Resilience

Energy sufficiency in changing climate

- Are technology innovation projects being evaluated where energy risk is greatest, e.g., ice storms?
- How will these sites adapt to this combined sensitivity to energy and water supply?



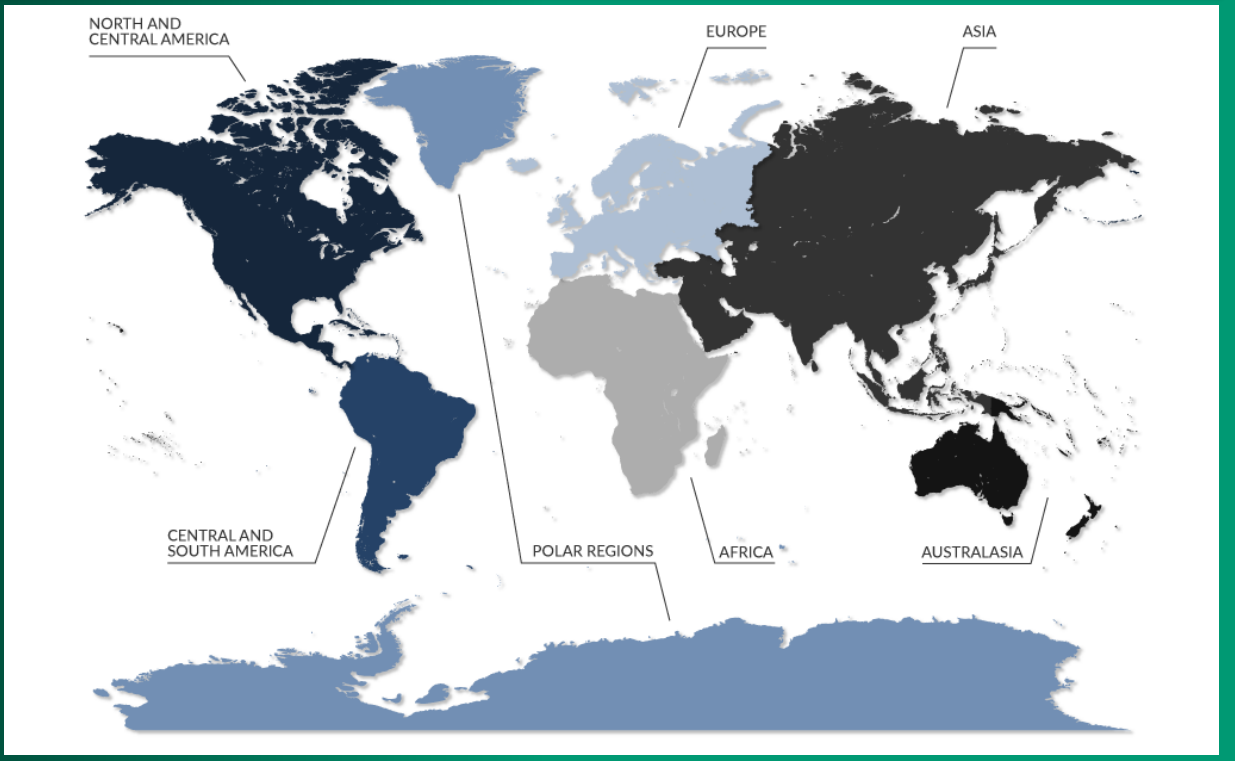
Damages in $2021, accumulated in the counties surrounding a site from NOAA. Ice storm footprints from USACE Ice Storm Database.

15

The Future of DCAT: Partner Nations CAT

POTUS Deliverable: During the April 2021 President's Leaders Summit on Climate Change, Defense Secretary Austin committed DoD to replicate and expand DCAT for mutually beneficial purposes

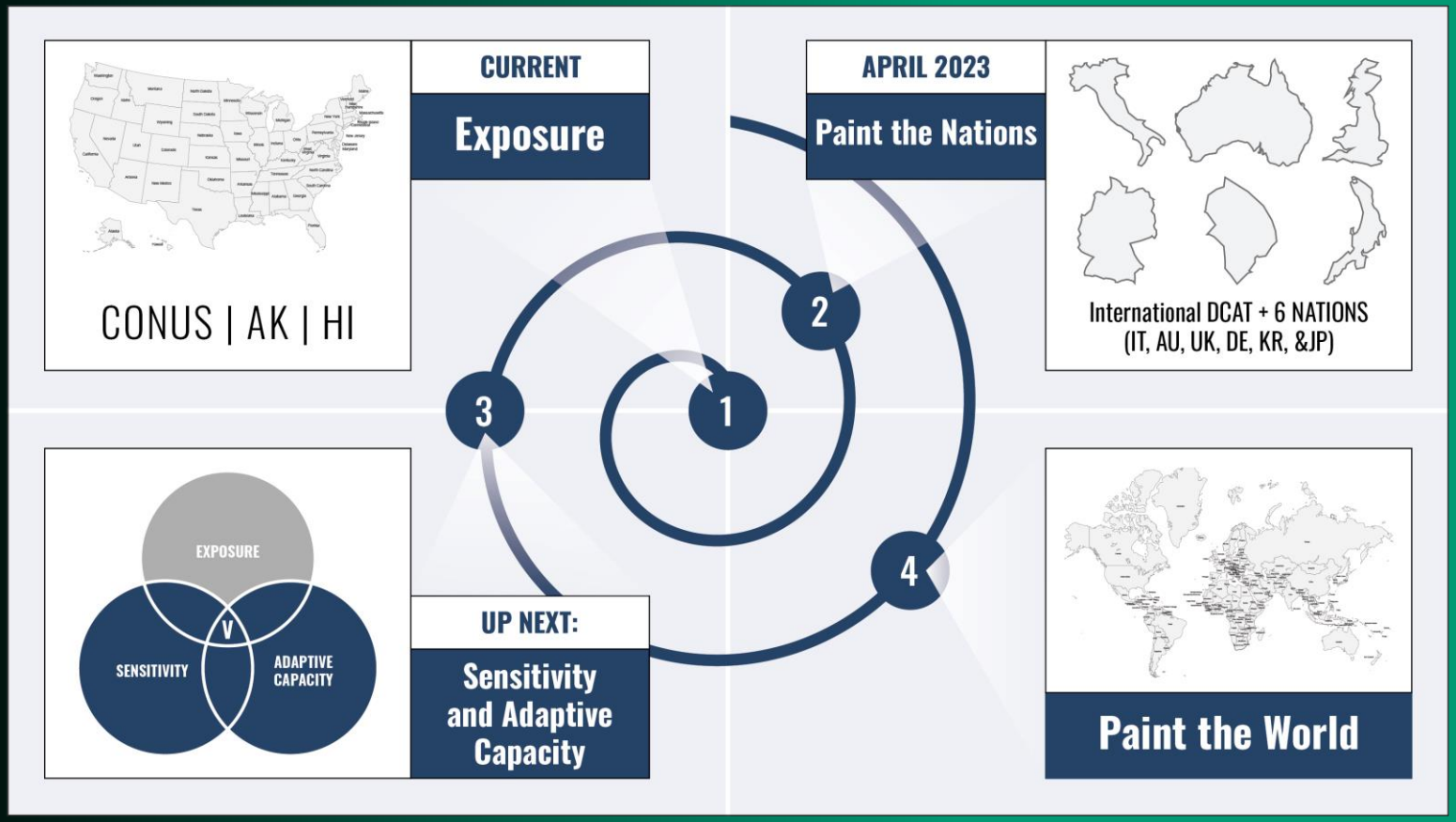
- Six nations: the United Kingdom, the Federal Republic of Germany, the Italian Republic, Japan, the Republic of Korea, Commonwealth of Australia
- OUSD(AS) and OUSD(Policy) jointly advancing this initiative



Firm deliverable date of April 2023, Earth Day

The Future of DCAT: Spiral Development

Spiral development of DCAT will leverage the **Paint the Nations** work, which is the watershed-based precursor to **Paint the World** (i.e., not installation-based)



Key Takeaways

- **A first step to climate-readiness is assessment of exposure to climate hazards (DCAT).**
- **Overall, the biggest threats to the Southeast installations are drought and flooding/sea level rise.**
- **DCAT information will be used to assess watersheds next year, which contains areas outside military installations.**
- **There will be an opportunity for state, local, and tribal governments to obtain DCAT information.**

Thank You

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Office of the Deputy Assistant Secretary of Defense of Environment and Energy Resilience
May 2023