



4-2022

## NOAA Hurricane Preparedness Summit 2022

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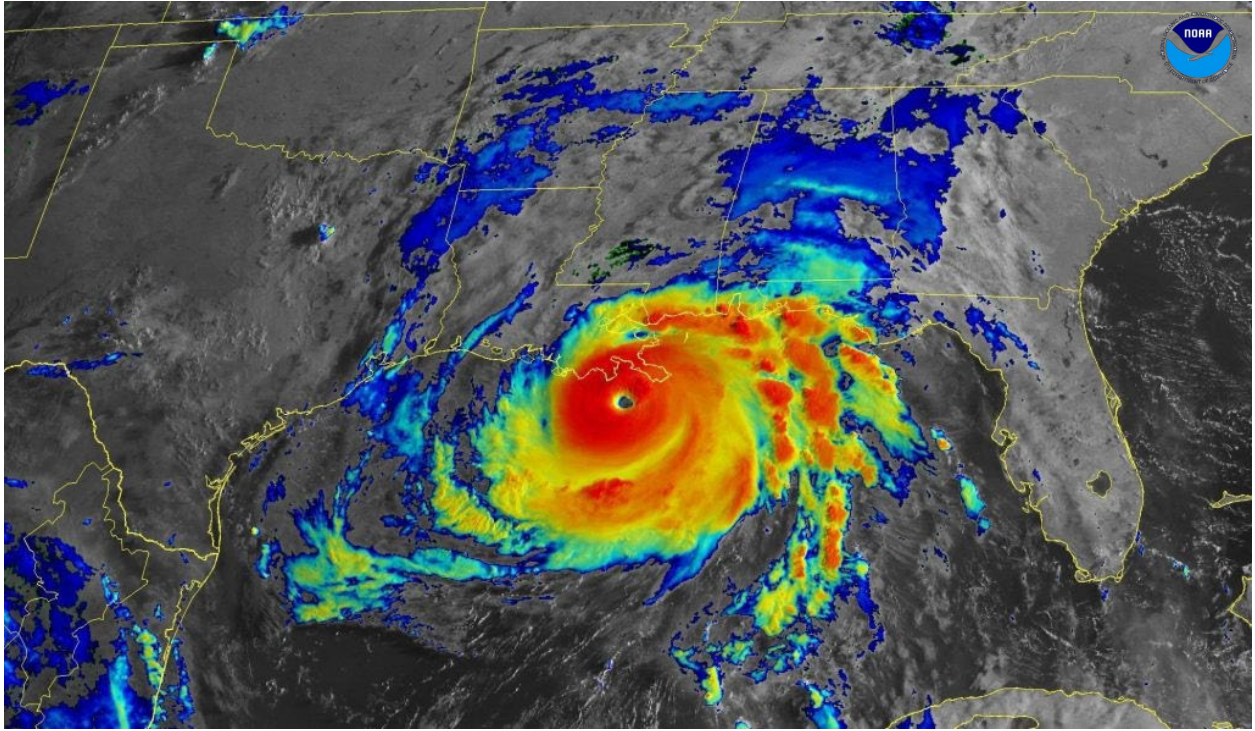
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# **NOAA Hurricane Preparedness Summit 2022**

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April 20 & 21, 2022

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## II. Acronyms

CAPT	Captain
CDR	Commander
COOP	Continuity Of Operations Planning
CO-OPS	NOAA Center of Operational Oceanographic Products and Services
CRRC	Coastal Response Research Center
DPP	NOAA Disaster Preparedness Program
DRC	Gulf of Mexico Disaster Response Center
DUSO	NOAA Deputy Under Secretary for Operations
ERD	NOAA OR&R Emergency Response Division
ESSD	NOAA NWS Environmental Scientific & Services Division
ERMA	Environmental Response Management Application
ESF	Emergency Support Function
FEMA	U.S. Federal Emergency Management Agency
GOHSEP	Governor's Office of Homeland Security and Emergency Preparedness
HSPO	NOAA Homeland Security Program Office
ITIC	International Tsunami Information Center
LA	Louisiana
LCDR	Lieutenant Commander
MEF	Mission Essential Function
NGS	NOAA National Geodetic Survey
NHC	NOAA NWS National Hurricane Center
NOAA	U.S. National Oceanic and Atmospheric Administration
NRAD	NOAA Response Asset Directory
NRB	NOAA OCS Navigation Response Branch
NRT	NOAA Navigation Response Team
NWS	NOAA National Weather Service
OCM	NOAA Office for Coastal Management
OCS	NOAA Office of Coast Survey
OMAO	NOAA Office of Marine and Aviation Operations
ONMS	NOAA Office of National Marine Sanctuaries
OR&R	NOAA Office of Response and Restoration
PIO	Public Information Office
PMI	Personnel, Mission, and Infrastructure
RPI	Research Planning, Inc.
SDB	Spatial Data Branch
SMART	Science Monitoring and Reliable Telecommunications
UAS	Uncrewed Aerial Systems
UNH	University of New Hampshire
U.S.	United States
USAID	U.S. Agency for International Development

USCG	U.S. Coast Guard
USPHS	U.S. Public Health Service
VaDR	Vessel and Debris Response

### III. Acknowledgements

This summit and report were supported by the National Oceanic and Atmospheric Administration's (NOAA) Office of Response and Restoration (OR&R) Disaster Preparedness Program (DPP) and the University of New Hampshire's (UNH) Coastal Response Research Center (CRRC). The content for the summit was developed in cooperation with NOAA DPP and the following Organizing Committee members:

- Nancy Kinner, UNH CRRC
- Charlie Henry, NOAA OR&R DPP and Gulf of Mexico Disaster Response Center (DRC)
- Bradford Benggio, NOAA OR&R Emergency Response Division (ERD)
- Lisa Symons, NOAA Office of National Marine Sanctuaries (ONMS), Florida Keys National Marine Sanctuary
- Matthew Chasse, NOAA Office for Coastal Management (OCM)
- Eric Lau, NOAA National Weather Service (NWS), Environmental Scientific & Services Division (ESSD)
- CAPT Chris "Bubba" Sloan, NOAA Homeland Security Program Office (HSPO)
- Leah Odeneal, NOAA OR&R DPP
- Charles Wisotzkey, NOAA Navigation Response Team (NRT)
- Katie Perry, UNH CRRC

This summit was facilitated by Nancy Kinner ([www.crrc.unh.edu](http://www.crrc.unh.edu)). CRRC is known globally as an independent intermediary that brings all stakeholders to the table to develop and implement viable and trusted solutions to complex problems related to environmental disasters. CRRC has conducted 70+ workshops that bring together practitioners, researchers, and scientists of diverse backgrounds (e.g., industry, academia, government, NGOs) to discuss and develop solutions to marine pollution and disaster problems.

We would like to thank each of the speakers for their participation in the workshop:

- Benjamin Friedman, NOAA Deputy Under Secretary for Operations (DUSO)
- Scott Lundgren, NOAA OR&R
- Cody Fritz, NOAA NWS National Hurricane Center (NHC)
- CDR Joseph Newcomb, U.S. Public Health Service (USPHS), NOAA Aircraft Operations Center
- Gretchen Hirt, Jefferson Parish, Louisiana Public Information Office (PIO)
- Christopher Guilbeaux, Louisiana Governor's Office of Homeland Security and Emergency Preparedness (LA GOHSEP)
- CAPT Chris 'Bubba' Sloan, NOAA HSPO
- CDR Megan Guberksi, NOAA Office of Coast Survey (OCS)
- Mike Brennan, NOAA NWS NHC

- Ben Schott, NOAA NWS
- CDR Kenneth J. 'KJ' Green, Director, NOAA Office of Marine and Aviation Operations (OMAO) Behavioral Health and Wellness, USPHS
- Kate Wheelock, NOAA OR&R DPP
- Genevieve 'Genny' Miller, NOAA NWS
- Marcus 'Landon' Aydlett, NOAA NWS
- LCDR James Hodges, United States Coast Guard (USCG)
- Laura Kong, International Tsunami Information Center (ITIC)
- Tiare Eastmond, U.S. Agency for International Development (USAID)
- Chad Yoshinaga, NOAA Pacific Island Fisheries Science Center
- Russell Jackson, NOAA OCM
- Paul Fanelli, NOAA Center of Operational Oceanographic Products and Services (CO-OPS)
- Maryellen Sault, NOAA National Geodetic Survey (NGS)
- Mike Aslaksen, NOAA NGS
- Jay Coady, NOAA OR&R Spatial Data Branch (SDB)
- Mark White, Research Planning, Inc. (RPI)

A special thank you to (1) Kathy Mandsager (UNH CRRC), Katie Perry (UNH CRRC), and Lauren Courtemanche (UNH CRRC) for their efforts in coordinating the virtual summit, and (2) Jessica Manning (UNH CRRC) and Alice House (UNH CRRC) for their notetaking during the event.

## IV. Executive Summary

NOAA's DPP partnered with CRRC to facilitate three webinars focusing on NOAA's hurricane preparedness and readiness for personnel (people), mission, and infrastructure (PMI). The virtual event entitled "NOAA Hurricane Preparedness Summit 2022," helped put NOAA in a better posture for the 2022 hurricane season by identifying best practices and lessons learned from the 2021 season, recognizing challenges specific to the Pacific Islands, and socializing tools and resources available to support different stages of storm landfall. The summit agenda is included as **Appendix A**. For Sessions 1, 2, and 3 of the Summit, there were 131, 59, and 84 attendees; respectively. Participants represented academia, federal, state, and local agencies.

Specific objectives were to:

1. Understand best practices and lessons learned from the 2021 hurricane season;
2. Become knowledgeable about PMI topics;
3. Work towards improving consistency in response between federal and state partners;
4. Recognize challenges for the next hurricane season;
5. Introduce and familiarize tools and resources; and
6. Understand gaps given the current limitations.

The summit included plenary presentations from federal and state agency representatives outlining: resilient communications, storm specific lessons learned, communication of severity of risk, facility and staff readiness, pandemic fatigue, mental health, challenges in the Pacific Islands (climatological impacts and infrastructure, communication, and supply chain challenges), and available tools and resources. Presentation slides are in **Appendix B**. Question and answer sessions were included throughout the summit, as well as polling to obtain feedback from participants.

Common themes emerged from discussions during the summit including:

- Communications will always be a challenge for conveying pre-/during-/post-storm information about preparedness, response, and recovery efforts.
- Pre-planning and engagement with the local community can be critical for saving lives and creating communities that can self-sustain until outside help arrives.
- COVID continues to be a factor in response capacity and capabilities.
- NOAA should continue pre-planning and coordination with federal and state partners to enhance readiness to meet its responsibilities and designated MEFs before, during, and after a major hurricane makes landfall.
- NOAA and partner facilities may not be sufficiently resilient to storm impacts, specifically from hurricanes.
- NOAA has a wide range of digital response and planning tools that can be used for hurricane planning, preparedness, response, and recovery activities.

The UNH Survey Center conducted a survey of stakeholders prior to the summit. The 21-question survey received 109 responses between February 7 – 22, 2022. It inquired about general demographics (i.e., organization name, NOAA line office, region), hurricane preparedness and response plans, Mission Essential Function (MEF)/Emergency Support Function (ESF) roles,

anticipated challenges, mitigation strategies, digital response and planning tools, and personal preparedness measures. More information about the survey and the results can be found in the pre-summit survey technical report (**Appendix C**).

## V. **Session 1: *Enhancing support of state and federal partners for the 2022 hurricane season by focusing on the readiness of NOAA's Standard Personnel, Mission and Infrastructure (PMI)***

The first session of the summit, held on April 20, 2022, focused on communications, preparedness and response lessons learned during the 2021 hurricane season, and compounding stressors (i.e., pandemic fatigue/mental health). Speakers shared examples of best practices to enhance facility and staff readiness and increase communication resiliency, including how to convey risk to the public. Introductory polls were used to understand the attendee's level of preparedness, priority concerns, and MEF/ESF roles.

**Poll Question 1:** Is your office/site/agency prepared for the 2022 hurricane season?

- a. **Yes (78%)**
- b. No (6%)
- c. Unsure (16%)

**Poll Question 2:** Do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF)?

- a. **Yes (70%)**
- b. No (23%)
- c. I don't know what MEF or ESF means (7%)

### Welcome and Summit Objectives

Nancy Kinner (UNH CRRC) provided the opening statements. Benjamin Freidman (DUSO) and Scott Lundgren (OR&R) each provided a welcome and their perspective on the upcoming hurricane season. Charlie Henry (OR&R) reviewed the six summit objectives and the pre-summit survey results.

1. Understand best practices and lessons learned from the 2021 hurricane season;
2. Become knowledgeable about PMI topics;
3. Work towards improving consistency in response between federal and state partners;
4. Recognize challenges for the next hurricane season;
5. Introduce and familiarize tools and resources; and
6. Understand gaps given the current limitations.

The survey prioritized the challenges that agencies anticipated for the 2022 hurricane season including: unreliability or loss of utilities (power, internet, water, cell service); availability of sufficient qualified personnel to respond; facility readiness, preparedness, resilience, and response; management of staff and other resource capacity; and management of the multiple aspects of pandemic – related fatigue. The survey indicated that 52% of participants found a mitigation strategy to keep their people safe and maintain access to adequate protection (PPE, COVID-19



testing, vaccines) during response activities, while only 16% of participants have mitigation strategies for managing pandemic-related fatigue.

## Setting the Stage

Cody Fritz (NWS) set the stage for the summit by reviewing the 2021 hurricane season which had eight U.S. landfalls, six tropical storms, and two hurricanes. There have been more Category 4 and 5 hurricanes in the U.S. since 2017 than from 1963 – 2016. Fritz reviewed the impacts of Hurricane Ida highlighting the forecasting and storm surge data, anticipated risk, and actual damages (\$75 billion). CDR Joseph Newcomb (USPHS) discussed NOAA's Aircraft Operations Center's methods of virus mitigation and surveillance during response including: weighing the risks and benefits, increasing vaccinations among staff, regular viral testing, and equipping units with a dedicated medical provider.

## Resilient Communications

Gretchen Hirt (Jefferson Parish, LA PIO) used Hurricane Ida as a case study to describe the methods the parish used to keep the public informed during the hurricane (e.g., interviews with news outlets, leveraging community relations and partnerships, responding quickly to messages, daily press briefings, activity on various social media platforms). Internal communication, including with partners, is important to effectively develop and execute a communications plan. Christopher Guilbeaux (LA GOHSEP) also noted the importance of pre-storm communication planning and public outreach. Guilbeaux discussed the challenges and benefits of social media before, during, and after a storm, specifically the difficulty in verifying storm-related claims made on social platforms. Hirt and Guilbeaux noted the benefit of after-action reports to continuously improve hurricane communications and response operations.

## Storm Specific Lessons Learned

CAPT Chris "Bubba" Sloan (HSPO) mentioned the ways HSPO maintains its preparedness, readiness, and resiliency during storm events to ensure that NOAA can continue to support mission functions. Sloan noted the importance of Continuity of Operations Planning (COOP) for emergency preparedness including identifying and testing redundant systems pre-event to ensure operation during a storm. Charlie Henry (DPP) discussed the importance of continuous improvement and learning from past events to advance preparedness and response for future events, often done through reviewing after action reports. Henry discussed the ways in which NOAA has improved preparedness efforts for the 2022 hurricane season such as continuing to manage pandemic limitations (testing, vaccines, following CDC recommendations) and having an increased familiarity with virtual work. CDR Megan Guberski (OCS) gave an overview of the 2021 lessons learned by the Navigation Response Branch (NRB) from Hurricane Elsa and the overlapping impacts of Tropical Storm Fred, Hurricane Grace, and Hurricane Henry. Guberski described the NRB response timeline to Hurricane Ida including when and where resources were deployed and what information was used to inform response decisions.

## Conveying Severity of Risk

Mike Brennan (NWS) presented methods to convey risk during tropical cyclones from the NHC perspective. The likelihood and consequences of an event, and vulnerability of threatened

communities are considered when determining the level or risk. Brennan discussed NHC tools and products used to communicate risk such as the storm forecast information, watches and warning, and messaging tools (media interviews, briefings, social media posts). Watches and warnings, such as those used for wind hazards and storm surges, are not forecasts, but rather risk communication tools.

## Facility and Staff Readiness

CAPT Chris “Bubba” Sloan (HSPO) provided recommendations for staff and facility readiness including: preparing for 14-day supply chain limitations, updating personal information and contacts for all staff, having sufficient gasoline supplies for generators, preparing evacuation plans, and creating redundancy in systems (including chain of command). Ben Schott (NWS) urged participants to identify their local NWS office and get on its email list to receive storm warnings. The NWS works 24/7 and has redundancies in place to ensure continuous operations, including knowing how many staff are needed for operations and having enough resources (food, water) for them to remain at the office for several days. Schott highlighted some activities that facilities personnel can do to improve facility readiness, such as: knowing what their building is rated to withstand in a storm, reviewing flood maps of the area, and making sure staff have personal preparedness plans to keep themselves and their families safe during and after the storm.

## Compounding Stressors (Pandemic Fatigue/Mental Health)

CDR KJ Green (USPHS) gave an overview of the behavioral health impacts of the pandemic, improvement of psychological resilience, stress management, and the value in using professional behavioral health support. Anxiety and depression have increased since the pandemic and evaluations, such as the General Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9), can help determine if you need further evaluation from a medical professional. Green noted that NOAA Behavioral Health and Wellness provides resources to NOAA and non-NOAA staff including direct services on a case-by-case basis, education and training, peer support programs, policies, and SOPs.

## VI. *Session 2: Addressing the unique challenges to NOAA’s PMI in the Pacific Islands during hurricane seasons.*

The second session, held on April 20, 2022, focused on unique challenges in the Pacific Islands related to infrastructure, communications, and supply chain. Presenters also gave background on the climatological impacts and typical preparedness efforts in the region. The session concluded with a discussion of each of the topics in more detail with the panelists. Polls were used throughout to understand challenges in the Pacific Islands.

**Poll Question 1:** Which of the following was a challenge during past tropical cyclone seasons? (Select all that apply)

- a. Food and Medication shortages (28%)
- b. Loss of water/sewer (50%)
- c. Fuel shortages (17%)
- d. Extended loss of power (78%)**

- e. Loss of internet/cellular communications (67%)

**Poll Question 2:** Do you have personal and office/agency contingencies for dealing with the following: (Select all that apply)

- a. Food and Medication shortages (57%)
- b. Loss of water/sewer (57%)
- c. Fuel shortages (24%)
- d. Extended loss of power (78%)**
- e. Loss of internet/cellular communications (71%)

Nancy Kinner (UNH CRRC) provided the opening statements. Benjamin Freidman (DUSO) and Genevieve “Genny” Miller (NWS) each provided a welcome and their perspective on the upcoming hurricane season. Charlie Henry (OR&R) reviewed the six summit objectives and the pre-summit survey results.

## History of Climatological Impacts

Eric Lau (NWS) discussed the impacts from natural disasters across the Pacific region. The Pacific Islands are in “typhoon alley” and are impacted from tropical cyclones, spring tides, coastal inundations, and tsunamis. The Pacific Islands and their people are especially vulnerable to the impacts of natural disasters due to their remote location and limited evacuation options, so it is critical to be prepared and spread awareness.

## Setting the Stage

Marcus “Landon” Aydlett (NWS) set the stage for the session by discussing public communication methods, noting communication is essential to ensure people are safe. Aydlett demonstrated how the impact of a storm can increase if it makes landfall only 10-15 miles off the predicted track. The NWS is the only source for weather information in the region and uses social media platforms to engage with the public quickly. Aydlett mentioned the importance of having redundant communication systems to ensure people are informed throughout a storm event.

## Infrastructure Challenges

LCDR James Hodges (USCG) provided an overview of previous hurricane impacts and near-misses in Hawaii, focusing on port vulnerabilities. To increase port resiliency, Hawaii has conducted assessments of port vulnerabilities and related infrastructure. Hodges noted that marine transportation systems are vital to Hawaiians since most goods are not produced on the islands. Due to the infrastructure vulnerabilities, Hawaii implemented a two-week readiness program to encourage residents to be prepared for storms with adequate supplies. Hodges also discussed USCG hurricane engagement and response plans.

## Communication Challenges

Laura Kong (ITIC) used the volcanic eruption in Tonga as a case study to illustrate the communication challenges the Pacific Islands face. Lives are saved by wide-spread, clear, and quick communication systems that are robust, reliable, redundant, and regularly tested. The public needs

to be educated before an event on how the warnings will be issued, who will issue them, when they will be issued, and what the warning messages will say. Kong demonstrated how multiple preparedness activities before the event improved the response in Tonga when the sole communication cable was compromised. Kong also gave an overview of remote emergency communications (Chatty Beetle) and Science Monitoring And Reliable Telecommunications (SMART) cables for early warnings of earthquakes and tsunamis.

### Supply Chain Challenges

Tiare Eastmond (USAID) discussed the mission of USAID and provided a snapshot of the agency's disaster responses in 2020. She focused on supply chain challenges in the Pacific Islands such as getting supplies to a community via vessel, transporting goods from the vessel to a warehouse, and to the people in the community. This operation is complicated by the pandemic and related restrictions and safety measures. Other supply chain challenges include keeping food fresh, competition for resources among countries, and handling unsolicited third-party goods.

## VII. Session 3: Tools and Resources for Storm Support

The third session, held on April 21, 2022, focused on introducing and socializing some of the available tools and resources that support different stages of storm landfall (I.e., pre-storm landfall, during storm landfall, post storm assessment, response activities, recovery). A list of disaster related tools highlighted is included in **Appendix D**. Polls were used throughout the session to understand the participants' knowledge and use of the featured tools.

**Poll Question 1:** Have you used some of the tools presented today in previous hurricane seasons?

- a. Yes (70%)
- b. No (30%)

**Poll Question 2:** Did the 2022 summit provide you new information or refresh your awareness of tools and resources?

- a. Yes, new to me tools (67%)
- b. Yes, it refreshed my (33%)

Nancy Kinner (UNH CRRC) provided the opening statements. Charlie Henry (OR&R) reviewed the pre-summit survey results and noted the tools and resources that were of great interest to participants.

### Pre-Storm Landfall Phase Arrival

Russell Jackson (OCM) gave an overview of OCM's [Digital Coast](#) which is a constituent-driven, integrated, platform used to integrate geospatial and coastal management. Jackson reviewed Digital Coast's website which provides effective and efficient access to coastal geospatial data, tools, training, and case studies. Jackson noted that there are over 500 terabytes of high-resolution elevation data, land cover data, orthoimagery; 200+ web mapping services; and links to 50 national-level coastal data sets. He concluded by giving a demonstration of one of the tools on

Digital Coast, the [Coastal Flood Exposure Mapper](#). This visualization tool creates a collection of user-defined maps that show people, places, and natural resources exposed to coastal flooding.

## Storm Landfall Phase

Paul Fanelli (CO-OPS) gave an overview of some of the CO-OPS products including a demonstration of the [Coastal Inundation Dashboard](#), which is an interactive map-based tool targeted at coastal decision makers and the planning community. It provides real-time and historic flood information and integrates data from other relevant NOAA databases such as the NWS flood thresholds, tropical cyclone forecasts, coastal flood advisories, storm surge watches and warnings, and OCM's sea level rise viewer. Fanelli described water level trends, how to view data from multiple water level stations, and upcoming advancements to the dashboard.

## Planning and Inventory Phase – Post Storm Assessment

Maryellen Sault (NGS) and Mike Aslaksen (NGS) provided an overview of NOAA's emergency response imagers, pre-event [imagery](#), and the potential for Unmanned Aircraft Systems (UAS). Sault and Aslaksen gave an overview of pre-event planning and aircraft and sensor operations including demonstrating what imagery looks like under different conditions. Sault and Aslaksen discussed the response workflow, and coordination with other federal agencies, and addressed commonly asked questions regarding image time, missing areas, and updates to the imagery viewer. The presentation concluded by showcasing imagery collected during previous storms and discussing the role uncrewed aerial systems (UAS) can play in emergency response.

## Implementation Phase – Response Activities

Jay Coady (OR&R) provided an overview of the [Environmental Response Management Application \(ERMA\)](#) which is an online mapping tool for visualizing environmental information related to spills and environmental disasters. ERMA is commonly used to: visualize the situation status during a spill drill/training; create a common operating picture during a disaster response; assess damage and plan for restoration; and analyze threats from climate change, and hurricanes. Coady demonstrated how ERMA can be used for hurricane response including: collecting baseline environmental data, receiving live streams of data (storm tracking, surge modeling, water levels, ship locations), locating critical infrastructure, viewing pre/post imagery, and tracking ESF-10 targets.

Mark White (RPI) provided an overview of the Vessel and Debris Response (VaDR) tool that provides data to other response tools, such as ERMA. Collected debris data are entered into VaDR near real-time and then used to feed into other response tools for near-real time visualization. White discussed the ways in which VaDR can be used for various parts of response including identifying displaced vessels, collecting response imagery, and verifying imagery in the field. VaDR archives photos and can apply layers, such as sensitive habitat areas, to images. White concluded by discussing the ways in which VaDR can be used in conjunction with field maps.

## Pre-Storm and Recovery Phase

Leah Odeneal (OR&R) provided an overview of the [NOAA Response Asset Directory \(NRAD\)](#) which is an all-hazards directory that includes searchable information on physical resources and services

that can be used or need protection during response and recovery from disasters. NRAD, currently a pilot program, can help NOAA respond to future disasters more efficiently through improved shared access to available resources (must have NOAA log-in). Odeneal described how NRAD organizes assets (e.g., facility, aircraft, vessel) and services (e.g., waterway mapping, navigation response, divers). She gave a tutorial on how to access and use the NRAD database and used a hypothetical scenario to show its use during hurricane preparedness.

## VIII. Summit Findings and Recommendations

1. Communications, whether in person or virtual, will always be a challenge for conveying pre-/during-/post-storm information about preparedness, response, and recovery efforts.
  - a. **Recommendation:** Pre-planning is critical, especially for communities that may be cut off from logistical support or communications (e.g., remote Pacific islands). Community outreach and tabletop exercises should be part of emergency management, preparedness campaigns.
  - b. **Recommendation:** The routine use of social media to communicate with the public should be increased, and additional tools developed that use social media to effectively convey risk.
  - c. **Recommendation:** Messaging should occur in multiple languages to reach potentially impacted communities
    - *NWS American Samoa translates all messages in Samoan.*
      - e.g., <https://www.weather.gov/ppg/ZFPPPG>.
  - d. **Recommendation:** Satellite phones or Chatty Beetle should be used during communication disruptions.
    - *NOAA expands use of 'Chatty Beetles' to help fill critical communication gaps after January's Tonga volcano eruption/tsunamis. Weblink to Commerce News [here](#)>>.*
  
2. Pre-planning and engagement with the local community can be critical for saving lives and creating communities that can self-sustain until outside help arrives. NOAA staff and facilities are a part of local communities and many of the agency's missions support local emergency managers. Pre-planning is vital for NOAA staff and facility preparedness. Supplies chains and equipment availability will be impacted by a major storm and should be considered as part of pre-storm preparation.
  - a. **Recommendation:** All NOAA staff (i.e., federal employees, contractors) that live in areas where hurricane impacts can occur should have personal, family, and pet disaster plans that include adequate home supplies for at least 5-14 days (time dependent on vulnerability and accessibility of the location) if there are no municipal services (e.g., water), power, or access to groceries, pharmacies, or fuel. Staff should also have a plan for evacuation should that become prudent.
  - b. **Recommendation:** NOAA facilities located in areas where hurricane impacts can occur should have a facility hurricane plan that is reviewed and updated annually. The plan should include critical materials such as disaster kits and any supplies or equipment that would be needed for staff safety and post-storm recovery (Also see Recommendation 5).
  - c. **Recommendation:** For mission support, critical supplies and equipment should be purchased before a storm event and pre-staged in safe, accessible locations.

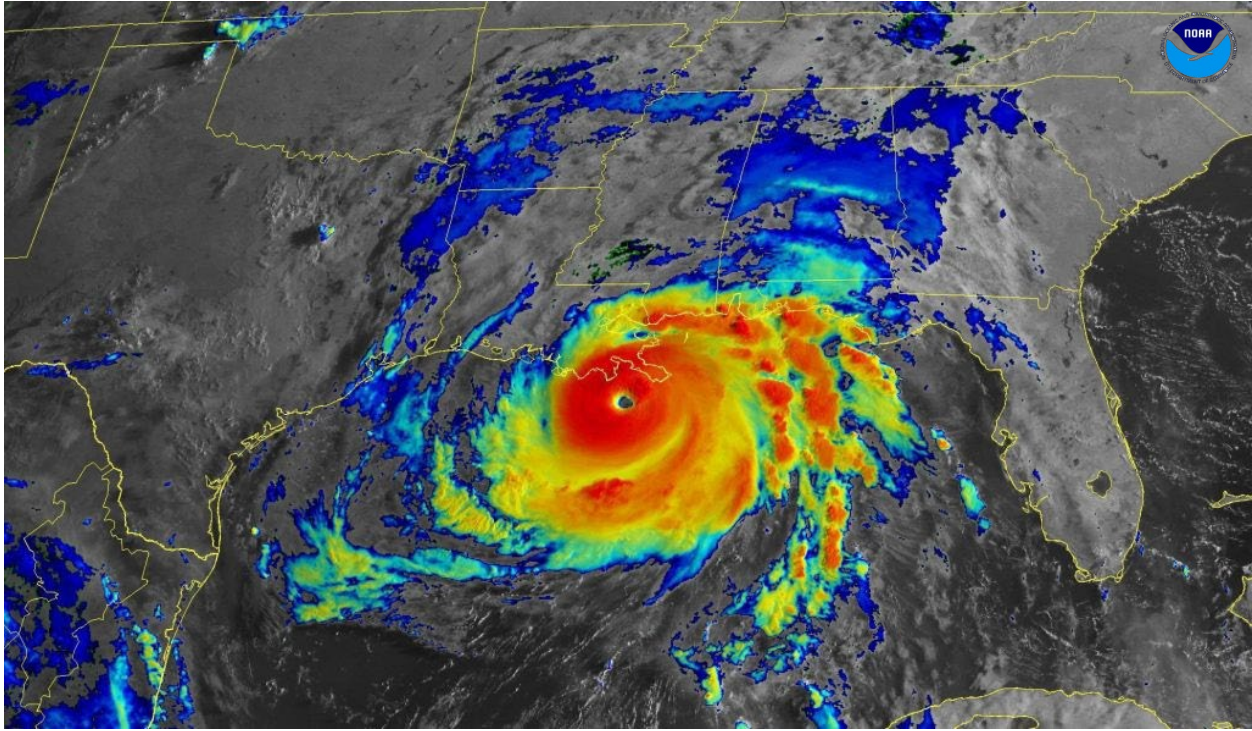
3. COVID continues to exacerbate challenges for evacuees and responders and may limit response capacity and capability. COVID related fatigue and complacency are common factors impacting response and recovery activities, as well as mental health outcomes.
  - a. **Recommendation:** The [NOAA Behavioral Health and Wellness team](#) should develop an outreach and education plan dedicated to informing NOAA employees about the Total Worker Health Program, available resources, and assigned behavioral health professionals.
  - b. **Recommendation:** NOAA should continue to promote and offer its employees the range of professional training opportunities recommended by [NOAA Behavioral Health and Wellness](#) to improve management of stress and fatigue.
  
4. NOAA should continue pre-planning and coordination with federal and state partners to enhance readiness to meet its responsibilities and designated MEFs before, during, and after a major hurricane makes landfall.
  - a. **Recommendation:** Disaster planning to support post-hurricane sunken and displaced vessels mission assignments and implementation gaps, and inconsistency in operations (improve ESF 3/10 response coordination) should continue. This may include developing a multi-agency guidebook to enhance coordination, mission planning, and response.
    - *OR&R is currently working with the Coastal Response Research Center on a project to assess lessons learned from the ESF-3 and 10 mission responses to sunken and displaced vessels during the 2020 and 2021 storm seasons.*
  - b. **Recommendation:** NOAA should continue to engage in mission-related exercises with federal and state partners to improve coordination, evaluate plans, and engage in continuous improvement to meet its MEFs.
  - c. **Recommendation:** Standardized training could be developed on best management practices, available tools, and regulatory guidance to enhance understanding, consistency and planning /preparedness initiatives.
  
5. NOAA and partner facilities may not be sufficiently resilient to storm impacts, specifically from hurricanes. The loss of essential products and services (e.g., power, water, life sustaining supplies) at NOAA or partner facilities impacts their ability to continue their assigned essential support activities and/or respond to ESFs, MEFs, and PMEFs and other response and recovery activities during and following a hurricane.
  - a. **Recommendation:** Storm/Hazard resiliency should be deliberately planned & budgeted, with improvements incorporated into new facilities and retrofits of existing facilities during recapitalization.



- The storm resiliency of NOAA facilities should be evaluated, and potential points of failure and interconnected infrastructure identified.
  - Mechanisms should be developed to use existing or new funding sources to improve the resilience of NOAA and partner facilities to hurricane impacts.
- b. Recommendation:** Information should be collected on the functional recovery times (i.e., the restoration of a system’s services to allow users to resume most of their pre-hurricane activities) for NOAA’s and its partners’ infrastructure systems. Strategies should be developed that improve infrastructure resilience and the interdependent capacity of coastal communities to recover from hurricane hazards.
6. NOAA has a wide range of digital response and planning tools that can be used for hurricane planning, preparedness, response, and recovery activities.
- a. Recommendation:** A summary of these tools with appropriate web links should be provided to all Summit participants.
- *The NOAA Hurricane Preparedness Summit website:*  
<https://crrc.unh.edu/nos-hurricane-summit-2022> Tools Summary is available online [here>>](#)
- b. Recommendation:** Opportunities should be pursued to share and educate potential users about these tools to gain greater acceptance and use (e.g., future NOAA hurricane summits, OR&R workshops, conferences).
- c. Recommendation:** Information should be collected on non-NOAA developed tools to further enhance user knowledge about the range of products available across federal agencies.

## IX. Appendices

- A. Summit Agenda
- B. Summit Presentations
- C. Pre-Summit Survey Technical Report
- D. Disaster Related Tools



# **NOAA Hurricane Preparedness Summit 2022**

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April 20 & 21, 2022

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## **APPENDIX**

## Appendix A: Summit Agenda

# NOAA HURRICANE PREPAREDNESS SUMMIT (2022) AGENDA

Enhancing support of state and federal partners for the 2022 Hurricane Season by focusing on the readiness of NOAA's Personal (People), Mission and Infrastructure (PMI)

## April 20, 2022 (Day 1) 1:00 – 5:00 pm (ET)

- 1:00 **Opening, Overview and Logistics**  
*Nancy Kinner, Coastal Response Research Center (CRRC), University of New Hampshire*
- 1:05 **Welcome**  
*Benjamin Friedman, NOAA Deputy Under Secretary for Operations (DUSO)*  
*Scott Lundgren, NOAA Office of Response and Restoration (OR&R)*
- 1:15 **Summit Objectives and Context**  
*Charlie Henry, NOAA OR&R*
- 1:25 **Setting the Stage**  
*Cody Fritz, NOAA National Weather Service (NWS) National Hurricane Center (NHC)*  
*CDR Joseph Newcomb, U.S. Public Health Service, NOAA Aircraft Operations Center*
- 1:55 **Q&A Participant Discussion**
- 2:05 *BREAK*
- 2:10 **Resilient Communications**  
*Gretchen Hirt, Jefferson Parish LA Public Information Office*  
*Christopher Guilbeaux, Louisiana Governor's Office of Homeland Security and Emergency Preparedness (LA GOHSEP)*
- 2:30 **Storm Specific Lessons Learned**  
*CAPT Chris Sloan, NOAA Homeland Security Program Office (HSPO)*  
*Kate Wheelock, NOAA OR&R*  
*CDR Megan Guberski, NOAA Office of Coast Survey (OCS)*
- 3:15 **Q&A Participant Discussion**
- 3:35 *BREAK*
- 3:40 **Conveying Severity of Risk**  
*Mike Brennan, NOAA NWS*
- 3:55 **Facility and Staff Readiness**  
*CAPT Chris Sloan, NOAA Homeland Security Program Office (HSPO)*  
*Ben Schott, NOAA NWS*
- 4:15 **Compounding Stressors (Pandemic Fatigue/Mental Health)**  
*CDR KJ Green, NOAA OMAO Office of Health Services*
- 3:35 **Q&A Participant Discussion**
- 4:50 **Wrap Up and Path Forward**  
*Kate Wheelock, NOAA OR&R*
- 5:00 *ADJOURN*



This event is made possible through the partnership with NOAA's Office of Response and Restoration (OR&R), Disaster Preparedness Program (DPP) in cooperation with the Coastal Response Research Center.



# NOS HURRICANE PREPAREDNESS SUMMIT AGENDA

Addressing the unique challenges to NOAA's Personal, Mission and Infrastructure in the Pacific Islands during Hurricane Season

## April 20, 2022 (Day 1 – Pacific Islands Session)

6:00 – 8:00 pm (ET)/12:00 – 2:00 pm (HST)

- 6:00 ET/12:00 HST **Opening, Overview and Logistics**  
*Nancy Kinner, Coastal Response Research Center (CRRRC)*
- 6:05 ET/12:05 HST **Welcome**  
*Benjamin Friedman, NOAA Deputy Under Secretary for Operations (DUSO)*  
*Genevieve "Genny" Miller, NOAA NWS*
- 6:15 ET/12:15 HST **Summit Objectives and Context**  
*Charlie Henry, NOAA OR&R*
- 6:25 ET/12:25 HST **History of Climatological Impacts**  
*Eric Lau, NOAA NWS*
- 6:35 ET/12:35 HST **Setting the Stage**  
*Marcus "Landon" Aydlett, NOAA NWS*
- 6:45 ET/12:45 HST **Infrastructure Challenges**  
*LCDR James Hodges, United States Coast Guard (USCG)*
- 7:00 ET/1:00 HST **Communication Challenges**  
*Laura Kong, International Tsunami Information Center (ITIC)*
- 7:15 ET/1:15 HST **Supply Chain Challenges**  
*Tiare Eastmond, U.S. Agency for International Development (USAID)*
- 7:25 ET/1:25 HST **Q&A Participant Discussion**  
*Moderator: Chad Yoshinaga, NOAA Pacific Islands Fisheries Science Center*
- 7:50 ET/1:50 HST **Closing Remarks**  
*Eric Lau, NOAA NWS*
- 8:00 ET/2:00 HST **ADJOURN**



This event is made possible through the partnership with NOAA's Office of Response and Restoration (OR&R), Disaster Preparedness Program (DPP) in cooperation with the Coastal Response Research Center.



# NOS HURRICANE PREPAREDNESS SUMMIT AGENDA

Addressing the unique challenges to NOAA's Personal, Mission and Infrastructure in the Pacific Islands during Hurricane Season.

**April 21, 2022 (Day 2) 1:00 – 5:00 pm (ET)**

**1:00 Opening, Overview and Logistics**

*Nancy Kinner, Coastal Response Research Center (CRRC)*

**1:05 Overview of Tools and Resources**

*Charlie Henry, NOAA OR&R*

## **FEATURED TOOLS**

**1:15 Pre-Storm Landfall Phase Arrival**

*Office of Coastal Management (OCM) Digital Coast - Russell Jackson, NOAA OCM*

**1:45 Storm Landfall Phase**

*Center for Operational Oceanographic Products and Services (CO-OPS) Products – Paul Fanelli, NOAA CO-OPS*

**2:15 Q&A Participant Discussion**

**2:30 BREAK**

**2:40 Planning and Inventory Phase – Post Storm Assessment**

*Remote Sensing – Maryellen Sault, NOAA National Geodetic Survey (NGS)*

**3:10 Implementation Phase – Response Activities**

*Environmental Response Management Application (ERMA) – Jay Coady, NOAA OR&R  
Vessel and Debris Response (VaDR) – Mark White, Research Planning, Inc. (RPI)*

**4:10 Pre-Storm and Recovery Phase**

*NOAA Response Asset Directory (NRAD) – Leah Odeneal, NOAA OR&R*

**4:40 Q&A Participant Discussion**

**4:55 Wrap Up**

*Matthew Chasse, NOAA OCM and Lisa Symons, NOAA ONMS*

**5:00 ADJOURN**




*This event is made possible through the partnership with NOAA's Office of Response and Restoration (OR&R), Disaster Preparedness Program (DPP) in cooperation with the Coastal Response Research Center.*



## Appendix B: Summit Presentations



NOAA | Office of Response and Restoration  
Disaster Preparedness Program

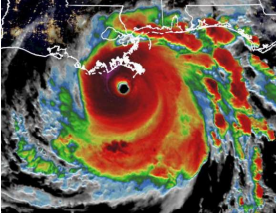
## 3<sup>rd</sup> Annual NOAA Hurricane Preparedness Summit Objectives and Context

Charlie Henry  
Director NOAA's Gulf of Mexico Disaster Response Center

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### “Putting NOAA is a better response posture for the next hurricane season.”

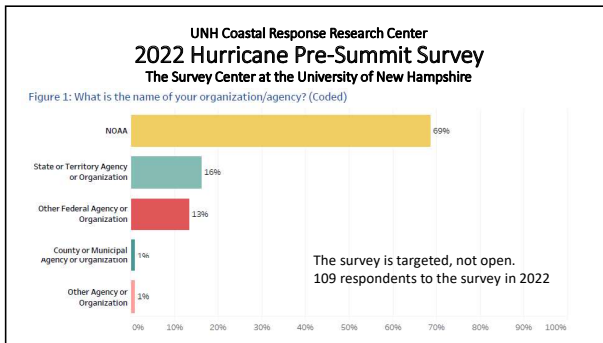
- Understand best practices and lessons learned from 2021 hurricane season;
- Become knowledgeable about Standard Personnel, Mission, and Infrastructure (PMI) topics;
- Work towards improving consistency in response between federal and state partners;
- Recognize future challenges for next hurricane season;
- Introduce and familiarize tools and resources; and
- Understand the gaps given the current limitations.



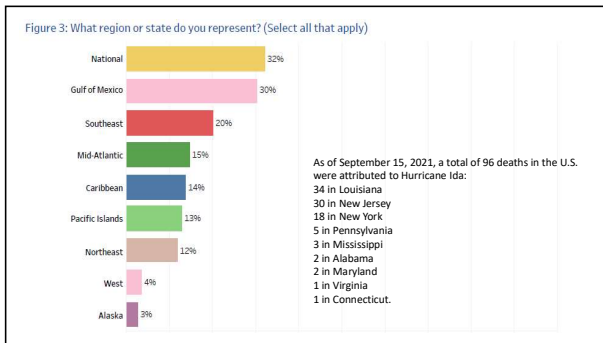
Hurricane Ida approaches Louisiana Coast, 29 August 2021.

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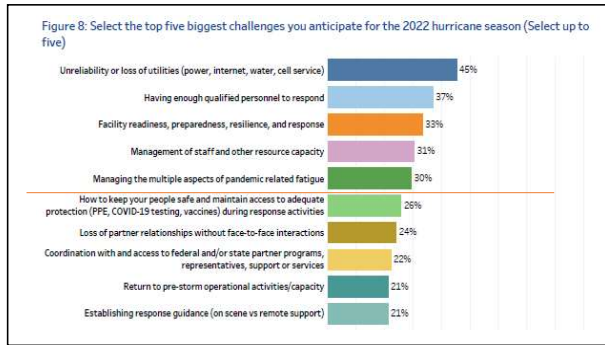
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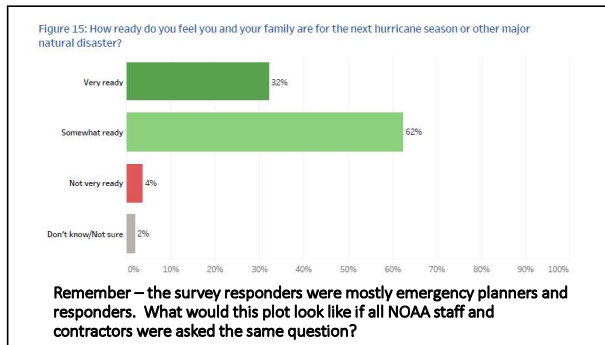


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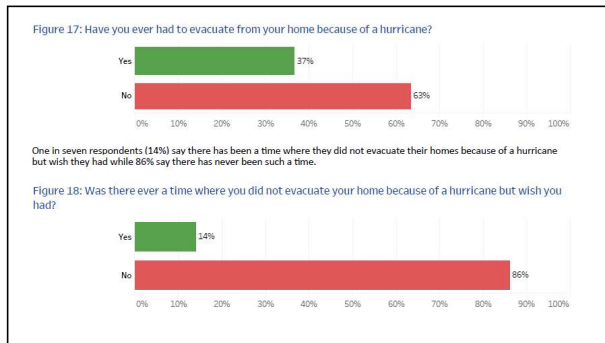


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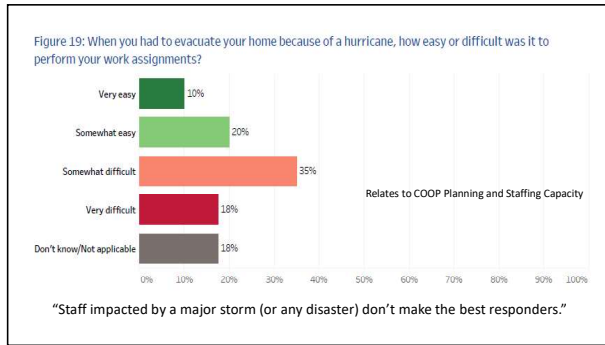
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Thank you to those presenting, you for attending, and to the steering committee members:

Lisa Symons (ONMS), Brad Benggio (ORR), Matt Chasse (OCM), Leah Odeneal (ORR), CAPT Chris Sloan (HSPO), Charles Wisotzkey (NRT), Eric Lau (NWS), Nancy Kinner (UNH/CRRC), Katie Perry (UNH/CRRC), and Charlie Henry (ORR).

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**HURRICANE PREPAREDNESS**  
 A look back at the hyper-active hurricane seasons and what to expect in 2022...

Cody Fritz  
 National Hurricane Center  
 Storm Surge Unit  
 April 20, 2022

U.S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL HURRICANE CENTER

1

**Atlantic Tropical Cyclone Activity 2017-2022**

- 100 named storms - 45 hurricanes, of which 21 were major hurricanes
- 16 U.S. hurricane landfalls, including 7 major hurricanes
- Total direct tropical cyclone fatalities basin-wide: ~ 1,000 (includes international)
- Total U.S. tropical cyclone damage: ~ \$482.8 billion
  - Billion dollar storms: 18
  - 10 Billion dollar storms: 7
- More Category 4 and 5 landfalls in the U.S. since 2017 than from 1963-2016!

Despite 16 hurricane landfalls, 7 of which were major hurricanes, in the continental United States since 2017, there has been an unusually low number of direct fatalities from storm surge, the hazard that historically represents the largest threat of mass fatalities in landfalling hurricanes.

2

### 2021 Seasonal Overview

- 8 U.S. landfalls
  - 6 tropical storms: Claudette, Danny, Elsa, Fred, Henri, Mindy
  - 2 hurricanes: Ida, Nicholas
- Direct U.S. fatalities: 71\* (55\* from Ida)
- Indirect U.S. fatalities: 43\* \*Preliminary
- \$75B in U.S. damage from Ida (more damage than entire 2020 season)
- 10 systems with watches or warnings on 1<sup>st</sup> advisory



Courtesy AP





#HurricaneIda @NHC @NOAA @NOAA\_Storm @NHC\_Storm

3

### Seasonal Overview – Hurricane Ida

Improvements in NHC forecasts during rapid intensification events

Very aggressive early forecast for Ida indicated the potential for a major hurricane landfall in Louisiana from the first advisory


#HurricaneIda @NHC @NOAA @NOAA\_Storm @NHC\_Storm

4


2

### Seasonal Overview – Hurricane Ida

- Maximum inundation levels of 9 to 14 feet above ground level (AGL) occurred primarily along the east bank of the Mississippi River
- Maximum inundation levels of 6 to 12 feet AGL occurred along the west bank of the Mississippi River
- Storm surge levels were high enough to overtop some local levee systems
- Hurricane Ida made landfall near Grand Isle, LA



Courtesy Dan Brown

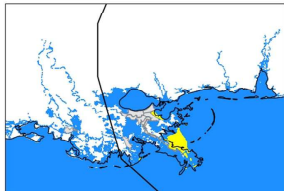
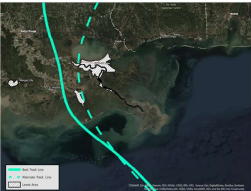



#HurricaneIda @NHC @NOAA @NOAA\_Storm @NHC\_Storm

5

### Understanding Risk: Hurricane Ida

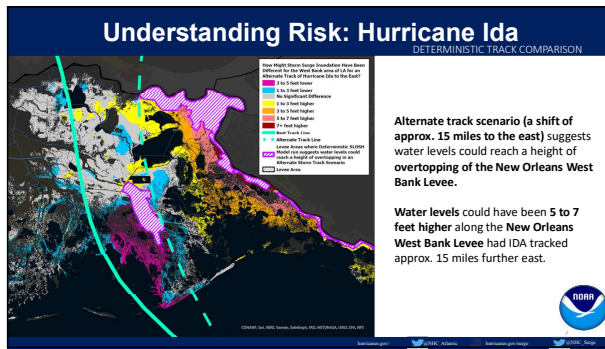
V<sub>max</sub>(10s) = 133.5  
 BMW(nmi) = 11.2

#HurricaneIda @NHC @NOAA @NOAA\_Storm @NHC\_Storm

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### Climate Change and Hurricanes

What we already know...

What We've Observed	What This Means
More severe tropical cyclones (Category 3-5)	More damage due to stronger winds and higher storm surge
Slower-moving tropical cyclones	Longer-duration events, more rainfall, higher storm surge
Strongest storms are occurring farther north, not just in the tropics	Puts the United States under increasing risk of significant impacts
Global number of tropical cyclones has not changed	No known negative impacts

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4

### Atlantic Tropical Weather Outlooks Began May 15

- In 2021, NHC began issuing Atlantic Tropical Weather Outlooks on May 15**
  - No change to the official start of hurricane season
  - Provides information on possible development prior to June 1
- 7 straight years (2015-2021) with at least one named storm prior to June 1<sup>st</sup>**
- 5 of the recent pre-season storms have impacted the United States**
  - Arthur and Bertha ('20), Alberto ('18), Bonnie ('16), Ana ('15)

9

### Atlantic Tropical Weather Outlooks Began May 15

- Beginning in 2022, the Tropical Weather Outlook will include geographic or system-specific headers for active systems and disturbances**
  - Makes the text product more readable and scannable
  - Minimizes confusion between multiple systems, especially when it's busy
  - Expected to be seamless with the Graphical TWO
  - Similar to other NWS text products

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**HURRICANE PREPAREDNESS**

NOAA Hurricane Season Outlook will be available later next month!

**Remember it only takes one storm!**

[Cody.Fritz@noaa.gov](mailto:Cody.Fritz@noaa.gov)



11

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**Office of Health Service**

**Department of Aviation Medicine**





1

1

**COVID 19 Mitigation, Surveillance**

Topics

1. Background
2. Viral Mitigation
3. Viral Surveillance
4. Safe to fly
5. Risk vs Benefit
6. Vaccination
7. Aeromedical Considerations
8. Non COVID-19 lessons learned



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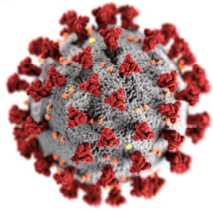
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## COVID 19 Mitigation, Surveillance

**Background**

1. December 2019 reports of a respiratory virus spreading in China
2. First American case of COVID 19 was in January 2020
3. June 2020 there was a viral outbreak at the AOC
4. Resulted in Viral mitigation then surveillance




3

## COVID 19 Mitigation, Surveillance

### Viral Mitigation - Keeping the virus from spreading

1. Failed plans
2. Plans implemented
3. Did it work?




4

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## COVID 19 Mitigation, Surveillance

### Viral Surveillance – Monitoring the virus and reacting to infections

1. Hardships for visitors and unit members during a record breaking season (2020)
2. Delta and Omicron surges
3. Peer review evidence




5

## COVID 19 Mitigation, Surveillance

### Safe to Fly

1. The Commander's intent
2. Risk Vs Benefit
3. 100% vaccinated reached at the AOC
4. More changes based on peer reviewed evidence




6

6

## COVID 19 Mitigation, Surveillance

### Risk Aversion

1. Risks vs benefit.
2. No increase in infections
3. Testing, SIP and Contact tracing are more likely to prevent a mission than a viral outbreak



7

## COVID 19 Mitigation, Surveillance

### Vaccines

1. As vaccination compliance increased, infection rates decreased
2. The AOC is at 100%



8


4

4/21/2022

## COVID 19 Mitigation, Surveillance

### Aeromedical Considerations

1. Supporting the Commander's intent
  - o Can the mission be done safely
2. AEB Current policy
  - o Testing when joining a crew
  - o Testing if ill
  - o SIP only when ill




9

## COVID 19 Mitigation, Surveillance

### Non-COVID 19 Lesson's Learned

1. New contractors/contracts
2. Single point of failure
3. Units need a dedicated medical provider
4. Proposed Policy
  - o Risk vs Benefits
  - o Flexibly



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## COVID 19 Mitigation, Surveillance

**Summary**



1. Background
2. Viral Mitigation
3. Viral Surveillance
4. Safe to fly
5. Risk vs Benefit
6. Vaccination
7. Aeromedical Considerations
8. Non COVID-19 lessons learned

11

11

## Office of Health Service Department of Aviation Medicine

Questions?

12



12

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4/21/2022

## Office of Health Service

**Joseph Newcomb, DMS, APA-C**  
**Commander, USPHS**  
 Director of Aviation Medicine  
 NOAA Aircraft Operations Center  
 Flight Surgeon RM 182  
 3450 Flightline Drive  
 Lakeland FL, 33811  
 MBL (910) 977-0990  
 OFF (863) 500-3991  
[joseph.newcomb@NOAA.gov](mailto:joseph.newcomb@NOAA.gov)

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## NOAA Hurricane Preparedness Virtual Summit – Resilient Communications

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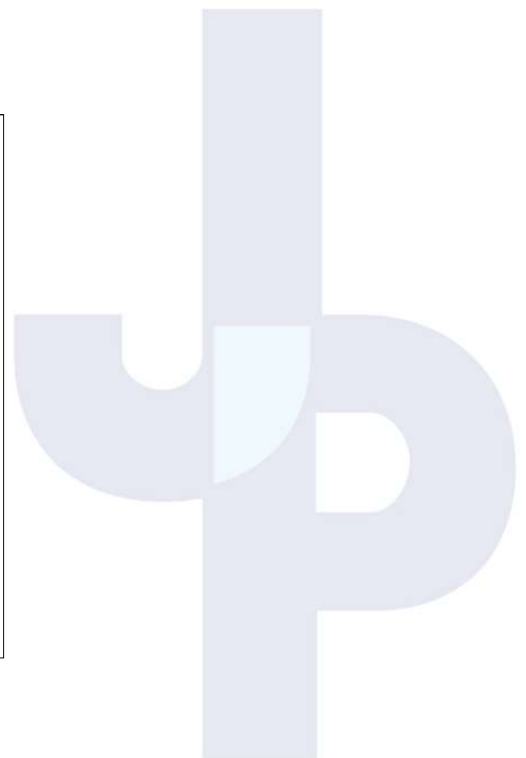
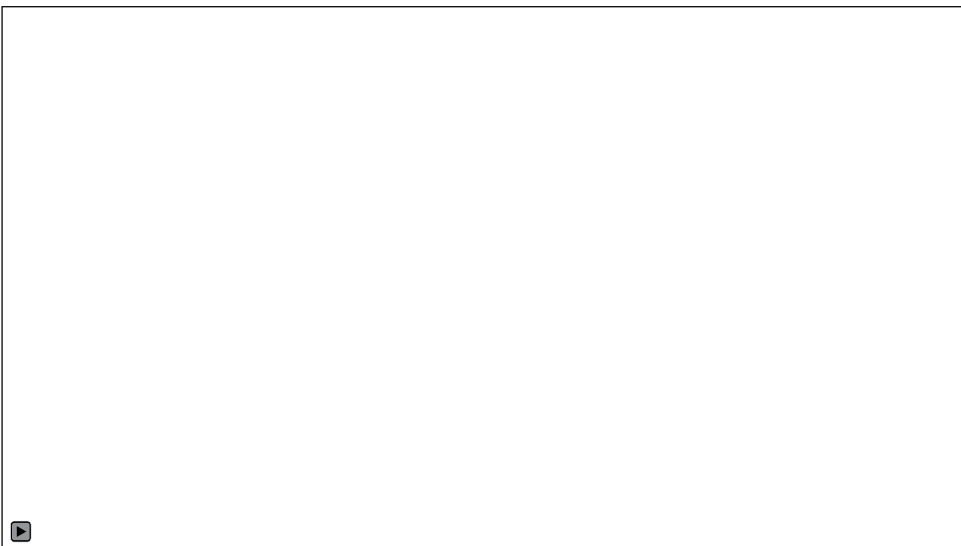
Jefferson Parish PIO  
Gretchen Hirt, APR

LA GOHSEP Deputy Director  
Christopher Guilbeaux



[www.JeffParish.net](http://www.JeffParish.net)

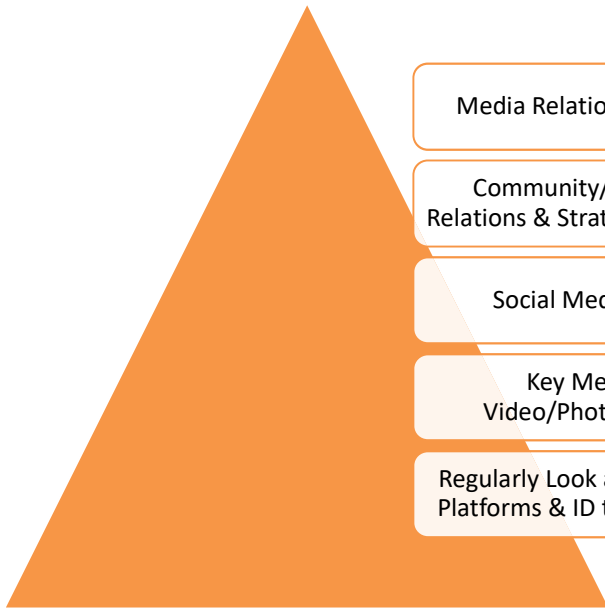
## Hurricane Ida Overview



[www.JeffParish.net](http://www.JeffParish.net)

# Communications Planning

Planning is critical leading up to Hurricane Season



Media Relations & Outreach

Community/Government Relations & Strategic Partnerships

Social Media Strategy

Key Messaging, Video/Photos/Graphics

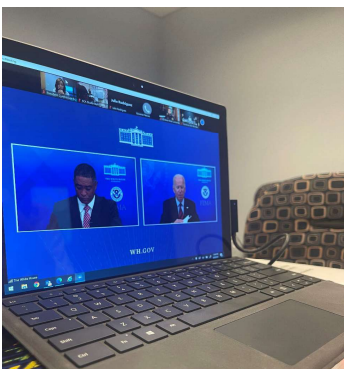
Regularly Look at Metrics for all Platforms & ID target audiences



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# Coordination & Collaboration

Ongoing coordination with all partners across federal, state & local levels



[www.JeffParish.net](http://www.JeffParish.net)

# Public Outreach Tactics

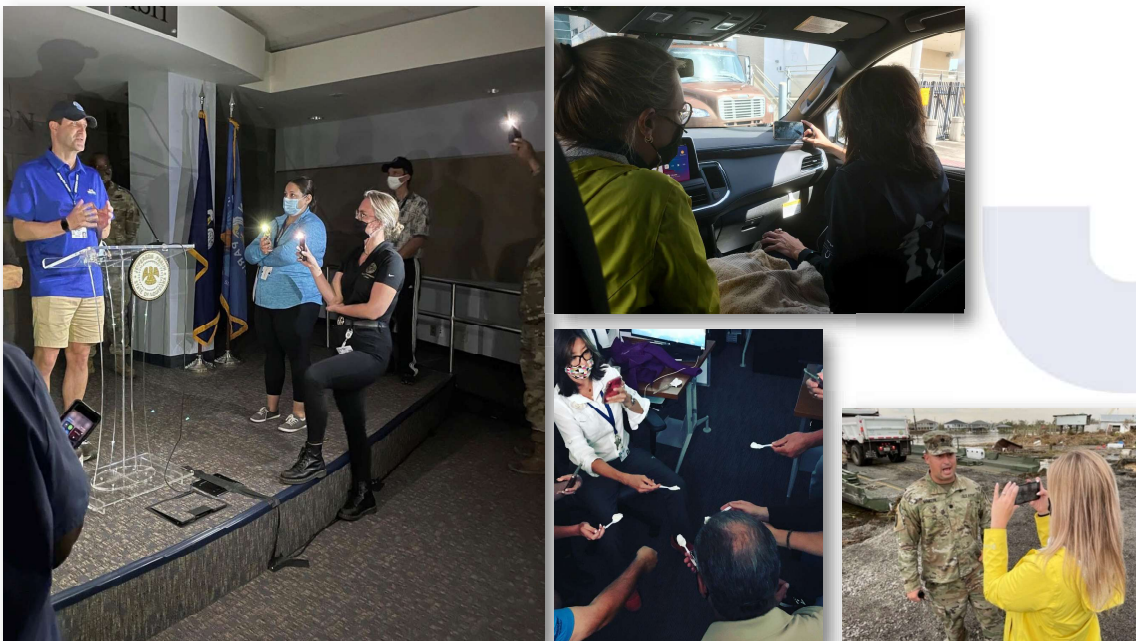
Social Media . Daily Press Briefings & Releases . JP Alerts



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# Real-Time Communication

You Can't Plan Everything / Be Ready to Shift at Any Moment



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# Results & Lessons Learned

After-Action Report & Improvement Plan . Analytics to Measure Reach



[www.JeffParish.net](http://www.JeffParish.net)

# Questions & Answers



[www.JeffParish.net](http://www.JeffParish.net)

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4/21/2022

NOAA | Office of Response and Restoration  
Disaster Preparedness Program

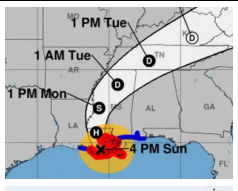

## STORM SPECIFIC LESSONS LEARNED

*"There is nothing learned from the second kick of a mule."*  
Miles Hayes

Kate Wheelock / Charlie Henry  
Disaster Preparedness Program

1

- **NOS Incident Management Team**
  - Support NOS Preparedness, Response, and Coordination, NOS Leadership, Reporting, and HSPO IMT.
  - Maintains the NOS Disaster Coordination Dashboard.
  - Activated for three Hurricanes in 2021 (Elsa, Henri, and Ida).
- 2021 NOS Hurricane Season After Action Report and Continuous Improvement Plan
- 2020 Hurricane Sally NOAA Disaster Response Center Activation in Support of USCG
- 2022 Sunken and Displaced and Abandoned and Derelict Vessel Project.

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**NOS 2021 Hurricane Season After Action Report and Corrective Action Plan – Key Findings:**

- 1. NOS was in a stronger position to respond with regard to the COVID-19 pandemic during the 2021 season due to progress made in 2020 and improvements implemented based on the 2020 Hurricane Season AAR.
- 2. NOS staff reported increased familiarity and effectiveness working in a virtual posture, however challenges with networking, information sharing, and innovation persist.
- 3. While the 2021 season was an above-average season in terms of the number of storms, there were fewer direct impacts to NOS than the year prior...

4

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**Continuous Improvement Plan:**  
(we can always get better)

- Increase personal preparedness across NOS.
- Improvements to NOS Situation Report: emphasize links to NHC homepage.
- Improvements to NOS Dashboard: Showcase “Disaster Specific Documents” link & FEMA NRCC reports.
- Create an event on the NOS Dashboard for fire-related responses.
- OR&R to offer ERMA resources & training to federal, state, and county/parish-level governments.
- Invite Purchase Card contact to an upcoming IMT meeting to present on purchase card protocols and request channels.
- Establish a cross Line/Program Office Outreach Team for disaster/IMT activation.

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2022 Sunken and Displaced and Abandoned and Derelict Vessel Project  
 NOAA OR&R and the UNH Coastal Response Research Center



Working with our partners  
 to better respond to storm  
 displaced and sunken vessels before they  
 become  
 Abandoned and Derelict Vessels


OR&R's Disaster Preparedness Program (DPP), Emergency Response Program (ERD), and Marine Debris Program (MDP)

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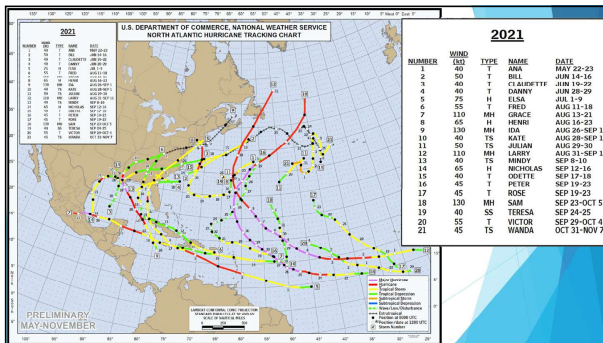
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Office of Coast Survey  
 Navigation Response Branch  
 Lessons Learned Hx Season 2021

CDR Megan R. Guberski, Chief, NRB  
 20 April 2022



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### Hurricane Elsa: 1-9 July

- NWS began alerts on PTC #5 30-June
- Intensified Hx on 2-July
- Stakeholders started prep calls 2-July
- 1<sup>st</sup> Landfall: Cuba 7-July @ 56 knots
- 2<sup>nd</sup> landfall: FL panhandle 7-July @ 56 knots
- No NRB response

Office of Coast Survey  
National Oceanic and Atmospheric Administration

3

### Fred, Grace, & Henri Oh my! 11-23 Aug

Office of Coast Survey  
National Oceanic and Atmospheric Administration

4

2

### Tropical Storm Fred: 11-18 Aug

- NWS began alerts on PTC #7 on 9-Aug
- 1<sup>st</sup> landfall (TS): Dominican Republic, 10-Aug @ 39 knots
- 2<sup>nd</sup> landfall: Cuba, 13-Aug @ 30 knots
- 3<sup>rd</sup> landfall: FL panhandle, 16-Aug @ 48 knots
- No NRB response requested

Office of Coast Survey  
National Oceanic and Atmospheric Administration

5

### Hurricane Grace: 13-21 Aug

- NWS began alerts on PTC #7 on 13-Aug
- 1<sup>st</sup> landfall: Greater Antilles 14-Aug @ 35 knots
- 2<sup>nd</sup> landfall: Jamaica 17-Aug @ 40 knots
- 3<sup>rd</sup> landfall: Cayman Islands 18-Aug @ 36 knots
- 4<sup>th</sup> landfall: Yucatan Peninsula, Mexico 19-Aug @ 70 knots
- 5<sup>th</sup> landfall: Veracruz, Mexico 21-Aug @ 108 knots

Office of Coast Survey  
National Oceanic and Atmospheric Administration

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### Hurricane Henri: Aug 15-23

Surface Wind Field of Tropical Storm Henri  
Sustained Winds as of 1100 AM EDT Sun Aug 22, 2021 Advisory Number 27

- NWS began alerts on PTC #8 on 15-Aug
- Landfall: Block Island, RI 22-Aug @ 56 knots
- NRB initially requested to respond in New London, but was stood down.

Office of Coast Survey  
National Oceanic and Atmospheric Administration

7

### Hurricane Ida: 26-Aug - 2-Sept

Surface Wind Field of Tropical Storm Ida  
Sustained Winds as of 100 PM CDT Mon Aug 26, 2021 Advisory Number 18A

- NWS began alerts on TD #9 on 26-Aug
- Hx strength on 27-Aug
- 1<sup>st</sup> landfall: Isla de la Juventud, Cuba 27-Aug @ 65 knots
- 2<sup>nd</sup> landfall: Pinar del Rio, Cuba 27-Aug @ 70 knots
- 3<sup>rd</sup> landfall: Port Fourchon, LA 29-Aug @ 130 knots 930 mb

Office of Coast Survey  
National Oceanic and Atmospheric Administration

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4

### Hx Ida Response Timeline

► 25-Aug: NSD begins internal meetings

Five-Day Graphical Tropical Weather Outlook  
National Hurricane Center

Five-Day Graphical Tropical Weather Outlook  
National Hurricane Center Miami, Florida

Five-Day Graphical Tropical Weather Outlook  
National Hurricane Center Miami, Florida

Office of Coast Survey  
National Oceanic and Atmospheric Administration

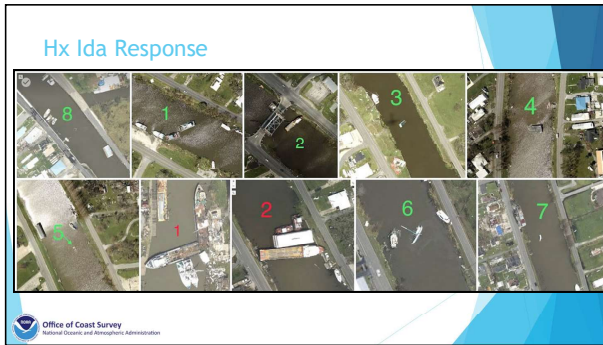
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### Hx Ida Response Timeline

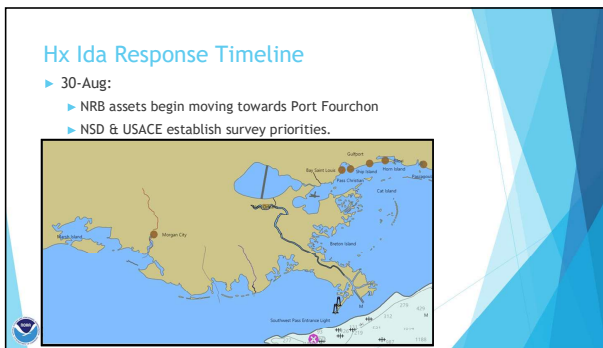
- 26-Aug
  - TX and LA Navigation Restoration teams both stand up MTRSU meetings
  - NSD decides to pre-stage response assets
    - Fernandina Beach team in Atlanta, GA (1 boat, 1 RV, 1 generator)
    - Stennis team in Gulfport, MS (2 boats, 2 RVs, 1 generator)
  - Double landfall in Cuba as Cat 1 hurricane.
- 27-Aug
  - Ida passes into GOMEX, and strengthens
- 29-Aug
  - Landfall at Grand Isle, LA, @ 1155 as Cat 4 hurricane
  - Retained Cat 4 wind speeds overland
  - Reports of devastation in New Orleans, Golden Meadow, Houma, Gattiano, LaPlace, Lockport and Grand Isle

Office of Coast Survey  
National Oceanic and Atmospheric Administration

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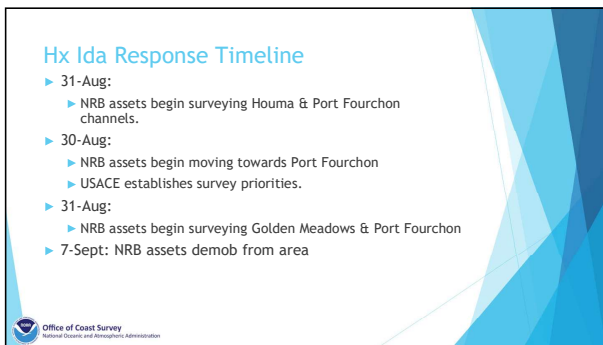
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4/21/2022



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NOAA - Navigation Response Branch Supplemental Contact Information NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE - OFFICE OF COAST SURVEY		Contact: Chief, Navigation Response Branch CDR Jay Lomenick, NOAA cjl@noaa.gov	
Date:	8/2/2022		
Location:	28° 11' 00.00"N		
Longitude:	092° 42' 23.00"W		
USCG's water depth:	14.17M		
USCG's contact height:	1.1		
Contact Altitude:	10.0M		
<b>CONTACT #1</b>			
Phone:	1-604-1808-01	Chart Number:	108-127M
Group:	NOAA Navigation Branch	Priority:	REG
Category:		Status:	Active
Reference:		Date of Survey:	8/2/2022
PRELIMINARY PRODUCT - FOR USCG & NOAA DECISIONAL USE ONLY - NOT FOR USE IN NAVIGATION			

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### Non-Hurricane Responses

- ▶ MIST kit at NY Harbor
- ▶ McMurdo Station Expedition



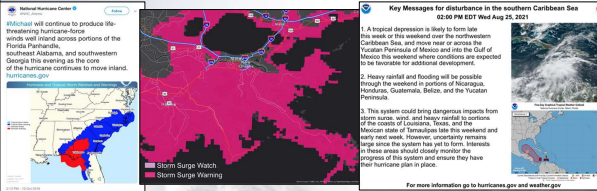
Office of Coast Survey  
National Oceanic and Atmospheric Administration

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4/21/2022

### Conveying Risk in Tropical Cyclones



**Key Messages for disturbance in the southern Caribbean Sea**  
02:50 PM EDT Wed Aug 25, 2021

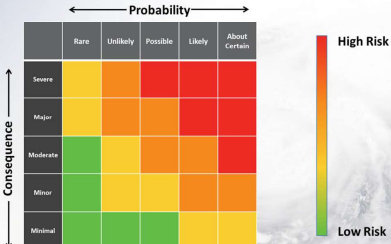
1. A tropical depression is likely to form late this week or the weekend over the northeastern Caribbean Sea, and move near or across the Yucatan Peninsula of Mexico and into the Gulf of Mexico. The immediate weather conditions are expected to be favorable for additional development.
2. Heavy rainfall and flooding will be possible through the weekend in portions of Nicaragua, Honduras, Guatemala, Belize, and the Yucatan Peninsula.
3. This system could bring dangerous impacts from storm surge, wind, and heavy rainfall to portions of the coasts of Louisiana, Texas, and the Mexican state of Tamaulipas late this weekend and early next week. However, uncertainty remains large since the system has yet to form. Islanders in these areas should monitor the progress of this system and ensure they have their hurricane plan in place.

For more information go to [hurricanes.gov](http://hurricanes.gov) and [weather.gov](http://weather.gov).

Dr. Michael J. Brennan  
Branch Chief, Hurricane Specialist Unit, National Hurricane Center  
2022 NOAA Hurricane Summit  
20 April 2022

1

### Low-Probability, High Consequence Events



Consequence	Probability				
	Rare	Unlikely	Possible	Likely	About Certain
Severe	Low Risk	Low Risk	Low Risk	High Risk	High Risk
Major	Low Risk	Low Risk	High Risk	High Risk	High Risk
Moderate	Low Risk	Low Risk	High Risk	High Risk	High Risk
Minor	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Minimal	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk

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### Understanding Risk

**Risk = Likelihood × Consequence × Vulnerability**

**3D Risk Matrix**  
(Thinking About People)

**IMPORTANT:** All other things being equal, a threatened community that is less-hardened against hurricane hazards is at greater risk than a well-hardened community. Even so, a hurricane warning is needed for each location.

Essential concepts for forecasters collaborating and/or issuing tropical watches and warnings

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### Tools to Convey Risk

- TC Genesis Forecasts - will there be a storm?
- Storm Forecast Information - track, intensity, size (useful, but deterministic and not hazard based)
- Probabilistic hazard-based products - wind, storm surge, rainfall
- Watches and Warnings
- Messaging Tools:
  - Key Messages, IDSS briefings, media interviews, social media posts and briefings

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4/21/2022

### U.S. Atlantic Tropical Cyclone Direct Deaths 1963-2012

Category	Percentage
Storm Surge	49%
Rain	27%
Wind	8%
Surf	6%
Offshore	6%
Tornado	3%
Other	1%

- Direct Death: fatality attributable to the forces of the storm
- Examples:
  - Drowning in storm surge, freshwater flood from rain, or storm-driven waves
  - Lives lost to physical trauma incurred from wind-borne debris or structural failure induced by wind (tornadic and otherwise)
- Most references in the historical record are to Direct Deaths

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### U.S. Atlantic Tropical Cyclone Indirect Deaths 1963-2012

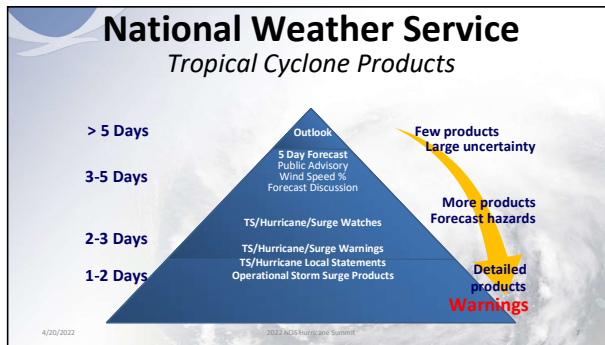
Category	Percentage
Other	34%
Heart attacks	13%
Vehicle accidents	7%
Falls from a roof or ladder	7%
Other (various)	22%

- Indirect Death: fatality not attributable to the forces of the storm, but which would not be expected to occur in the absence of the storm
- Examples
  - Heart attacks
  - Vehicle accidents
  - Falls from a roof or ladder
- Little attention to these losses in historical literature

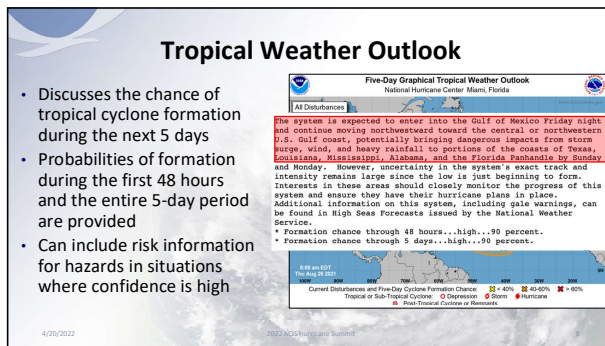
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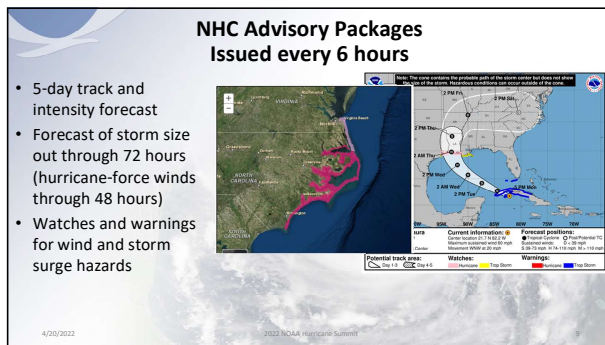


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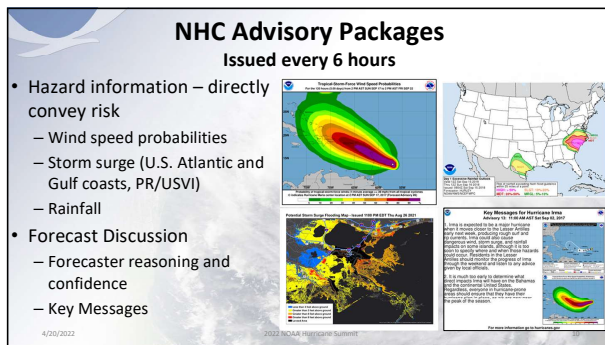


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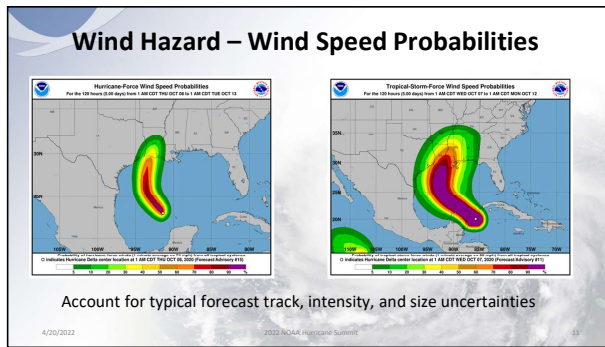
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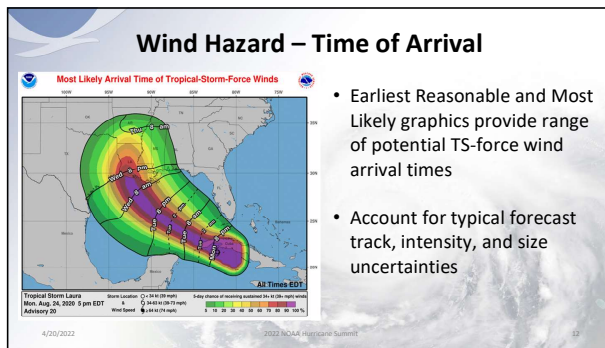
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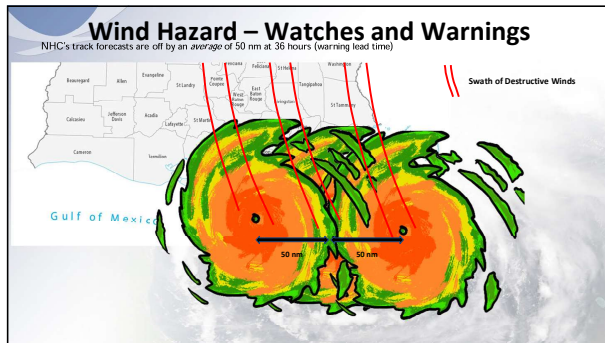
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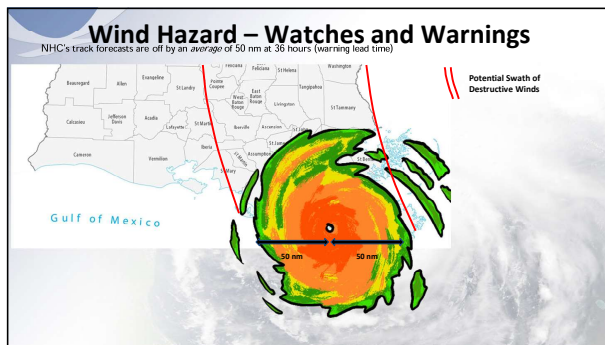
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4/21/2022



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## Wind Hazard – Watches and Warnings

Watches and warnings are **NOT** forecasts...

they are

**RISK COMMUNICATION TOOLS!**  
(that account for uncertainty, hazard severity, and vulnerability)

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## Storm Surge Hazard – Inundation Graphic

- Potential Storm Surge Flooding map shows the reasonable worst case scenario to aid in decision making
- Accounts for uncertainty in storm track, intensity, structure and forward speed

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4/21/2022

## Storm Surge Hazard – Watches and Warnings

- **Storm Surge Watch**
  - **Possibility** of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within **48 hours**
- **Storm Surge Warning**
  - **Danger** of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within **36 hours**

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## Storm Surge Hazard – Uncertainty

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### Rainfall/Flooding Hazard

- WPC's Excessive Rainfall Outlook is a situational awareness and planning tool
- Shows the location of the greatest risk of rainfall-induced flash flooding

4/20/2022 2022 NOAA Hydrologic Outlook

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### Goals of National Level Messaging

- Raise awareness
- Describe evolving threat
- Address uncertainty
- Focus on hazards, not storm "details"
- Encourage preparedness
- Direct users to trusted sources of information

For more information go to hurricanes.gov

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### Goals of National Level Messaging

- Help drive media narrative
- Provide a clear, calm voice
- Set cadence and tone to NWS messaging
- Provide high-level talking points for use in NWS and elsewhere
- Assist FEMA and states in anticipating needs for and directing resources

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## Thank You!

Michael.J.Brennan@noaa.gov

22

NOAA  
Hurricane  
Preparedness  
Summit

20 APR 2022



NOAA Behavioral Health and Wellness

1



Introduction

Name:

Kenneth J. "KJ" Green, LCSW, BCD  
Commander, U.S. Public Health Service

Billet and Duty Station:

Director, Behavioral Health & Wellness  
Office of Health Services, OMAO  
Silver Spring, MD

NOAA Behavioral Health and Wellness

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4/21/2022


Overview

This conversation will address the following:

Compounding Stressors

1. Behavioral Health impacts of the COVID-19 pandemic
2. Improving Psychological Resilience
3. Managing Stress
4. Utilizing Professional Behavioral Health Support

- Q&A -



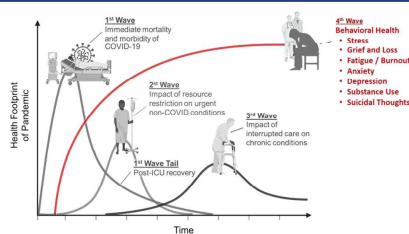
NOAA Behavioral Health and Wellness

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NOAA Behavioral Health and Wellness

1. Behavioral Health impacts of the COVID-19 pandemic

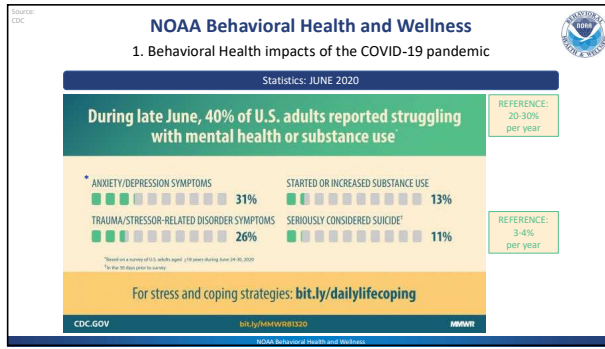
Theoretical Model



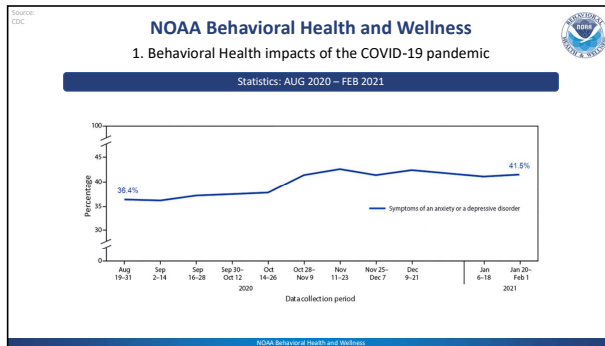
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### Behavioral Health

#### Anxiety

GAD-7

Over the last two weeks, how often have you been bothered by the following problems?

	Not at all	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
Add the scores for each column				
Total Score (add your column scores) = _____				

**cutoff score ≥ 10**  
consider further evaluation by a healthcare professional

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7

### Behavioral Health

#### Depression

PHQ-9

Over the last two weeks, how often have you been bothered by the following problems?

	Not at all	Several days	Over half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
Add the scores for each column				
Total Score (add your column scores) = _____				

**cutoff score ≥ 10**  
consider further evaluation by a healthcare professional

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## NOAA Behavioral Health and Wellness

### 2. Improving Psychological Resilience

#### Improved Psychological Resilience through Wellness

**Wellness** is an active process of examining options, making choices, and taking actions in the pursuit of living a better life through the optimal balance of—and synergistic relationship between—multiple overlapping and interconnected life domains.

- Intellectual: curiosity and engagement
- Existential/Spiritual: sense of purpose and meaning
- Emotional: affective balance and life satisfaction
- Financial: security, basic needs, and simple pleasures
- Occ & Rec: balance between satisfying work and leisure
- Environmental: safe and comfortable with access to resources
- Social: Respectful (kind) and Trustworthy (honest) relationships
- Physical: performance triad (nutrition, physical activity, sleep)

Source: Substance Abuse and Mental Health Services Administration

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## NOAA Behavioral Health and Wellness

### 3. Managing Stress

#### Throttling Stress Exposure

**Think like a clinician:**

- Onset of first/original episode
- Frequency of episodes
- Intensity of episodes
- Duration of episodes

These variables are trade-offs.

NOTE: Equalizers are unique to the person and the situation.

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## NOAA Behavioral Health and Wellness

### 4. Utilizing NOAA Behavioral Health and Wellness

#### When should you consider behavioral health services?

**Subjective Sense**

**Functional Impairment**

- Job / Occupational
- Family
- Social / Recreational

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## NOAA Behavioral Health and Wellness

### 4. Utilizing NOAA Behavioral Health and Wellness

#### When might someone else benefit from behavioral health services?

You observe a change in their presentation:  
speech, behavior, and/or appearance

[ This requires that you get to know them ]

Their presentation causes you to feel  
concerned or worried.

[ Ask them how they are doing,  
and if there is anything you can do ]

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### NOAA Behavioral Health and Wellness

#### 4. Utilizing NOAA Behavioral Health and Wellness

1. Direct Services on a Case-by-Case Basis
  - Consultation
  - Clinical Care
  - Case Management
2. Education & Training
  - Behavioral Health Literacy
  - Stress Management and Resilience
  - Topical by Request
3. Programs
4. Policies, SOPs, etc.
5. Intranet Website <https://dohis.gpo.gov/commissioners/behavioral-health-and-wellness>
6. Suggestions / Recommendations?

#### Behavioral Health & Wellness

Office of Marine and Aviation Operations  
National Oceanic and Atmospheric Administration

**Consultation**  
Do you have someone you might be experiencing signs and symptoms of a behavioral health condition and you want to be helped and supported?

**Service Coordination**  
Do you think you might be experiencing signs and symptoms of a behavioral health condition and that you may possibly benefit from counseling, therapy, or related behavioral health services?


**Education & Training**  
Do you want your staff or group to learn more about someone's mental well-being to increase understanding, recognizing signs, and developing skills?

**Contact**  
202-889-5472 (call or text)  
Director, Behavioral Health & Wellness  
office: 802-313-3634  
email: kenneth.green@noaa.gov


NOAA Behavioral Health and Wellness

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### NOAA Behavioral Health and Wellness



**Andrea Battle, PhD**  
Lieutenant Commander, U.S. Public Health Service  
Chief, Behavioral Health and Wellness  
National Marine Fisheries Service  
National Oceanic and Atmospheric Administration  
cell: 301-325-1672 (call or text)  
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**Valerie Gardner, LCSW, MAC, BCD**  
Lieutenant Commander, U.S. Public Health Service  
Chief, Behavioral Health and Wellness  
National Weather Service  
National Oceanic and Atmospheric Administration  
cell: 202-510-0362 (call or text)  
Email: valerie.gardner@noaa.gov



**Candice T. Karber, LICSW, BCD**  
Lieutenant Commander, U.S. Public Health Service  
Chief, Behavioral Health and Wellness  
Oceanic and Atmospheric Research  
National Oceanic and Atmospheric Administration  
cell: 202-889-5472 (call or text)  
Email: candice.karber@noaa.gov

NOAA Behavioral Health and Wellness

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### NOAA Behavioral Health and Wellness

Start Date:  
**mid-MAY**

[No Picture Available]

**George Mitzner, PhD**  
Lieutenant Commander, U.S. Public Health Service  
Chief, Behavioral Health and Wellness  
National Ocean Service  
National Oceanic and Atmospheric Administration  
cell: TBD  
Email: TBD

NOAA Behavioral Health and Wellness

15

### NOAA Behavioral Health and Wellness



**Kenneth J. "KJ" Green, LCSW, BCD**  
Commander, U.S. Public Health Service  
Director, Behavioral Health & Wellness  
Office of Health Services  
National Oceanic and Atmospheric Administration  
Personal Cell: 571-241-0349  
Email: kenneth.green@noaa.gov

# Thank You!

NOAA Behavioral Health and Wellness

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NOAA | Office of Response and Restoration  
Disaster Preparedness Program



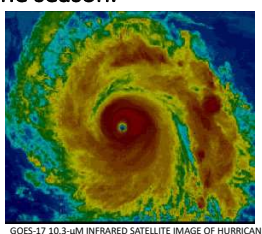

## 3<sup>rd</sup> Annual NOAA Hurricane Preparedness Summit Pacific Islands Session Objectives and Context

Charlie Henry  
Director NOAA's Gulf of Mexico Disaster Response Center

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### “Putting NOAA is a better response posture for the next hurricane season.”

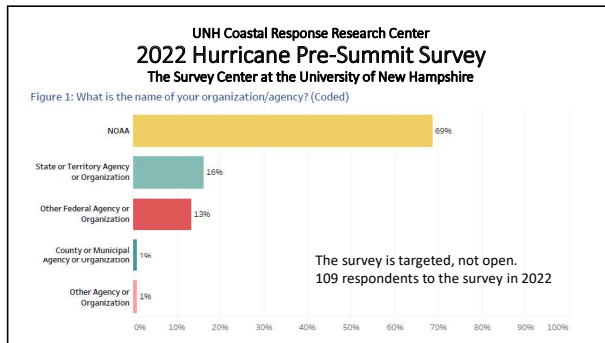
- Understand best practices and lessons learned from 2021 tropical cyclone season;
- Become knowledgeable about Standard Personnel, Mission, and Infrastructure (PMI) topics;
- Work towards improving consistency in response between federal and state partners;
- Recognize future challenges for next hurricane season;
- Introduce and familiarize tools and resources; and
- Understand the gaps given the current limitations.



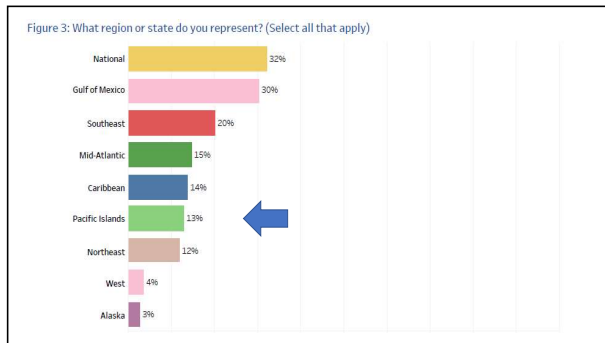
GOES-17 10.3-µm INFRARED SATELLITE IMAGE OF HURRICANE DOUGLAS NEAR ITS PEAK INTENSITY AT 0000 UTC 24 JULY 2020.

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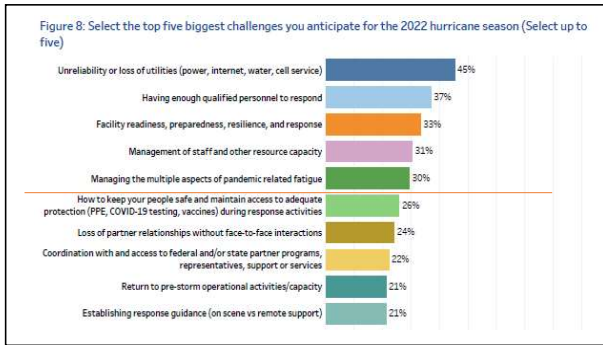
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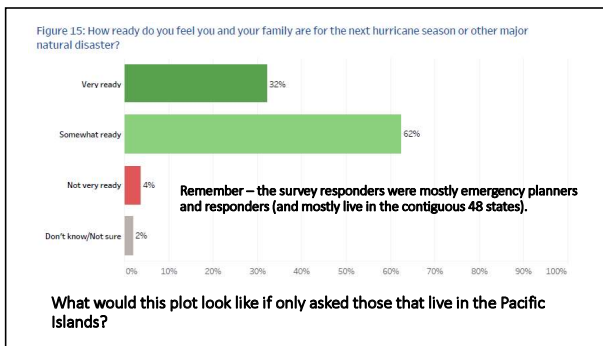
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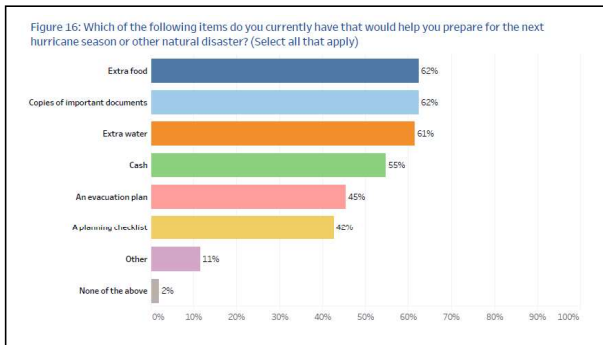


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Something that I read that was both interesting and frightening...

- Guam has the highest risk of being hit by a typhoon of any state or territory in the United States.
- It also has one of the highest risks for getting a typhoon strike of any densely populated area in the world.
- Guam is susceptible to being hit by the world's largest and most intense tropical cyclones.

From Typhoon Vulnerability Study for Guam, 1999, Water and Environmental Research Institute of the Western Pacific (WERI) at the University of Guam.

Tropical Depression 02W, April 7, 2022

8

Thank you to those presenting, you for attending, and to the steering committee members:

Lisa Symons (ONMS), Brad Benggio (ORR), Matt Chasse (OCM), Leah Odeneal (ORR), CAPT Chris "Bubba" Sloan (HSPO), Charles Wisotzkey (NRT), Eric Lau (NWS), Nancy Kinner (UNH/CRRC), Katie Perry (UNH/CRRC), and Charlie Henry (ORR).

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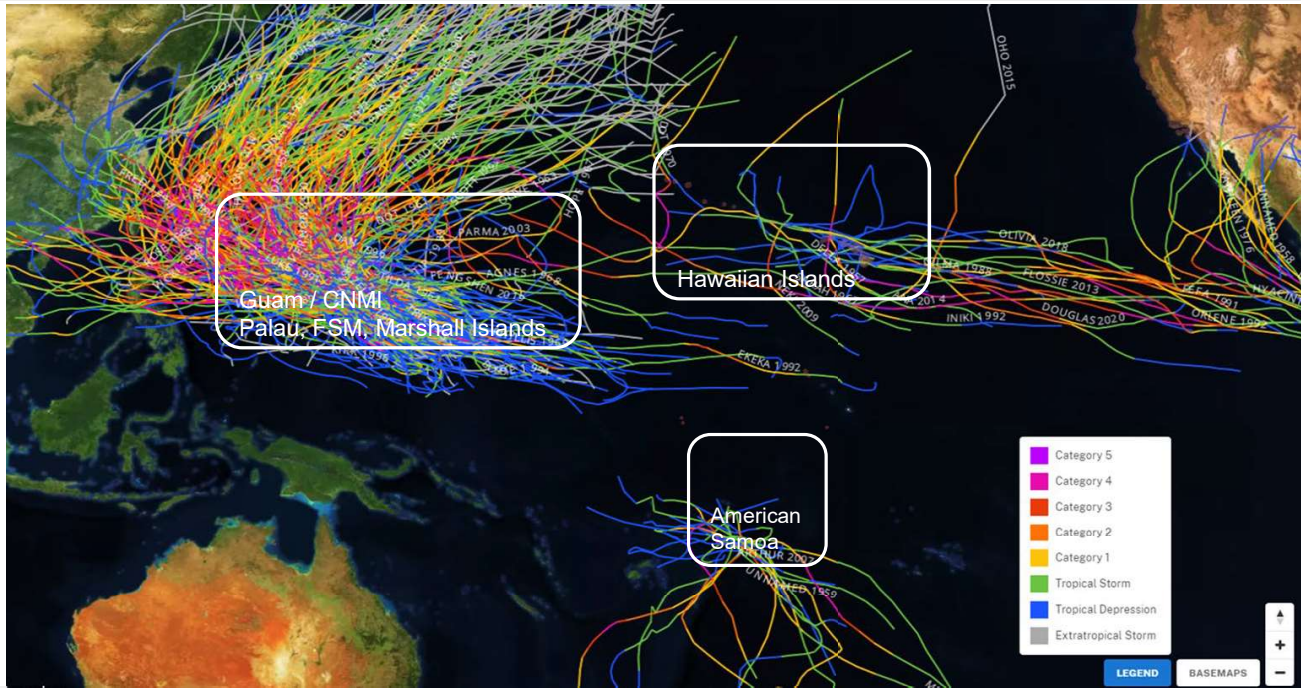
# Impacts from Natural Disasters across Pacific Region

Eric Lau  
National Weather Service



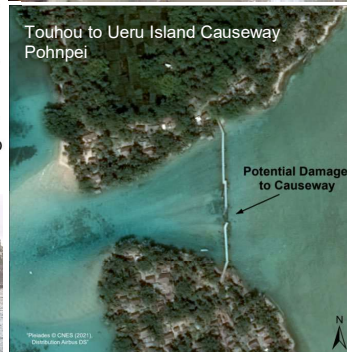
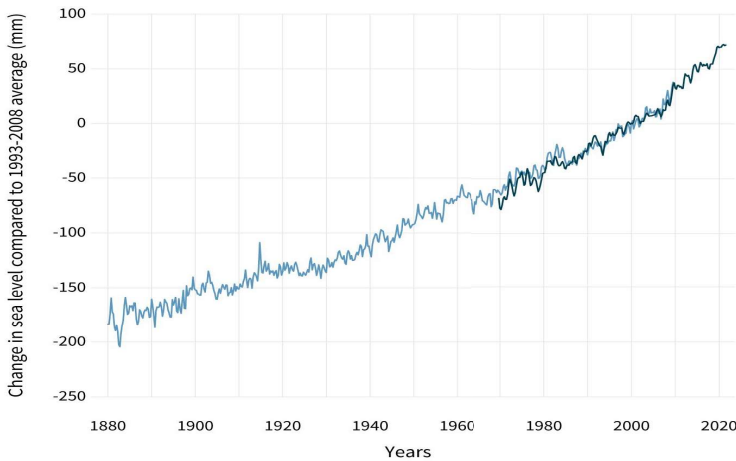


# Pacific Region Tropical Cyclone Climatology



# Pacific Region Hazards - Sea Level Rise and Coastal Inundation

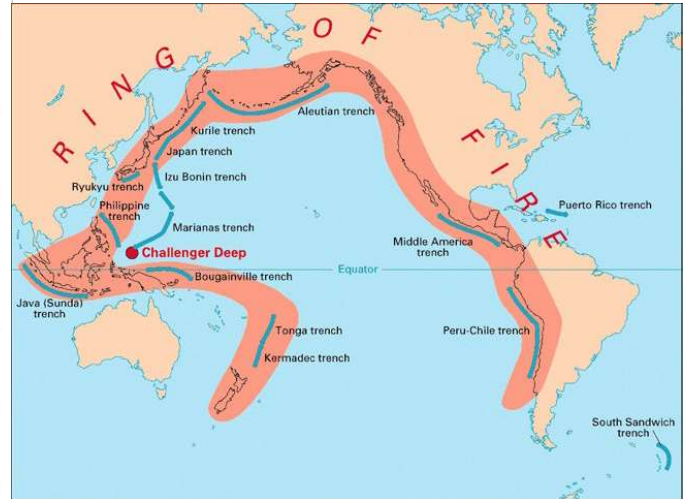
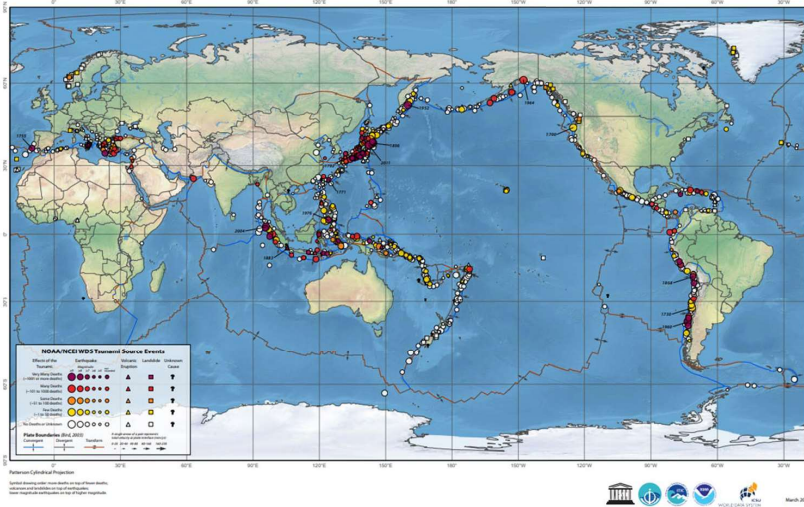
## GLOBAL SEA LEVEL





# Pacific Region Hazards - Tsunami

Tsunami Sources 1610 B.C. to A.D. 2022  
From Earthquakes, Volcanic Eruptions, Landslides, and Other Causes



# Pacific Region Impacts from Natural Disasters

**Tropical Cyclones**

**Severe Weather**

**Tsunami**

**Damaging Winds**

**Torrential Rain Flash Flooding**

**High Surf Storm Surge**

**Coastal Inundation**

Elapsed Time: 09 hr 38 min  
UTC: 1700 27 Jan 14:38 Z  
Tsunami Wave Amplitude (meters): > 1, 1.00, 0.75, 0.50, 0.25, 0.10, -0.05, -0.01



# Pacific Region - Thank you

*Kom, mool*  
*Mahalo*  
*Gracias*  
*Fa'afetai*  
*Si Yu'os ma'ase'*  
*Ke kmal mesaul*  
*Kalahngan*  
*Kammagar*

**from**

**NOAA's National Weather Service**

**Pacific Region**





National Weather Service  
Pacific Region

4/21/2022

**2022 NOAA Hurricane Preparedness Summit**  
**Setting the Stage**



**National Weather Service**

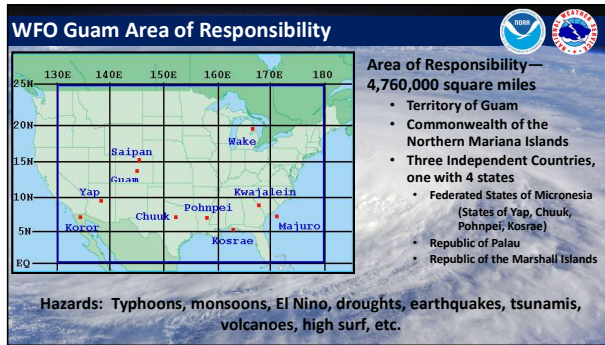
**Marcus Landon Aydllett**  
 Warning Coordination Meteorologist  
 NWS Weather Forecast Office, Guam

20 April 2022 – 12:00 PM Hawaii  
 21 April 2022 – 8:00 AM Guam

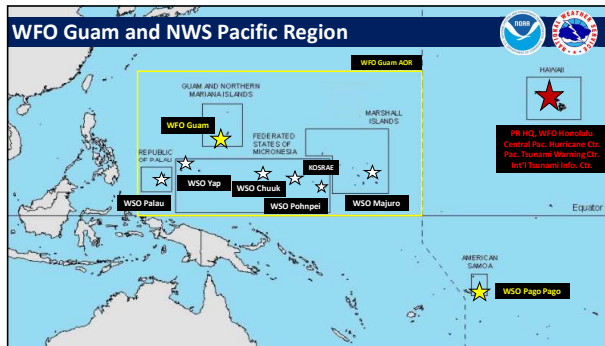
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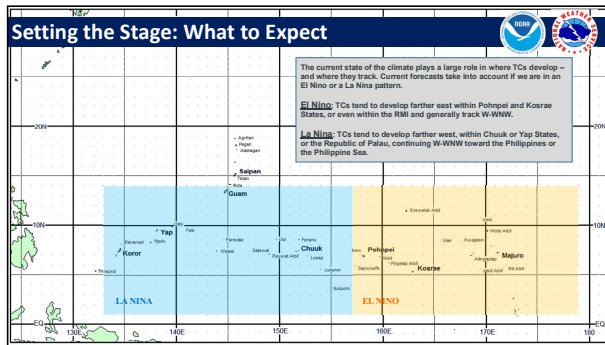


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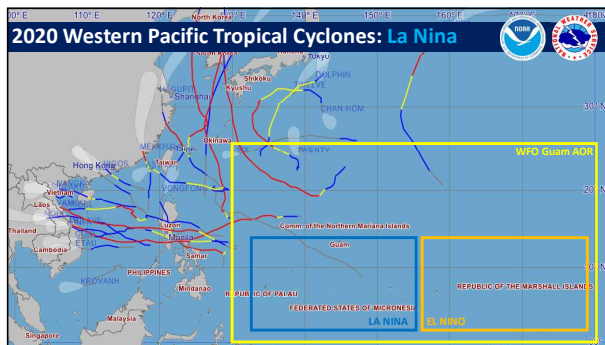


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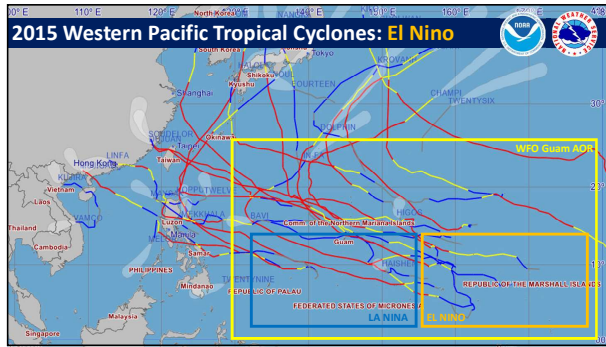


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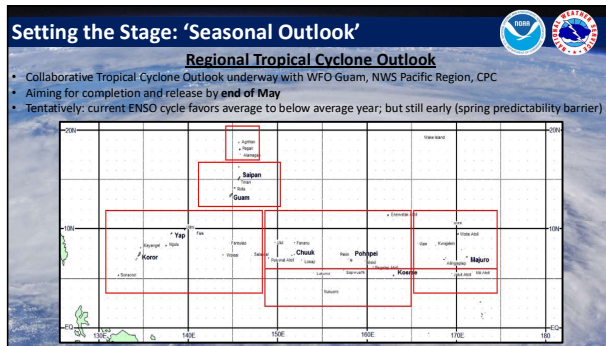


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**Communicating Regional Weather & Threats**

- Broad, regional weather outlooks to detail the potential for, or ongoing significant weather
- Focused DSS email to core partners, WSOs and WRN Ambassadors to provide more detailed weather information
- Use of Social Media: Facebook (2013) and Twitter (2020), and the use of Facebook Live during significant/high-impact events (2018)

9

**Impact-Based Decision Support Services**

- Mission for Today:** Provide weather, water, and seasonal data, forecasts, warnings, and Impact-Based Decision Support Services for the protection of life and property and the enhancement of the national economy.
- Vision for Tomorrow:** A Weather-Ready Nation where society is prepared for and responds to weather and water events; where communities are "Ready, Responsive and Resilient".
- What People Want:** (Accompanied by images of a road and a person pointing at a screen)

10

### Regional Preparedness and Communication

- WFO Guam works closely with WSOs across Micronesia
  - Primary Communications: Phone, Email, Video Conference (2020)
  - Secondary Communications: Satellite Phone, Chatty Beetle
  - Additional Communications: HF Radio, WhatsApp (2020-2021), NWS Chat (2021)
  - WSOs relay WFO WWAs to their DCOs/EMOs, leaders and community
- WFO Guam has direct and frequent communication with Core Partners
  - Guam Homeland Security/Office of Civil Defense
  - CNMI Homeland Security and Emergency Management
  - US Embassies and USAID in Palau, FSM and RMI
  - Joint Region Marianas, USN-NBG, AAFB, USCG




WFO Guam Chatty Beetle

11

### Regional Preparedness and Communication

- The **NWS Weather-Ready Nation** has been a pivotal game-changer for WFO Guam and its presence in the community through awareness, education and outreach efforts. The WRN has been a catalyst to develop new, and strengthen existing relationships across the western North Pacific to promote weather readiness, resilience and responsiveness.
  - Examples: CasaGuam, KUAM Weekly Weather Broadcast, Pacific Daily News Column.**



12

6

### WFO Guam Regional Climate Conference

- Developed in early 2021, with the first RCC held in June 2021
- The Webinar was to be a virtual forum to bring together WFO Guam, regional WSOs, NWS Pacific Region, and regional emergency managers/disaster coordinating offices and other USG folks together in one setting
- RCC would feature weather, climate, preparedness and response topics specific to the western North Pacific region
- Prior to COVID, WFO Guam Warning Coordination Meteorologist (WCM) would visit each of the main islands every one to two years; travels have been suspended since 2020
- The RCC would also be a venue to publicly release the coordinated, regional tropical cyclone outlook
- The 2022 WFO Guam Regional Climate Conference is tentatively set for **Thursday, May 26 (Guam) / Wednesday, May 26 (Hawaii and CONUS)** and will feature topics on Sea Level projections, Food Security, Preparedness/Response, and WFO Guam TC Operations and Outlook
- **Send an email to [Marcus.Aydlett@noaa.gov](mailto:Marcus.Aydlett@noaa.gov) if you would like the RCC invitation**

13

### Contacts – and For More Information

**NWS Weather Forecast Office Guam**


**Marcus Landon Aydlett**  
Warning Coordination Meteorologist  
[Marcus.Aydlett@noaa.gov](mailto:Marcus.Aydlett@noaa.gov)  
671-777-5337 (C)  
671-472-0946 (O)

WFO Guam Operations: [nws.gum.operations@noaa.gov](mailto:nws.gum.operations@noaa.gov)  
671-472-0900

WFO Guam: [www.weather.gov/gum](http://www.weather.gov/gum)  
Facebook: [www.facebook.com/NWSGuam](https://www.facebook.com/NWSGuam)  
Twitter: [www.twitter.com/NWSGuam](https://www.twitter.com/NWSGuam)

- [www.weather.gov/gum/WSOMajuro](http://www.weather.gov/gum/WSOMajuro) **Yokwe!**
- [www.weather.gov/gum/WSOPohnpei](http://www.weather.gov/gum/WSOPohnpei) **Kaselehlie!**
- [www.weather.gov/gum/WSOChuuk](http://www.weather.gov/gum/WSOChuuk) **Ran Annim!**
- [www.weather.gov/gum/WSOYap](http://www.weather.gov/gum/WSOYap) **Mogethin!**
- [www.weather.gov/gum/WSOPalau](http://www.weather.gov/gum/WSOPalau) **Aliii!**

14



**NOAA NOS Hurricane Preparedness Summit**  
**Infrastructure Challenges**  
**April 20, 2022**

1

### Hurricanes in Hawaii?

Let's take a look back...




Hurricane Ike - September 11, 1992 at 1:50 local Hawaii time directly impacting Kauai



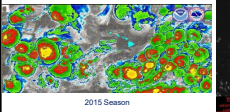
2

1

### Hurricanes in Hawaii



Historical Tracks, 1950's - Present



2015 Season

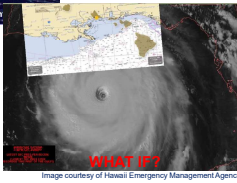


Image courtesy of Hawaii Emergency Management Agency

3

### Port Vulnerabilities / Resiliency



Honolulu, Gantry cranes & cargo yard at Pier 31



Hilo, Cargo yard at Pier 3



PORT HAWAII  
 10 Commercial Harbors  
 & Islands

Image courtesy of Hawaii Dept. of Transportation

4

2





# Pacific Islands Session

## Communications Challenges

### Case Study - Tonga, January 2022



5:47 pm TOT, Nuku'alofa, Tonga

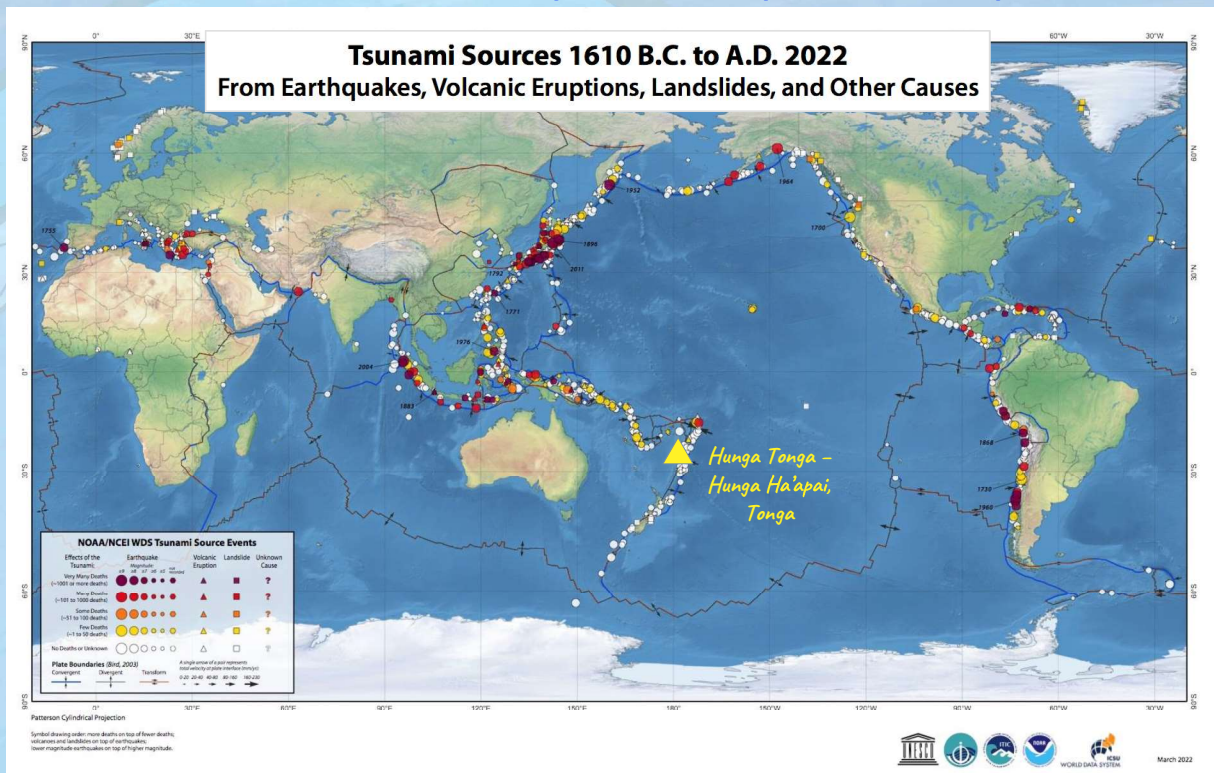
Dr. Laura Kong  
Director  
International Tsunami Information Center  
NOAA/NWS/Pacific Region



Tanaki'anga 'o e nau'au 'a e kolo ki  
he Tokelau 'i'itake 'o Anoleka

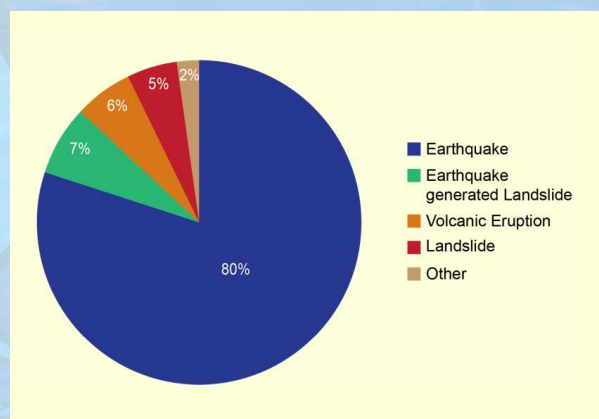
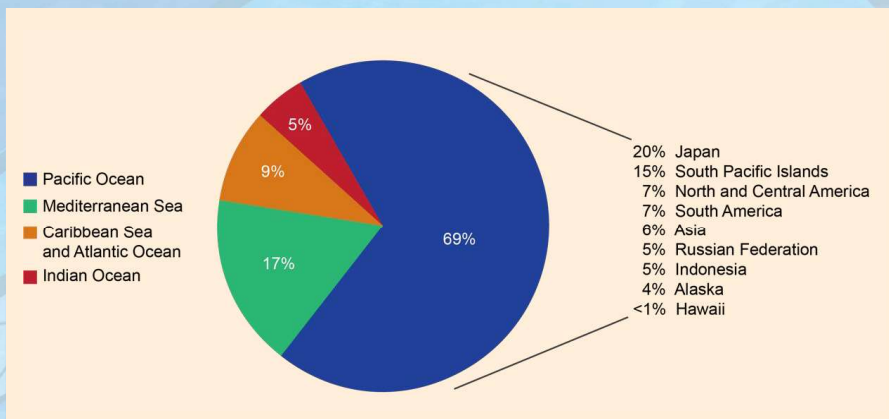
Ha'apai, Tonga (TGS)

## Tsunamis – what, when, where, how





# Tsunamis - where, how



- 69% in Pacific
- 87% from Earthquakes, Earthquake-generated landslides (6% Volcano)
- 90% deaths from local or regional tsunamis

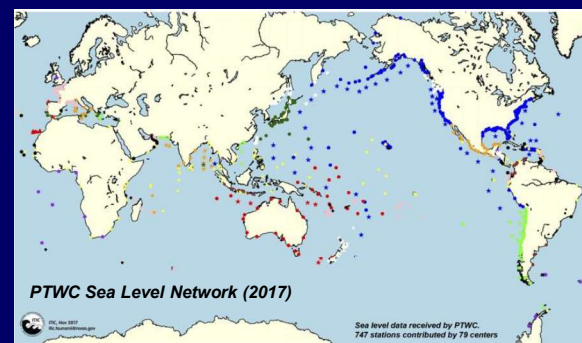
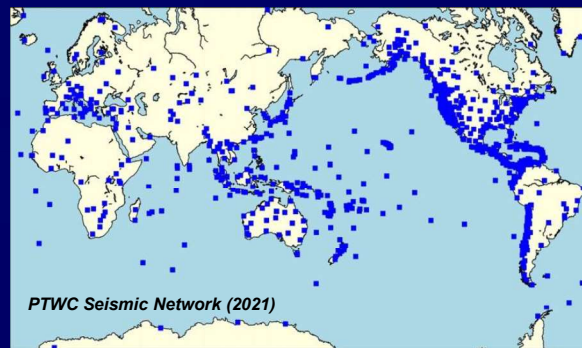
## 3 BASIC WARNING NEEDS



- **VERY RAPID EARTHQUAKE EVAL**
- **VERY RAPID SEA LEVEL EVAL**
- **VERY RAPID COMMUNICATIONS**

- *Detection, Forecast - Multi-national, Global Nets, Real-time, Data Sharing*
- *Widespread, Timely Alerting - Reliable, Robust, Redundant*

➤ **ALL REQUIRED FOR WARNING**



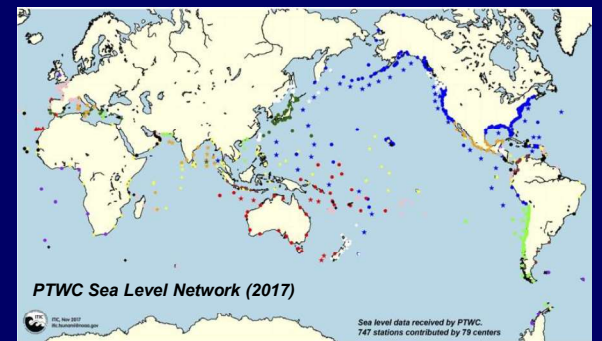
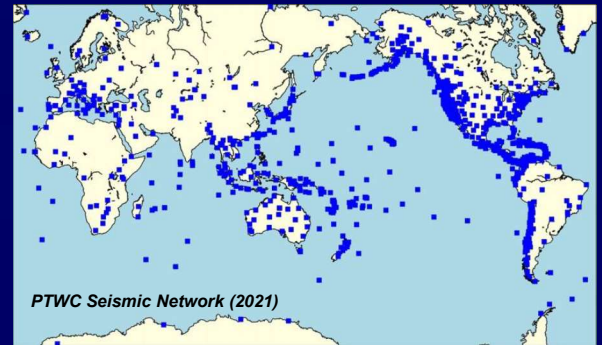
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- *Detection, Forecast - Multi-national, Global Nets, Real-time, Data Sharing*
- *Widespread, Timely Alerting - Reliable, Robust, Redundant*

## ➤ **ALL REQUIRED FOR WARNING**



## Emergency Communications - 3Rs + T required for Warning

- ❑ **Robust** - capable of **performing without failure under a wide range of conditions** (*Miriam-Webster*); persistence of a system's characteristic behavior under perturbations or unusual or conditions of uncertainty (*Wikipedia*)
- ❑ **Reliable** – giving the **same result on successive trials, dependable** (*Miriam-Webster*); ability of a system to perform and maintain its functions in routine circumstances, as well as hostile or unexpected circumstances (*Wikipedia*)
- ❑ **Redundant** - serving as **duplicate for preventing failure of an entire system** upon failure of single component (*Miriam-Webster*); duplication of critical components or functions of system with intention of increasing reliability of system, usually as backup or fail-safe (*Wikipedia*)
- ❑ **Tested regularly** - serving as **practice to be familiar on what to do, where to go.** Regular testing of Early Warning System (detection, analysis, alert, evacuation) critical







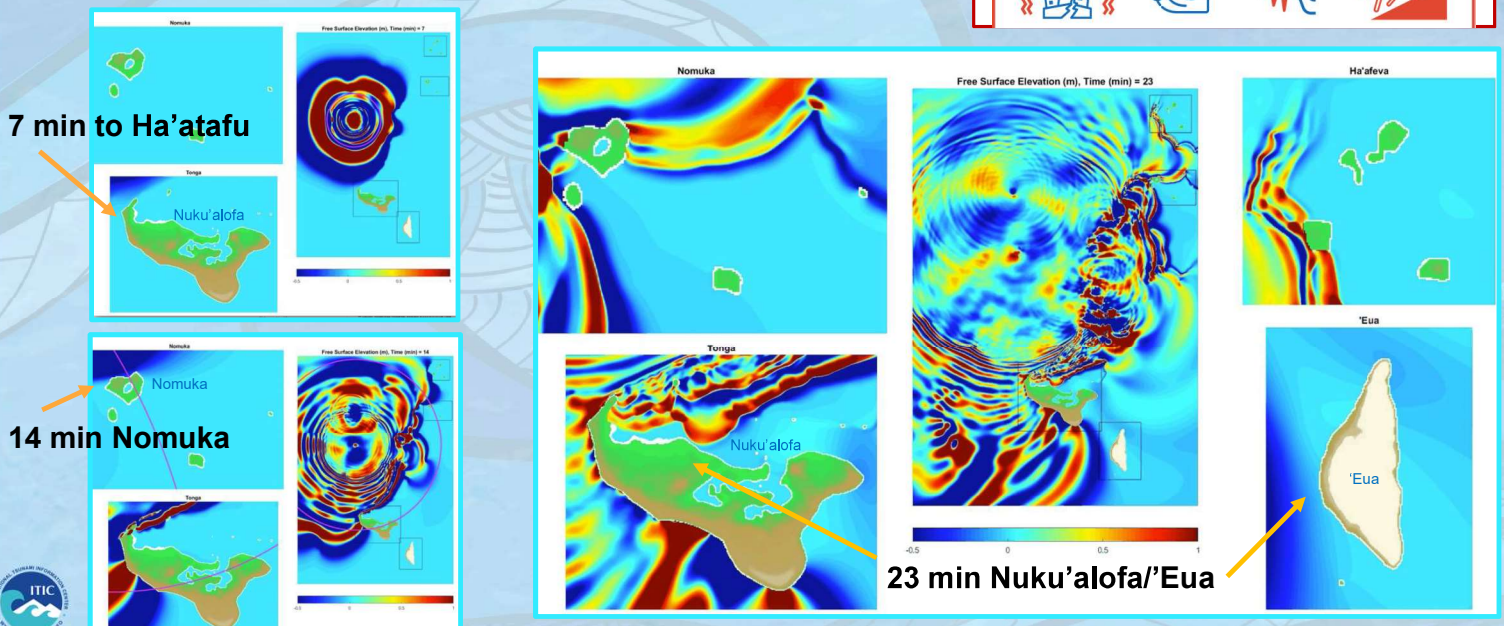
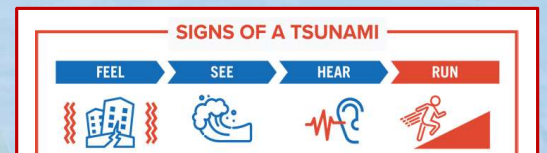
# The Event: Hunga-Tonga Hunga-Ha'apai (HTHH) Volcanic Eruption and Tsunami

- **14 January** – ‘small’ eruption, issued marine warning, cancelled morning of 15 January
- **15 January** – ‘gigantic’ eruption, warning
  - 0407 UTC (JMA HIMAWARI-8) – Began erupting
  - 0414:45 UTC (USGS) – 50-60 km stratosphere
- **Observations, Early Warning System**
  - 0412-0421 UTC – Ash Cloud, Loud blasts, Shock wave, Sea birds
  - 0430 UTC – Urgent Tsunami Warning / Evacuation – Radio Tonga lines choked, No time for normal SOP (Coord calls, messages ...)
  - 0530 UTC – Undersea telecom cable cut – no sea level data, comms, except by satellite phone
  - 1248 UTC 16 January – Downgraded to Marine Warning
  - 2100 UTC 17 Jan (North) / 0100 UTC 18 Jan (South) – Cancelled
- **Because of well-functioning EWS and successful** (National Tsunami Drill, school outreach, Tsunami Awareness Day, Nov 5), only 4 died.



## HTHH - LOCAL TSUNAMI => Act on Natural Warnings

- SEE ash cloud. HEAR loud Explosions. FEEL ground shaking.
- SEE unusual ocean (swirling eddies, fast draining), Birds flying



# Communications: Post-HTHH – 1<sup>st</sup> 10 days – NEAR 0

- Communication with members a challenge and limited. Key protection partners need phone credit and satellite phones.
- Severely damaged communications systems hampered capacity to conduct rapid assessments and impacted on establishing communication with NEMO
- **15-24 January – nearly 0 communication with outside world**
  - **T-1:** 14 January (daily) – Govt Tonga Sitreps
  - **T-0:** 0530 UTC 15 January – undersea cable cut. Interisland, International Comms, Internet severed
  - **T+1:** 16 Jan – State of Emergency. 18 Jan – 1<sup>st</sup> Govt Media Release
  - **T+3-7:** 18 - 22 Jan – HMNZS Wellington. Aotearoa – survey Nuku’alofa and ‘Eua ports, P3 Orion surveillance flights, Humanitarian flights from Australia, China, NZ, Japan -COVID protocols (contactless, 72 hr quarantine)
  - **T+7:** 22 Jan, SITREP 8, 9 – Emergency Telecomms Cluster – contact with Vava’u, Niuaus to NEOC
  - **T+9:** 15-24 January – Weather and Tsunami Forecasting: VAAC Auckland, RMS Fiji advise by satellite phone, Chatty Beetle – outer islands only until supplies arr, VHF Radio (NDMO)



T+37 days, 22 Feb  
Chatty Beetle supplies



# Communications: Post-HTHH – Next Month

- **T+9 days - 5 weeks: 25 Jan – 21 Feb – slowly returning Services**
  - Digicel, Tonga Communications Corporation (TCC) restored some services including voice, SMS, and limited internet services.
  - Asian Dev Bank - internet via backup sat link Nuku’alofa for responders
  - ETC - 3 portable satellite data terminals (BGANs) for internet and voice
  - ETC/ITU/IOC sat phones w/airtime to Tonga Govt (10+ over month)
- 24 Jan, SITREP 10, 1<sup>st</sup> impacts summaries – Tongatapu, Ha’apai (Lulunga Distr)
- **24 Jan - Facebook Messenger! 1st sat ph call – ITIC/NZ GNS with Tonga Met**
- **25 Jan – Tonga Met assistance written req to NZ, Australia, USA, ITIC for TEWS** (through NEMO Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Communication and Climate Change (MEIDECC))
- **25 Jan to pres – ITIC ‘Daily’ CHECK-IN (cell ph to ADB sat link, 1 Feb)** (Tonga Met, Tonga Geol Svc, PTWC, NZ GNS, IOC, SPC, USGS VDP/NEIC, Australia Geoscience/BOM, ORSNET/Vanuatu, Univ Southern CA (modelling), eCoast NZ):  
*Emergency repairs/data (Chatty Beetle, Weather Station, Sea level), Interim HTHH Volcano Tsu Alerts (PTWC and Pacific), Interim Seismic Net (Tonga, region), Post-Tsu Surv (runup, inundation, eyewitness)*
- **26 Jan onward, Tonga Geol Svcs Facebook – drone imagery of affected area** – Nuku’alofa, White Sandy Beach, Ha’apai (Mango Island, Nomuka, Fonoifua)
- **22 February (5 wks!) – UNDERSEA CABLE REPAIRED. Internet returns**



1:50:23.212 AM  
@ITIC-Global  
**We're back, but without full internet**  
Saturday, January 22, 2022 • 13:15. Updated on Saturday, January 22, 2022 • 15:11.  
Nuku'alofa, Tonga

By Paul and Mary Lynn Fox  
We are emotional. One way let you, our readers, know please and through a few photos and through a few words. We need our staff and the waves. We need you as soon as of this disaster as soon as

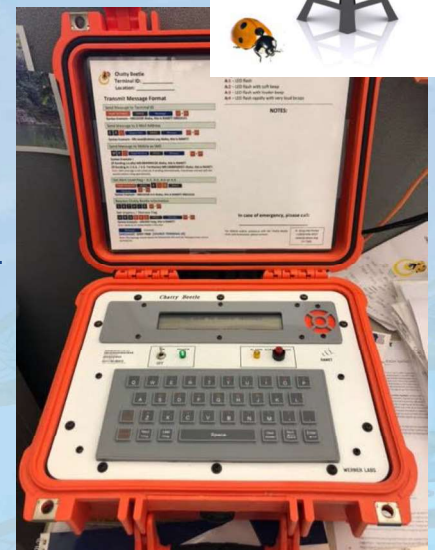
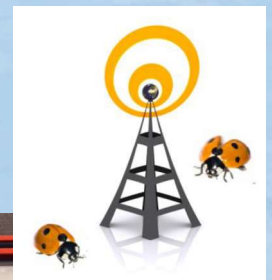
# Lessons Learnt - Communities

- *Noting historically, earthquakes generate 87% of tsunami  
Prepare for earthquakes, but be aware of other 13%*
- *For local (close by) and distant, GET TSUNAMI READY!*
- *Communities: Know ETA (time to reach) fr ALL sources  
Must Plan Ahead & Practice. Natural Warnings!  
*YOU must act yourself – your personal action / responsibility**
- *Communications: Must Reliable, Robust, Redundant, Realistic (4Rs)  
Broadcast. Simple. Reach all (low and high-tech)*



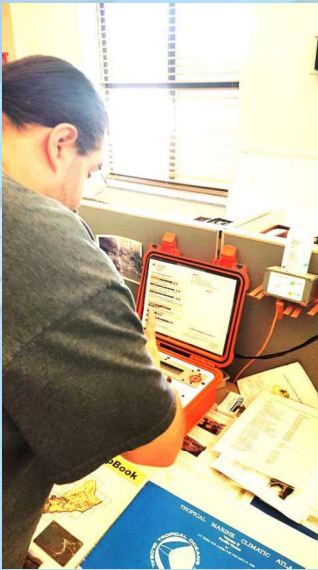
## Remote Emergency Communications Chatty Beetle: What is it?

- **1990s – Concept. 1998 – Africa request Climate Outlook products** to reach remote / rural communities. U/Oklahoma – USAID RANET (*RADio and InterNET for the Communication of Hydro- Meteorological, Climate, and Related Information for Rural Development*).
- **2005:** WMO WG on Planning and Implementation of WWW in RA V – incl RANET (RAV/WG-PIW-04/Doc. 5.2 (4), 4.XI.2005)
- **Asia / Pacific request for simple paging system or alert device.** Many have means (HF radio), but systems turned off at night to conserve power. No active way to alert operator
- **Text alert / messaging device** where other communications do not exist, unreliable, where simple notification needed.
- **Not designed to replace formal means** of alerting. Rather serves as “heads up” notification.
- **Global Deployment – Pacific Islands, Caribbean, Africa**

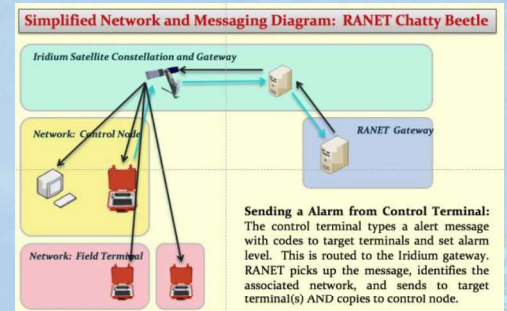


Pioneered Kelly Sponberg UCAR JOSS International Extension and Public Alert Systems (IEPAS) & RANET

# Chatty Beetle: Basic Functionality



- Uses Iridium Short Burst Data
- **Hardened terminal** designed to operate in harsh environment.
- Operate **fixed (office) / mobile**
- **Two-way** messaging.
- **Audible / visual alarm cues**
- Operate on **battery - 36 hours+** (tested 72 hours+)
- Control external devices (relay and serial port functionality)
- Send messages from **terminal / web to e-mail or as SMS.**



## 3 BASIC WARNING NEEDS

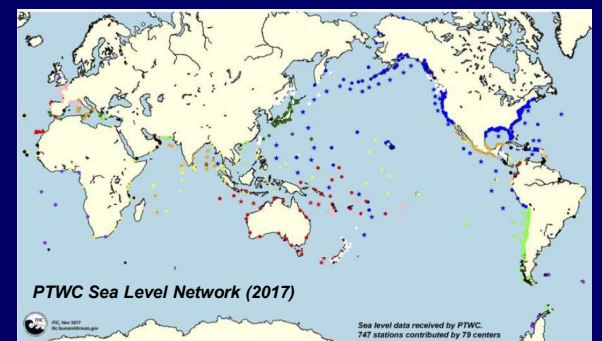
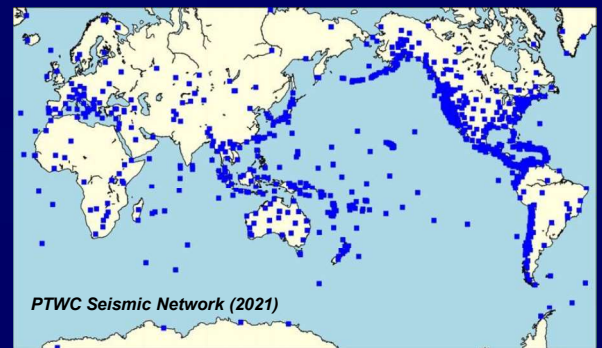


- **VERY RAPID EARTHQUAKE EVAL**
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➤ **ALL REQUIRED FOR WARNING**





Submarine telecommunication cables can catalyze science, early warning, and capacity development

# SMART cables for Earthquake and Tsunami Early Warning

*SMART: Science Monitoring And Reliable Telecommunications*

**Bruce M. Howe**

Chair, ITU/WMO/UNESCO IOC Joint Task Force  
University of Hawai'i at Mānoa



2021-2030 United Nations Decade of Ocean Science for Sustainable Development



**Laura Kong**

Director, International Tsunami Information Center (ITIC)  
UNESCO/IOC – NOAA Partnership



National Oceanic and Atmospheric Administration  
Hawai'i, USA  
Puerto Rico, USA  
Servicio Hidrográfico y Oceanográfico de la Armada de Chile  
Valparaiso, Chile



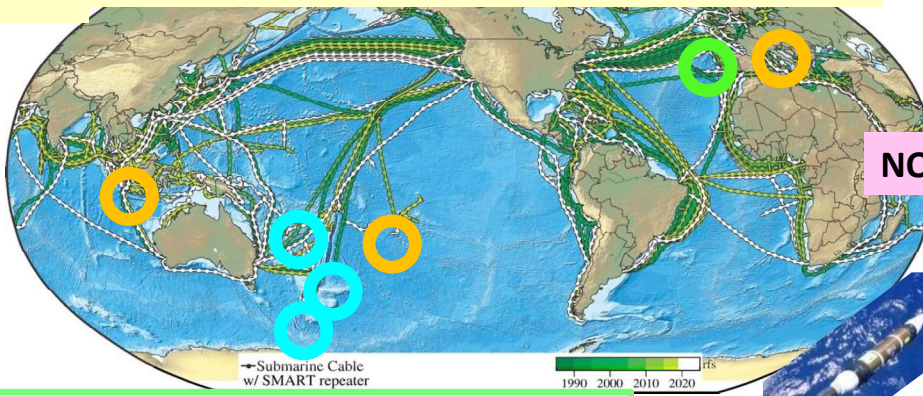
## SMART Subsea Cables



### Global Array: Climate, Oceans, Sea Level, Earthquakes, Tsunamis

- Create Planetary Sensor, power, Internet network
- 1<sup>st</sup> order addition to Ocean-Earth observing system

Share submarine cable infrastructure  
Telecom + science  
NO Interference ↓ €  
1.2+ Gm  
~20,000 repeaters  
20 year refresh  
repeaters ~70 km



2021-2030 United Nations Decade of Ocean Science for Sustainable Development

**SMART:**  
UN Decade for Ocean Science Project

**CAM: 3700 km, Gov't, install 2025 → SMART**

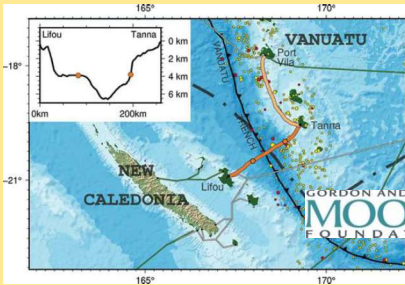
**Continent/Lisbon-Azores-Madeira ring**  
1755 Lisbon - Seismic, tsunami, ocean, environment  
3700 km, 50 SMART repeaters, €120M

1<sup>st</sup> Sensors: Bottom temperature, pressure, seismic acceleration

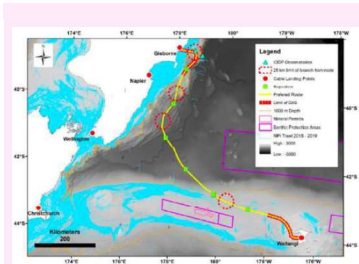




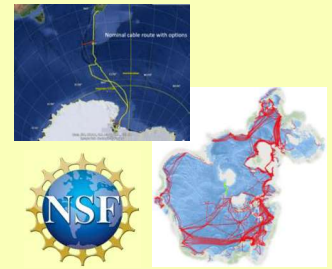
# SMART Cables - Pacific



**Vanuatu – New Caledonia**  
SMART, DAS  
Deployed 2025



**NZ–Chatham Islands**  
SMART + DAS + BUs/nodes  
Under gov't review (MBIE)



**Antarctica – NZ**  
Improve connectivity  
SMART Cable  
Workshops, NSF, NAS Chile

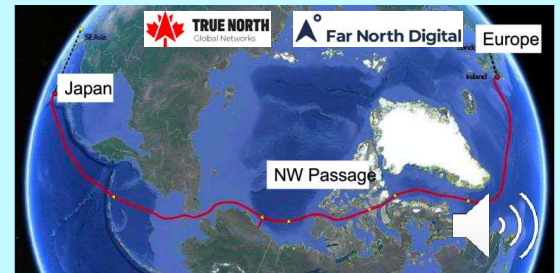


**Indonesia**  
In country development Ina-CBT  
Single ended test systems underway  
Follow with Makassar Strait, with telecom



**Project Koete**  
Perth-Darwin-Malaysia  
Communities  
SMART integral  
Raising funds

**Arctic Express**  
14,000 km  
Low latency  
Communities  
Contract Q1 2022  
RFS Q4 2025  
SMART integral



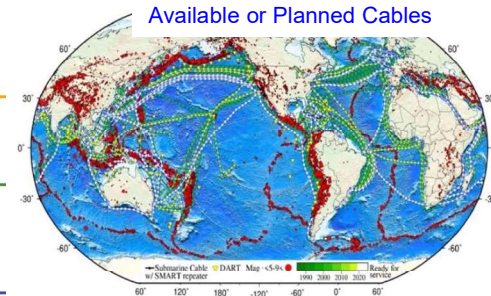
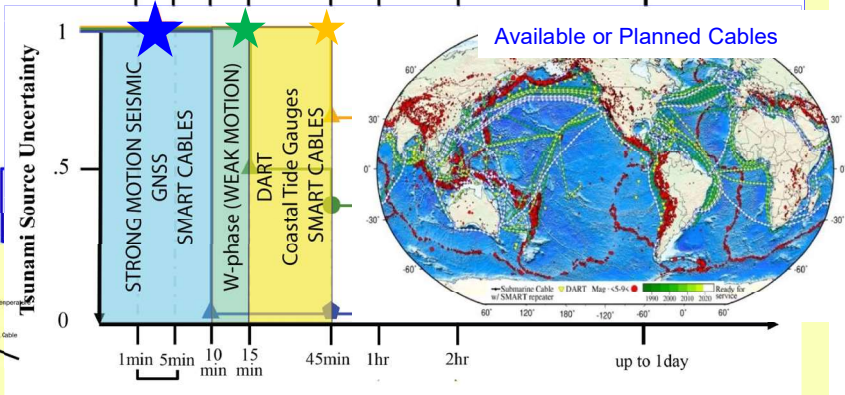
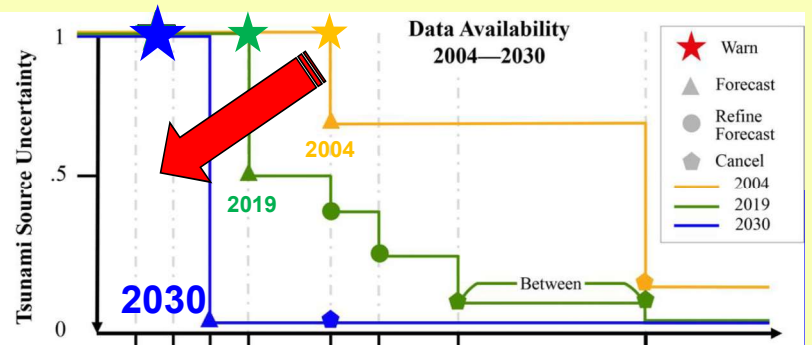
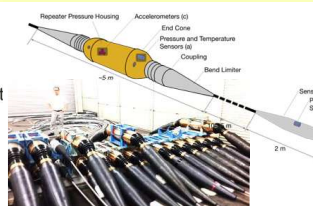
## IMPROVEMENT IN EARLY WARNING (using SMART)

**UN Ocean Decade Goal (2021-2030):**

Integrate  
**SMART Cable**  
technology into  
innovative  
**early warning**  
systems

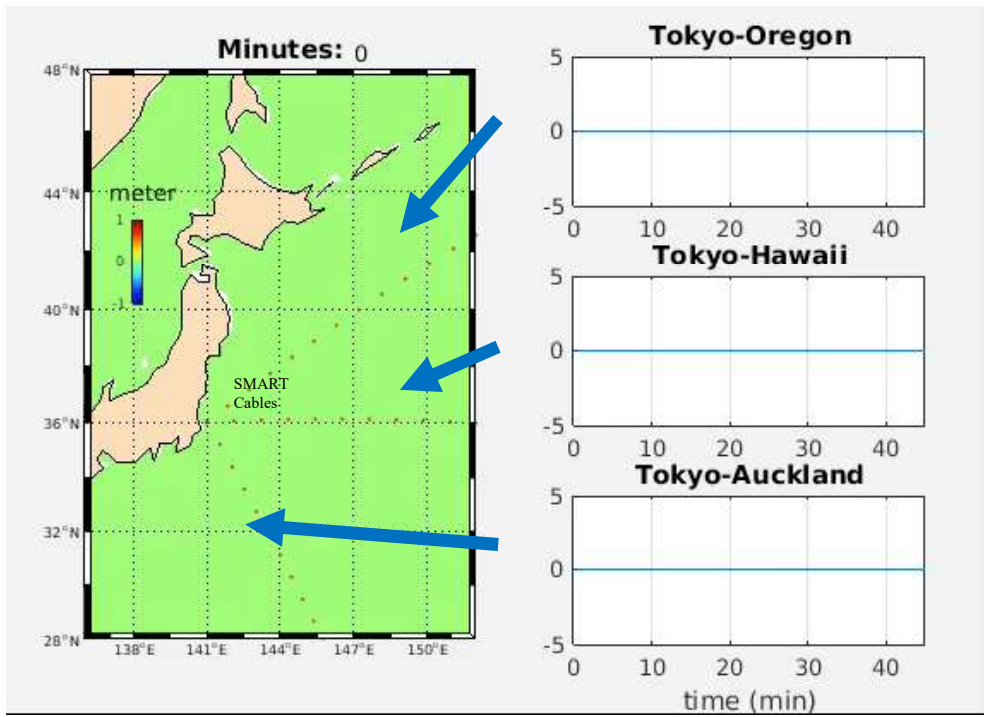


**2021-2030** United Nations Decade of Ocean Science for Sustainable Development





# Simulation – Tsunami Detection (bottom pressure)

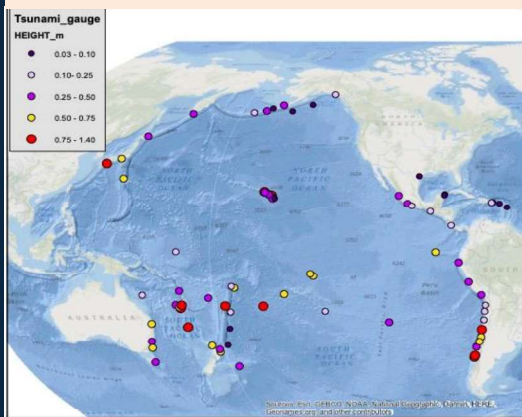


Each line represents pressure sensor along cable

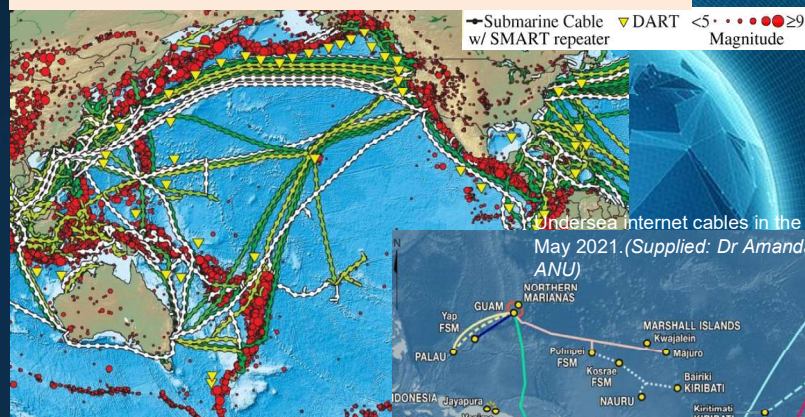
Tony Song, JPL/CalTech

## Observing the Ocean in real time Filling in Gaps with SMART sensors on cables

15 Jan 22 observations reported by PTWC



Available / Planned Telecomm cables – 1990 - 2020



Undersea internet cables in the Pacific region, as of May 2021. (Supplied: Dr Amanda Watson and CartoG) ANU

### Undersea cables in the South Pacific

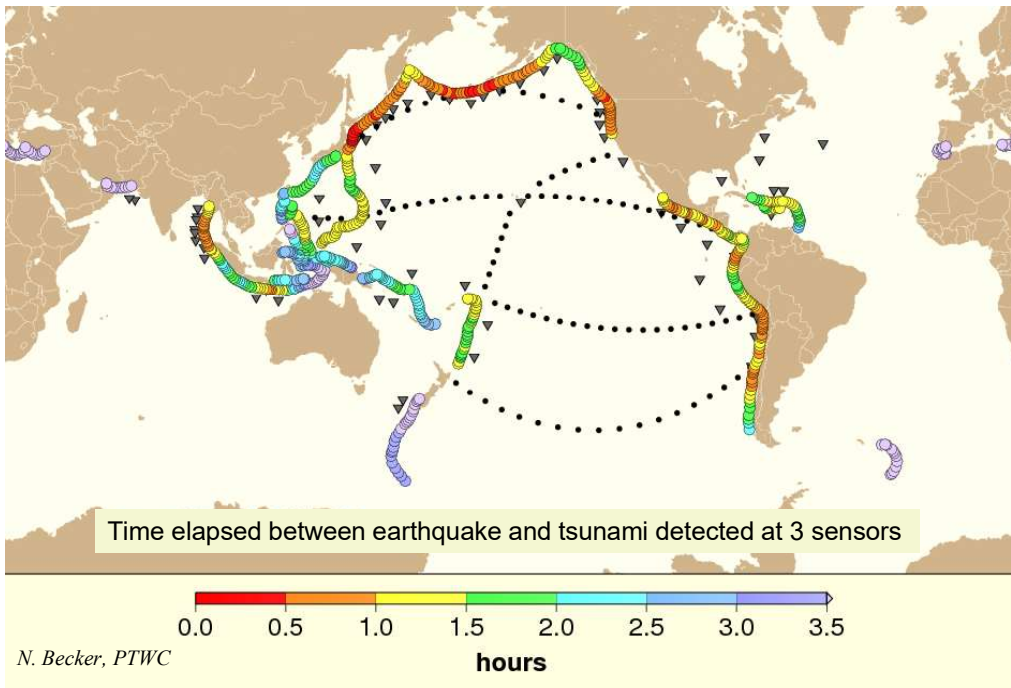
The eruption of the Hunga Tonga-Hunga-Ha'apai volcano on Jan. 15 triggered a tsunami on the shores of Tonga and cut off phone and internet lines to the archipelago. It has severed the Tonga Cable, a 827 km submarine fibre-optic cable that connects the island country to Fiji and international networks. The CS Reliance, a cable laying vessel, owned by U.S. subsea cable repair company Subcom expected to repair the cable is docked at Port Moresby nearly 4,000 km away.

Sources: Telegeography  
A. Katakam, 18/01/2022



Tonga – 2022 single pt of failure

# Tsunami Detection Time – 3 bottom pressure sensors



- ▲ SMART sensor (500 km)
- Earthquake epicenter

- **25% time reduction** to issue warning (2.1 to 1.6 hrs)  
**=> 30 min is important for evacuation** (walk speed 2 mph)
- More time with 50 or 100 km sensor spacing

‘Ōlelo No‘eau, Hawaiian proverb or wise saying

**“ ‘Iliki ke kai i ka ‘ope‘ope lā, lilo!  
I lilo nō he hāwāwā.”**

**A person who fails to watch out often loses!  
Never turn your back on the sea.**

Mary Kawena Pukui



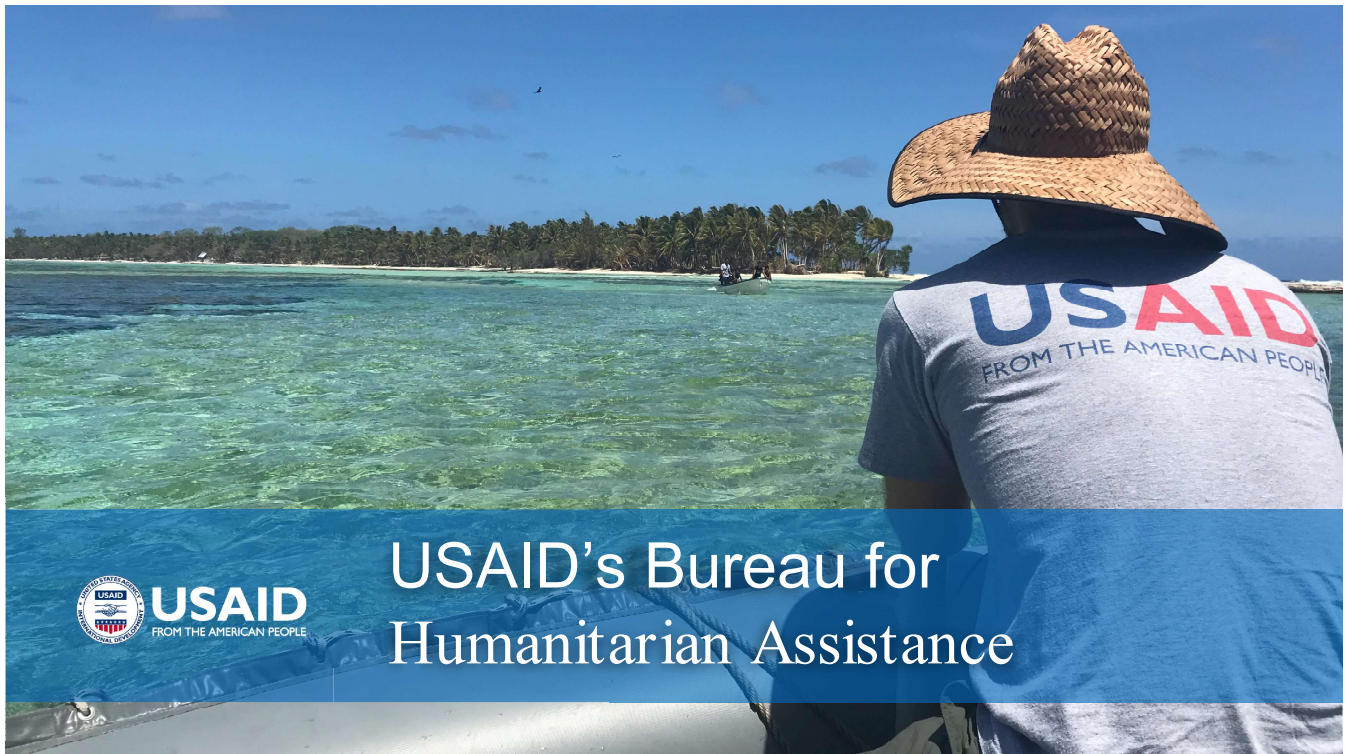
NOS HURRICANE PREPAREDNESS SUMMIT, 20-21 April 2022, Virtual

Enhancing support of state and federal partners for the 2022 Hurricane Season by focusing on the readiness of NOAA's Personal (People), Mission and Infrastructure (PMI)

# Thank you! Mahalo!

Dr. Laura Kong  
Director

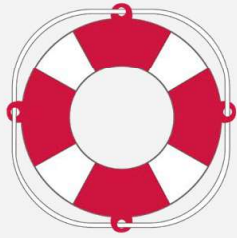
International Tsunami Information Center  
NOAA/NWS/Pacific Region



USAID's Bureau for  
Humanitarian Assistance

## Our Mandate

---



Save  
Lives



Alleviate  
Human Suffering



Reduce the impact  
of humanitarian crises

## Disaster Response Snapshot Fiscal Year 2020

---

Disaster Responses

66



Complex Emergency:  
Most frequent disaster

More than **\$7 billion** in  
humanitarian assistance



Food Assistance:  
Most funded type  
of assistance

**49: Countries**  
that received USAID/BHA  
humanitarian assistance



# BHA's Response Options



Provide immediate assistance of \$100,000



Fund NGOs and International Organizations including the UN



Deploy a Regional Advisor, Assessment Team, or a Disaster Assistance Response Team (DART)



Activate a Response Management Team (RMT)



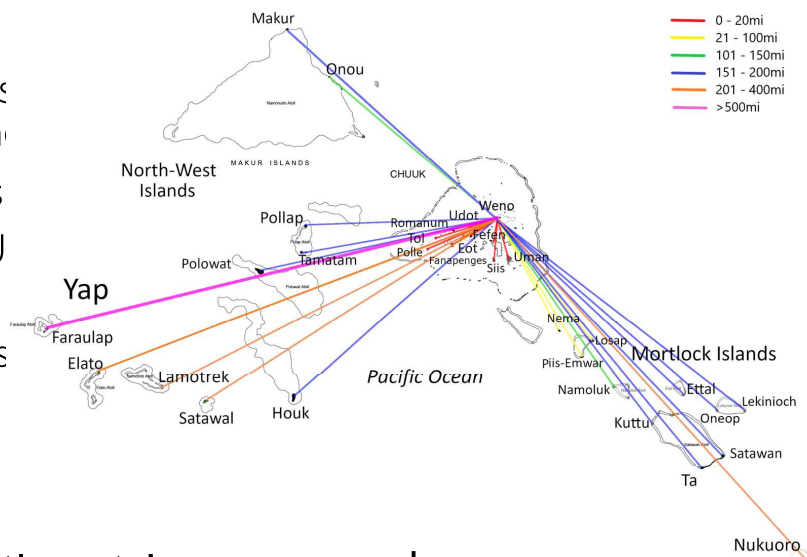
Dispatch Commodities



Request support from U.S. Government agencies

## Food Distribution Example – FSM Typhoon Wutip

- IOM and BHA/USAID procured 470.56 US tons of food assistance together
  - Rice - 209.14 US tons
  - Vegetables - 104.57 U tons
  - Fruit - 104.57 US tons
  - Oil - 52.29 US tons



- In total, 104 distributions trips were made covering over 18,000 nautical miles.



# Border Closures Impacting Response Activities Across the Pacific



## Pacific Regional Cargo and Passenger Entry Point Updates – April 2022

Micronesia			
PICT	Air Freight	Sea Freight	Passenger
<a href="#">Federated States of Micronesia (FSM)</a>	✓	✓	✗
<a href="#">Guam</a>	✓	✓	✓
<a href="#">Kiribati</a>	✓	✓	✓
<a href="#">Marshall Islands (RMI)</a>	✓	✓	✓
<a href="#">Nauru</a>	✓	✓	✓
<a href="#">Northern Mariana Islands (CNMI)</a>	✓	✓	✓
<a href="#">Palau</a>	✓	✓	✓

These tables show the ENTRY STATUS for air freight, sea freight and passengers for the listed countries and territories in the Pacific region. Please note: The Pacific Regional Logistics Cluster strives to provide the most up-to-date information gathered from various sources including governments, humanitarian agencies, news outlets and commercial service providers. The Cluster has no control over any inaccuracies or changes to this information.

### LEGEND

- ✓ - Entry is allowed and regular commercial services are available.
  - ✓ - Entry is allowed but commercial services are limited.
  - ✓ - Entry is ONLY for citizens, residents and those with special permission.
  - ✗ - Entry is NOT allowed.
- More information via country links.*

Melanesia			
PICT	Air Freight	Sea Freight	Passenger
<a href="#">Fiji</a>	✓	✓	✓
<a href="#">New Caledonia</a>	✓	✓	✓
<a href="#">Solomon Islands</a>	✓	✓	✓
<a href="#">Vanuatu</a>	✓	✓	✓

Polynesia			
PICT	Air Freight	Sea Freight	Passenger
<a href="#">American Samoa</a>	✓	✓	✓
<a href="#">Cook Islands</a>	✓	✓	✓
<a href="#">French Polynesia</a>	✓	✓	✓
<a href="#">Niue</a>	✓	✓	✓
<a href="#">Samoa</a>	✓	✓	✓
<a href="#">Tokelau</a>	✓	✓	✓
<a href="#">Tonga</a>	✓	✓	✓
<a href="#">Tuvalu</a>	✓	✓	✓
<a href="#">Wallis &amp; Futuna</a>	✓	✓	✓





## Last Mile Distributions During COVID-19

- Need for pre-positioning
- Need for trained local organizations
- Contact-less distribution protocol
- Quarantine



## Tonga Response Lessons Learned

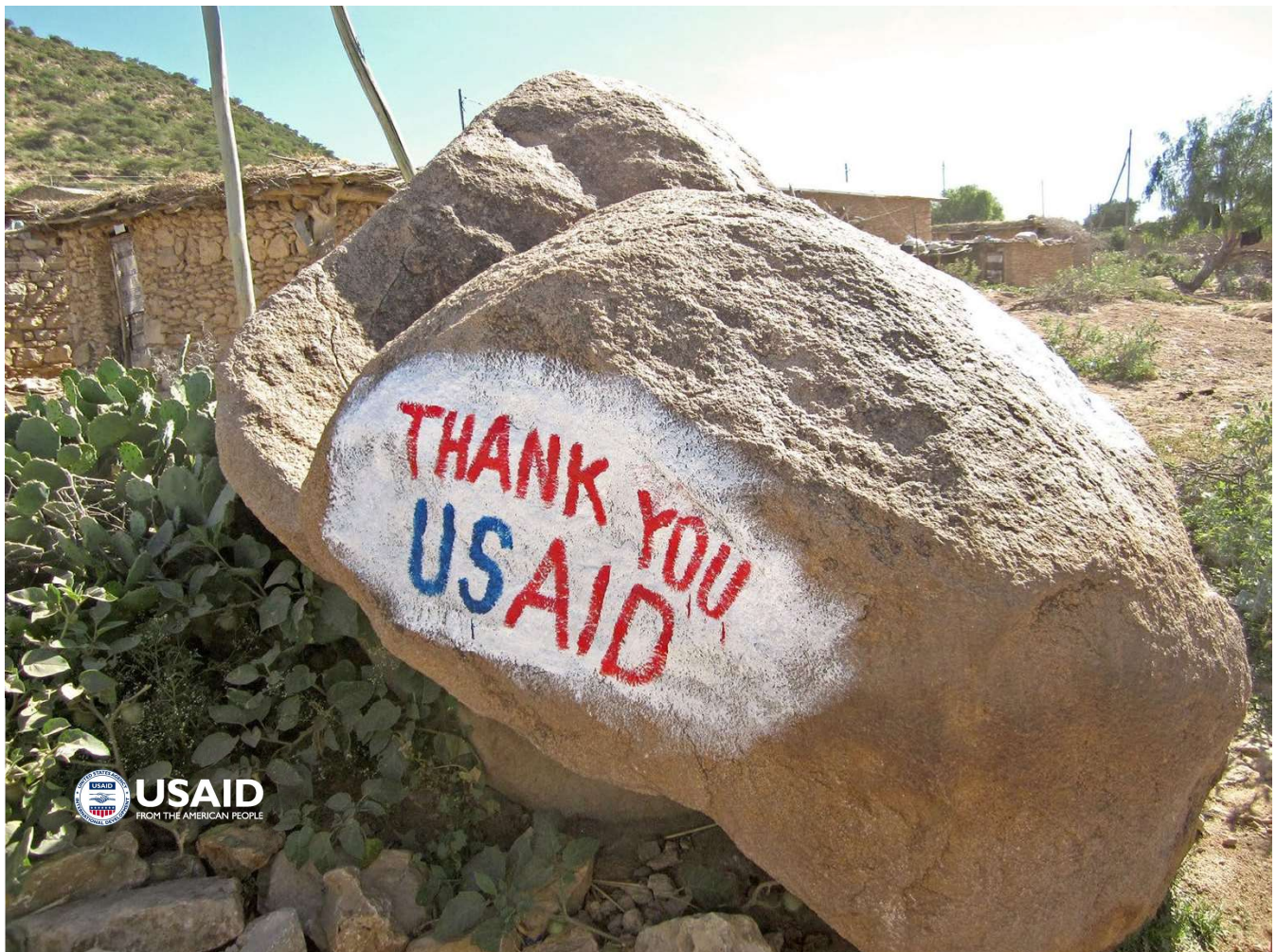


[Learn More](#)



@USAIDSavesLives


Tiare Eastmond  
Regional Humanitarian Advisor for the Pacific  
teastmond@usaid.gov



# NOAA's Digital Coast Actionable Information for Communities

**Russell Jackson**  
NOAA Office for Coastal Management  
4/21/2022


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1

## Digital Coast

- **Approach:** Bring the geospatial and coastal management communities together
- **Outcome:** A constituent-driven, integrated, enabling platform supporting coastal resource management that is used



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## Digital Coast Enabling Platform




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## Digital Coast Website

- Provides effective and efficient access to coastal geospatial data, tools, training, and case studies
- Facilitates linkages between elements to enhance utility and application
- Provides opportunity to demonstrate role of geospatial information and training in decision-making



© 2021 NOAA



4

2

### A Broad Spectrum Approach: Facilitating Use and Application

© 2014 NOAA

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### Digital Coast Data

- Over 500 terabytes of high-resolution elevation data, land cover data, and orthoimagery
- 200+ web mapping services
- Linkages 50 national-level coastal data sets

© 2014 NOAA

6

3

### Digital Coast Tools

- An inventory of over 50 decision-support and information visualization tools
- Many provide visualization and analysis capabilities without need for desktop GIS software

© 2014 NOAA

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### Digital Coast Academy

- 190 learning resources covering a variety of coastal topics
- Includes:
  - Classroom and online instructor-led trainings
  - Self-guided resources
  - Case studies
  - Publications and quick references
  - Videos and webinars

© 2014 NOAA

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### Stories from the Field


- Almost 150 narratives that demonstrate how users are applying Digital Coast resources to coastal issues
- Highlight partnerships and impact



© 2021 NOAA




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**Coastal Flood Exposure Mapper**  
Visualizing Community Risk  
People | Places | Natural Resources

NATIONAL U.S. DEPARTMENT OF COMMERCE

© 2021 NOAA




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### Coastal Flood Exposure Mapper Demonstration

<https://coast.noaa.gov/floodexposure>


© 2021 NOAA



11


### Q&A Session

© 2021 NOAA



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6



## CO-OPS Coastal Inundation Dashboard

**Paul Fanelli**  
 Lead Oceanographer  
 National Ocean Service (NOS)  
 Center for Operational Oceanographic Products & Services (CO-OPS)

[paul.fanelli@noaa.gov](mailto:paul.fanelli@noaa.gov)

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1


## What is CO-OPS?

**Meaningful oceanographic data for the Nation**

CO-OPS is the authoritative source for accurate, reliable, and timely tides, water levels, currents, and other oceanographic information.

**Our work benefits:**

- Safe and efficient navigation
- Mapping and charting for the nation
- Planning for coastal hazards
- Ecological forecasting





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2

1

## CO-OPS Role in Planning for and Monitoring Coastal Flooding

Real-time coastal water level observations and historical analysis

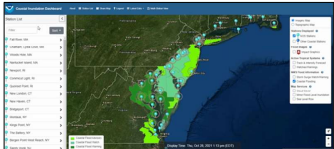



- Coastal Inundation Dashboard
- Tidal datum analysis & support
- Sea Level Trends
- High Tide Flood Outlook

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## Coastal Inundation Dashboard



- Interactive map-based web application targeted towards coastal decision makers and planning community
- Real-time & historic flood information at NOS water level stations
- Customizable - create your own custom map URL!
- Water levels relative to MHHW (average daily highest tide)

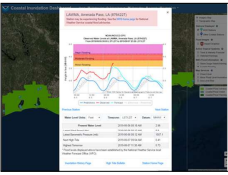
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2

### Coastal Inundation Dashboard

- Integrates NOS and other relevant NOAA flood information
  - Local NWS weather forecast office (WFO) flood thresholds
  - Tropical cyclone forecast information from National Hurricane Center (NHC)
  - Coastal flood advisory & storm surge watch/warning
  - OCM Sea Level Rise Viewer
- Compares observed water levels with known flood impact thresholds automatically!




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### Flood Impact Thresholds

- Takes into account local geography and infrastructure (WFO specific)
- Provides a trigger point for issuing NWS coastal flood advisory products
- CO-OPS has [analyzed](#) available NWS minor flood levels nationwide to derive a consistent impact level relationship that can be applied at most coastal regions



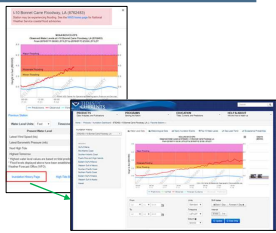
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3

### Coastal Inundation Dashboard: Inundation History

- Available by clicking *Inundation History Page* on any station pop-up
- Access real-time and historical water level & meteorological data
- Yearly Inundation Events
- Top-Ten Water Levels
- Sea Level Trend
- Exceedance Probabilities

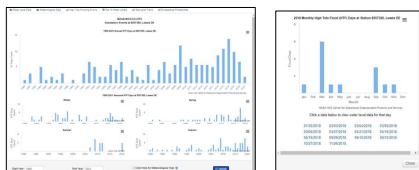


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### Coastal Inundation Dashboard: Yearly Inundation Events

- Annual number of days where water levels have exceeded the minor flooding threshold



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### Coastal Inundation Dashboard: Top-10 Water Levels

- Peak historic water levels, along with cause (if known)
- Links directly to water level observations

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### Coastal Inundation Dashboard: Sea Level Trend & Exceedance Probabilities

- Linear sea level trend and annual 1-year, 2-year, 10-year and 100-year exceedance levels

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5

### Monitoring Storm Surge During Tropical Events

- CO-OPS will disseminate a storm-specific dashboard page with a custom URL
  - Storm track/intensity, coastal watches/warnings and flood "alerts" update automatically
- Activated at first tropical storm or hurricane watch
- Summary of Coastal Observations
  - Text analysis updated 3 times daily

Highlighted on NOS and NOAA social media!

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### Viewing Data for Multiple Stations

- Quickly view latest observed water level and meteorological data
- 72 hour peak observed water level computed automatically
- Easily sort and export data

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### Viewing Water Level Plots for Multiple Stations

- Select up to 20 water level stations
- Generate an HTML page with a snapshot of the map and water level plots with latest observations
- Option to export as a PDF

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### What's on the Horizon? Addition of Great Lakes Stations

- Integration of over 50 long-term Great Lakes water level stations into the product
- View real-time water level information relative to Low Water Datum (LWD)
- Access data for historical flood events.

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### What's on the Horizon? Integration of High Tide Flood Outlook Information

- Based on the NOAA Annual [High Tide Flood Outlook](#)
- Highlights projected high tide flood day range at select stations
- Uses updated sea level scenarios from [2022 Sea Level Rise Technical Report](#)
- Available for long-term stations

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### What's on the Horizon? Integration of High Tide Bulletin Information

- Highlights days where locations are more vulnerable to high tide flooding due to astronomical conditions and climatology
- Higher than normal tides can compound storm surge impacts


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8

## What's on the Horizon? Transition to gridded information

- IJA funding on Seasonal to Annual water prediction will allow NOS to enhance High Tide Bulletin & Outlook information
- Will move beyond point based prediction to a 500m spatial resolution grid and improved inundation mapping



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## Links

- Coastal Inundation Dashboard
  - <https://tidesandcurrents.noaa.gov/inundationdb/>
  - [https://tidesandcurrents.noaa.gov/inundationdb\\_info.html](https://tidesandcurrents.noaa.gov/inundationdb_info.html)
- High Tide Flood Outlook
  - [https://tidesandcurrents.noaa.gov/HighTideFlooding\\_AnnualOutlook.html](https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html)
- High Tide Bulletin
  - <https://oceanservice.noaa.gov/news/high-tide-bulletin/welcome.html>


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# NOAA's Emergency Response Imagery, Pre event imagery, and UAS possibilities

Maryellen Sault & Mike Aslaksen  
NOAA/NGS/RSD  
April 2022

1


1


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## National Geodetic Survey

**Mission:** Define, maintain and provide access to the National Spatial Reference System.

**RSD Primary Programs:**







Aeronautical Survey Program
Coastal Mapping Program
Emergency Response

2

1

NOAA's National Geodetic Survey Positioning America for the Future [geodesy.noaa.gov](http://geodesy.noaa.gov)

## Emergency Response Imagery

- Support NOAA's requirements and NRF Emergency Support Functions:
  - ESF 1 Transportation
  - ESF 11 Agriculture and Natural Resources
  - ESF 3 Public Works and Engineering
  - ESF 9 Search and Rescue
  - ESF 10 Oil and Hazardous Material Response
  - ESF 13 Public Safety and Security
  - ESF 14 Long-term Community Recovery and Mitigation
- Pre-Scripted Mission Assignments (PSMA) With FEMA

3



4

2

NOAA's National Geodetic Survey Positioning America for the Future [geodesy.noaa.gov](http://geodesy.noaa.gov)

## Aircraft and Sensors

Nadir system with 30cm rgb and Gps in

Oblique system with two 30cm rgb

5

NOAA's National Geodetic Survey Positioning America for the Future [www.egs.noaa.gov](http://www.egs.noaa.gov)

## ~4-6 hr Tiled Ortho-mosaic

Time	Image Type	Resolution
~3 Days	Un-rectified Image	16 MP
~24 hr	Ortho Image	22 MP
~8-12 hr	Tiled Ortho-mosaic	39 MP
		2016 ~158 MP **

"Wheels down to web up"

\* Image sizes are to scale  
\*\* 39+39+80 MP

6

3

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## Applanix / LeadAir DSS (Version 6)




NEW

7

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## Response Workflow






- 1 Imagery uploaded to cloud after landing
- 2 Ortho-rectification, mosaic processing & web-map tiling in cloud
- 3 Mosaicked tiles are warehoused in AWS storage
- 4 TileServer & MapBox are used to make the data web accessible
- 5 Public website is created

8

4

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## Coordination Recommendations


-  NOAA CDM contacts, NOAA Regional Reps, NGS
- 
  - Explain data importance
  - Identify FEMA RS and GIS lead for your JFO
-  USGS Liaisons, USACE Districts, NSGIC, etc.

Provide feedback on plans and indicate any intentions of collecting similar data within your state.

9

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## FAQ - Image Time

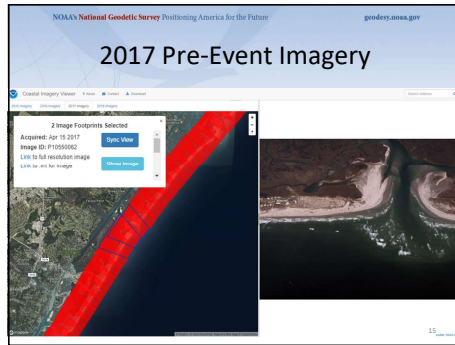


C26262664	022581-083121042333-RGB1.jpg
C = Camera identifier	022318 = image id
262 = GPS day of year	083121 = MMDDYY
62664 = Approximate seconds of GPS day 262	2042333 = HHMMSS (UTC)
	RGB1 = camera id

NEW

10



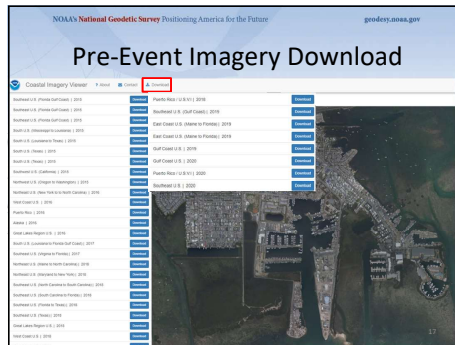


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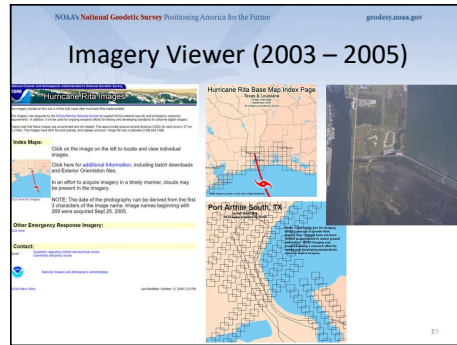
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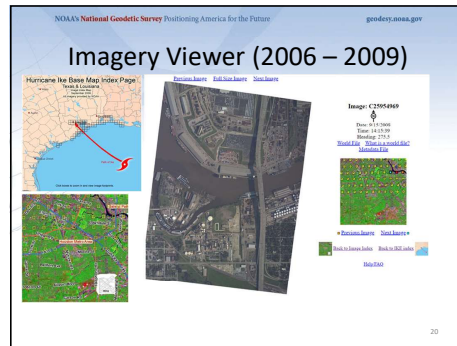
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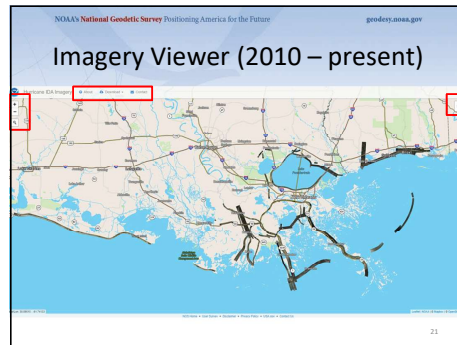


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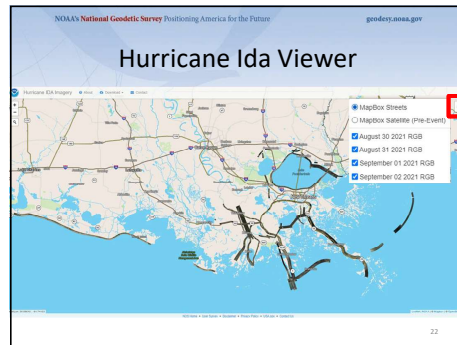


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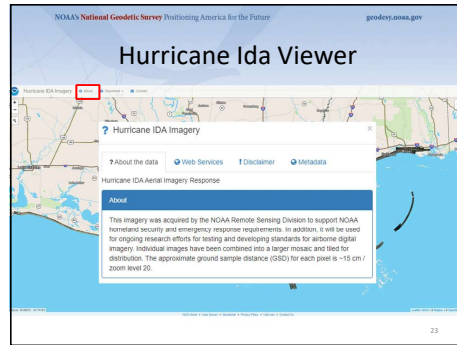
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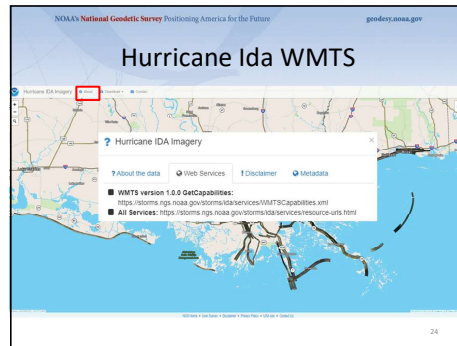
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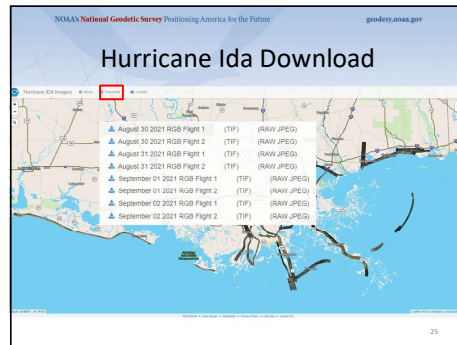


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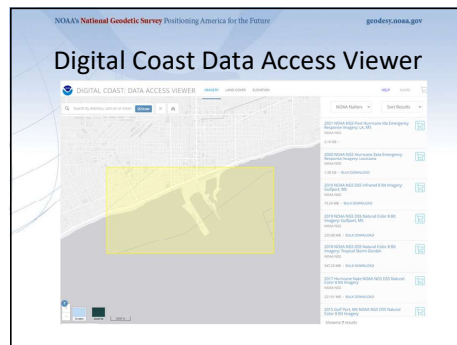


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## Summary

- Data is disseminated to federal, state, and local government agencies, as well as the general public to facilitate support efforts
- Nadir and oblique imagery is collected, processed, and disseminated in GIS ready formats
- Goal: processed and available 6-8 hours after landing
- The ER Viewers have had over 4.1 million pageviews by 1.8 million users since February 2018.
- Technical Questions: ngs.hurricane1@noaa.gov

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## UAS Emergency Response

Multi-Rotor

Fixed-Wing

VTOL

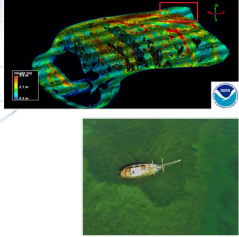
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## UAS Emergency Response



**UAS Payloads:**

- RGB
- IR / Thermal / NIR
- Multispectral
- Hyperspectral
- LIDAR


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## UAS Emergency Response

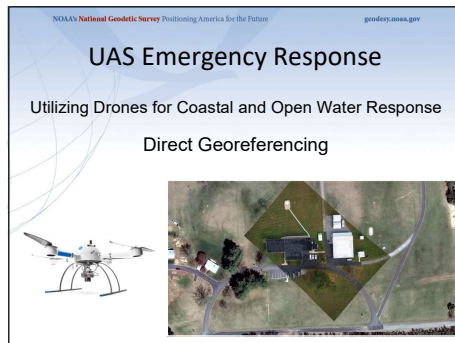
**Fleet Ready**

- UAS approved for NOAA Ship and small boat ops
- Mapping Capable
- Search and Rescue
- Rapid Response to local needs

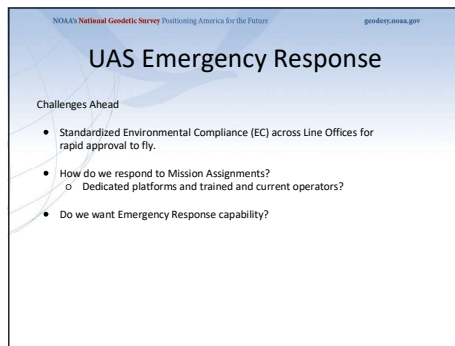


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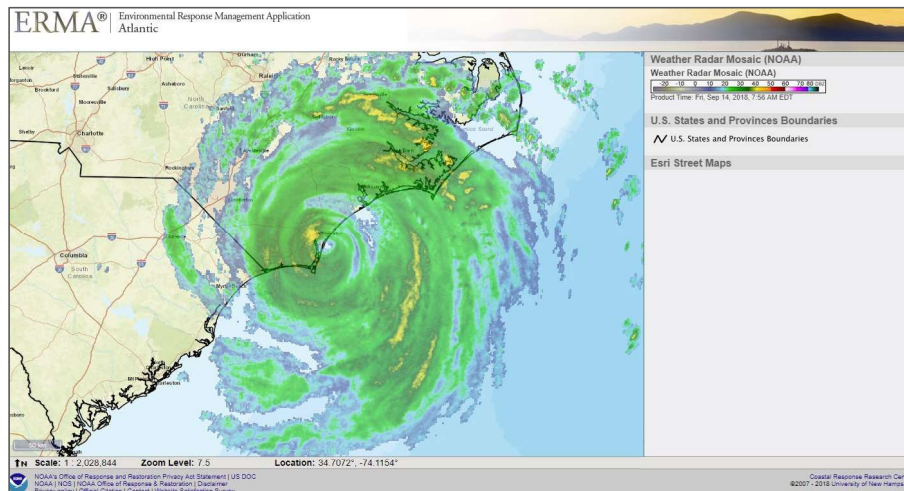
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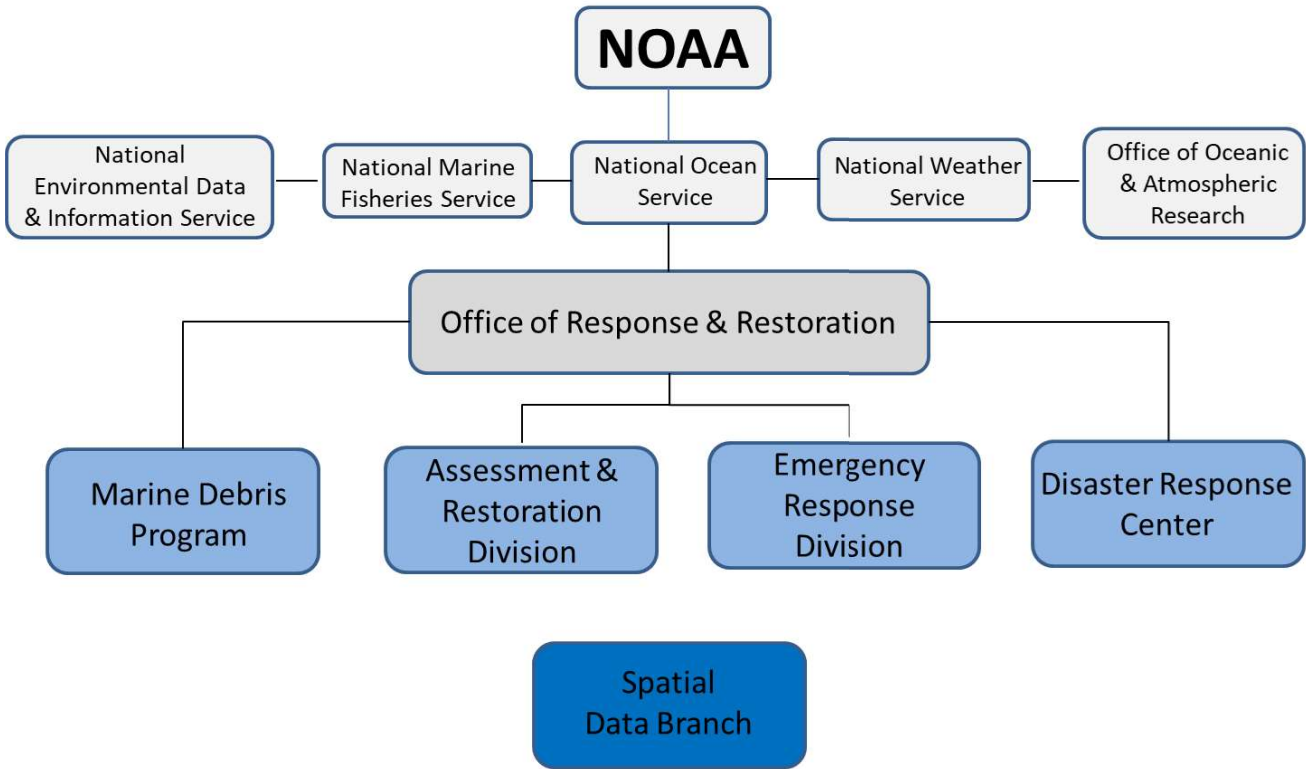
# The Environmental Response Management Application

## ERMA®

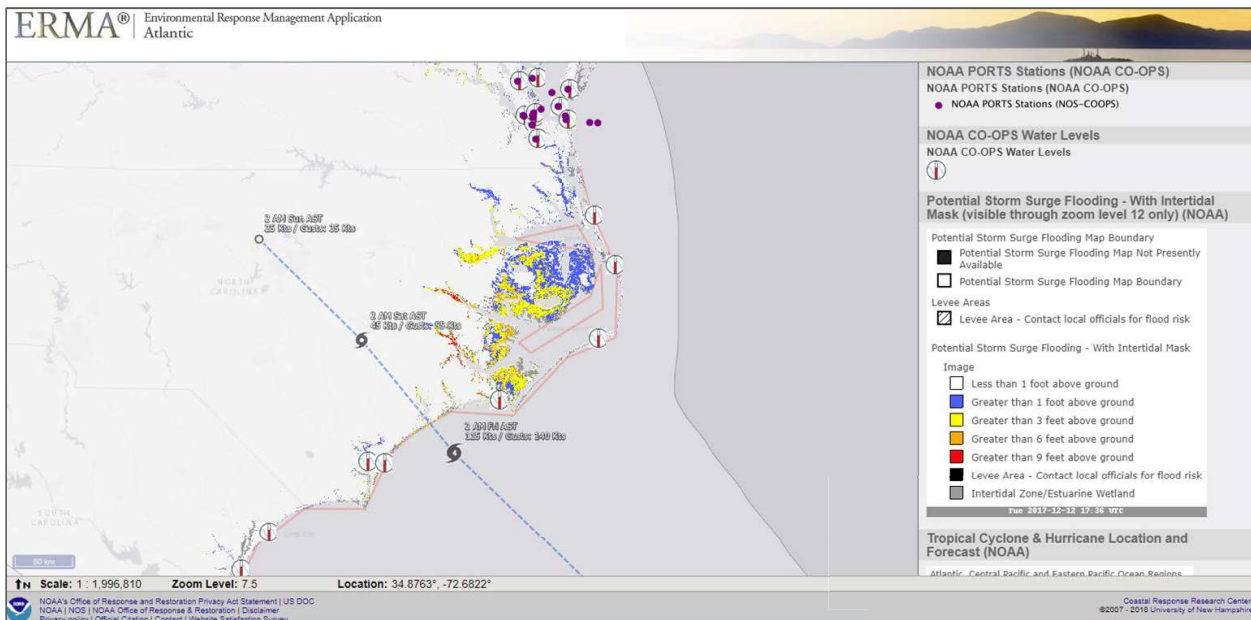


Jay Coady  
 Office of Response & Restoration  
 Assessment and Restoration Division  
 Spatial Data Branch

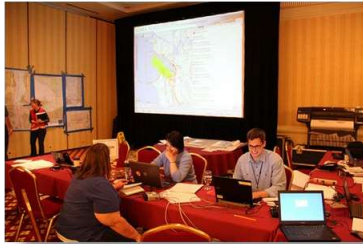
response.restoration.noaa



**ERMA** is an online mapping tool for visualizing environmental information relevant to oil spills and natural disasters.



## ERMA is used to:



Visualize the situation status during an oil spill drill/training



Create a Common Operational Picture in a disaster response



Assess damage and plan for restoration

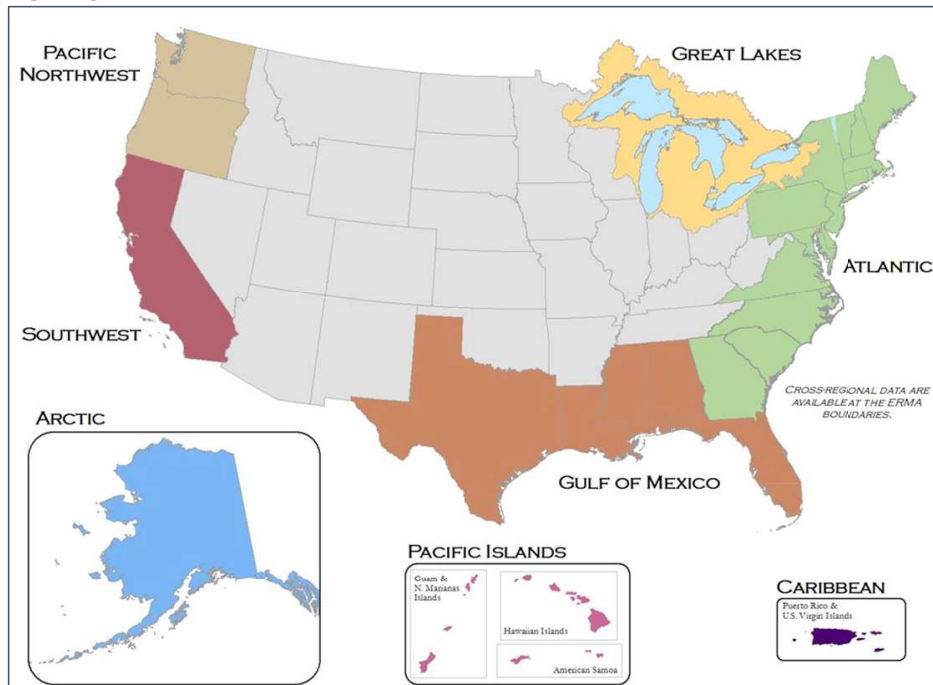


Analyze threats from climate change, drilling, and **hurricanes**

## Key Functionality

- Access ERMA via any Web browser. No special software needed.
- Provides centralized access to information
- Tiered system security that protects data.
- Standardized user interface; simplifying data uploading.
- Build customized maps using layers.
- Create and view customized sets of layers quickly with bookmarked views.
- Investigate and compare data quickly with Dashboards and

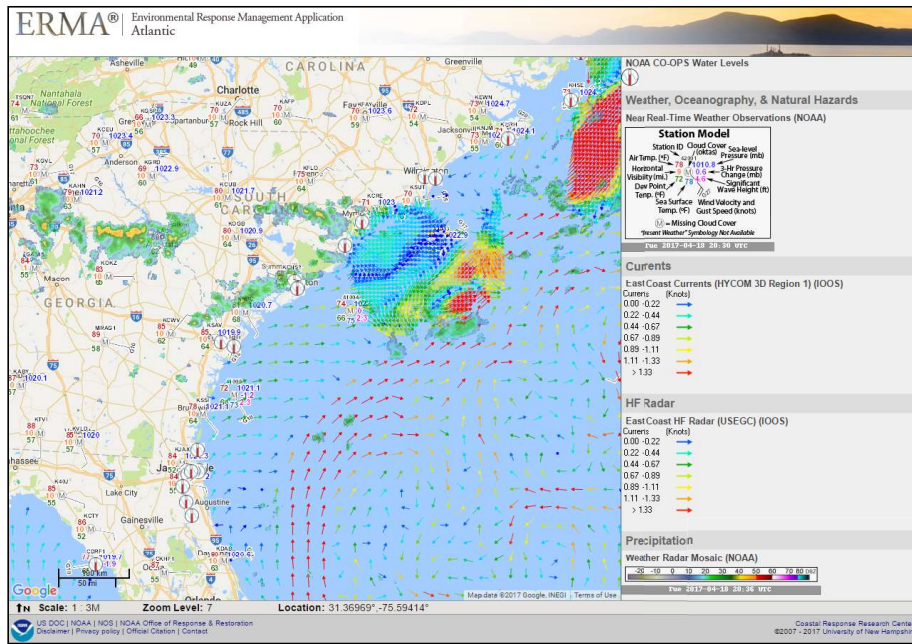
## ERMA Regions



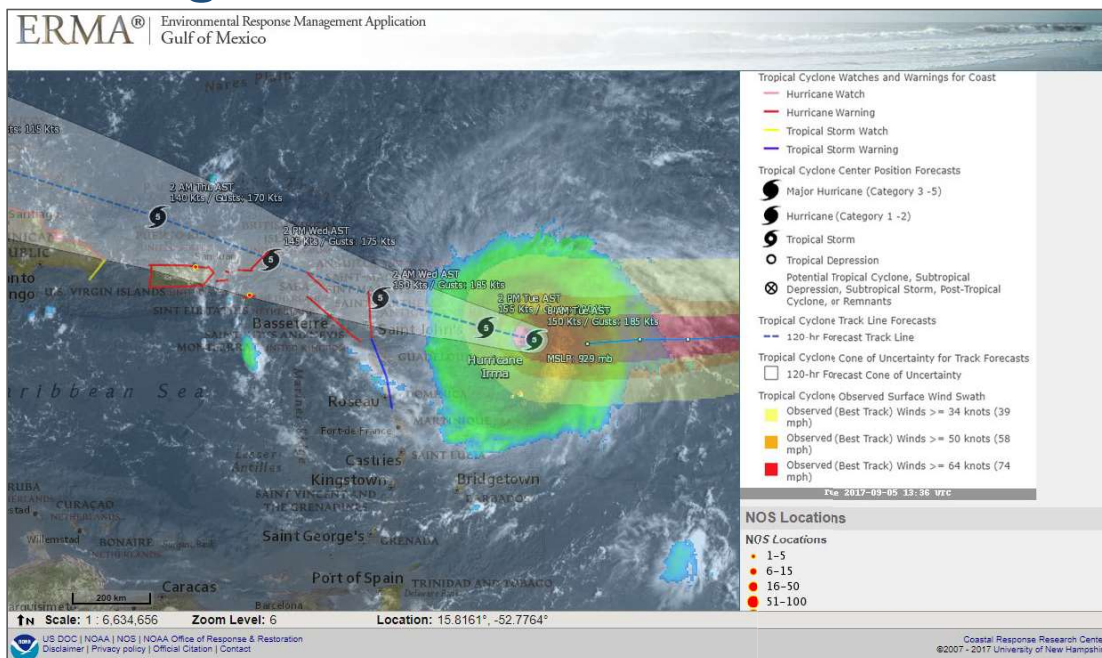
## Hurricane Response With ERMA

- Base environmental data
- Live data streams
  - Storm tracking, surge modeling, current water levels, ship locations, and more.
- Critical infrastructure
- Pre/post storm imagery
- Quick turnaround post storm data
- Live tracking of ESF-10 targets

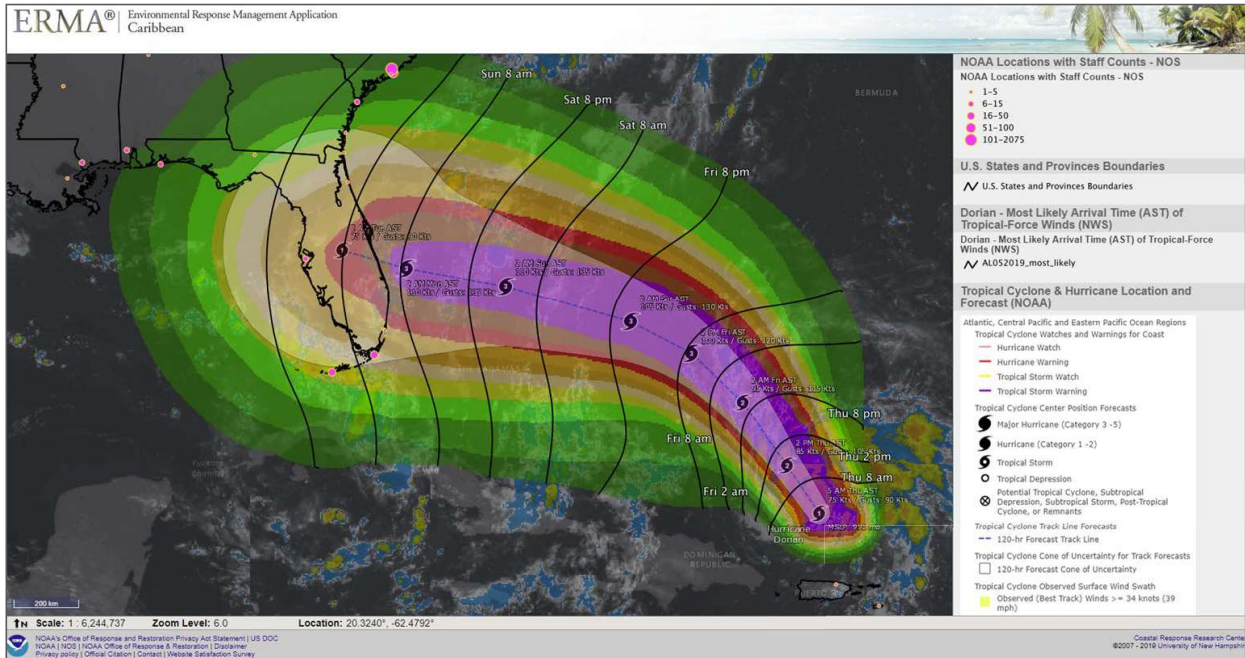
# Near Real Time Weather



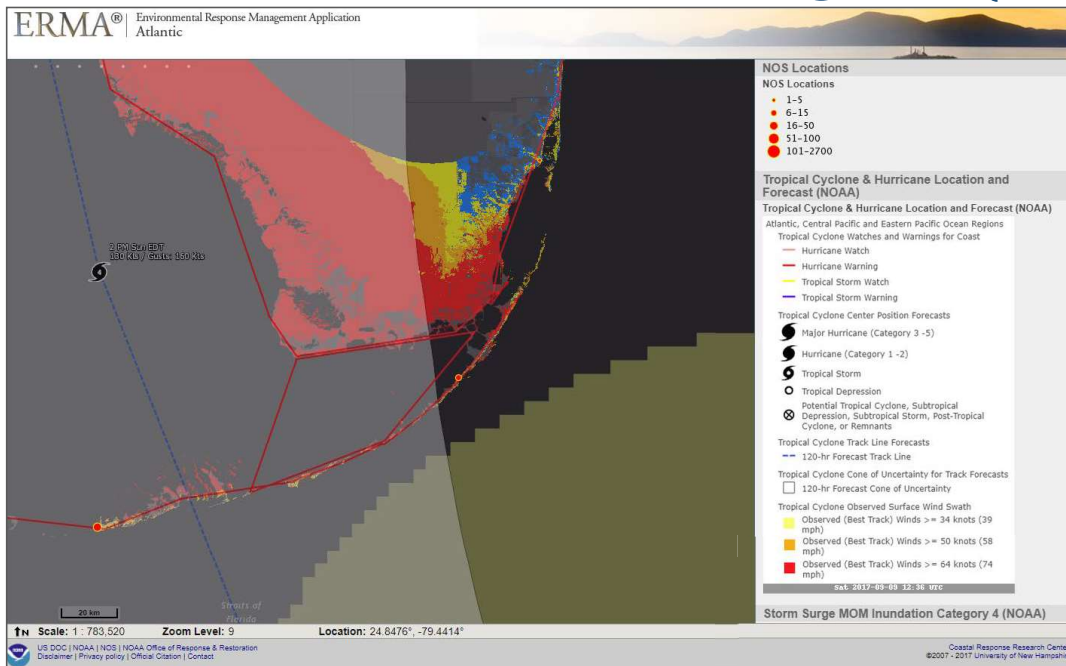
# Storm Tracking



# Arrival Times of Winds



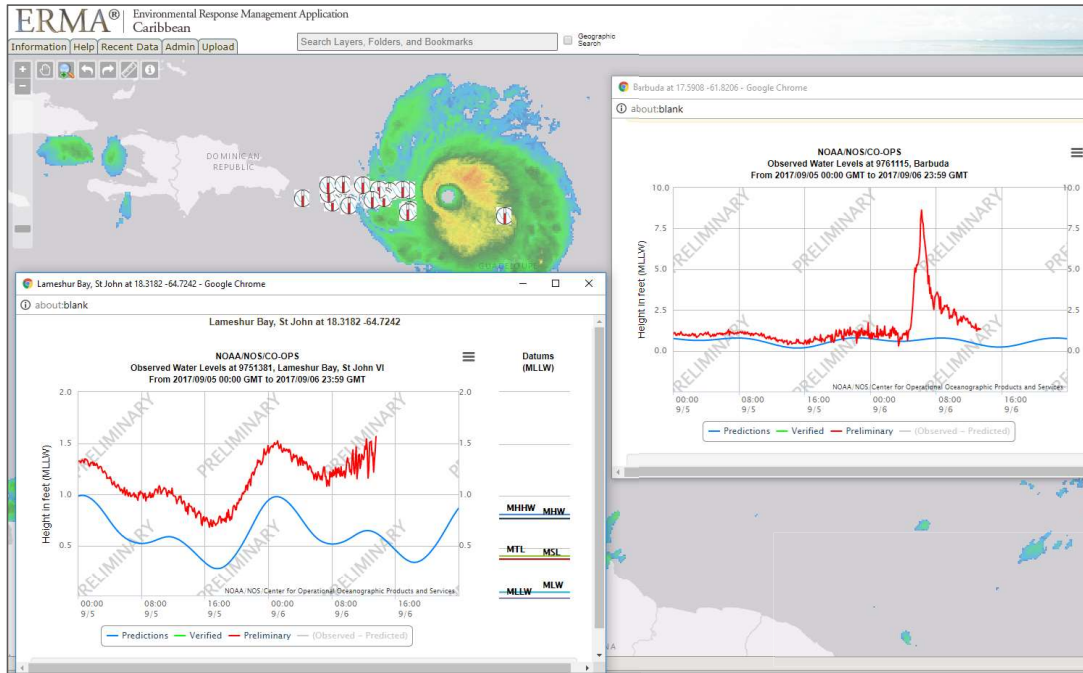
# SLOSH Maximum of the Maximum Categories (MOMs)



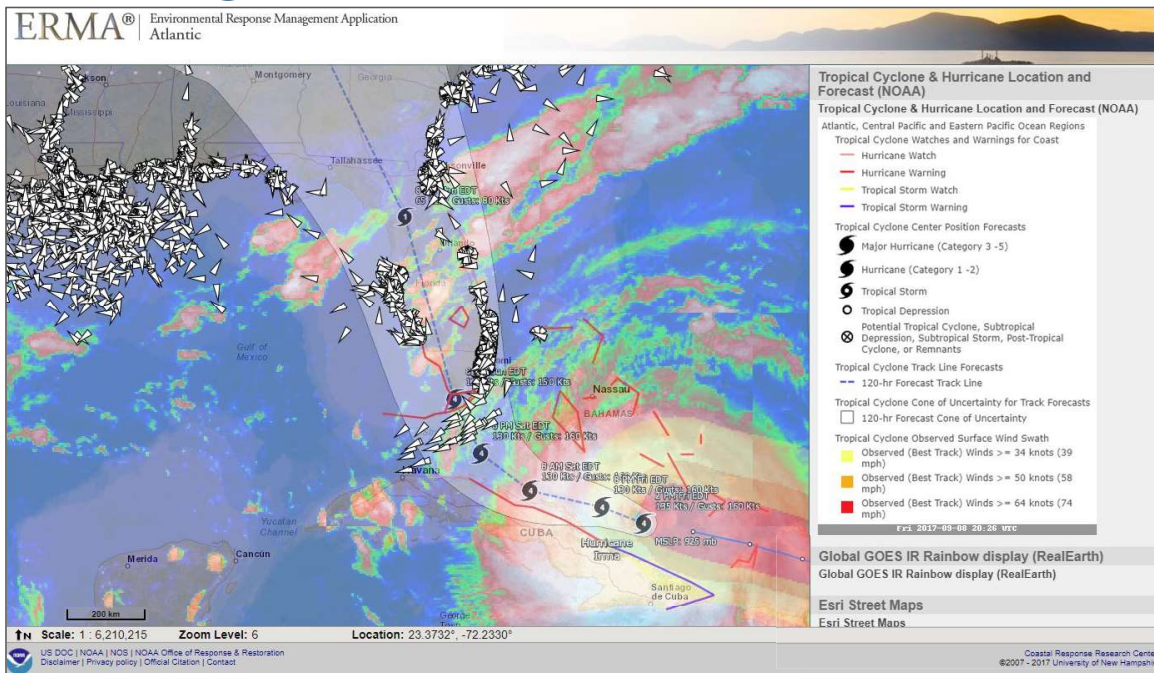




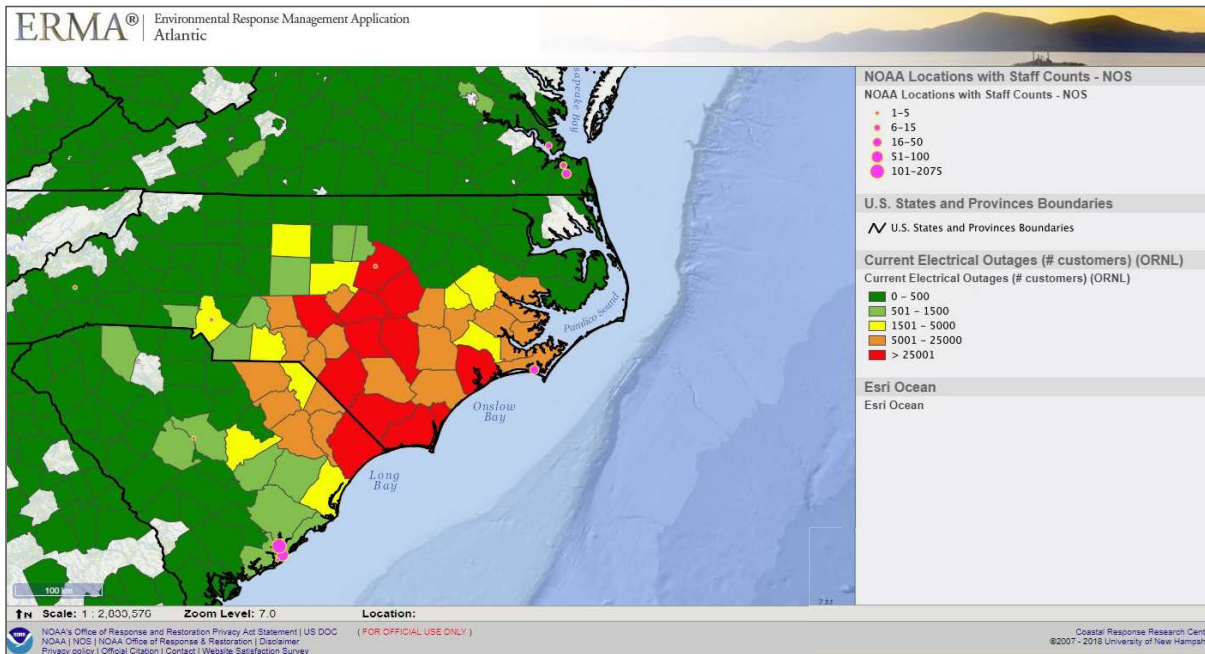
# Water Levels



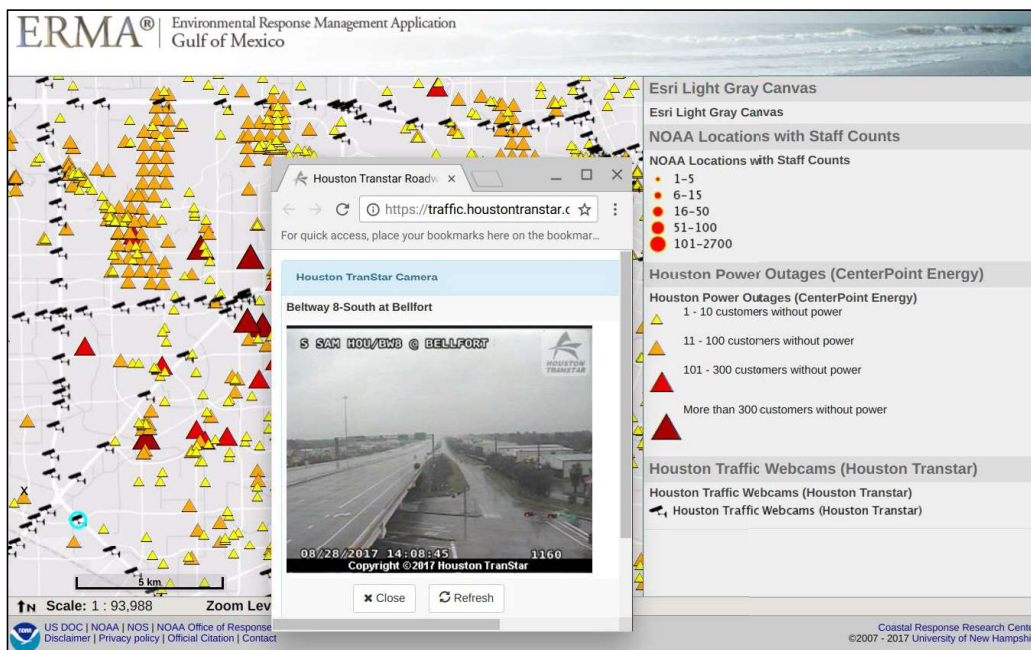
# Vessel Tracking



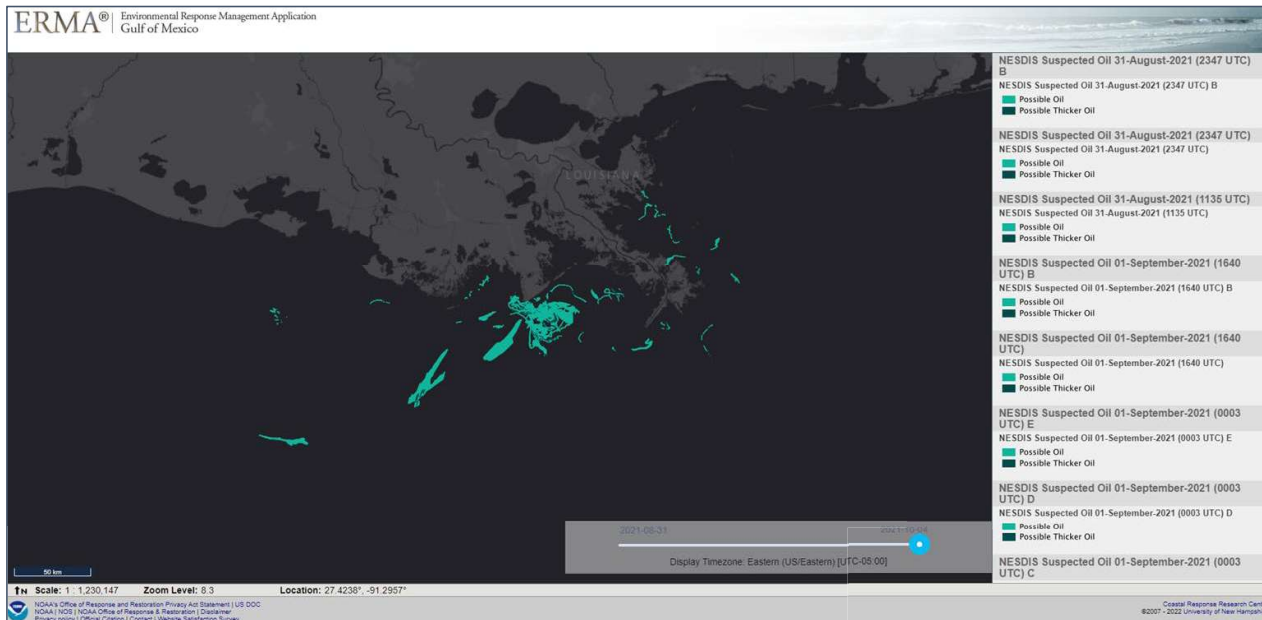
# Power Outages



# Power Outages and Traffic Cams

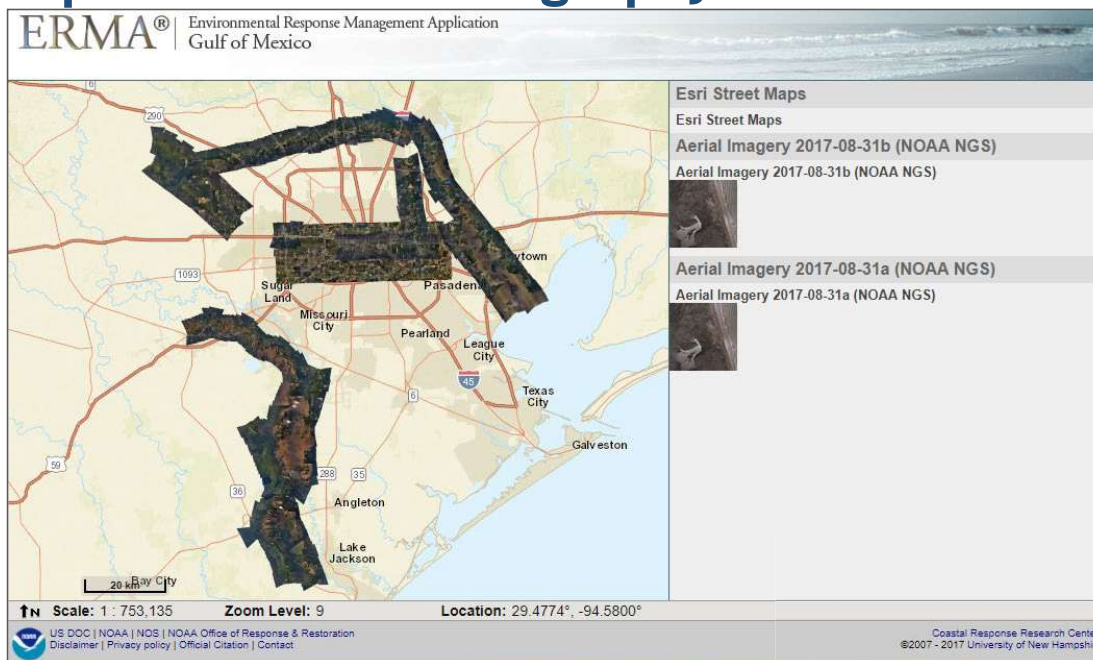


# Marine Pollution Surveillance Reports (MPSR)



<https://www.ospo.noaa.gov/Products/ocean/marinepollution/>

# NGS Response Aerial Photography



# NGS Response Aerial Photography

ERMA® Environmental Response Management Application  
Gulf of Mexico

Blank Base Layer  
Blank Base Layer  
Aerial Imagery 2017-08-30 (NOAA NGS)  
Aerial Imagery 2017-08-30 (NOAA NGS)

Esri World Imagery  
Esri World Imagery

Scale: 1 : 5,870    Zoom Level: 16    Location: 29.7949°, -95.6088°

US DOC | NOAA | NOS | NOAA Office of Response & Restoration  
Disclaimer | Privacy policy | Official Citation | Contact

Coastal Response Research Center  
©2007 - 2017 University of New Hampshire

# NGS Response Aerial Photography

ERMA® Environmental Response Management Application  
Gulf of Mexico

ERMA® Environmental Response Management Application  
Gulf of Mexico

ERMA® Environmental Response Management Application  
Gulf of Mexico

Scale: 1 : 768    Zoom Level: 19    Location: 24.7161°, -81.0699°

Scale: 1 : 768    Zoom Level: 19    Location: 24.7161°, -81.0699°

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# Other Imagery Sources

ERMA® Environmental Response Management Application  
Gulf of Mexico




NICB Hurricane Laura Imagery (Geointel)  
NICB Hurricane Laura Imagery (Geointel)

Esri National Geographic

Scale: 1 : 8.304    Zoom Level: 15.5    Location: 29.7504° -93.8596°

# Civil Air Patrol

ERMA® Environmental Response Management Application  
Caribbean



Civil Air Patrol Photos for Hurricane Maria (CAP)  
Civil Air Patrol Photos for Hurricane Maria (CAP)  
● Civil Air Patrol Photos for Hurricane Maria (CAP)

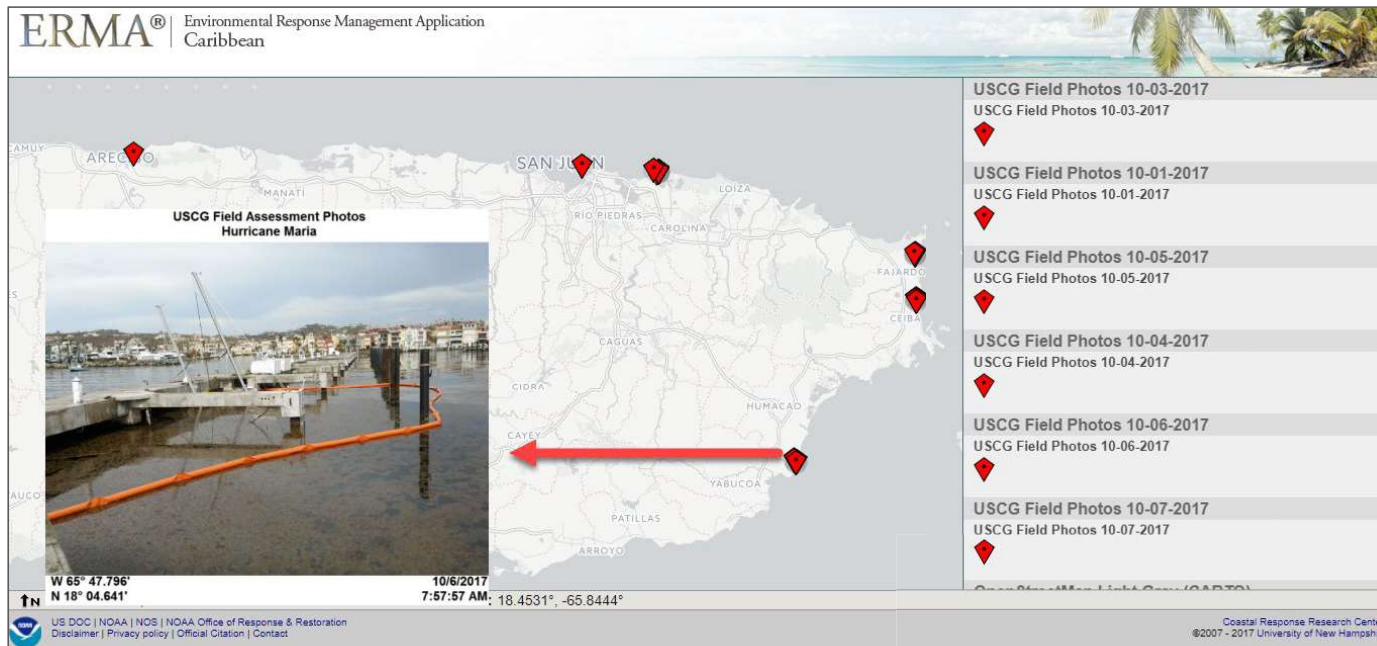
OpenStreetMap Light Gray (CARTO)  
OpenStreetMap Light Gray (CARTO)

Scale: 1 : 882,296    Zoom Level: 8.9000000000000000    Location: 18.2965° -64.5829°

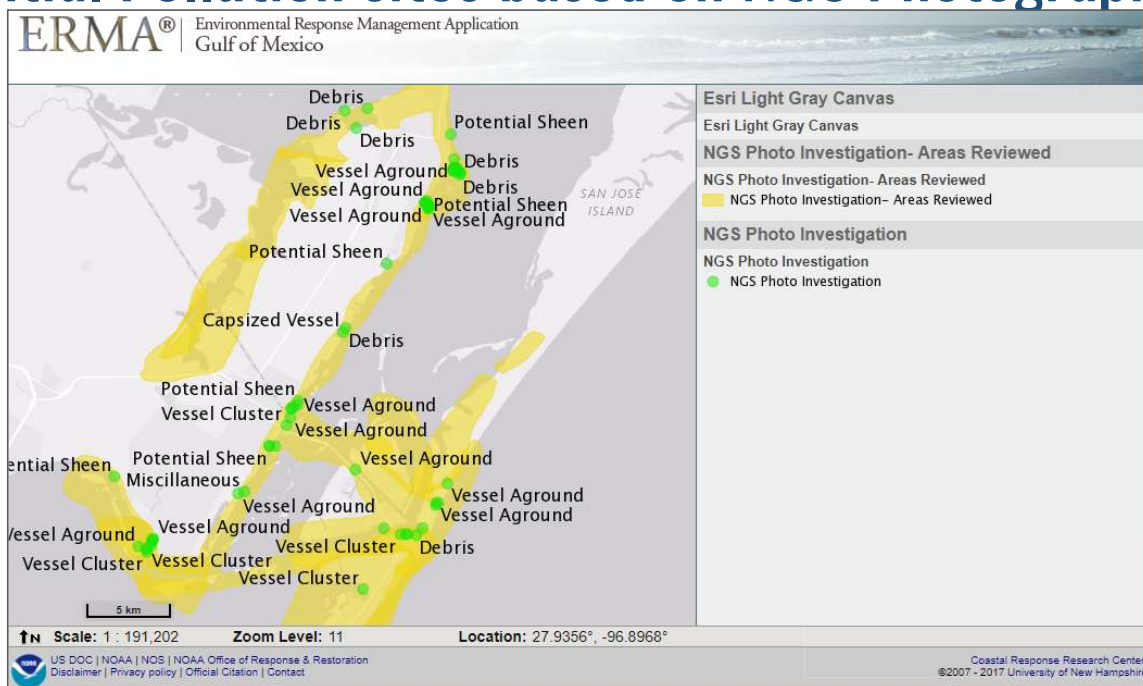
US DOC | NOAA | NOS | NOAA Office of Response & Restoration  
Disclaimer | Privacy policy | Official Citation | Contact

Coastal Response Research Center  
©2007 - 2017 University of New Hampshire

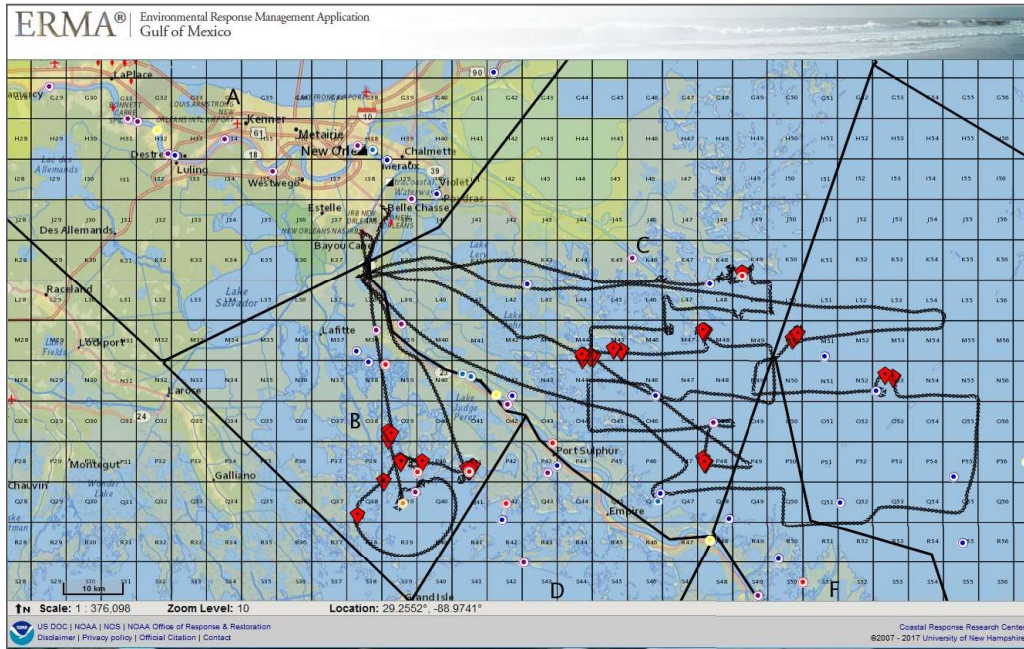
# Field Photos



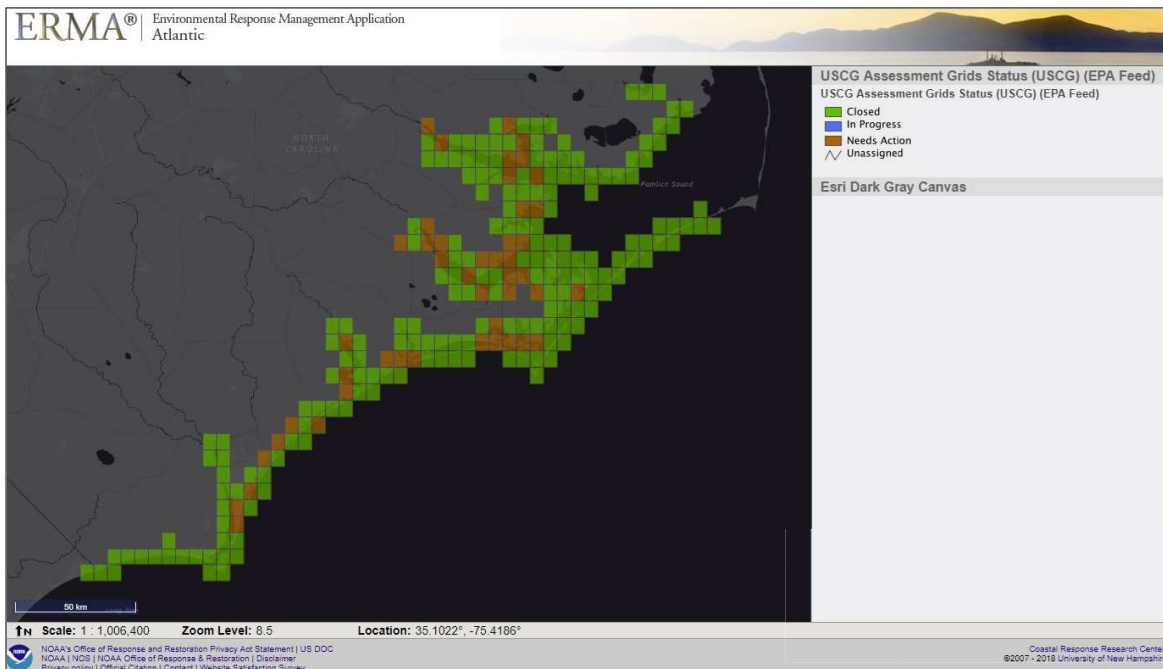
# Potential Pollution sites based on NGS Photography



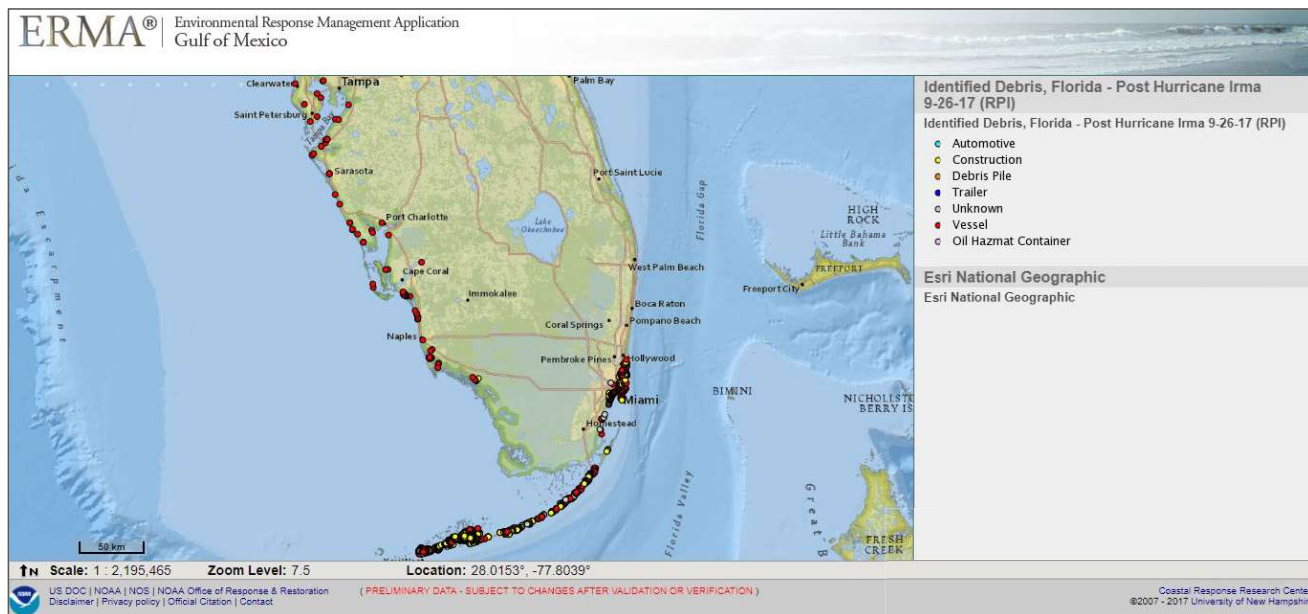
# Tracking ESF Targets



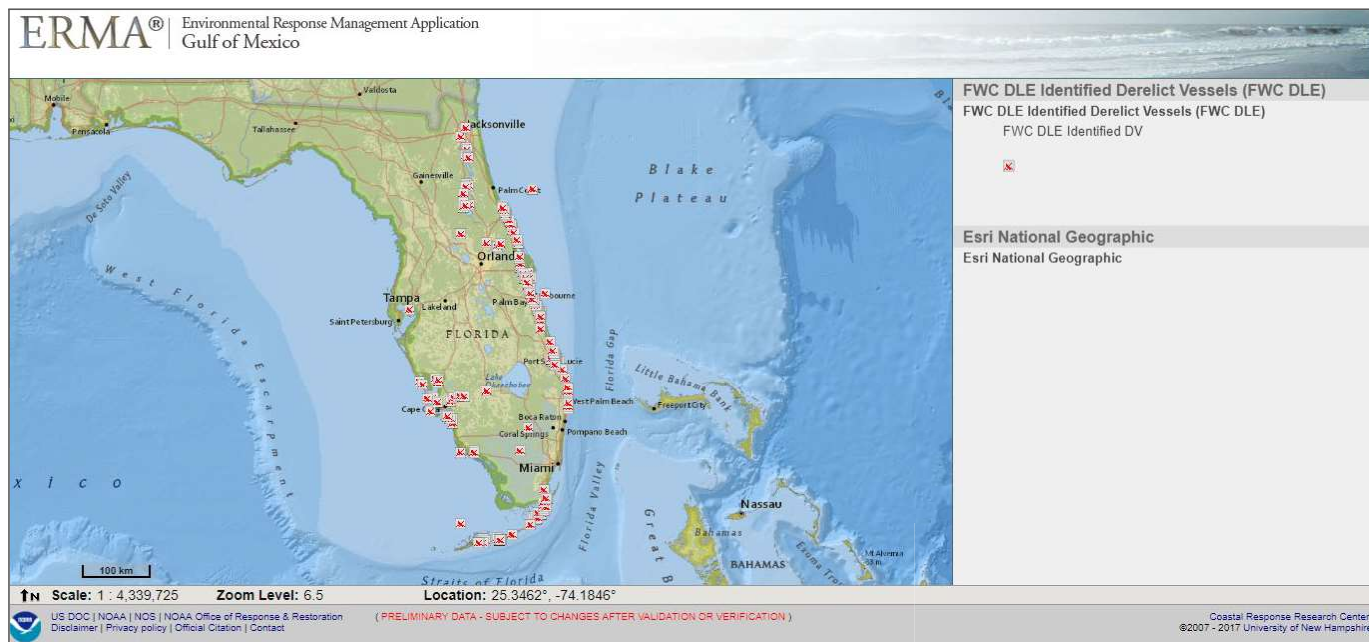
# Operational Grids



# Identified Debris from Imagery 09-28-17

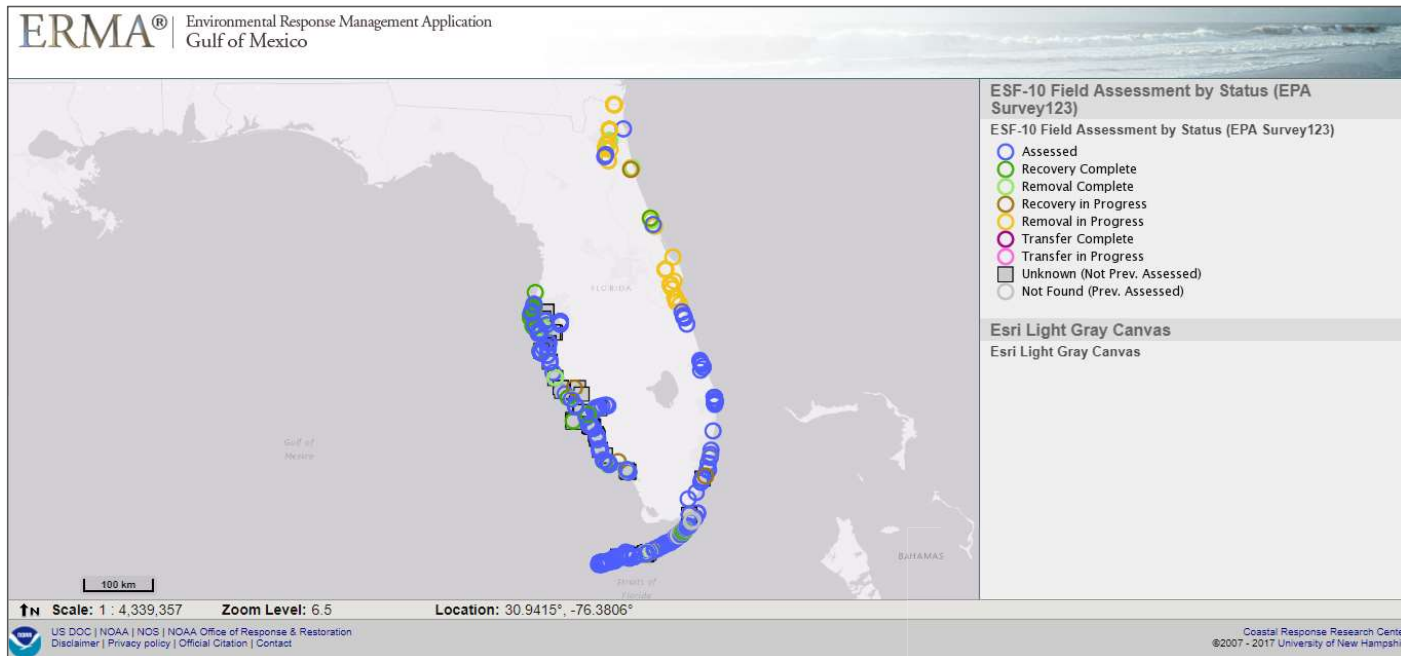


# Identified Vessels by State of Florida

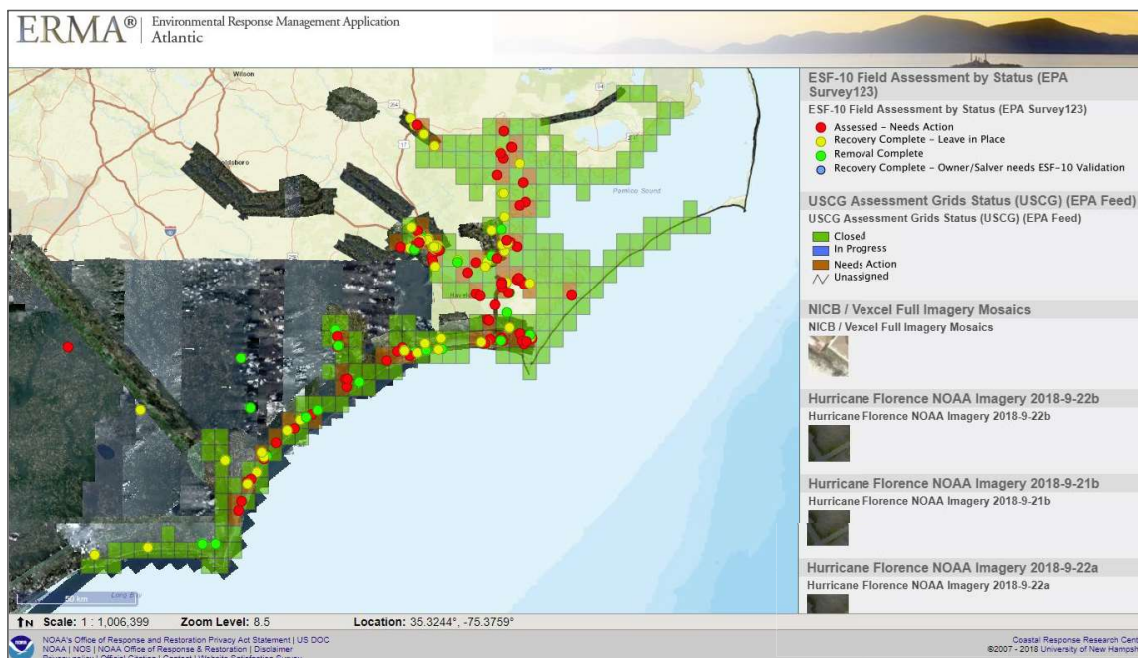




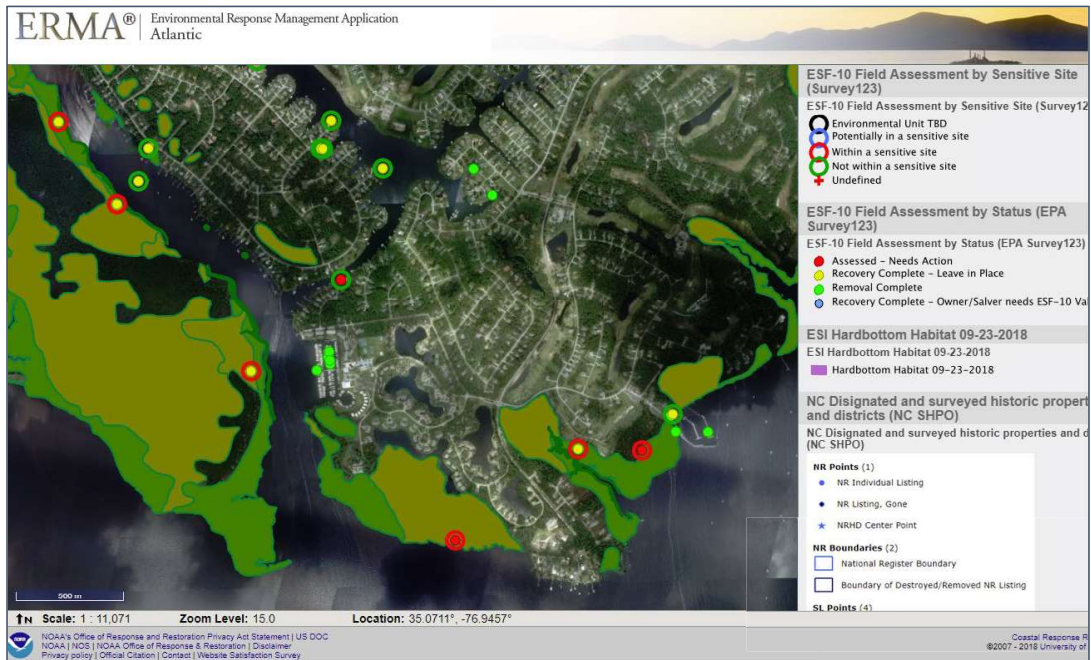
# ESF 10 Targets



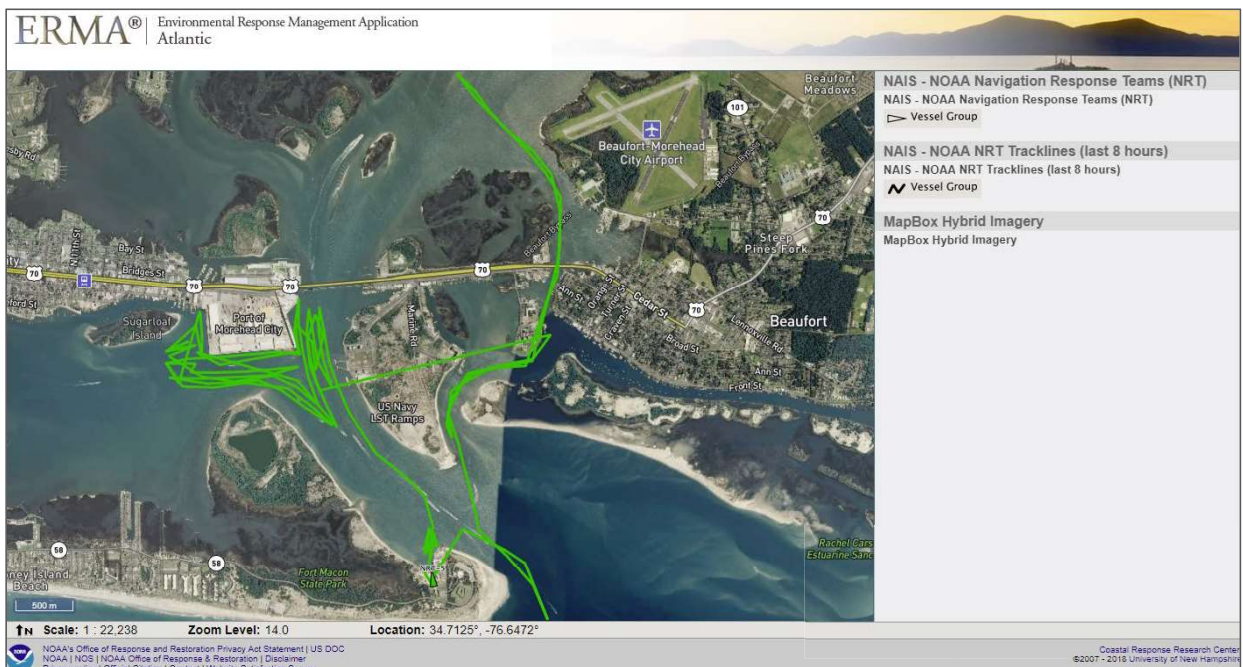
# Operational Grids with Targets



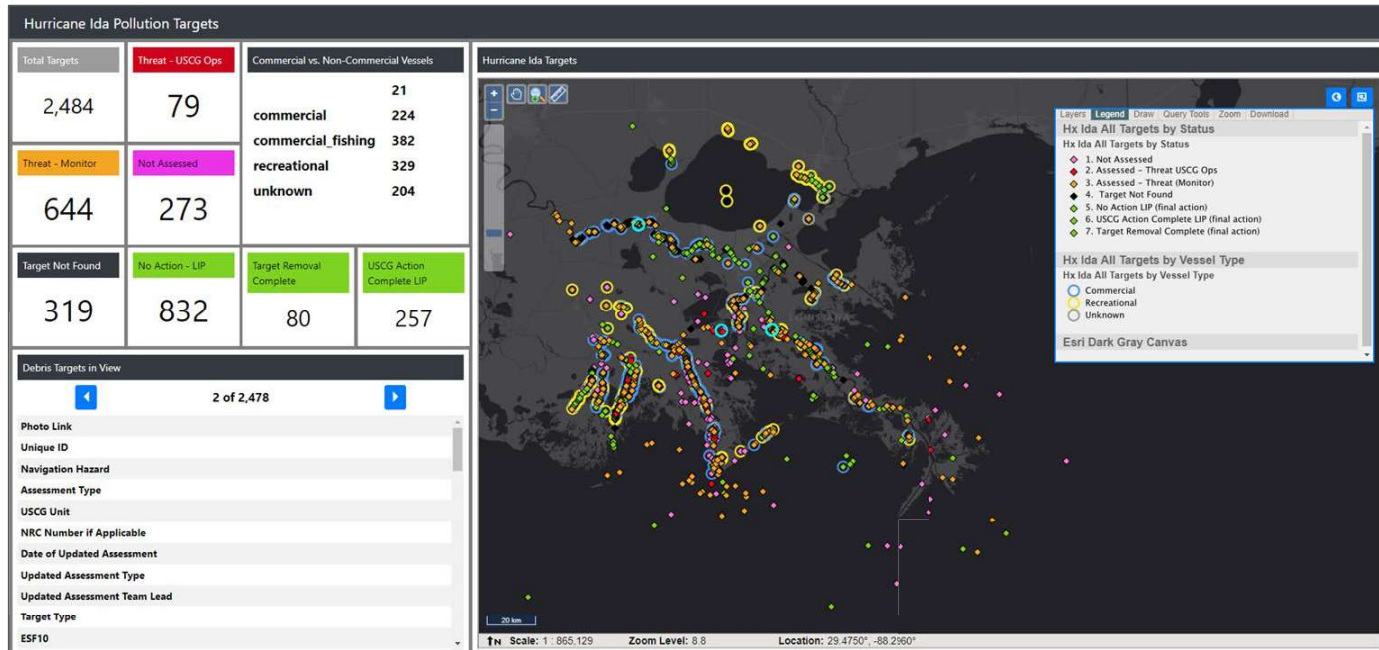
# ESF-10 with Sensitive Sites



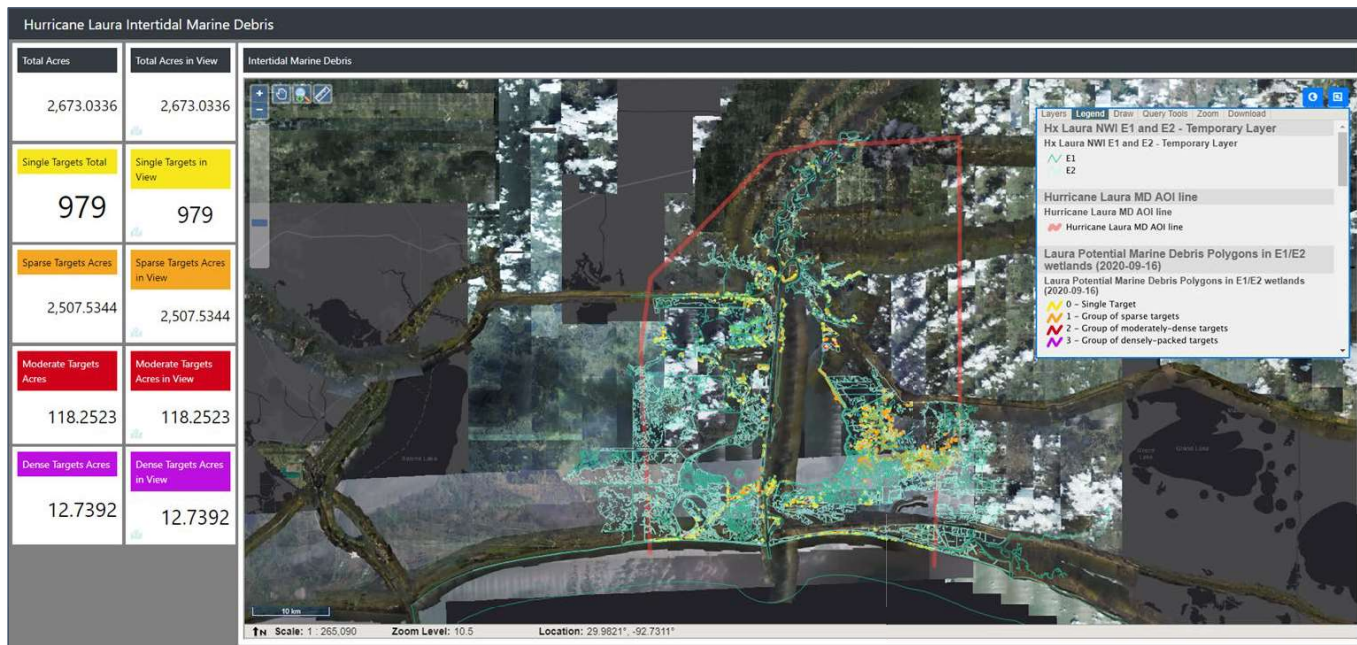
# Navigational Response Teams (NRT)



# Pollution Target Dashboard



# ESF-3 Tracking



# Query and Save Data

**ERMA®** Environmental Response Management Application  
Gulf of Mexico

Information Help Recent Data Dashboards Admin Search Layers, Folders, and Bookmarks Geographic Search Add Map Data Change Password Logout

**Query Tools**

**Step 1: Create New or Use Existing Shapes:**  
Create new shapes by selecting the Create Polygon button. Draw the polygon on the map by clicking vertices with the mouse. Double click to end drawing.  
To use an existing shape continue to Step 2.

**All shapes drawn on the map will be used by the Layer Query by Polygon Tool and the ESI Query Tool. The IPaC Query Tool can only use one polygon. If you want run the query with one shape, delete the remaining shapes. You do not need to select a shape for it to be run in the query.**

Create Polygon Delete Selected Delete All Show WKT

**Step 2: Select a Query Tool:**

**ERMA Layer Query by Polygon Tool**  
The Query by Polygon Tool allows queries against all layers hosted internally by ERMA (vs. shapefiles). It does not support externally hosted layers (ex. real time conditions, DIVER-linked queries). Depending on the host of the data you may receive a "Data Not Available" message when the query is run. To check the data's host open the layer's Metadata window.

Select all features that touch these polygons (intersect)  
Select only features COMPLETELY covered by these polygons

Run ERMA Query By Shape

**NOAA ESI Query Tool**  
ESI maps provide a summary of coastal resources that are at risk if an oil spill occurs. This includes biological resources, sensitive shorelines, and human-use resources.

Run ESI Query

**U.S. Fish and Wildlife Service IPaC Query Tool**  
IPaC provides information about U.S. Fish and Wildlife Service trust resources for your selected area, including threatened and endangered species. It also provides recommended conservation measures tailored to your project activities and trust resource species.

IPaC accepts ONE polygon. It does not currently support points or line segments. If you need to define your project location as a point or

Scale: 1: 497,374 Zoom Level: 9.6 Location: 29.3230°, -88.3864°

NOAA's Office of Response and Restoration Privacy Act Statement | US DOC  
NOAA | USCG | NOAA Office of Response & Restoration | Disclaimer  
Privacy Policy | Official Citation | Contact | Website Satisfaction Survey

(PRELIMINARY DATA - SUBJECT TO CHANGES AFTER VALIDATION OR VERIFICATION)

Coastal Response Research Center ©2007-2022 University of New Hampshire

# Query and Save Data

Summary Layer 47843

Hx Ida All Targets by Status Rows 1 to 100 of 110 records

id	dischargeamount	dischargeunits	ndrp_condition	status_ida	substatus_ida	sensitivehabitat	nofi	nofi_date	nofa	nofa_date	uav
						yes					
						yes					
						no					
						no					
						yes					
						no					
						potential Futr	no				
						potential Futr	no				
						no					
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei 3.3 No RP/Potential Futr	no				
						5. No USCG Action - Lei 3.3 No RP/Potential Futr	no				
						5. No USCG Action - Lei 3.3 No RP/Potential Futr	no				
						UNK					
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				
						5. No USCG Action - Lei	no				

Filter choices...  
 Select All  
 3. Assessed - Threat (Monitor)  
 4. Assessed - Target Not Found  
 5. No USCG Action - Leave in Place (final action)  
 6. USCG Action Complete - Leave in Place (final action)  
 7. Target Removal Complete (final action)

Columns  
 Clear All Filters  
 Refresh  
 View Summary Stats  
 Create Temporary Layer

# Query and Save Data

Summary Layer 47843

Layer Name	Layer ID	Result Count	Comments	Information	Export
Hx Ida All Targets by Status	47843	110		<a href="#">Information</a>	<a href="#">Export</a>

Some or all of the layers you have selected may be restricted and not publicly accessible.  
 By exporting data from ERMA, you are agreeing to take all reasonable precautions to prevent unauthorized third parties or persons from accessing, using, or redisplaying the data in a public setting or view.

Export

Filters  Export with spatial and field filters applied.  Export with only spatial filters applied.

File Format

Terms of Use

GeoJSON  
 Comma Separated Values (no geometries)  
 MS Excel Format (no geometries)

# ACKNOWLEDGMENTS

**NOAA:**

- Michele Jacobi
- George Graettinger
- Ben Shorr
- Robb Wright

**Genwest:**

- Michael Greer
- Adam Rotert
- Zach Winters-Staszak
- Kaitlin DeAeth
- George Marino

**Linker:**

- Mathew Dorsey

**Development Team:**

- Aaron Racicot, Z-Pulley
- Chander Ganesan,OTG
- Robert St. Lawrence, UNH
- Jerry Bower, Bowerson Services
- Mark Bonner, Cheetah Consulting, Inc.

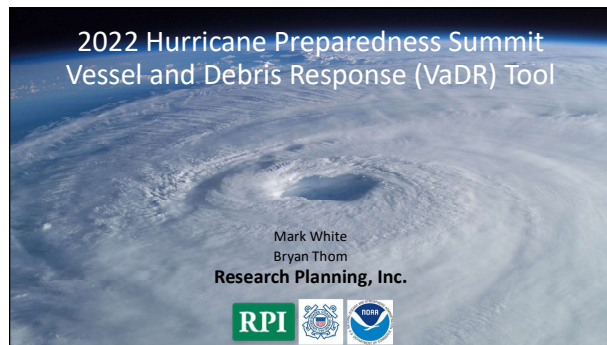


# Questions?

[response.restoration.noaa.gov](https://response.restoration.noaa.gov)



4/21/2022



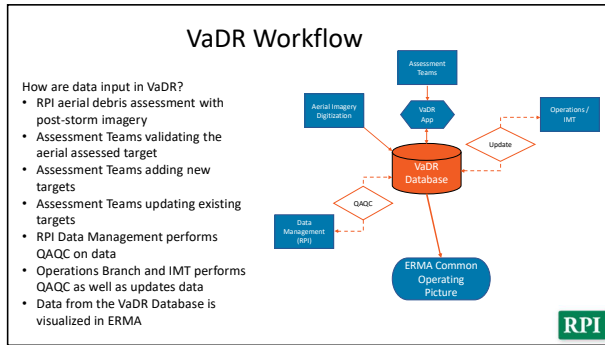
1

## VaDR – Feeds ERMA, IMT, and IC

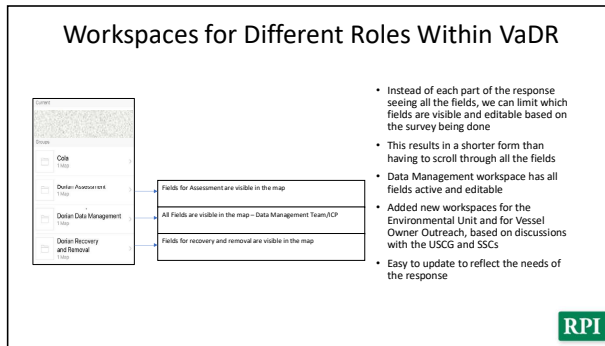
- Data are collected and edited in VaDR
  - using a mobile application/device → Phone/Tablet
  - and an online GIS environment → ArcGIS Online
- Near real time data updates depending on connectivity
  - new data collected during assessments or
  - edited existing data in the field or ICP
- Data collected or edited using VaDR gets “pushed” to ERMA (COP) for visualization
  - breakdown of data are then shown in ERMA’s Dashboards



2

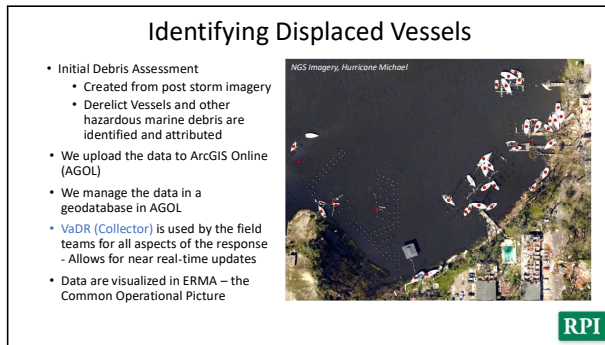


3

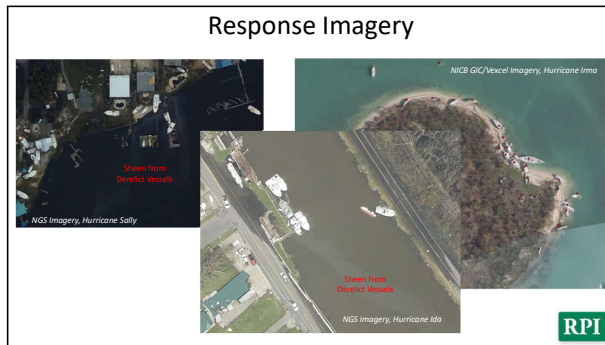


4

2



5




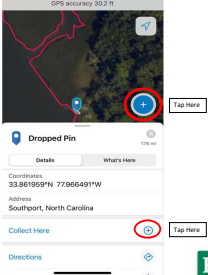
6

3

### Field Assessment/Validation/Identification

- VaDR gives you the ability to add derelict vessels and update attributes while in the field






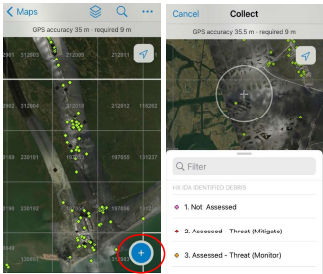
**RPI**

7

### Attributing Displaced Vessels - VaDR

- Collecting new TARGETS (Vessels, Hazardous Containers, etc.)





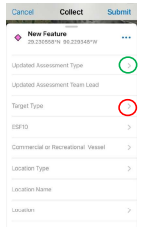
**RPI**

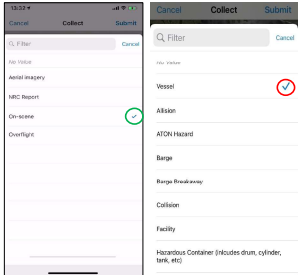
8

4

### Attributing Displaced Vessels - VaDR

- Increases efficiencies
  - Picklists/Dropdown Menus
  - Conditional Formatting (Field Maps)





**RPI**

9

### Photo Archive - VaDR

- Photos can be added to an existing record or a new record.
- They are stored with the data in the geodatabase.
- Photo archive of Assessment, Removal, and Environment.






**RPI**

10

5



### Sensitive Habitats (ESI) Layers

- Identify derelict vessels located in a sensitive habitat.
- Toggle layers on/off

Layers

- MAP LAYERS
- HK Derelict ESI/ID Targets
- Grids
- Counties
- ESI\_ID
- SIW
- Hardbottom
- PotentialOysterHabitat
- Marsh\_ESI\_ID\_100
- Wetland\_Foreland\_ESI\_ID\_100
- 20190607H\_RGR
- 20190609H\_RGR
- 20190610H\_RGR

GPS accuracy 4.6 m

2 Items

DERELICT TARGETS (1)

- 163261\_048 20.220957°N 87.388331°W 718 m

SENSITIVE TARGETS (1)

- Sensitive Target: 163261\_048 20.220957°N 87.388331°W 718 m

RPI

11

### Sensitive Habitats and BMPs

- Best Management Practices
- Select Sensitive Target symbol → to display ADVISORIES
- Select "Attached" to link to full BMPs

GPS accuracy 4.7 m

Sensitive Target: 163261\_048 20.220957°N 87.388331°W 718 m

Details Attached

Critical Habitat: This target may be located within ESA listed Gulf Sturgeon Critical Habitat. All response vessel operators and crew must watch for and avoid collision with vessels within this habitat. Obstructions, such as pilings, wrecks, and other debris, may be present. These obstructions may be damaged, moved, or removed. Use of other debris water methodologies. See complete BMPs.

Wetland Habitat: N/A

Marsh Habitat: N/A

Acoustic Presence: N/A

RPI

12

6

### Best Management Practices

- Best Management Practices
- Full BMPs accessed via Collector

REGULATORY REQUIREMENTS AND BEST MANAGEMENT PRACTICES (BMPs)

7/21/2016

Sensitive Habitats, Wetlands, and Fisheries Resources

PERSONNEL SHALL RESPOND AS FOLLOWS:

- 1. That location
- 2. That location
- 3. That location

Wetland Habitat: N/A

Marsh Habitat: N/A

Acoustic Presence: N/A

RPI

13

### Customizing VaDR

- Increase/modify functionality to address specific mission needs

GPS accuracy 6.4 m - required 6 m

197063\_005 20.217124°N 89.217823°W 178 m

Details Attached

When assigning STATUS of 2 (red) click here to send email.

Cancel

Target was assigned status of 2

To: Name@ucgp.mil

Cc: mwhite@researchplanning.com

Bcc:

From: mwhite@researchplanning.com

Subject: Target was assigned status of 2

Unique ID: 312981\_C01; Status: 5; No USCG Action - Leave in Place (final action)

Sent from my iPhone

RPI

14

### VaDR: ArcGIS Online – Map Viewer Classic

15

### VaDR: ArcGIS Online – Map Viewer Classic

- IMT
- OPs
- Forward OPs Branches

16

8

4/21/2022

### Identifying Abandoned and Derelict Vessels with AI

- Using AI and deep learning algorithms to augment the derelict vessel identification

17

### Advanced Techniques - sUAS



- Verify location and gather additional information using a sUAS
- Images can later be attached to the record in VaDR (it is very important they are added)
- Additional information, such as registration numbers, vessel name, etc might be able to be captured for a vessel in a hard to get to location
- Hi-res image of surrounding environment

18


9

### Derelict Vessels with AI – ArcGIS Field Maps

- Further verify results with fieldwork collecting data using Field Maps


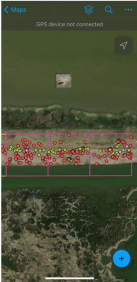
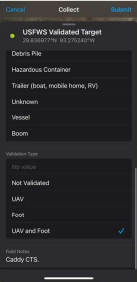
*USFWS Southwest LA and NOAA Automated Vessel Identification project.*




19

### VaDR Collector → ArcGIS Field Maps

- Field Maps has a similar look and feel as Collector
- Map Centric with Smart Form Capability



20

10




4/21/2022

## 2022 Hurricane Preparedness Summit Vessel and Debris Response (VaDR)

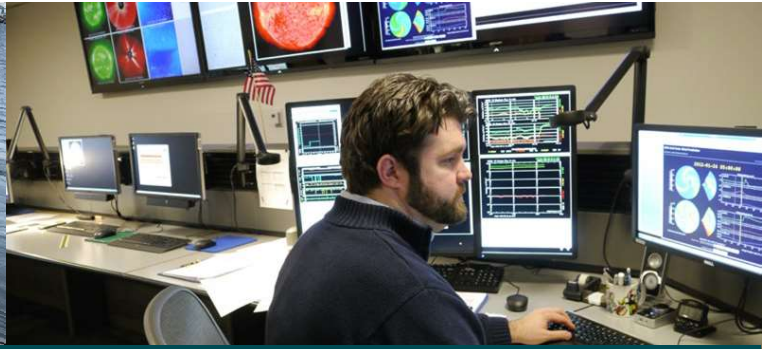
Recognition:  
NOAA SSCs – Support, Training, and Input  
USCG – Input and Feedback on VaDR's Functionality

Thank you  
Mark White  
Bryan Thom

**Research Planning, Inc.**

21



# NOAA Response Asset Directory (NRAD)

Leah Odeneal, Disaster Preparedness Specialist  
Genwest Systems, Inc./OR&R's Disaster Preparedness Program



## Topics

- NRAD Purpose & Scope
- NRAD Maintenance
- NRAD Scenario



Credit: NOAA



# NOAA Response Asset Directory

Login

## Welcome to the NOAA Response Asset Directory

The NOAA Response Asset Directory (NRAD) is an all-hazards directory that includes searchable information on physical resources and services which could be used or in need of protection during response and recovery from disasters. The expectation is that NOAA can respond to future disasters more efficiently through improved shared access to available resources.

In this pilot site, NRAD primarily includes NOAA assets from the Gulf Region including the states of Texas, Louisiana, Mississippi, Alabama, Florida and Georgia. The expectation is that the site will expand nationally in a subsequent release. NRAD is a product of the NOAA Gulf of Mexico Disaster Response Center.

This is an internal access-controlled database requiring approved login credentials. [Please log in to access NRAD.](#)



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**This is an internal access-controlled database requiring approved login credentials. [Please log in to access NRAD.](#)**

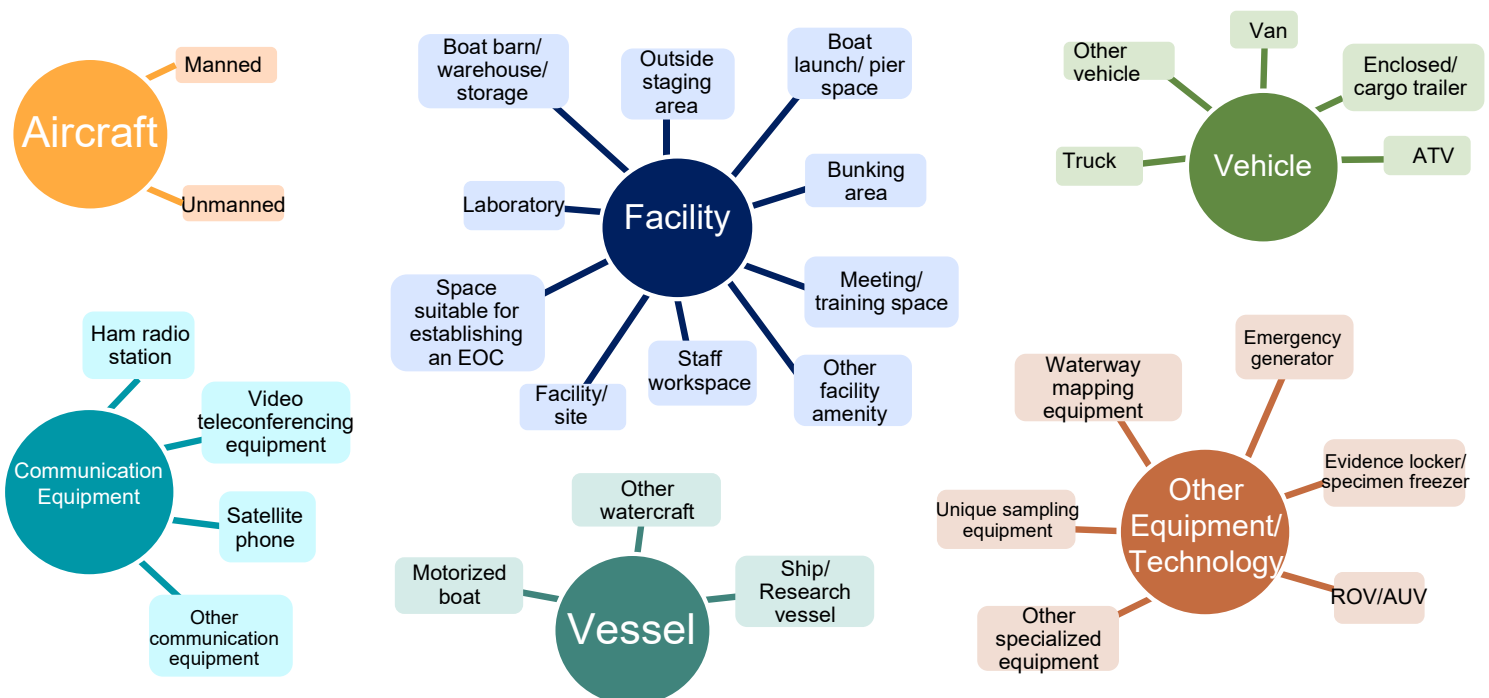


# Why?

NOAA can respond to future disasters more efficiently through improved shared access to available resources.



## Physical Resources



# Services

Aerial survey and imagery

Compliance expertise

Divers 

Flood preparedness

Geographic Information Systems (GIS) mapping


Harmful algal bloom (HAB) forecasting

Hypoxia modeling

Local knowledge

Long-term community resilience and recovery

Marine debris expertise

Marine mammal/Sea turtle stranding response 

Navigation response

Oil spill trajectory modeling


On-scene weather and water forecasting services

Public affairs and/or risk communication expertise

Scientific Support Coordinator

Seafood safety monitoring and closures

Security and law enforcement

Tropical storm/hurricane preparedness 

Waterway mapping

Other service

## Topics

 NRAD Purpose & Sc

 NRAD Maintenance

 NRAD Scenario



Credit: NOAA

# Asset Data Managers




Select staff who manage NRAD assets

Add, delete, modify, or transfer managed assets

Asked to update/confirm assets annually



← → ↻ [responsedirectory.orr.noaa.gov/#/add-asset/](https://responsedirectory.orr.noaa.gov/#/add-asset/) ☆ ⚙️ A

 **NOAA** Response Asset Directory Amy Gohres ▾

Home My Assets **Add Asset** Search Spatial Search User Guide  
Glossary of Terms  
Acronym Listing

### Asset Categorization

Category (\* required)

Category Detail (\* required)

### Asset Ownership Details

Organization (\* required)

Organization Code (\* required)

### Asset Description

Description (\* required)

### Asset Home Base Location

Address (\* required)

City	State ▾	Zip
------	---------	-----



responsedirectory.orr.noaa.gov/#/my-assets/

My Assets My Assets includes all assets for which you are the Asset Data Manager.

[Edit Asset](#)
[Delete Asset\(s\)](#)
[Reviewed With No Changes](#)
[Copy Asset](#)
[Transfer Asset\(s\)](#)
[Enable Batch Mode](#)

Category	Category Detail	Address 1	Address 2	City	State	Zip Code	Attributes	Description
Aircraft	Manned aircraft	7345 Zeigler Bouleva...		Mobile	AL	36608	Quantity 1	test

Selected Asset - Aircraft / Manned aircraft

<b>Asset Category:</b> Aircraft <b>Category Detail:</b> Manned aircraft <b>Organization:</b> BUSINESS SERVICES GROUP <b>Organization Code:</b> NOS/ORR/BSG <b>Last Update:</b> Nov 8, 2016 9:24:50 AM CST <b>Last Updated By:</b> amy.gohres@noaa.gov	<b>Home Base Location:</b> 7345 Zeigler Boulevard Mobile, AL 36608 United States <b>Geographic Coordinates</b> Latitude: 30.705817 Longitude: -88.214644 <a href="#">View on Map</a>
--	---

# Topics

- NRAD Purpose & Sc
- NRAD Maintenance
- NRAD Scenario



Credit: NOAA



# NOAA Response Asset Directory

Amy Gibbs



Home



My Assets



Add Asset



Search



Spatial Search

User Guide  
Glossary of Terms  
Acronym Listing

## Welcome to the NOAA Response Asset Directory

### Welcome to the NRAD Site

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It is the responsibility of NRAD users to coordinate directly with asset points of contact to verify an individual asset's description, availability, or restrictions/limitations on use. NOAA Gulf of Mexico Disaster Response Center provides NRAD as a service to the NOAA community and is not responsible for inaccurate or missing information.

In this pilot site, NRAD primarily includes NOAA assets from the Gulf Region including the states of Texas, Louisiana, Mississippi, Alabama, Florida and Georgia. The expectation is that the site will expand nationally in a subsequent release. NRAD is a product of the NOAA Gulf of Mexico Disaster Response Center.

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# NOAA Response Asset Directory

Amy Gibbs



Home



My Assets



Add Asset



Search



Spatial Search

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responsedirectory.orr.noaa.gov/#/

NOAA Response Asset Directory

Home My Assets Add Asset Search Spatial Search

User Guide  
Glossary of Terms  
Acronym Listing

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US DOC | NOAA | NOS | NOAA Office of Response & Restoration | Web site owner: NOAA Gulf of Mexico Disaster Response Center  
Disclaimer | Terms of Use | Privacy policy | User Survey | Email comments | Revision Date: Feb 24,

responsedirectory.orr.noaa.gov/#/search/

NOAA Response Asset Directory

Home My Assets Add Asset Search Spatial Search

User Guide  
Glossary of Terms  
Acronym Listing

Search

Category	Category Detail	Address 1	Address 2	City	State	Zip Code	Attributes	Description
	Pick Category 1st	Search here	Search here	Search here		Search here	Search here	Search here
Aircraft	Manned aircraft	7344 Zeigler Bouleva...		mobile	AL	36608	Quantity 1	test
Service	Other service	7344 Zeigler Blvd		Mobile	AL	36608	Quantity 1	*TEST* PIO c
Vessel	Motorized boat	4301 Rickenbacker C...		Miami	FL	33149	Quantity 1	22 foot Jone:
Vessel	Motorized boat	4301 Rickenbacker C...		Miami	FL	33149	Quantity 1	25 foot Dusk
Vessel	Motorized boat	4301 Rickenbacker C...		Miami	FL	33149	Quantity 1	21 foot Park

1 / 165 5 items per page 1.. 5 of 825 items

Search

Category	Category Detail	Address 1	Address 2	City	State	Zip Code	Attributes	Description
<input type="text"/>	Pick Category 1st	Search here	Search here	Search here	<input type="text"/>	Search here	Search here	Search here
Aircraft	Manned aircraft	7344 Zeigler Bouleva...		mobile	AL	36608	Quantity 1	test
Service	Other service	7344 Zeigler Blvd		Mobile	AL	36608	Quantity 1	*TEST* PIO e
Vessel	Motorized boat	4301 Rickenbacker C...		Miami	FL	33149	Quantity 1	22 foot Jone:
Vessel	Motorized boat	4301 Rickenbacker C...		Miami	FL	33149	Quantity 1	25 foot Dus
Vessel	Motorized boat	4301 Rickenbacker C...		Miami	FL	33149	Quantity 1	21 foot Park

1 / 165 items per page 1.. 5 of 825 items

Search

Attributes	Description	Organization	Organization Code	1st Contact	2nd Contact	3rd Contact
Search here	Search here	<input type="text"/>	<input type="text"/>	Search here		
Quantity 1	test	BUSINESS SERVICES ...	NOS/ORR/BSG	Amy Gohres		
Quantity 1	*TEST* PIO experience	DISASTER RESPONSE...	NOS/ORR/DRC	Katherine Krushinski		
Quantity 1	22 foot Jones Brothers with si...	ATLANTIC OCEANOLOG...	OAR/AOML	Alyssa Thompson	Dennis Donahue	Molly Baringer
Quantity 1	25 foot Dusky 252 Cuddy Sid...	ATLANTIC OCEANOLOG...	OAR/AOML	Alyssa Thompson	Dennis Donahue	Molly Baringer
Quantity 1	21 foot Parker with a single 2...	ATLANTIC OCEANOLOG...	OAR/AOML	Alyssa Thompson	Dennis Donahue	Molly Baringer

1 / 165 items per page 1.. 5 of 825 items



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Search

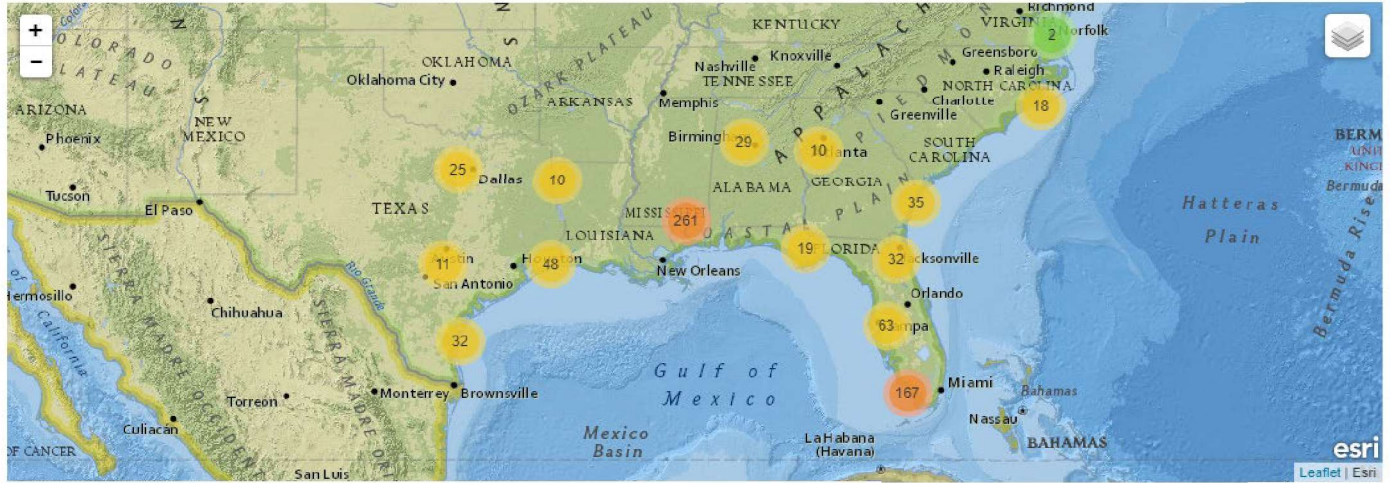


Spatial Search

User Guide  
Glossary of Terms  
Acronym Listing

Spatial Search

Full Extent

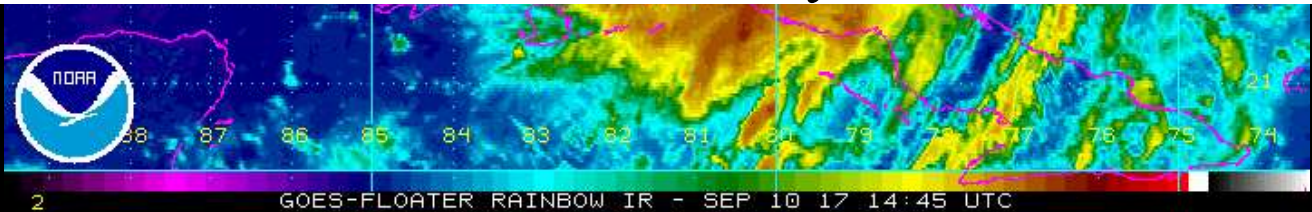


# Scenario



# Major Disaster in South Florida

NOAA needs a facility with an outside staging area in or near Key West



## Questions?

Thank  
You

## Appendix C: Pre-Summit Survey Technical Report



University of New Hampshire

The Survey Center

# UNH Coastal Response Research Center 2022 Hurricane Pre-Summit Survey

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The Survey Center  
University of New Hampshire  
March, 2022



*The University of New Hampshire*  
**Survey Center**

The UNH Survey Center is an independent, non-partisan academic survey research organization and division of the UNH College of Liberal Arts.

The Survey Center conducts telephone, mail, web, and intercept surveys, as well as focus groups and other qualitative research for university researchers, government agencies, public non-profit organizations, private businesses and media clients.

Our senior staff have over 50 years experience in designing and conducting custom research on a broad range of political, social, health care, and other public policy issues.

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## Executive Summary

The University of New Hampshire Survey Center conducted a survey for the University of New Hampshire Coastal Response Research Center to better understand the hurricane response, preparedness, and recovery community. One hundred and nine (109) respondents completed the survey between February 7 and February 22, 2022. The following figures display survey results including any demographic differences. Appendix A contains detailed tabular results and Appendix B contains the survey instrument. Due to rounding, percentages may not sum to 100%.

### Key Findings

#### Organizational Details

The majority of respondents say that their agency or organization is the National Oceanic and Atmospheric Administration (NOAA) and the majority of respondents who work for or are a contractor for NOAA say that their line office is the National Ocean Service (NOS). Respondents are scattered in the various regions they represent with the most respondents saying that they represent the nation or the Gulf of Mexico. Three in four respondents say their agency or organization has a hurricane preparedness/response plan and among this group, more than seven in ten say their plan includes provisions regarding the COVID-19 pandemic. Six in ten respondents have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response, with a majority of those respondents saying they work under ESF #10: Oil and Hazardous Materials Response.

#### Challenges

When asked to select the top five biggest challenges they anticipate for the 2022 hurricane season, respondents most often mentioned unreliability or loss of utilities, having enough qualified personnel to respond, and facility readiness, preparedness, resilience, and response. More than half of respondents say they have found mitigation strategies for how to keep their people safe and maintain access to adequate protection during the response activities, while at least one in five found mitigation strategies for Continuity of Operations Planning (COOP), establishing response guidance, coordinating deployment logistics, facility readiness, preparedness, resilience, and response, having enough qualified personnel to respond, management of staff and other resource capacity, and staff safety during evacuations.

At the upcoming summit at least one-third of respondents would like to see the following digital response and planning tools/products: Environmental Response Management Application (ERMA) Emergency Support Function (ESF) 10 Dashboard, Drones, Vessel and Debris Response (VaDR), Emergency Support Function (ESF) 10 Resource Advisors, Remote Sensing Division photogrammetry, and NOAA Center for Operational Oceanographic Products and Services products.

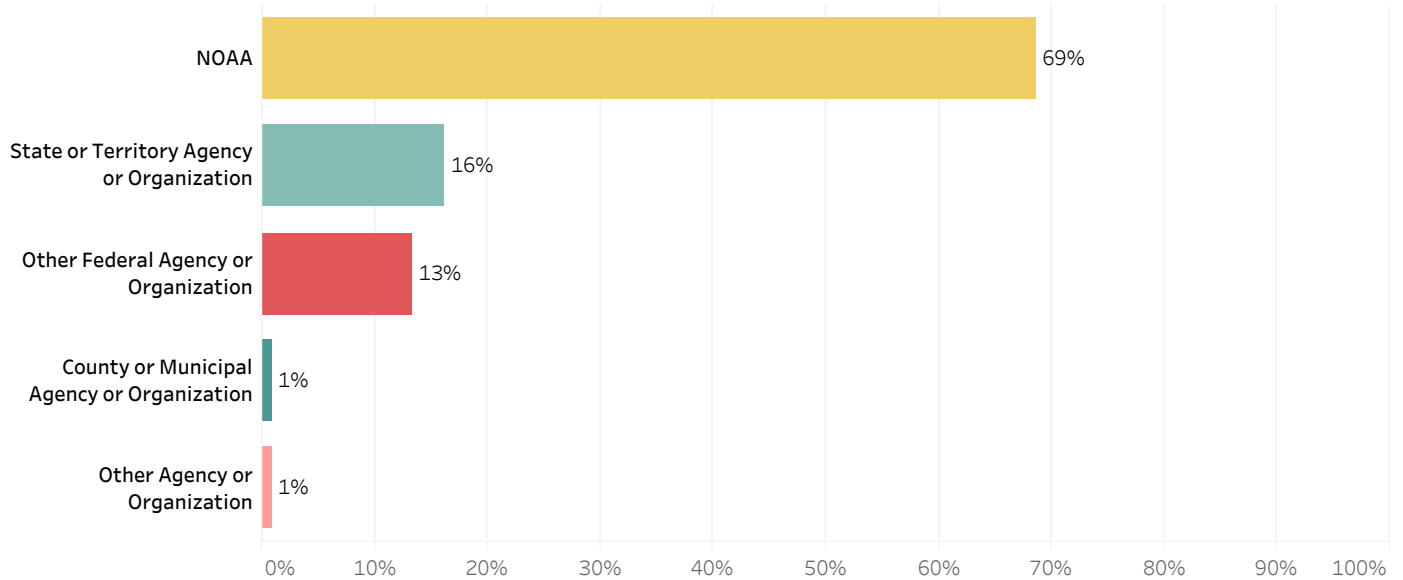
#### Hurricane/Disaster Preparedness

Nearly all respondents consider themselves to be very or somewhat ready for the next hurricane season or another major natural disaster. At least half of respondents currently have extra food, copies of important documents, extra water, and cash in preparation for the next hurricane season or other natural disaster. Just over one-third of respondents have had to evacuate their home because of a hurricane and one in seven say there was a time where they did not evacuate because of a hurricane but wish they had. The majority of respondents who have had to evacuate their home because of a hurricane say it was difficult to perform their work assignments. Most respondents believe they should plan to be self-sufficient for at least a week after a major hurricane or a major natural disaster and three-quarters say their official duty station is either very or somewhat prepared for a major hurricane.

## Organizational Details

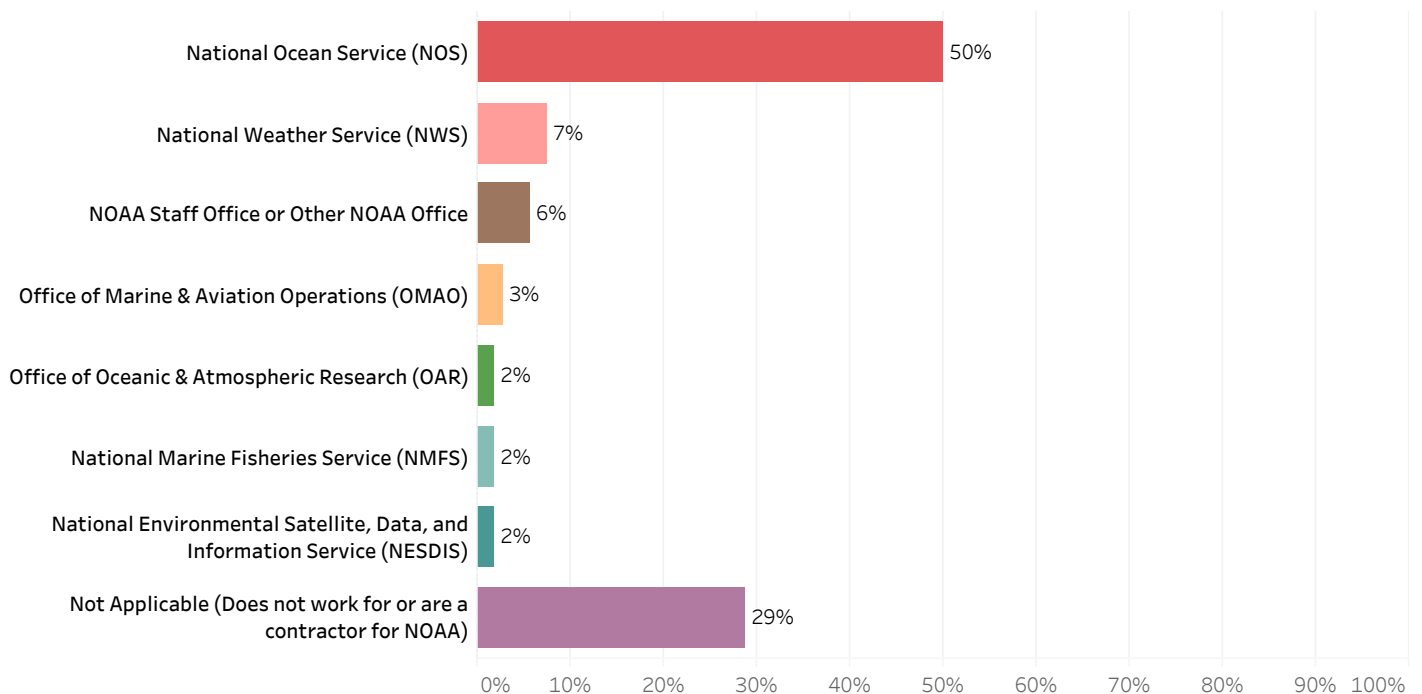
Seven in ten respondents (69%) say their agency or organization is NOAA, 16% say it is a state or territory agency or organization, and 13% say it is a non-NOAA federal agency or organization. Very few respondents say their agency or organization is one at the county or municipal level (1%) or that it is some other type of agency or organization (1%).

Figure 1: What is the name of your organization/agency? (Coded)



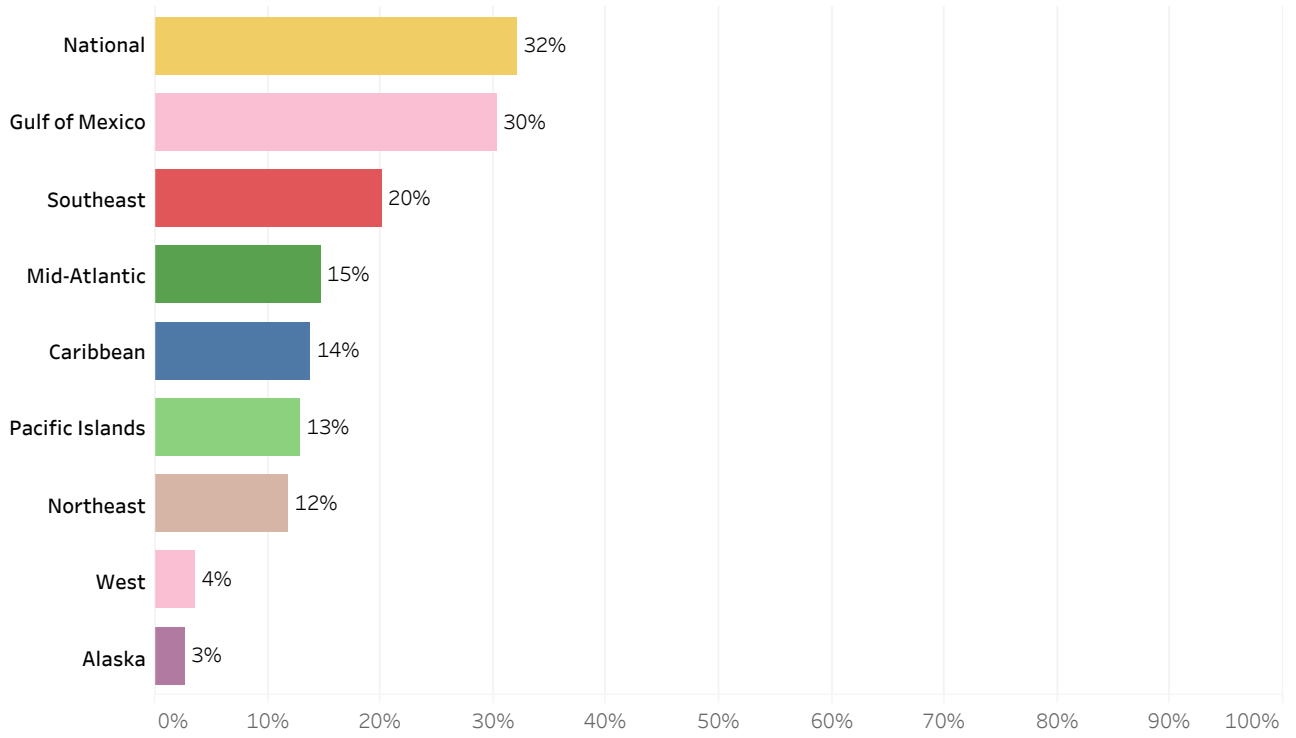
Half of respondents (50%) say their line office is the National Ocean Service (NOS), while very few say their line office is the National Weather Service (NWS) (7%), the NOAA Staff Office or other NOAA Office (6%), the Office of Marine & Aviation Operations (OMAO) (3%), the Office of Oceanic & Atmospheric Research (OAR) (2%), the National Marine Fisheries Service (NMFS) (2%), or the National Environmental Satellite, Data, and Information Service (NESDIS) (2%). Three in ten respondents (29%) say that this question was not applicable.

Figure 2: If you work or are a contractor for NOAA, select your appropriate line office:



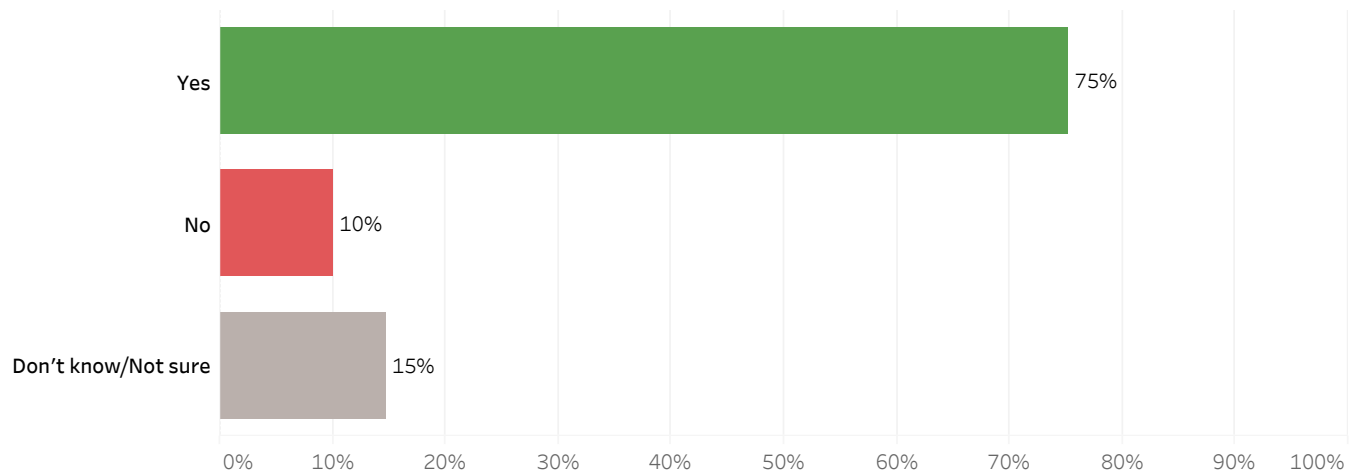
When asked what state or region they represent, 32% of respondents say they represent the nation while three in ten represent the Gulf of Mexico (30%). Less than one-quarter represent the Southeast (20%), the Mid-Atlantic (15%), the Caribbean (14%), the Pacific Islands (13%), or the Northeast (12%). Less than ten percent of respondents represent the West (4%) or Alaska (3%).

Figure 3: What region or state do you represent? (Select all that apply)



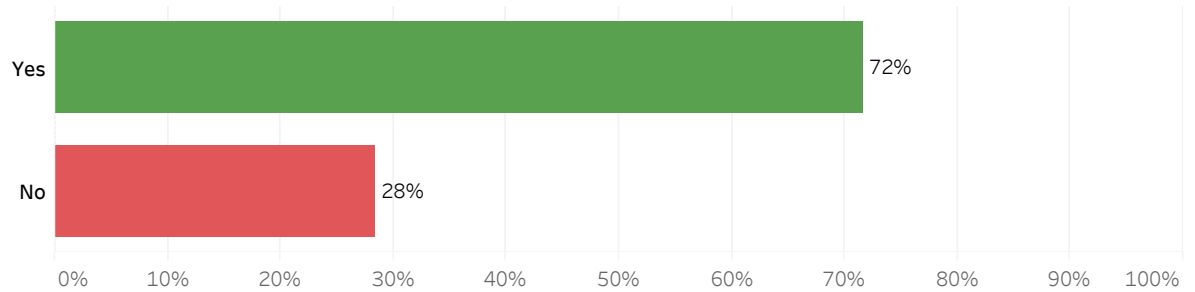
Three-quarters of respondents (75%) say their organization or agency has a hurricane preparedness or response plan while one in ten respondents (10%) do not and 15% don't know.

Figure 4: Does your organization/agency have a hurricane preparedness/response plan?



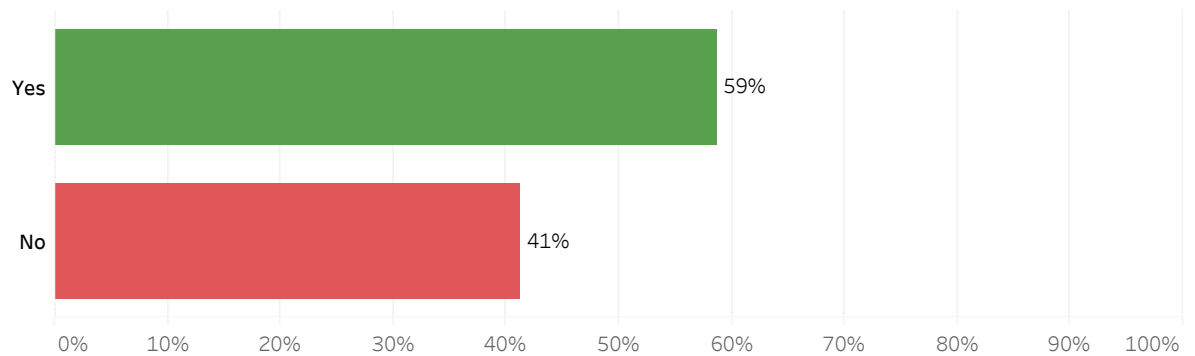
Among those who have a hurricane preparedness/response plan (N=81), just over seven in ten respondents (72%) say their organization's hurricane preparedness/response plan includes provisions regarding the COVID-19 pandemic while 28% of respondents say it does not.

**Figure 5: Does your organization's hurricane preparedness/response plan include provisions regarding the COVID-19 pandemic?**



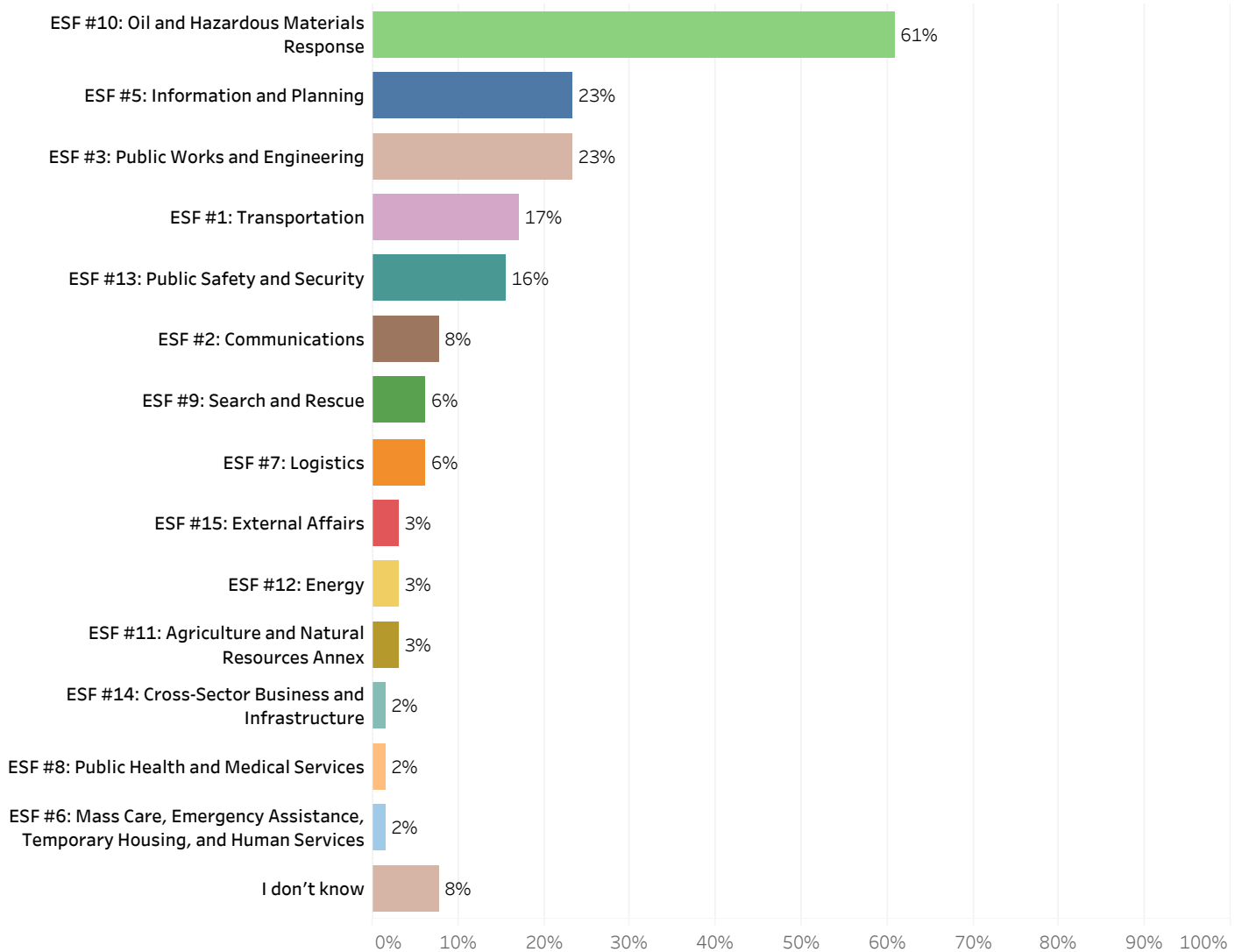
Six in ten respondents (59%) say they have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response while four in ten respondents (41%) do not.

**Figure 6: Do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response?**



Among respondents who indicate that they have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response (N=64), three in five (61%) work under ESF #10: Oil and Hazardous Materials Response. About one-quarter work under ESF #5: Information and Planning (23%) and ESF #3: Public Works and Engineering (23%). Fewer respondents work under ESF #1: Transportation (17%), ESF #13: Public Safety and Security (16%), ESF #2: Communications (8%), ESF #9: Search and Rescue (6%), ESF #7 Logistics (6%), ESF #15: External Affairs (3%), ESF #12: Energy (3%), ESF #11: Agriculture and Natural Resources Annex (3%), ESF #14: Cross-Sector Business and Infrastructure (2%), ESF #8: Public Health and Medical Services (2%), or ESF: #6 Mass Care, Emergency Assistance, Temporary Housing, and Human Services (2%) while 8% don't know what ESF they work under.

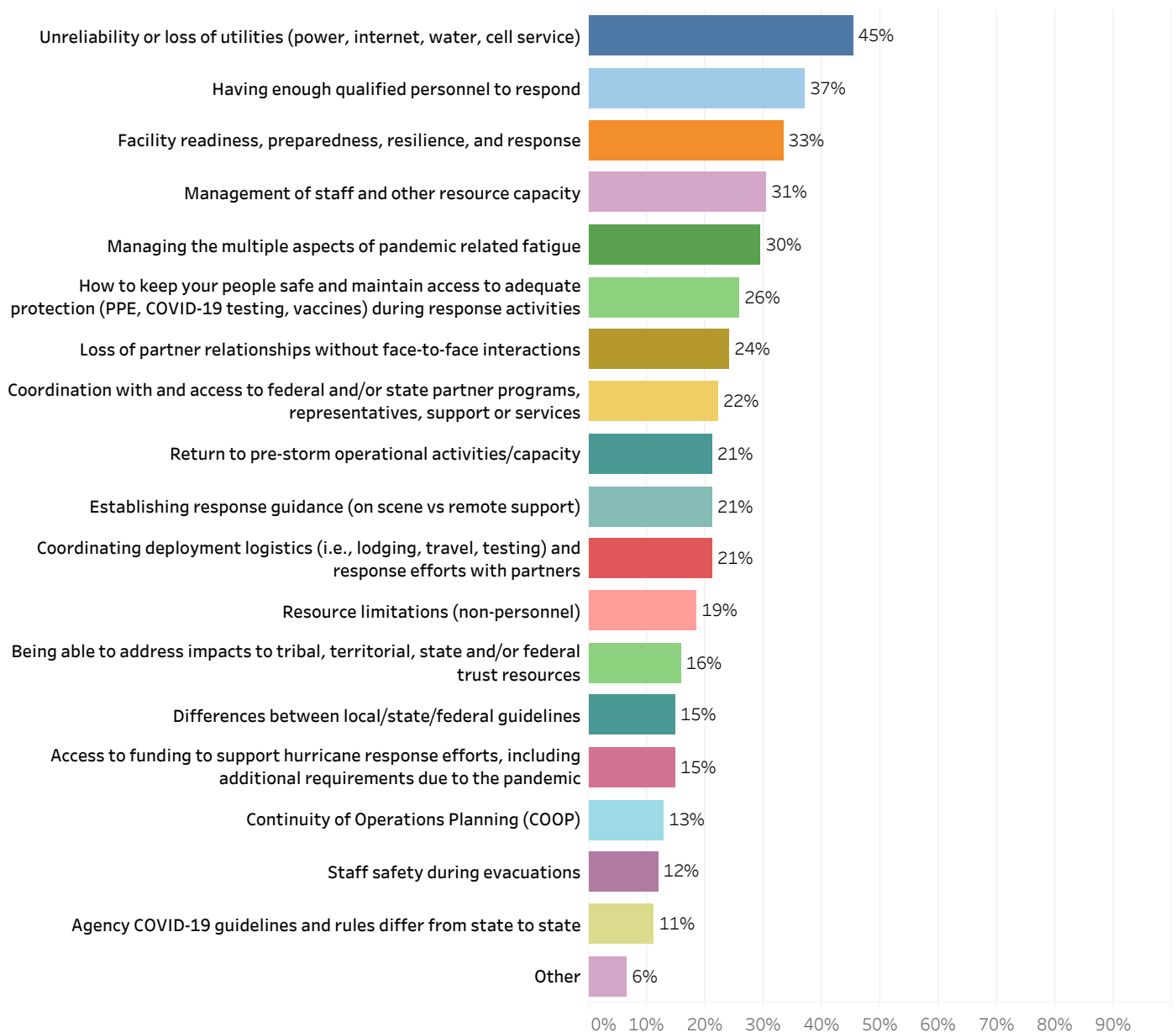
**Figure 7: Please select the ESF's you work under (Select all that apply)**



## Challenges

When asked to choose the top five biggest challenges they anticipate for the 2022 hurricane season, at least one-third of respondents indicated that unreliability or loss of utilities (45%), having enough qualified personnel to respond (37%), and facility readiness, preparedness, resilience, and response are among the top five biggest challenges. At least one in five cite management of staff and other resource capacity (31%), managing the multiple aspects of pandemic related fatigue (30%), how to keep their people safe and maintain access to adequate protection during response activities (26%), loss or partner relationships without face-to-face interactions (24%), coordination with and access to federal and/or state partner programs, representatives, support or services (22%), return to pre-storm operational activities/capacity (21%), establishing response guidance (21%), and coordinating deployment logistics and response efforts with partners (21%) as among their top five big challenges. Fewer respondents mention resource limitations (19%), being able to address impacts to tribal, territorial, state and/or federal trust resources (16%), differences between local/state/federal guidelines (15%), access to funding to support hurricane response efforts (15%), Continuity of Operations Planning (13%), staff safety during evacuations (12%), and agency COVID-19 guidelines and rules differing from state to state.

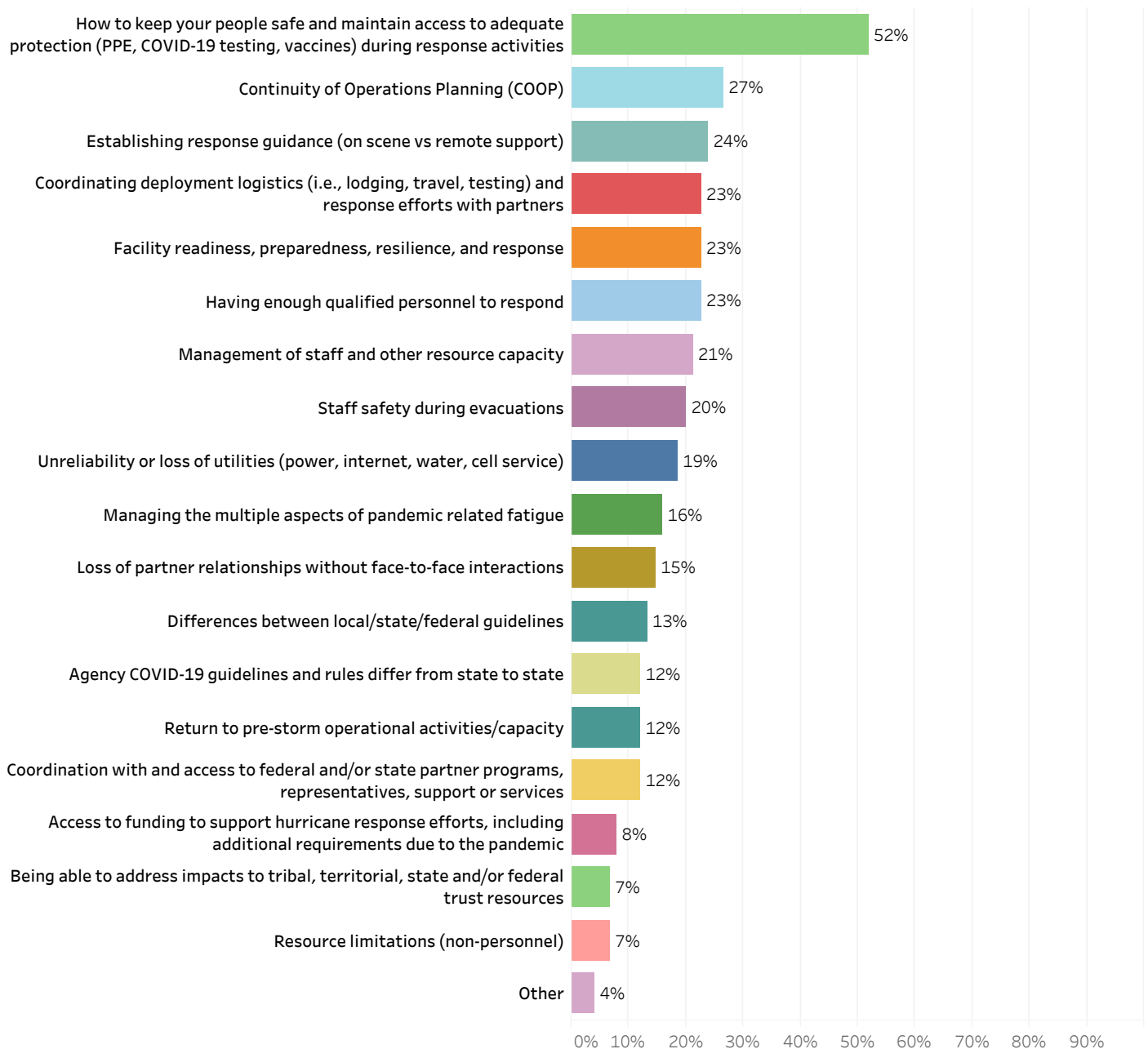
**Figure 8: Select the top five biggest challenges you anticipate for the 2022 hurricane season (Select up to five)**





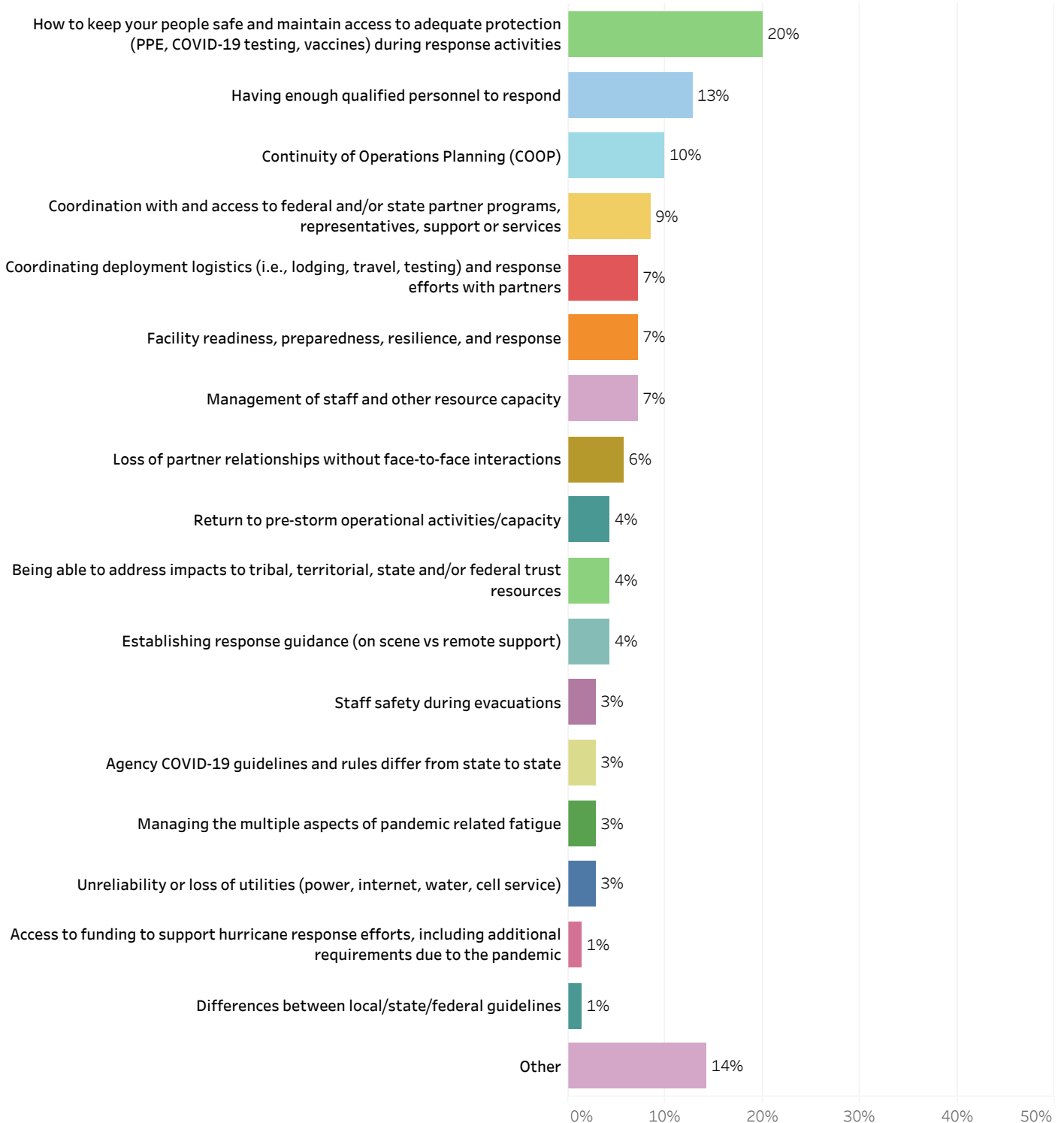
When asked which of the challenges that respondents have found mitigation strategies for, more than half (52%) say that have found mitigation strategies for how to keep their people safe and maintain access to adequate protection during response activities. At least one in five respondents found mitigation strategies for Continuity of Operations Planning (27%), establishing response guidance (24%), coordinating deployment logistics (23%), facility readiness, preparedness, resilience, and response (23%), having enough qualified personnel to respond (23%), management of staff and other resource capacity (21%), and staff safety during evacuations (20%). Fewer respondents have found mitigation strategies for unreliability or loss of utilities (19%), managing the multiple aspects of pandemic related fatigue (16%), loss of partner relationships without face-to-face interactions (15%), differences between local/state/federal guidelines (13%), agency COVID-19 guidelines and rules differing from state to state (12%), returning to pre-storm operational activities/capacity (12%), coordination with and access to federal and/or state partner programs, representatives, support or services (12%), access to funding to support hurricane response efforts, including additional requirements due to the pandemic (8%), being able to address impacts to tribal, territorial, state and/or federal trust resources (7%), and resource limitations (7%).

**Figure 9: Of the challenges listed below, please check any that you have found mitigation strategies for (Select all that apply)**



When asked to provide their most effective mitigation strategy, 20% provided one in reference to how to keep their people safe and maintain access to adequate protection during response activities, 13% provided a mitigation strategy for having enough qualified personnel to respond, and 10% provided a mitigation strategy for Continuity of Operations Planning. Less than 10% of respondents each say their most effective mitigation strategy was in reference to one of the other challenges. The following pages show the most effective mitigation strategy for each respondent sorted by challenge.

**Figure 10: Which of the following challenges is your most effective mitigation strategy referring to? (Select all that apply)**



## Figure 11a: For any of the challenges you selected in the previous question, please briefly describe the one mitigation strategy you have developed that you consider to be the most effective? - Sorted by challenge

### How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities

COVID exposure risk assessment use prior to deployment to ensure awareness of effective mitigations as well as access to necessary resources.

COVID test kit and job hazard analysis for risk management.

Develop safety BMPs (including limiting people in an EOC, ensuring they are vaccinated, social distancing, sanitizing) and order the PPE and tests that are needed for deployed staff.

Mandating vaccinations for all personnel.

NOAA's Navigation Response Branch has implemented a operational plan that addresses COVID-19 risks, mitigations, how to travel, and PPE requirements. This has provided continuity for teams as they travel between states, and thus between regulations.

Our Agency has developed a Covid-19 Field protocol that has worked well for both Field Staff and Office Staff during this pandemic. The protocol has allowed Staff to continue to conduct our critical missions with limited interruption from Covid.

Our health & safety officer has been outstanding with providing sound information regarding current pandemic conditions and ensuring that all appropriate resources are available to staff prior to and during deployment.

Our staff conducted weekly testing to determine if it would be feasible during a SEOC activation.

Planning, planning, planning

PPE and Social Distancing

Utilizing access to COVID rapid testing availability through the NYS CST at Fort Hamilton in Brooklyn, NY.

Stockpiling and preparing personal COVID go-kits for response personnel.

WE continued to maintain 24/7 operations in the building during the entire pandemic and established procedures to minimize exposure till the vaccinations came out.

We have been working closely with NGO/VOAD partners - early and often

We have provided remotely located staff with emergency kits including satellite phones in the case of an extended power outage.

### Having enough qualified personnel to respond

Build stronger capacity in Back-up Regions and intensive training for new staff.

Establishing back up roles for preparedness/response activities

Establishment, development/training and maintenance of an Emergency Response Team (ERT) composed of subject matter experts from each of my organization's divisions.

Hiring of contract personnel to supplement federal workforce, developing non gov partners for facility and IT needs to support mission needs.

Interagency collaboration (across state and federal esf-10 players) to identify adequate number of people to respond.

Keeping a strict training program within the office to ensure all staff are up to dates on methods, operations and technologies to best serve our customers, particularly in high-impact weather events.

Pre-event contracts to augment response staffing.

Roles and responsibilities of individuals before and after a storm have been laid out in our response plan with a communication structure.

We were able to back-fill positions to meet our pre-pandemic capacity.

### Access to funding to support hurricane response efforts, including additional requirements due to the pandemic

NERRA networks for support with partners, federal gov't resources, and raising funds in response to needs.

### Staff safety during evacuations

Staff is trained on there post event responsibilities and given the tools they need to work remotely.

We have a detailed preparation and response plan for Sea Grant staff.

## Figure 11b: For any of the challenges you selected in the previous question, please briefly describe the one mitigation strategy you have developed that you consider to be the most effective? - Sorted by challenge

### Return to pre-storm operational activities/capacity

---

Daily tracking of the operations of utilities and IT connectivity

Moving boats and vehicles off-site for protection

Widespread deployment of remote work capabilities in response to Covid has improved ability to resume normal operations, assuming power and connectivity are available

---

### Continuity of Operations Planning (COOP)

---

COOP Plan

Ensuring redundancy for key positions

Provide real-time backup of all products and services for each of our three backup sites.

redundant personnel and equipment for COOP purposes

Remote work.

We have a detailed preparation and response plan for Sea Grant staff.

We have been effectively teleworking for the past 2 years. Our ability to continue operations with a distributed workforce is second nature to us at this point.

---

### Managing the multiple aspects of pandemic related fatigue

---

Educating our staff with relevant resources and information so they can make informed decisions.

OAR hired a behavioral therapist that works with us weekly

---

### Management of staff and other resource capacity

---

Get fully staffed before season starts

redundant personnel and equipment for COOP purposes

Remote work.

Resource Advisor Training deepens the bench for field observers to monitor marine debris removal operations and provides training on recognizing appropriate salvaging techniques and BMPs.

The Marine Debris Program (MDP) has spent a good deal of effort organizing itself and improving coordination with other ORR divisions so that we are better able to support debris response. We have developed 14 state specific marine debris response guides to help states address impacts, a marine debris response framework to define our internal MDP approach to debris response, a response continuum to define the decision points for when MDP staff go on scene, and a list of MDP/ORR/NOS/NOAA capabilities that are relevant to debris response.

---

### Unreliability or loss of utilities (power, internet, water, cell service)

---

Development and updating of the Florida Marine Debris Emergency Response Guide and storm preparedness workshops and trainings.

Staff were given Jackery battery powered support to help run computers during power outages.

---

## Figure 11c: For any of the challenges you selected in the previous question, please briefly describe the one mitigation strategy you have developed that you consider to be the most effective? - Sorted by challenge

### Being able to address impacts to tribal, territorial, state and/or federal trust resources

---

Coordination and relationships with regional resource trustees and management agencies

Development and updating of the Florida Marine Debris Emergency Response Guide and storm preparedness workshops and trainings.

Resource Advisor Training deepens the bench for field observers to monitor marine debris removal operations and provides training on recognizing appropriate salvaging techniques and BMPs.

---

### Facility readiness, preparedness, resilience, and response

---

Communications are very established in NMFS field offices to include some 200+ locations throughout the US and its territories conduct N..

Development and updating of the Florida Marine Debris Emergency Response Guide and storm preparedness workshops and trainings.

Ensuring redundant coverage for site preparation.

Partnerships with local providers and resources to ensure continued access to affected facilities.

Planning, planning, planning

---

### Establishing response guidance (on scene vs remote support)

---

Collaboratively drafted the CNMI Marine Debris Emergency Response Guide.

Development and updating of the Florida Marine Debris Emergency Response Guide and storm preparedness workshops and trainings.

Having go-kits with COVID supplies

---

### Agency COVID-19 guidelines and rules differ from state to state

---

National COVID policy and guidance

NOAA's Navigation Response Branch has implemented a operational plan that addresses COVID-19 risks, mitigations, how to travel, and PPE requirements. This has provided continuity for teams as they travel between states, and thus between regulations.

---

### Differences between local/state/federal guidelines

---

NOAA's Navigation Response Branch has implemented a operational plan that addresses COVID-19 risks, mitigations, how to travel, and PPE requirements. This has provided continuity for teams as they travel between states, and thus between regulations.

---

### Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners

---

Development and updating of the Florida Marine Debris Emergency Response Guide and storm preparedness workshops and trainings.

Facilitating community disaster preparedness group meetings and Map Your Neighborhood exercises

Significant early coordination both internally and externally. Less reluctance for USCG to issue PRFA early in response.

Through our new Clean-up Contract, we now have the capability to support deployment logistics.

We now leverage the use of RV's for our response deployment. This cuts down on logistics issues and allows our teams to remain on site rather than spending a large amount of time in transit.

---

## Figure 11d: For any of the challenges you selected in the previous question, please briefly describe the one mitigation strategy you have developed that you consider to be the most effective? - Sorted by challenge

### Coordination with and access to federal and/or state partner programs, representatives, support or services

Development and updating of the Florida Marine Debris Emergency Response Guide and storm preparedness workshops and trainings.

For coordination with partner Federal and State agencies, more frequent short virtual meetings on directed topics helps with maintaining important relationships. It's not perfect, but is working better than no contact between disasters.

Maintaining communication with federal and state agencies with regards to our available resources --&gt; systematic communication with OCS supervisors via work and/or cell numbers

Resource Advisor Training deepens the bench for field observers to monitor marine debris removal operations and provides training on recognizing appropriate salvaging techniques and BMPs.

Response efforts coordinated through a central organization (FEMA).

We have prepared the facilities (dorms and office buildings) with photovoltaic and batteries system and with a water tank.

### Loss of partner relationships without face-to-face interactions

Checking in more with partners.

Increased virtual support

Loss of partner relationship without face to face - Mitigation is to communicate, early, often, and even to the point of being almost annoying. Setting up regular communication times and channels helps keeps everyone connected and working together.

Staff are trained to know their jobs and what needs to be accomplished despite interruptions. Also, allowing staff to evacuate and work from other locations allows for informal COOP.

### Other

DPP has established a strong COOP structure and a ready assessment tool.

I think it is the combination of mitigation strategies that leads to effectiveness, so I can't pick just one.

I think NOAA's JHA evaluations done by a safety officer regarding travel, and command post work are great. However those rules and risk mitigation efforts are useless when partners fail to comply as well within the command post. This loss of compliance becomes a safety risk, which in turn limits staffs willingness to deploy. We then find ourselves without necessary field staff to deploy to support field operations.

Keeping communication with staff very open.

remote access to systems and use of official equipment

Staff are trained to know their jobs and what needs to be accomplished despite interruptions. Also, allowing staff to evacuate and work from other locations allows for informal COOP.

The most effective for preparing the community is concentrated education and outreach in the community to inform them of hurricane risk and the appropriate mitigation measures. This will require increased emphasis on education and outreach utilizing many different communication strategies that are able to reach proactive, receptive and skeptical individuals.

Use of virtual media briefings

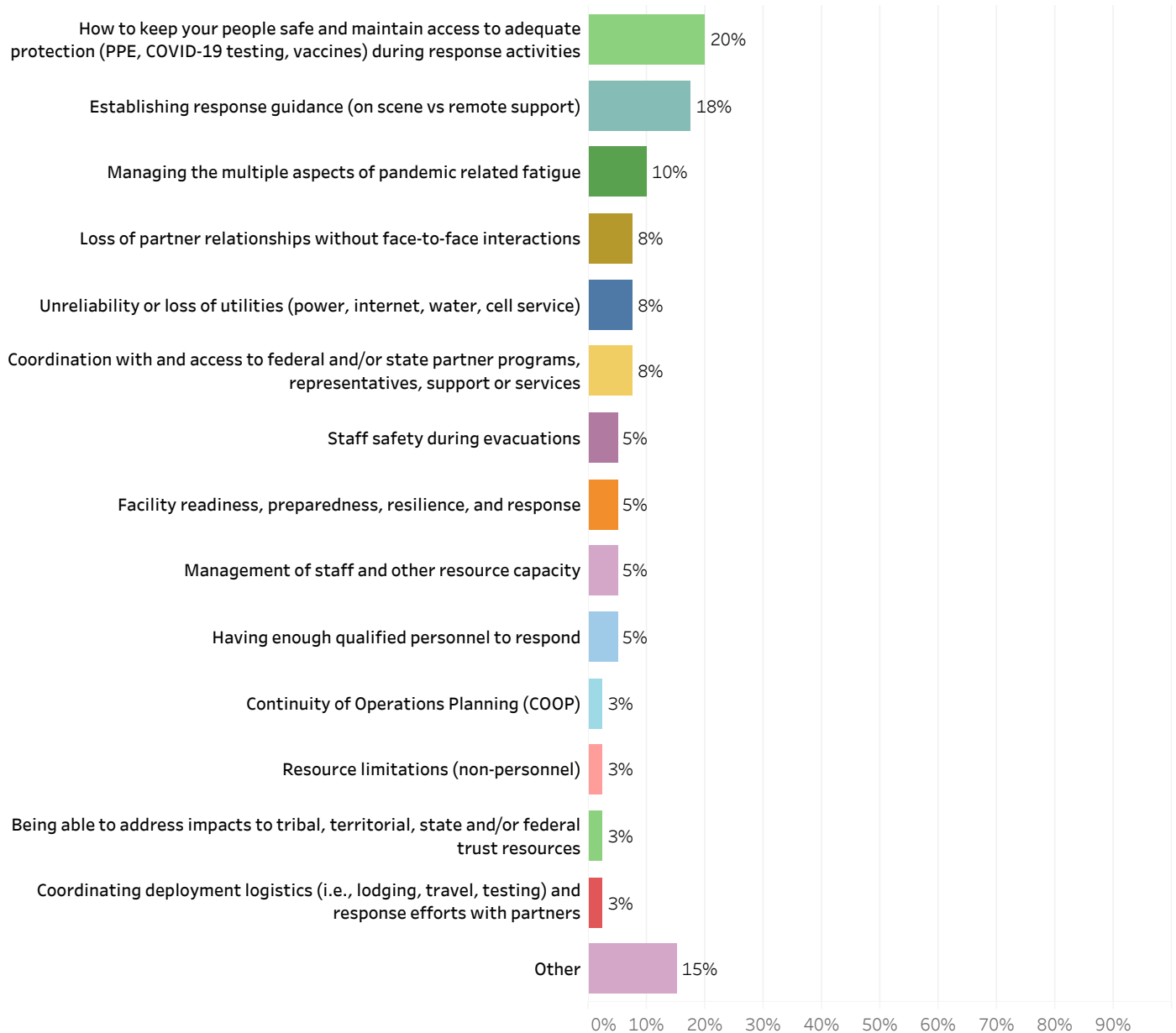
We have reviewed our training plan and are incorporating more Impact-based Decision Support Services training for the entire staff.

Working to equip dorm at Weeks Bay Reserve with backup generator and water supply, power walls for existing solar panels, communications capabilities to serve as local response site.

..

When asked to provide their most novel mitigation strategy, 20% provided one in reference to how to keep their people safe and maintain access to adequate protection during response activities, 18% provided a mitigation strategy for establishing response guidance, and 10% provided a mitigation strategy for managing the multiple aspects of pandemic related fatigue. Less than 10% of respondents each say their most novel mitigation strategy was in reference to one of the other challenges. The following pages show the most novel mitigation strategy for each respondent sorted by challenge.

**Figure 12: Which of the following challenges is your most novel mitigation strategy referring to? (Select all that apply)**



## Figure 13a: For any of the challenges you previously selected, please briefly describe the one mitigation strategy you have developed that you consider the most novel? - Sorted by challenge

### How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities

Ensuring a seamless operation thru the entirety of the COVID pandemic without a loss of service to the community; while providing a clean and safe work environment for all staff.

NRB has started renting RV's for teams to use as lodging during storm responses.

OR&R has one of the only full-time safety officers in NOS. We have adopted science-based protocols to analyze, continuously improve, and significantly reduce risk for staff who mobilize for storm response.

Put each shift worker in a different room of the building and used Google Chat to communicate.

Separating unvaccinated personnel.

The State of Louisiana developed an virtual inspection process for our Risk Management Program early on in the Covid-19 pandemic that was used as a model for other States and the USEPA.

The University headquarters in Austin provides all PPE needs. If there is a storm, the headquarters is located 200 miles from the NERR and is still in a position to provide PPE.

Using CARES funding for better refuge area / shelter operations

### Having enough qualified personnel to respond

To train our new employees on IDSS, we provided a mock typhoon scenario and had them develop an in-person briefing for our Partners (Emergency Management Office, media, etc.). The format was entirely up to them but they received helpful feedback from the partners.

Utilizing Survey123 for personnel to upload their response availability, which feeds an OSC Availability Dashboard in ArcGIS.

### Resource limitations (non-personnel)

I guess assisting with preparedness including coordinating with Reserves on needs pre disaster and in that way assisting with preparedness.

### Staff safety during evacuations

Earlier more and liberal evacuation pay?? I think this was implemented this past year for feds, but I'm not 100% sure.

planned meeting location and and time after the event in case power or phone service is interrupted.

### Continuity of Operations Planning (COOP)

planned meeting location and and time after the event in case power or phone service is interrupted.

### Managing the multiple aspects of pandemic related fatigue

Being positive

Drawing on multiple resources including an updated Employee Assistance Program (EAP) charted through the Dept of Health and Services/Federal Occupational Health organization.

Establishment of Regional Wellness team and Wellness representative in each field office.

Our program has developed a Homeowner's Handbook to Prepare for Natural Resources that is a one stop shop of information on emergency preparedness for multiple coastal hazards.

### Management of staff and other resource capacity

Push work down to remote office local level

Use of Google Meet to coordinate staff actions



## Figure 13b: For any of the challenges you previously selected, please briefly describe the one mitigation strategy you have developed that you consider the most novel? - Sorted by challenge

### Unreliability or loss of utilities (power, internet, water, cell service)

---

Hurricane kits with portable jumpstart/charger/air pumps

Providing portable power units and a corresponding safe use / storage brief to those who live in areas prone to extended power outages.

Same as previous: Development and continuous updating of the Florida Marine Debris Emergency Response Guide, storm preparedness workshops and trainings as well as expansion of natural resource advisor training.

---

### Facility readiness, preparedness, resilience, and response

---

Not a NMFS derived mitigation strategy....rather, effective tools such as ENS, ERMA and others make coordination, accountability, and comms possible.

Same as previous: Development and continuous updating of the Florida Marine Debris Emergency Response Guide, storm preparedness workshops and trainings as well as expansion of natural resource advisor training.

---

### Being able to address impacts to tribal, territorial, state and/or federal trust resources

---

Same as previous: Development and continuous updating of the Florida Marine Debris Emergency Response Guide, storm preparedness workshops and trainings as well as expansion of natural resource advisor training.

---

### Establishing response guidance (on scene vs remote support)

---

Ability to have strong remote support for on scene responders

Establishing response guidance on the use of MS Teams to minimize the deployment footprint of response personnel is the region's most novel mitigation strategy.

Home office VPN access to NOAA Network which allows remote support to partners.

Same as previous: Development and continuous updating of the Florida Marine Debris Emergency Response Guide, storm preparedness workshops and trainings as well as expansion of natural resource advisor training.

Spun up new staff to support FEMA HQ as part of the response team

We also enhanced our common operating picture to better support a virtual activation if needed.

We try to respond to events that damage corals. Our response guidance is not novel in the world of coral emergency response, but it is novel in terms of working with FEMA and other ESF agencies immediately after a large catastrophic event. We are working with FEMA to see if NOAA can be added to the ESF so that we can respond more quickly to triage and rescue corals sooner than the NCR RSF phase allows.

---

### Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners

---

Same as previous: Development and continuous updating of the Florida Marine Debris Emergency Response Guide, storm preparedness workshops and trainings as well as expansion of natural resource advisor training.

---

### Figure 13c: For any of the challenges you previously selected, please briefly describe the one mitigation strategy you have developed that you consider the most novel? - Sorted by challenge

#### Coordination with and access to federal and/or state partner programs, representatives, support or services

---

Marine Debris Emergency Response Guides

Same as previous: Development and continuous updating of the Florida Marine Debris Emergency Response Guide, storm preparedness workshops and trainings as well as expansion of natural resource advisor training.

With the help of an NGO - National Estuarine Research Reserve Association (NERRA) we have activated a satellite phone. Also, we received the help of many people who wanted to contribute financially to acquire the necessary materials to respond to the damage caused by the disaster caused by a hurricane. The state agency was not operable, we could not buy chainsaws or chains because we did not have cash, and it was through donations received through NERRA that we were able to acquire the necessary materials to attend to the emergency. This mechanism is a good example of collaboration.

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#### Loss of partner relationships without face-to-face interactions

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Not sure that it's novel, but maintaining relationships with our partners in spite of all the pandemic constraints of virtual responses. Working inside ORR to develop and execute virtual resource advisor training and hosting 9 monthly webinars called "Salvaging Solutions" that focused o..

Shared data servers with secure remote access. this allows for some staff not to deploy and instead work remotely. However issue of communication and lack of face to face interactions and situational awareness can suffer.

Use of media platforms like zoom or Teams.

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#### Other

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Allowing employees to work from home.

Dorm upgrades

I don't think it is novel - but the use of RVs.

Increased education and outreach strategies targeting the behavioral characteristics of members of the community is the most novel, perhaps not in the academic world, but definitely in real life.

integrating existing GIS layers of covid rates over mission areas to identify and minimize risk for mission crews.

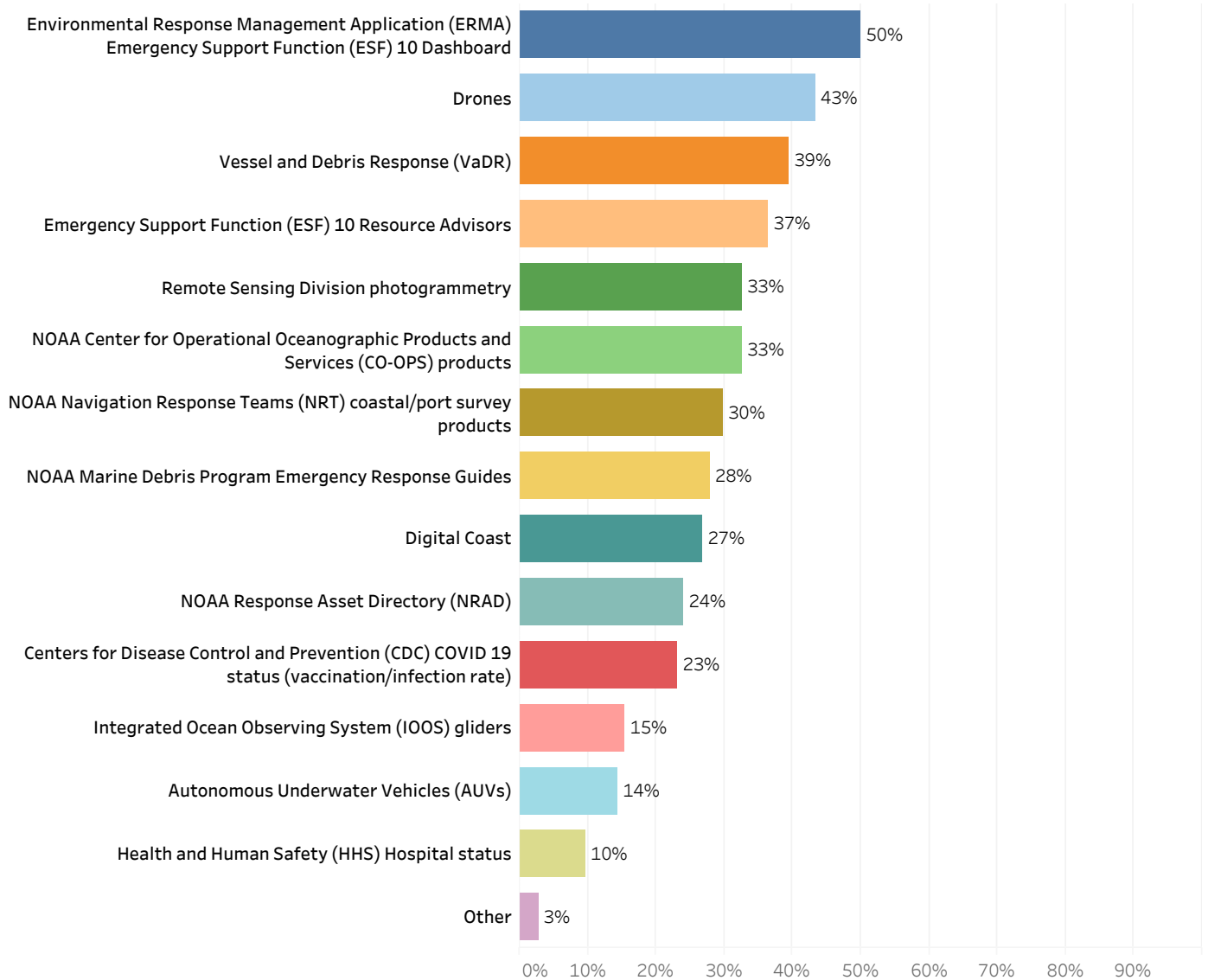
Maximum flexibility in telework and location.

New to position so nothing to add at this point in time.

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When asked which specific digital response and planning tools or products they would like in the upcoming summit, half of respondents (50%) would like Environmental Response Management Application (ERMA) Emergency Support Function (ESF) 10 Dashboard, while at least a third would like Drones (43%), Vessel and Debris Response (VaDR) (39%), Emergency Support Function (ESF) 10 Resource Advisors (37%), Remote Sensing Division photogrammetry (33%), and NOAA Center for Operational Oceanographic Products and Services products (33%). Fewer respondents would like to see NOAA Navigation Response Teams (NRT) coastal/port survey products (30%), NOAA Marine Debris Program Emergency Response Guides (28%), Digital Coast (27%), NOAA Response Asset Directory (NRAD) (24%), Centers for Disease Control and Prevention (CDC) COVID-19 status (vaccination/infection rate) (23%), Integrated Ocean Observing System (IOOS) gliders (15%), Autonomous Underwater Vehicles (AUVs) (14%), and Health and Human Safety (HHS) Hospital status (10%).

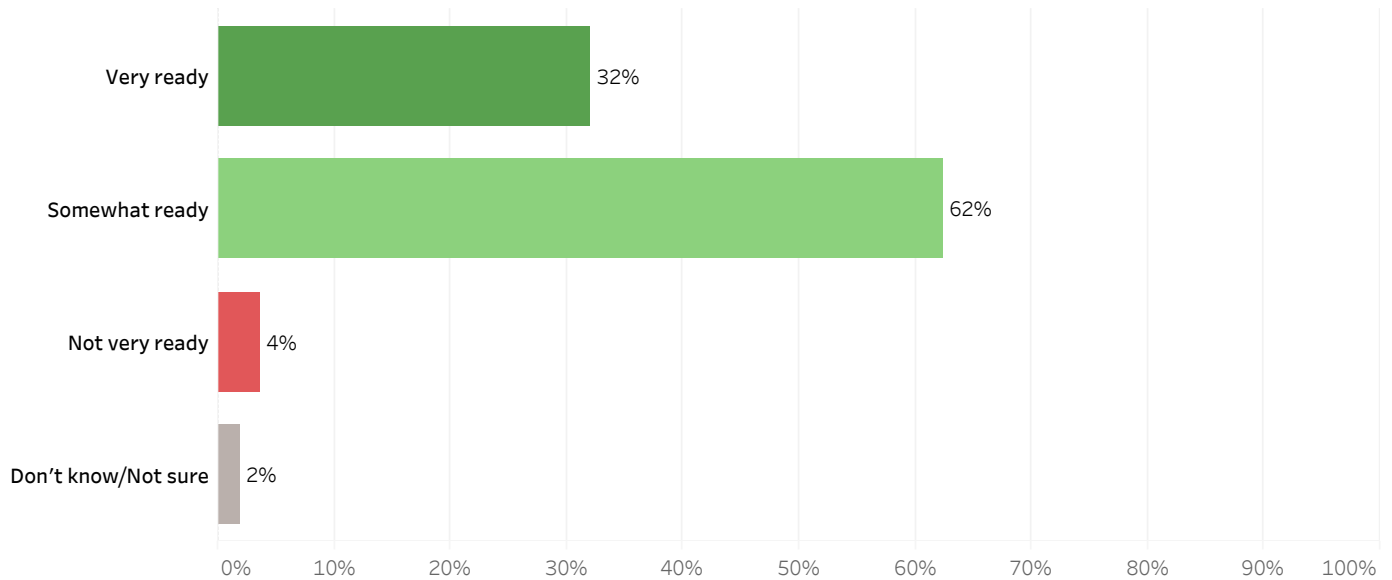
**Figure 14: Which of the following specific digital response and planning tools/products would you like in the upcoming summit? (Select all that apply)**



## Hurricane/Disaster Preparedness

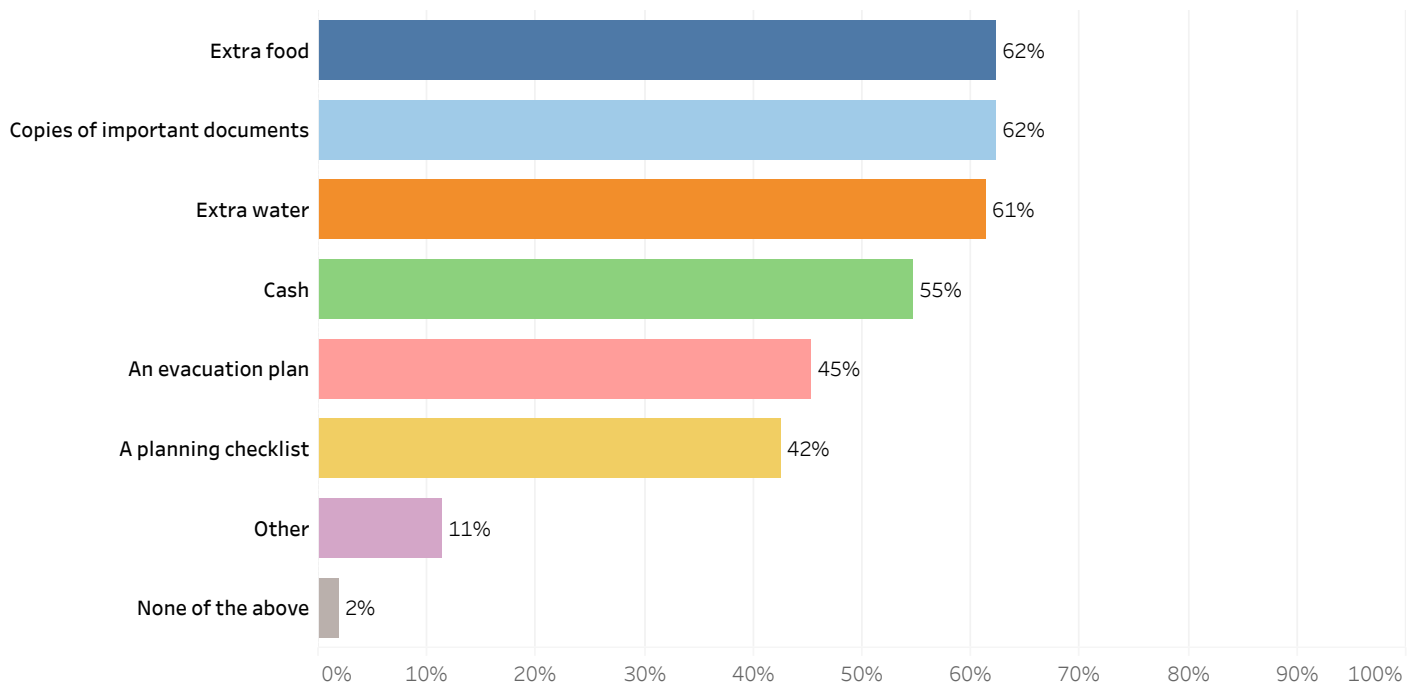
Three in ten respondents (32%) say they and their families are very ready for the next hurricane season or other major natural disaster, six in ten (62%) say they are somewhat ready, 4% say they are not very ready, and 2% don't know or are not sure.

**Figure 15: How ready do you feel you and your family are for the next hurricane season or other major natural disaster?**



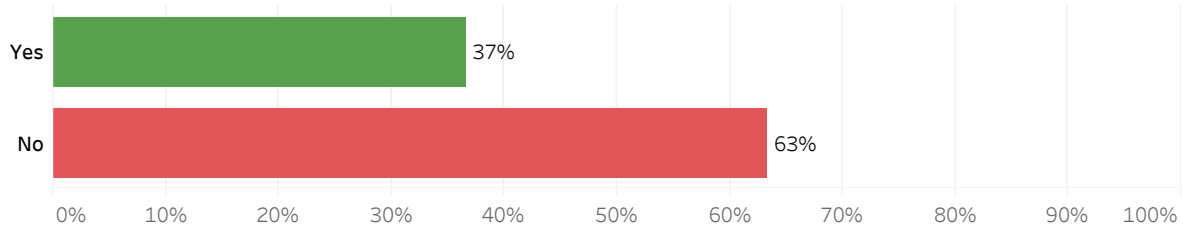
Six in ten respondents say they currently have extra food (62%), copies of important documents (62%), or extra water (61%) to help them prepare for the next hurricane season or other natural disaster. More than half of respondents (55%) say they have cash, while just under half have an evacuation plan (45%) or a planning checklist (42%). One in ten respondents (11%) have other items to help them prepare, and 2% of respondents have none of the above.

**Figure 16: Which of the following items do you currently have that would help you prepare for the next hurricane season or other natural disaster? (Select all that apply)**



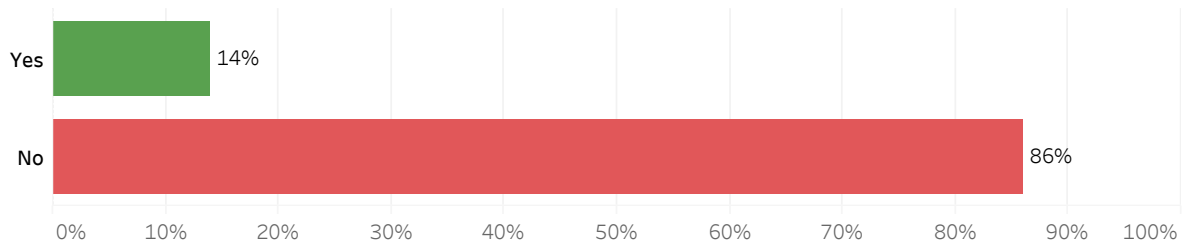
More than one-third of respondents (37%) say they have had to evacuate their homes because of a hurricane while more than six in ten respondents (63%) say they have never had to.

Figure 17: Have you ever had to evacuate from your home because of a hurricane?



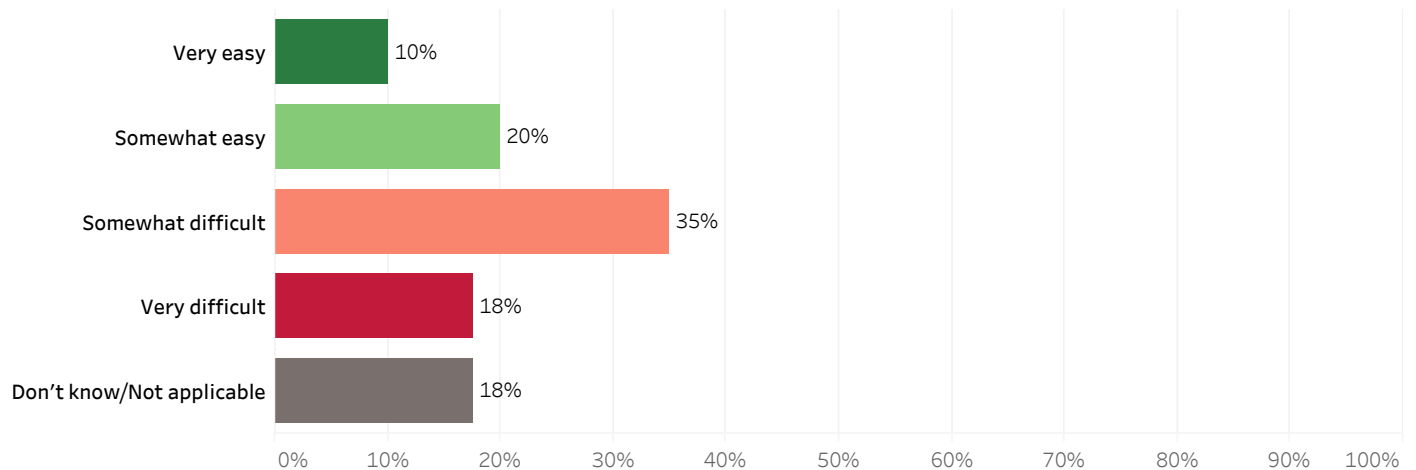
One in seven respondents (14%) say there has been a time where they did not evacuate their homes because of a hurricane but wish they had while 86% say there has never been such a time.

Figure 18: Was there ever a time where you did not evacuate your home because of a hurricane but wish you had?



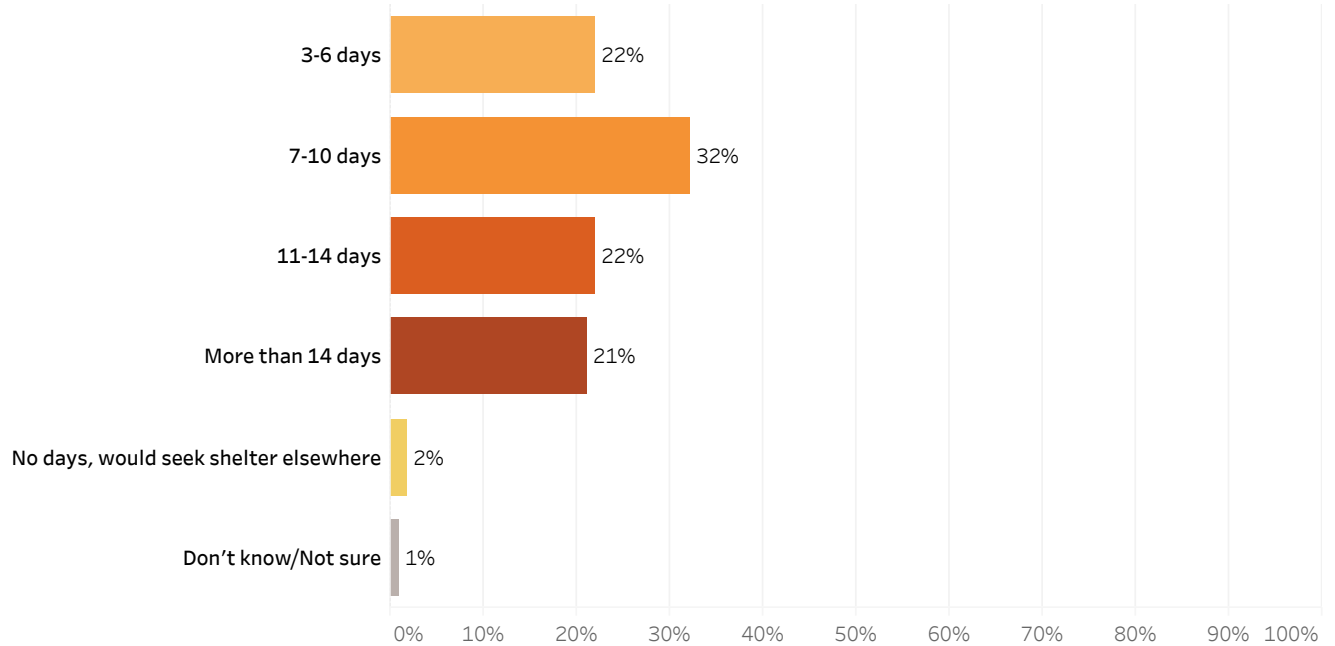
Among respondents who have had to evacuate their home because of a hurricane (N=40), three in ten (30%) said it was very (10%) or somewhat (20%) easy to perform their work assignments, 53% said it was very (18%) or somewhat (35%) difficult, and 18% didn't know or said the question was not applicable.

Figure 19: When you had to evacuate your home because of a hurricane, how easy or difficult was it to perform your work assignments?



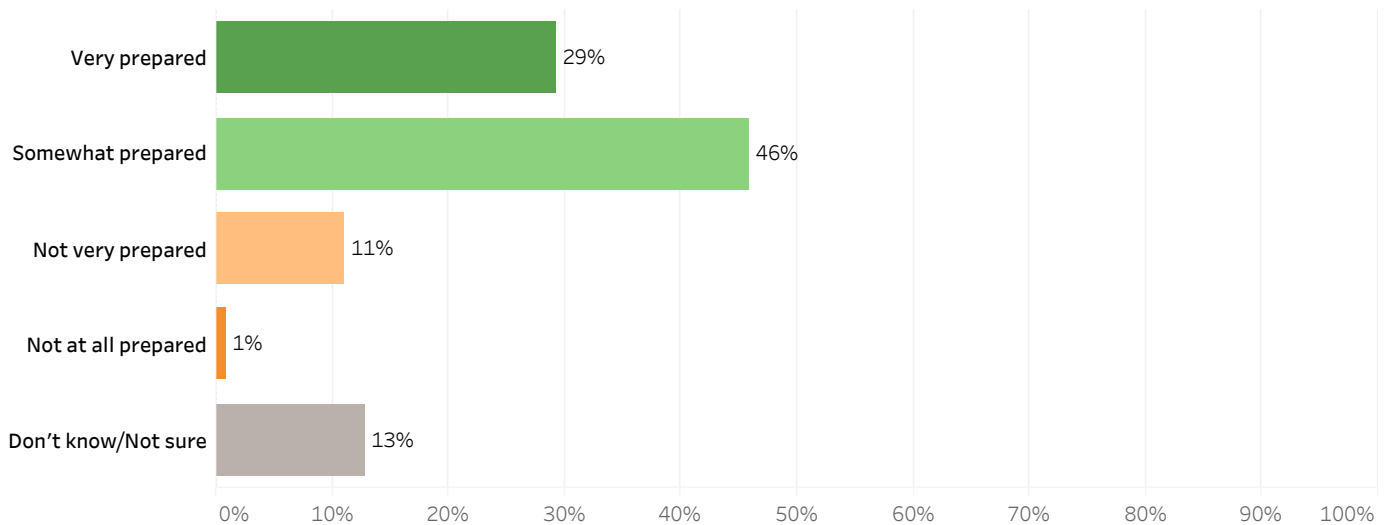
Nearly one-quarter of respondents (22%) say that in their opinion, they should plan to be self-sufficient for 3-6 days after a major hurricane or other major natural disaster. Thirty-two percent say they should plan to be self-sufficient for 7-10 days, 22% said 11-14 days, and 21% said more than 14 days. Two percent say they should not be prepared to be self-sufficient any days as they would seek shelter elsewhere, and 1% don't know or are unsure.

**Figure 20: In your opinion, how long should you plan to be self-sufficient without access to electricity, gasoline, a grocery store, or pharmacy after a major hurricane or other major natural disaster?**



Three in four respondents (75%) say their official duty station is very (29%) or somewhat (46%) prepared for a major hurricane, 11% say their duty station is not very prepared, 1% say it is not at all prepared, and 13% don't know or are unsure.

**Figure 21: In your opinion, how prepared is your official duty station (where you would normally go to work) for a major hurricane?**



## Appendix A

Q1: What is the name of your organization/agency?

		NOAA	County or Municipal Agency or Organization	State or Territory Agency or Organization	Other Federal Agency or Organization	Other Agency or Organization	N
<b>Overall</b>		69%	1%	16%	13%	1%	105
<b>Line Office</b>	NESDIS	100%					2
	NMFS	100%					2
	NOAA Staff Office or Other	83%		17%			6
	NOS	96%			2%	2%	53
	NWS	100%					8
	OAR	100%					1
	OMAO	100%					3
	Not Applicable		3%	52%	45%		29
<b>Region</b>	Alaska	100%					3
	Caribbean	67%		13%	20%		15
	Gulf of Mexico	69%		16%	16%		32
	Mid-Atlantic	69%		19%	13%		16
	National	94%			3%	3%	34
	Northeast	69%		15%	15%		13
	Pacific Islands	79%	7%	14%			14
	Southeast	67%		19%	14%		21
	West	100%					3
<b>ESF</b>	ESF #1	100%					11
	ESF #2	80%		20%			5
	ESF #3	71%			21%	7%	14
	ESF #5	100%					14
	ESF #6		100%				1
	ESF #7	100%					4
	ESF #8	100%					1
	ESF #9	75%		25%			4
	ESF #10	74%	3%	11%	11%	3%	38
	ESF #11	50%			50%		2
	ESF #12		50%	50%			2
	ESF #13	90%		10%			10
	ESF #14	100%					1
	ESF #15	100%					2

Q2: If you work or are a contractor for NOAA, select your appropriate line office

		National Environmental Satellite, Data, and Information Service (NESDIS)	National Marine Fisheries Service (NMFS)	National Ocean Service (NOS)	National Weather Service (NWS)
<b>Overall</b>		2%	2%	50%	7%
<b>Org or Agency Type</b>	NOAA	3%	3%	71%	11%
	County or Municipal				
	State or Territory				
	Other Federal			7%	
	Other Type			100%	
<b>Region</b>	Alaska		33%	33%	
	Caribbean		7%	53%	
	Gulf of Mexico		3%	56%	3%
	Mid-Atlantic	6%	6%	38%	
	National	3%	6%	71%	3%
	Northeast		8%	38%	
	Pacific Islands		7%	29%	36%
	Southeast		5%	41%	5%
	West		25%	25%	
<b>ESF</b>	ESF #1			64%	
	ESF #2			20%	20%
	ESF #3			73%	
	ESF #5	7%		60%	13%
	ESF #6				
	ESF #7			75%	
	ESF #8				
	ESF #9	25%		25%	25%
	ESF #10	3%		62%	3%
	ESF #11			50%	
	ESF #12				
	ESF #13			40%	30%
	ESF #14			100%	
	ESF #15			50%	



Q2: If you work or are a contractor for NOAA, select your appropriate line office

		NOAA Staff Office or Other NOAA Office	Office of Marine & Aviation Operations (OMAO)	Office of Oceanic & Atmospheric Research (OAR)	Not Applicable (Does not work for or are a contractor for NOAA)	N
<b>Overall</b>		6%	3%	2%	29%	108
<b>Org or Agency Type</b>	NOAA	7%	4%	1%		72
	County or Municipal				100%	1
	State or Territory	6%			94%	16
	Other Federal				93%	14
	Other Type					1
<b>Region</b>	Alaska			33%		3
	Caribbean		7%		33%	15
	Gulf of Mexico	3%	6%		28%	32
	Mid-Atlantic		13%	6%	31%	16
	National	14%	3%			35
	Northeast		15%	8%	31%	13
	Pacific Islands	7%		7%	14%	14
	Southeast		9%	5%	36%	22
	West			50%		4
<b>ESF</b>	ESF #1	9%	27%			11
	ESF #2	40%			20%	5
	ESF #3			7%	20%	15
	ESF #5	7%		7%	7%	15
	ESF #6				100%	1
	ESF #7		25%			4
	ESF #8			100%		1
	ESF #9				25%	4
	ESF #10	3%	5%	3%	23%	39
	ESF #11				50%	2
	ESF #12				100%	2
	ESF #13	10%	10%		10%	10
	ESF #14					1
	ESF #15	50%				2

Q3: What region or state do you represent? (Select all that apply)

		Alaska	Caribbean	Gulf of Mexico	Mid-Atlantic	National
<b>Overall</b>		3%	14%	30%	15%	32%
<b>Org or Agency Type</b>	NOAA	4%	14%	31%	15%	44%
	County or Municipal					
	State or Territory		12%	29%	18%	
	Other Federal		21%	36%	14%	7%
	Other Type					100%
<b>Line Office</b>	NESDIS				50%	50%
	NMFS	50%	50%	50%	50%	100%
	NOAA Staff Office or Other			17%		83%
	NOS	2%	15%	33%	11%	46%
	NWS			13%		13%
	OAR	50%			50%	
	OMAO		33%	67%	67%	33%
	Not Applicable		16%	29%	16%	
<b>Region</b>	Alaska	100%	67%	67%	100%	67%
	Caribbean	13%	100%	53%	33%	13%
	Gulf of Mexico	6%	24%	100%	18%	6%
	Mid-Atlantic	19%	31%	38%	100%	13%
	National	6%	6%	6%	6%	100%
	Northeast	23%	38%	38%	46%	15%
	Pacific Islands	21%	21%	29%	21%	14%
	Southeast	14%	41%	45%	32%	9%
	West	75%	50%	50%	75%	50%
<b>ESF</b>	ESF #1	9%	27%	45%	27%	64%
	ESF #2			20%		40%
	ESF #3		20%	33%		27%
	ESF #5	13%	13%	20%	13%	47%
	ESF #6					
	ESF #7		25%	75%	25%	25%
	ESF #8	100%			100%	
	ESF #9					50%
	ESF #10	3%	13%	33%	10%	36%
	ESF #11		50%			50%
	ESF #12			50%		
	ESF #13		10%	40%	20%	20%
	ESF #14			100%		
	ESF #15			50%		50%

Q3: What region or state do you represent? (Select all that apply)

		Northeast	Pacific Islands	Southeast	West	N
<b>Overall</b>		12%	13%	20%	4%	109
<b>Org or Agency Type</b>	NOAA	13%	15%	19%	4%	72
	County or Municipal		100%			1
	State or Territory	12%	12%	24%		17
	Other Federal	14%		21%		14
	Other Type					1
<b>Line Office</b>	NESDIS					2
	NMFS	50%	50%	50%	50%	2
	NOAA Staff Office or Other		17%			6
	NOS	9%	7%	17%	2%	54
	NWS		63%	13%		8
	OAR	50%	50%	50%	100%	2
	OMAO	67%		67%		3
	Not Applicable	13%	6%	26%		31
<b>Region</b>	Alaska	100%	100%	100%	100%	3
	Caribbean	33%	20%	60%	13%	15
	Gulf of Mexico	15%	12%	30%	6%	33
	Mid-Atlantic	38%	19%	44%	19%	16
	National	6%	6%	6%	6%	35
	Northeast	100%	23%	46%	23%	13
	Pacific Islands	21%	100%	29%	21%	14
	Southeast	27%	18%	100%	14%	22
	West	75%	75%	75%	100%	4
<b>ESF</b>	ESF #1	27%	9%	36%	9%	11
	ESF #2		20%	20%		5
	ESF #3	7%	7%	20%	7%	15
	ESF #5	20%	27%	33%	13%	15
	ESF #6		100%			1
	ESF #7	25%		50%		4
	ESF #8	100%	100%	100%	100%	1
	ESF #9			50%		4
	ESF #10	10%	8%	28%	5%	39
	ESF #11					2
	ESF #12		50%			2
	ESF #13	10%	10%	40%		10
	ESF #14					1
	ESF #15					2

Q4: Does your organization have a hurricane preparedness/response plan?

		Yes	No	Don't know/Not sure	N
<b>Overall</b>		75%	10%	15%	109
<b>Org or Agency Type</b>	NOAA	75%	7%	18%	72
	County or Municipal	100%			1
	State or Territory	65%	24%	12%	17
	Other Federal	86%	7%	7%	14
	Other Type	100%			1
<b>Line Office</b>	NESDIS	50%		50%	2
	NMFS	50%	50%		2
	NOAA Staff Office or Other	33%	33%	33%	6
	NOS	78%	4%	19%	54
	NWS	88%		13%	8
	OAR	50%	50%		2
	OMAO	100%			3
	Not Applicable	77%	16%	6%	31
<b>Region</b>	Alaska	67%	33%		3
	Caribbean	80%	13%	7%	15
	Gulf of Mexico	82%	9%	9%	33
	Mid-Atlantic	75%	13%	13%	16
	National	71%	9%	20%	35
	Northeast	69%	31%		13
	Pacific Islands	57%	21%	21%	14
	Southeast	82%	9%	9%	22
	West	50%	50%		4
<b>ESF</b>	ESF #1	91%		9%	11
	ESF #2	60%		40%	5
	ESF #3	73%	13%	13%	15
	ESF #5	93%		7%	15
	ESF #6	100%			1
	ESF #7	100%			4
	ESF #8	100%			1
	ESF #9	50%		50%	4
	ESF #10	79%	5%	15%	39
	ESF #11	100%			2
	ESF #12	100%			2
	ESF #13	80%		20%	10
	ESF #14	100%			1
	ESF #15	50%	50%		2

Q5: Does your organization's hurricane preparedness/response plan include provisions regarding the COVID-19 pandemic?

		Yes	No	N
<b>Overall</b>		72%	28%	81
<b>Org or Agency Type</b>	NOAA	75%	25%	53
	County or Municipal	100%		1
	State or Territory	55%	45%	11
	Other Federal	58%	42%	12
	Other Type	100%		1
<b>Line Office</b>	NESDIS	100%		1
	NMFS	100%		1
	NOAA Staff Office or Other	50%	50%	2
	NOS	78%	22%	41
	NWS	57%	43%	7
	OAR	100%		1
	OMAO	67%	33%	3
	Not Applicable	67%	33%	24
<b>Region</b>	Alaska	50%	50%	2
	Caribbean	83%	17%	12
	Gulf of Mexico	63%	37%	27
	Mid-Atlantic	75%	25%	12
	National	75%	25%	24
	Northeast	67%	33%	9
	Pacific Islands	63%	38%	8
	Southeast	72%	28%	18
	West	50%	50%	2
<b>ESF</b>	ESF #1	80%	20%	10
	ESF #2	33%	67%	3
	ESF #3	91%	9%	11
	ESF #5	79%	21%	14
	ESF #6	100%		1
	ESF #7	75%	25%	4
	ESF #8	100%		1
	ESF #9	100%		2
	ESF #10	77%	23%	31
	ESF #11	100%		2
	ESF #12	50%	50%	2
	ESF #13	75%	25%	8
	ESF #14	100%		1
	ESF #15	100%		1

Q6: Do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response?

		Yes	No	N
<b>Overall</b>		59%	41%	109
<b>Org or Agency Type</b>	NOAA	64%	36%	72
	County or Municipal	100%		1
	State or Territory	41%	59%	17
	Other Federal	43%	57%	14
	Other Type	100%		1
<b>Line Office</b>	NESDIS	50%	50%	2
	NMFS		100%	2
	NOAA Staff Office or Other	50%	50%	6
	NOS	59%	41%	54
	NWS	88%	13%	8
	OAR	100%		2
	OMAO	100%		3
	Not Applicable	52%	48%	31
	<b>Region</b>	Alaska	67%	33%
Caribbean		53%	47%	15
Gulf of Mexico		64%	36%	33
Mid-Atlantic		44%	56%	16
National		60%	40%	35
Northeast		46%	54%	13
Pacific Islands		64%	36%	14
Southeast		73%	27%	22
West		75%	25%	4

Q7: Please select the ESFs you work under (Select all that apply)

		ESF #1: Transportation	ESF #2: Communications	ESF #3: Public Works and Engineering	ESF #5: Information and Planning	ESF #6: Mass Care, Emergency Assistance, Temporary Housing, and Human Services
<b>Overall</b>		17%	8%	23%	23%	2%
<b>Org or Agency Type</b>	NOAA	24%	9%	22%	30%	
	County or Municipal					100%
	State or Territory		14%			
	Other Federal			50%		
	Other Type			100%		
<b>Line Office</b>	NESDIS				100%	
	NMFS					
	NOAA Staff Office or Other	33%	67%		33%	
	NOS	22%	3%	34%	28%	
	NWS		14%		29%	
	OAR			50%	50%	
	OMAO	100%				
	Not Applicable		6%	19%	6%	6%
<b>Region</b>	Alaska	50%			100%	
	Caribbean	38%		38%	25%	
	Gulf of Mexico	24%	5%	24%	14%	
	Mid-Atlantic	43%			29%	
	National	33%	10%	19%	33%	
	Northeast	50%		17%	50%	
	Pacific Islands	11%	11%	11%	44%	11%
	Southeast	25%	6%	19%	31%	
	West	33%		33%	67%	

Q7: Please select the ESFs you work under (Select all that apply)

		ESF #7: Logistics	ESF #8: Public Health and Medical Services	ESF #9: Search and Rescue	ESF #10: Oil and Hazardous Materials Response	ESF #11: Agriculture and Natural Resources Annex
<b>Overall</b>		6%	2%	6%	61%	3%
<b>Org or Agency Type</b>	NOAA	9%	2%	7%	61%	2%
	County or Municipal				100%	
	State or Territory			14%	57%	
	Other Federal				67%	17%
	Other Type				100%	
<b>Line Office</b>	NESDIS			100%	100%	
	NMFS					
	NOAA Staff Office or Other				33%	
	NOS	9%		3%	75%	3%
	NWS			14%	14%	
	OAR		50%		50%	
	OMAO	33%			67%	
	Not Applicable			6%	56%	6%
	<b>Region</b>	Alaska		50%		50%
Caribbean		13%			63%	13%
Gulf of Mexico		14%			62%	
Mid-Atlantic		14%	14%		57%	
National		5%		10%	67%	5%
Northeast		17%	17%		67%	
Pacific Islands			11%		33%	
Southeast		13%	6%	13%	69%	
West			33%		67%	



Q7: Please select the ESFs you work under (Select all that apply)

		ESF #12: Energy	ESF #13: Public Safety and Security	ESF #14: Cross-Sector Business and Infrastructure	ESF #15: External Affairs	I don't know	N
<b>Overall</b>		3%	16%	2%	3%	8%	64
<b>Org or Agency Type</b>	NOAA		20%	2%	4%	7%	46
	County or Municipal	100%					1
	State or Territory	14%	14%			14%	7
	Other Federal						6
	Other Type						1
<b>Line Office</b>	NESDIS						1
	NMFS						
	NOAA Staff Office or Other		33%		33%		3
	NOS		13%	3%	3%	3%	32
	NWS		43%			29%	7
	OAR						2
	OMAO		33%				3
	Not Applicable	13%	6%			13%	16
<b>Region</b>	Alaska						2
	Caribbean		13%				8
	Gulf of Mexico	5%	19%	5%	5%	10%	21
	Mid-Atlantic		29%				7
	National		10%		5%	5%	21
	Northeast		17%				6
	Pacific Islands	11%	11%			22%	9
	Southeast		25%				16
	West						3

Q8: Select the top five biggest challenges you anticipate for the 2022 hurricane season (Select up to five)

		Access to funding to support hurricane response efforts, including additional requirements due to the pandemic	Agency COVID-19 guidelines and rules differ from state to state	Being able to address impacts to tribal, territorial, state and/or federal trust resources	Continuity of Operations Planning (COOP)
<b>Overall</b>		15%	11%	16%	13%
<b>Org or Agency Type</b>	NOAA	18%	13%	17%	15%
	County or Municipal				
	State or Territory	13%		19%	
	Other Federal	7%		7%	21%
	Other Type				
<b>Line Office</b>	NESDIS	50%			
	NMFS	50%			
	NOAA Staff Office or Other			17%	33%
	NOS	20%	17%	20%	9%
	NWS	13%		13%	25%
	OAR		50%		
	OMAO		33%		67%
	Not Applicable	7%	3%	13%	10%
<b>Region</b>	Alaska	33%			33%
	Caribbean	7%	7%	27%	20%
	Gulf of Mexico	9%	15%	21%	12%
	Mid-Atlantic	19%		6%	31%
	National	20%	14%	11%	14%
	Northeast	8%	8%	15%	15%
	Pacific Islands	21%		21%	21%
	Southeast	19%	5%	19%	14%
	West	25%	25%		25%
<b>ESF</b>	ESF #1	18%	18%		45%
	ESF #2		20%		40%
	ESF #3	20%	27%	33%	
	ESF #5	20%	13%	13%	20%
	ESF #6				
	ESF #7		50%		50%
	ESF #8				
	ESF #9			25%	
	ESF #10	15%	13%	21%	15%
	ESF #11			50%	
	ESF #12				
	ESF #13		10%	10%	40%
	ESF #14		100%		
	ESF #15		50%		

Q8: Select the top five biggest challenges you anticipate for the 2022 hurricane season (Select up to five)

		Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners	Coordination with and access to federal and/or state partner programs, representatives, support or services	Differences between local/state/federal guidelines	Establishing response guidance (on scene vs remote support)
<b>Overall</b>		21%	22%	15%	21%
<b>Org or Agency Type</b>	NOAA	21%	24%	14%	25%
	County or Municipal	100%			
	State or Territory	13%	31%	13%	13%
	Other Federal	14%	7%	14%	21%
	Other Type	100%		100%	
<b>Line Office</b>	NESDIS				
	NMFS		50%	50%	50%
	NOAA Staff Office or Other		33%		33%
	NOS	26%	22%	19%	19%
	NWS	13%		13%	38%
	OAR	50%	100%		50%
	OMAO	33%	33%		33%
	Not Applicable	20%	20%	13%	17%
<b>Region</b>	Alaska		33%		33%
	Caribbean	33%	33%	27%	33%
	Gulf of Mexico	21%	21%	9%	18%
	Mid-Atlantic	19%	44%	6%	25%
	National	17%	17%	23%	23%
	Northeast	23%	31%		15%
	Pacific Islands	14%	7%		21%
	Southeast	29%	38%	14%	24%
	West	25%	50%		25%
<b>ESF</b>	ESF #1	36%	36%		9%
	ESF #2	20%	20%		
	ESF #3	33%	40%	27%	20%
	ESF #5	40%	20%	20%	13%
	ESF #6	100%			
	ESF #7	75%	50%	25%	
	ESF #8		100%		100%
	ESF #9	25%		25%	
	ESF #10	33%	33%	18%	28%
	ESF #11	50%			50%
	ESF #12	50%	50%		
	ESF #13	50%	40%		20%
	ESF #14	100%			
	ESF #15	50%	50%		50%

Q8: Select the top five biggest challenges you anticipate for the 2022 hurricane season (Select up to five)

		Facility readiness, preparedness, resilience, and response	Having enough qualified personnel to respond	How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities	Loss of partner relationships without face-to-face interactions
<b>Overall</b>		33%	37%	26%	24%
<b>Org or Agency Type</b>	NOAA	28%	33%	28%	28%
	County or Municipal	100%	100%		
	State or Territory	50%	50%	13%	13%
	Other Federal	36%	36%	36%	21%
	Other Type		100%		
<b>Line Office</b>	NESDIS				
	NMFS	50%	50%		
	NOAA Staff Office or Other	17%	17%	17%	17%
	NOS	26%	33%	35%	24%
	NWS	50%	50%		63%
	OAR	100%		50%	
	OMAO	67%	33%		33%
	Not Applicable	40%	47%	23%	20%
<b>Region</b>	Alaska	67%	33%	33%	
	Caribbean	27%	53%	13%	20%
	Gulf of Mexico	24%	45%	27%	33%
	Mid-Atlantic	50%	31%	13%	13%
	National	26%	34%	26%	17%
	Northeast	46%	31%	31%	15%
	Pacific Islands	57%	43%	21%	29%
	Southeast	43%	48%	19%	19%
	West	75%	25%	25%	
<b>ESF</b>	ESF #1	27%	64%		18%
	ESF #2	60%	40%		20%
	ESF #3	20%	40%	40%	27%
	ESF #5	20%	47%	13%	20%
	ESF #6	100%	100%		
	ESF #7	50%	25%		
	ESF #8	100%		100%	
	ESF #9	50%	25%	25%	
	ESF #10	31%	46%	33%	31%
	ESF #11		50%		50%
	ESF #12	100%	50%		
	ESF #13	50%	50%		20%
	ESF #14	100%			
	ESF #15	50%			

Q8: Select the top five biggest challenges you anticipate for the 2022 hurricane season (Select up to five)

		Management of staff and other resource capacity	Managing the multiple aspects of pandemic related fatigue	Resource limitations (non-personnel)	Return to pre-storm operational activities/capacity
<b>Overall</b>		31%	30%	19%	21%
<b>Org or Agency Type</b>	NOAA	29%	36%	17%	19%
	County or Municipal			100%	
	State or Territory	38%	13%	25%	38%
	Other Federal	36%	21%	7%	21%
	Other Type				
<b>Line Office</b>	NESDIS	50%	50%	50%	
	NMFS	50%	50%		50%
	NOAA Staff Office or Other	33%	17%	33%	
	NOS	24%	31%	15%	22%
	NWS	38%	50%	13%	13%
	OAR		50%		
	OMAO	33%	67%	33%	
	Not Applicable	40%	17%	23%	27%
<b>Region</b>	Alaska	33%	33%		33%
	Caribbean	33%	27%	20%	27%
	Gulf of Mexico	21%	30%	12%	33%
	Mid-Atlantic	44%	31%	13%	25%
	National	29%	37%	23%	11%
	Northeast	31%	31%	15%	31%
	Pacific Islands	43%	36%	14%	14%
	Southeast	38%	24%	10%	24%
	West	25%	50%		25%
<b>ESF</b>	ESF #1	27%	36%	36%	18%
	ESF #2	20%	40%	20%	20%
	ESF #3	47%	20%		20%
	ESF #5	33%	33%	13%	20%
	ESF #6			100%	
	ESF #7	25%	25%	50%	50%
	ESF #8				
	ESF #9		75%		
	ESF #10	33%	26%	10%	15%
	ESF #11	50%	100%		
	ESF #12	50%		100%	
	ESF #13	40%	30%	20%	30%
	ESF #14				100%
	ESF #15				50%

Q8: Select the top five biggest challenges you anticipate for the 2022 hurricane season (Select up to five)

		Staff safety during evacuations	Unreliability or loss of utilities (power, internet, water, cell service)	Other	N
<b>Overall</b>		12%	45%	6%	108
<b>Org or Agency Type</b>	NOAA	15%	40%	7%	72
	County or Municipal		100%		1
	State or Territory	13%	69%	6%	16
	Other Federal		57%		14
	Other Type				1
<b>Line Office</b>	NESDIS				2
	NMFS		50%		2
	NOAA Staff Office or Other		67%	17%	6
	NOS	19%	39%	9%	54
	NWS		38%		8
	OAR		50%		2
	OMAO	33%			3
	Not Applicable	7%	60%	3%	30
<b>Region</b>	Alaska		67%		3
	Caribbean	13%	47%	7%	15
	Gulf of Mexico	12%	58%	9%	33
	Mid-Atlantic	13%	38%	13%	16
	National	14%	34%	9%	35
	Northeast	15%	62%		13
	Pacific Islands	14%	57%	7%	14
	Southeast	14%	33%	5%	21
	West		50%		4
<b>ESF</b>	ESF #1	9%	27%	9%	11
	ESF #2		40%		5
	ESF #3		27%		15
	ESF #5		33%		15
	ESF #6		100%		1
	ESF #7		25%		4
	ESF #8		100%		1
	ESF #9		25%		4
	ESF #10	5%	33%	8%	39
	ESF #11		100%		2
	ESF #12		100%		2
	ESF #13		40%		10
	ESF #14		100%		1
	ESF #15		50%		2

Q9: Of the challenges listed below, please check any that you have found mitigation strategies for (Select all that apply)

		Access to funding to support hurricane response efforts, including additional requirements due to the pandemic	Agency COVID-19 guidelines and rules differ from state to state	Being able to address impacts to tribal, territorial, state and/or federal trust resources	Continuity of Operations Planning (COOP)
<b>Overall</b>		8%	12%	7%	27%
<b>Org or Agency Type</b>	NOAA	6%	8%	6%	31%
	County or Municipal	100%			
	State or Territory		10%	10%	20%
	Other Federal	17%	25%	8%	25%
	Other Type				
<b>Line Office</b>	NESDIS				
	NMFS				
	NOAA Staff Office or Other		20%		20%
	NOS	11%	6%	9%	31%
	NWS		17%		33%
	OAR				
	OMAO		33%		33%
	Not Applicable	10%	19%	10%	24%
<b>Region</b>	Alaska				33%
	Caribbean		22%	11%	33%
	Gulf of Mexico	9%	4%	9%	35%
	Mid-Atlantic			9%	36%
	National	12%	16%	4%	28%
	Northeast		10%		20%
	Pacific Islands	8%	8%		17%
	Southeast	7%	7%	27%	20%
West				25%	
<b>ESF</b>	ESF #1	11%	22%	11%	33%
	ESF #2				
	ESF #3	9%	18%	9%	9%
	ESF #5				17%
	ESF #6	100%			
	ESF #7				
	ESF #8				
	ESF #9				
	ESF #10	18%	11%	18%	21%
	ESF #11				
	ESF #12	100%			
	ESF #13				29%
	ESF #14				
	ESF #15				

Q9: Of the challenges listed below, please check any that you have found mitigation strategies for (Select all that apply)

		Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners	Coordination with and access to federal and/or state partner programs, representatives, support or services	Differences between local/state/federal guidelines	Establishing response guidance (on scene vs remote support)
<b>Overall</b>		23%	12%	13%	24%
<b>Org or Agency Type</b>	NOAA	27%	10%	10%	23%
	County or Municipal			100%	
	State or Territory		20%	20%	10%
	Other Federal	33%	17%	8%	33%
	Other Type				100%
<b>Line Office</b>	NESDIS				
	NMFS	100%			
	NOAA Staff Office or Other	20%		40%	
	NOS	26%	11%	14%	26%
	NWS	33%	17%		50%
	OAR				
	OMAO				
	Not Applicable	19%	19%	14%	29%
<b>Region</b>	Alaska	33%			
	Caribbean	22%	22%		33%
	Gulf of Mexico	22%	4%	9%	17%
	Mid-Atlantic	9%		9%	18%
	National	36%	12%	20%	24%
	Northeast	20%			10%
	Pacific Islands	25%	8%	17%	25%
	Southeast	13%	20%	13%	27%
	West	25%			
<b>ESF</b>	ESF #1	44%	22%	22%	22%
	ESF #2				
	ESF #3	36%	9%		36%
	ESF #5	17%			17%
	ESF #6			100%	
	ESF #7				
	ESF #8				
	ESF #9				
	ESF #10	29%	14%	14%	29%
	ESF #11	100%	50%		50%
	ESF #12			100%	
	ESF #13	14%		14%	29%
	ESF #14				
	ESF #15				



Q9: Of the challenges listed below, please check any that you have found mitigation strategies for (Select all that apply)

		Facility readiness, preparedness, resilience, and response	Having enough qualified personnel to respond	How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities	Loss of partner relationships without face-to-face interactions
<b>Overall</b>		23%	23%	52%	15%
<b>Org or Agency Type</b>	NOAA	23%	23%	50%	17%
	County or Municipal			100%	
	State or Territory	20%	20%	40%	10%
	Other Federal	25%	33%	50%	17%
	Other Type			100%	
<b>Line Office</b>	NESDIS				
	NMFS	100%			
	NOAA Staff Office or Other	40%	20%	20%	20%
	NOS	14%	17%	54%	11%
	NWS	67%	33%	67%	33%
	OAR		50%	50%	
	OMAO		33%	67%	33%
	Not Applicable	24%	29%	57%	14%
<b>Region</b>	Alaska	33%	33%		
	Caribbean	11%	22%	44%	22%
	Gulf of Mexico	30%	17%	43%	13%
	Mid-Atlantic	18%	18%	27%	9%
	National	24%	20%	48%	24%
	Northeast	10%	40%	30%	10%
	Pacific Islands	33%	25%	58%	8%
	Southeast	27%	33%	47%	13%
	West	25%	25%	25%	
<b>ESF</b>	ESF #1	33%	33%	67%	22%
	ESF #2	33%	33%	67%	
	ESF #3	9%	36%	55%	18%
	ESF #5	33%	67%	33%	
	ESF #6			100%	
	ESF #7				
	ESF #8		100%		
	ESF #9			100%	
	ESF #10	21%	25%	64%	11%
	ESF #11		50%		
	ESF #12			100%	
	ESF #13	29%	14%	43%	
	ESF #14				
	ESF #15				

Q9: Of the challenges listed below, please check any that you have found mitigation strategies for (Select all that apply)

		Management of staff and other resource capacity	Managing the multiple aspects of pandemic related fatigue	Resource limitations (non-personnel)	Return to pre-storm operational activities/capacity
<b>Overall</b>		21%	16%	7%	12%
<b>Org or Agency Type</b>	NOAA	29%	17%	4%	13%
	County or Municipal				
	State or Territory	20%	30%	10%	20%
	Other Federal		8%	17%	8%
	Other Type				
<b>Line Office</b>	NESDIS	100%		100%	
	NMFS				100%
	NOAA Staff Office or Other	20%	20%		
	NOS	29%	14%	3%	9%
	NWS	17%	17%		33%
	OAR		50%		
	OMAO	33%		33%	
	Not Applicable	10%	19%	10%	14%
<b>Region</b>	Alaska	33%	33%		33%
	Caribbean	11%	22%		11%
	Gulf of Mexico	13%	9%	9%	4%
	Mid-Atlantic	55%	27%	18%	9%
	National	28%	12%	4%	20%
	Northeast	20%	10%	10%	20%
	Pacific Islands	17%	33%		17%
	Southeast	27%	20%	20%	20%
	West	25%	25%		25%
<b>ESF</b>	ESF #1	44%		11%	11%
	ESF #2		33%		
	ESF #3	27%	9%		
	ESF #5	33%	33%		
	ESF #6				
	ESF #7	100%		100%	
	ESF #8		100%		
	ESF #9				
	ESF #10	32%	7%	11%	7%
	ESF #11	50%			
	ESF #12				
	ESF #13	43%	14%	14%	
	ESF #14				
	ESF #15				

Q9: Of the challenges listed below, please check any that you have found mitigation strategies for (Select all that apply)

		Staff safety during evacuations	Unreliability or loss of utilities (power, internet, water, cell service)	Other	N
<b>Overall</b>		20%	19%	4%	75
<b>Org or Agency Type</b>	NOAA	23%	21%	4%	48
	County or Municipal				1
	State or Territory	10%	20%	10%	10
	Other Federal	17%	17%		12
	Other Type				1
<b>Line Office</b>	NESDIS				1
	NMFS				1
	NOAA Staff Office or Other	20%	40%	20%	5
	NOS	31%	17%	6%	35
	NWS		33%		6
	OAR				2
	OMAO				3
	Not Applicable	14%	14%		21
<b>Region</b>	Alaska				3
	Caribbean	11%	11%		9
	Gulf of Mexico	35%	22%	4%	23
	Mid-Atlantic			9%	11
	National	28%	20%	4%	25
	Northeast				10
	Pacific Islands	8%	17%	8%	12
	Southeast	13%	13%		15
	West				4
<b>ESF</b>	ESF #1	33%	33%		9
	ESF #2	33%	33%		3
	ESF #3		9%	9%	11
	ESF #5		17%		6
	ESF #6				1
	ESF #7				1
	ESF #8				1
	ESF #9				1
	ESF #10	18%	21%	4%	28
	ESF #11				2
	ESF #12				1
	ESF #13	14%	14%		7
	ESF #14				
	ESF #15				

Q11: Which of the following challenges is your most effective mitigation strategy referring to? (Select all that apply)

		Access to funding to support hurricane response efforts, including additional requirements due to the pandemic	Agency COVID-19 guidelines and rules differ from state to state	Being able to address impacts to tribal, territorial, state and/or federal trust resources	Continuity of Operations Planning (COOP)	Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners
<b>Overall</b>		1%	3%	4%	10%	7%
<b>Org or Agency Type</b>	NOAA		2%	5%	12%	5%
	County or Municipal					
	State or Territory				9%	
	Other Federal	8%	8%	8%	8%	23%
	Other Type					
<b>Line Office</b>	NESDIS					
	NMFS					
	NOAA Staff Office or Other					
	NOS	3%	3%	6%	13%	6%
	NWS				17%	
	OAR					
	OMAO					
	Not Applicable		4%	4%	9%	13%
<b>Region</b>	Alaska				33%	
	Caribbean		11%	11%	11%	
	Gulf of Mexico			8%	15%	12%
	Mid-Atlantic			13%	25%	
	National	5%	5%		10%	5%
	Northeast				20%	10%
	Pacific Islands				8%	
	Southeast			20%	7%	7%
	West				25%	
<b>ESF</b>	ESF #1		11%		11%	11%
	ESF #2					
	ESF #3			9%		9%
	ESF #5				14%	
	ESF #6					
	ESF #7					
	ESF #8					
	ESF #9					
	ESF #10			11%	4%	11%
	ESF #11					
	ESF #12					
	ESF #13				14%	
	ESF #14					
	ESF #15					

Q11: Which of the following challenges is your most effective mitigation strategy referring to? (Select all that apply)

		Coordination with and access to federal and/or state partner programs, representatives, support or services	Differences between local/state/federal guidelines	Establishing response guidance (on scene vs remote support)	Facility readiness, preparedness, resilience, and response	Having enough qualified personnel to respond
<b>Overall</b>		9%	1%	4%	7%	13%
<b>Org or Agency Type</b>	NOAA	7%	2%	2%	7%	12%
	County or Municipal					
	State or Territory	9%			9%	9%
	Other Federal	15%		8%	8%	23%
	Other Type			100%		
<b>Line Office</b>	NESDIS					
	NMFS				100%	
	NOAA Staff Office or Other				25%	25%
	NOS	10%	3%	6%	3%	10%
	NWS					17%
	OAR					
	OMAO					
	Not Applicable	13%		4%	9%	17%
<b>Region</b>	Alaska				33%	
	Caribbean	22%			11%	
	Gulf of Mexico	8%		4%	12%	12%
	Mid-Atlantic				13%	
	National	5%	5%	5%	15%	10%
	Northeast				10%	10%
	Pacific Islands			8%	8%	8%
	Southeast	13%		7%	13%	13%
	West				25%	
<b>ESF</b>	ESF #1	22%	11%		11%	11%
	ESF #2	25%			25%	25%
	ESF #3	9%		18%		18%
	ESF #5	14%				29%
	ESF #6					
	ESF #7	50%				
	ESF #8					
	ESF #9					
	ESF #10	15%		11%	11%	11%
	ESF #11	50%				50%
	ESF #12					
	ESF #13	14%			14%	14%
	ESF #14	100%				
	ESF #15	50%				

Q11: Which of the following challenges is your most effective mitigation strategy referring to? (Select all that apply)

		How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities	Loss of partner relationships without face-to-face interactions	Management of staff and other resource capacity	Managing the multiple aspects of pandemic related fatigue	Return to pre-storm operational activities/capacity
<b>Overall</b>		20%	6%	7%	3%	4%
<b>Org or Agency Type</b>	NOAA	19%	10%	10%	2%	2%
	County or Municipal	100%				
	State or Territory	18%		9%	9%	9%
	Other Federal	8%				8%
	Other Type					
<b>Line Office</b>	NESDIS					
	NMFS					
	NOAA Staff Office or Other					
	NOS	19%	10%	10%		3%
	NWS	17%	17%			
	OAR	50%			50%	
	OMAO	50%		50%		
	Not Applicable	22%		4%	4%	9%
<b>Region</b>	Alaska			33%	33%	
	Caribbean	33%		11%		
	Gulf of Mexico	19%	4%	8%		
	Mid-Atlantic	13%		38%	13%	
	National	10%	15%	10%		5%
	Northeast	20%		20%	10%	10%
	Pacific Islands	33%		8%	17%	
	Southeast	27%		20%	7%	7%
	West	25%		25%	25%	
<b>ESF</b>	ESF #1	22%		22%		
	ESF #2	25%				
	ESF #3	27%		18%		
	ESF #5	14%		14%	14%	
	ESF #6	100%				
	ESF #7			50%		
	ESF #8				100%	
	ESF #9					
	ESF #10	26%	4%	15%		
	ESF #11					
	ESF #12	50%				
	ESF #13	14%		14%		
	ESF #14					
	ESF #15					

Q11: Which of the following challenges is your most effective mitigation strategy referring to? (Select all that apply)

		Staff safety during evacuations	Unreliability or loss of utilities (power, internet, water, cell service)	Other	N
<b>Overall</b>		3%	3%	14%	70
<b>Org or Agency Type</b>	NOAA		2%	14%	42
	County or Municipal				1
	State or Territory	9%		27%	11
	Other Federal	8%	8%	8%	13
	Other Type				1
<b>Line Office</b>	NESDIS				
	NMFS				1
	NOAA Staff Office or Other			50%	4
	NOS		3%	10%	31
	NWS			33%	6
	OAR				2
	OMAO				2
	Not Applicable	9%	4%	9%	23
	<b>Region</b>	Alaska			
Caribbean					9
Gulf of Mexico		8%	8%	15%	26
Mid-Atlantic				13%	8
National				15%	20
Northeast					10
Pacific Islands				17%	12
Southeast			7%	7%	15
West					4
<b>ESF</b>	ESF #1				9
	ESF #2				4
	ESF #3			9%	11
	ESF #5			14%	7
	ESF #6				1
	ESF #7				2
	ESF #8				1
	ESF #9			100%	1
	ESF #10	4%	4%	7%	27
	ESF #11				2
	ESF #12			50%	2
	ESF #13			14%	7
	ESF #14				1
	ESF #15			50%	2

Q13: Which of the following challenges is your most novel mitigation strategy referring to? (Select all that apply)

		Being able to address impacts to tribal, territorial, state and/or federal trust resources	Continuity of Operations Planning (COOP)	Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners	Coordination with and access to federal and/or state partner programs, representatives, support or services	Establishing response guidance (on scene vs remote support)
<b>Overall</b>		3%	3%	3%	8%	18%
<b>Org or Agency Type</b>	NOAA				5%	14%
	County or Municipal					
	State or Territory				17%	
	Other Federal	11%	11%	11%	11%	22%
Other Type						100%
<b>Line Office</b>	NESDIS					
	NMFS					
	NOAA Staff Office or Other					
	NOS				7%	13%
	NWS					40%
	OAR					
	OMAO					
	Not Applicable	7%	7%	7%	14%	21%
<b>Region</b>	Alaska					
	Caribbean				17%	17%
	Gulf of Mexico	7%	7%	7%	7%	27%
	Mid-Atlantic					
	National					14%
	Northeast					
	Pacific Islands					13%
	Southeast	11%		11%	22%	33%
West						
<b>ESF</b>	ESF #1					
	ESF #2					
	ESF #3				11%	22%
	ESF #5					25%
	ESF #6					
	ESF #7					
	ESF #8					
	ESF #9					
	ESF #10	8%		8%	15%	23%
	ESF #11					
	ESF #12					
	ESF #13					25%
	ESF #14					
	ESF #15					



Q13: Which of the following challenges is your most novel mitigation strategy referring to? (Select all that apply)

		Facility readiness, preparedness, resilience, and response	Having enough qualified personnel to respond	How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities	Loss of partner relationships without face-to-face interactions	Management of staff and other resource capacity
<b>Overall</b>		5%	5%	20%	8%	5%
<b>Org or Agency Type</b>	NOAA	5%	5%	23%	9%	9%
	County or Municipal			100%		
	State or Territory			17%		
	Other Federal	11%	11%	11%	11%	
	Other Type					
<b>Line Office</b>	NESDIS					
	NMFS	100%				
	NOAA Staff Office or Other					
	NOS			13%	13%	7%
	NWS		20%	40%		
	OAR					
	OMAO			50%		50%
	Not Applicable	7%	7%	21%	7%	
<b>Region</b>	Alaska	100%				
	Caribbean	17%	17%	17%		
	Gulf of Mexico	13%		13%	7%	7%
	Mid-Atlantic	33%		33%		33%
	National	7%		14%	14%	7%
	Northeast	25%	25%	25%		25%
	Pacific Islands	13%	13%	38%		
	Southeast	22%		22%		11%
	West	100%				
<b>ESF</b>	ESF #1			40%		20%
	ESF #2			50%		
	ESF #3		11%		33%	
	ESF #5		25%			
	ESF #6			100%		
	ESF #7					100%
	ESF #8					
	ESF #9					
	ESF #10	8%	8%	15%	15%	8%
	ESF #11					
	ESF #12			100%		
	ESF #13			25%		25%
	ESF #14					
	ESF #15					

Q13: Which of the following challenges is your most novel mitigation strategy referring to? (Select all that apply)

		Managing the multiple aspects of pandemic related fatigue	Resource limitations (non-personnel)	Staff safety during evacuations	Unreliability or loss of utilities (power, internet, water, cell service)	N
<b>Overall</b>		10%	3%	5%	8%	109
<b>Org or Agency Type</b>	NOAA	9%		5%	5%	72
	County or Municipal					1
	State or Territory	17%				17
	Other Federal	11%	11%	11%	22%	14
	Other Type					1
<b>Line Office</b>	NESDIS					2
	NMFS					2
	NOAA Staff Office or Other	50%				6
	NOS	7%	7%	7%	7%	54
	NWS					8
	OAR					2
	OMAO					3
	Not Applicable	14%		7%	14%	31
	<b>Region</b>	Alaska				
Caribbean		17%				15
Gulf of Mexico				13%	13%	33
Mid-Atlantic						16
National		14%	7%			35
Northeast						13
Pacific Islands		13%				14
Southeast					22%	22
West						4
<b>ESF</b>	ESF #1					11
	ESF #2	50%				5
	ESF #3				11%	15
	ESF #5	25%				15
	ESF #6					1
	ESF #7					4
	ESF #8					1
	ESF #9					4
	ESF #10				15%	39
	ESF #11					2
	ESF #12					2
	ESF #13					10
	ESF #14					1
	ESF #15					2

Q14: Which of the following specific digital response and planning tools/products would you like in the upcoming summit? (Select all that apply)

		Autonomous Underwater Vehicles (AUVs)	Centers for Disease Control and Prevention (CDC) COVID 19 status (vaccination/infection rate)	Digital Coast	Drones	Emergency Support Function (ESF) 10 Resource Advisors
<b>Overall</b>		14%	23%	27%	43%	37%
<b>Org or Agency Type</b>	NOAA	16%	29%	28%	35%	36%
	County or Municipal					
	State or Territory	7%		27%	40%	40%
	Other Federal	21%	21%	36%	79%	36%
	Other Type				100%	100%
<b>Line Office</b>	NESDIS			50%		
	NMFS		100%			
	NOAA Staff Office or Other		25%	25%		50%
	NOS	17%	33%	31%	37%	43%
	NWS	29%		29%	71%	14%
	OAR				100%	50%
	OMAO		33%			
	Not Applicable	14%	7%	24%	59%	38%
<b>Region</b>	Alaska		33%		33%	
	Caribbean	27%	20%	27%	53%	40%
	Gulf of Mexico	21%	30%	30%	52%	24%
	Mid-Atlantic	6%	13%	19%	19%	19%
	National	12%	39%	24%	24%	39%
	Northeast	8%	25%	17%	33%	17%
	Pacific Islands	15%	8%	15%	62%	15%
	Southeast	29%	24%	10%	57%	38%
	West		25%		50%	25%
<b>ESF</b>	ESF #1	18%	27%	9%	27%	18%
	ESF #2	40%	20%		40%	20%
	ESF #3	20%	27%	13%	60%	80%
	ESF #5	13%	20%	40%	60%	20%
	ESF #6					
	ESF #7	25%	25%		50%	
	ESF #8				100%	
	ESF #9			50%		25%
	ESF #10	15%	23%	21%	46%	59%
	ESF #11		50%	50%	100%	
	ESF #12			50%	50%	
	ESF #13	30%	10%	10%	50%	20%
	ESF #14	100%			100%	
	ESF #15	100%			100%	

Q14: Which of the following specific digital response and planning tools/products would you like in the upcoming summit? (Select all that apply)

		Environmental Response Management Application (ERMA) Emergency Support Function (ESF) 10 Dashboard	Health and Human Safety (HHS) Hospital status	Integrated Ocean Observing System (IOOS) gliders	NOAA Center for Operational Oceanographic Products and Services (CO-OPS) products	NOAA Marine Debris Program Emergency Response Guides
<b>Overall</b>		50%	10%	15%	33%	28%
<b>Org or Agency Type</b>	NOAA	51%	9%	20%	41%	28%
	County or Municipal					
	State or Territory	53%			13%	27%
	Other Federal	50%	21%	14%	21%	36%
	Other Type					
<b>Line Office</b>	NESDIS	50%				100%
	NMFS				50%	
	NOAA Staff Office or Other					
	NOS	59%	11%	19%	41%	30%
	NWS	29%		57%	57%	14%
	OAR	50%				
	OMAO	33%			33%	
	Not Applicable	52%	14%	7%	21%	34%
<b>Region</b>	Alaska				33%	
	Caribbean	53%		13%	33%	33%
	Gulf of Mexico	48%	9%	18%	39%	27%
	Mid-Atlantic	31%	6%	6%	19%	13%
	National	52%	9%	12%	33%	27%
	Northeast	33%	8%		25%	33%
	Pacific Islands	23%		31%	23%	
	Southeast	43%	14%	19%	43%	19%
West	25%			25%		
<b>ESF</b>	ESF #1	45%		9%	45%	9%
	ESF #2			40%	20%	20%
	ESF #3	80%		20%	27%	47%
	ESF #5	40%	13%	13%	60%	33%
	ESF #6					
	ESF #7	25%	25%	25%	75%	50%
	ESF #8					
	ESF #9	50%			25%	75%
	ESF #10	69%	5%	18%	33%	23%
	ESF #11	50%				50%
	ESF #12					50%
	ESF #13	30%		30%	40%	30%
	ESF #14			100%	100%	
	ESF #15			100%	100%	

Q14: Which of the following specific digital response and planning tools/products would you like in the upcoming summit? (Select all that apply)

		NOAA Navigation Response Teams (NRT) coastal/port survey products	NOAA Response Asset Directory (NRAD)	Remote Sensing Division photogrammetry	Vessel and Debris Response (VaDR)	Other	N
<b>Overall</b>		30%	24%	33%	39%	3%	104
<b>Org or Agency Type</b>	NOAA	36%	30%	33%	36%	3%	69
	County or Municipal				100%		1
	State or Territory	20%	13%	47%	53%	7%	15
	Other Federal	14%	14%	21%	36%		14
	Other Type				100%		1
<b>Line Office</b>	NESDIS		50%		100%		2
	NMFS		50%		50%		2
	NOAA Staff Office or Other					25%	4
	NOS	43%	31%	37%	39%	4%	54
	NWS	29%	14%	29%	14%		7
	OAR	50%	50%	50%	50%		2
	OMAO		33%	33%	33%		3
	Not Applicable	17%	10%	31%	48%		29
<b>Region</b>	Alaska	33%	33%	33%			3
	Caribbean	40%	33%	60%	73%		15
	Gulf of Mexico	33%	30%	39%	52%	3%	33
	Mid-Atlantic	25%	31%	25%	38%	6%	16
	National	21%	24%	24%	27%		33
	Northeast	33%	33%	42%	25%	8%	12
	Pacific Islands	15%	8%	31%	15%	8%	13
	Southeast	33%	29%	43%	48%		21
	West	25%	25%	50%	25%		4
<b>ESF</b>	ESF #1	45%	18%	36%	18%		11
	ESF #2	20%					5
	ESF #3	47%	13%	47%	53%		15
	ESF #5	40%	20%	40%	20%		15
	ESF #6				100%		1
	ESF #7	50%	25%				4
	ESF #8	100%	100%				1
	ESF #9	25%	25%		25%		4
	ESF #10	31%	26%	33%	54%		39
	ESF #11	100%		50%	50%		2
	ESF #12			50%	100%		2
	ESF #13	60%	20%	30%			10
	ESF #14	100%					1
	ESF #15	100%					1

Q15: How ready do you feel you and your family are for the next hurricane season or other major natural disaster?

		Very ready	Somewhat ready	Not very ready	Don't know/Not sure	N
<b>Overall</b>		32%	62%	4%	2%	109
<b>Org or Agency Type</b>	NOAA	31%	63%	4%	3%	72
	County or Municipal	100%				1
	State or Territory	29%	71%			17
	Other Federal	29%	64%	7%		14
	Other Type	100%				1
<b>Line Office</b>	NESDIS	50%	50%			2
	NMFS		100%			2
	NOAA Staff Office or Other	50%	33%		17%	6
	NOS	31%	61%	6%	2%	54
	NWS	25%	75%			8
	OAR	50%	50%			2
	OMAO	33%	67%			3
	Not Applicable	32%	65%	3%		31
<b>Region</b>	Alaska	33%	67%			3
	Caribbean	13%	80%		7%	15
	Gulf of Mexico	39%	58%		3%	33
	Mid-Atlantic	25%	69%	6%		16
	National	26%	63%	9%	3%	35
	Northeast	31%	69%			13
	Pacific Islands	43%	57%			14
	Southeast	23%	73%		5%	22
	West	25%	75%			4
<b>ESF</b>	ESF #1	27%	55%	9%	9%	11
	ESF #2	40%	60%			5
	ESF #3	33%	67%			15
	ESF #5	20%	67%	7%	7%	15
	ESF #6	100%				1
	ESF #7		50%	25%	25%	4
	ESF #8	100%				1
	ESF #9	25%	75%			4
	ESF #10	31%	69%			39
	ESF #11		100%			2
	ESF #12	50%	50%			2
	ESF #13	30%	60%		10%	10
	ESF #14		100%			1
	ESF #15	50%	50%			2

Q16: Which of the following items do you currently have that would help you prepare for the next hurricane season or other natural disaster?  
(Select all that apply)

		A planning checklist	An evacuation plan	Cash	Copies of important documents
<b>Overall</b>		42%	45%	55%	62%
<b>Org or Agency Type</b>	NOAA	43%	51%	54%	61%
	County or Municipal	100%	100%	100%	100%
	State or Territory	41%	29%	59%	65%
	Other Federal	36%	36%	57%	64%
	Other Type				100%
<b>Line Office</b>	NESDIS		50%	50%	50%
	NMFS				100%
	NOAA Staff Office or Other	80%	80%	60%	80%
	NOS	44%	50%	52%	56%
	NWS	38%	38%	50%	75%
	OAR	50%	50%	100%	100%
	OMAO	67%	67%	67%	33%
	Not Applicable	39%	35%	58%	68%
<b>Region</b>	Alaska	33%	67%	67%	100%
	Caribbean	40%	27%	47%	60%
	Gulf of Mexico	39%	58%	73%	70%
	Mid-Atlantic	31%	31%	56%	50%
	National	50%	50%	50%	59%
	Northeast	15%	38%	54%	54%
	Pacific Islands	50%	57%	71%	86%
	Southeast	45%	50%	50%	64%
	West	25%	50%	75%	100%
<b>ESF</b>	ESF #1	60%	70%	80%	70%
	ESF #2	60%	60%	80%	100%
	ESF #3	40%	40%	60%	67%
	ESF #5	50%	71%	57%	86%
	ESF #6	100%	100%	100%	100%
	ESF #7	75%	25%	50%	50%
	ESF #8	100%	100%	100%	100%
	ESF #9	33%	33%	67%	67%
	ESF #10	49%	49%	68%	70%
	ESF #11		50%	100%	50%
	ESF #12	100%	100%	100%	100%
	ESF #13	40%	40%	70%	70%
	ESF #14	100%	100%	100%	100%
	ESF #15	100%	100%	100%	100%

Q16: Which of the following items do you currently have that would help you prepare for the next hurricane season or other natural disaster?  
(Select all that apply)

		Extra food	Extra water	Other	None of the above	N
<b>Overall</b>		62%	61%	11%	2%	106
<b>Org or Agency Type</b>	NOAA	57%	58%	9%	3%	69
	County or Municipal	100%	100%			1
	State or Territory	71%	76%	24%		17
	Other Federal	71%	50%	14%		14
	Other Type					1
<b>Line Office</b>	NESDIS	50%	50%		50%	2
	NMFS	100%	100%			2
	NOAA Staff Office or Other	80%	80%	20%		5
	NOS	58%	58%	8%	2%	52
	NWS	38%	50%	13%		8
	OAR	100%	100%	50%		2
	OMAO	33%	33%			3
	Not Applicable	71%	65%	16%		31
<b>Region</b>	Alaska	67%	100%	33%		3
	Caribbean	60%	60%	13%		15
	Gulf of Mexico	61%	67%	12%		33
	Mid-Atlantic	50%	56%	13%	6%	16
	National	63%	59%	6%		32
	Northeast	46%	38%	15%	8%	13
	Pacific Islands	64%	79%	36%		14
	Southeast	59%	59%	9%		22
	West	75%	100%	25%		4
<b>ESF</b>	ESF #1	50%	60%	10%		10
	ESF #2	80%	80%			5
	ESF #3	73%	53%	7%		15
	ESF #5	64%	57%	14%	7%	14
	ESF #6	100%	100%			1
	ESF #7	25%	25%			4
	ESF #8	100%	100%	100%		1
	ESF #9	67%	67%			3
	ESF #10	70%	68%	3%	3%	37
	ESF #11	100%	100%			2
	ESF #12	100%	100%	50%		2
	ESF #13	60%	70%			10
	ESF #14	100%	100%			1
	ESF #15	100%	100%			1



Q17: Have you ever had to evacuate from your home because of a hurricane?

		Yes	No	N
<b>Overall</b>		37%	63%	109
<b>Org or Agency Type</b>	NOAA	42%	58%	72
	County or Municipal		100%	1
	State or Territory	29%	71%	17
	Other Federal	29%	71%	14
	Other Type		100%	1
<b>Line Office</b>	NESDIS		100%	2
	NMFS	50%	50%	2
	NOAA Staff Office or Other	33%	67%	6
	NOS	46%	54%	54
	NWS	25%	75%	8
	OAR	50%	50%	2
	OMAO		100%	3
	Not Applicable	29%	71%	31
<b>Region</b>	Alaska	33%	67%	3
	Caribbean	40%	60%	15
	Gulf of Mexico	52%	48%	33
	Mid-Atlantic	38%	63%	16
	National	26%	74%	35
	Northeast	23%	77%	13
	Pacific Islands	14%	86%	14
	Southeast	55%	45%	22
	West	50%	50%	4
<b>ESF</b>	ESF #1	18%	82%	11
	ESF #2	40%	60%	5
	ESF #3	53%	47%	15
	ESF #5	20%	80%	15
	ESF #6		100%	1
	ESF #7		100%	4
	ESF #8		100%	1
	ESF #9	25%	75%	4
	ESF #10	36%	64%	39
	ESF #11	50%	50%	2
	ESF #12		100%	2
	ESF #13	50%	50%	10
	ESF #14		100%	1
	ESF #15		100%	2

Q18: Was there ever a time where you did not evacuate your home because of a hurricane but wish you had?

		Yes	No	N
<b>Overall</b>		14%	86%	107
<b>Org or Agency Type</b>	NOAA	13%	88%	72
	County or Municipal		100%	1
	State or Territory	18%	82%	17
	Other Federal	17%	83%	12
	Other Type		100%	1
<b>Line Office</b>	NESDIS		100%	2
	NMFS		100%	2
	NOAA Staff Office or Other	17%	83%	6
	NOS	15%	85%	54
	NWS		100%	8
	OAR	50%	50%	2
	OMAO		100%	3
	Not Applicable	17%	83%	29
<b>Region</b>	Alaska		100%	3
	Caribbean	14%	86%	14
	Gulf of Mexico	27%	73%	33
	Mid-Atlantic	6%	94%	16
	National	6%	94%	35
	Northeast		100%	12
	Pacific Islands		100%	14
	Southeast	29%	71%	21
	West	25%	75%	4
<b>ESF</b>	ESF #1	9%	91%	11
	ESF #2	20%	80%	5
	ESF #3	21%	79%	14
	ESF #5	13%	87%	15
	ESF #6		100%	1
	ESF #7	25%	75%	4
	ESF #8		100%	1
	ESF #9	25%	75%	4
	ESF #10	16%	84%	37
	ESF #11		100%	2
	ESF #12	50%	50%	2
	ESF #13	20%	80%	10
	ESF #14		100%	1
	ESF #15		100%	2

Q19: When you had to evacuate your home because of a hurricane, how easy or difficult was it to perform your work assignments?

		Very easy	Somewhat easy	Somewhat difficult	Very difficult	Don't know/Not applicable	N
<b>Overall</b>		10%	20%	35%	18%	18%	40
<b>Org or Agency Type</b>	NOAA	13%	23%	30%	20%	13%	30
	State or Territory			80%		20%	5
	Other Federal		25%	25%	25%	25%	4
<b>Line Office</b>	NMFS		100%				1
	NOAA Staff Office or Other			50%	50%		2
	NOS	12%	20%	32%	20%	16%	25
	NWS	50%	50%				2
	OAR					100%	1
	Not Applicable		11%	56%	11%	22%	9
<b>Region</b>	Alaska		100%				1
	Caribbean		33%	50%		17%	6
	Gulf of Mexico	6%	35%	24%	24%	12%	17
	Mid-Atlantic	17%	33%	33%		17%	6
	National	22%	22%	33%	22%		9
	Northeast		67%			33%	3
	Pacific Islands		100%				2
	Southeast		17%	50%	8%	25%	12
	West		50%			50%	2
<b>ESF</b>	ESF #1			100%			2
	ESF #2			50%		50%	2
	ESF #3		13%	38%	13%	38%	8
	ESF #5		33%	67%			3
	ESF #9					100%	1
	ESF #10			64%	14%	21%	14
	ESF #11			100%			1
	ESF #13	40%		40%		20%	5

Q20: In your opinion, how long should you plan to be self-sufficient without access to electricity, gasoline, a grocery store, or pharmacy after a major hurricane or other major natural disaster?

		3-6 days	7-10 days	11-14 days	More than 14 days	No days, would seek shelter elsewhere	Don't know/Not sure	N
<b>Overall</b>		22%	32%	22%	21%	2%	1%	109
<b>Org or Agency Type</b>	NOAA	24%	33%	18%	24%	1%		72
	County or Municipal			100%				1
	State or Territory	12%	29%	29%	24%	6%		17
	Other Federal	29%	29%	21%	14%		7%	14
	Other Type		100%					1
<b>Line Office</b>	NESDIS		50%			50%		2
	NMFS	50%		50%				2
	NOAA Staff Office or Other	33%	17%	17%	33%			6
	NOS	22%	39%	20%	19%			54
	NWS	13%	25%	13%	50%			8
	OAR			50%	50%			2
	OMAO	33%	33%		33%			3
	Not Applicable	23%	26%	29%	16%	3%	3%	31
<b>Region</b>	Alaska	33%	33%		33%			3
	Caribbean	27%	27%	13%	33%			15
	Gulf of Mexico	27%	45%	21%	6%			33
	Mid-Atlantic	31%	25%		31%	6%	6%	16
	National	26%	37%	17%	20%			35
	Northeast	31%	38%	15%	15%			13
	Pacific Islands	7%	21%	14%	57%			14
	Southeast	23%	32%	32%	9%	5%		22
	West	25%	25%	25%	25%			4
<b>ESF</b>	ESF #1	27%	45%	9%	18%			11
	ESF #2	20%	40%	40%				5
	ESF #3	27%	20%	27%	27%			15
	ESF #5	20%	47%	7%	27%			15
	ESF #6			100%				1
	ESF #7	25%	75%					4
	ESF #8				100%			1
	ESF #9		50%	50%				4
	ESF #10	23%	36%	26%	15%			39
	ESF #11	50%			50%			2
	ESF #12	50%		50%				2
	ESF #13	30%	40%	20%	10%			10
	ESF #14		100%					1
	ESF #15		100%					2

Q21: In your opinion, how prepared is your official duty station (where you would normally go to work) for a major hurricane?

		Very prepared	Somewhat prepared	Not very prepared	Not at all prepared	Don't know/Not sure	N
<b>Overall</b>		29%	46%	11%	1%	13%	109
<b>Org or Agency Type</b>	NOAA	35%	40%	10%	1%	14%	72
	County or Municipal		100%				1
	State or Territory	6%	76%	18%			17
	Other Federal	21%	43%	7%		29%	14
	Other Type		100%				1
<b>Line Office</b>	NESDIS	50%				50%	2
	NMFS		50%	50%			2
	NOAA Staff Office or Other	33%	50%			17%	6
	NOS	33%	41%	9%		17%	54
	NWS	50%	25%	13%	13%		8
	OAR	50%		50%			2
	OMAO	33%	67%				3
	Not Applicable	16%	61%	13%		10%	31
<b>Region</b>	Alaska	33%	67%				3
	Caribbean		53%	13%		33%	15
	Gulf of Mexico	39%	42%	9%		9%	33
	Mid-Atlantic	25%	56%	13%		6%	16
	National	29%	46%	11%		14%	35
	Northeast	15%	77%	8%			13
	Pacific Islands	29%	57%	7%	7%		14
	Southeast	18%	59%	5%		18%	22
West	25%	50%	25%			4	
<b>ESF</b>	ESF #1	27%	45%	9%		18%	11
	ESF #2	20%	80%				5
	ESF #3	20%	47%	13%		20%	15
	ESF #5	33%	40%	7%	7%	13%	15
	ESF #6		100%				1
	ESF #7	25%	50%			25%	4
	ESF #8	100%					1
	ESF #9	50%	50%				4
	ESF #10	28%	41%	15%		15%	39
	ESF #11		50%			50%	2
	ESF #12		100%				2
	ESF #13	40%	50%			10%	10
	ESF #14		100%				1
	ESF #15		100%				2

## Appendix B

# 2022 Hurricane Summit - Pre-Summit Survey

### INTRO

The 2022 hurricane season is quickly approaching, and while we may have many of the same challenges this year, there may be new challenges as well as opportunities. NOAA will host the third annual virtual NOS Hurricane Preparedness Summit focused on personnel (people), mission, and infrastructure (PMI) to enhance our readiness and ability to support our partners.

As a valued member of the response, preparedness and recovery community, you were identified by a member of the planning committee to provide feedback to help shape this year's summit. Please provide the NOS Hurricane Preparedness Summit planning committee and the 2022 participants in the Hurricane Summit (April 20 & 21) with your thoughts and insights. Thank you very much for your past participation and for again assisting us this year. Best!

Charlie Henry  
Director, NOAA's Gulf of Mexico Disaster Response Center

If you received this email, you will be receiving a registration invite in the very near future.

Q1 What is the name of your organization/agency?

*(e.g. NOAA, Texas General Land Office (TXGLO), American Red Cross)*

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Q2 If you work or are a contractor for NOAA, select your appropriate line office:

- National Environmental Satellite, Data, and Information Service (NESDIS) (1)
- National Marine Fisheries Service (NMFS) (2)
- National Ocean Service (NOS) (3)
- National Weather Service (NWS) (4)
- Office of Marine & Aviation Operations (OMAO) (5)
- Office of Oceanic & Atmospheric Research (OAR) (6)
- NOAA Staff Office or Other NOAA Office (7)
- Not Applicable (Does not work for or are a contractor for NOAA) (8)

Q3 What region or state do you represent?

*(Select all that apply)*

- Northeast (1)
- Mid-Atlantic (2)
- Southeast (3)
- West (4)
- Caribbean (5)
- Gulf of Mexico (6)
- Pacific Islands (7)
- Alaska (8)
- National (9)

Q4 Does [\\${e://Field/ORG}](#) have a hurricane preparedness/response plan?

- Yes (1)
  - No (2)
  - Don't know/Not sure (98)
-



*Display This Question:*

*If Does  $\{e://Field/ORG\}$  have a hurricane preparedness/response plan? = Yes*

Q5 Does  $\{e://Field/ORG\}$  hurricane preparedness/response plan include provisions regarding the COVID-19 pandemic?

Yes (1)

No (2)

Q6 Do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response?

Yes (1)

No (2)

---

*Display This Question:*

*If Do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurric... = Yes*

Q7 Please select the ESF's you work under.

*(Select all that apply)*

- ESF #1: Transportation (1)
- ESF #2: Communications (2)
- ESF #3: Public Works and Engineering (3)
- ESF #4: Firefighting (4)
- ESF #5: Information and Planning (5)
- ESF #6: Mass Care, Emergency Assistance, Temporary Housing, and Human Services (6)
- ESF #7: Logistics (7)
- ESF #8: Public Health and Medical Services (8)
- ESF #9: Search and Rescue (9)
- ESF #10: Oil and Hazardous Materials Response (10)
- ESF #11: Agriculture and Natural Resources Annex (11)
- ESF #12: Energy (12)
- ESF #13: Public Safety and Security (13)
- ESF #14: Cross-Sector Business and Infrastructure (14)
- ESF #15: External Affairs (15)



I don't know (98)

Q8 Select the top five biggest challenges you anticipate for the 2022 hurricane season: (Select up to five)

- How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities (1)
- Having enough qualified personnel to respond (2)
- Access to funding to support hurricane response efforts, including additional requirements due to the pandemic (3)
- Resource limitations (non-personnel) (4)
- Staff safety during evacuations (5)
- Continuity of Operations Planning (COOP) (6)
- Return to pre-storm operational activities/capacity (7)
- Managing the multiple aspects of pandemic related fatigue (8)
- Management of staff and other resource capacity (9)
- Unreliability or loss of utilities (power, internet, water, cell service) (10)
- Facility readiness, preparedness, resilience, and response (11)
- Being able to address impacts to tribal, territorial, state and/or federal trust resources (12)
- Establishing response guidance (on scene vs remote support) (13)
- Agency COVID-19 guidelines and rules differ from state to state (14)
- Differences between local/state/federal guidelines (15)
- Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners (16)

- Coordination with and access to federal and/or state partner programs, representatives, support or services (17)
  - Loss of partner relationships without face-to-face interactions (18)
  - Other (please specify) (19)
-

Q9 Of the challenges listed below, please check any that you have found mitigation strategies for: (Select all that apply)

- How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities (1)
- Having enough qualified personnel to respond (2)
- Access to funding to support hurricane response efforts, including additional requirements due to the pandemic (3)
- Resource limitations (non-personnel) (4)
- Staff safety during evacuations (5)
- Continuity of Operations Planning (COOP) (6)
- Return to pre-storm operational activities/capacity (7)
- Managing the multiple aspects of pandemic related fatigue (8)
- Management of staff and other resource capacity (9)
- Unreliability or loss of utilities (power, internet, water, cell service) (10)
- Facility readiness, preparedness, resilience, and response (11)
- Being able to address impacts to tribal, territorial, state and/or federal trust resources (12)
- Establishing response guidance (on scene vs remote support) (13)
- Agency COVID-19 guidelines and rules differ from state to state (14)
- Differences between local/state/federal guidelines (15)
- Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners (16)

- Coordination with and access to federal and/or state partner programs, representatives, support or services (17)
  - Loss of partner relationships without face-to-face interactions (18)
  - Other (please specify) (19)
- 

Q10 For any of the challenges you selected in the previous question, please briefly describe the **ONE mitigation strategy** you have developed that you consider the **most effective**?

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Carry Forward Selected Choices from "Of the challenges listed below, please check any that you have found mitigation strategies for: (Select all that apply)"

Q11 Which of the following challenges is your most effective mitigation strategy referring to?

- How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities (1)
- Having enough qualified personnel to respond (2)
- Access to funding to support hurricane response efforts, including additional requirements due to the pandemic (3)
- Resource limitations (non-personnel) (4)
- Staff safety during evacuations (5)
- Continuity of Operations Planning (COOP) (6)
- Return to pre-storm operational activities/capacity (7)
- Managing the multiple aspects of pandemic related fatigue (8)
- Management of staff and other resource capacity (9)
- Unreliability or loss of utilities (power, internet, water, cell service) (10)
- Facility readiness, preparedness, resilience, and response (11)
- Being able to address impacts to tribal, territorial, state and/or federal trust resources (12)
- Establishing response guidance (on scene vs remote support) (13)
- Agency COVID-19 guidelines and rules differ from state to state (14)
- Differences between local/state/federal guidelines (15)



Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners (16)

Coordination with and access to federal and/or state partner programs, representatives, support or services (17)

Loss of partner relationships without face-to-face interactions (18)

Other (please specify) (19)

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Q12 For any of the challenges you previously selected, please briefly describe the ONE **mitigation strategy** you have developed that you consider the **most novel**?

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*Carry Forward Selected Choices from "Of the challenges listed below, please check any that you have found mitigation strategies for: (Select all that apply)"*

Q13 Which of the following challenges is your most novel mitigation strategy referring to?

- How to keep your people safe and maintain access to adequate protection (PPE, COVID-19 testing, vaccines) during response activities (1)
- Having enough qualified personnel to respond (2)
- Access to funding to support hurricane response efforts, including additional requirements due to the pandemic (3)
- Resource limitations (non-personnel) (4)
- Staff safety during evacuations (5)
- Continuity of Operations Planning (COOP) (6)
- Return to pre-storm operational activities/capacity (7)
- Managing the multiple aspects of pandemic related fatigue (8)
- Management of staff and other resource capacity (9)
- Unreliability or loss of utilities (power, internet, water, cell service) (10)
- Facility readiness, preparedness, resilience, and response (11)
- Being able to address impacts to tribal, territorial, state and/or federal trust resources (12)
- Establishing response guidance (on scene vs remote support) (13)
- Agency COVID-19 guidelines and rules differ from state to state (14)
- Differences between local/state/federal guidelines (15)

Coordinating deployment logistics (i.e., lodging, travel, testing) and response efforts with partners (16)

Coordination with and access to federal and/or state partner programs, representatives, support or services (17)

Loss of partner relationships without face-to-face interactions (18)

Other (please specify) (19)

---

Q14 Which of the following specific digital response and planning tools/products would you like in the upcoming summit? (Select all that apply)

- NOAA Center for Operational Oceanographic Products and Services (CO-OPS) products (1)
  - Digital Coast (2)
  - Environmental Response Management Application (ERMA) Emergency Support Function (ESF) 10 Dashboard (3)
  - Vessel and Debris Response (VaDR) (4)
  - Remote Sensing Division photogrammetry (5)
  - NOAA Navigation Response Teams (NRT) coastal/port survey products (6)
  - Health and Human Safety (HHS) Hospital status (7)
  - Centers for Disease Control and Prevention (CDC) COVID 19 status (vaccination/infection rate) (8)
  - Emergency Support Function (ESF) 10 Resource Advisors (9)
  - Integrated Ocean Observing System (IOOS) gliders (10)
  - Drones (11)
  - Autonomous Underwater Vehicles (AUVs) (12)
  - NOAA Response Asset Directory (NRAD) (13)
  - NOAA Marine Debris Program Emergency Response Guides (14)
  - Other: (Please specify) (15)
-

Q15 How ready do you feel you and your family are for the next hurricane season or other major natural disaster?

- Very ready (1)
  - Somewhat ready (2)
  - Not very ready (3)
  - Not ready at all (4)
  - Don't know/Not sure (98)
- 

Q16 Which of the following items do you currently have that would help you prepare for the next hurricane season or other natural disaster? (Select all that apply)

- Extra food (1)
  - Extra water (2)
  - Cash (3)
  - Copies of important documents (4)
  - An evacuation plan (5)
  - A planning checklist (6)
  - Other (Please specify) (7)
- 
- None of the above (8)

Q17 Have you ever had to evacuate from your home because of a hurricane?

- Yes (1)
  - No (2)
- 

Q18 Was there ever a time where you did not evacuate your home because of a hurricane but wish you had?

- Yes (1)
  - No (2)
- 

*Display This Question:*

*If Have you ever had to evacuate from your home because of a hurricane? = Yes*

Q19 When you had to evacuate your home because of a hurricane, how easy or difficult was it to perform your work assignments?

- Very easy (1)
- Somewhat easy (2)
- Somewhat difficult (4)
- Very difficult (5)
- Don't know/Not applicable (6)

Q20 In your opinion, how long should you plan to be self-sufficient without access to electricity, gasoline, a grocery store, or pharmacy after a major hurricane or other major natural disaster?

- More than 14 days (1)
- 11-14 days (2)
- 7-10 days (3)
- 3-6 days (4)
- 2 days (5)
- 1 day (6)
- No days, would seek shelter elsewhere (7)
- Don't know/Not sure (98)

Q21 In your opinion, how prepared is your official duty station (where you would normally go to work) for a major hurricane?

- Very prepared (1)
- Somewhat prepared (2)
- Not very prepared (3)
- Not at all prepared (4)
- Don't know/Not sure (98)

Q22 Thank you very much for taking the time to complete this survey. If you have any questions about the summit, please contact Katie Perry at the Coastal Response Research Center ([katie.perry@unh.edu](mailto:katie.perry@unh.edu)).

## Appendix D: Disaster Related Tools





## DISASTER RELATED TOOLS FROM NOS AND PARTNERS

NOAA and its partner agencies have tools that are useful during response to disaster events. Tools range from those that help with internal NOAA coordination to large mapping tools such as ERMA and nowCOAST for viewing large areas. In this document, a number of tools have been selected that are helpful during disaster response. Please note some tools are for internal NOAA use only and require a NOAA login for access.

### Note:

# = Requires a NOAA login

\* = tools that have authoritative sources of information.

*Authoritative Source: A source of data or information that is recognized by members of a Community of Interest (COI) to be valid or trusted because it is considered to be highly reliable or accurate or is from an official publication or reference.*

## OR&R

- [ADIOS](#) The Automated Data Inquiry for Oil Spills is NOAA's oil weathering model. It's an oil spill response tool that models how different types of oil weather undergo physical and chemical changes in the marine environment.
- [ADV InfoHub](#) The Abandoned and Derelict Vessel Information Hub is a central source of information regarding ADVs and the policies surrounding them organized at the state level. It explains how ADVs are handled by each coastal state creating a comprehensive look at the subject.
- [CAFE](#) The Chemical Aquatic Fate and Effects database is a program used to estimate the fate and effects of thousands of chemicals, oils, and dispersants. CAFE helps responders in their assessment of environmental impacts from chemical or oil spills into an aquatic environment.
- [CAMEO](#) Computer-Aided Management of Emergency Operations software suite is a set of tools designed to assist emergency planning and response—especially for events related to hazardous chemicals. There are four core programs in the suite: **ALOHA** (Areal Locations of Hazardous Atmospheres) estimates threat zones for chemical spills, including toxic gas clouds, fires, and explosions. **CAMEO Chemicals** provides critical response information and physical properties about hazardous chemicals. **CAMEO<sub>fm</sub>** manages emergency planning and response data, including facilities, chemical inventories, contact information, transportation routes, past incidents, special locations of interest, and response resources. **MARPLOT** (Mapping Application for Response, Planning, and Local Operational Tasks) is a mapping tool used for assessing geospatial information for emergency incidents and creating custom maps displaying data created in CAMEO.

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### DID WE MISS ANYTHING?

If you'd like to suggest an additional tool to be included in this document, please click [here](#) and complete our tool suggestion form.



- [DIVER](#) Data Integration Visualization Exploration and Reporting (DIVER) allows users to search and download a broad array of environmental characterization and project planning data specific to geographic regions or activities.
- [ERMA](#) The Environmental Response Management Application is an online mapping tool that integrates both static and real-time data, such as Environmental Sensitivity Index (ESI) maps, ship locations, weather, and ocean currents, in a centralized, easy-to-use format for environmental responders and decision makers. ERMA houses digital Area Contingency Plans and oil infrastructure data for the region along with environmental data enabling responders to quickly access relevant information during an incident. ERMA serves as OR&R's and NOAA's Homeland Security Program Office (HSPO) Common Operational Picture during events.
- [ESI Maps](#)\* Environmental Sensitivity Index maps provide a concise summary of coastal resources that are at risk if an oil spill occurs nearby. Examples of at-risk resources include biological resources (such as birds and shellfish beds), sensitive shorelines (such as marshes and tidal flats), and human-use resources (such as public beaches and parks).
- [GNOME](#) General NOAA Operational Modeling Environment is the modeling tool the Office of Response and Restoration (OR&R) Emergency Response Division uses to predict the possible trajectory a pollutant might follow in or on a body of water, such as in an oil spill.
- [Marine Debris Emergency Response Guides](#) are response guidance documents aimed at improving preparedness and facilitating a coordinated, well-managed, and immediate response to acute waterway debris incidents.
- [Marine Debris Tracker App](#) is a smart phone application that allows for easy data recording of marine debris found across the country.
- [MDMAP](#) Marine Debris Monitoring and Assessment Project is a citizen science initiative that engages NOAA partners and volunteers across the nation to survey and record the amount and types of marine debris on shorelines.
- [NRAD](#)# The NOAA Response Asset Directory (NRAD) is an internal all-hazards NOAA directory that includes searchable information on physical assets and services which could be used or in need of protection during response and recovery from disasters.
- [ResponseLink](#)# is an internal NOAA website which the Office of Response and Restoration uses to share information during oil spills or other pollution response operations with NOAA and our federal, state, and local government partners.

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#### DID WE MISS ANYTHING?

If you'd like to suggest an additional tool to be included in this document, please click [here](#) and complete our tool suggestion form.



## CO-OPs

- [Tides and Currents Map](#)\* displays locations of CO-OPS water level and meteorological stations. From this map you can access real-time and historical data, station information, tidal datums, tide predictions and other products for all available stations.
- [Storm Quicklook](#) provides a synopsis of near real-time oceanographic and meteorological observations at locations affected by a tropical cyclone. It is initiated when a National Weather Service (NWS) storm center issues a tropical storm or hurricane warning for the U.S. or its island possessions and updated 4 times a day.
- [Coastal Inundation Dashboard](#) displays real-time and historical coastal flooding information at CO-OPS tide gauges. Map layers include active tropical cyclone information, NWS coastal flood forecast products and NOAA Sea Level Rise Viewer. Station markers "ping" when water levels exceed NWS minor flood impact threshold.
- [1-Minute Tsunami Water Level Data](#) map provides locations of all coastal tide gauges (CO OPS, NTWC) configured to collect 1-minute water level data to support tsunami monitoring. Recent earthquake information from USGS is displayed in red.

## OCM

- [Coastal Flood Exposure Mapper](#) is an online visualization tool that supports communities that are assessing their coastal hazard risks and vulnerabilities. It creates user-defined maps showing the people, places, and natural resources exposed to coastal flooding. *The current geography includes the East Coast, Gulf of Mexico, and islands in the Pacific and Caribbean.*
- [Marine Cadastre](#) A joint BOEM and NOAA initiative providing authoritative data to meet the needs of the offshore energy and marine planning communities.
- [Digital Coast](#) is an online tool that provides coastal data, tools, training, and related information that will be useful for coastal managers.

## NGS

- [Emergency Response Imagery](#)\* The imagery is acquired by the [NOAA Remote Sensing Division](#) to support NOAA homeland security and emergency response requirements.
- [NCAT](#) The NGS Coordinate Conversion and Transformation Tool easily converts Latitude and Longitudes into different formats.

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### DID WE MISS ANYTHING?

If you'd like to suggest an additional tool to be included in this document, please click [here](#) and complete our tool suggestion form.



## OCS

- [AWOIS](#) The Automated Wreck and Obstruction Information System contains information on over 10,000 submerged wrecks and obstructions in the coastal waters of the United States. Information includes latitude and longitude of each feature along with brief historic and descriptive details.
- [Electronic Navigational Charts](#) from NOAA provide the latest navigational aids for navigable waters. Electronic Navigational Charts, which are vector versions of the charts, are available in several formats, plus a map viewer.
- [nowCOAST](#) is a web mapping portal that provides spatially referenced links to thousands of real-time coastal observations and NOAA forecasts. It is a planning aid for mariners, coastal managers, HAZMAT responders, marine educators, and researchers, allowing for display of real-time information for an area of interest.
- [Navigation Response Teams \(NRT\)](#) conduct hydrographic surveys to update NOAA's suite of nautical charts. The teams are strategically located around the country and remain on call to respond to emergencies, speeding the resumption of shipping after storms, and protecting life and property from underwater dangers to navigation.
- [Raster Navigational Chart \(RNC\) Viewer](#) allows digital viewing of paper charts. These are also available for [download](#).
- [Regional Navigation Managers](#) is a clickable map that provides contact information for Regional Navigational Managers that coordinate the Office of Coast Survey's Navigation Response Teams.
- [United States Coast Pilot](#) consists of a series of nautical books that cover a variety of information important to navigators of coastal and intracoastal waters and the Great Lakes. Issued in nine volumes, they contain supplemental information that is difficult to portray on a nautical chart.

## NATIONAL WEATHER SERVICE

- [2-Day Graphical Tropical Weather Outlook\\*](#) This online satellite viewer by the National Hurricane Center shows predictions for tropical cyclone activity for the next 48 hours for both the Eastern North Pacific and the Atlantic.

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### DID WE MISS ANYTHING?

If you'd like to suggest an additional tool to be included in this document, please click [here](#) and complete our tool suggestion form.



- [NHC Active Storms](#)\* This online satellite viewer by the National Hurricane Center shows positioning and intensity of current active tropical cyclones for both the Eastern North Pacific and the Atlantic.
- [NWS Enhanced Data Display \(EDD\)](#) is a web mapping site with many weather and incident related layers. Many of the layers are interactive for forecasts.
- [Weather & Hazards Data Viewer](#) This online mapping tool brings weather forecast information and hazards planning data into the same location—helping managers monitor storms and fire weather and visualize potential impacts. The weather forecast information is provided by NOAA nowCOAST and the NOAA National Weather Service’s National Digital Forecast Database.

## FEDERAL PARTNER TOOLS

- [Flood Event Viewer](#) This interactive map provides viewable and downloadable flood event data from the U.S. Geological Survey's Short-Term Network (STN) database.
- [HAZUS-MH](#) FEMA’s Hazards U.S. Multi-Hazards is a nationally applicable, standardized method that estimates potential losses from earthquakes, hurricane winds, and floods. State-of-the-art GIS software maps and displays hazard data and estimates of damage and economic losses to buildings and infrastructure. *\*Requires ArcGIS 10.x*
- [Hazards Data Distribution System \(HDDS\) Explorer](#) This U.S. Geological Survey’s tool is an event-based interface that provides a single point-of-entry for access to remotely sensed imagery and other geospatial datasets as they become available during a response.
- [Hurricane eMatrix](#) This OSHA tool uses hazard exposure and risk assessment matrices for individuals participating in hurricane response and recovery work based on the response activity using activity sheets.

## NGO PARTNER TOOLS

- [Coastal Resilience Mapping Portal](#) The Nature Conservancy’s online mapping tool helps users visualize future flood risks from sea level rise and storm surge.
- [Surging Seas](#) Climate Central’s web-based tool allows users to visualize areas potentially affected by sea level rise and storm surge, down to the neighborhood scale.

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### DID WE MISS ANYTHING?

If you'd like to suggest an additional tool to be included in this document, please click [here](#) and complete our tool suggestion form.