



6-2024

## 5th Annual NOAA Hurricane Preparedness Summit Report

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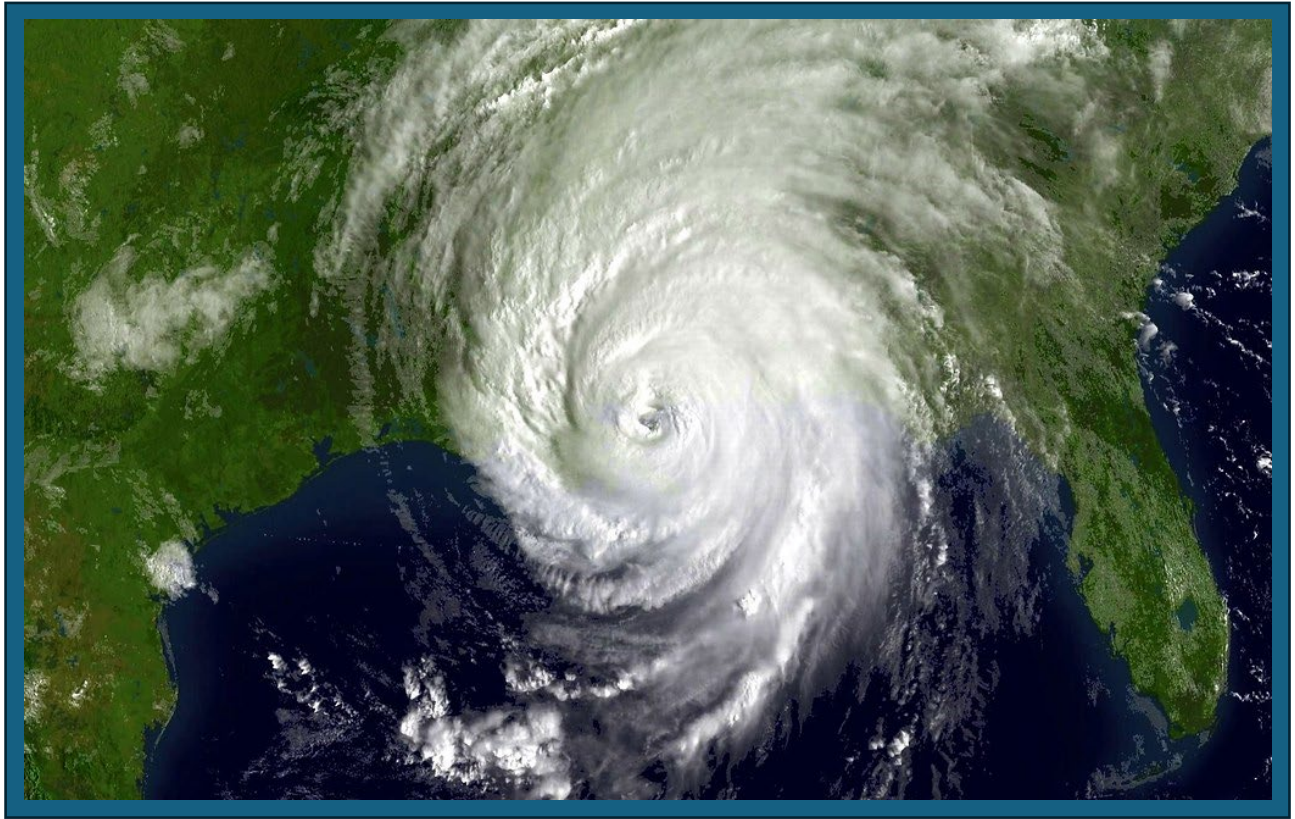
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# NOAA HURRICANE PREPAREDNESS SUMMIT 2024

April 24 & 25, 2024

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## II. Acronyms

ACE	Accumulated Cyclone Energy
API	Application Programming Interface
CO-OPS	Center for Operational Oceanographic Products and Services
COP	Common Operating Picture
CSV	Comma-Separated Values
CRRC	Coastal Response Research Center
DO	Dissolved Oxygen
DOD	Department of Defense
DOI	Department of the Interior
DPP	NOAA OR&R Disaster Preparedness Program
EDA	U.S. Economic Development Administration
EPA	Environmental Protection Agency
ERMA®	Environmental Response Management Application
ESF	Emergency Support Function
ESI	Environmental Sensitivity Index
FEMA	U.S. Federal Emergency Management Agency
FSLT	Federal, State, Local, and Territorial
FWS	Fish and Wildlife Service
GDAC	Glider Data Assembly Center
GIS	Geographic Information System
GPS	Global Positioning System
HSPO	NOAA Homeland Security Program Office
IFAS	Institute of Food and Agricultural Sciences
IOOS	NOAA Integrated Ocean Observing Office
KM	Kilometer
LIDAR	Light Detection and Ranging
LCDR	Lieutenant Commander
LCRI	Louisiana Community Resilience Institute
LO/PO	Line Office/Program Office
M	Meter
MER	Mobile Emergency Response
MPH	Miles Per Hour
NCR	Natural and Cultural Resources
NDWG	National Dislocated Worker Grants
NGO	Non-Government Organization
NGS	NOAA National Geodetic Survey
NHC	NOAA NWS National Hurricane Center
NOAA	U.S. National Oceanic and Atmospheric Administration
NOS	NOAA National Ocean Service
NWS	NOAA National Weather Service
OCM	NOAA Office of Coastal Management
OMAO	NOAA Office of Marine and Aviation Operators

ONMS	NOAA Office of National Marine Sanctuaries
OR&R	NOAA Office of Response and Restoration
PMI	Personnel, Mission, and Infrastructure
RSF	Recovery Support Function
SCAT	Shoreline Cleanup Assessment Techniques
sUAS	Small Uncrewed Aerial Systems
TCP	Tropical Cyclone Public Advisory Format
UAS	Uncrewed Aerial Systems
SUAS	Small Uncrewed Aerial Systems
USV	Uncrewed Surface Vehicles
UXS	Uncrewed Systems
UNH	University of New Hampshire
USB	Universal Serial Bus
USCG	U.S. Coast Guard
VADR	Vessel, All-hazards, Debris Response Tool

### III. Acknowledgements

The 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's DPP and the following Organizing Committee Members:

- [Nancy Kinner](#)  
UNH | Coastal Response Research Center
- [Charlie Henry](#)  
NOAA | OR&R | Disaster Preparedness Program
- [Brad Benggio](#)  
NOAA | OR&R | Emergency Response Division
- [Kyla Breland](#)  
NOAA | OR&R | Disaster Preparedness Program
- [Matthew Chasse](#)  
NOAA | Office for Coastal Management
- [Lisa Symons](#)  
NOAA | ONMS | Florida Keys National Marine Sanctuary
- [Jason Beaman](#)  
NOAA | National Weather Service
- [Capt. Eric Johnson](#)  
NOAA | Homeland Security Program Office | Emergency Planning
- [Autumn Lotze](#)  
NOAA | OR&R | Disaster Preparedness Program

This summit was facilitated by Nancy Kinner, UNH co-director of CRRC. CRRC ([www.crrc.unh.edu](http://www.crrc.unh.edu)) 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 90+ workshops that bring together practitioners, researchers, and scientists of diverse backgrounds (e.g., industry, academia, government, non-government organizations (NGOs)) to discuss and develop solutions to marine pollution and disaster problems.

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

**Charlie Henry, Director**

NOAA | OR&R | Disaster Preparedness Program

**Brad Reinhart, Hurricane Specialist**

NOAA | NWS | National Hurricane Center

**Jason Beaman, Meteorologist**

NOAA | NWS Mobile/Pensacola

**Capt. Eric Johnson, Director**

NOAA | Homeland Security Program Office | Emergency Planning

**Chris Peregrin, Reserve Manager**

Tijuana River National Estuarine Research Reserve (CA State Parks)

**Michael Allen, Fisheries Scientist**

University of Florida | IFAS Nature Coast Biological Station

**Capt. John Stark, Deputy Manager**

U.S. Fish & Wildlife Service | National Wildlife Refuge System Cedar Key

**Emily Setser, Disaster Preparedness Specialist/Meteorologist**

NOAA | OR&R | Disaster Preparedness Program

**Kyla Breland, West Coast and Pacific Islands Regional Preparedness Coordinator**

NOAA | OR&R | Disaster Preparedness Program

**Niki Pace, Research Attorney**

Louisiana Sea Grant Law & Policy Program

**Lisa Symons, Regional Response Coordinator**

NOAA | ONMS | Florida Keys National Marine Sanctuary

**Autumn Lotze, Recovery Specialist**

NOAA | OR&R | Disaster Preparedness Program

**Michael Nemith, Biologist**

NOAA | Restoration Center

**Kelly Samek, Gulf Mexico Regional Lead**

NOAA | National Sea Grant Office

**Latanya Lowery, Federal Project Officer**

U.S. Department of Labor | Employment and Training Administration

**Rusty Skinner, Chief Executive Officer**

CareerSource Citrus Levy Marion

**Dale French, Executive Vice President**

CareerSource Citrus Levy Marion

**Milton Cochran Sr., Regional Economic Development Integrator**

U.S. Department of Commerce | Economic Development Administration

**CDR Benjamin LaCour, Associate Director for Requirements & Capabilities**

NOAA | OMAO Uncrewed Systems Ops Center

**Mark White, *Manager***

Research Planning, Inc.

**Bryan Thom, *GIS Analyst***

Research Planning, Inc.

**Jennifer Horsman, *GIS Analyst/Geologist***

Research Planning, Inc.

**George Marino, *GIS Analyst***

NOAA | OR&R | Spatial Data Branch

**Edward Davis, *Oceanographer***

NOAA | Center for Operational  
Oceanographic Products and Services  
(CO-OPS)

**LCDR Aaron Colohan, *NOAA Corps  
Officer***

NOAA | Integrated Ocean Observing  
System (IOOS) Office

A special thank you to (1) Kathy Mandsager (UNH CRRC), and Wesley Lambert (UNH CRRC) for their efforts in coordinating the virtual summit, and (2) Madeline Dubosque (UNH CRRC), James Wood (UNH CRRC), Alex Magin (UNH CRRC), and Emily Peltier (UNH CRRC) for their notetaking during the event.

## IV. Pre-Summit Analyses

During the planning phase of the 2024 Hurricane Summit, Matthew Chasse (NOAA OCM) conducted an analysis that revealed the anticipated and genuine effects of lessons learned and data obtained from the 2020-2024 Hurricane Summits and Survey Reports. The analysis garnered the following common objectives between each summit, among others:

- Understanding best practices and lessons learned from the prior hurricane season.
- Improved coordination across NOAA and with Federal, State, Local, and Territorial (FSLT) partners.
- Enhancing Personnel, Mission, and Infrastructure (PMI) within NOAA to support hurricane preparedness, response, and recovery.
- Understanding gaps and challenges in hurricane preparedness across NOAA and partners

It was then decided that themes derived from the objectives above would be integrated into the 2024 Summit through presentation, evaluation, and discussion. General themes include individual preparedness, health, and safety, staff and facility resilience, and communication with NOAA and NOAA partners. Finally, the findings of the analysis



revealed five items to acknowledge when designing the 2024 Hurricane Summit and practice in future:

- Be more intentional in developing summit survey instruments to better understand the impacts of NOAA’s Hurricane Summit on organizations as they work to improve their preparedness, response, and recovery to future hurricanes or extreme storms.
- Consistent application of survey questions would be helpful for future Summits to measure trends over time.
- Consider implementing a post summit survey to get a better sense of the audience’s intent to apply information gathered during the Summit for the upcoming hurricane season.
- Targeted and consistently applied data collection and analysis of key topics hurricane preparedness, response and recovery over time can improve impact analysis.
- Consider implementing an external review of the Summit at the 10-year mark to ensure the financial investment in the Summit is appropriately valued.

## V. Executive Summary

NOAA’s DPP partnered with CRRRC to facilitate webinars on two consecutive days focusing on NOAA’s hurricane preparedness and readiness for PMI. The virtual event entitled “NOAA Hurricane Preparedness Summit 2024,” helped put NOAA in a better posture for the 2024 hurricane season by identifying best practices and lessons learned from the 2023 season, recognizing and discussing challenges related to climate change and extreme weather events, and socializing tools and resources available to support different stages of response.

The summit included plenary presentations from federal and state agency representatives outlining topics such as: interpreting and using NWS Products and Services, looking back at the 2023 hurricane season, preparedness at home, operational spotlights, and showcase technological innovations, tools, and resources.

### Summit Theme

NOAA and its partners must evolve and adapt to sufficiently prepare for and mitigate extreme weather events that now occur with increasing frequency and intensity.

### Summit Objectives

- Identify innovative solutions and strategies for improvement, including those that address challenges identified in previous hurricane seasons.

## VI. Fortify NOAA's capacity across Personnel, Mission, and Infrastructure (PMI) to support hurricane preparedness, response, and recovery

- Facilitate effective hurricane preparedness and response through improved coordination across NOAA and with our FSLT partners.

### Key Messages

- **State-of-the-Art Products and Services:** Advancing tools are making data interpretation and hurricane prediction increasingly digestible for decision-makers, responders, and the general public. NOAA and its partners are improving their cross-agency data sharing capabilities within the tools and services that are provided.
- **Climate Change:** Consistently rising ocean and atmospheric temperatures are thrusting us toward periods of heightened risk of extreme-weather events. Hurricanes are forming more frequently, rapidly intensifying, and sustaining at higher categories, indicating the need to raise efforts in preparation to mitigate response.
- **Partner Coordination, Collaboration, and Conversation:** Relationships and partnerships are at the core of emergency planning and require attention prior to the start of the extreme-weather season. Successful emergency preparation and recovery is a factor of transparency among partners.
- **Preparation from Home:** Misconceptions regarding hurricanes result in fatalities that could be avoided with sufficient preparation. Hurricane education and awareness alongside an emergency plan and preparedness kit sets individuals up for success and mitigates extreme weather events.
- **Technological Development:** Uncrewed Aerial Systems (UAS) with longer flight times equipped with next-generation sensors and data loggers provide information necessary for long-range hurricane forecasting. Unmanned Glider Systems and Gliders from IOOS and the Navy, respectively are acquiring changes in hurricane intensity, providing a comprehensive picture of characteristics in the field, and assisting NOAA modelers in improving model accuracy.
- **Recovery:** Successful case studies from the 2023 hurricane season reveal the steps taken to encourage efficient recovery in the midst of progressing storm seasons. Shoreline defense strategies, emergency planning, and personal preparation were revealed to act as catalysts for rebounding communities along with local, state, and federal assistance where necessary.

## Summit Agenda

The summit agenda can be found in Appendix A.

## VII. Day 1:

### Presentation Summaries

Presentation slides can be found in Appendix C.

### Welcome and Summit Objectives

Nancy Kinner (UNH CRRC) provided the opening statements of the summit. Charlie Henry (OR&R) reviewed the survey results and introduced the summit objectives.

### Setting the Stage:

#### ***“An Overview of the 2023 Hurricane Season and What’s New at NHC for 2024”***

Brad Reinhart, *Hurricane Specialist*, NOAA | NWS | National Hurricane Center

**Reinhart** set the stage for the summit by reviewing the events of the 2023 Atlantic and Pacific hurricane seasons. Reinhart revealed the total Accumulated Cyclone Energy (ACE) was approximately 20% above the 30-year mean in both the Atlantic and Eastern Pacific Basins. This is supported by a total of 37 named storms occurring opposed to an average of 29. There was a total of 17 hurricanes, 11 of which were major hurricanes with a majority of them occurring the Eastern Pacific Basin. Even though it was an active year, Reinhart stressed that the majority of storms remained offshore. Multiple hurricanes made landfall (e.g., Idalia, Lee, Hilary), impacting the U.S. territorial islands and mainland which ultimately resulted in 13 direct mortalities, primarily from nearshore currents. Rapid hurricane intensification and communication were two prominent concepts as a result of 2023 hurricane season. Idalia best represents rapid intensification and early communication prior to landfall where efforts were invested in public notification by utilizing news stations and social networking sites. NHC has 7 new product updates for the 2024 season, including (operationally) U.S. watches and warnings issued on intermediate advisories, public issuance at earlier intervals, additional weblinks to simplify the public advisory format (TCP), Spanish text products, (experimentally) inland U.S. watches and warnings, and international rainfall graphics.

#### ***“Interpreting and Using NWS Products and Services”***

Jason Beaman, *Meteorologist*, NOAA | NWS Mobile/Pensacola

**Beaman** discussed the “tropical mindset” and how the efforts of NWS meteorologists break down what hurricanes will look like at a local scale in simplistic terms and direct attention away from standard, larger scale models (e.g., spaghetti models, Saffir-Simpson scale). Beaman also compared actual storm impacts to prediction cones and corrected the misconception that cones predict impact area. In reality, cones accurately predict the location of the storms center 2/3 of the time and do not vary in size on a storm-to-storm basis. He mentioned Tropical Webpages and showed how information (e.g., safety margins, rapid intensification, impacts, threats) can be accessed and interpreted by a user. A key topic of Beaman’s presentation was flooding and other storm surge products the NWS has to predict and visualize related threats. Storm surge has directly taken 442 lives since 2013 and is dependent on a number of factors (e.g., storm velocity, approach angle, intensity, storm size). Potential storm surge flood maps present worst-case scenarios, with storm surge watches and warnings posting (generally) 48 and 36 hours prior to landfall, respectively. Additionally, Beaman covered wind speed simulations and stressed that personal preparations should be completed prior to the arrival of the earliest tropical storm-force winds.

## Looking Back at 2023

Capt. Eric Johnson, *Director*, NOAA | HSPO | Emergency Planning

**Captain Johnson** began by reviewing the 2023 Atlantic and Pacific hurricane seasons. He mentioned the typical implications of El Niño (i.e., less hurricanes form during years where El Niño is present) in the Atlantic Basin and how this year was an exception with the 4<sup>th</sup> most number of named storms on record, which may be explained by the record-setting sea surface temperatures. Conditions were similar in the Pacific Basin, which had an above-average year in terms of named storms in addition to major hurricanes. He mentioned Hurricanes Hilary, Dora, and Otis as they were a select few that made landfall in this region. The reoccurring theme of rapid intensification was discussed with respect to Hurricane Otis. Otis underwent an intensification due to a small band of warmer waters where winds increased 115 mph in a 24-hour period, turning a tropical storm into the strongest hurricane in the Pacific Basin on record. Johnson tied the 2024 hurricane season to recent record-breaking seasons (2017-2022) to show the quickly warming climate trend and its effect on hurricane production. He concluded with the following statement: The 2024 hurricane season has the ingredients to be an especially active season.

**“Cross Border Water, Marine Debris Impacts, and Flood Impacts from Tropical Storm Hilary”**

Chris Peregrin, *Reserve Manager*, Tijuana River National Estuarine Research Reserve (CA State Parks)

**Peregrin** introduced a case study of Tropical Storm Hilary’s impact on the ecosystem within the Tijuana River National Estuarine Reserve. He explained the Tijuana River estuary is the largest wetland in southern California which is vital to the biosphere in that region of the U.S. and Mexico, which is also in the presence of wastewater infrastructure (e.g., culverts) and treatment plants that manage the city’s municipal wastewater. When hurricane Hilary made landfall, torrential rain overwhelmed and clogged the network of culverts and pumpstations, causing the system to fail and releasing millions of gallons of wastewater into the estuary and inundating existing settling ponds. Water quality data was collected in 30 locations across the reserve to capture a comprehensive image of the reserve’s condition. Dissolved oxygen (DO) levels dropped and remained at zero for 3-4 days after hurricane Hilary, causing significant ecological disruption and forcing fish and invertebrates to leave the area in search of oxygenized water. Peregrin stressed the importance of understanding infrastructure capabilities and limitations, so the necessary resources are on hand for when things begin to go wrong. To avoid another situation such as this one, \$600-\$900 million is needed to complete the necessary upgrades.

**“Lessons in Recovery and Resilience from Hurricane Idalia in Cedar Key, FL”**

Michael Allen, *Fisheries Scientist*, UF | IFAS Nature Coast Biological Station

**Allen** provided insight to the success story surrounding Cedar Key, FL in their ability to withstand the impacts of Hurricane Idalia. The IFAS biological station located in Cedar Key was built to withstand 4-5 meters of storm surge. Hurricane Idalia brought in approximately 11 feet of storm surge alongside catastrophic rain and winds to the Cedar Key area, evaluating two aspects of modern hurricane response and mitigation efforts: Media coverage and living shoreline performance, respectively.

Two days prior to Hurricane Idalia’s landfall, the local weather channel made contact with the IFAS Nature Coast Biological Station team and requested to utilize the building as a nerve center to monitor the hurricane as it progressed. After careful thought, Allen agreed and believed the coverage would serve as a valuable education opportunity for the public. The weather channel broadcasted extensive, continuous coverage of Idalia as it made landfall and visualized concepts that are usually difficult for some individuals to comprehend, such as storm surge. The broadcast was so successful that editors came

back to Cedar Key to report on the success of living shorelines in preventing erosion, along with the resiliency of the town.

Living shoreline projects around Cedar Key were funded to implement mitigation strategies to reduce coastal erosion by utilizing native marine plants and corals. Wave energy sensors were strategically placed around beaches with and without living shorelines and monitored during the time Hurricane Idalia made landfall. The sensors detected a 15-20% reduction in wave energy across all beaches protected by living shorelines and none experienced significant erosion, some of which were completely devastated (i.e., washed out) from previous storms. Allen said all coastal vegetation and corals remains intact today, proving to be a valuable asset in reducing the impacts of storm surge and wave energy.

### ***“Recovery Lessons Learned”***

*Capt. John Stark, Deputy Manager* U.S. FWS | National Wildlife Refuge System Cedar Key

**Stark** shared two case studies from a recovery perspective after the events of Hurricane Idalia in Cedar Key, FL and the Lower Suwanee National Wildlife Refuges. A key aspect of Stark’s presentation was the emphasis on cross-agency collaboration. The FWS entered into a mutual agreement with the city of Cedar Key that allowed them to provide assistance when needed. The opportunity arose with Hurricane Idalia, stranding many people who refused to leave their homes. The FWS had heavy equipment called a MarshMaster, an amphibious vehicle which sits on pontoons tracks and served as a mechanism for rescue while the local police and fire departments were immobilized. Stark uses this example to stress cross-agency communication, encouraging the utilization all resources possible in a recovery setting to set local responders up for success. The second case study involved the theme “expect the unexpected.” In the midst of recovery efforts and assessing impacts to designated wilderness areas, Stark and team members discovered a cannonball dated to the civil war era adjacent to eagle nesting locations and a herd of manatees. FWS was contacted and a bomb squad appropriately disposed of the cannonball, again stressing the importance of inter-agency communication as well.

## Focus on Personnel: Preparing at Home

### **“Operation Preparation: Preparing for the Storm and Beyond”**

Emily Setser, *Disaster Preparedness Specialist/Meteorologist*, NOAA | OR&R | Disaster Preparedness Program

**Setser** introduced the concept of emergency planning at a domestic scale and the statistic that approximately 61% of Americans have not developed and discussed an emergency plan with their families. She also stressed that the situation becomes dangerous when supplies or evacuation and emergency plans are not in place. There is no “one size fits all” approach to emergency planning and the decisions made will ultimately be location-specific, however, one must be prepared for all possible disaster events. Setser also brought to light that allergies or other ailments that need intermittent medical intervention be paramount when considering supplies. Batteries, cash, proof of residency, images of belongings, and emergency plans for pets were all items mentioned that should be a part of a successful emergency plan. An individual should have enough resources on hand to be able to last for two weeks without contact with the outside world. This preparation at a personal level overall alleviates the stress experienced by Federal Emergency Management Agency (FEMA) personnel and first responders. Fema.gov has additional information on being prepared.

### **“Building a Preparedness Kit on a Budget”**

Kyla Breland, *West Coast and Pacific Islands Regional Preparedness Coordinator*, NOAA | OR&R | Disaster Preparedness Program

**Breland** presented her success finding affordable supplies from a local convenience store for the purpose of disaster preparedness. The budget was set at \$50 and was spent on recommended items to have in case of an emergency. The first and most important item Breland mentioned was reusable water bottles. In the moments before a disaster, one of the primary products sold out from a majority of stores are single-use water bottles. Having refillable bottles on hand is key for being able to sustain oneself and family for the standard two-week period. Breland also emphasized NOAA radios, which can double as flashlights and do not require batteries. These devices are solar-powered and even have USB ports for charging other devices (e.g., cell phones, GPS). Having a first-aid kit is essential as well. Standard first-aid kits come prepared with two weeks’ worth of supplies. Breland provided each item she purchased and summarized uses, pricing, and more.

## **“Navigating Federal Disaster Aid: Resources for Community Understanding and Preparedness”**

Niki Pace, *Research Attorney*, Louisiana Sea Grant Law & Policy Program

**Pace** presented on a project conducted by the Louisiana Sea Grant that assisted the residents of Louisiana in comprehending the available federal aid types in the wake of an extreme storm event. Louisiana Sea Grant has developed fact sheets (in progress), video components, a website, and opportunities for in-person engagement to provide multiple avenues of communication and maximize information sharing. Pace emphasized that all resources (i.e., aid request forms) available on the websites are small enough to be accessible over the phone, which has been an issue in the past. The fact sheets contain fisheries, storm debris, and video series information that can be utilized by people of many and all backgrounds in requesting aid. A significant part of the project was providing resources translated from English to Spanish and Vietnamese, who have a large presence in the fishing industry in southeast Louisiana. Pace depicted in-person engagement using examples and future workshops with local leaders, homeowner’s associations, and fisheries personnel which distributes information to as wide an audience as possible.

## VIII. Day 2:

### Welcome and Summit Overview

Nancy Kinner (UNH CRRC) provided the opening statements of the summit. Captain Eric Johnson (NOAA HSPO) reviewed the material of Day 1 and provided an overview of the HSPO.

### NOAA Support in Disaster Recovery: Looking Back and Looking Ahead

#### **“Recovery Support Landscape Overview”**

Autumn Lotze, *Recovery Specialist*, NOAA | OR&R | Disaster Preparedness Program

**Lotze** gave an in-depth review of disaster recovery support available and how individual agencies can coordinate to maximize resources. Recovery Support Functions (RSF) aim to reduce the time it takes to restore and redevelop after a disaster by providing structured collaboration and using the best available science. Lotze emphasized the national preparedness system, processes and how “plugging into” an established framework for how a community works together before and after an event is paramount in a scenario that requires support. NOAA’s role in recovery was reviewed and depicted as a vast component of scientific knowledge and networking to the recovery landscape that other partners can leverage. Lotze concluded with a summary of NOAA’s recent success stories and noted



that advancements were impossible if not for the coordination between all programs, offices, or agencies involved.

## Operational Spotlights

### **“Natural & Cultural Resources RSF: Post Disaster Coral Restoration in Puerto Rico”**

Michael Nemith, *Biologist*, NOAA | Restoration Center

**Nemith** discussed response and recovery efforts resulting from hurricanes that impacted Puerto Rico and the U.S. Virgin Islands in 2017 while emphasizing effects on coral reefs. Hurricane Maria caused significant wave action and storm that impacted multiple fronts on the U.S. Virgin Islands and Puerto Rico. NOAA’s restoration center along with others were involved with ESF-10 once response began in an effort to salvage up to 1,000 vessels, minimizing additional environmental impacts. There was also capacity for preliminary impact assessments on coral reef resources and habitats. However, due to the size of the storm and limited resources, funding quickly dissipated which initiated coordination with the Natural and Cultural Resources (NCR) RSF and Coastal Working Group to gather local jurisdictions and partners. Visual assessments and restoration efforts ultimately revealed ~11% of corals had detached and piled up depending on storm surge strength. A “Hurricane Coral Reef Assessment and Triage in Puerto Rico” story-map was maintained to provide real-time updates to restoration efforts, increasing public awareness. The Coastal Working Group and NCR RSF concluded recovery by having used FEMA’s Public Assistance program and Hazard Mitigation Grant Program that addressed damages and provided technical support to local jurisdictions, respectively.

### **“Community Assistance RSF: Sea Grant & Louisiana Community Resilience Institute”**

Kelly Samek, *Gulf Mexico Regional Lead*, NOAA | National Sea Grant Office

Niki Pace, *Research Attorney*, Louisiana Sea Grant Law & Policy Program

**Samek and Pace** provided an overview of instances when Louisiana Sea Grant’s authorities could be leveraged to support community capacity building in post-disaster situations. The National Sea Grant provides partnerships between the federal government and universities to employ research to tackle marine issues. Flooding events in 2016 (March, August) yielded 7 trillion gallons of excess water in Louisiana’s waterways which prompted FEMA to award funds to Louisiana Sea Grant and, in turn, the Louisiana Community Resilience Institute (LCRI). This funding brought elected leaders along with subject matter experts from 6 different communities together in a studio format to

brainstorm routes to achieve recovery. Upon the arrival of Hurricanes Laura and Ida in 2020 and 2021, respectively, the studio was utilized to identify post-disaster recovery projects and produced technical handouts from each. Lessons learned from these cases reveal that the National Sea Grant Program must be involved early in the planning process to be given ample time to arrange funding sources.

***“Interagency Collaboration to Support Aquaculture Workforce in Florida”***

[Latanya Lowery, Federal Project Officer](#) U.S. Department of Labor | Employment and Training Administration

[Rusty Skinner, Chief Executive Officer](#), CareerSource Citrus Levy Marion

[Dale French, Executive Vice President](#), CareerSource Citrus Levy Marion

[Milton Cochran Sr., Regional Economic Development Integrator](#), U.S. Department of Commerce | Economic Development Administration

**Lowery, Skinner, French, and Cochran Sr.** described National Dislocated Worker Grants (NDWG) and the work that has resulted from recent disasters. Lowery first reviewed the NDWG application, technical assistance, and who qualifies for the disaster emergency grant. Grant funds are available for application as soon as natural disaster warnings are put in place, at which point the state receiving the forms (i.e., SF 424, SF 424A, and NDWG forms) coordinate with local offices and reach out to the national NDWG office to request funds according to what was requested. Lowery stressed an important aspect of this process is the state that requests funding must be able to justify where resources are allocated. She also covered rapid response (i.e., Federal Code – 20 CFR 682.300) funding and how it ensures applicants are prepared when natural disasters are on the way. An emphasis on partnerships and coordination concluded Lowery’s talk.

Skinner and French outlined how the local delivery of NDWG services impacted the recovery of Cedar Key, FL in the wake of Hurricane Idalia. Two primary industries affected by Idalia in Cedar Key were shellfish farming and tourism. While there was an 80% loss of income within the community, individuals were hesitant to accept the help of the NDWG. The U.S. Economic Development Administration (EDA), the University of Florida, and the FL department of commerce were leveraged as opportunities to connect with the public and construct the trust required for fruitful relationship and a rapid recovery. Public meetings along with private conversations were another route to finalizing the installation of available funds to the community. Since the launch of the program, 174 individuals have enrolled and a total of \$447,354 has been granted to Cedar Key.

Cochran Sr. lastly covered the importance of the National Disaster Recovery Framework. The EDA was able to rapidly administer funds to severely impacted communities while collaborating and socializing the benefits of the program with all levels of government. The local workforce was able to get back to pre-Idalia levels much faster than if there had not been any government intervention. Cochran Sr. often revisited the idea of a “local champion” who instilled trust in other members of the community that were skeptical of assistance offered by the federal government.

## Showcase Technological Innovations, Tools, and Resources

### “Uncrewed Aerial Systems (UAS)”

CDR Benjamin LaCour, *Associate Director for Requirements & Capabilities*, NOAA | OMAO Uncrewed Systems Ops Center

**LaCour** provided insight to the state-of-the-art UAS used by the NOAA Uncrewed Systems (UXS) Operations Center for hurricane surveillance. LaCour reviewed NOAA’s intimate history with UAS systems, stating annual flight hours have been increasing steadily over the past 20 years with approximately 3,000 flights being conducted in the last year alone. 10% of flights have been designated to storm surveillance and research using small UAS (sUAS) due to their capacity for collecting high resolution data over longer periods of time compared to other methods of sampling (e.g., satellites). For forecasting, the Altius and Global Hawk sUAS systems have proven valuable assets in monitoring hurricanes and providing validation data for other remote sensing equipment, most recently while observing Hurricane Ian. LaCour also stressed the evolution of long-range UAS monitoring capabilities and how the information collected continues to improve models published by NOAA forecasters. Data collected extreme distances away from low pressure systems under conducive conditions fill the gaps left behind by more expensive fixed-wing surveys. Air-water interface Uncrewed Surface Vehicles (USV) are also being deployed in and around hurricanes to provide additional real-time data to NOAA forecasters, further improving models. Lastly, LaCour gave insight to UAS deployments in the response phase post-storm event. Visible light and light detection and ranging (LiDAR) sensors are used for small-scale photogrammetry and damage assessment, however, current limitations for UAS deployment reveal crewed aircraft are better options in response.

## “VADR”

Mark White, *GIS Manager*, Research Planning, Inc.

Bryan Thom, *GIS Analyst*, Research Planning, Inc.

Jennifer Horsman, *GIS Analyst/Geologist*, Research Planning, Inc.

**White, Thom, and Horsman** depicted the Vessel, All-hazards, Debris Response Tool (VADR) and its integration into NOAA’s response toolbox as a valuable asset in hurricane response and recovery. White explained VADR is a geographic information system (GIS) platform designed for mobile emergency response (MER) and ESF-10 responses and supports environmental sensitivity index (ESI) mapping, shoreline cleanup assessment techniques (SCAT) training, SCAT data management, aerial imaging assessment, and more. Data can be rapidly analyzed in VADR on any mobile device and uploaded to NOAA’s common operating picture (COP), the Environmental Response Management Application (ERMA), within 5 minutes and ultimately providing decision-makers with the information necessary to deploy response assets. High-resolution UAS imagery is collected and analyzed within a 12-hour period at a low cost, identifying derelict vessels, marine debris, or any other hazards that require the attention of response personnel.

Thom provided insight to the workflow of data processed in VADR. Imagery and other calibration (i.e., ground truthing) data is fed directly into VADR where it can be analyzed and visualized. U.S. Coast Guard (USCG) and state assessment teams are capable of accessing the VADR application from mobile device or desktops, getting valuable information in the hands of first responders. Multiple map formats are available in VADR and for individuals from various backgrounds and prohibits them from editing maps outside their group. Thom expressed filtering maps, setting geo-triggers, and target identification have proven especially helpful in navigating the volume of data housed by VADR.

## “ERMA”

George Marino, *GIS Analyst*, NOAA | OR&R | Spatial Data Branch

**Marino** overviewed ERMA® and its abilities as the common operating platform for NOAA and NOAA partners. ERMA is capable of rapidly uploading and displaying spatial data on an online platform that’s easily digestible for end-users within 8 different regions of the U.S. Hurricane data visualized in ERMA includes pre-storm water levels via buoys, storm trajectories, and storm surge levels once the hurricane arrives, among other things. By being displayable on any mobile device, Marino explained ERMA is publicly accessible

(N.B., ERMA accounts are necessary to access sensitive information) and datasets or subsets can be downloaded and filtered depending on specific uses. Users who wish to access high-security data require sponsorship from a member of NOAA OR&R and must remain active on their account for it to remain viable. Hurricane Charts, storm surge models, critical infrastructure, and imagery from the National Geodetic Survey and external partners are accessible from ERMA. Weather data from the NWS can also be paired with any spatial dataset, providing a comprehensive mapping product depicting the area of interest along with each hurricane's unique characteristics. Satellite data can also be leveraged within ERMA to identify large hazards such as oil spills or other sources of pollution. Fixed-wing-surveys conducted by the National Geodetic Survey (NGS) are processed into mosaics, allowing for comparison and contrast of satellite imagery to that of higher-resolution. Lastly, Marino spoke how filtering each data set using attributes and queries is streamlined to get valuable information into the hands of decision makers.

### **“CO-OPS”**

Edward Davis, *Oceanographer*, NOAA | Center for Operational Oceanographic Products and Services (CO-OPS)

**Davis** covered the mission CO-OPS and emphasized how they provide decision-support to address coastal hazards and inundation. For this talk, Davis focused on the National Ocean Service (NOS) Coastal Inundation Dashboard. The NOS dashboard is an interactive web map that allows users to create customized maps to share publicly. NWS historical and forecast data can be used in constructing the map and has been helpful in visualizing storm surges, cones of uncertainty, and wind fields brought by hurricanes. A unique feature to the dashboard allows users to access “impact graphics” from the map legend that reveals a library of geo-rectified images of hurricane effects. A webcam feature is currently in development that would allow live streaming as well, showing storm events in real-time. The dashboard is updated, at a minimum, 3 times daily during an active storm. The updates include text analyses and information of the storm's location and water levels. Individual water level stations can be compared to closely monitor the progression of the storm surge as it advances on a location within the dashboard, among other things (i.e., annual and monthly high tide outlooks). These data tables and figures also provide predicted water levels, wind speed, gust speed, barometric water level, and historical data from each in the past 72 hours along with sea level trends and water level exceedance probabilities, respectively. Post-storm event, CO-OPS collects all peak water levels and visualizes them on an online web mapping Application Programming Interface (API), publishing and making all data available in CSV format.

### **“IOOS (Glider Systems)”**

LCDR Aaron Colohan, *NOAA Corps Officer*, NOAA | Integrated Ocean Observing System (IOOS) Office

**Colohan** described NOAA Hurricane Gliders and their contribution to NOAA hurricane intensity forecasts by monitoring subsurface ocean temperatures and salinity. Gliders are USVs that track with developing low-pressure systems and supply NOAA forecasters with the necessary data to refine their ocean models. An average of 100,000 sea temperature and salinity profiles are captured in any given hurricane season. The Glider Data Assemble Center (GDAC) provides all information associated with gliders sampling coastal regions and is publicly available in real-time. Colohan provided an example of profiles collected from the Mid-Atlantic Bight Cold Pool where they were able to observe the thermocline approximately ~15m beneath the water’s surface and above a 1,000km long, shelf-wide cold bottom layer. Here, there was a clear difference in seasonal temperature differences within the cold pool itself and is a main research point for how this profile affects changes in hurricane intensity. An area to improve on for the future is maintaining glider operations year-round, rather than just hurricane season and integrating collected data into global models (N.B., Colohan found a 56% increase in model accuracy when temperature and salinity profiles were included). Challenges with gliders primarily involve the timing of deployment and quantity. The goal is to avoid sampling within hurricanes, rather before and after to observe changes to temperature and salinity profiles. Only 25 gliders currently exist and limit the coverage that NOAA and NOAA partners can cover within the Atlantic. However, gliders are one component of the integrated observing system and work in conjunction with UAS, sail drones, satellites, and more. NOAA partners further assist “filling the gaps” left behind by gliders. Colohan was clear in his emphasis of partnership, stating that it would not be possible for NOAA/IOOS to complete the work alone.

## **IX. Summit Findings and Recommendations**

Findings were identified during the summit and the Summit’s Steering Committee made recommendations to improve NOAA’s hurricane preparedness and response capabilities.

### **Advance NOAA’s Ability to Adapt and Respond to the Effects of a Changing Climate and Extreme Weather Events**

**“Enhance NOAA readiness and response posture ahead of the next hurricane/typhoon season.”**

### 2024 Summit Objectives:

- **Identify innovative solutions and strategies for improvement, including those that address challenges identified in previous hurricane seasons.**
- **Fortify NOAA's capacity across Personnel, Mission, and Infrastructure (PMI) to support hurricane preparedness, response, and recovery.**
- **Facilitate effective hurricane preparedness and response through improved coordination across NOAA and with our FSLT partners.**

### Review of Past Hurricane Summits:

Prior summits (2020-2023) offered clear connections between individual Preparedness, Health, and Safety challenges and decreased concerns around these as organizations implemented best practices.

There was no appreciable difference in how organizations were able to use the summit to inform their efforts to improve Staff and Facility Resilience. Participants noted that this is an ongoing challenge, and NOAA and its partner organizations should continue efforts to increase the sharing of best practices and lessons learned.

Communications was consistently part of all the prior Hurricane Summits. Over time, specific focus on communications-related issues (e.g., underserved communities, communication of risk) were addressed and dialog around the issues have evolved and become a large part of the discussion. Overall, based on historical data, the summits have increased the conversation, internally and with partners, around hurricane preparedness, response and recovery.

Moving beyond the 2024 summit, NOAA should develop a suite of metrics to better understand the impacts of the Hurricane Summit on targeted audiences, internally and externally, as it works to improve preparedness for, response to, and recovery from future hurricanes or extreme storms.

NOAA should continue to implement a pre-summit survey. The Steering Committee should consider post summit evaluation techniques to get a better sense of the audience's intent to apply information gathered during the summit for the upcoming hurricane season. Information could also be gathered on how participants intend to use the knowledge and resources gained (NOAA products and services) to improve their preparedness, response, and recovery actions.

## **Summit Audience**

The summit focuses on enhancing NOAA's readiness and response posture which includes effective collaboration and coordination with its partners. To achieve the stated objectives, the summit audience includes internal and external partners. However, the findings and recommendations are limited to actions within NOAA's scope to improve preparedness, response, and recovery to hurricanes.

## **Findings and Recommendations from the 2024 Hurricane Summit**

The following findings and recommendations were identified by the Summit's Steering Committee to continue efforts towards improving NOAA's hurricane preparedness and response capabilities.

- 1) Finding: NOAA National Weather Service indicated an upward trend in the rapid intensification of tropical cyclones, which often leads to stronger storms. The increase in occurrences and destruction from these storms highlights the importance of enhanced response coordination and agility across NOAA.
  - a) Recommendations:
    - i) NOAA personnel and facilities within hurricane prone areas should reassess and update their field operations to enable a greater state of daily preparedness. This will facilitate rapid shutdown and evacuations of personnel for rapid intensification storms.
    - ii) Review operational plans and procedures for NOAA response personnel to affirm rapid deployment of necessary resources.
- 2) Finding: Improvements to modeling and post-disaster damage assessments indicate variability of trends and hazard impacts year to year. Risk communication and outreach activities should align with changing trends and hazard impacts and be collaborative across NOAA and with partners.
  - a) Recommendations:
    - i) Enhance community understanding of hurricane-related risk through improved coordination and collaboration between NOAA offices providing hurricane tools, products, and services.
    - ii) Ensure equitable access to and usability of NOAA's climate services, tools, and resources.



- iii) Support engagement with local communities to highlight post-disaster lived experiences. Leverage trusted voices within the community to improve awareness, outreach, and engagement with available forecasts, advisory tools, graphics, and other resources with and in support of local community organizations through shared messaging. (e.g., in partnership with [NOAA's Office of Education](#))
  - iv) Continue to integrate social science research to inform enhanced risk communication and evidence-based decision making at the local level.
- 3) Finding: Anthropogenic impacts (i.e., growth management, inadequate infrastructure including stormwater and wastewater systems) may exacerbate hurricane-induced watershed impacts.
- a) Recommendation:
    - i) Explore improved information sharing and coordination with other federal agencies (e.g., FEMA, U.S. EPA, DOD, DOI), including on funding opportunities, to encourage a more coordinated approach to reducing inland storm impacts and improving critical infrastructure resiliency.
    - ii) Support cross-jurisdictional watershed or landscape scale planning with partners to mitigate future watershed impacts from intense or long-duration hurricane induced precipitation events.
- 4) Finding: Increased frequency and intensity of storms further diminishes the adaptive capacity of local communities. Communities have limited capabilities and resources to respond to the perpetual cycle of disasters. This is especially true for small rural and island communities as well as those that have been historically marginalized, underserved, or underrepresented.
- a) Recommendations
    - i) Identify and catalog NOAA products, services, and expertise that improve community-level response and recovery capabilities prior to the hurricane season. This may include providing materials in other languages to reach non-English speakers.
    - ii) Implement targeted outreach of identified and cataloged NOAA hurricane-related tools and resources in partnership with community partners.

- iii) Provide technical assistance in collaboration with other federal and state partners to strengthen local communities' response and recovery capacity, where appropriate.
- 5) Finding: Personal preparedness expenses can be daunting but are manageable when repurposing existing items. Households should also consider potential disaster recovery needs and financial preparedness as part of their planning.
- a) Recommendation:
- i) NOAA, Staff-Offices, LOs, POs, Divisions and supervisors should promote personal and family preparedness planning and share useful and creative ideas.
  - ii) Use READY.GOV, [Sea Grant Homeowner's and Residents Handbooks](#), and other lists as guidance, but tailor kits to match the family's human and furry/scaly needs. Repurpose daily items, where appropriate.
  - iii) Plan not just for hurricanes, but for all threats to where you live.
  - iv) Emphasize the importance of recovery considerations in NOAA workforce personal preparedness efforts, including [financial preparedness](#) for post-disaster needs.
- 6) It is as important for communities to prepare for recovery as it is to prepare for response. A range of resources are available to assist.
- a) Recommendations:
- i) Continue to build awareness of NOAA's role in federal disaster recovery support operations and enhance planning, coordination, and relationship building for recovery support delivery.
  - ii) Emphasize the importance of partners to incorporate disaster recovery considerations into coastal planning and preparedness efforts.
  - iii) Raise awareness of and assist partners in accessing relevant federal and non-federal resources to support pre-disaster planning and post-disaster recovery needs, e.g.:
    - (1) Planning: [FEMA Community Recovery Management Toolkit](#), [National Resilience Guidance](#)
    - (2) Accessing Assistance: [LA Sea Grant Disaster Aid Overview & Fact Sheets](#), [DisasterAssistance.gov](#)

## X. Appendices

- A. Summit Agenda
- B. Poll Results
- C. Summit Presentations
- D. Disaster Related Tools from NOS Partners

# APPENDIX A

## Summit Agenda

# NOAA HURRICANE PREPAREDNESS SUMMIT

## 2024 Summit Theme:

Advance NOAA's Ability to Adapt and Respond to the Effects of a Changing Climate and Extreme Weather Events

April 24 & 25, 2024

### 2024 Summit Objectives:

- Identify innovative solutions and strategies for improvement, including those that address challenges identified in previous hurricane seasons.
- Fortify NOAA's capacity across Personnel, Mission, and Infrastructure (PMI) to support hurricane preparedness, response, and recovery.
- Facilitate effective hurricane preparedness and response through improved coordination across NOAA and with our federal, state, local, territorial, and tribal partners.

\*\*\*\*\*

## Wednesday 24 April (Day 1)

1 - 5 PM (All times are EDT)

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

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

1:05 **Summit Objectives and Context**

*Charlie Henry, NOAA OR&R, Disaster Preparedness Program, Gulf of Mexico Disaster Response Center*

1:25 **Setting the Stage: An Overview of the 2023 Hurricane Season and What's New at National Hurricane Center for 2024**

*Brad Reinhart, Hurricane Specialist, NOAA NWS National Hurricane Center*

2:00 **Interpreting and Using NWS Products and Services**

*Jason Beaman, National Weather Service Mobile/Pensacola*

2:35 **BREAK**

2:45 **Looking Back at 2023**

*Capt Eric Johnson, NOAA Homeland Security Program (HSPO)*

- Cross border water/marine debris impacts/Flood and debris impacts from the Tropical Storm Hillary  
*Chris Peregrin, Tijuana River National Estuarine Research Reserve (CA Parks)*
- Lessons in Recovery and Resilience from Hurricane Idalia in Cedar Key, Florida  
*Michael Allen, University of Florida/IFAS Nature Coast Biological Station*
- Recover Lessons Learned  
*John Stark, U.S. Fish & Wildlife Service, National Wildlife Refuge System Cedar Key*

3:55 **Focus on Personnel: Preparing at Home**

- Operation Preparation: Preparing for the Storm and Beyond  
*Emily Setser, Disaster Preparedness Specialist/Meteorologist, OR&R's Disaster Preparedness Program*
- Building a Preparedness Kit on a Budget  
*Kyla Breland, NOAA OR&R Disaster Preparedness Program*
- Navigating Federal Disaster Aid: Resources for Community Understanding and Preparedness  
*Niki Pace, Research Attorney, Louisiana Sea Grant Law & Policy Program*

**Q&A / Participant Discussion**

4:50 **Wrap Up**

*Lisa Symons, Hurricane Summit Steering Committee Members*

5:00 **ADJOURN**

\*\*\*\*\*

**Thursday 25 April (Day 2)**

**1:00 – 5:00 PM (EDT)**

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

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

1:05 **Welcome**

*Capt Eric Johnson, NOAA Homeland Security Program*

1:15 **NOAA Support in Disaster Recovery: Looking Back and Looking Ahead  
Recovery Support Landscape Overview**

(1:20) – Autumn (60 min for total session)

*Autumn Lotze, NOAA OR&R Disaster Preparedness Program Recovery Specialist*

**Operational Spotlights:**

- Natural & Cultural Resources RSF: Post-Disaster Coral Restoration in Puerto  
*Michael Nemeth, NOAA Restoration Center*
- Community Assistance RSF: Sea Grant & Louisiana Community Resilience Institute  
*Kelly Samek, Gulf of Mexico Regional Lead, NOAA National Sea Grant Office*  
*Niki L. Pace, Louisiana Sea Grant*
- Interagency Collaboration to Support Aquaculture Workforce in Florida  
*Latanya Lowery, U.S. Department of Labor, Employment and Training Administration*  
*Rusty Skinner and Dale French, CareerSource Citrus Levy Marion*  
*Milton Cochran Sr., U.S. Department of Commerce, Economic Development Administration*

**Q&A / Participant Discussion**

*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 <https://crrc.unh.edu/resource/5th-annual-noaa-hurricane-preparedness-summit-2024>*

2:20 **BREAK**

2:30 **Showcase Technological Innovations, Tools and Resources**

- Uncrewed Aerial Systems (UAS) – *CDR Benjamin LaCour, NOAA, OMAO Uncrewed Systems Ops Center*
- VADR – *Mark White, Bryan Thom, Jennifer Horsman of Research Planning Inc (RPI)*
- ERMA – *George Marino, NOAA OR&R Spatial Data Branch*
- CO-OPS – *Edward Davis, Oceanographer for NOAA's Center for Operational Oceanographic Products and Services (CO-OPS)*
- IOOS (Glider Systems) – *LCDR Aaron Colohan, NOAA Integrated Ocean Observing System (IOOS) Office*

4:30 **Wrap Up and Path Forward**

*Kyla Breland, NOAA OR&R Disaster Preparedness Program, Steering Committee Member*

5:00 **ADJOURN**

## APPENDIX B

### Summit Presentations



# NOAA Hurricane Preparedness Summit 2024

**Nancy E. Kinner, Facilitator**  
**Coastal Response Research Center (CRRC)**  
**University of New Hampshire**

**April 24, 2024**



# COASTAL RESPONSE RESEARCH CENTER (CRRC)

- Partnership between NOAA's Office of Response and Restoration and the University of New Hampshire
- Since 2004
  - UNH Co-Director – Nancy Kinner
  - NOAA Co-Director – Troy Baker



**Coastal Response  
Research Center  
(NOAA \$)**

**Center for Spills and  
Environmental Hazards  
(All Other \$)**

- Conduct and Oversee **Basic** and **Applied** Research and Outreach on Spill and Other Environmental Disaster Response and Restoration
- Transform Research **Results into Practice**
- Serve as **Hub for Spill and Environmental Disaster R&D**
- **Facilitate Interaction** Among Spill/Environmental Disaster Community (All Stakeholders)
- **Educate/Train Students for** Careers in Response and Restoration



# Hurricane Summit 2024

## STEERING COMMITTEE

Nancy Kinner, UNH CRRC

Charlie Henry, NOAA OR&R GoM DRC

Lisa Symons, NOAA ONMS

Matthew Chasse, NOAA OCM

Brad Benggio, NOAA OR&R ERD

Capt Eric Johnson, NOAA HSPO

Kyla Breland, NOAA DPP

Jason Beaman, NOAA NWS



# HOW TO PARTICIPATE

- **Attendees:** Muted & camera off
- **Panelists:** Unmute & camera on ONLY when speaking
- **Questions for Panelists:** Please put them in the Q&A or Chat panel
- **Download GoToWebinar** application vs. online browser
- **If you have access issues, please contact Lisa [Lisa.Symons@noaa.gov](mailto:Lisa.Symons@noaa.gov), cell 301-529-1860 or Kathy at [kathy.mandsager@unh.edu](mailto:kathy.mandsager@unh.edu), cell 603.498.8010**



# Q&A Tool

- **Type questions in Q&A space as you think of them**
  - No need to wait until the Q&A session in the agenda
- Located in main tool bar
- Q&A and Chat will be monitored and questions collated
- Questions may be read aloud or addressed in the Q&A Tool



# For More Information

- Previous Hurricane Summit reports
- 2024 Hurricane Summit Survey Results
- Disaster Related Tools from NOAA and Partners
- All presentations (available post-workshop)

Available on workshop webpage:

<https://crrc.unh.edu/resource/5th-annual-noaa-hurricane-preparedness-summit-2024>



**THANK YOU FOR LISTENING**  
**.....And Away We GO.....**

**<https://crrc.unh.edu/resource/5th-annual-noaa-hurricane-preparedness-summit-2024>**





# 5<sup>th</sup> Annual NOAA Hurricane Preparedness Summit



## Summit Objectives and Context

**Charlie Henry**

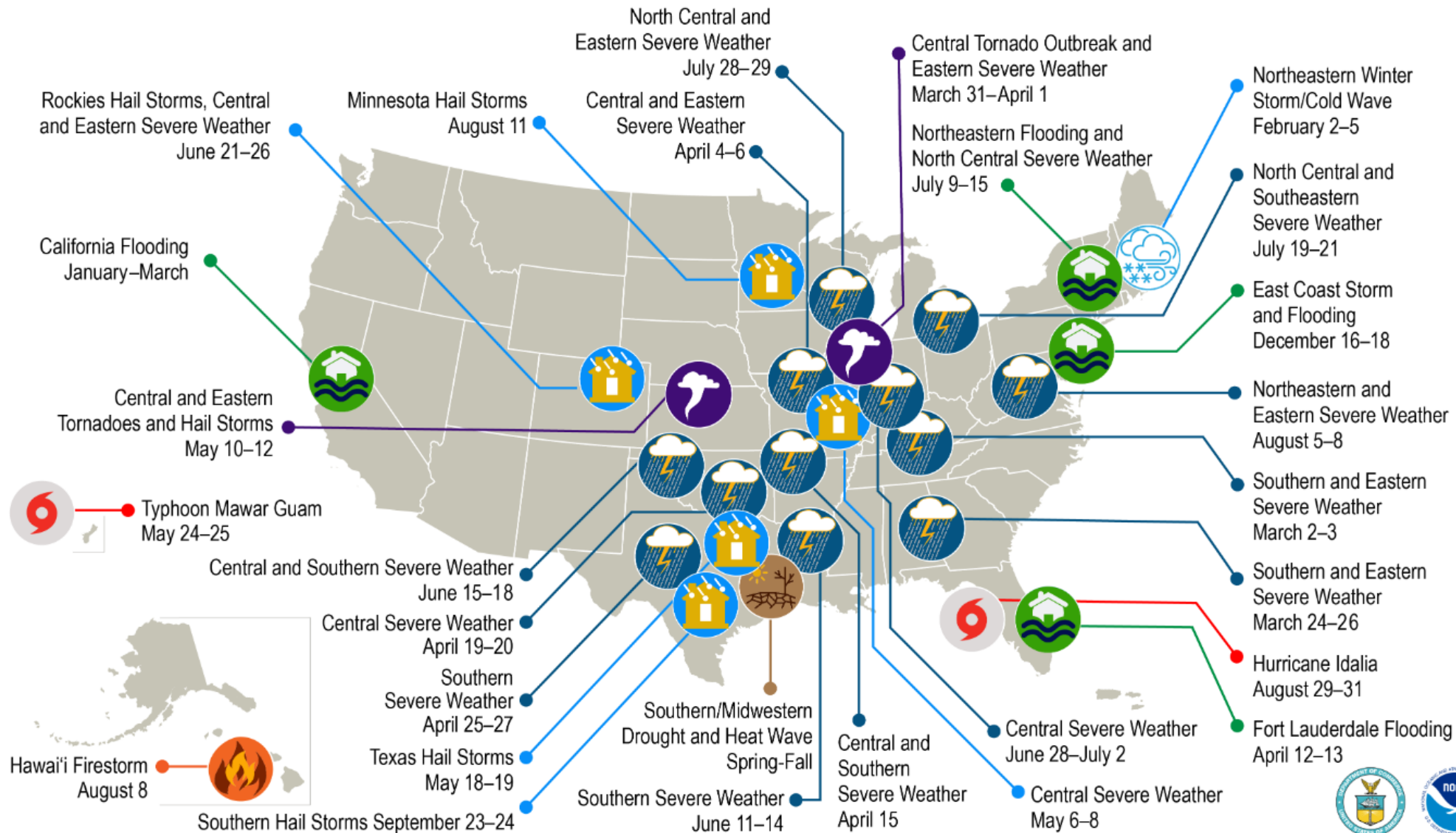
Director NOAA's Gulf of Mexico Disaster Response Center

National Ocean Service / Office of Response and Restoration / Disaster Preparedness Program

2024 Summit Theme

**Advance NOAA's Ability to Adapt and Respond to the Effects of a Changing Climate and Extreme Weather Events**

# U.S. 2023 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 28 separate billion-dollar weather and climate disasters that impacted the United States in 2023.



## Goal:

“Enhance NOAA readiness and response posture ahead of the next hurricane/typhoon season.”

## 2024 Summit Objectives:

- Identify innovative solutions and strategies for improvement, including those that address challenges identified in previous hurricane seasons.
- Fortify NOAA’s capacity across Personnel, Mission, and Infrastructure (PMI) to support hurricane preparedness, response, and recovery.
- Facilitate effective hurricane preparedness and response through improved coordination across NOAA and with our federal, state, local, territorial, and tribal partners.

# 5<sup>th</sup> Annual NOAA Hurricane Preparedness Summit – Steering Committee

## **Steering Committee:**

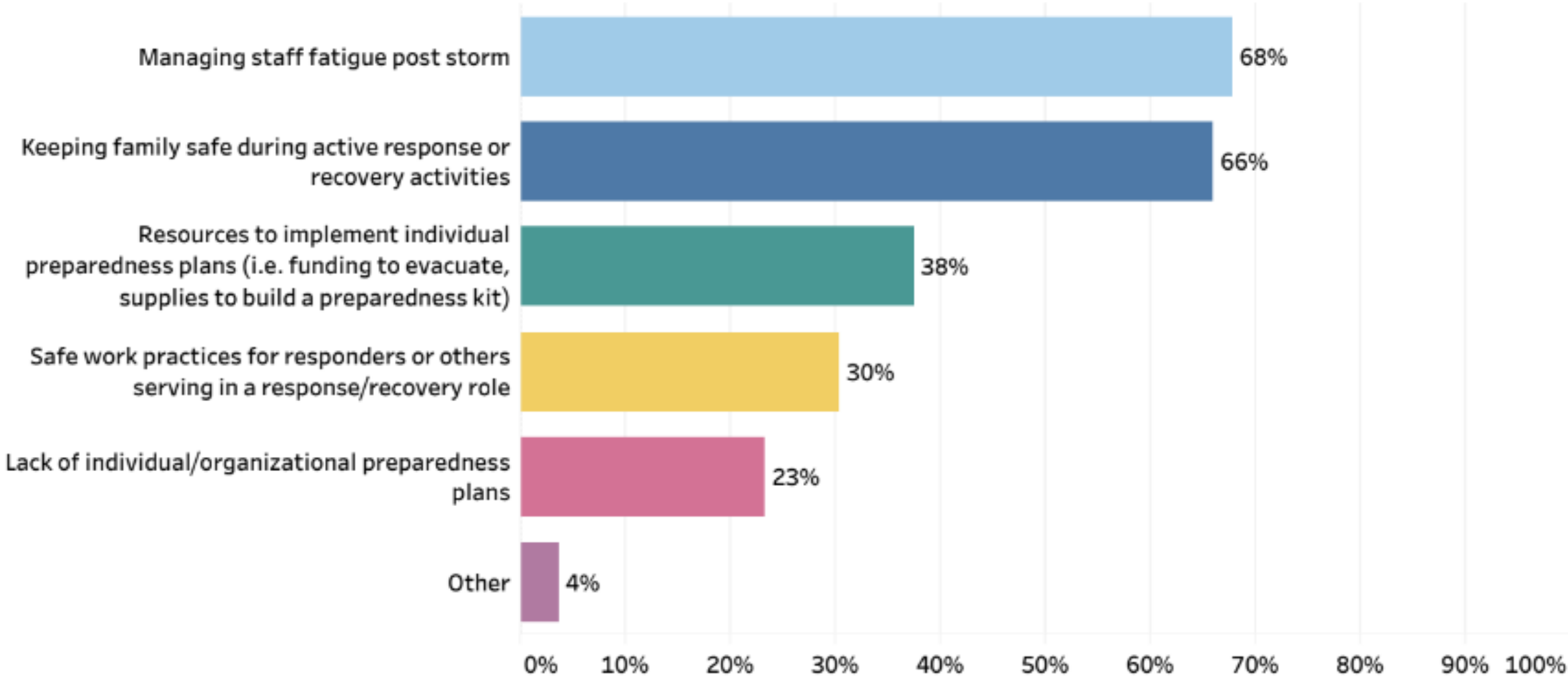
- Nancy Kinner, Coastal Response Research Center, University of New Hampshire (Co-Chair)
- Lisa Symons, NOS, Office of National Marine Sanctuaries
- Matt Chasse, NOS, Office of Coastal Management
- Jason Beaman, NWS, WFO Mobile/Pensacola
- Capt. Eric Johnson, NOAA Homeland Security Program Office (HSPO)
- Autumn Lotze, NOS, Office of Response and Restoration
- Brad Benggio, NOS, Office of Response and Restoration
- Kyla Breland, NOS, Office of Response and Restoration
- Charlie Henry, NOS, Office of Response and Restoration (Co-Chair)

## **Executive Coordinator:**

- Kathy Mandsager, Coastal Response Research Center, University of New Hampshire

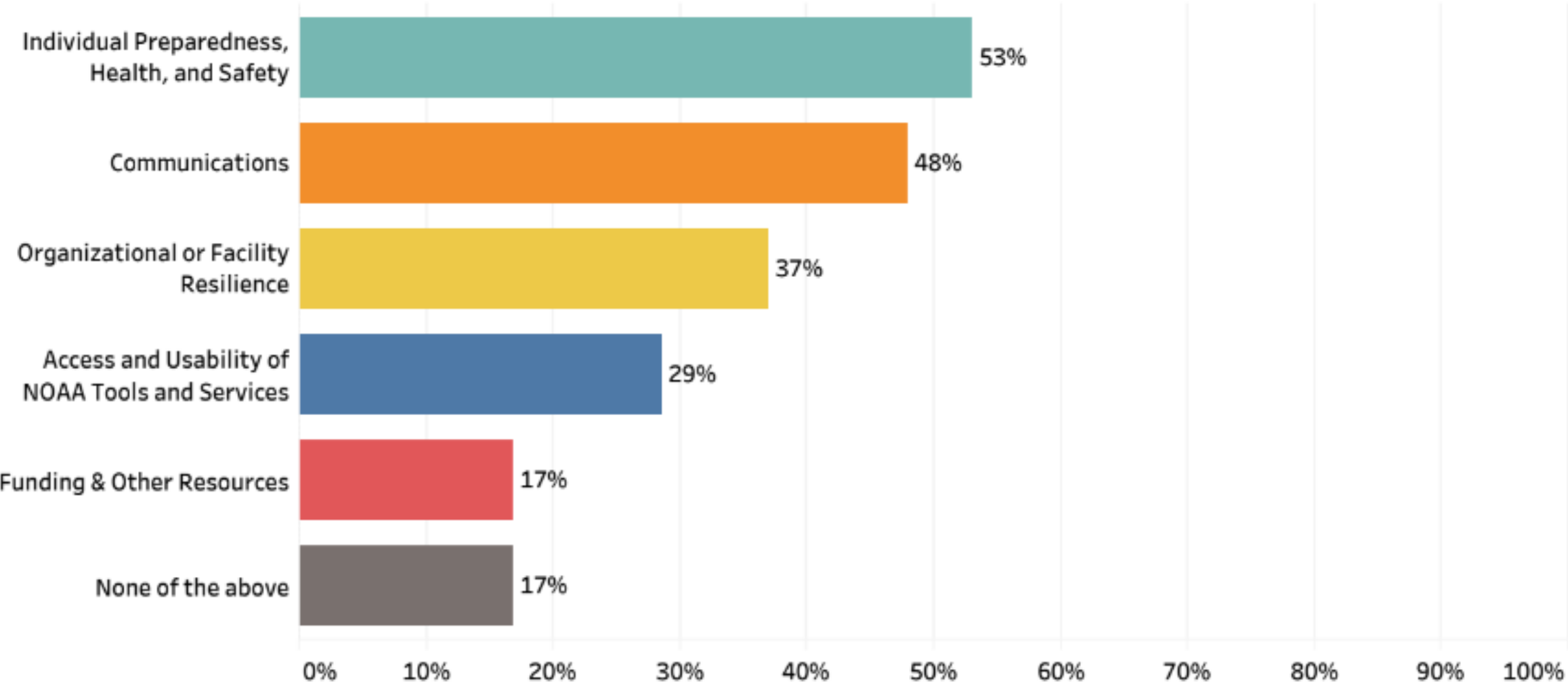
# 5<sup>th</sup> Annual NOAA Hurricane Preparedness Summit – UNH Survey Results

Figure 10: You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas contribute to this challenge? (Select all that apply)



# 5<sup>th</sup> Annual NOAA Hurricane Preparedness Summit – UNH Survey Results

Figure 15: Looking at prior hurricane seasons, for which of the following general challenges have you successfully implemented mitigation strategies? (Select all that apply)



**INSIDE**

Obituaries — Pg. 3  
 Sports — Pg. 13  
 Editorial — Pg. 4

# THE DAILY HERALD

**WEATHER**

Clear to partly cloudy and warm through Friday with widely scattered, mainly afternoon and evening thundershowers. Lowest tonight 79 to 78.

Served By Associated Press Volume 85—Number 275

Mississippi Coast, Thursday Afternoon, August 21, 1969



1 Section—14 Pages

Single Copy 10c

## Hurricane Refugees Evacuated; Governor Says Death Toll 230



**Old Glory, Midst Destruction, Still Waves In Home Of Brave**

### Homeless Sent To Other Cities

(From Staff and Wire Reports)

More than 5,500 homeless storm victims from the Gulf Coast were to find temporary shelter today in Hattiesburg and Jackson.

Camp Shelby and the University of Southern Mississippi at Hattiesburg were prepared to take care of 4,000 of them all in need of food, water, clothing and shelter.

Another 1,000 were to be put up at the Robert E. Lee Hotel in Jackson.

Gov. John Bell Williams had ordered the evacuation of Pass Christian, once the jewel of the Gulf Coast with beautiful and stately homes lining the beach and its famed "Scenic Drive."

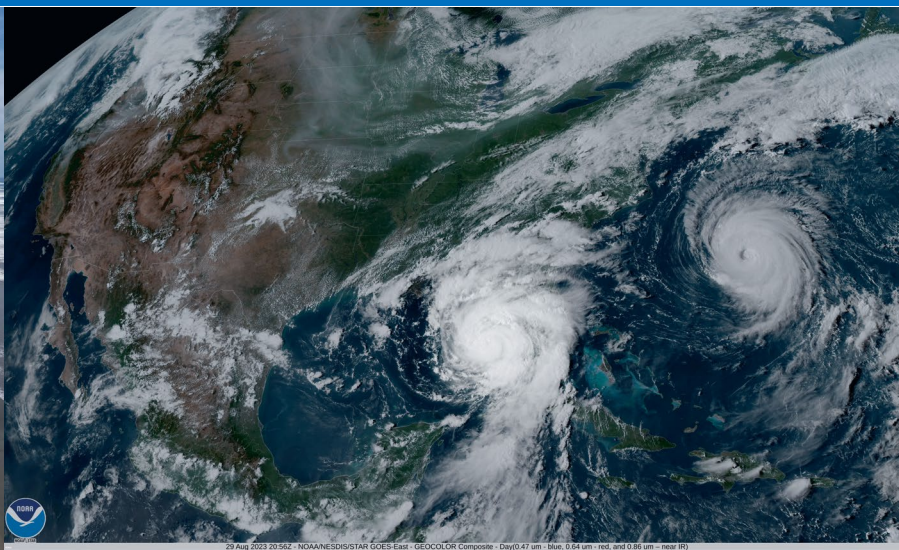
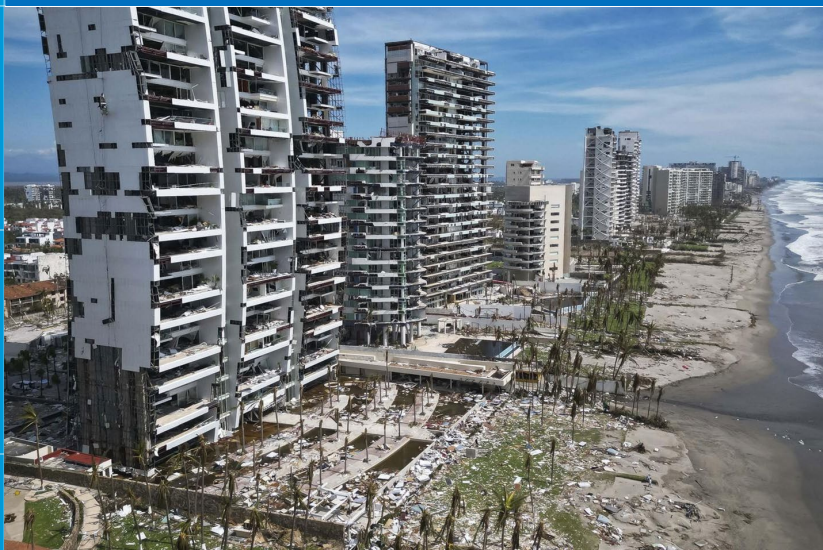
The community of 4,000 was wiped out by the storm. Long Beach, population 6,000, was



**NOAA**  
National  
Weather  
Service

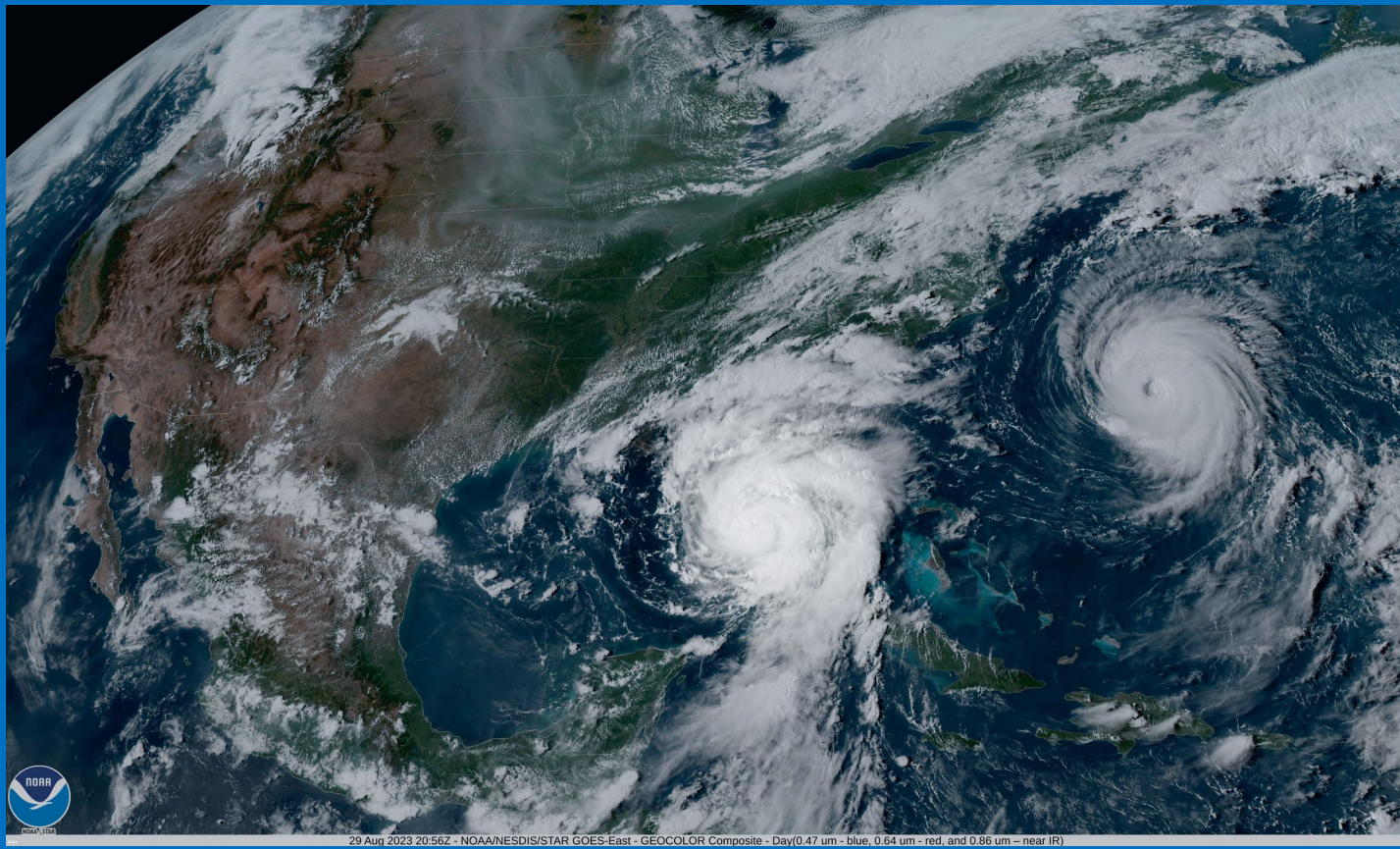
# 2023 Hurricane Season Review & What's New at NHC for 2024

Brad Reinhart  
National Hurricane Center  
April 24, 2024





# 2023 Hurricane Season Review

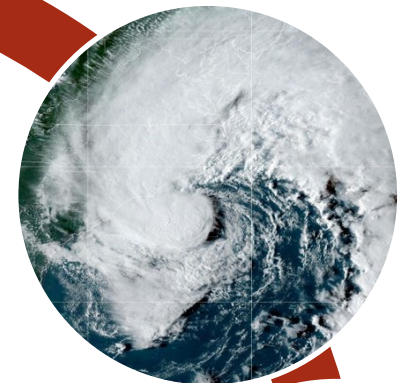


29 Aug 2023 20:56Z - NOAA/NESDIS/STAR GOES-East - GEOCOLOR Composite - Day(0.47 um - blue, 0.64 um - red, and 0.86 um - near IR)

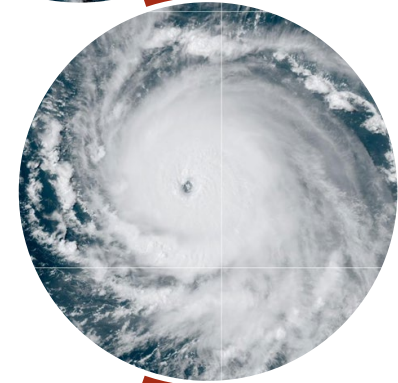




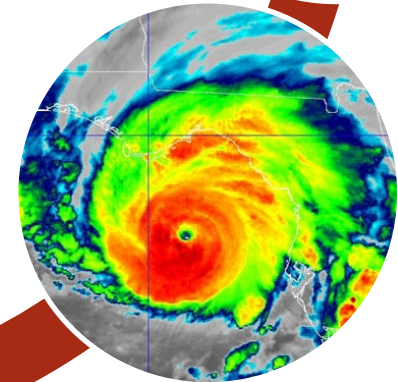
# 2023 Atlantic Hurricane Season



20 named storms  
(average: 14)



7 hurricanes  
(average: 7)



3 major hurricanes  
(average: 3)

Accumulated Cyclone Energy (ACE): about 20% above 30-yr mean

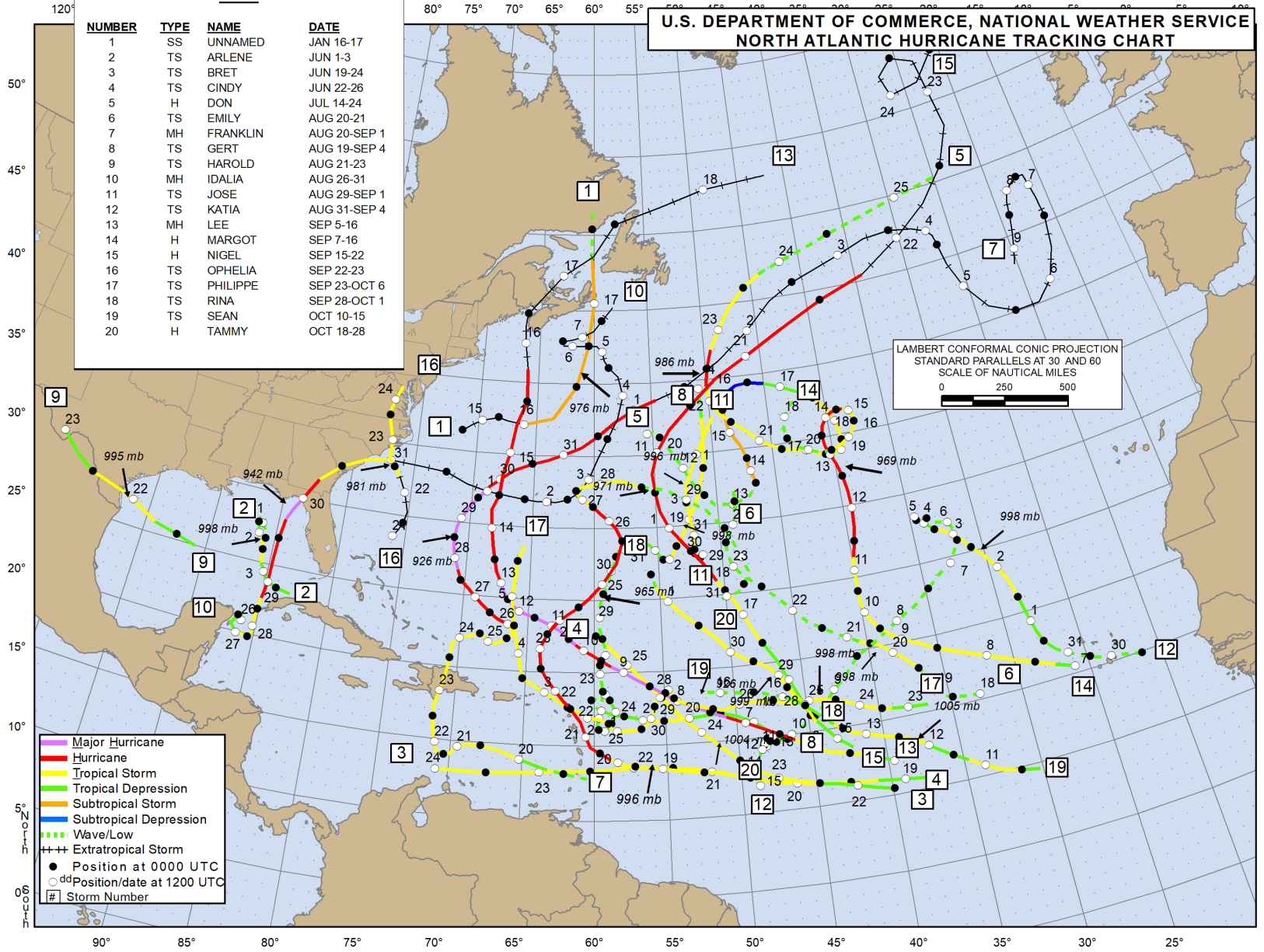




### 2023

NUMBER	TYPE	NAME	DATE
1	SS	UNNAMED	JAN 16-17
2	TS	ARLENE	JUN 1-3
3	TS	BRET	JUN 19-24
4	TS	CINDY	JUN 22-26
5	H	DON	JUL 14-24
6	TS	EMILY	AUG 20-21
7	MH	FRANKLIN	AUG 20-SEP 1
8	TS	GERT	AUG 19-SEP 4
9	TS	HAROLD	AUG 21-23
10	MH	IDALIA	AUG 26-31
11	TS	JOSE	AUG 29-SEP 1
12	TS	KATIA	AUG 31-SEP 4
13	MH	LEE	SEP 5-16
14	H	MARGOT	SEP 7-16
15	H	NIGEL	SEP 15-22
16	TS	OPHELIA	SEP 22-23
17	TS	PHILIPPE	SEP 23-OCT 6
18	TS	RINA	SEP 28-OCT 1
19	TS	SEAN	OCT 10-15
20	H	TAMMY	OCT 18-28

### U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE NORTH ATLANTIC HURRICANE TRACKING CHART



LAMBERT CONFORMAL CONIC PROJECTION  
STANDARD PARALLELS AT 30 AND 60  
SCALE OF NAUTICAL MILES  
0 250 500

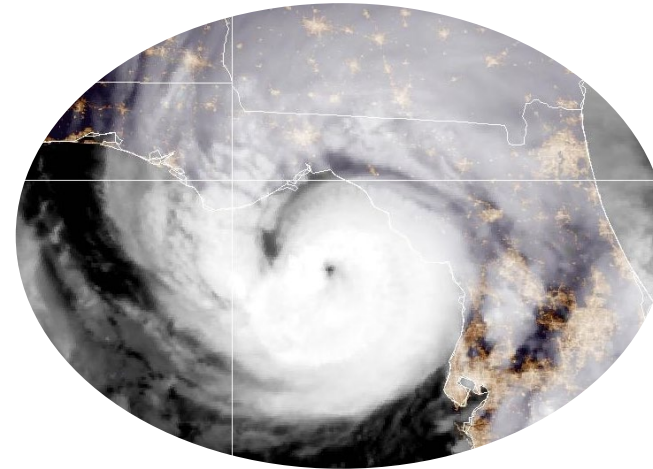
- Major Hurricane
- Hurricane
- Tropical Storm
- Tropical Depression
- Subtropical Storm
- Subtropical Depression
- - - Wave/Low
- ++ Extratropical Storm
- Position at 0000 UTC
- Position/date at 1200 UTC
- # Storm Number



# 2023 Atlantic Impacts

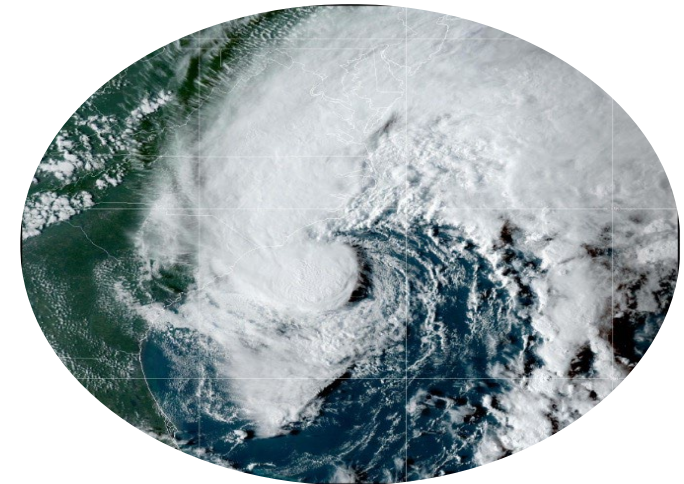
- **Land Impacts**

- Bret (Windward Islands - TS)
- Franklin (Hispaniola - TS)
- Harold (U.S. - TS)
- Idalia (Cuba and U.S. - MH)
- Lee (Canada and U.S. - H)
- Ophelia (U.S. - TS)
- Philippe (Leeward Islands - TS)
- Tammy (Leeward Islands - TS)

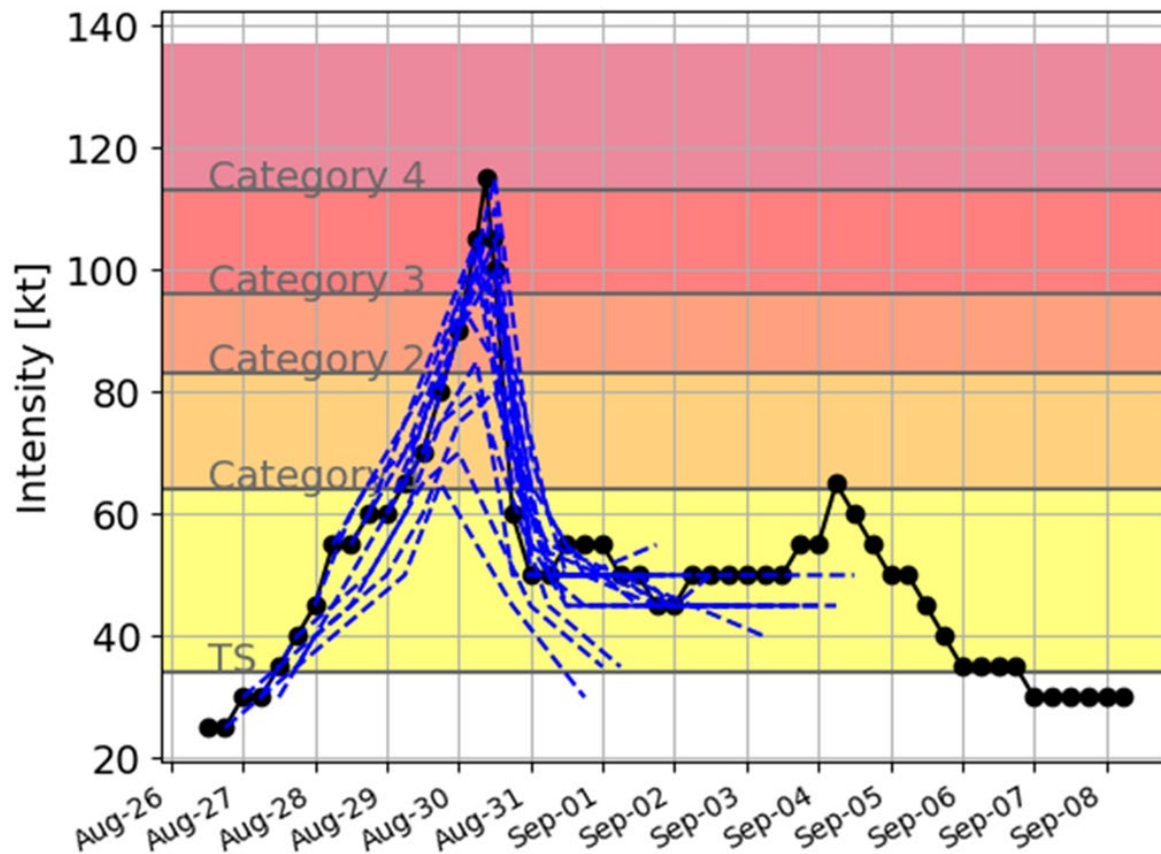


**Hurricane  
Idalia**

**Tropical  
Storm  
Ophelia**



# Hurricane Idalia – Rapid Intensification



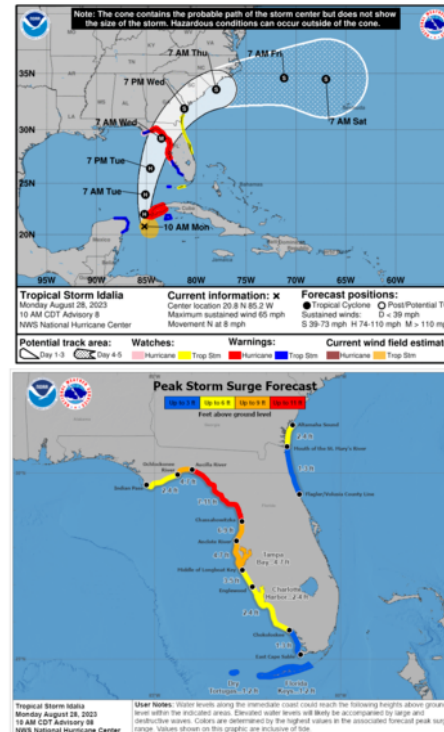
- NHC successfully predicted the potential for Idalia to rapidly intensify to a major hurricane **2+ days** before landfall
- Forecasts showed a peak intensity of 115-130 mph early on August 30
- Peak intensity: **130 mph** at 5 AM EDT August 30

# Idalia Coordination and Messaging

## Key Messages for Tropical Storm Idalia Advisory 8: 10:00 AM CDT Mon Aug 28, 2023

1. There is a danger of life-threatening storm surge inundation along portions of the Florida Gulf Coast where a Storm Surge Warning is in effect, including Tampa Bay and the Big Bend region of Florida. Inundation of 7 to 11 feet above ground level is expected somewhere between Chassahowitzka and Aucilla River. Residents in these areas should follow any advice given by local officials.
2. Hurricane conditions are expected within portions of the Hurricane Warning area along the Florida Gulf Coast, with the potential for destructive winds where the core of Idalia moves onshore. Strong winds will also spread inland across portions of northern Florida near the track of the center of Idalia.
3. Areas of flash and urban flooding, some of which may be locally significant, are expected across portions of the west coast of Florida, the Florida Panhandle, and southern Georgia Tuesday into Wednesday, spreading into portions of the eastern Carolinas Wednesday into Thursday.
4. Hurricane-force winds are expected across portions of far western Cuba later today. Heavy rainfall is also expected across portions of western Cuba and may produce areas of flash and urban flooding as well as landslides across western Cuba.

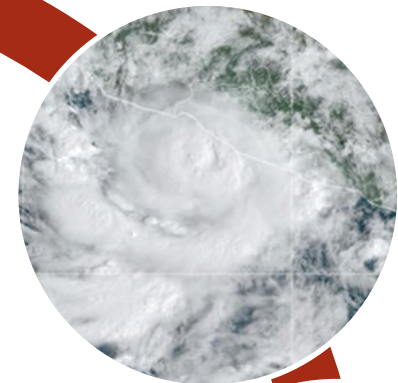
For more information go to [hurricanes.gov](https://hurricanes.gov)



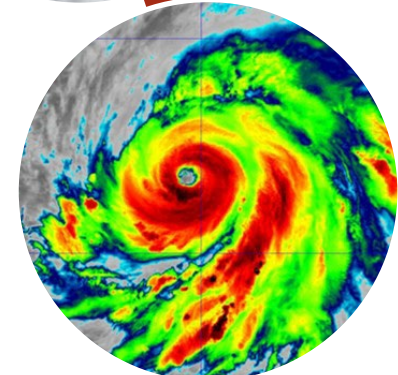
- 15 decision support briefings provided through the FEMA Hurricane Liaison Team at NHC
- 10 live stream broadcasts via YouTube and Facebook Live
- Hurricane and Storm Surge Watches & Warnings provided ample lead time for the west coast of Florida
  - Watch: ~ 54 h before TS-force winds
  - Warning: ~ 36 h before TS-force winds



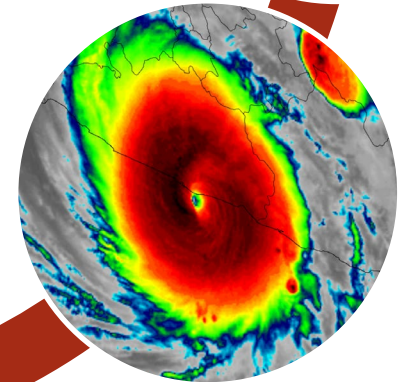
# 2023 East Pacific Hurricane Season



17 named storms  
(average: 15)



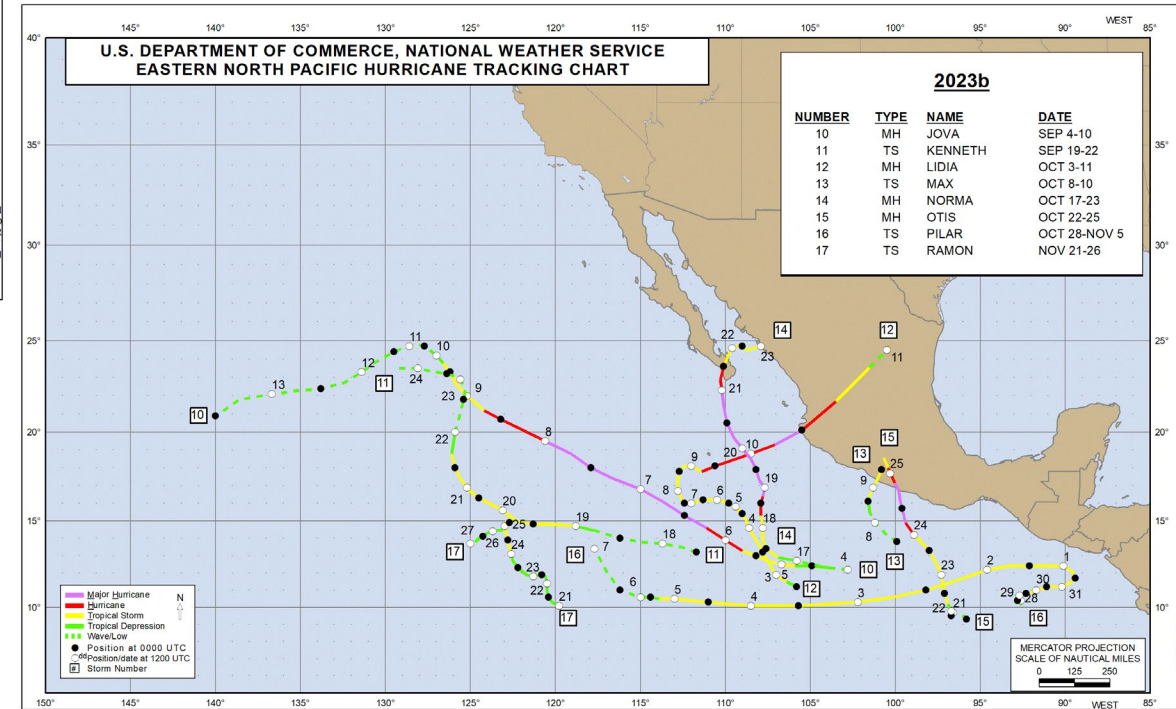
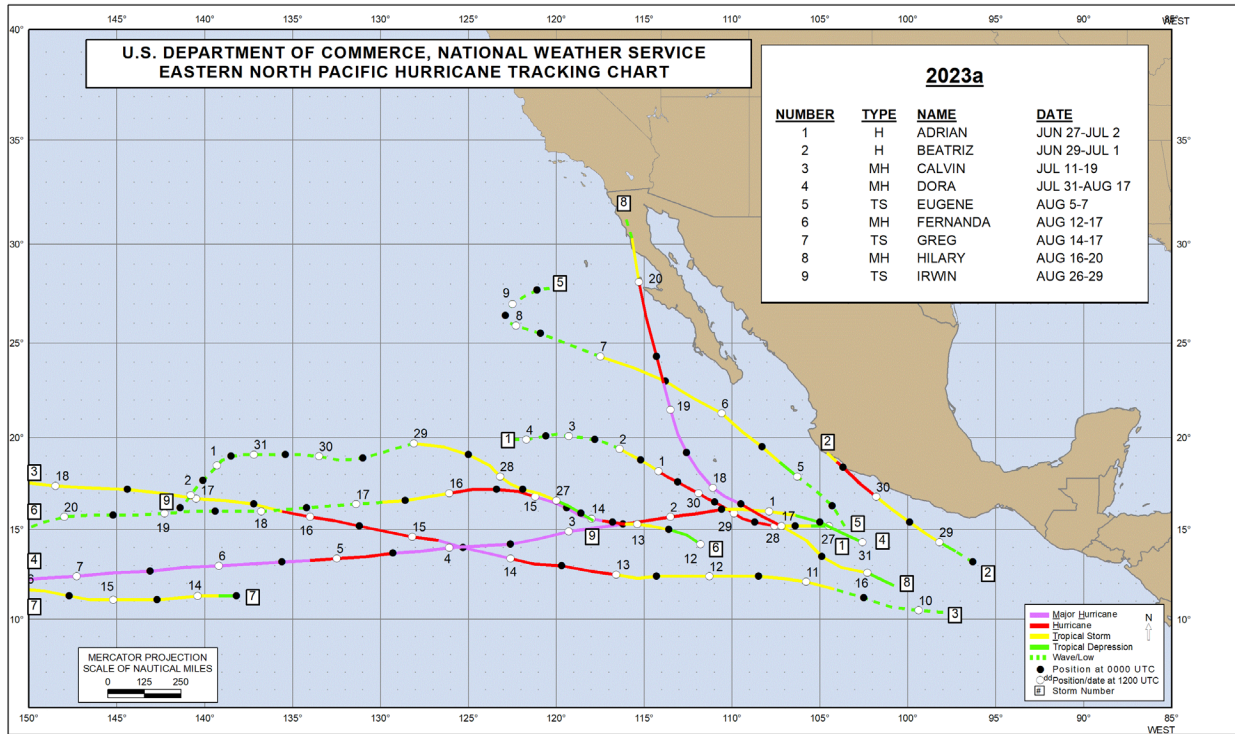
10 hurricanes  
(average: 8)



8 major hurricanes  
(average: 4)

Accumulated Cyclone Energy (ACE): about 20% above 30-yr mean



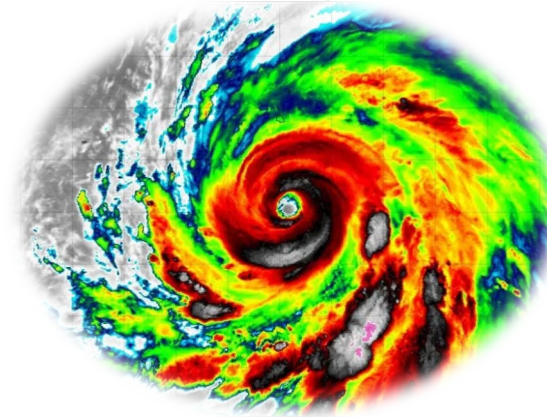




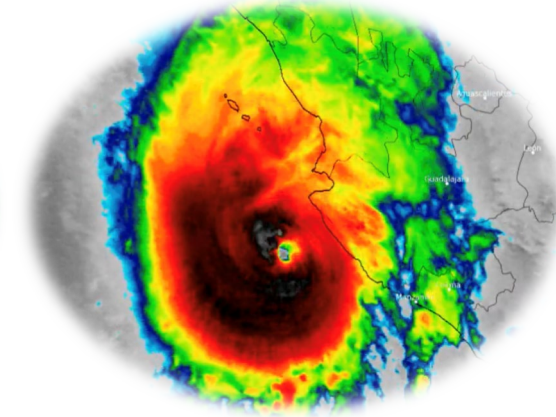
# 2023 East Pacific Impacts

- **Land Impacts**

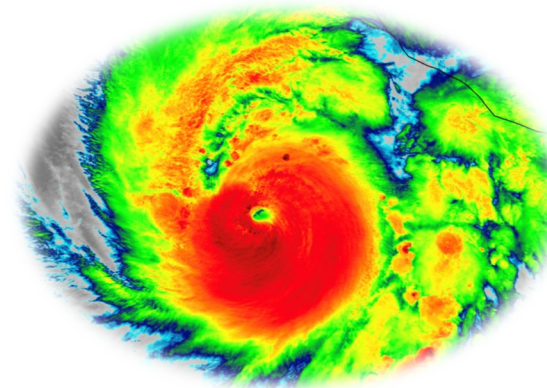
- 3 Mexico hurricane landfalls: Lidia (Jalisco), Norma (Baja California Sur), and Otis (Guerrero)
- 3 Mexico TS landfalls: Beatriz (Colima), Hilary (Baja California), and Max (Guerrero)
- Hilary brought significant impacts to the southwestern U.S. as a tropical storm and post-tropical cyclone



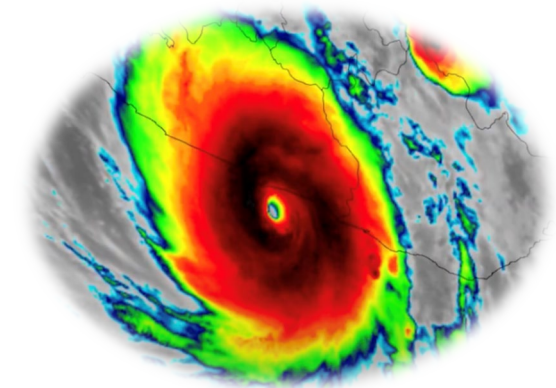
**Hilary**



**Lidia**

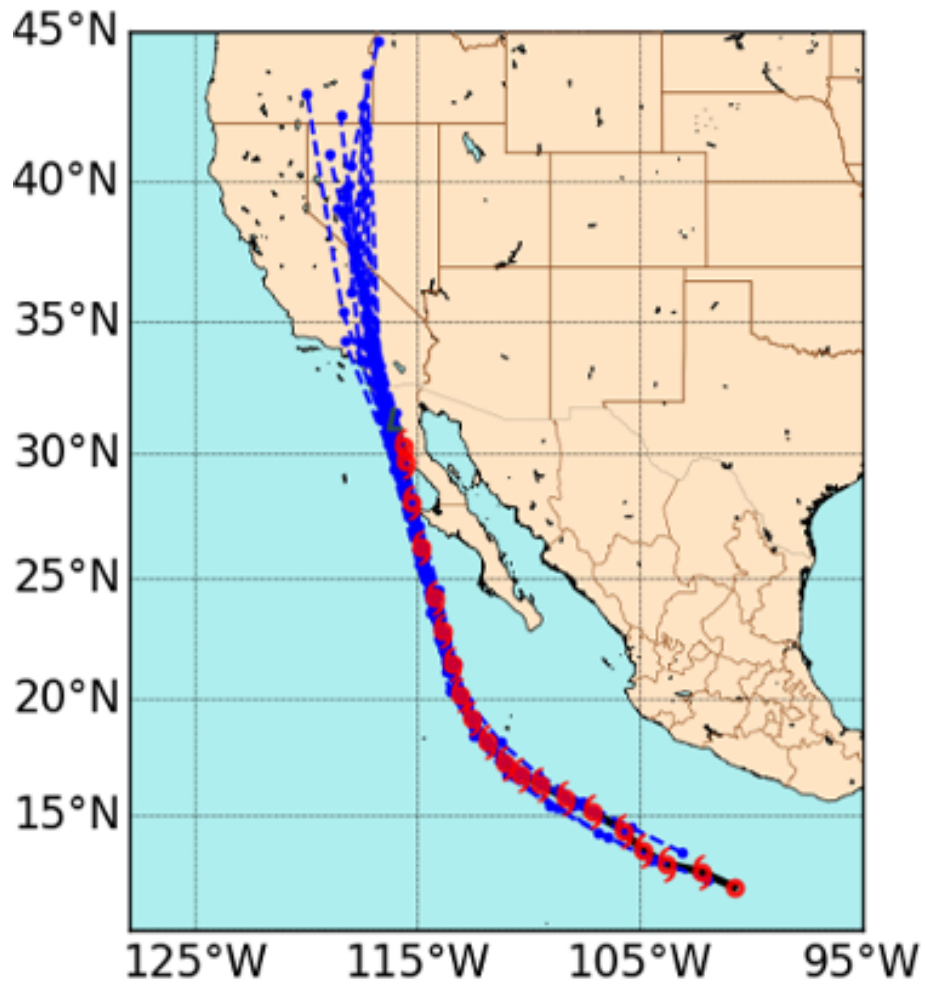


**Norma**

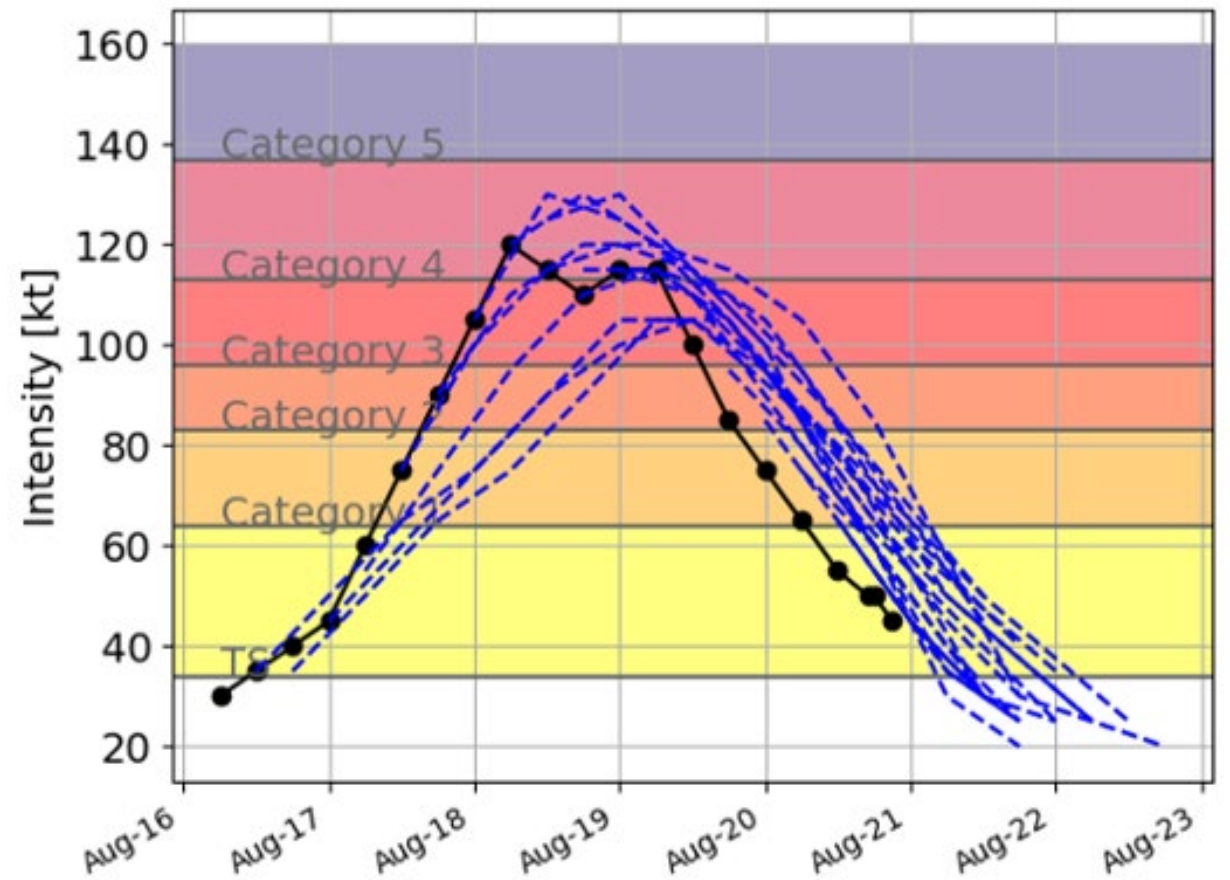


**Otis**

# Hilary Track and Intensity Forecasts



— OFCL      —○ Best Track



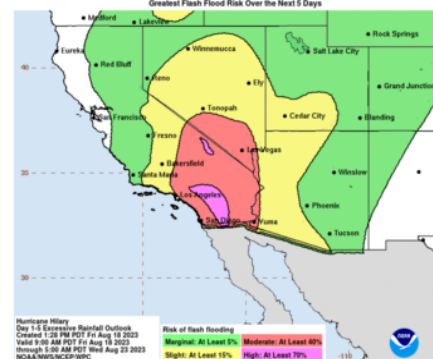
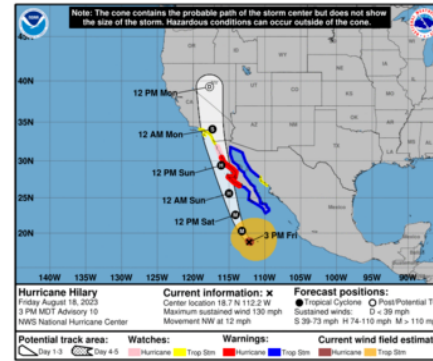
# Hilary Coordination and Messaging



## Key Messages for Hurricane Hilary Advisory 10: 3:00 PM MDT Fri Aug 18, 2023



1. Heavy rainfall associated with Hilary will begin well in advance of the center, from the Baja California Peninsula into the Southwestern United States. Preparations for the impacts of flooding from rainfall should be completed as soon as possible, as heavy rain will increase ahead of the center on Saturday. In the Southwestern United States, flash, urban, and arroyo flooding is expected, with the potential for dangerous and locally catastrophic impacts.
2. Hurricane conditions are expected within portions of the hurricane warning area along the west-central coast of the Baja California Peninsula Saturday night and are possible in the Hurricane Watch area.
3. Tropical storm conditions are possible by late Sunday in portions of southern California where a Tropical Storm Watch is in effect.
4. Large swells generated by Hilary will affect portions of the coast of southwestern Mexico, the Baja California peninsula, and south California over the next few days. These swells are likely to cause life-threatening surf and rip current conditions.



For more information go to [hurricanes.gov](https://hurricanes.gov)

- Coordination with NWS Western Region and SW U.S. NWS offices began several days before impact
- First-ever issuance of coastal and inland Tropical Storm Watches and Warnings for Southern California
- Spanish-language Key Messages were provided using new NWS AI translation software



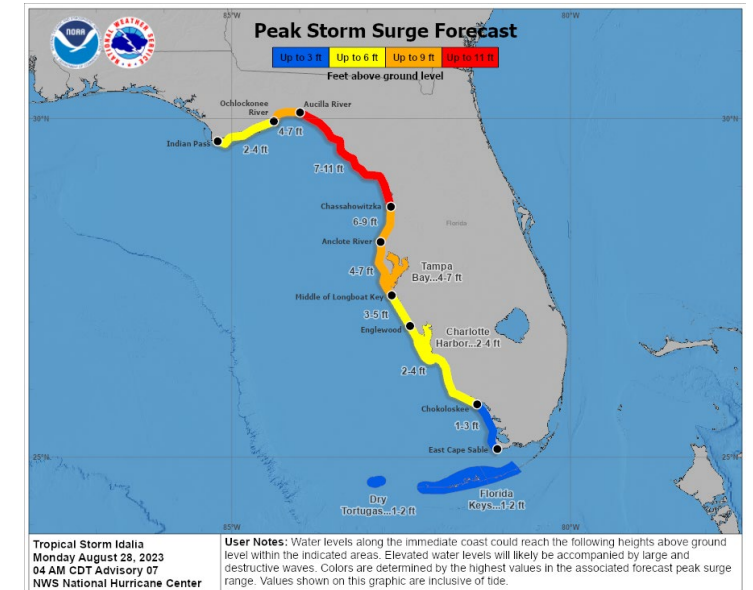
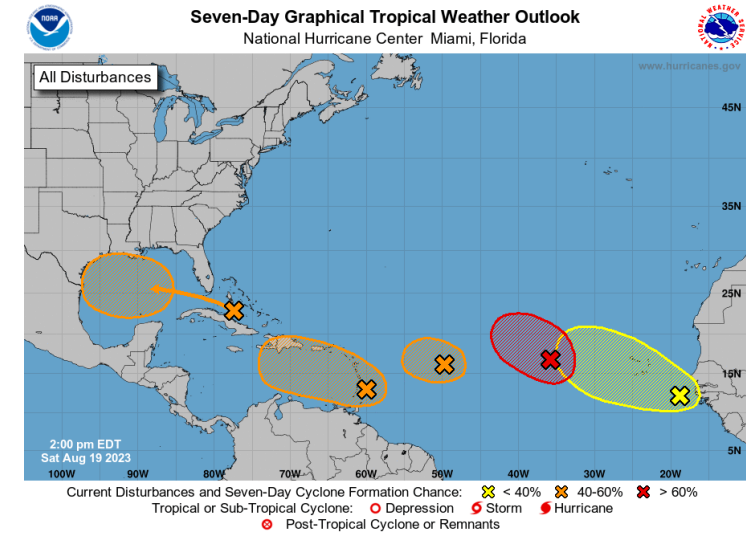
# 2023 U.S. Fatality Data

- **Total:** 13 direct U.S. fatalities
  - 11/13 (84%) due to surf/rip currents
- **Idalia:** 12 fatalities (4 indirect)
  - Surf/Rip Currents: 8 (FL: 1, NC: 3, NJ: 3, DE: 1)
  - Vehicle Accident: 2 (FL)
  - Cleanup/Tree Accident: 2 (FL: 1, GA: 1)
- **Lee:** 4 fatalities
  - Surf/Rip Currents: 3 (FL: 1, NJ: 1, PR: 1)
  - Wind: 1 (ME)
- **Hilary:** 1 fatality
  - Freshwater Flooding: 1 (CA)



# Review of 2023 NHC Product Changes

- Tropical Weather Outlook (TWO)
  - Extended to 7 days
  - Added Invest Numbers
- Forecast Advisory (TCM)
  - Removal of Watches/Warnings from this text product
  - Watches/Warnings are listed in the Public Advisory
- Storm Surge Graphics
  - Peak Storm Surge Graphic became operational
  - Extension of the Potential Storm Surge Flooding Map to Puerto Rico and U.S. Virgin Islands





# NHC Products and Services Update for 2024 Season



# 2024 NHC Product Updates

## Operational

- U.S. watches and warnings can be issued on intermediate advisories
- Public issuance of day four and five 34- and 50-kt wind radii forecasts
- Added weblinks to shorten hazard section in the public advisory (TCP)
- Spanish language advisory text products

## Experimental

- Inland U.S. watches/warnings on experimental cone graphic
- International tropical cyclone rainfall graphics



# U.S. Watches/Warnings on Intermediate Advisories



## Pre-2024:

- NWS policy prevented NWS/NHC from issuing U.S. watches and warnings on intermediate advisories
- Any additions/upgrades to U.S. watches and warnings required the issuance of a Special Advisory



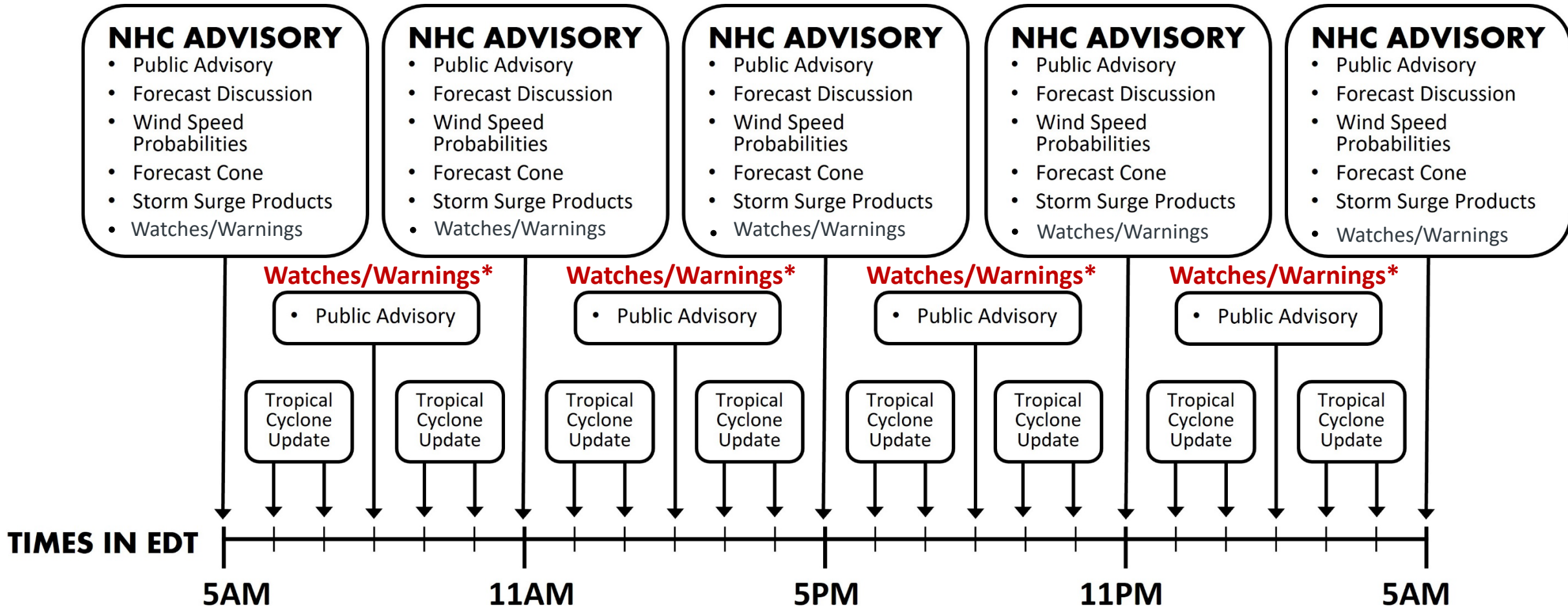
## 2024:

- ***U.S. wind and storm surge watches & warnings can be issued on intermediate advisories*** (NWS still retains the option to issue Special Advisories for significant or unexpected changes to the forecast or watches/warnings)
- Could help alleviate WEA alerting concerns by allowing issuance of hurricane or storm surge warnings at less intrusive times (e.g., 8 AM instead of 5 AM)





# U.S. Watches/Warnings on Intermediate Advisories



**\*New in 2024**



# Day 4-5 Wind Radii Forecasts

```
ZCZC M1ATCMAT3 ALL
TTAAB0 KNHC DDHMM

HURRICANE LEE FORECAST/ADVISORY NUMBER 22
NWS NATIONAL HURRICANE CENTER MIAMI FL AL132023
2100 UTC SUN SEP 10 2023

HURRICANE CENTER LOCATED NEAR 22.1N 61.7W AT 10/2100Z
POSITION ACCURATE WITHIN 15 NM

PRESENT MOVEMENT TOWARD THE WEST-NORTHWEST OR 300 DEGREES AT 7 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 954 MB
EYE DIAMETER 20 NM
MAX SUSTAINED WINDS 105 KT WITH GUSTS TO 120 KT.
64 KT..... 40NE 35SE 30SW 40NW.
50 KT..... 90NE 70SE 50SW 80NW.
34 KT.....150NE 140SE 100SW 140NW.
12 FT SEAS..300NE 180SE 240SW 300NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL
MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 22.1N 61.7W AT 10/2100Z
AT 10/1800Z CENTER WAS LOCATED NEAR 21.9N 61.4W

FORECAST VALID 11/0600Z 22.7N 62.7W
MAX WIND 115 KT...GUSTS 140 KT.
64 KT... 50NE 40SE 35SW 50NW.
50 KT... 90NE 80SE 50SW 80NW.
34 KT...150NE 140SE 100SW 140NW.

FORECAST VALID 11/1800Z 23.3N 63.9W
MAX WIND 120 KT...GUSTS 145 KT.
64 KT... 50NE 50SE 35SW 50NW.
50 KT... 90NE 80SE 60SW 80NW.
34 KT...150NE 150SE 110SW 140NW.

FORECAST VALID 12/0600Z 23.8N 65.1W
MAX WIND 120 KT...GUSTS 145 KT.
64 KT... 60NE 60SE 40SW 60NW.
50 KT... 90NE 90SE 70SW 80NW.
34 KT...150NE 150SE 120SW 140NW.

FORECAST VALID 12/1800Z 24.2N 66.2W
MAX WIND 115 KT...GUSTS 140 KT.
64 KT... 60NE 50SE 40SW 60NW.
50 KT... 90NE 90SE 70SW 80NW.
34 KT...160NE 160SE 120SW 150NW.

FORECAST VALID 13/0600Z 24.7N 67.0W
MAX WIND 105 KT...GUSTS 130 KT.
50 KT...100NE 100SE 80SW 80NW.
34 KT...170NE 170SE 130SW 160NW.

FORECAST VALID 13/1800Z 25.6N 67.0W
MAX WIND 100 KT...GUSTS 120 KT.
50 KT...100NE 90SE 80SW 90NW.
34 KT...180NE 180SE 140SW 180NW.

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 125 NM
ON DAY 4 AND 175 NM ON DAY 5...AND FOR INTENSITY NEAR 15 KT EACH DAY

OUTLOOK VALID 14/1800Z 28.9N 68.0W
MAX WIND 90 KT...GUSTS 110 KT.
50 KT...110NE 100SE 90SW 100NW.
34 KT...200NE 200SE 160SW 200NW.

OUTLOOK VALID 15/1800Z 33.6N 67.4W
MAX WIND 80 KT...GUSTS 100 KT.
50 KT...120NE 100SE 90SW 90NW.
34 KT...210NE 200SE 160SW 200NW.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 22.1N 61.7W

NEXT ADVISORY AT 11/0300Z

$$
FORECASTER BROWN
```

- NHC has been making in-house 34- and 50-kt wind radii forecasts at days 4 and 5 for several hurricane seasons
- These radii forecasts will become operational in 2024
- Official forecast radii will replace climatology-persistence (DRCL) radii that have been used in downstream applications (wind speed probs, WTCM, etc.)

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 125 NM ON DAY 4 AND 175 NM ON DAY 5...AND FOR INTENSITY NEAR 15 KT EACH DAY

OUTLOOK VALID 14/1800Z 28.9N 68.0W  
MAX WIND 90 KT...GUSTS 110 KT.  
50 KT...110NE 100SE 90SW 100NW.  
34 KT...200NE 200SE 160SW 200NW.

**34- and 50-kt radii  
will now be included  
in the TCM for  
days 4 and 5**

OUTLOOK VALID 15/1800Z 33.6N 67.4W  
MAX WIND 80 KT...GUSTS 100 KT.  
50 KT...120NE 100SE 90SW 90NW.  
34 KT...210NE 200SE 160SW 200NW.

# Spanish Advisory Text Products

## BOLETÍN

Advertencia Intermedia del Huracán Otis Número 13A  
Centro Nacional de Huracanes del SNM Miami FL EP182023  
700 AM CDT miércoles 25 de octubre de 2023

...FUERTES VIENTOS CONTINUANDO EXTENDIÉNDOSE TIERRA DENTRO SOBRE EL SUR DE MÉXICO....FUERTES LLUVIAS E INUNDACIONES REPENTINAS QUE OCURREN SOBRE PORCIONES DEL SUR DE MÉXICO...

## RESUMEN DE 700 AM CDT...1200 UTC...INFORMACIÓN

-----  
UBICACIÓN...17.7N 100.3O  
ALREDEDOR DE 60 MI...100 KM NO DE ACAPULCO MÉXICO  
VIENTOS MÁXIMOS SOSTENIDOS...110 MPH...175 KM/H  
MOVIMIENTO ACTUAL...NNO O 345 GRADOS A 10 MPH...17 KM/H  
PRESIÓN CENTRAL MÍNIMA...965 MB...28.50 PULGADAS

## VIGILANCIAS Y AVISOS

### CAMBIOS CON ESTA ADVERTENCIA:

Ninguno.

### RESUMEN DE VIGILANCIAS Y AVISOS EN EFECTO:

Un Aviso de Huracán está en efecto para...  
\* Punta Maldonado hacia el oeste a Zihuatanejo

- NWS San Juan has translated NHC's Atlantic Public Advisories (TCPs) and Tropical Weather Outlooks (TWOs) for many years
- NHC takes over operational Spanish Atlantic TCP & TWO in 2024 using new AI translation techniques that were tested in 2023
- NHC issues experimental Spanish Atlantic Tropical Cyclone Discussions (TCDs) and Key Messages

Examples available at <https://www.weather.gov/translate/>



# Spanish Advisory Text Products

<i>Spanish Product</i>	<i>WMO ID</i>	<i>AWIPS PIL</i>
TWO - Atlantic	ACCA62 KNHC	TWOSAT
TWO - Eastern Pacific	ABPZ21 KNHC	TWOSEP
TCP - Atlantic	WTCA/41-45/KNHC	TASAT/1-5/
TCP - Eastern Pacific (NHC)	WTPZ/11-15/ KNHC	TASEP/1-5/
TCD - Atlantic (NHC)	WTNT/51-55/ KNHC	TDSAT/1-5/
TCD - Eastern Pacific (NHC)	WTPZ/51-55/ KNHC	TDSEP/1-5/
TCU - Atlantic	WTNT/71-75/ KNHC	TUSAT/1-5/
TCU - Eastern Pacific	WTPZ/71-75/ KNHC	TUSEP/1-5/

**Examples available at <https://www.weather.gov/translate/>**

# Weblinks in the TCP for Hazard Information

**STORM SURGE:** The combination of a dangerous storm surge and the tide will cause normally dry areas near the coast to be flooded by rising waters moving inland from the shoreline. The water could reach the following heights above ground somewhere in the indicated areas if the peak surge occurs at the time of high tide...

Wakulla/Jefferson County line, FL to Yankeetown, FL...12-16 ft  
Ochlockonee River, FL to Wakulla/Jefferson County line, FL...8-12 ft  
Yankeetown to Chassahowitzka, FL...7-11 ft  
Chassahowitzka, FL to Anclote River, FL...6-9 ft  
Carrabelle, FL to Ochlockonee River, FL...5-8 ft  
Anclote River, FL to Middle of Longboat Key, FL...4-6 ft  
Tampa Bay...4-6 ft  
Middle of Longboat Key, FL to Englewood, FL...3-5 ft  
Indian Pass, FL to Carrabelle, FL...3-5 ft  
Englewood, FL to Bonita Beach, FL...2-4 ft  
Charlotte Harbor...2-4 ft  
Mouth of the St. Mary's River to South Santee, SC...2-4 ft  
Beaufort Inlet to Drum Inlet, NC...2-4 ft  
Pamlico and Neuse Rivers...2-4 ft  
South of Bonita Beach to Chokoloskee, FL...1-3 ft  
South Santee, SC to Beaufort Inlet, NC...1-3 ft  
Drum Inlet to Duck, NC...1-3 ft  
Chokoloskee, FL to East Cape Sable, FL...1-3 ft  
Flagler/Volusia County Line, FL to Mouth of St. Mary's River...1-3 ft  
Indian Pass to Mexico Beach...1 to 3 ft  
Florida Keys...1-2 ft

**OLD**

The deepest water will occur along the immediate coast in areas of onshore winds, where the surge will be accompanied by large and dangerous waves. Surge-related flooding depends on the relative timing of the surge and the tidal cycle, and can vary greatly over short distances. For information specific to your area, please see products issued by your local National Weather Service forecast office.

- Shorten the hazard section of the public advisory by adding weblinks that direct users to Peak Storm Surge and WPC rainfall forecast graphics
- Only keep the most significant or impactful forecast values in the public advisory instead of listing every segment/area

# Weblinks in the TCP for Hazard Information

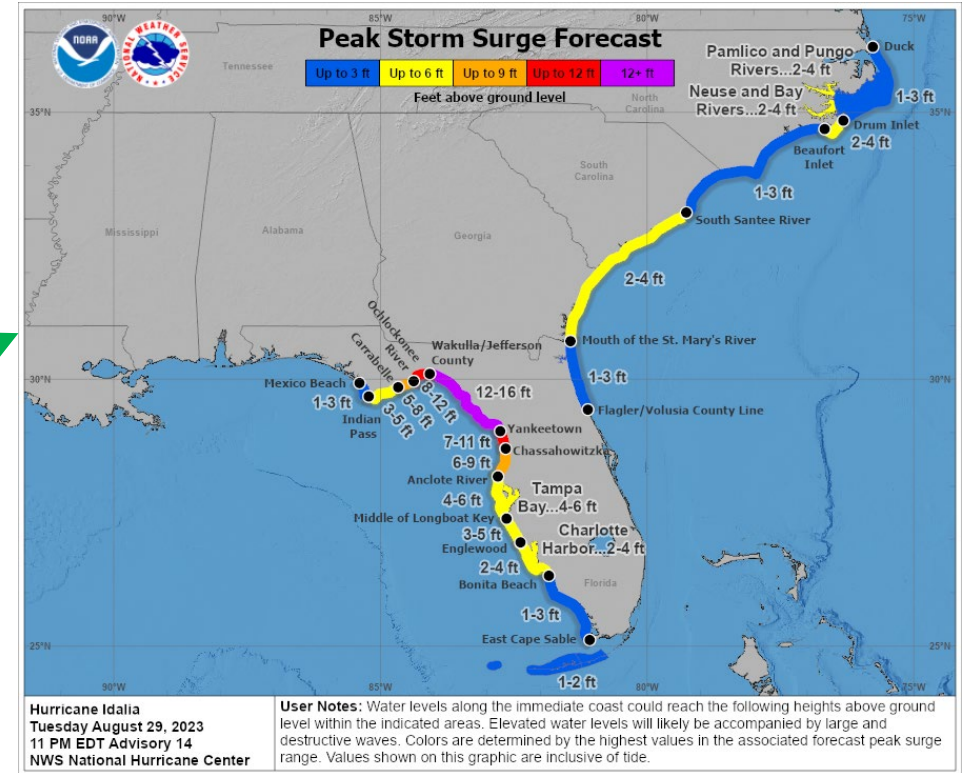
**STORM SURGE:** The combination of a dangerous storm surge and the tide will cause normally dry areas near the coast to be flooded by rising waters moving inland from the shoreline. The water could reach the following heights above ground somewhere in the indicated areas if the peak surge occurs at the time of high tide...

Wakulla/Jefferson County line, FL to Yankeetown, FL...12-16 ft  
Ochlockonee River, FL to Wakulla/Jefferson County line, FL...8-12 ft  
Yankeetown to Chassahowitzka, FL...7-11 ft  
Chassahowitzka, FL to Anclote River, FL...6-9 ft  
Carrabelle, FL to Ochlockonee River, FL...5-8 ft

**NEW**

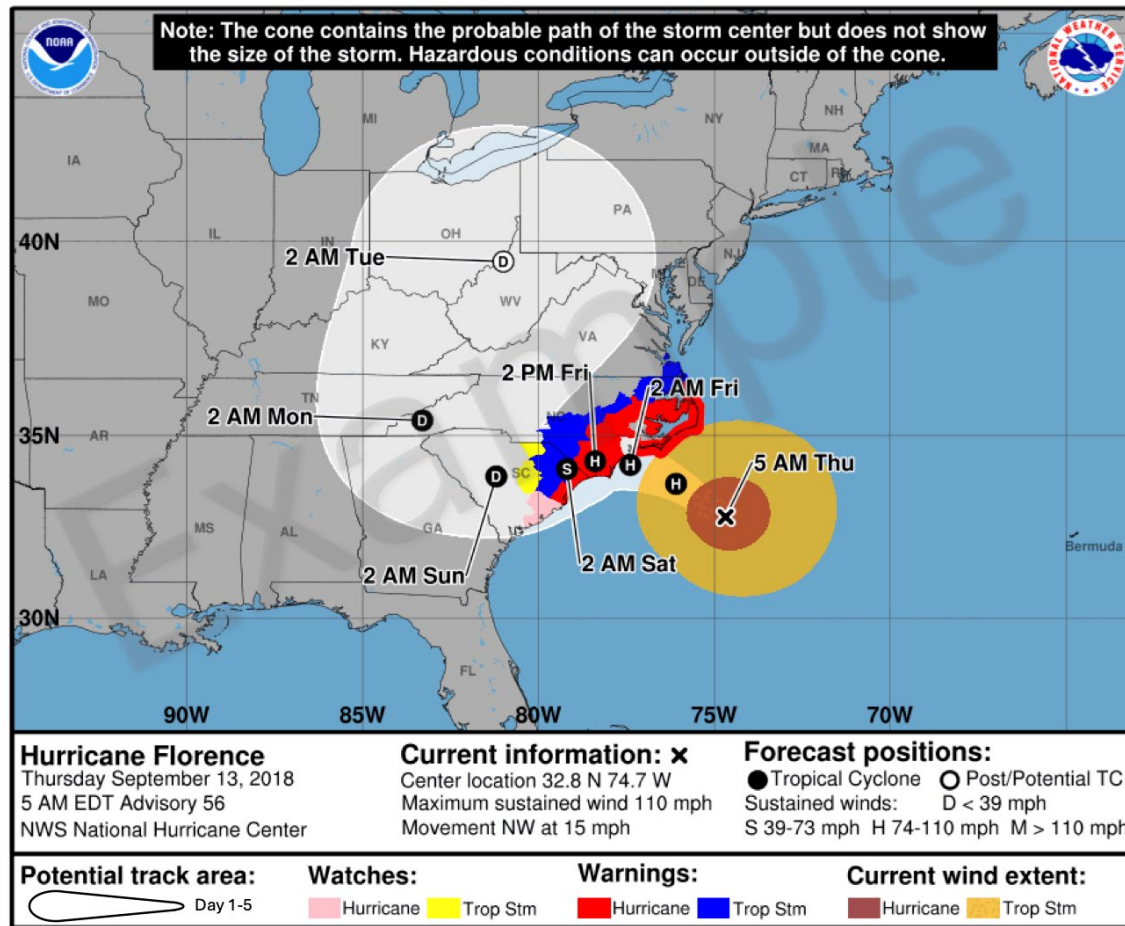
For a complete depiction of areas at risk of storm surge inundation, please see the National Weather Service Peak Storm Surge Graphic, available at [hurricanes.gov/graphics\\_at5.shtml?peakSurge](https://hurricanes.gov/graphics_at5.shtml?peakSurge).

The deepest water will occur along the immediate coast in areas of onshore winds, where the surge will be accompanied by large and dangerous waves. Surge-related flooding depends on the relative timing of the surge and the tidal cycle, and can vary greatly over short distances. For information specific to your area, please see products issued by your local National Weather Service forecast office.



# Experimental Cone Graphic

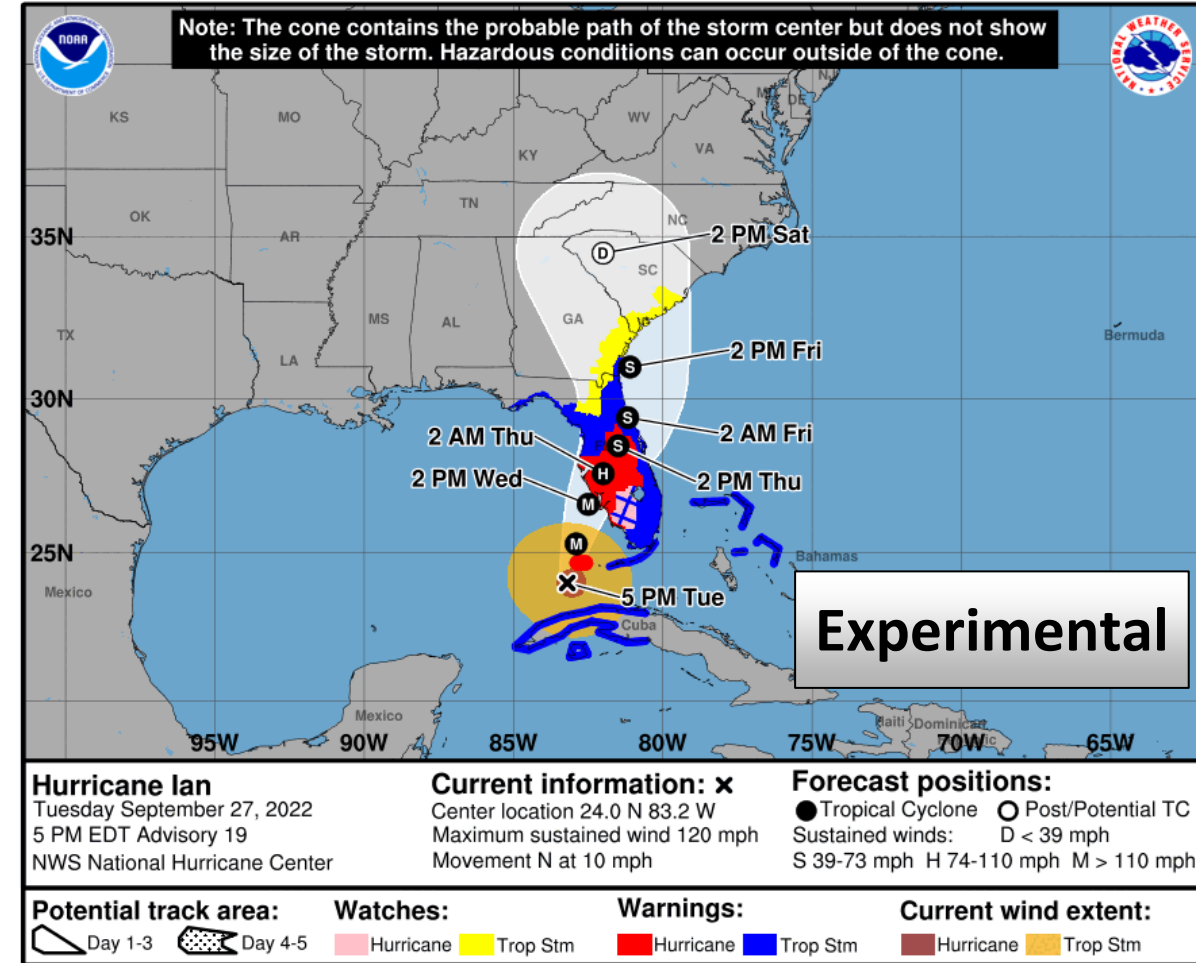
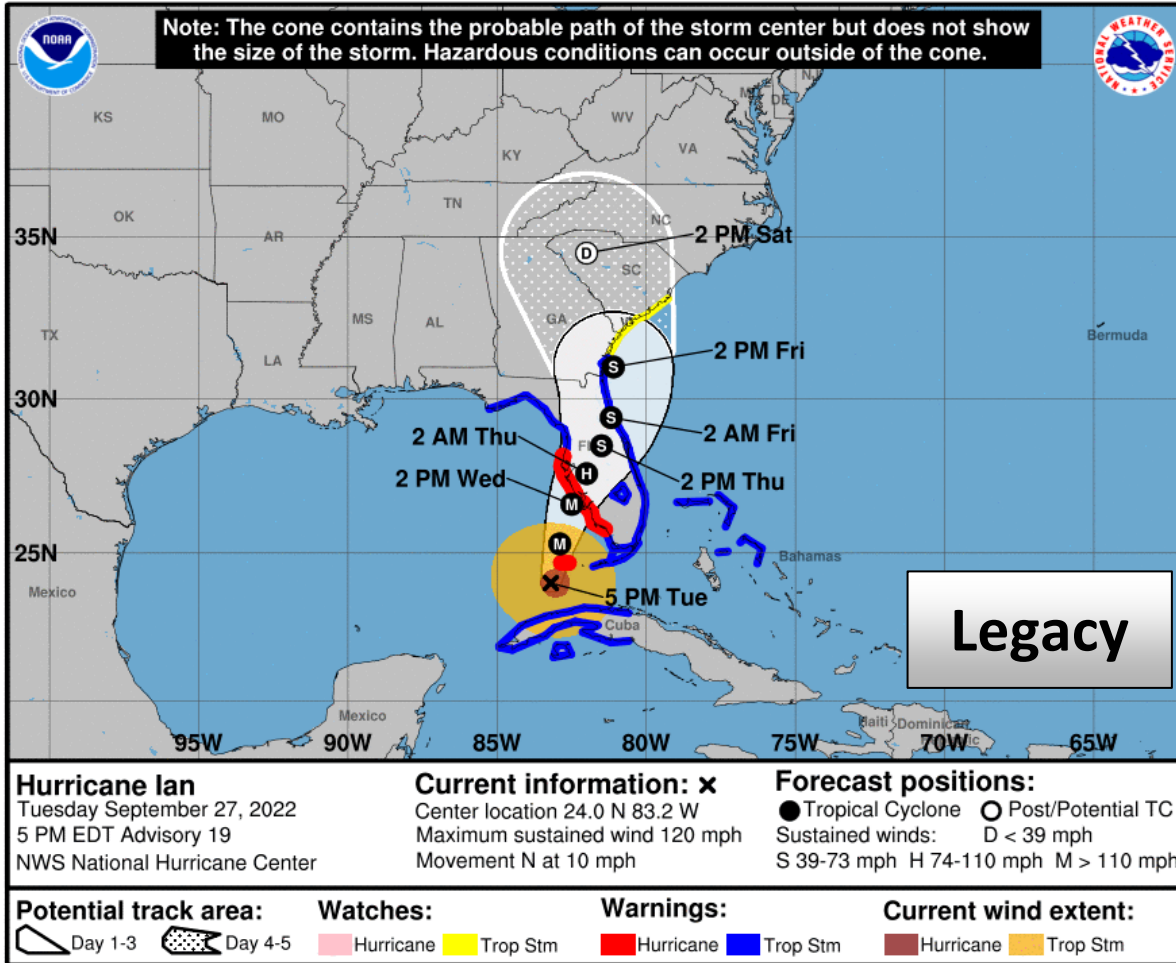
## Depicting Inland U.S. Watches/Warnings



- Experimental cone graphic depicting inland U.S. tropical storm and hurricane watches and warnings will be available around mid-August 2024
- Will better convey the wind hazard risk
- Graphic may not be available as soon as the current cone graphic due to the time need to compile complete inland watch and warning information
- Feedback and comments will be collected during experimental period

# Experimental Cone Graphic

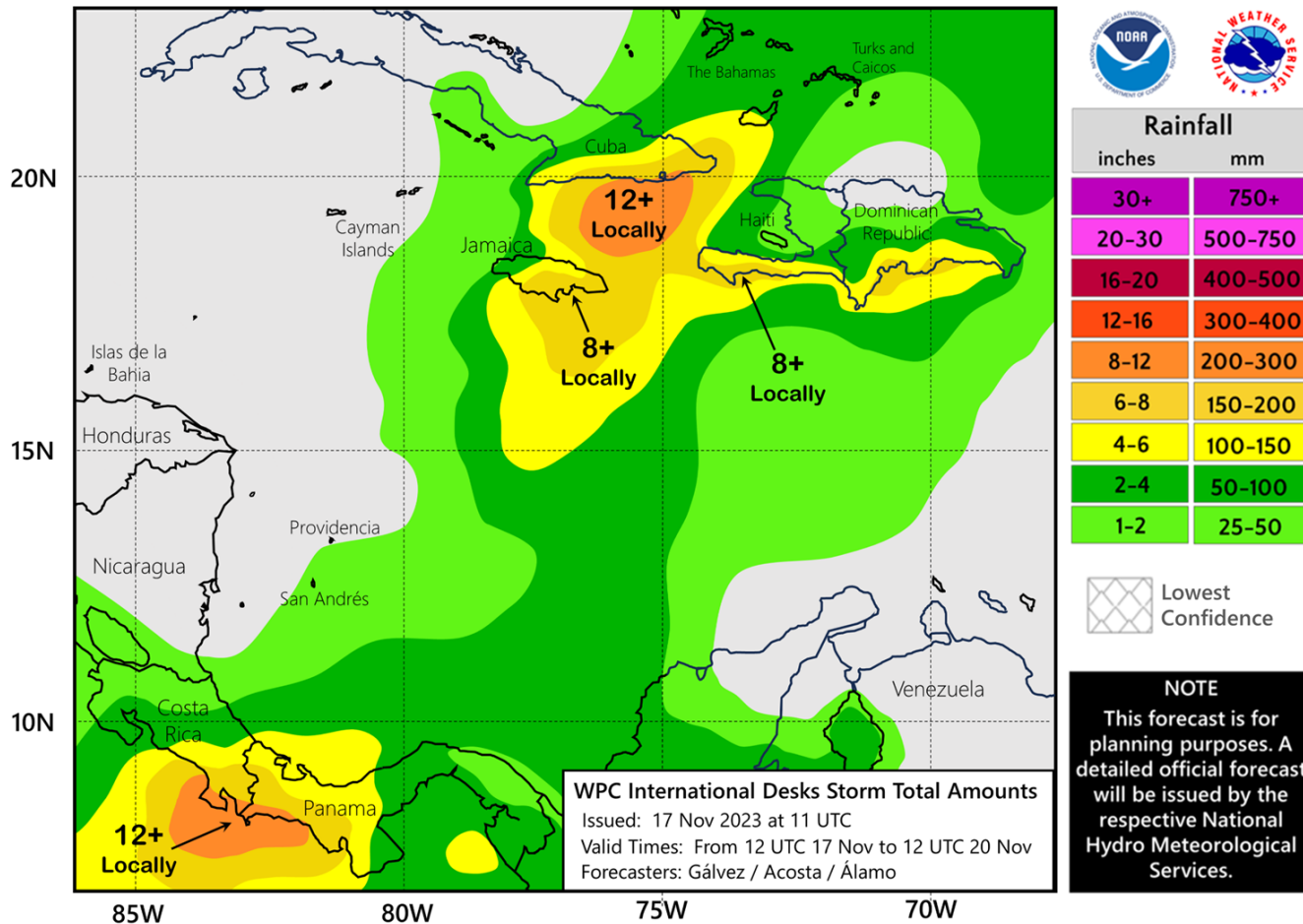
## Depicting Inland U.S. Watches/Warnings





# Experimental International TC Rainfall Graphics

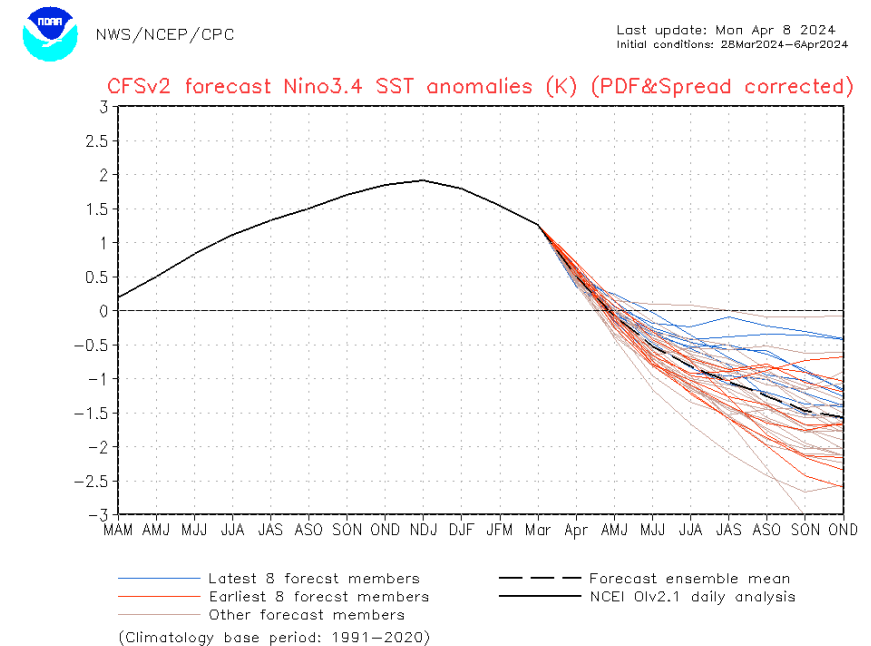
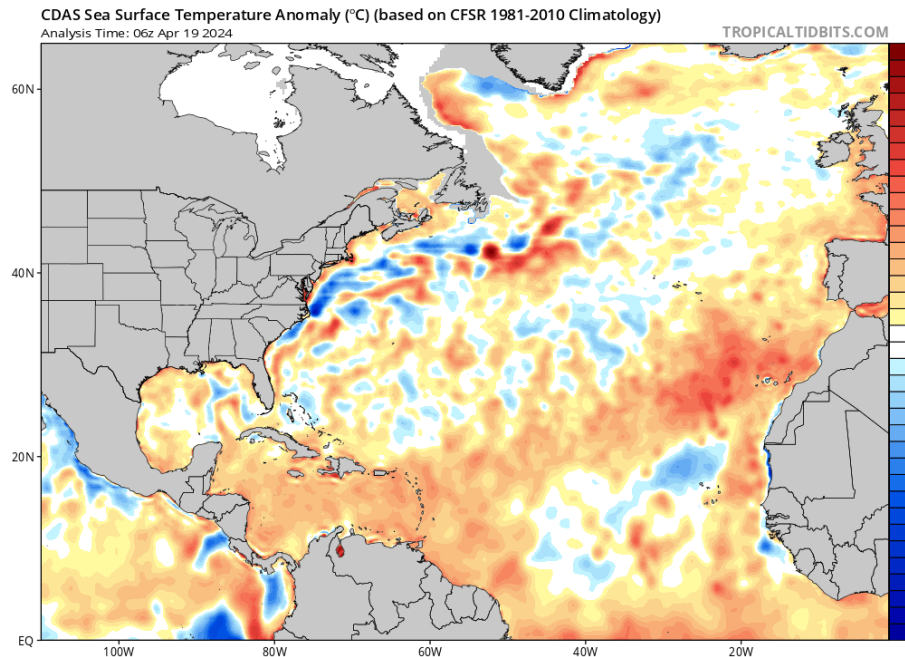
Total Rainfall with Potential Tropical Cyclone Twenty-Two (Experimental)



- Experimental graphics created by the Weather Prediction Center and available on [hurricanes.gov](https://hurricanes.gov)
- Available for tropical cyclones affecting the Caribbean, Central America, or Mexico
- Complements the rainfall forecast provided in the public advisory

# What About 2024?

- 2024 NOAA Hurricane Season Outlook will be released in May
- Climate Prediction Center: A transition from El Niño to ENSO-neutral is likely by April-June 2024 (85% chance), with the odds of La Niña developing by June-August 2024 (60% chance).



# Questions?

## Summary Document



Dan Brown | Hurricane Specialist Unit  
Branch Chief

[daniel.p.brown@noaa.gov](mailto:daniel.p.brown@noaa.gov)

Brad Reinhart | Hurricane Specialist

[brad.reinhart@noaa.gov](mailto:brad.reinhart@noaa.gov)



# Interpreting and Using NWS Tropical Products & Services

Jason Beaman  
NWS Mobile/Pensacola



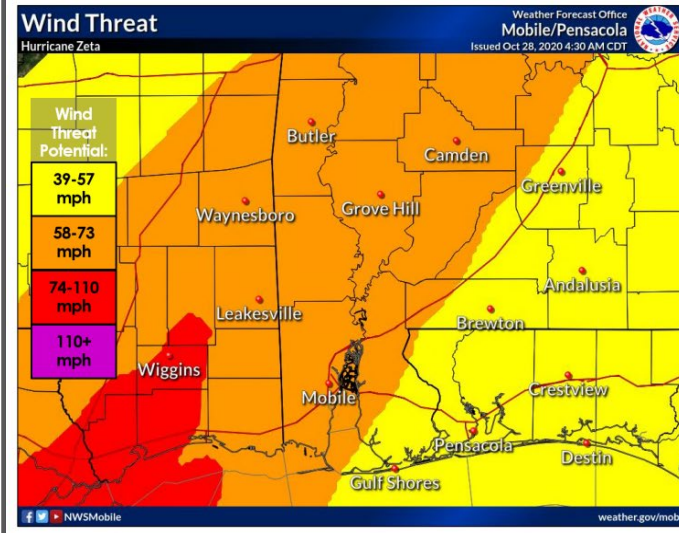


# Help Change the Tropical Mindset!

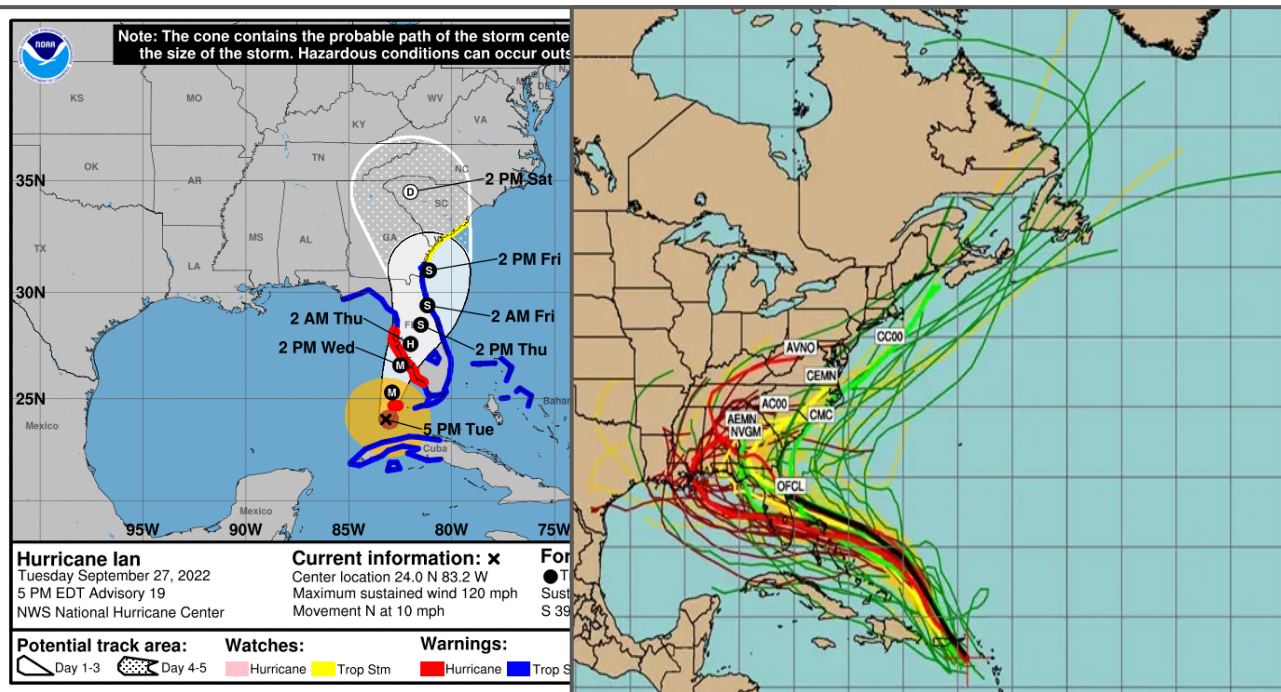


## Wind Threat / Potential Impact

Hurricane Zeta



- There is a potential for:
  - Numerous downed trees and powerlines across much of the area
  - **Widespread power outages across far southeast Mississippi**
  - Scattered to numerous power outages across interior southeast Mississippi and southwest Alabama
  - The wind threat will extend well inland due to the fast forward motion of Zeta

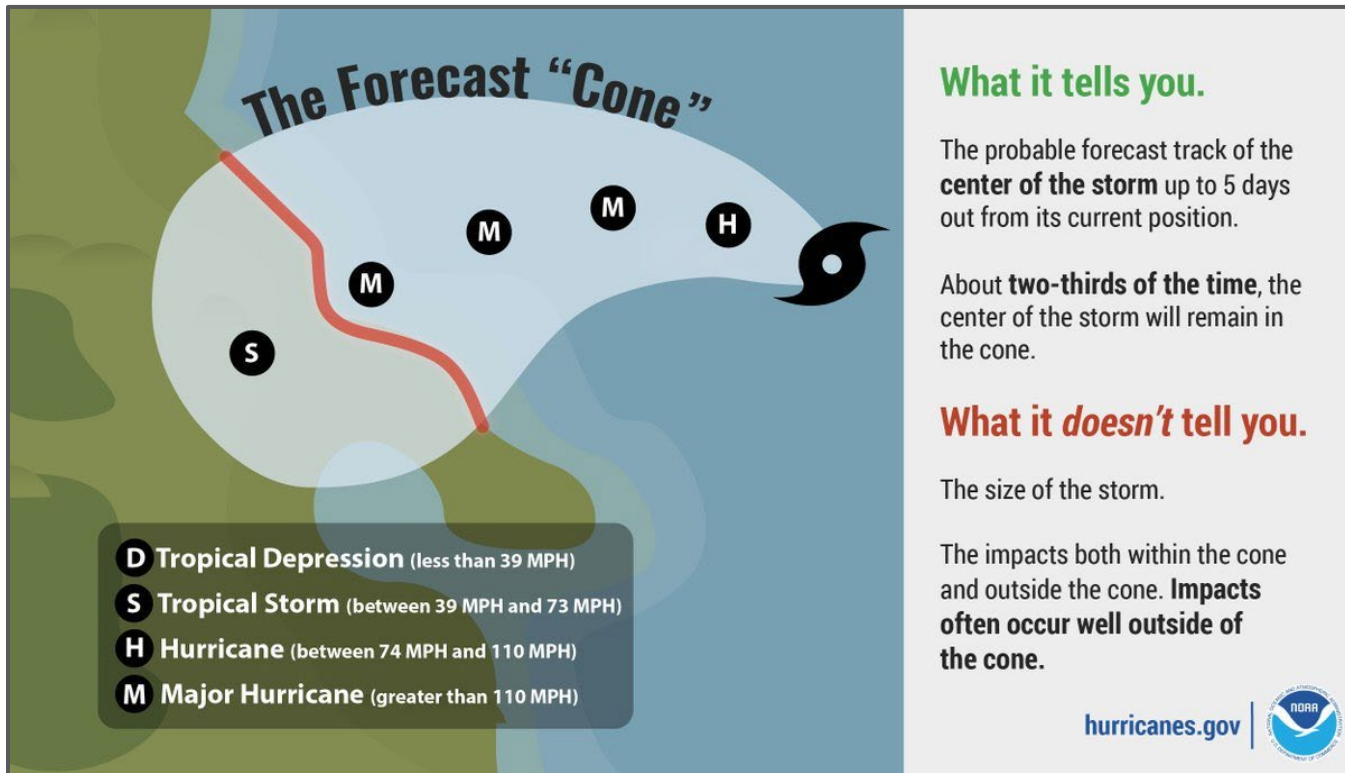


*Less emphasis on the center of the forecast cone, computer models, and Saffir-Simpson Storm Category*

*MORE emphasis on the potential local impacts and local watches and warnings*



# Impacts vs. the Cone



## The Forecast Cone!

- The cone does not tell you anything about the impacts to your area
- The cone only tells you where the exact center of the storm will go 2/3rds of the time
- The size of the cone does not change from storm to storm
- **REMEMBER:** Impacts can occur hundreds of miles outside of the cone!





# WFO Tropical Webpages

## Overview

Access point for local office products and resources.

How to find the page:

- Available from the navigation menu on the Local Office (WFO) main page
- Linked from hurricanes.gov when a particular WFO is issuing tropical products
- ER: [weather.gov/WFO/tropical](http://weather.gov/WFO/tropical)  
SR and WR: [weather.gov/srh/tropical?office=WFO](http://weather.gov/srh/tropical?office=WFO)  
where WFO is the three letter office identifier

“Active Storms” and “Local Products” tabs only available when Advisories are being issued

**NATIONAL WEATHER SERVICE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

**NWS Southern Region Tropical Webpage**  
Southern Region Headquarters

Weather.gov > Southern Region Headquarters > NWS Southern Region Tropical Webpage

Local Forecast Offices A-L Local Forecast Offices M-Z River Forecast Centers Center Weather Service Units Regional HQ

NWS Corpus Christi homepage

Outlook **Active Storms** Threats and Impacts Local Products Satellite Radar Social Media Preparedness Links

**National Hurricane Center Advisory 22 for Hurricane Harvey**

Update: 6 PM CDT POSITION AND INTENSITY UPDATE

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.

1 AM Sun 4 PM Fri 1 PM Wed 1 PM Tue 1 PM Mon

**Hurricane Harvey**  
Friday August 25, 2017  
4 PM CDT Advisory 22  
NWS National Hurricane Center

**Current information: x**  
Center location 27.5 N 96.5 W  
Maximum sustained wind 125 mph  
Movement NW at 10 mph

**Forecast positions:**  
● Tropical Cyclone ○ Post/Potential TC  
Sustained winds: D < 39 mph  
S 39-73 mph H 74-110 mph M > 110 mph

**Potential track area:** Day 1-3 Day 4-5  
**Watches:** Hurricane Trop Stm  
**Warnings:** Hurricane Trop Stm  
**Current wind extent:** Hurricane Trop Stm

NHC Advisory Text Products			
Public Advisory	Forecast Advisory	Forecast Discussion	Wind Speed Probabilities
Tropical Storm Wind Speed Probabilities	Hurricane Wind Speed Probabilities	Earliest Reasonable Arrival Time of Tropical Storm Winds	Most Likely Arrival Time of Tropical Storm Winds

Click image to swap into full size panel above.

Description of the Track Forecast and Wind Speed Probability Maps Description of the Tropical Storm-Force Wind Arrival Time Maps

Source: National Hurricane Center





# WFO Tropical Webpages

Hurricane Threat and Impact Graphics

Threats and Impacts tab contains a map of the Hurricane Threat and Impact (HTI) graphics when there is an active storm

Depicts what people should be prepared for in terms of wind, storm surge, inland flooding and tornadoes and includes a safety margin

On the right side of the page, specific local forecast information is shown when a user clicks on a location on the map on the left

Direct links to the HTI data displayed on the map are changing for the 2024 season. [New links](#) are available under the map on the “download KML” option.

NWS Miami homepage [Provide Feedback on this Webpage](#)

[Outlook](#)
[Active Storms](#)
[Threats and Impacts](#)
[Local Products](#)
[Satellite](#)
[Radar](#)
[Social Media](#)
[Preparedness](#)
[Links](#)

Hurricane Threats and Impacts Graphics FAQ

Map of Coastal Threats and Potential Impacts - What's This?

Wind Threat
  Storm Surge Threat
  Flooding Rain Threat
  Tornado Threat

[Latest Forecast - What's This?](#)

**Threat Level - Potential for wind greater than 110 mph**

\*Structural damage to sturdy buildings, some with complete roof and wall failures. Complete destruction of mobile homes. Damage greatly accentuated by large airborne projectiles.

**For: Inland Palm Beach County**

**...HURRICANE WARNING REMAINS IN EFFECT...**

\* LOCATIONS AFFECTED

- Wellington
- Lion Country Safari
- Belle Glade
- Pahokee

\* WIND

- LATEST LOCAL FORECAST: Equivalent Tropical Storm force wind
- Peak Wind Forecast: 45-55 mph with gusts to 90 mph
- Window for Tropical Storm force winds: early Sunday morning until early Monday morning

- Emergency plans should include a reasonable threat as depicted on the left.

\* FOR MORE INFORMATION:

- <http://www.weather.gov/mfl>
- [www.co-palm-beach.fl.us](http://www.co-palm-beach.fl.us)
- For storm information call 2-1-1

[\[Download KML\]](#)
[\[Download Image\]](#)

Wind Threat
Potential for wind greater than 110 mph
Potential for wind 74 to 110 mph
Potential for wind 58 to 73 mph
Potential for wind 39 to 57 mph
Wind less than 39 mph







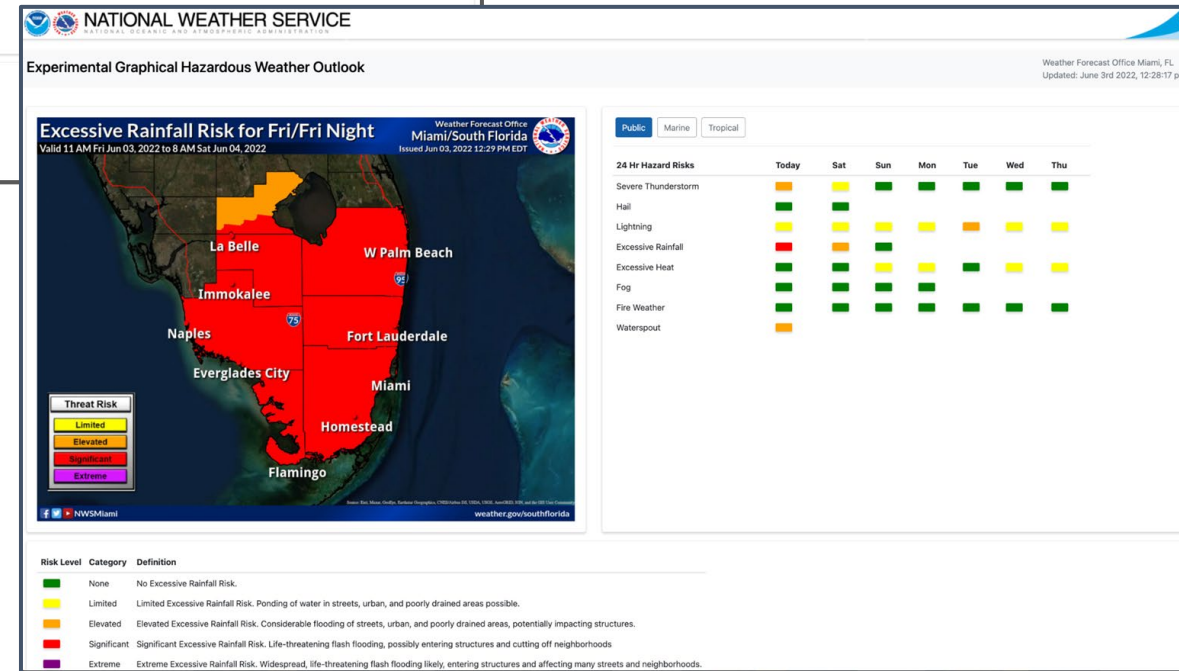
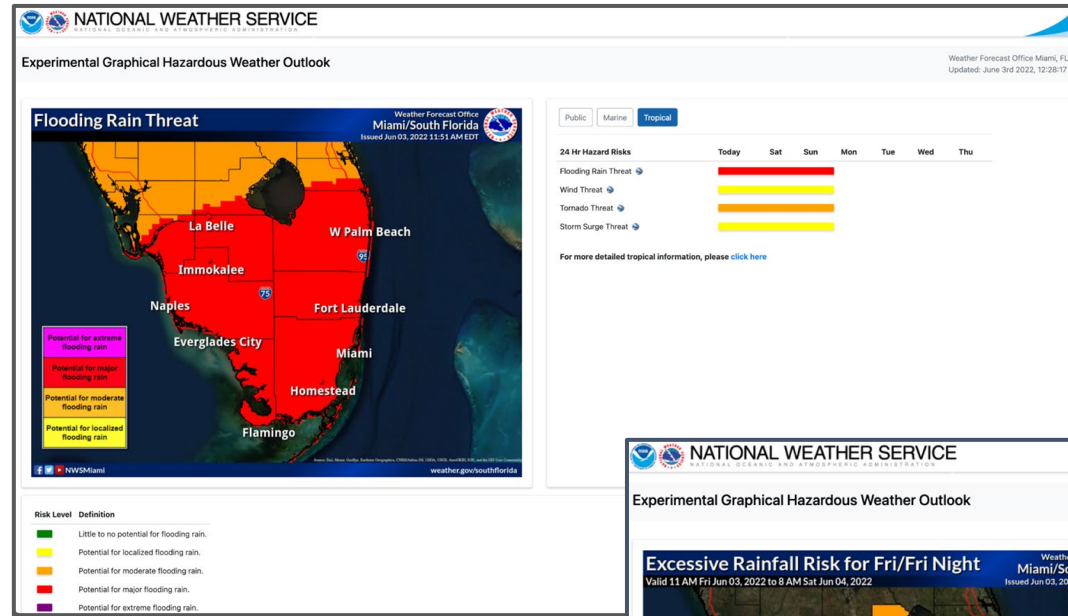
# Graphical Hazards Weather Outlook

Tab on the Graphical Hazardous Weather Outlook (GHWO) for “Tropical” depicts the Hurricane Threat and Impact (HTI) Graphics but in the GHWO format

Link to the GHWO:

[weather.gov/erh/ghwo?wfo=WFO](https://weather.gov/erh/ghwo?wfo=WFO)

where *WFO* is the 3 letter identifier for the WFO

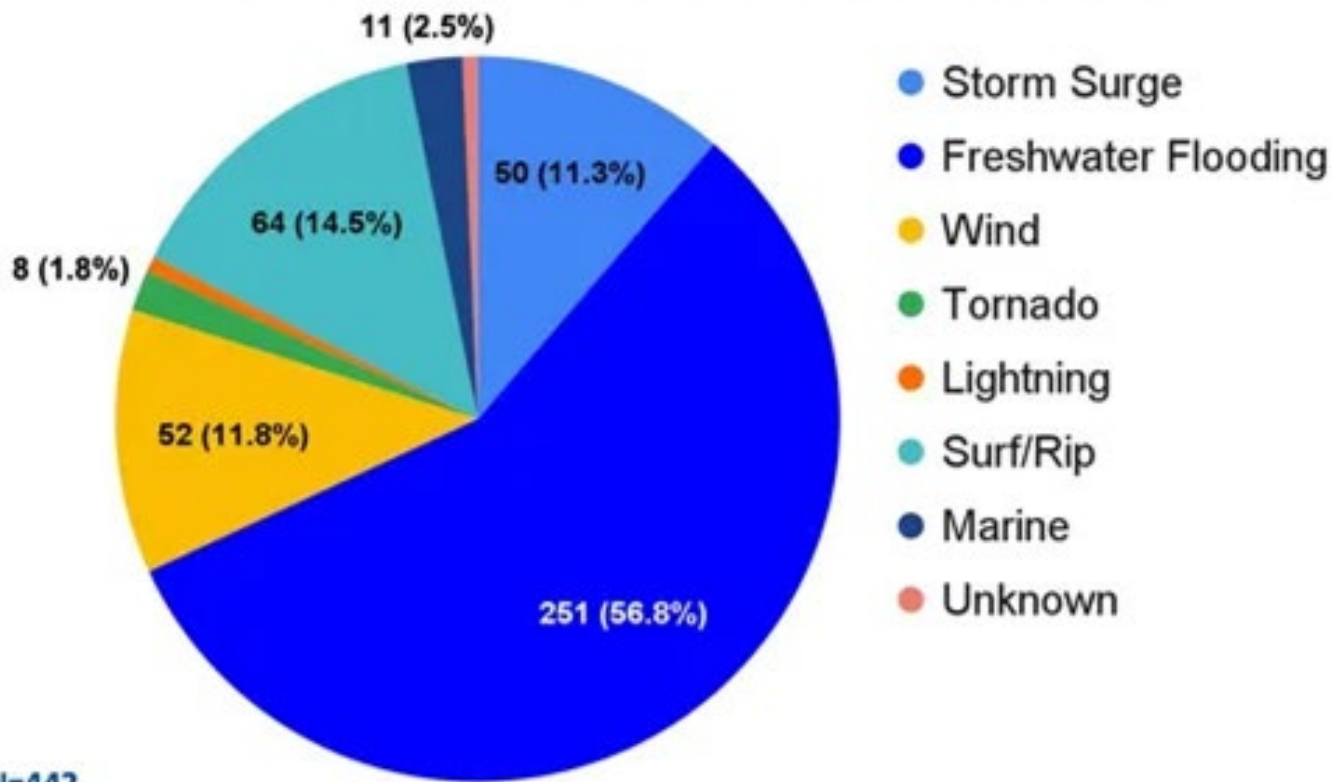




# Direct Tropical Cyclone Fatalities

442 direct fatalities in the U.S. from 2013-2022

## Direct Fatalities 2013-2022

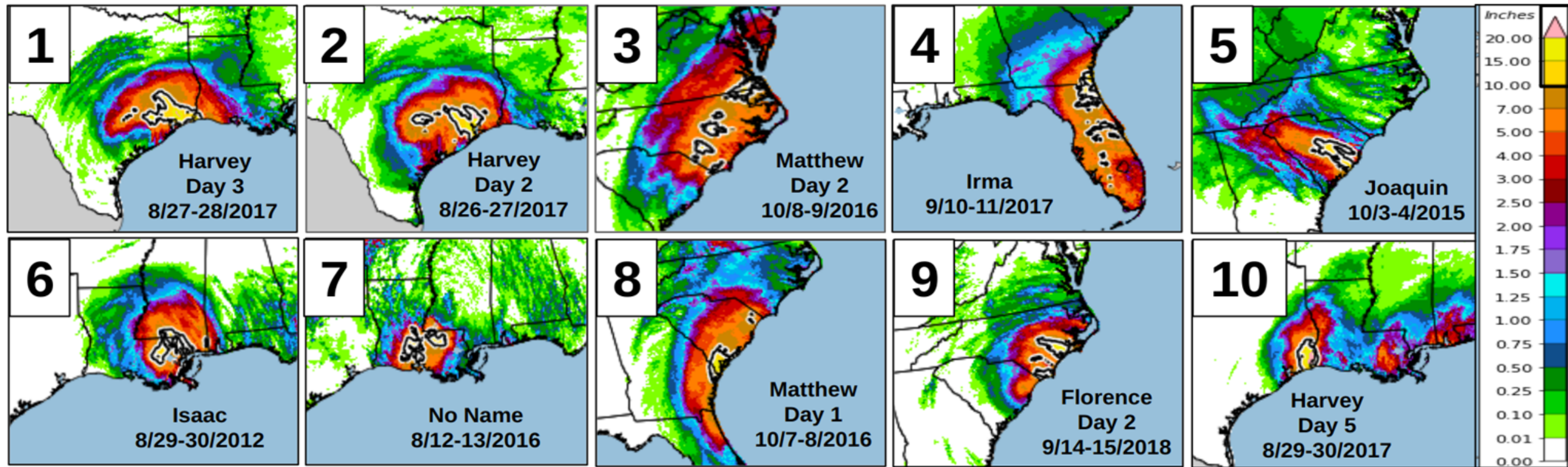


- Freshwater flooding is responsible for 57% of direct deaths
- 11% due to storm surge (41 of the 50 from Ian)
- 15% due to wind - many tree-related
- We must be prepared for the **total tropical threat** - be sure to know all potential threats not just the category!

N=442

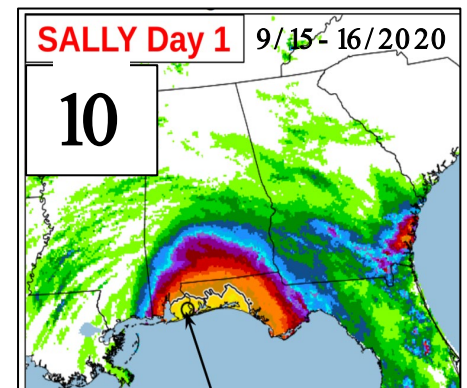


# The Major Impact of Flooding Rain



**\*By a area covered with 10+ inches of rainfall in 24 hours.**

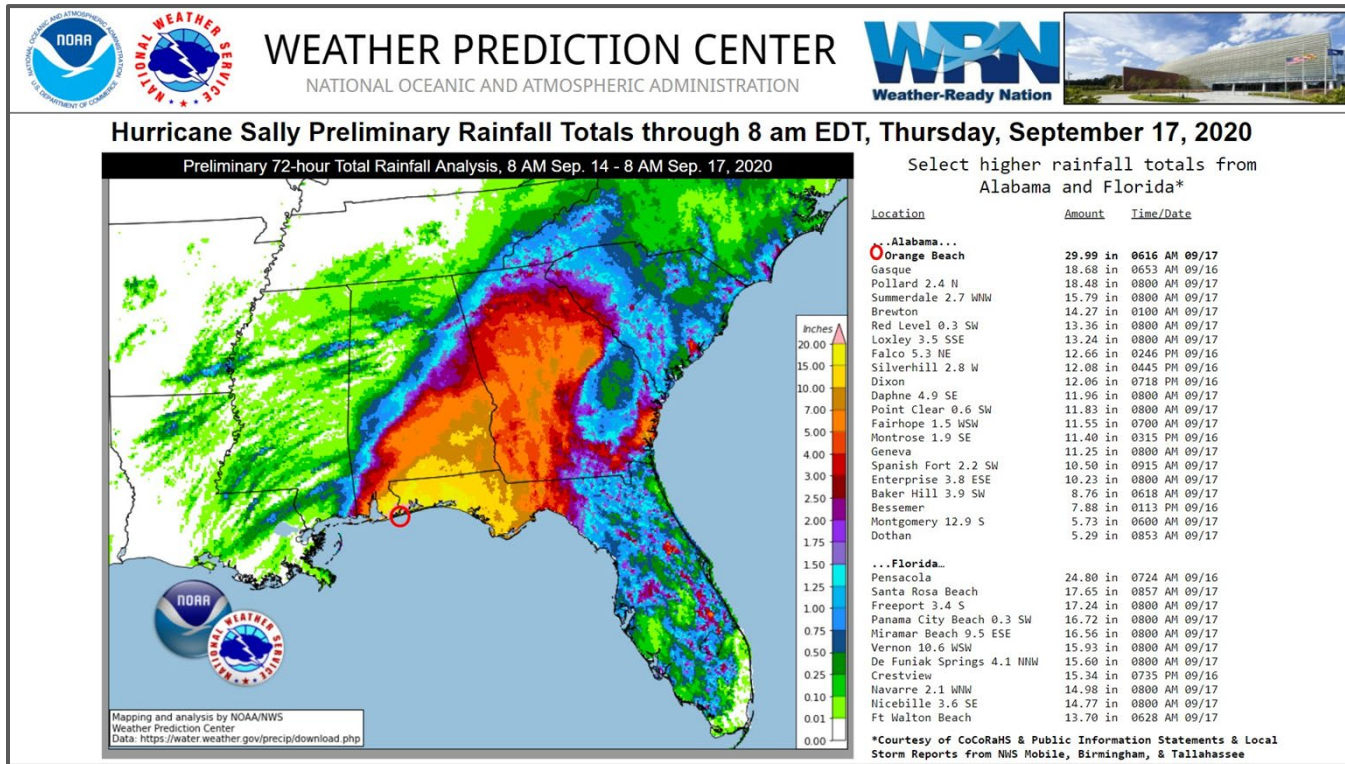
Three of the wettest TC days since 2005 are associated with Hurricane Harvey in 2017. Hurricane Matthew shows up twice in the top 10, producing the 3rd and 8th wettest days, while Hurricane Sally, in 2020, ties with Harvey's day 5 extreme rainfall swath, for 10th wettest TC rainfall day over the past 17 years.





# The Major Impact of Flooding Rain

## Hurricane Sally 2020

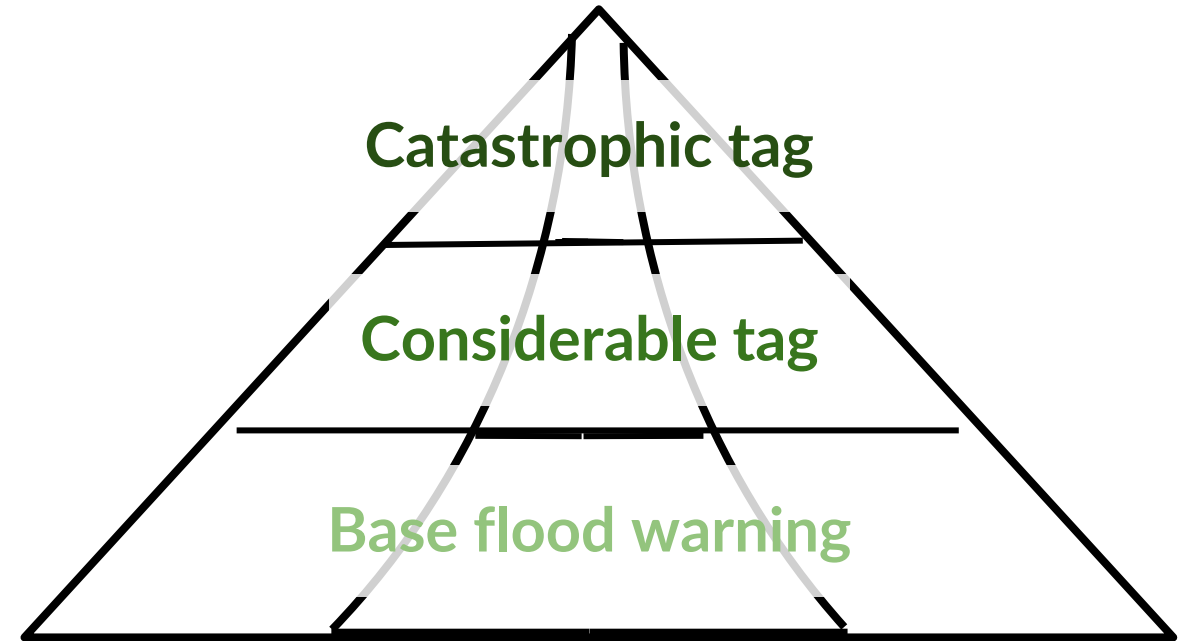


- The leading cause of death in tropical systems is freshwater flooding (a.k.a. river flooding and flash flooding) - this is the result of heavy rainfall
- Hurricane Sally produced 29.99 inches of rain with a widespread 1-2 FEET of rainfall
- Catastrophic flooding occurred with numerous Flash Flood Emergencies



# Three Levels of Flash Flood Warnings

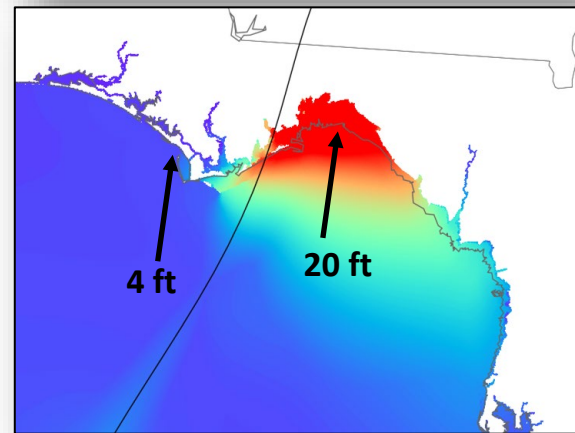
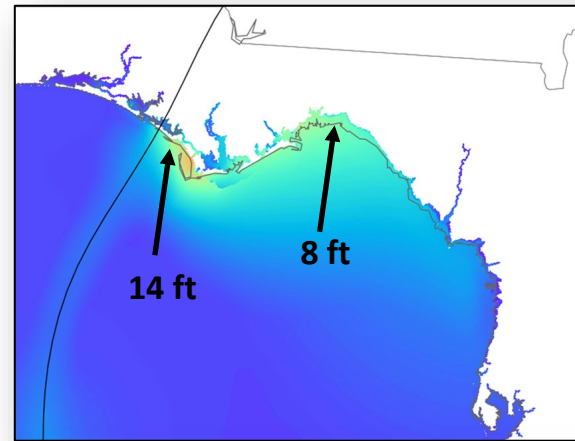
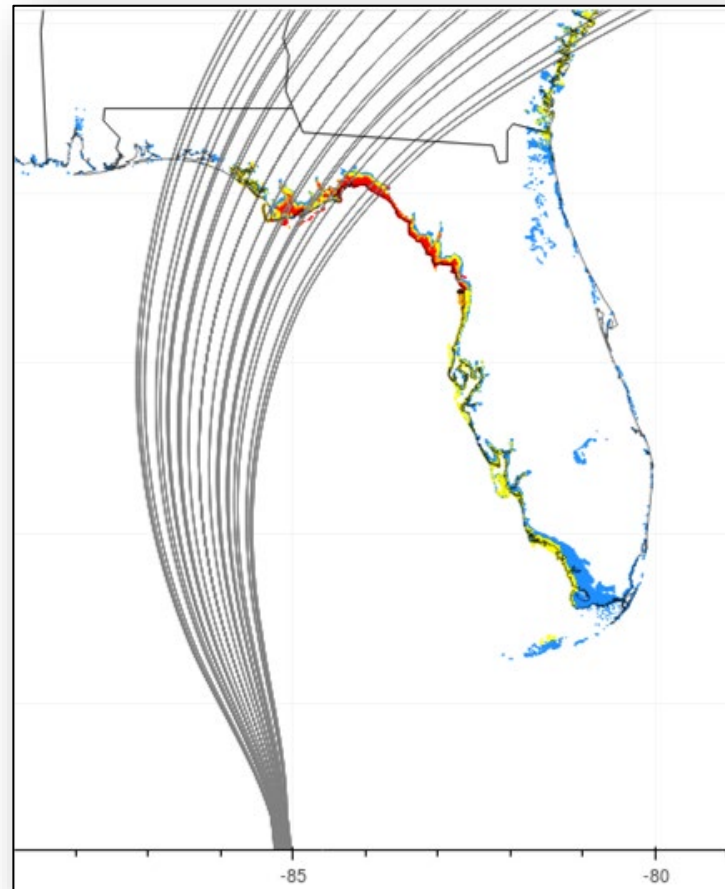
- **Base:** most frequently used. Flash flooding could occur within the warned area.
- **Considerable:** Infrequently used. Indications that flash flooding capable of unusual severity. Urgent action is necessary.
- **Catastrophic:** Rarely used. Threat for flash flooding is life threatening and catastrophic damage is likely.
  - Will headline **FLASH FLOOD EMERGENCY**



**WEA:** When a new FFW is issued with a Considerable or Catastrophic tag OR if a base FFW is upgraded to the Considerable or Catastrophic tag.



# The Complexities of Storm Surge



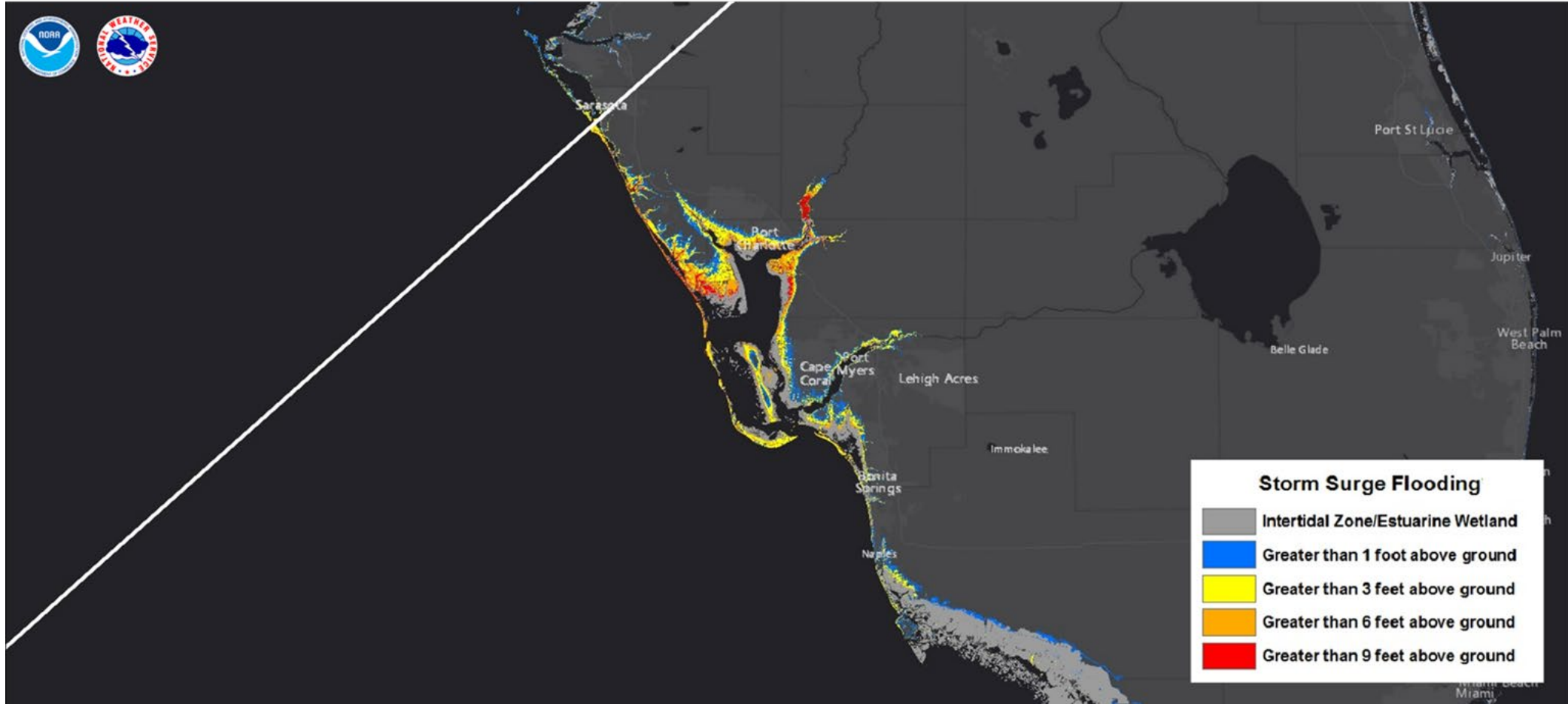
- Recent hurricanes have taught us that surge forecasting is complex and filled with inherent uncertainties.
- These uncertainties are amplified with significant track changes. This is especially true when a major rainfall event is forecast as well.
- Each storm has its own unique surge footprint and level of uncertainty.





# It's All in the Details - Effect of Intensity

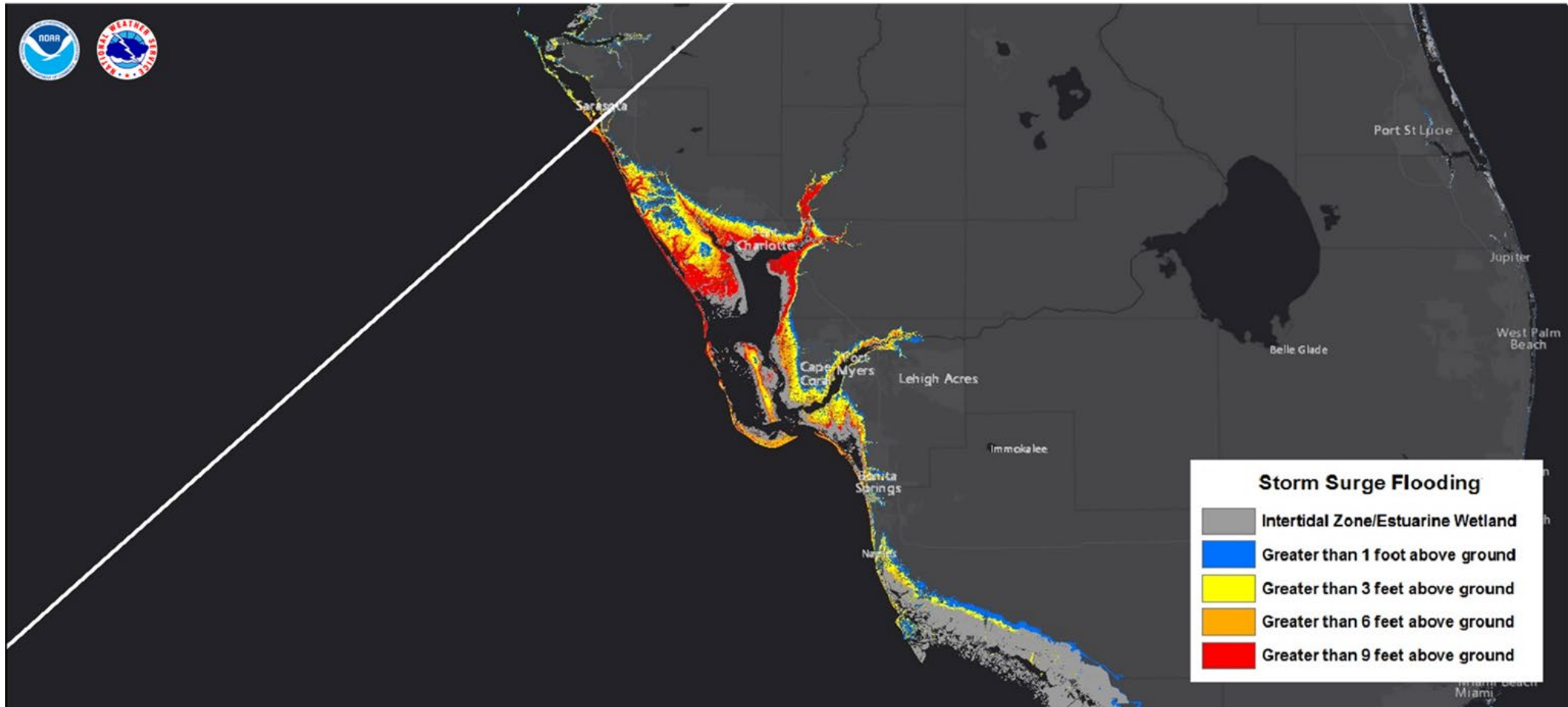
## Category 3





# It's All in the Details - Effect of Intensity

## Category 4







# It's All in the Details - Effect of Forward Speed

## Forward Speed

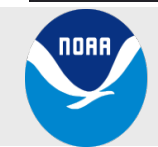
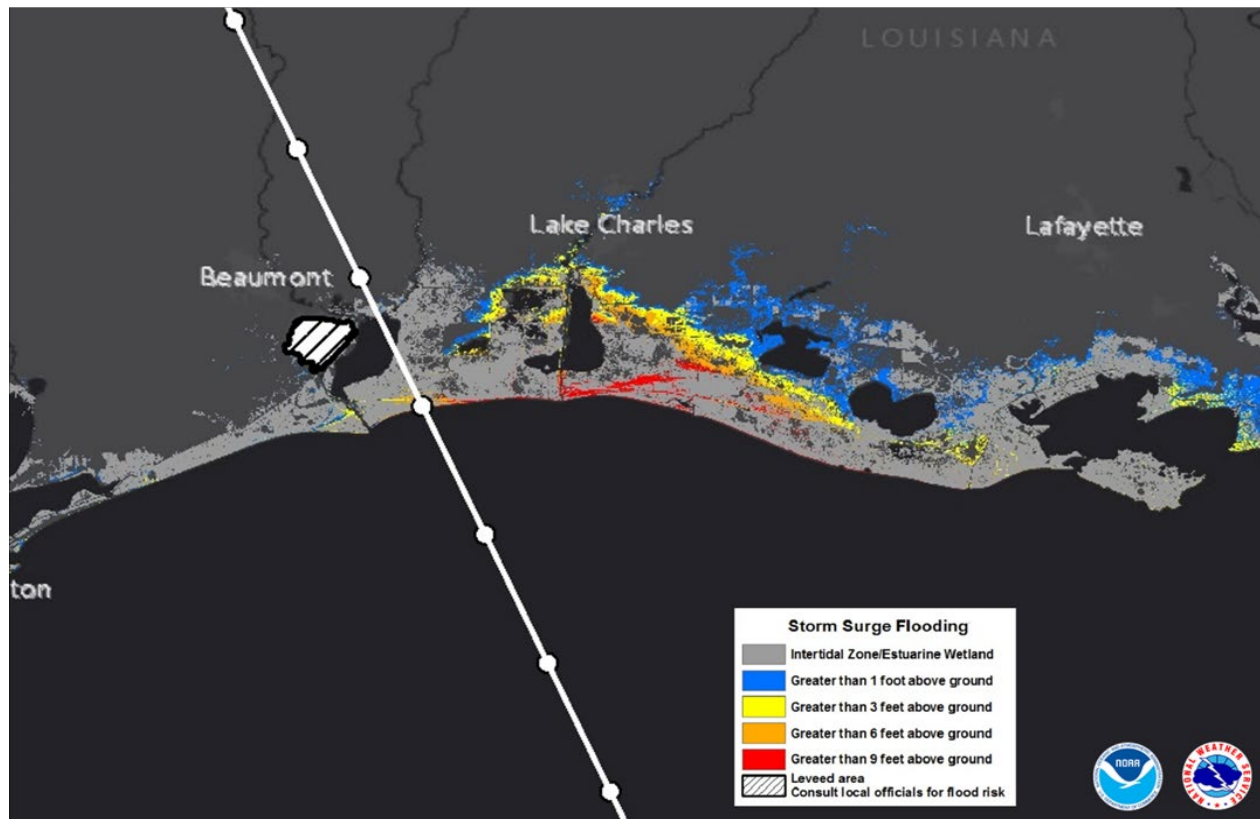
25 mph

### Faster Storms:

Higher maximum at coast

### Slower Storms:

Farther inland penetration

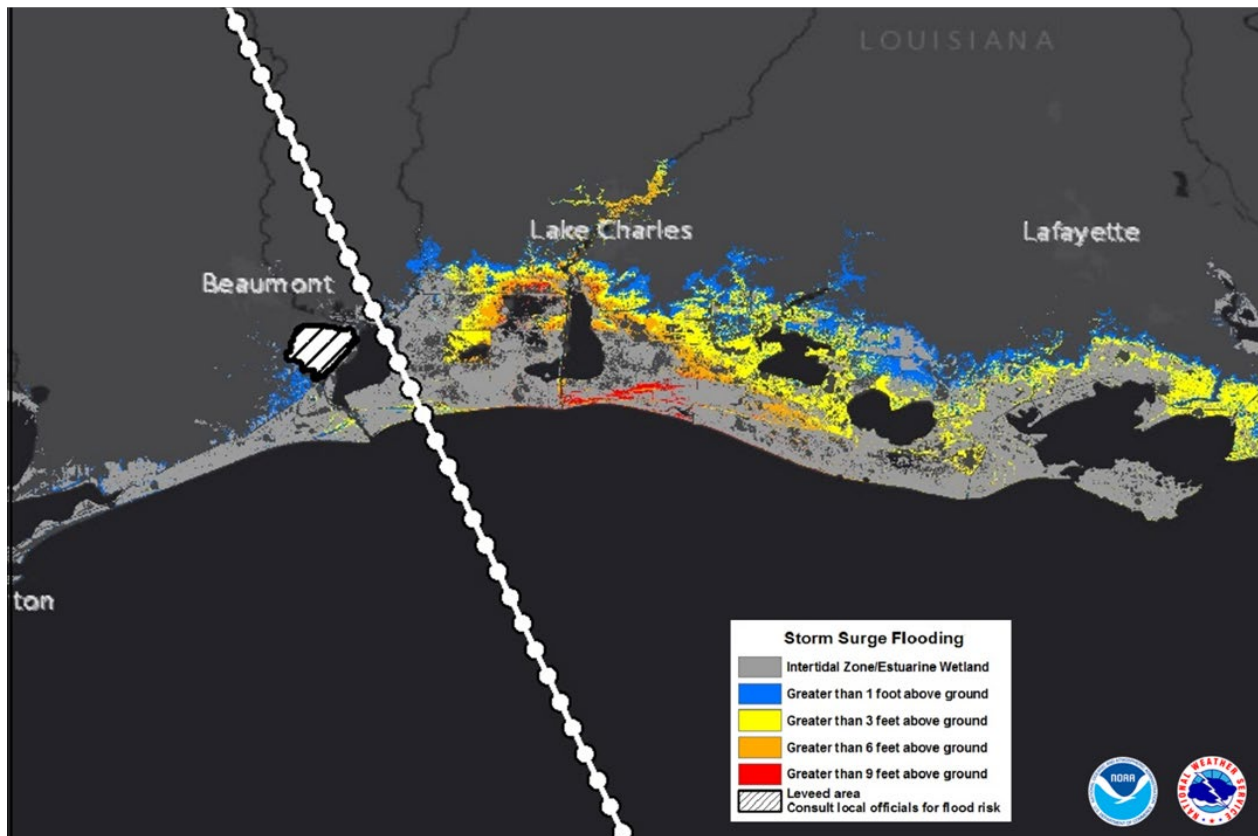




# It's All in the Details - Effect of Forward Speed

## Forward Speed

5 mph



### Faster Storms:

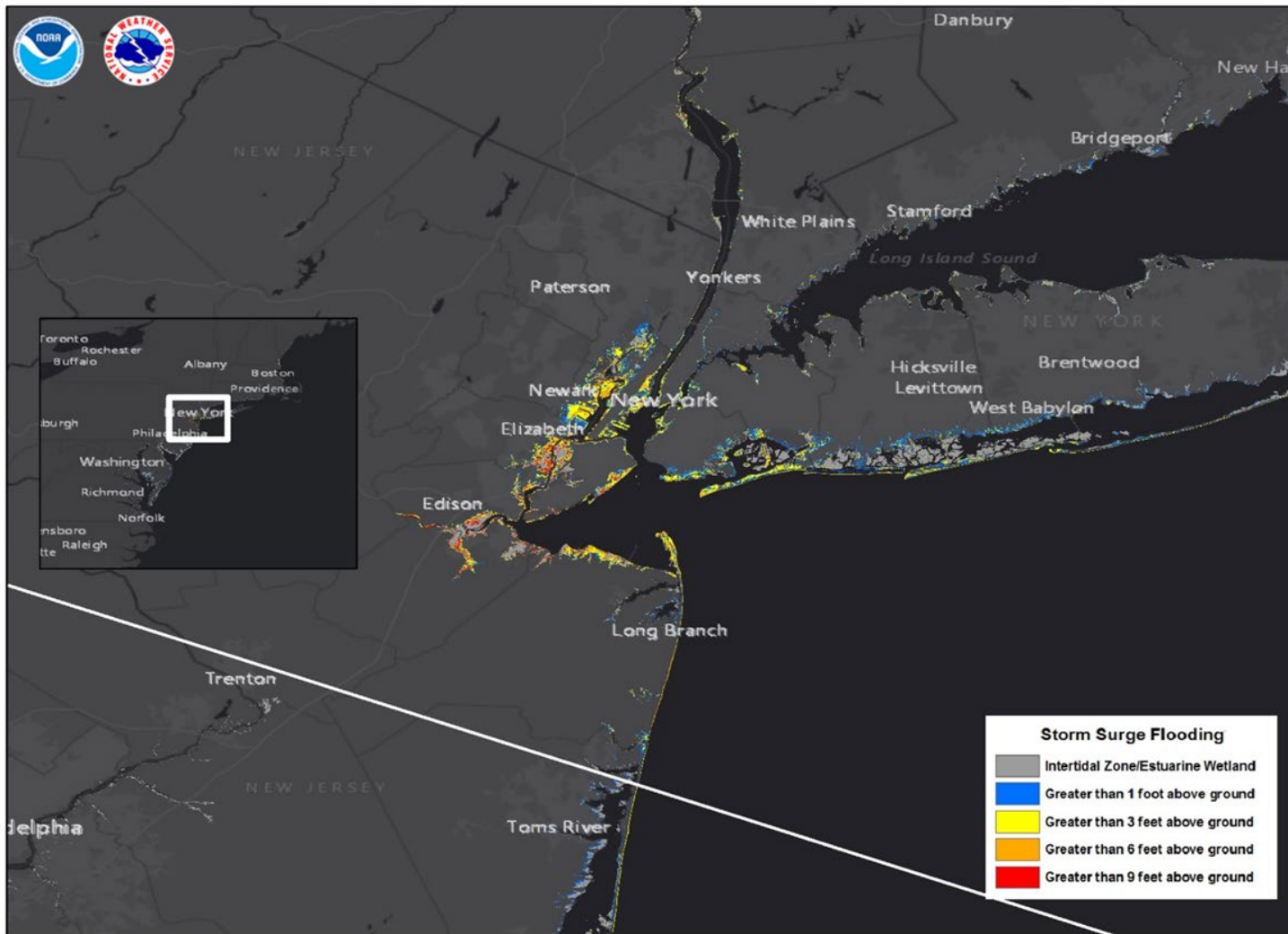
Higher maximum at coast

### Slower Storms:

Farther inland penetration



# It's All in the Details - Angle of Approach



## Angle of Approach

WNW

VS

NNW

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



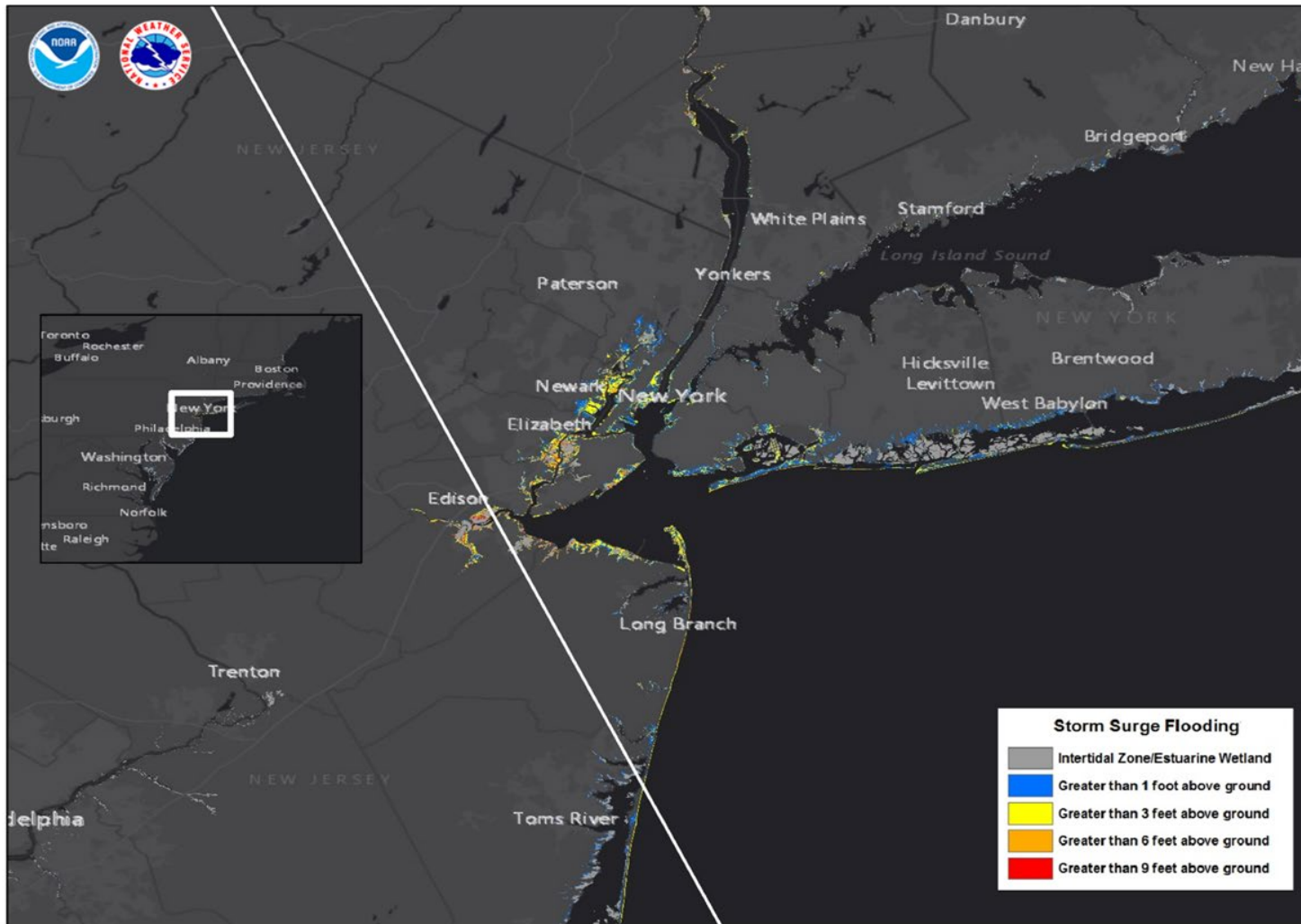
National Oceanic and Atmospheric Administration

U.S. Department of Commerce

National Weather Service



# It's All in the Details - Angle of Approach



## Angle of Approach

WNW

VS

NNW

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



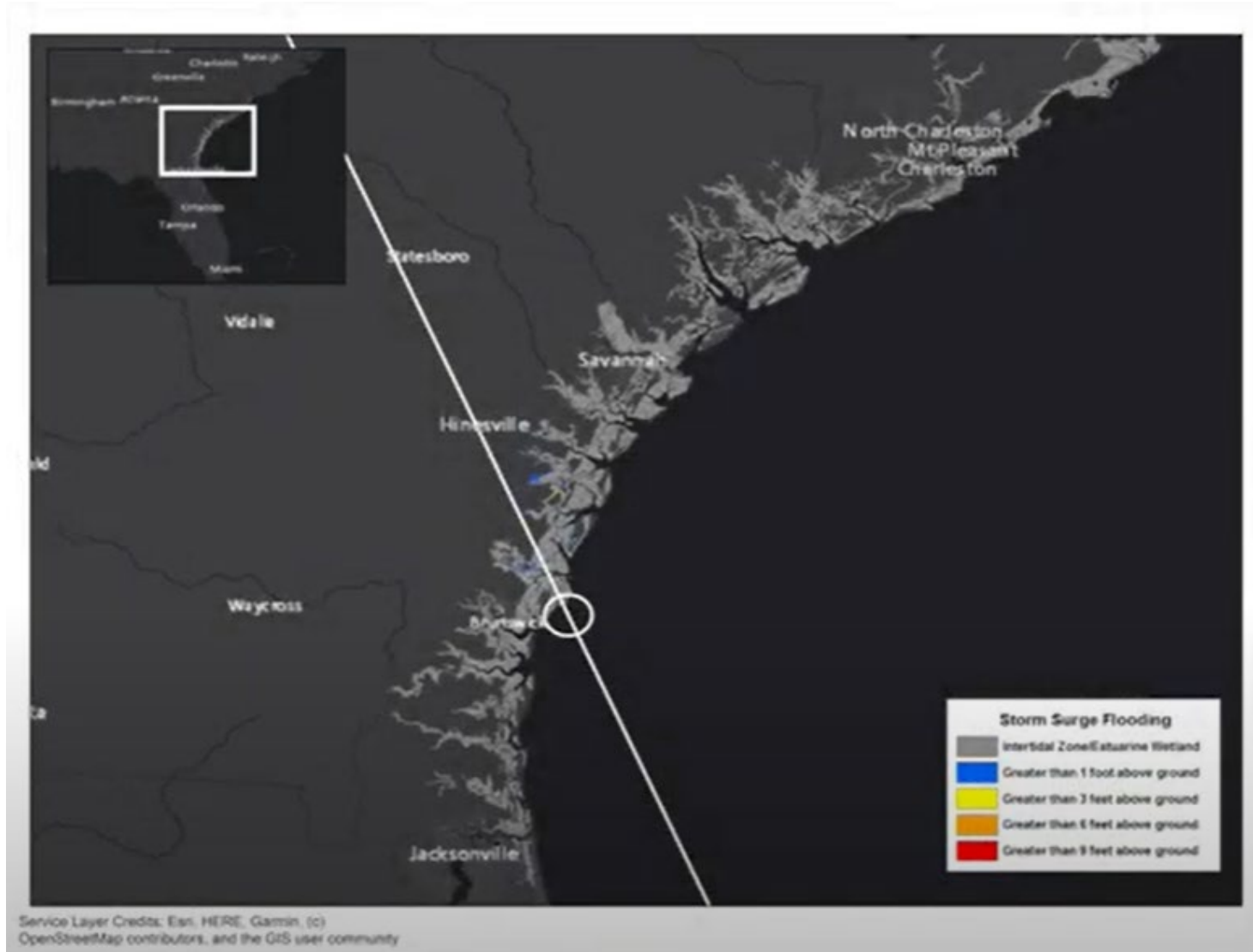
National Oceanic and Atmospheric Administration

U.S. Department of Commerce

National Weather Service

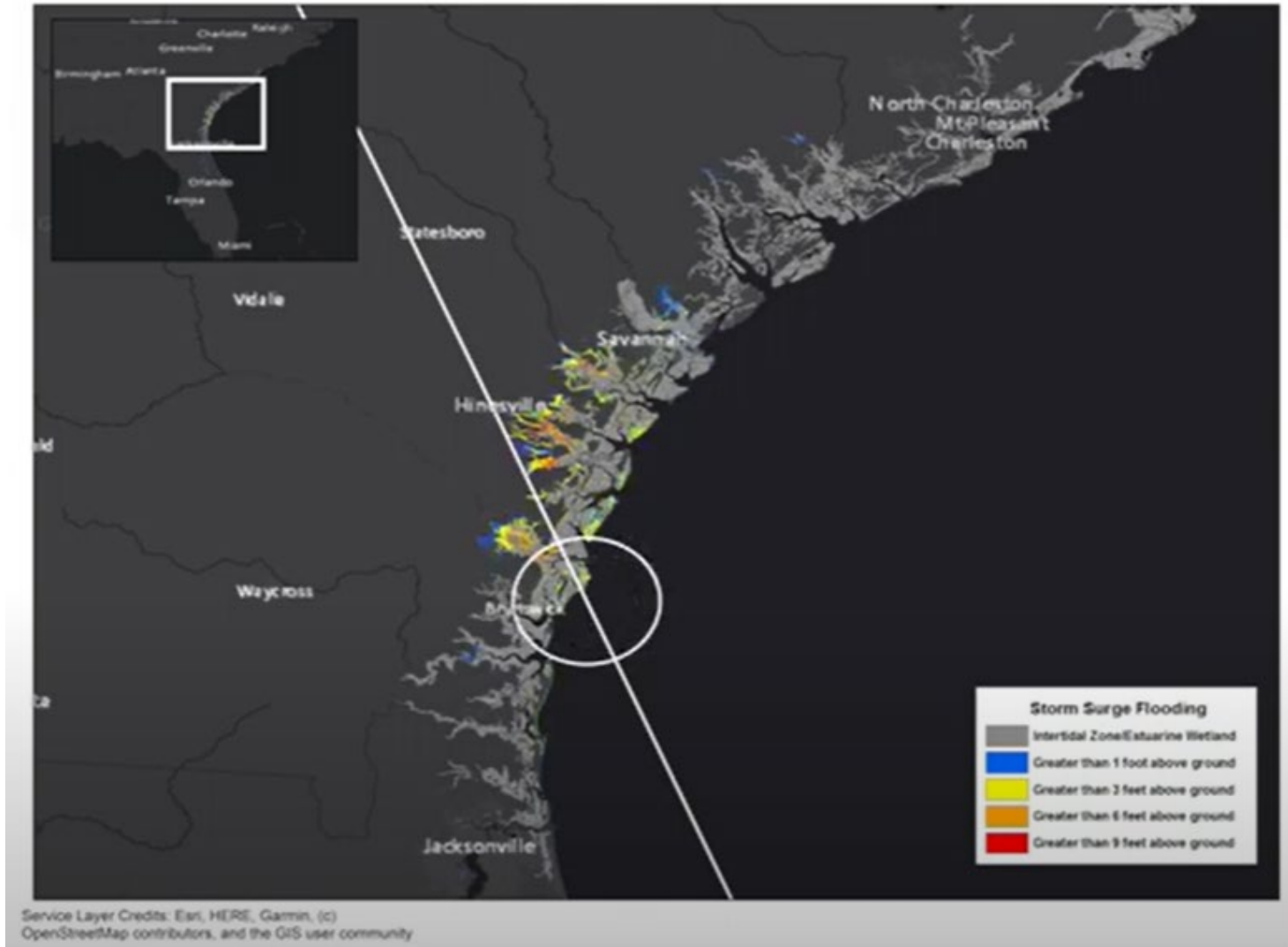


# It's All in the Details - Storm Size



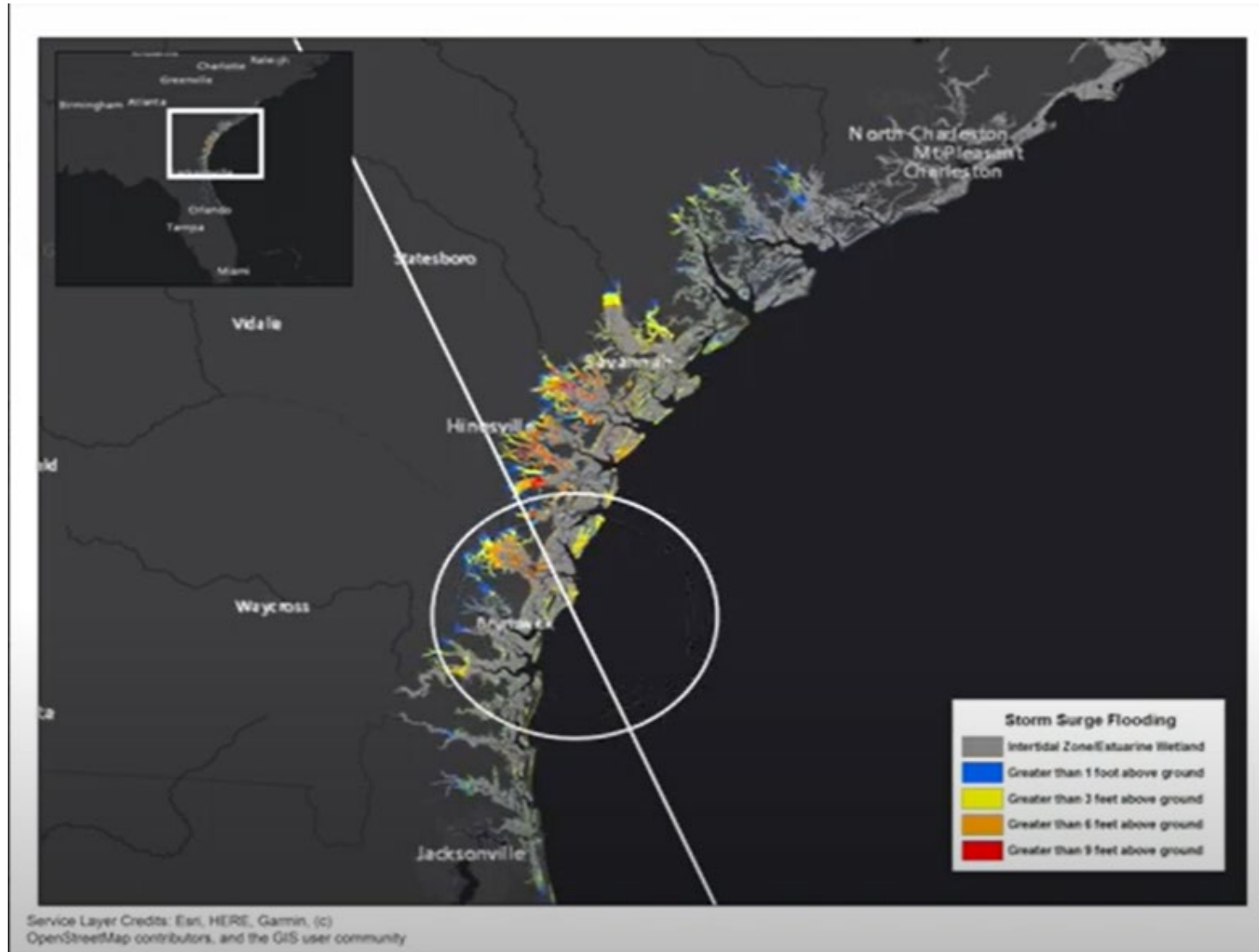


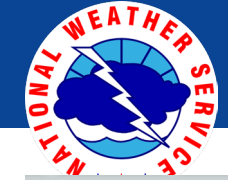
# It's All in the Details - Storm Size





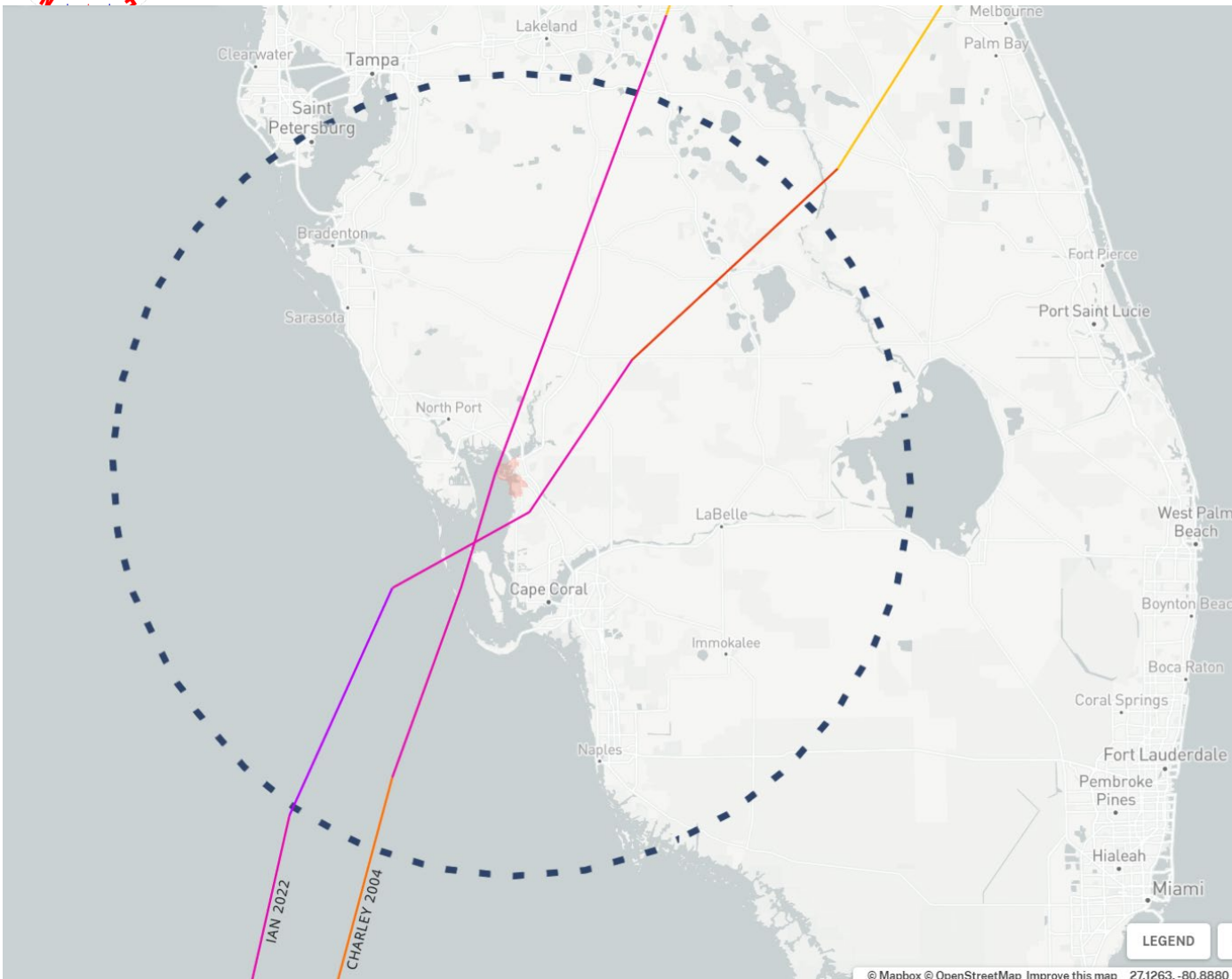
# It's All in the Details - Storm Size





# Two Very Different Surge Events - Ian vs. Charley

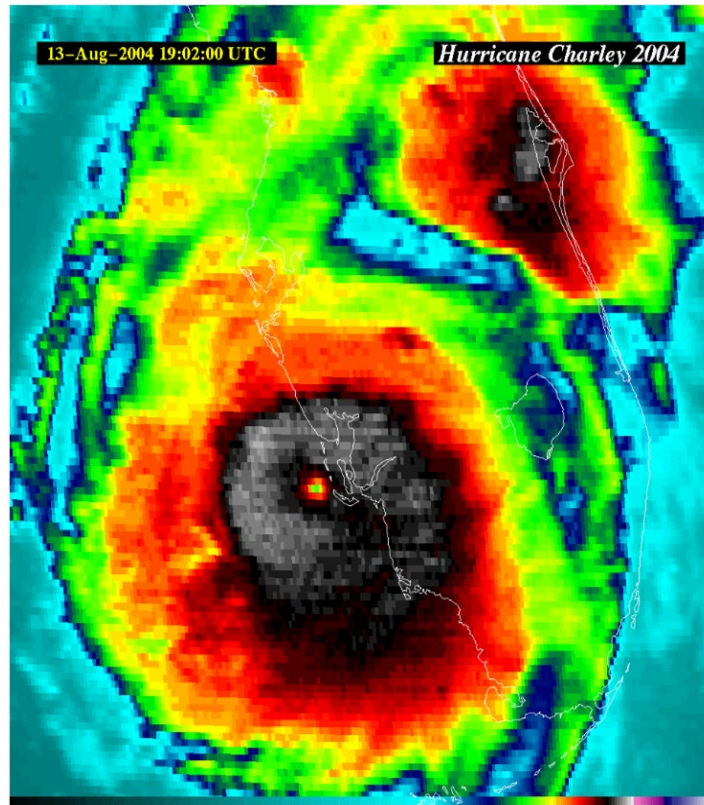
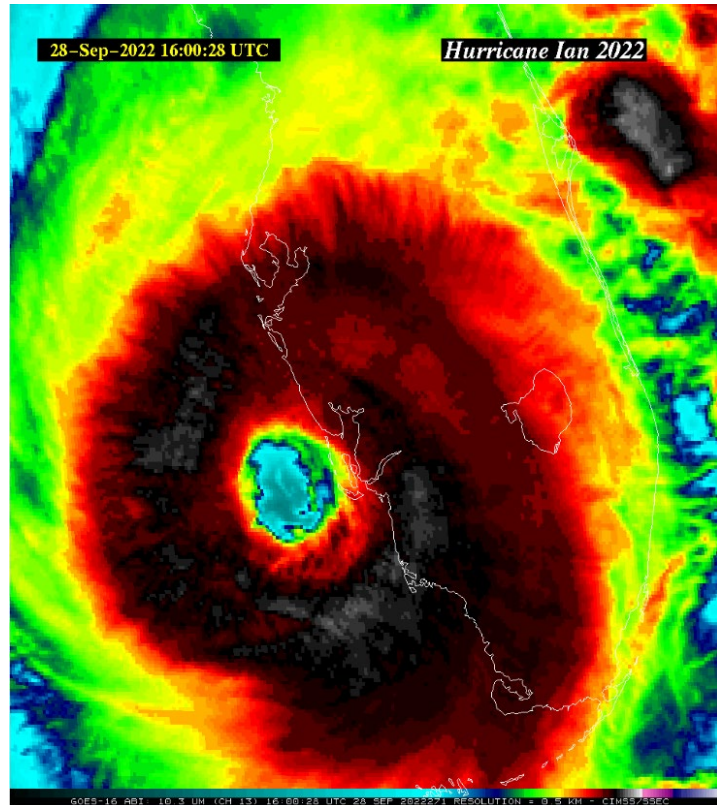
- Both Charley and Ian were Category 4 storms at landfall but that is where the similarities end.
- Ian was much larger than Charley.
- Ian's forward speed was half of Charley
- **End result: Ian produced double the surge of Charley. 10- 15 ft of inundation was observed in SW FL**







# Two Very Different Surge Events - Ian vs. Charley

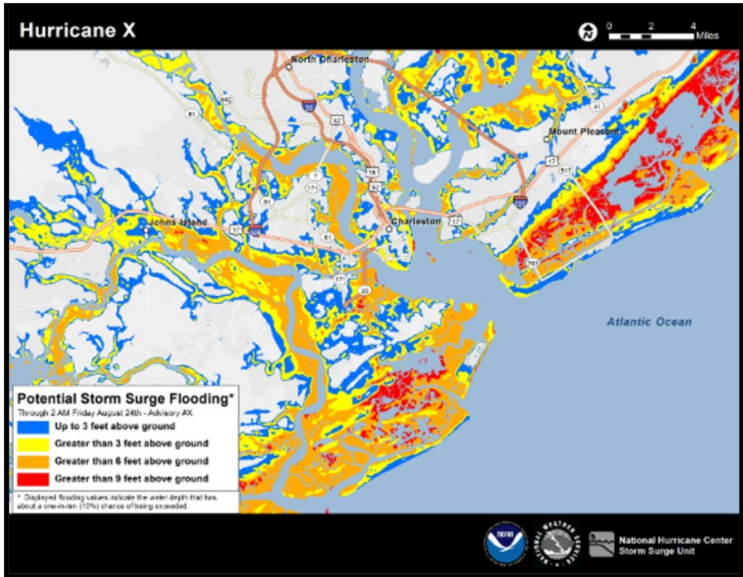


- Both Charley and Ian were Category 4 storms at landfall but that is where the similarities end.
- Ian was much larger than Charley.
- Ian's forward speed was half of Charley
- End result: Ian produced double the surge of Charley. 10-15 ft of inundation was observed in SW FL



# Storm Surge Products

## Potential Storm Surge Flooding Map

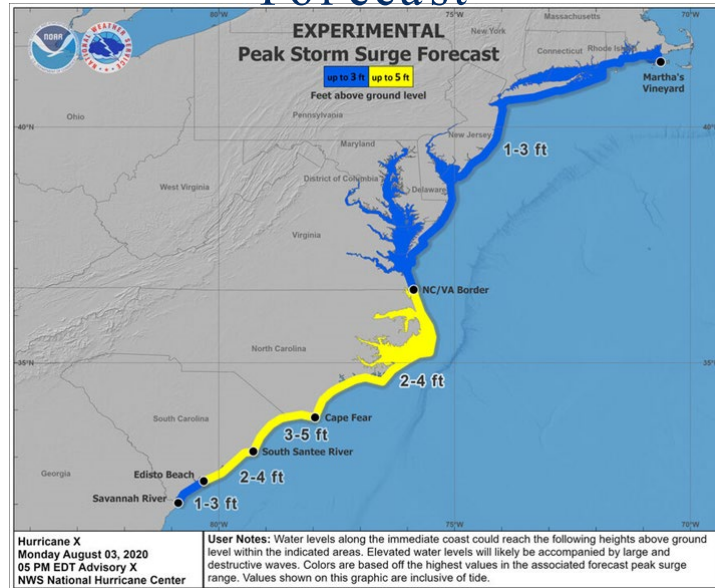


Reasonable worst case scenario

Only a 1 in 10 chance storm surge will be greater than shown

Doesn't represent a flooding footprint

## Peak Storm Surge Forecast



Peak values water could reach above normally dry ground

Only valid along the immediate coast - does not depict inland extent

## Storm Surge watch/warning

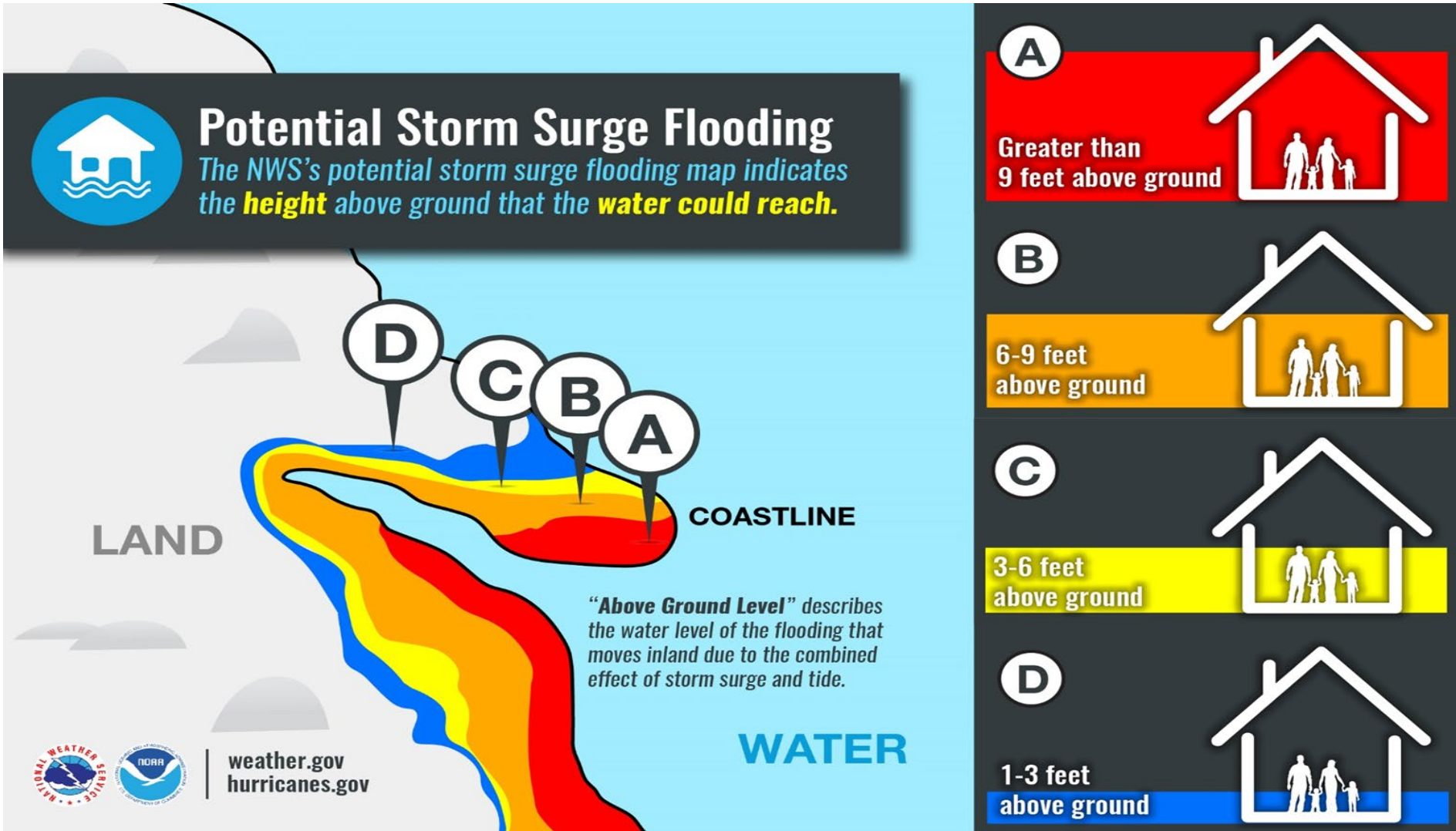


**Storm Surge Watch** - Possibility of life-threatening inundation generally within 48 hours

**Storm Surge Warning** - Danger of life-threatening inundation generally within 36 hours



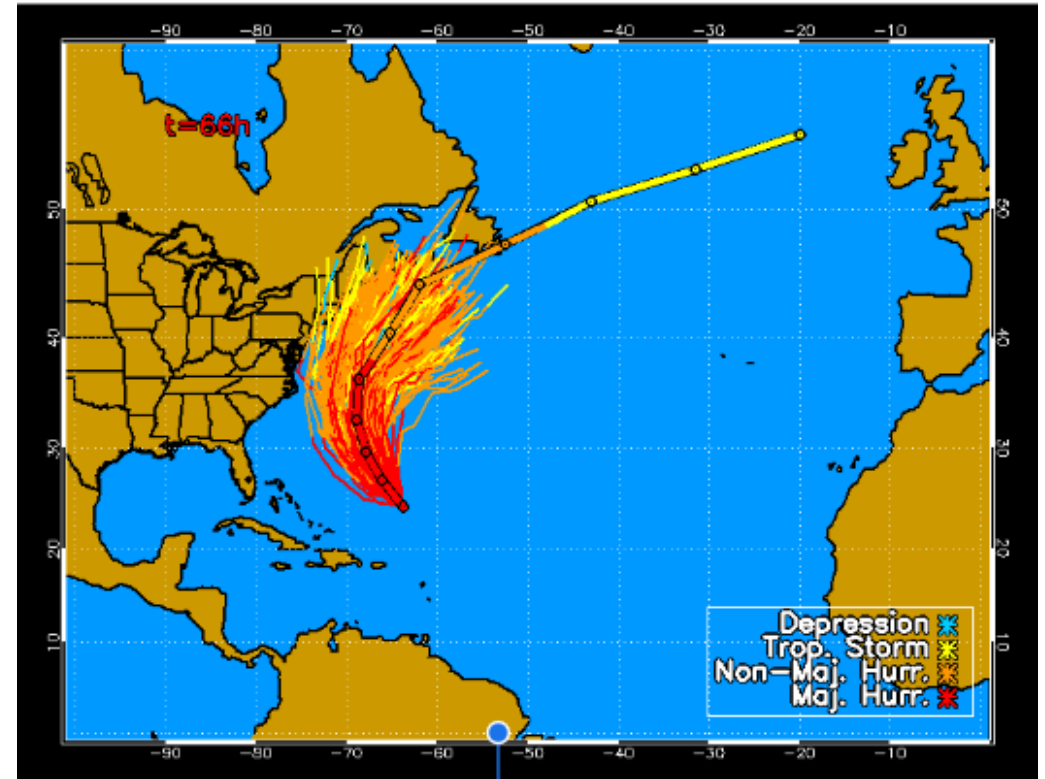
# Potential Storm Surge Flooding Map





# Tropical Storm Force Wind Speed Time of Arrival Graphics

- 1,000 realistic alternative scenarios (realizations) are created using
  - Official NHC track and intensity forecasts
  - Historical NHC track and intensity forecast errors
  - Climatology and persistence wind radii model
- Accounts for weakening of storms over land
- Uses model spread to account for track forecast uncertainty
- Probability of exceeding 34, 50, and 64 kt wind thresholds are computed at individual locations



370 of 1,000 realizations bring 34-kt winds to Nantucket, Massachusetts

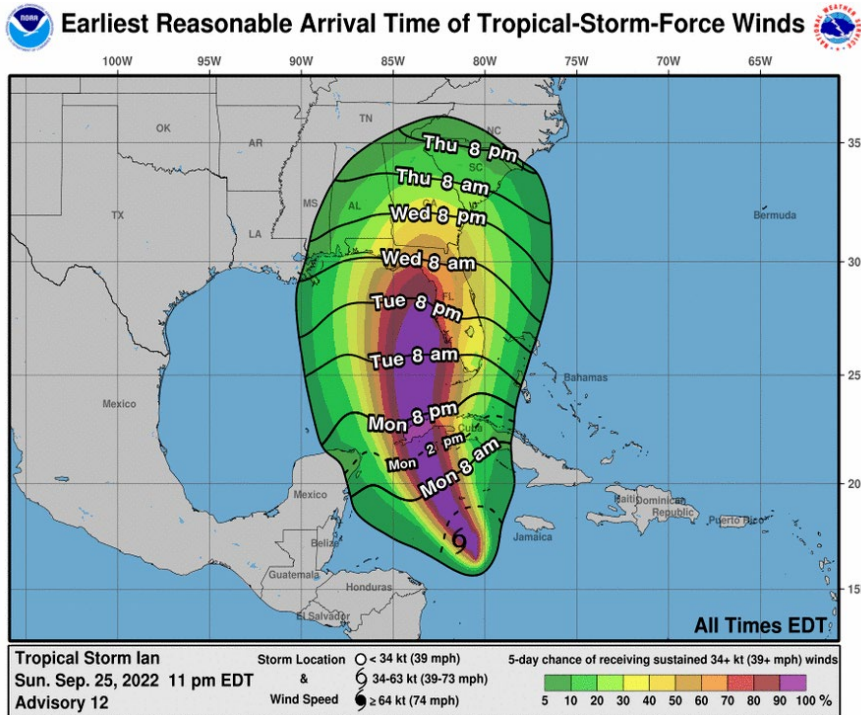
$370/1,000 = 0.37 = 37\%$  chance of tropical storm force winds at Nantucket





# Tropical Storm Force Wind Speed Time of Arrival Graphics

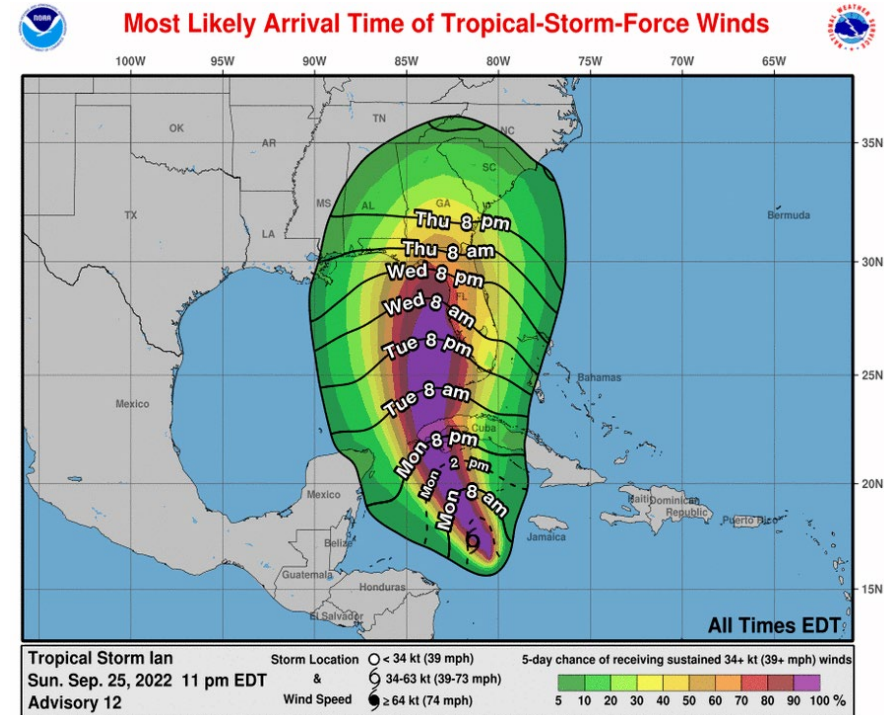
## Earliest Reasonable



Only 1 in 10 chance of tropical storm force winds arriving earlier than noted time

Best for users with low risk tolerance

## Most Likely



Equal chances of tropical storm force winds arriving before or after the time listed

Preparations should be completed by this time





# 5 Days to Prepare? Not Always!

## Category 5 Landfalls:

- Labor Day (1935)
- Camille (1969)
- Andrew (1992)
- Michael (2018)

Where were these hurricanes  
5 days before landfall?



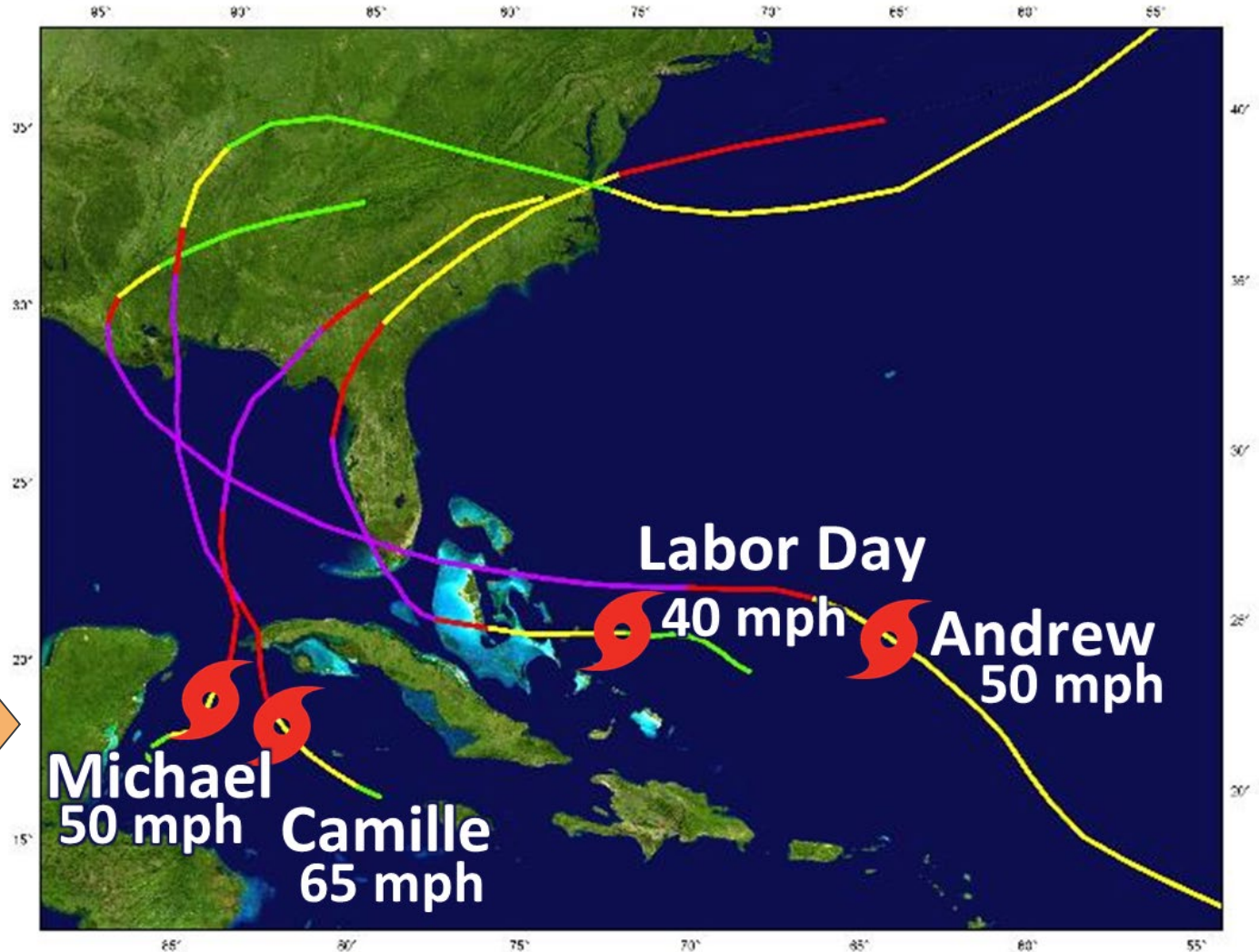


# 5 Days to Prepare? Not Always!

## Category 5 Landfalls:

- Labor Day (1935)
- Camille (1969)
- Andrew (1992)
- Michael (2018)

Where were these hurricanes  
3 days before landfall?



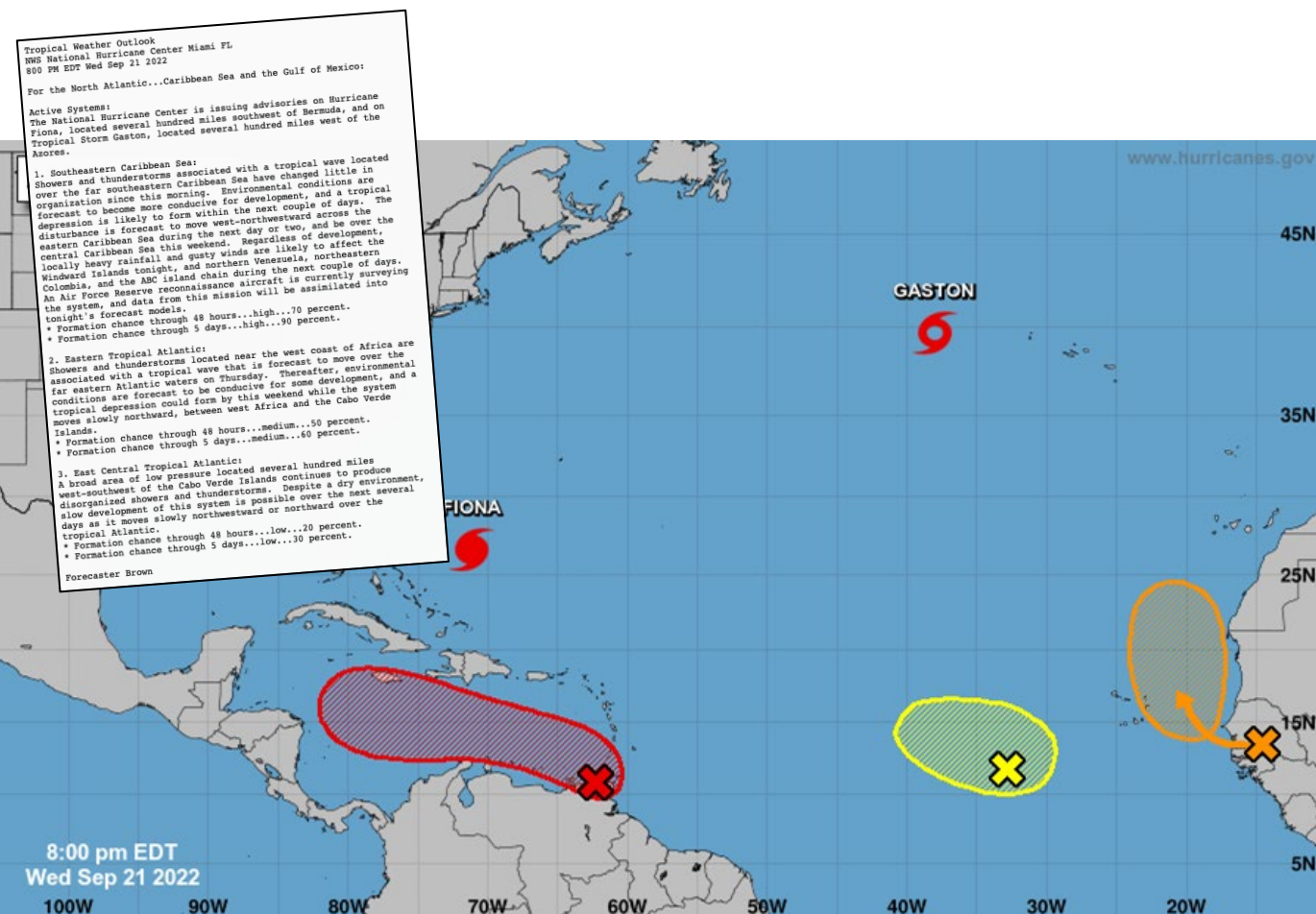


# Tropical Weather Outlook

## Tropical Weather Outlooks begin May 15

Provides probabilities of formation for the next 48 hours and 7 days

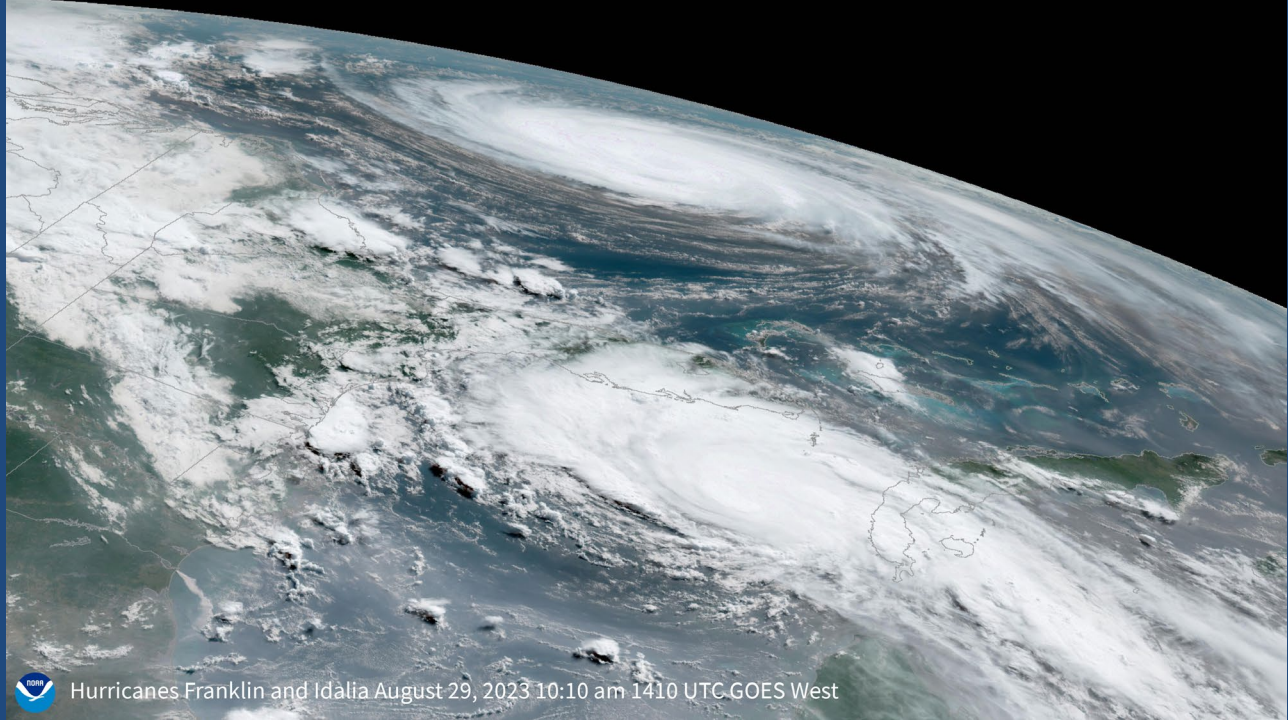
Routinely issued from 1 June - 30 November for the central North Pacific basin and from 15 May - 30 November in the eastern North Pacific and Atlantic basins





# Questions?





Hurricanes Franklin and Idalia August 29, 2023 10:10 am 1410 UTC GOES West

# Looking Back at 2023

CAPTAIN Eric Johnson, Director Homeland Security Program Office



# 2023 Broke Records

## Atlantic Basin

- Despite El Nino.. We saw an unprecedentedly active year
  - El Nino = less storms
- We saw the 4<sup>th</sup> most named storms on record in the Atlantic Basin
  - 20 named storms were recorded
  - 14 named storms is the average
- Sea Surface Temperatures were record-warm
  - This aided in their being an above average number of storms and the most named storms of any El Nino season
- Only one major landfalling hurricane
  - Hurricane Idalia



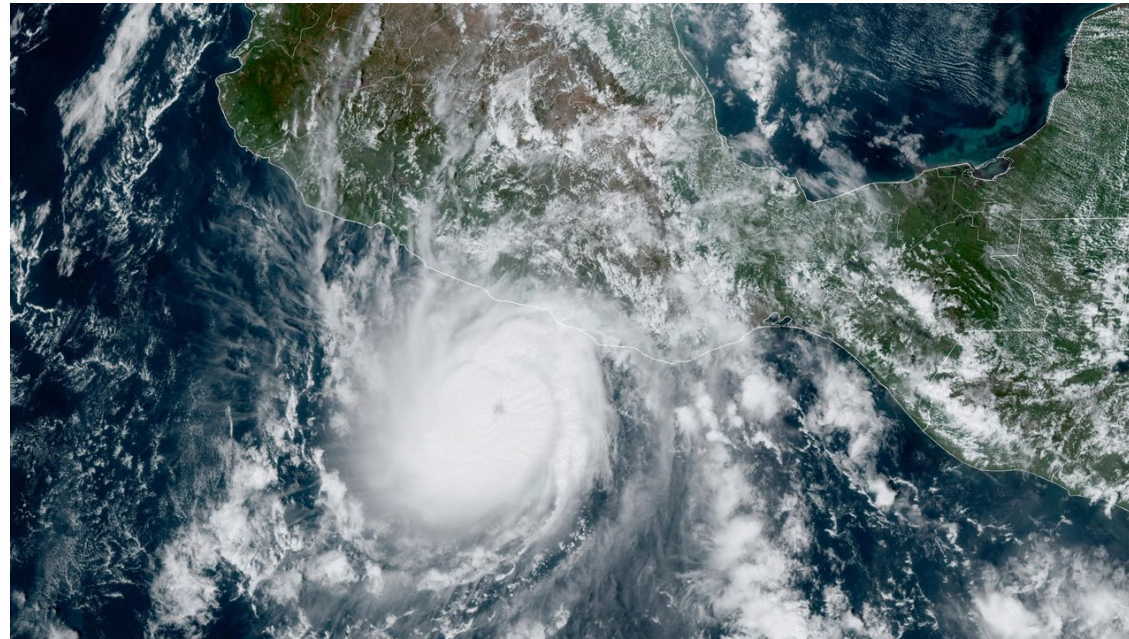
## Pacific Basin

- The Pacific Basin had a notable year
- Post-Tropical Storm Hilary
  - Hilary affected Southern California
  - First ever issuance of Tropical Storm Watches and warnings in this region
  - Widespread heavy rainfall and flooding
  - Downgraded to a post-tropical low when it struck California
- Hurricane Dora
  - Category 4 hurricane
  - The first major hurricane in the Central Pacific basin since 2020
  - Did not make landfall, but resulted in the wildfires in Maui
- Hurricane Otis
  - Perhaps the most noteworthy hurricane of the entire season
  - Made landfall as a category 5 hurricane in Acapulco, Mexico
  - Rapidly intensified from a tropical storm to a category 5 overnight



# A closer look at Otis

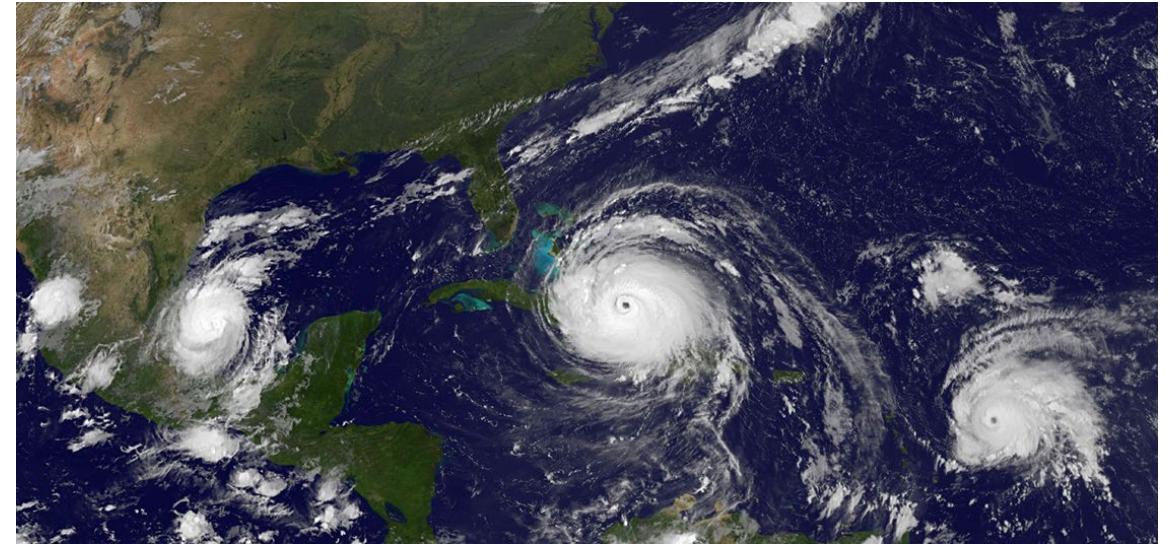
- Otis was a rapidly intensifying storm...
  - It intensified 115 mph in 24 hours
- Was predicted to make landfall as a tropical storm, but instead made landfall as a cat-5 with winds around 165 mph.
- The strongest landfalling hurricane in the eastern pacific on record





# Looking back even further at record breaking seasons

- 2017
  - Hurricane Maria, Hurricane Harvey, Hurricane Irma
- 2018
  - Hurricane Florence, Hurricane Michael
- 2019
  - Above average number of named storms
  - Hurricane Dorian
- 2020
  - One of the most active Atlantic Hurricane seasons on record: 30 named storms
  - The second time in history the Greek alphabet was used
  - Seven major hurricanes: Dolly, Laura, Teddy, Delta, Epsilon, Zeta, Eta
  - Notable Mention: Hurricane Sally, Hurricane Isaias
- 2021
  - Third most active Atlantic hurricane season on record: 21 named storms
  - Hurricane Ida
- 2022
  - Hurricane Ian, Hurricane Nicole, Hurricane Fiona





# What we have learned

- We have all the ingredients for an active hurricane season (and early indications are for higher numbers this year)
- It only takes one bad storm to make it a bad season
- To hope for the best, but expect and plan the worst

# Hurricane Hilary and Ecosystem Impacts Tijuana River Estuary

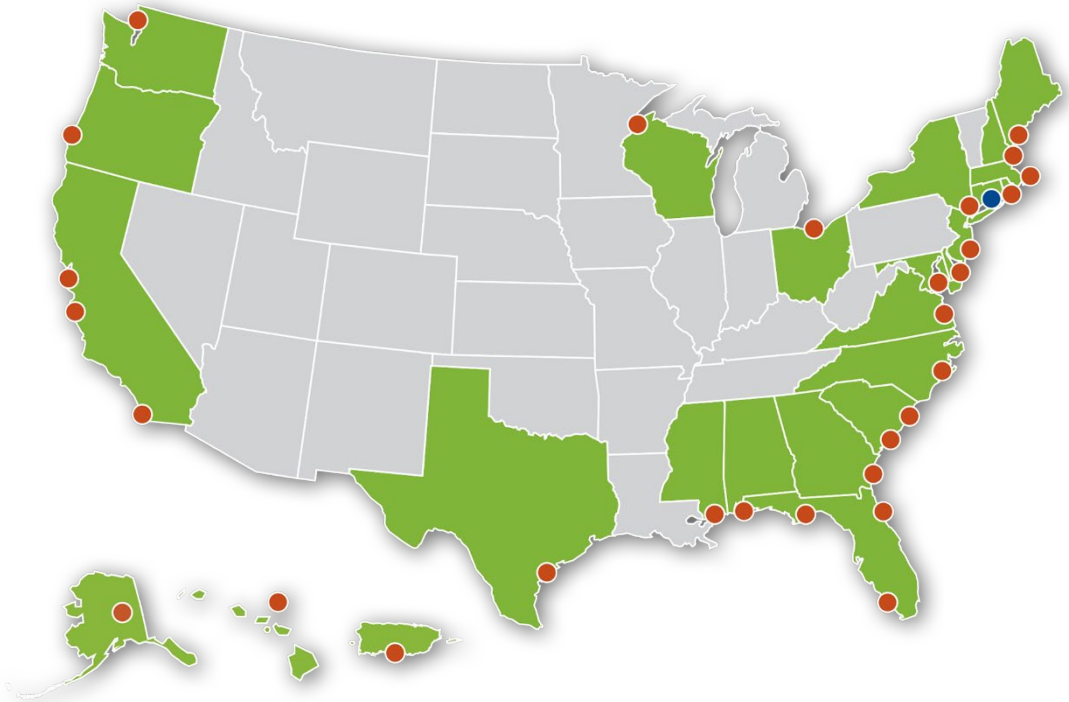


# National Estuarine Research Reserve System

A network of 30 coastal sites designated to protect and study estuarine systems.

Established through the Coastal Zone Management Act.

A partnership program between NOAA and the coastal states.

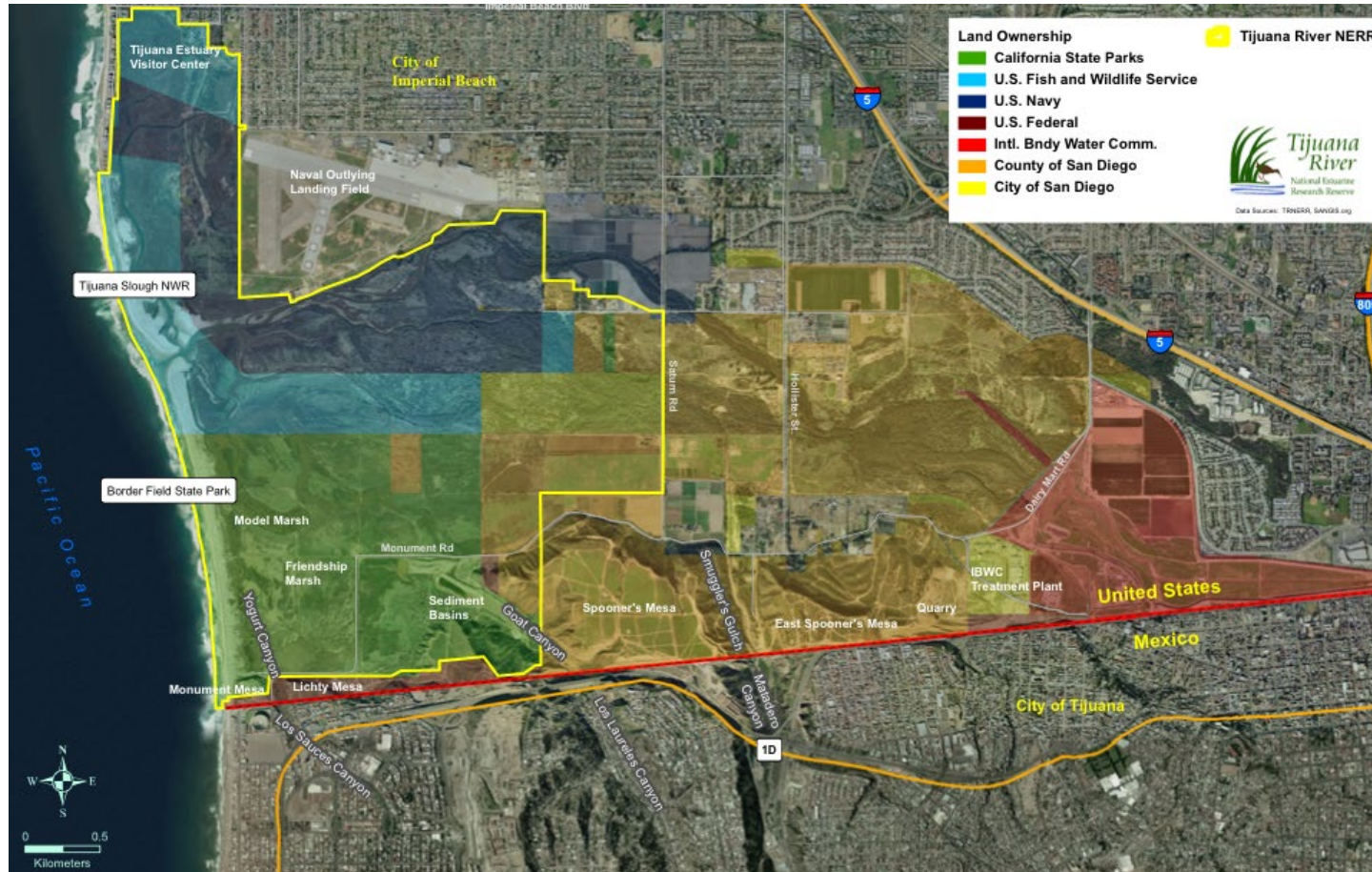


<https://coast.noaa.gov/nerrs/>





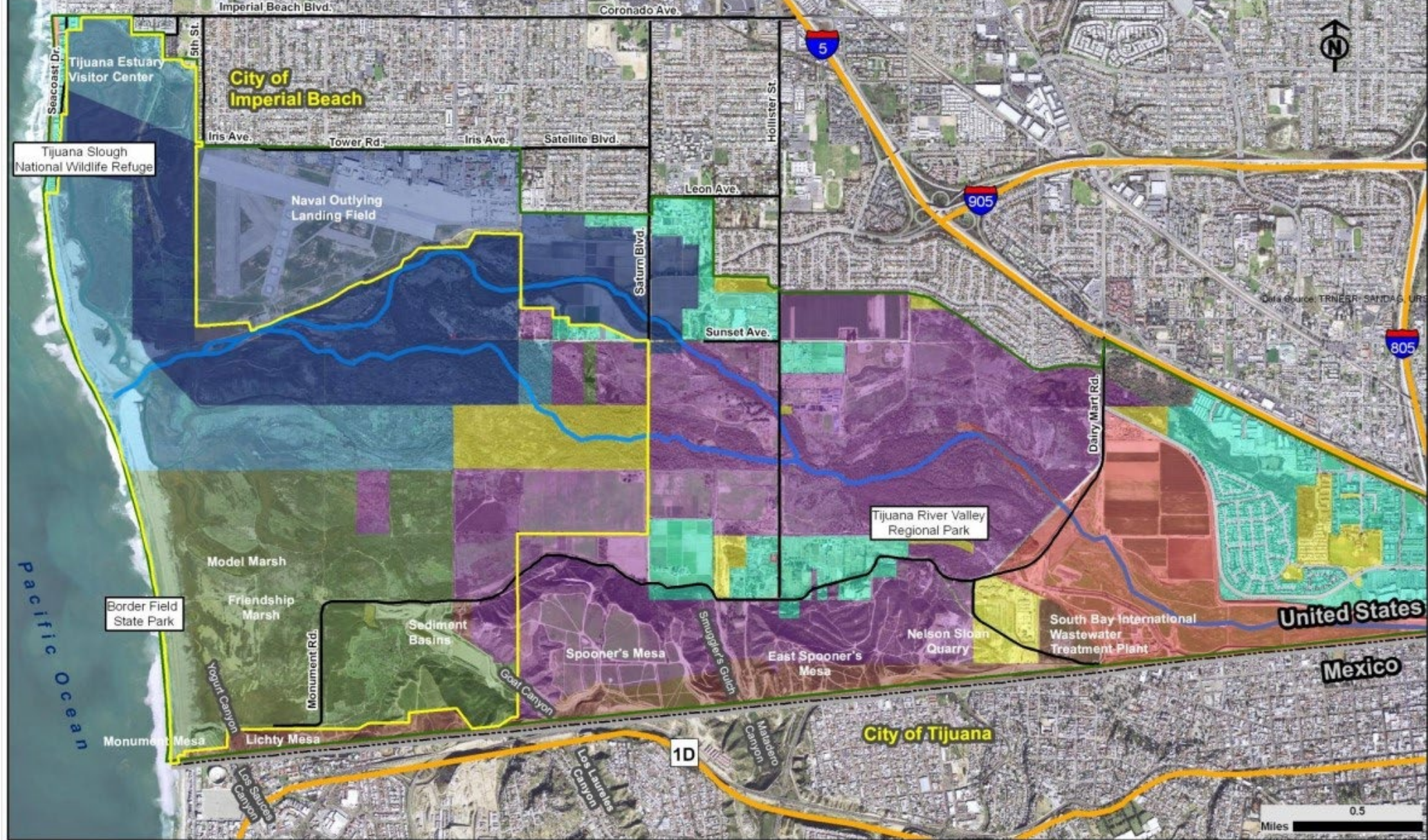
# Tijuana River NERR



Tijuana River Valley Land Management

Tijuana River Valley- San Diego/Tijuana

# LAND OWNERSHIP IN THE TIJUANA RIVER VALLEY



## Land Ownership

- |                                |  |                        |                                     |
|--------------------------------|--|------------------------|-------------------------------------|
| California State Parks         | U.S. Department of Homeland Security             | City of San Diego      | Project Area (Tijuana River Valley) |
| U.S. Fish and Wildlife Service | International Boundary & Water Commission (IBWC) | City of Imperial Beach | TRNERR                              |
| U.S. Navy                      | County of San Diego                              | Private                | Tijuana River                       |



Data Source: URS Corporation, TRNERR, SANDAG and SanGIS

**TIJUANA RIVER NATIONAL  
ESTUARINE RESEARCH RESERVE**



**A WETLAND OF INTERNATIONAL IMPORTANCE**

Credit: Phillip Colla/[Oceanlight.com](https://www.oceanlight.com)



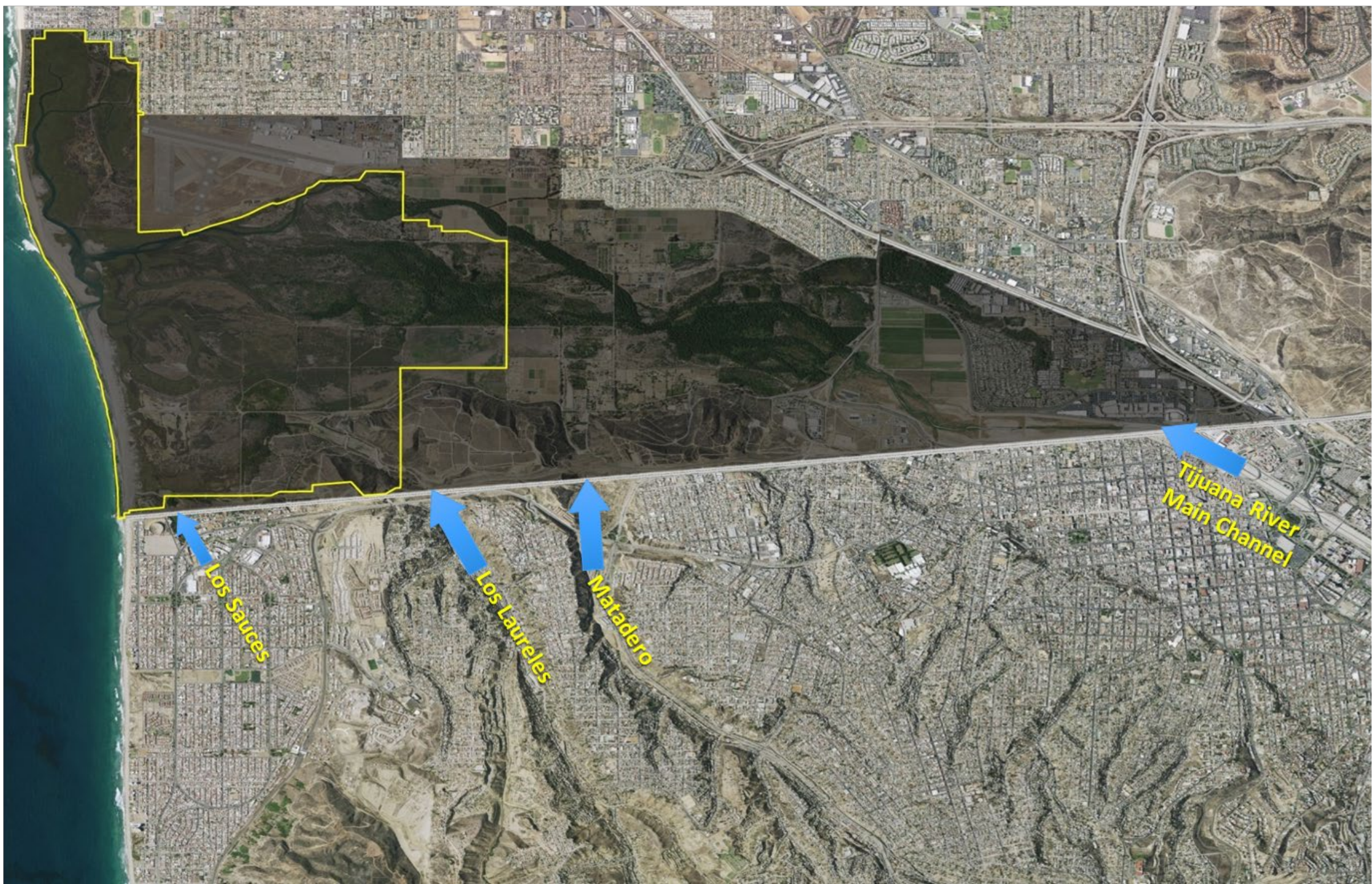
**Tijuana River Watershed**

-  Tijuana River Watershed and Sub-Basins
-  Tijuana River NERR
-  Lakes and Streams



# TRANSBOUNDARY POLLUTION

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## RAPID AND UNPLANNED GROWTH IN MEXICO

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## DEBRIS BLOCKAGES & FLOODING

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## DEBRIS BLOCKAGES & FLOODING



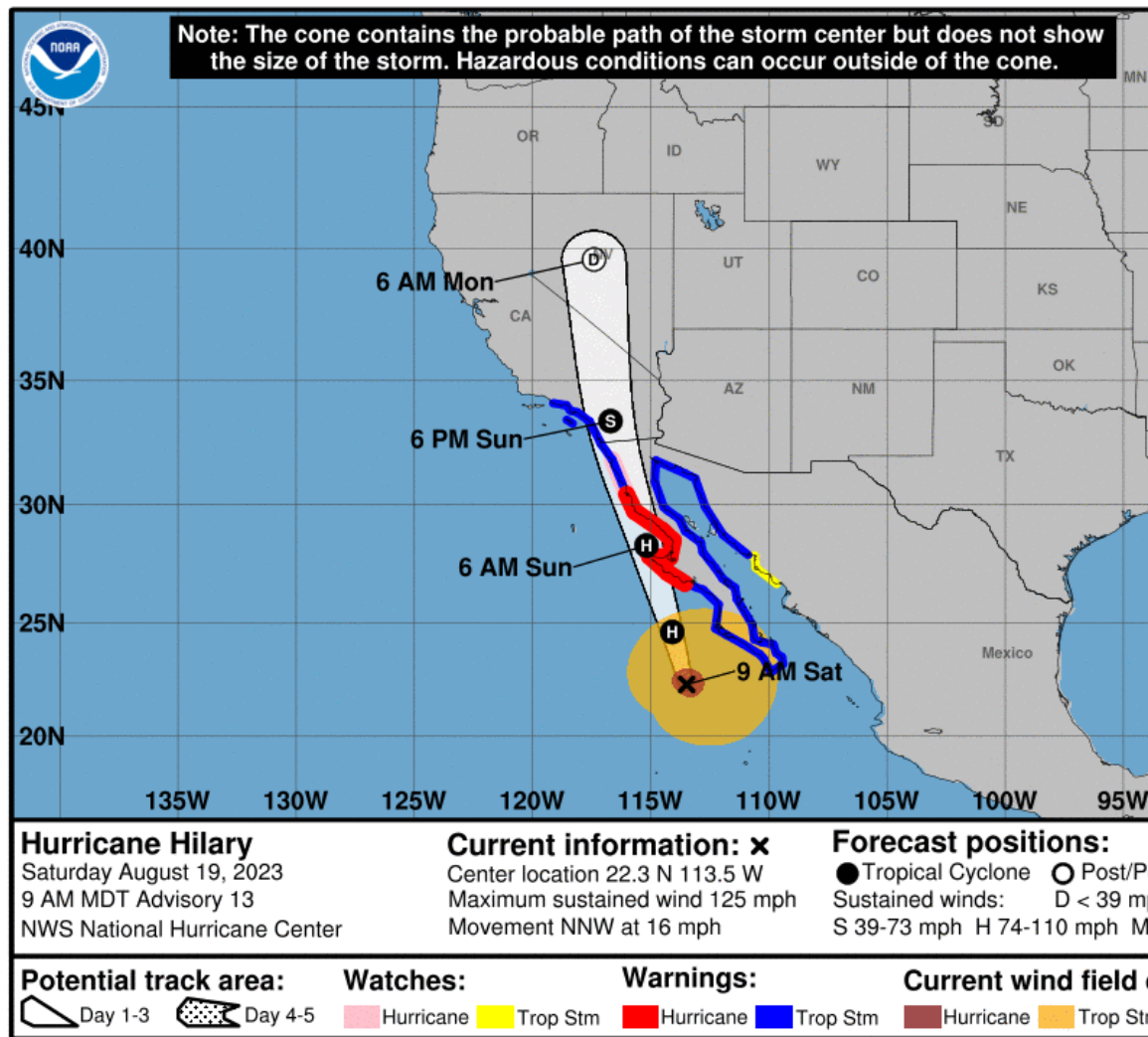
Source: San Diego Union Tribune



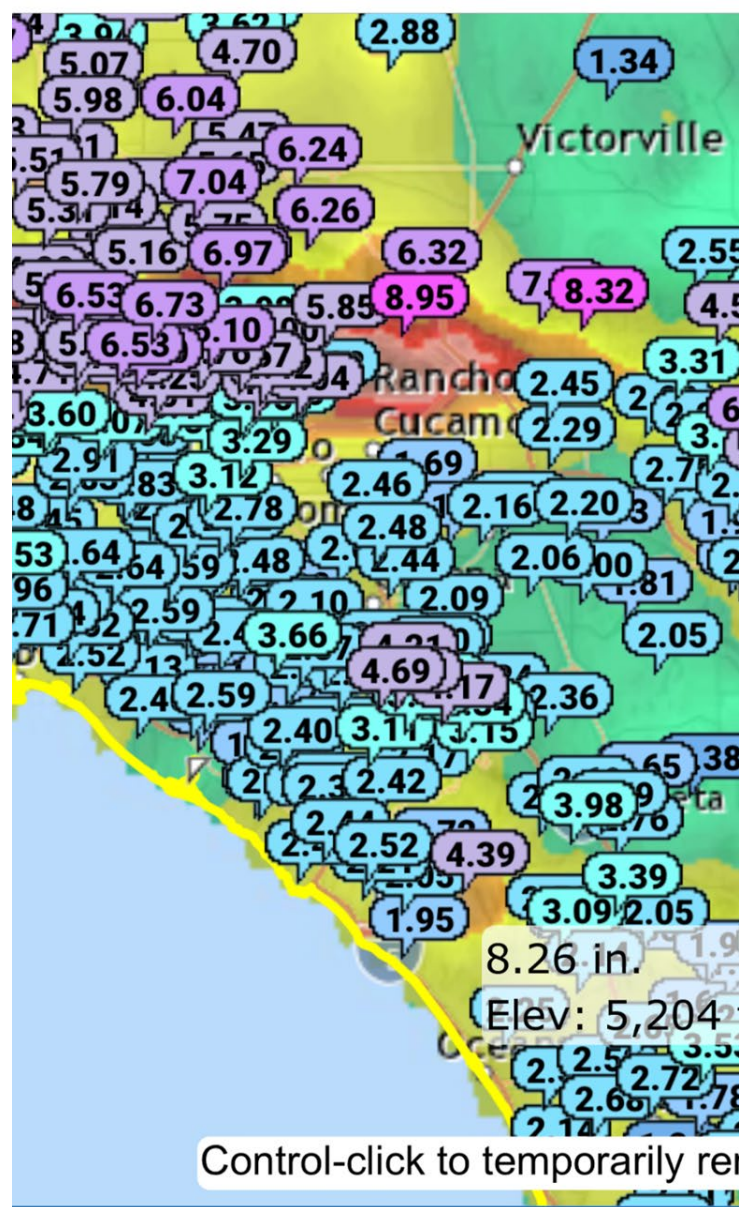


# Latest hurricane message TS warning at 9 am

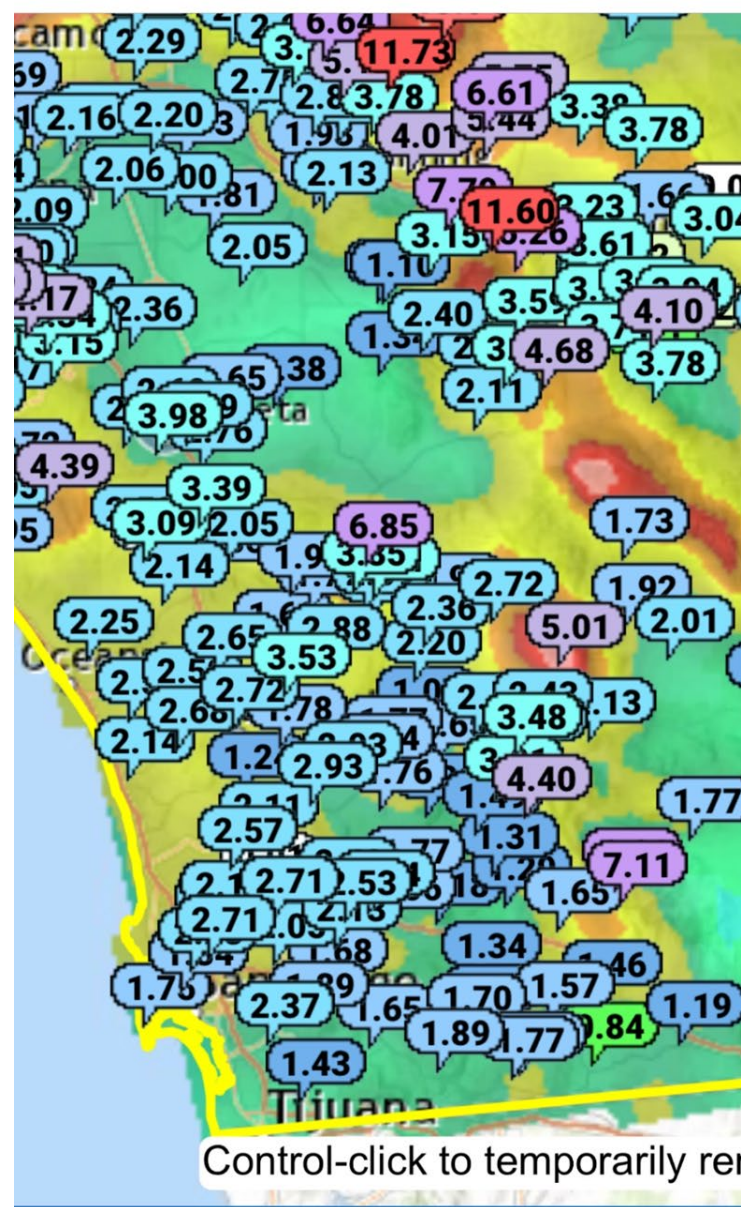
Weather Forecast Office  
San Diego, CA  
Saturday, August 19



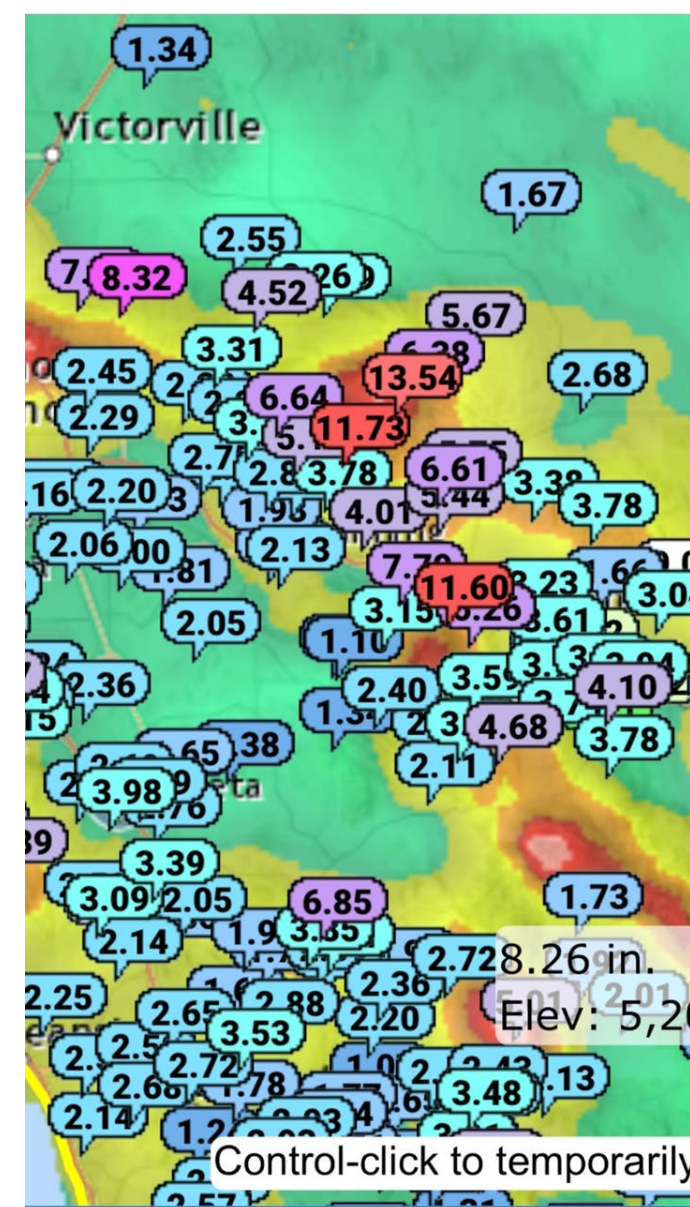
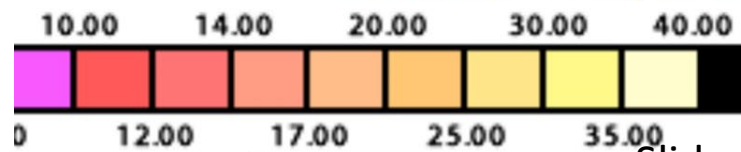
Slide Credit: Alex Tardy, National Weather Service



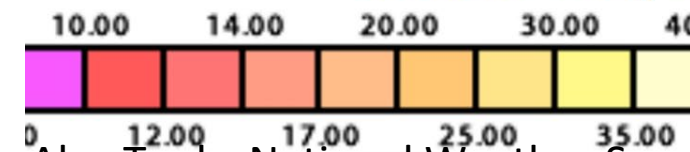
Created: Fri Aug 25 21



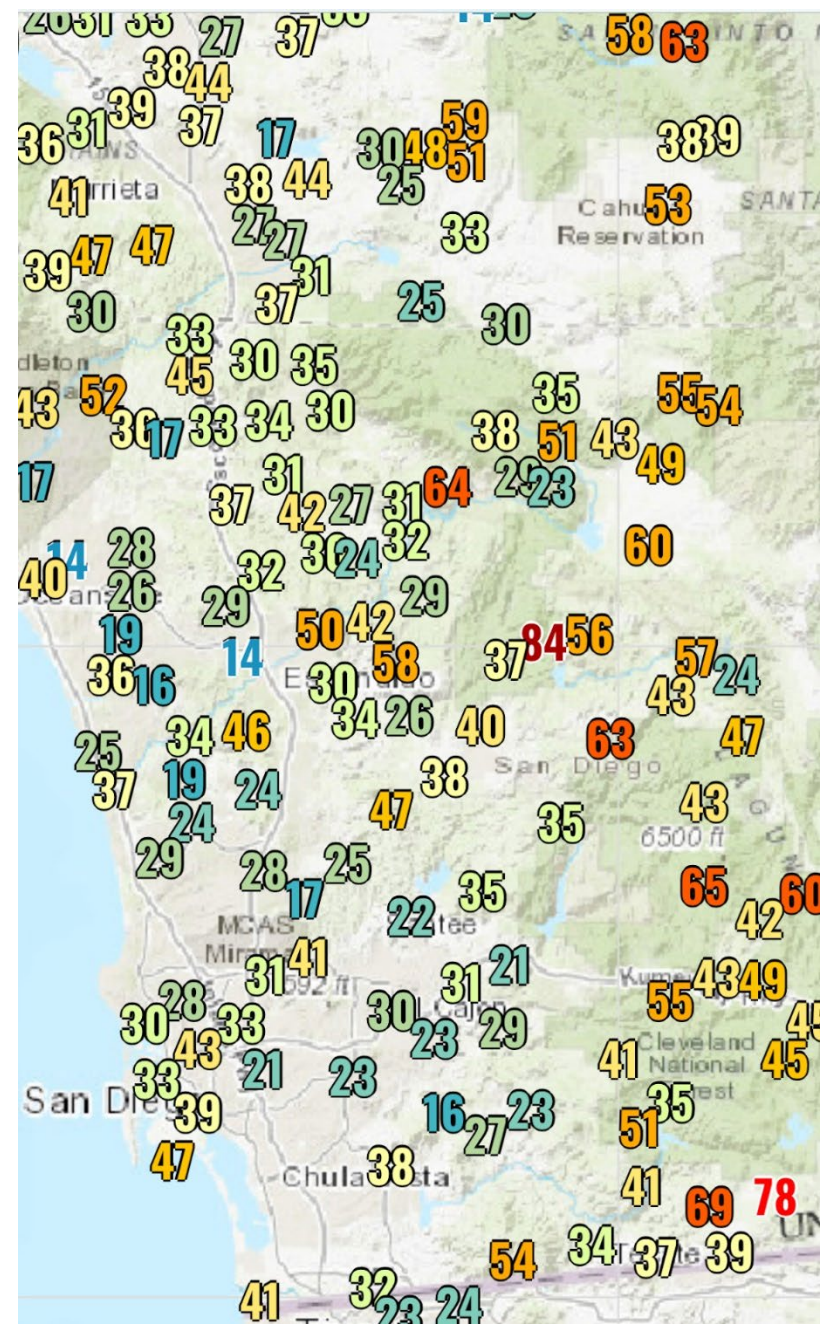
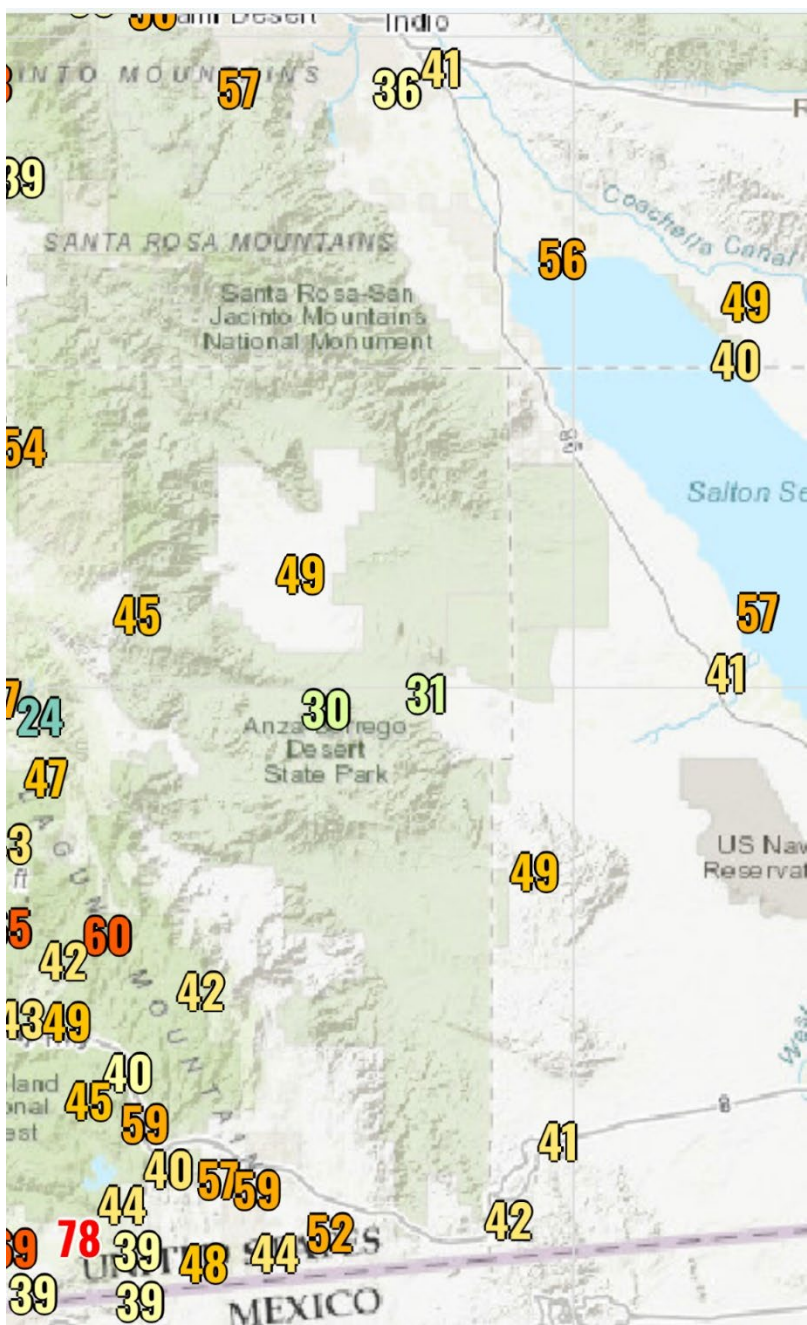
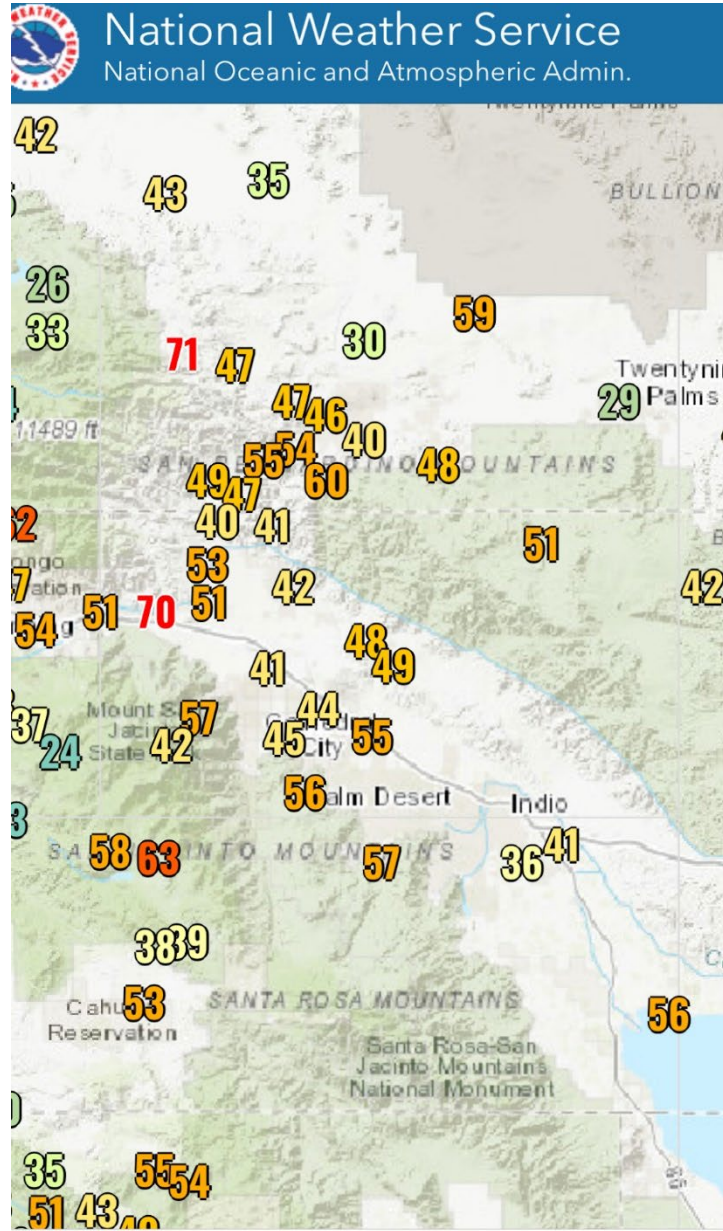
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Created: Fri Aug 25 21



# Observed wind gusts

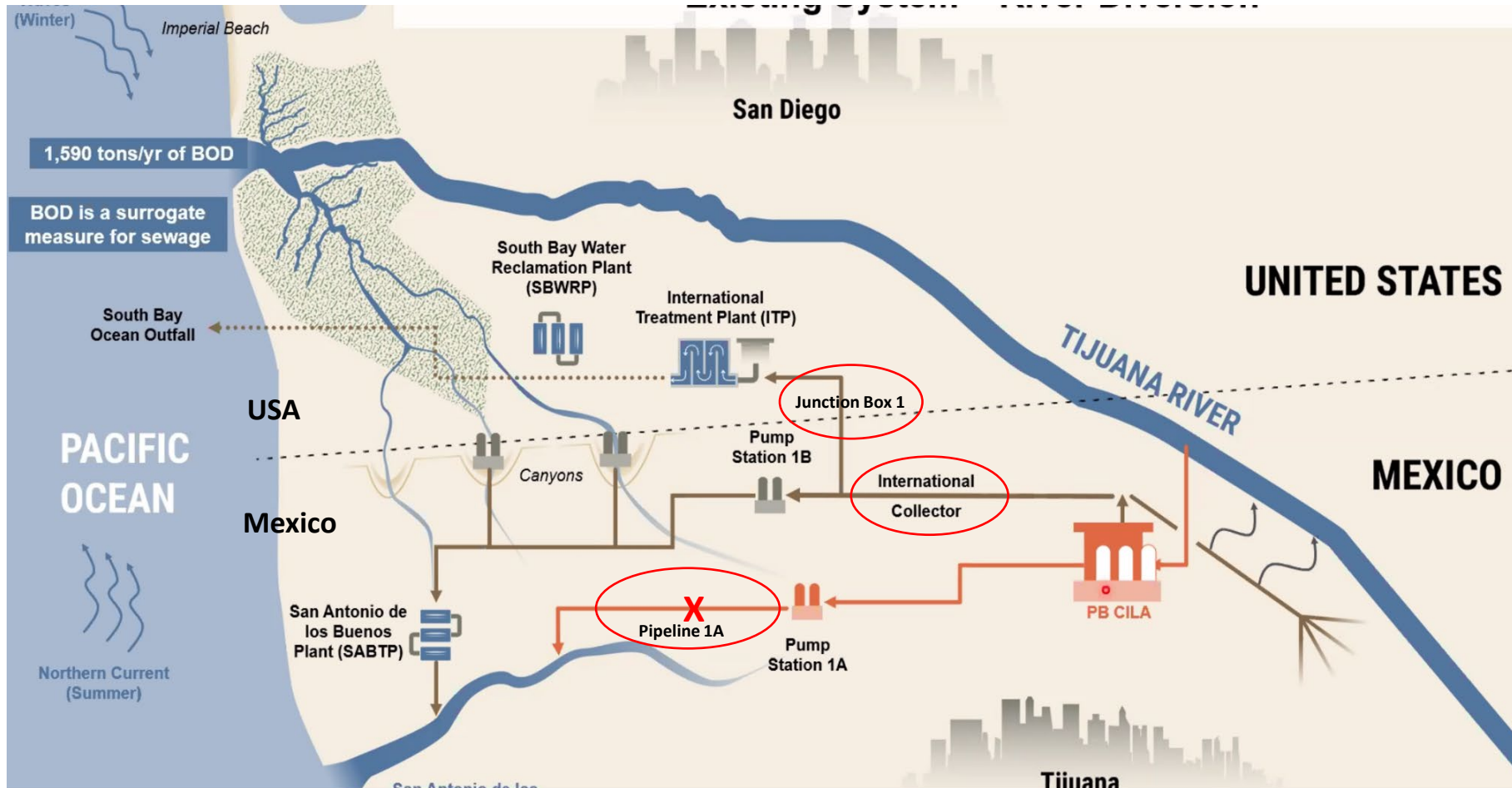


Slide Credit: Alex Tardy, National Weather Service



# Infrastructure Weak Points

What is the problem?



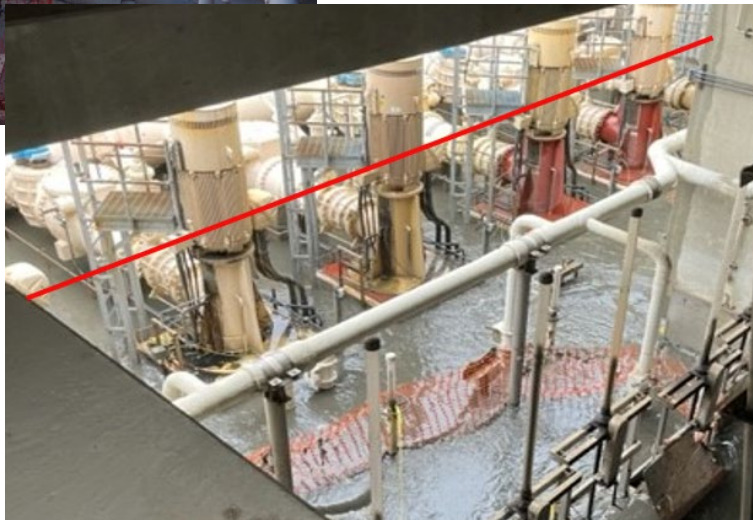
Slide Credit: Morgan Rogers, International Boundary and Water Commission

# Tropical Storm Hilary Impacts

What is the problem?



Dry Conditions



Beginning of Storm

- Flooding of headworks- pump and electrical issues
- Trash, Sediment, and Debris impacted the entire plant
  - Excess build-up in wet wells, tanks, and basins
  - Entanglement of trash in impellers and check valves – pump failures

Waterline at peak storm, approx. 8 ft.

Slide Credit: Morgan Rogers, IBWC



## SBIWTP Excess Flows

- From Aug 2022 to Dec 2023
  - **14** of past 17 months with excess flows
  - **8 -17** of 35 water quality permit parameters' exceedance per month



Normal PST



Overloaded PST

16

What is the problem?

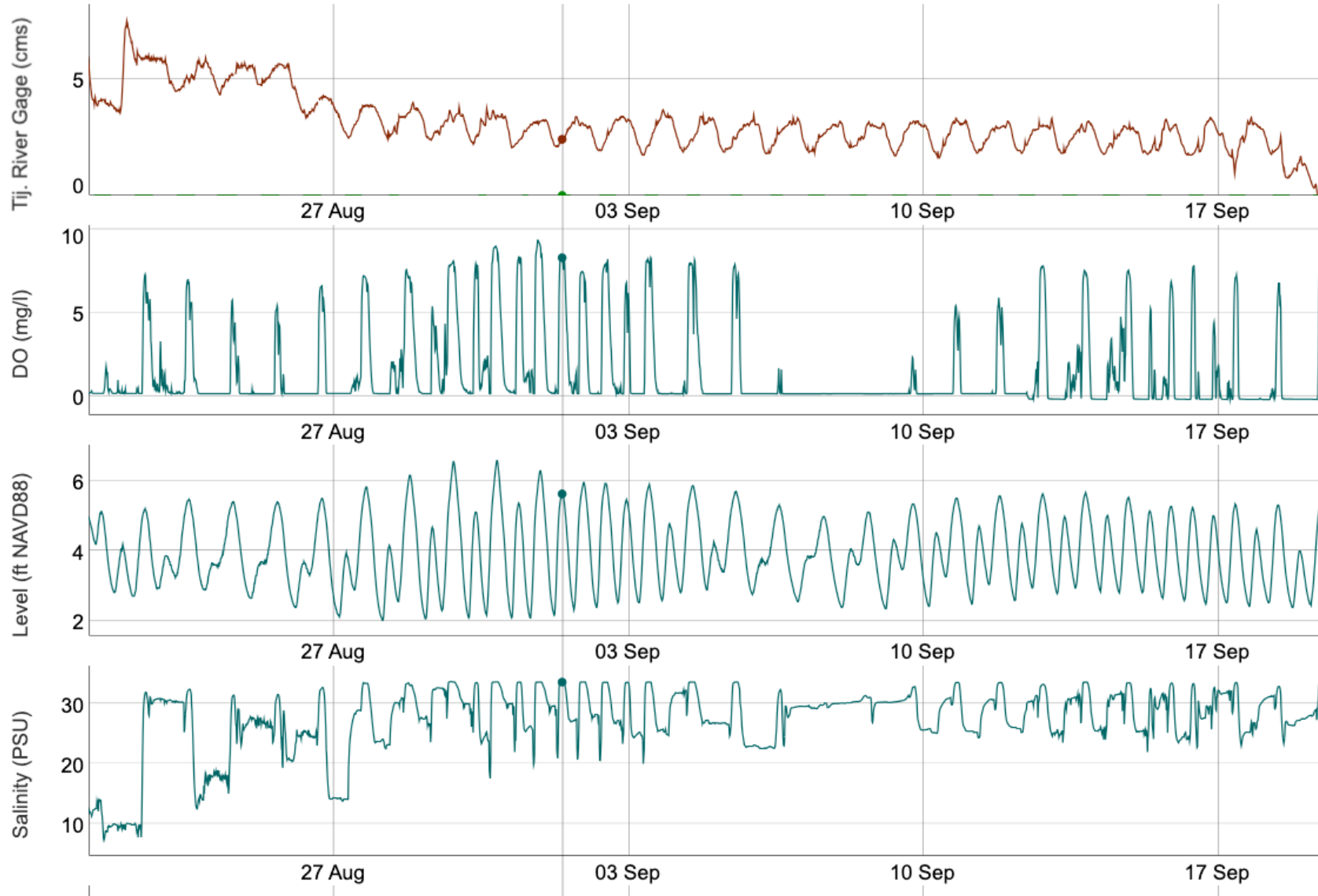
### Impacts:

- Trash and sediment clog bar screens
- Excessive wear and tear of influent pumps – 3/6 pumps operational
- Overloaded grit chambers
- Overloaded primary sedimentation tanks (PST) – no solids removal
- Solids carryover into the secondary treatment
- Permit exceedances in volume & effluent quality

Slide Credit: Morgan Rogers, IBWC

# TRNERR Oneonta Slough station water quality with IBWC river gage data

All data is preliminary and has not undergone any QAQC procedures (please see links below for further information). Times are Pacific Standard Time

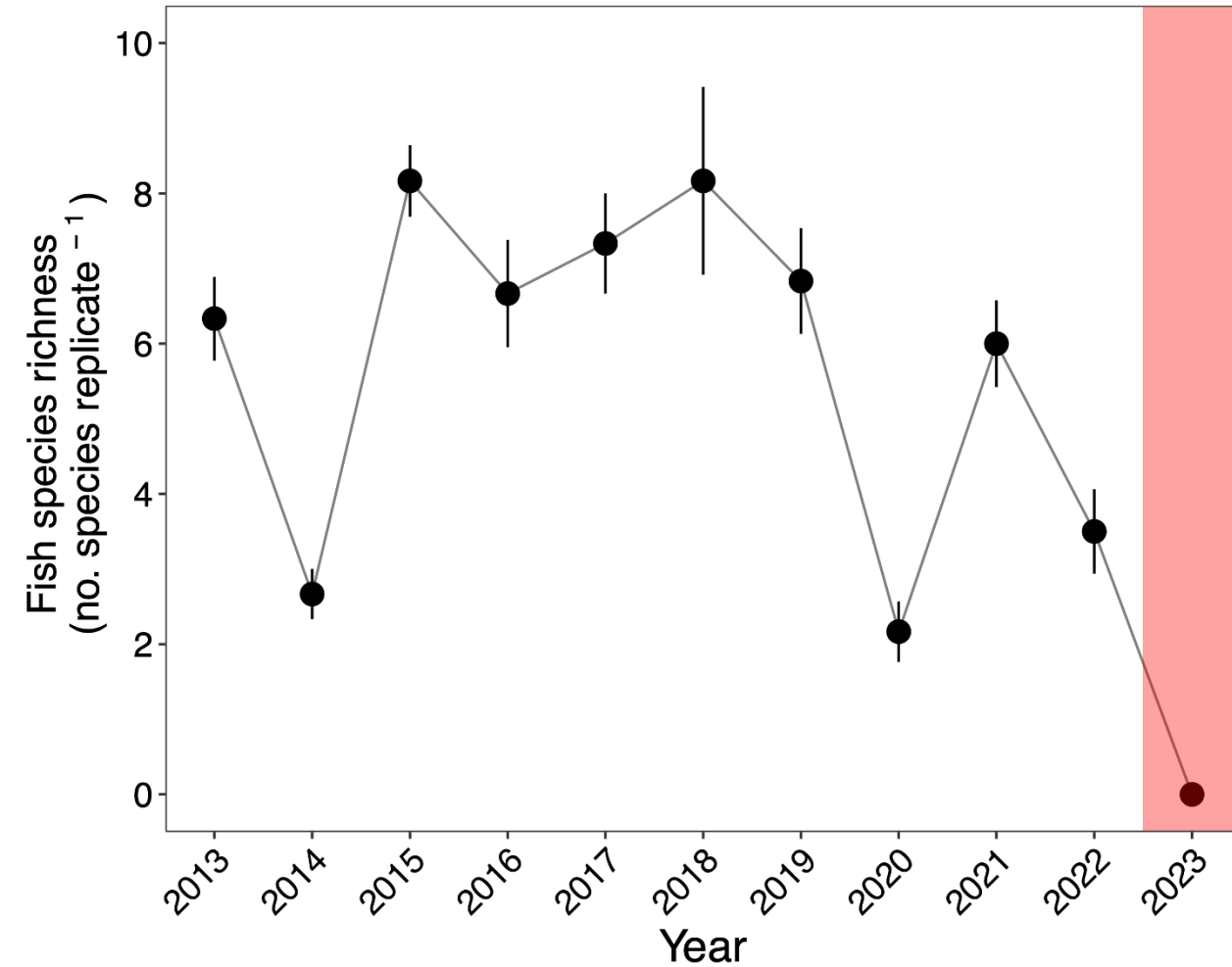


# Biological Data – Fish Richness

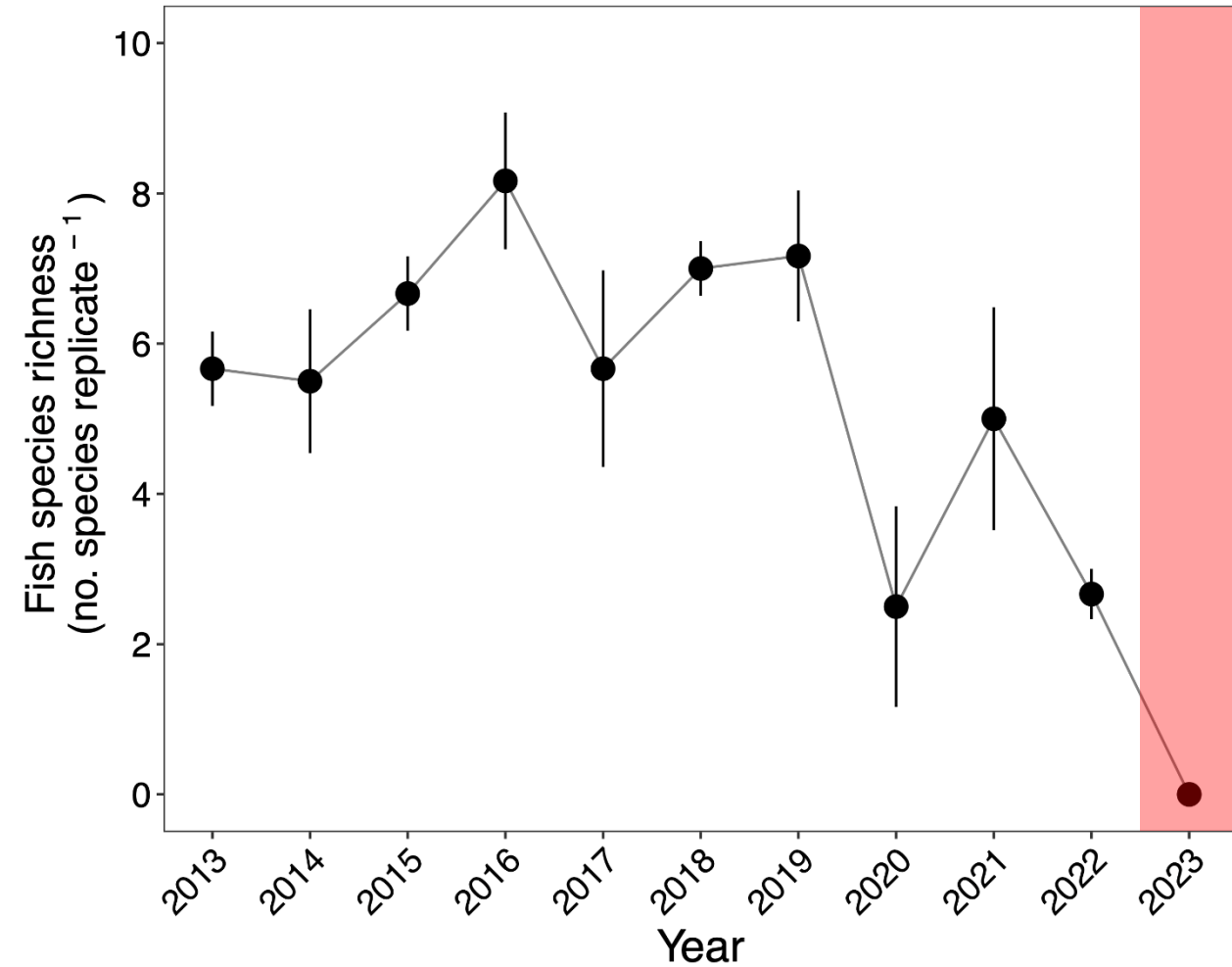
SONGS biological data, Tijuana Estuary 2013-2023

University of California Santa Barbara.

## Main channel habitat



## Tidal creek habitat

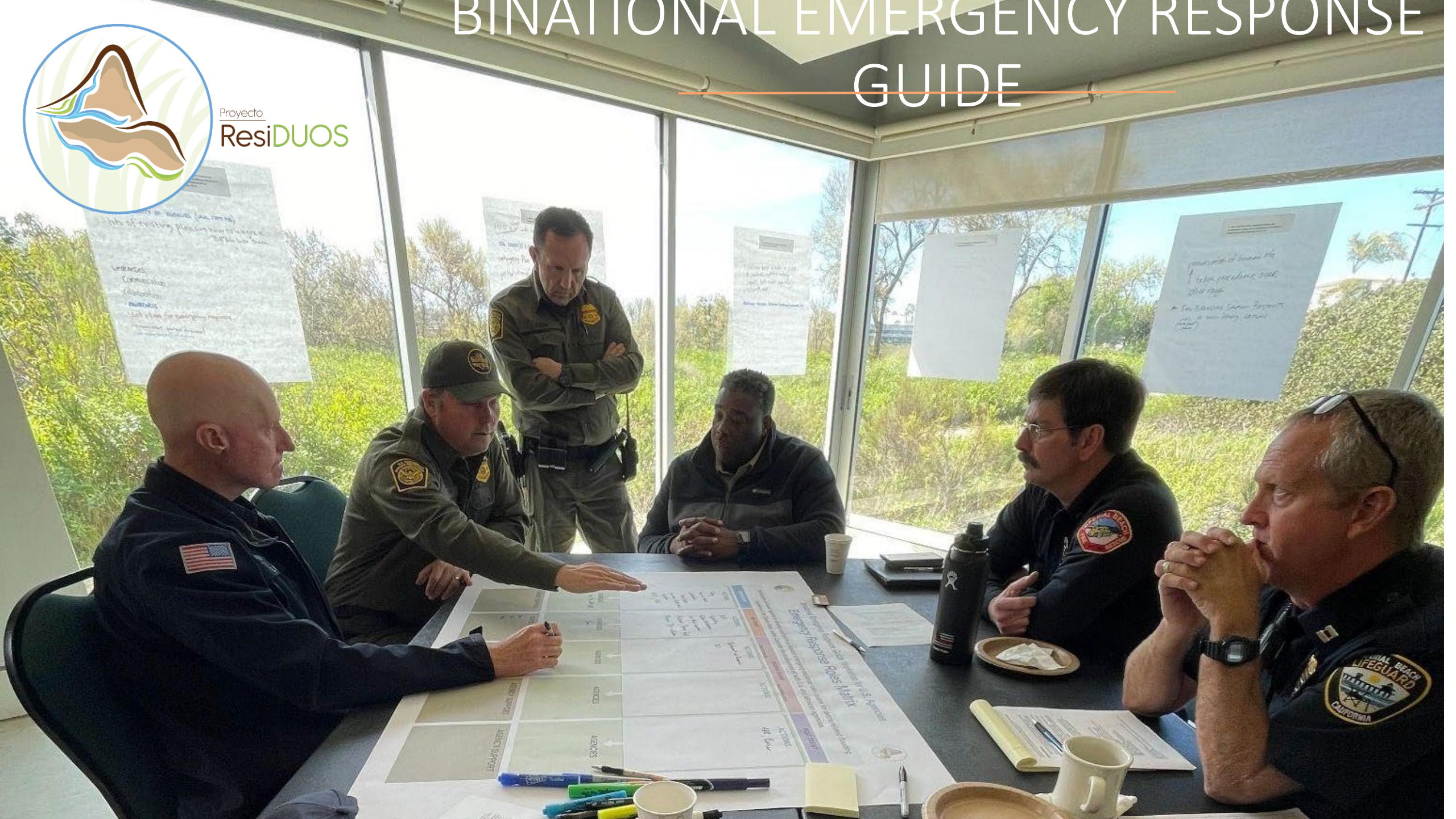




# BINATIONAL EMERGENCY RESPONSE GUIDE

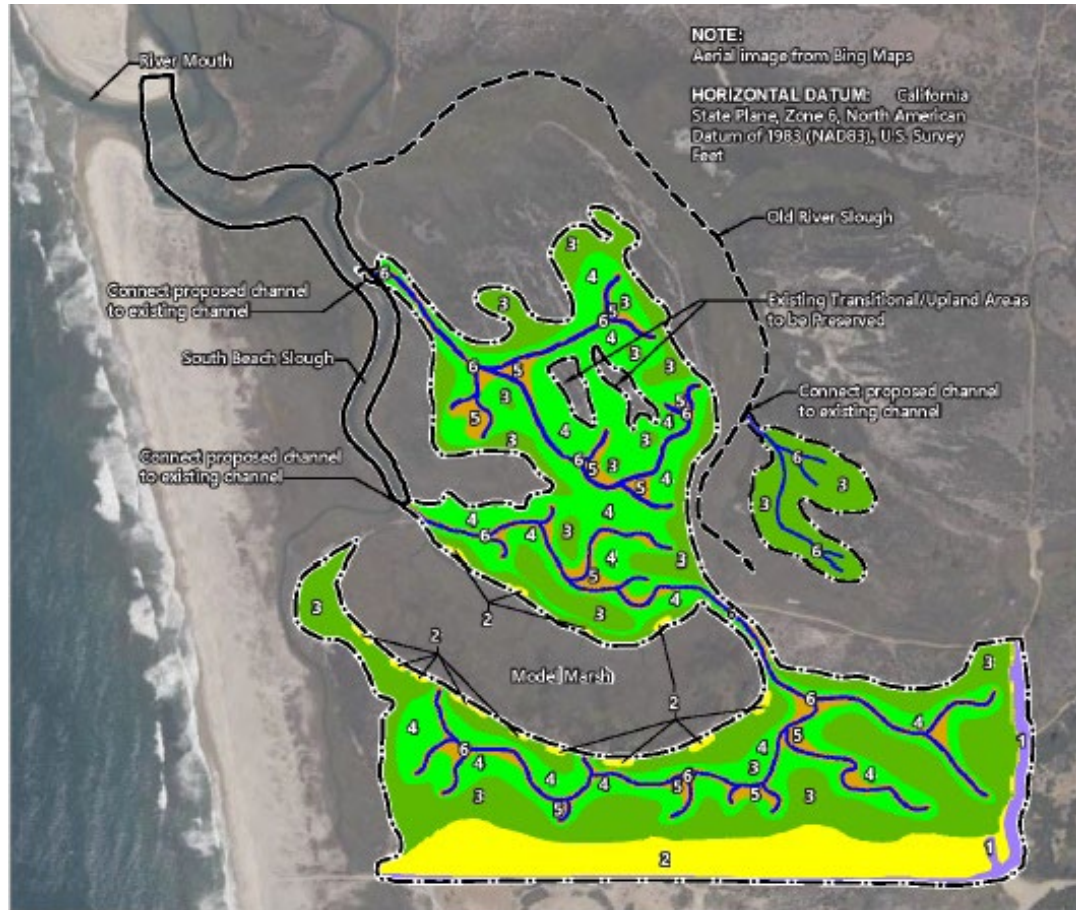


Proyecto  
**ResiDUOS**



LEADS TO	LEADS TO	LEADS TO	LEADS TO	LEADS TO
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# Tijuana Estuary Tidal Restoration Program (TETRP)



TETRP II Phase 1- design.



Location of TETRP II Phase I



# THANK YOU

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**Chris Peregrin**

Manager

TRNERR &

Border Field State Park &

Silver Strand State Beach

[chris.peregrin@parks.ca.gov](mailto:chris.peregrin@parks.ca.gov)



# Lessons in Recovery and Resilience from Hurricane Idalia, in Cedar Key, Florida

Dr. Mike S. Allen, Savanna Barry, Mark Clark, and  
Elix Hernandez

Nature Coast Biological Station

University of Florida

Cedar Key, Florida





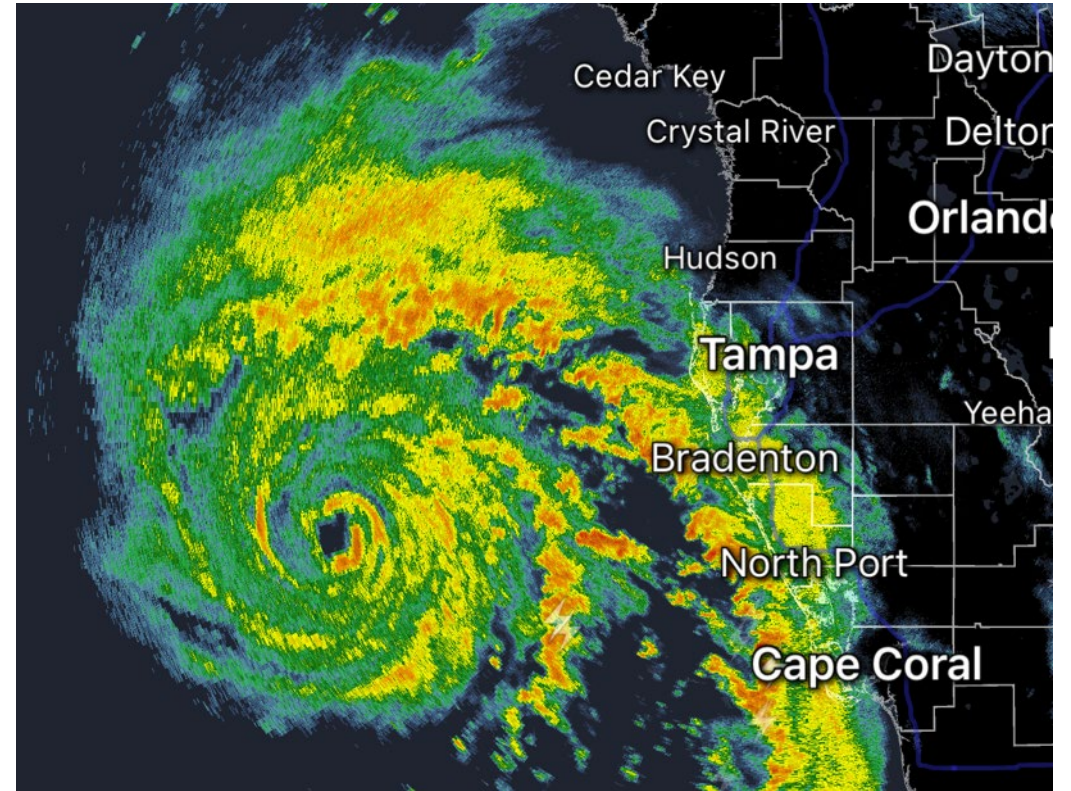


# Daughtry Bayou Living Shoreline Complex



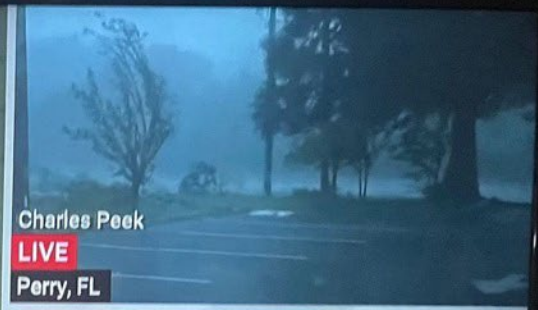
# Hurricane Idalia

- August 30, 2024, Category 3
- 10.89 ft. Storm Surge (MLLW) in Cedar Key
- Largest storm surge in over 120 years for Cedar Key
- Focus on two aspects:
  - Media coverage and follow up
  - Living shoreline performance









**LIVE**  
Cedar Key, FL 82°

# **BREAKING** EXCESSIVE RAIN FUELS FLASH FLOOD THREAT

Active Warnings  
**Tornado**

6:11m Greenville, SC Tonight 68° Showers Early 60% Chance of Precip



LIVE

Cedar Key, FL 82°



svrweather.com

LIVE

Horseshoe Beach, FL 77°



# BREAKING IDALIA LANDFALL IMMINENT: FLORIDA BIG BEND

Active Warnings  
Tornado

The Weather Channel

4:21p

Reno, NV Now

58°

Fair

Calm

Feels Like 58°





## Video Link

Here is the link on our YouTube channel <https://www.youtube.com/watch?v=bxx-XxSabt0&t=1s>



BEFORE (6/30/2023)



AFTER (9/4/2023)

Mar 2023



Aug 2023 (pre-Idalia)



Sep 2023 (2 days post-Idalia)



Oct 2023 (6 weeks post-Idalia)



Living Shoreline  
protected “toe” of  
hardened infrastructure

G Street after Idalia



no erosion

erosion





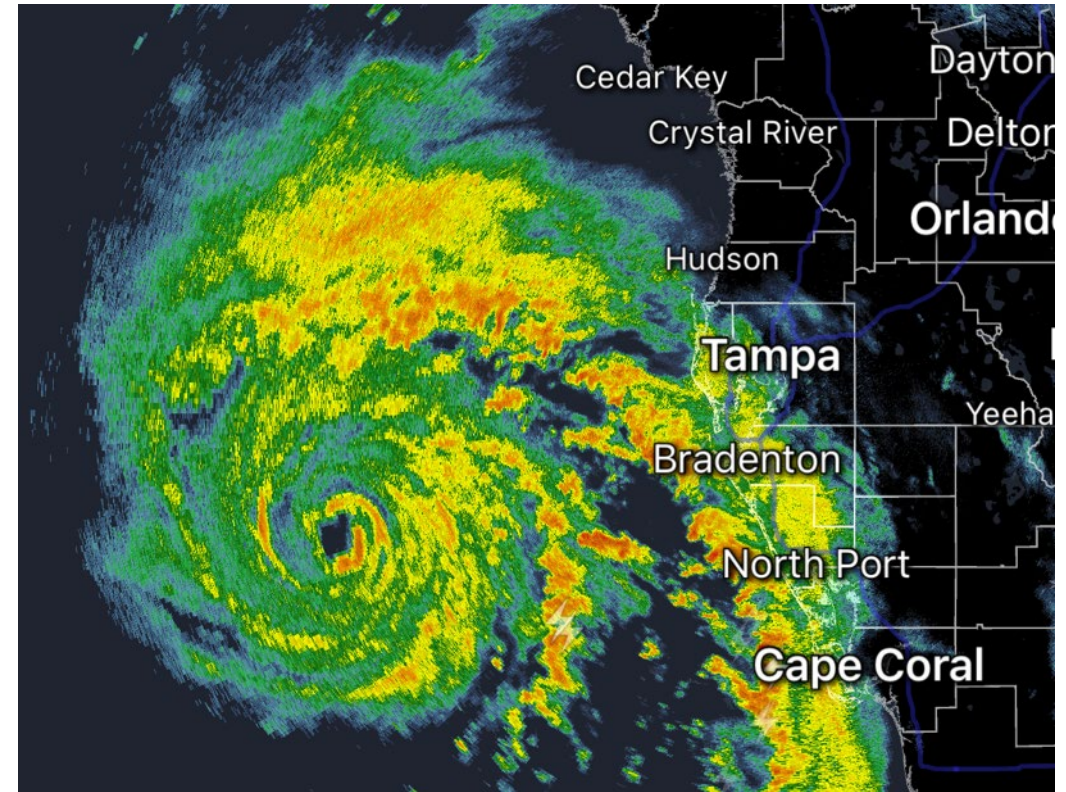
BEFORE (6/30/2023)



AFTER (9/4/2023)

# Lessons Learned

- Media coverage matters, ask for follow up stories to hopefully help local economy
- Recovery was faster than we expected, perhaps due to local experience with Hurricane Hermine in 2016
- Living shorelines performed well
- Monitor responses and quantify benefits











# Recovery Lessons Learned from Hurricane Idalia

CEDAR KEYS AND LOWER SUWANNEE NATIONAL WILDLIFE REFUGES .

John Stark, Deputy Refuge Manager for Cedar Keys and Lower Suwannee National Wildlife Refuges (NWRs) [john\\_stark@fws.gov](mailto:john_stark@fws.gov)

# Objectives

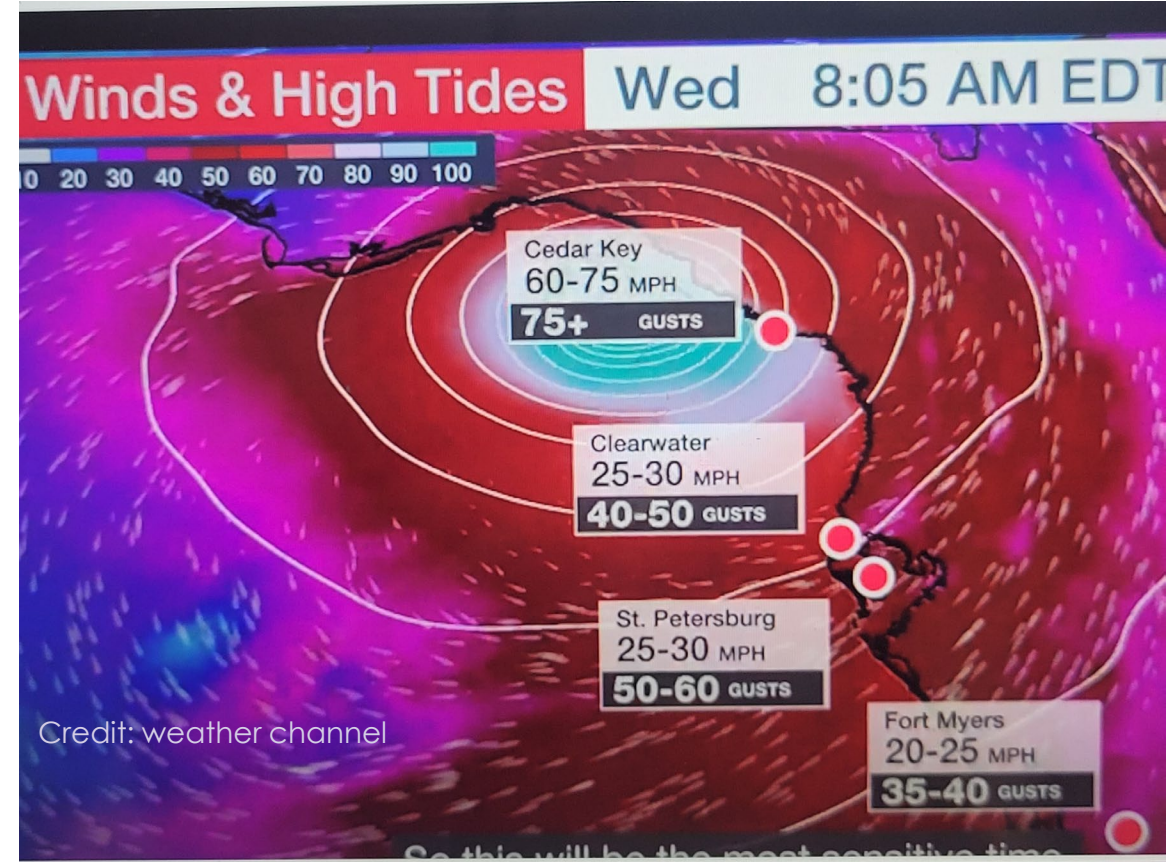
- ▶ Share two U.S. Fish and Wildlife stories “Case Studies” about recovery efforts after hurricane Idalia.
- ▶ Describe examples of how USFWS works with other agencies in disaster response.
- ▶ Offer some lessons learned from those experiences that may inform how better to prepare for other situations.



Credit: Weather Channel

# Case Study One: Mutual Aid Agreement between Cedar Keys NWR and the city of Cedar Key

- ▶ Cedar Keys NWR maintains a Mutual Aid Agreement with the city where: *The Parties hereby mutually agree to assist each other in the event of a natural or human-caused disaster that is beyond their respective ability to alleviate the result of the disaster on their own.*
- ▶ Immediately after Idalia's landfall, Cedar Keys NWR was able to provide assistance in doing health and welfare checks of residents who were known to be home but not reachable by phone.
- ▶ Everything went very well, but there were several lessons learned that can help the refuge do better next time.





# Mutual Aid Agreement between Cedar Keys NWR and the city of Cedar Key

Local Law enforcement & 1<sup>st</sup> responders were staged, waiting for the storm tide to recede.

- ▶ USFWS bypassed everyone and headed for Cedar Key.



# Mutual Aid Agreement between Cedar Keys NWR and the city of Cedar Key

## Cedar Keys NWR has a Marsh Master, which can:

- ▶ Drive over debris, such as wood with nails.
- ▶ Float, and drive across water.
- ▶ No one else had equipment available that could do both.



Credit: Wall Street Journal

# Mutual Aid Agreement between Cedar Keys NWR and the city of Cedar Key

By early afternoon, refuge staff was coordinating with Cedar Key PD and the U.S. Army Guard to check homes. This went exceptionally well.

## Lesson Learned:

It was by chance that the refuge brought a marsh master that was uniquely capable of searching homes before the storm tide had left.

The need for a marsh master could have been reasonably anticipated by planning ahead and “gaming out” what assistance would look like and what tools would be needed.

Cedar Key Fire Rescue Facebook page, Aug 30, 2023

*“We have the Lower Suwannee Refuge, helping us to the areas we cannot due to Highwater to check on those who refused to leave.”*



# Case Study Two: Expect the Unexpected!

- ▶ There was a post storm cultural resources damage assessment conducted on Seahorse Key, one of the islands that are part of Cedar Keys NWR, on September 12.
- ▶ Seahorse key has a plethora of cultural resources, including a lighthouse, which was built in 1854, and a cemetery with marked graves from the 1700's and 1800's.
- ▶ While conducting the damage assessment, refuge staff found a cannonball, unexploded ordinance from the civil war. We were not expecting this!
- ▶ This triggered a very complicated response.
- ▶ In retrospect, there were several lessons learned that could be helpful in the future.



# Expect the Unexpected!

## First things first...is that what we think it is?

- ▶ Consulted with the regional USFWS archeologist to verify that it was, in fact, a civil war cannonball, and to determine if it was dangerous.
- ▶ It was confirmed to be an 1800's cannonball. During this period, one type of cannonball would be filled with black powder. These, when found, are unstable and dangerous.



# Expect the Unexpected!

## **USFWS law enforcement was consulted.**

- ▶ They coordinated with:
- ▶ The Florida Fish and Wildlife Conservation Commission Law Enforcement.
- ▶ Cedar Key City Police Dept.
- ▶ Levy County Sherriff's Dept.
- ▶ Alachua county Bomb Squad.



# Expect the Unexpected!

## Made an Assessment of risks to wildlife:

- ▶ Reviewed state database of known existing Eagle nests
- ▶ Reviewed Designated Critical Habitat maps.
- ▶ Observed the beach for the presence of any Threatened and/or endangered shorebirds.
- ▶ There was a family of manatees close by that were monitored.

**It was determined not to have black powder, otherwise it would have been blown up on the beach.**



# Expect the Unexpected!

## Other considerations and/or unanswered questions:

- ▶ At the edge of designated wilderness. Should there be a minimum requirements analysis (MRA)?
- ▶ Seahorse Key NWR begins/state lands end at the “mean high tide”. Were we on or off of the refuge?
- ▶ What if there had been an eagle, sea turtle, bird nest there?

## Lessons Learned:

- ▶ No one could have anticipated U.X.O. on Cedar Key NWR.
- ▶ But, a coastal refuge should be ready for the unexpected....

## Do so by:


- ▶ Having contacts for emergency response organizations.
- ▶ Having on hand information about sensitive or trust resources to account for, such as T & E species, etc.





# Many Thanks!

- ▶ To everyone hosting and/or participating in the  
**5th Annual NOAA Hurricane Preparedness Virtual Summit (2024)**
- ▶ To the first responders and service members that assisted with recovery/response from Hurricane Idalia.
- ▶ Particularly to the Alachua County bomb squad that put themselves in harms way to ensure that Seahorse Key is safe for everyone else.

A satellite image of Earth showing a large storm system over the Atlantic Ocean. The storm has a distinct eye and spiral cloud bands. The surrounding landmasses are visible in shades of green and brown, and the ocean is a deep blue. The text is overlaid on the image.

# **Operation Preparation: Preparing for the storm and beyond**

By: Emily Setser, Disaster Preparedness Specialist/Meteorologist, OR&R's Disaster Preparedness Program



# Did you know...

*According to the CDC..... Only 39% of Americans have developed an emergency plan and discussed it with their family!*





# It is important to be prepared

- Being prepared can save your life and your property. Don't be a part of the 61% of people who are caught unprepared.





# Two Week Preparedness

- By being two weeks ready you can ensure you and your family can survive, especially in the case of impassable roads.
- First Responders will be able to prioritize life-threatening situations if you are able to be self-sustaining.
- You will be able to help neighbors if you have enough supplies



# What should you be prepared for?

- Know what disasters and hazards could affect your region
- It is important to be prepared for all hazards!
- This can include...
  - Natural Disasters
  - Human Caused Disasters
  - Terrorist acts





# How to make a plan



## Make A Plan



### Step 1: Put a plan together

- How will I receive emergency alerts and warnings?
- What is my shelter plan?
- What is my evacuation route?
- What is my family/household communication plan?
- Do I need to update my emergency preparedness kit?

### Step 2: Consider specific needs in your household.

- Tailor our plans and supplies to specific daily needs and responsibilities within your household.
- Remember to plan for the care of children if necessary.
- Create a plan for pets if you have them.
- Consider dietary or medical restrictions.

### Step 3: Create a family emergency plan

- Write down emergency contacts (phone numbers and addresses)
- Consider emergency meeting places if your family is separated.
- Discuss this plan with your family and update it at least once a year.

### Step 4: Practice this plan with your family/household

- It is important to practice this plan with everyone in your household to ensure they understand it.



# How to be prepared

## Basic Emergency Supplies

1. Water for two weeks (One gallon per person per day)
2. Food for two weeks for each person
3. Radio, battery-powered or hand-crank
4. Flashlight
5. Extra batteries
6. First aid kit and medications
7. Whistle (to signal for help)
8. Sanitation and personal hygiene times
9. Multi-purpose tool
10. Copies of personal documents (add contact information)
11. Cell phone and chargers
12. Can Opener
13. Cash
14. Blanket
15. Maps of the area

## Additional Supply Items

1. Identification and Charge Cards (NOAA ID Card)
2. Prescription eyeglasses
3. Infant formula and diapers
4. Pet food and water for pet
5. Change of clothing
6. Fire extinguisher
7. Lighter
8. Toilet paper
9. Plastic bags
10. Paper and pencil
11. Games, books, puzzles, or other activities
12. Comfort foods
13. Communication Equipment (Gov. Issued)

- Know the hazards in your area
- Document and insure your property
- Have a plan and practice it with your family often
- Have a way to get emergency alerts
- Prepare a Kit







# Pet Preparedness

- According to a poll distributed by the ASPCA in 2021, 83% of the polled pet owners reported living in a community threatened by natural disasters
  - Only 46% of those polled had preparedness plans for their pets
  - More than 1 in 5 pet owners have had to evacuate their homes
  - 32% left behind a dog and 20% left behind a cat





# Make a pet preparedness plan

- ✓ Have an evacuation plan for your pet
- ✓ Develop a buddy stem
- ✓ Have your pet microchipped
- ✓ Contact your local emergency management office  
or  
animal shelter



# Pet Emergency Supply Checklist



## Pet Preparedness Checklist



- ✓ Food
- ✓ Water
- ✓ Medicine
- ✓ First Aid Kit
- ✓ Collar with ID Tag
- ✓ Harness or Leash

- ✓ Traveling Bag
- ✓ Crate or carrier
- ✓ Grooming Items
- ✓ Sanitation Needs
- ✓ Proof of ownership
- ✓ Familiar items





# Preparedness Surveys

- Every year the Disaster Preparedness Program distributes a Personal Preparedness Survey to the Office of Response and Restoration Staff
- This survey is intended to assess OR&R staff's personal preparedness and serve as a reminder for everyone to be prepared for all hazards.

*Plan to be a survivor and not a victim of a disaster*



# Building a Preparedness Kit on a Budget

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Kyla Breland, MPH, MEP

West Coast & Pacific Islands Regional Preparedness Coordinator



# Agenda

- Basic Preparedness Kit Contents
- Supermarket Sweep: \$50 Budget Build
- Hurricane Hacks

# Basic Preparedness Kit: Recommended Items

- ✓ Water
- ✓ Food
- ✓ NOAA Weather Radio (*battery-powered or hand crank*)
- ✓ Flashlight
- ✓ Extra batteries
- ✓ First aid kit
- ✓ Whistle
- ✓ Multi-purpose tool
- ✓ Sanitation and personal hygiene items
- ✓ Dust mask (*to help filter contaminated air*)
- ✓ Plastic sheeting and duct tape (*to shelter in place*)
- ✓ Manual can opener
- ✓ Local maps
- ✓ Cell phone with chargers and a backup battery
- ✓ Copies of personal documents



For more info visit [ready.gov](https://www.ready.gov)

# Basic Preparedness Kit: Additional Items



- ✓ Soap, hand sanitizer, and wipes to disinfect surfaces
- ✓ Prescription medication
- ✓ Non-prescription medications (*pain relievers, anti-diarrhea, antacids, etc.*)
- ✓ Prescription eyeglasses and contact lens solution
- ✓ Infant formula, bottles, diapers, wipes, & diaper rash cream
- ✓ Pet food and extra water for your pet
- ✓ Cash or traveler's checks
- ✓ Sleeping bag or warm blanket for each person
- ✓ Change of clothing
- ✓ Fire extinguisher
- ✓ Toilet paper and plastic bags
- ✓ Matches in a waterproof container
- ✓ Mess kits, paper cups, plates, paper towels and utensils
- ✓ Paper and pencil
- ✓ Books, games, puzzles, or other activities for children



  
**SUPERMARKET**  
 **SWEEP** 

**Challenge:**

Build a base kit for **\$50**

...Can she do it?



  
**SUPERMARKET  
SWEEP**  

Challenge:

Build a base kit for \$

...C

**Spoiler Alert!**

**...SHE CAN**



# Base Kit: Cost Breakdown

*\*not including food*

Item	Cost
Water	\$0.00
NOAA Weather Radio	\$14.90
Flashlight	<i>*no additional cost</i>
Extra batteries	<i>*no additional cost</i>
First aid kit	\$3.67
Whistle	\$2.53
Multi-purpose tool	\$9.88
Sanitation and personal hygiene items	<i>*no additional cost</i>
Dust mask	\$3.48
Plastic sheet	\$5.78
Duct tape	\$3.94
Manual can opener	\$5.97
Local maps	<i>*no additional cost</i>
Cell phone with chargers and a backup battery	<i>*no additional cost</i>
Copies of personal documents	<i>*no additional cost</i>



**GRAND TOTAL:**  
**\$50.15**



# Hurricane Hacks

A collection of tips & tricks I've accumulated

## life hack

noun

informal

: a usually simple and clever tip or technique for accomplishing some familiar task more easily and efficiently

# Need water for your kit?



**No need to buy plastic water bottles!**



When the first watches and warnings are issued, the water from your tap is just as good, if not better than bottled water from the store.

Gather all the water bottles, storage containers, and pitchers you can find and fill them up!

*My personal favorite*




# Is my frozen food still safe to eat?

Need to know how long frozen food will last before spoiling after the power is knocked out?

Grab a glass and fill it with water. Freeze it overnight, then place a penny atop the ice and leave the glass inside the freezer. If the ice fully melts and the penny rests at the bottom of the glass, your frozen goods completely thawed out and are likely spoiled.



# Turn a water jug into a lantern

 Recycle your milk jugs!

Fill a clear, plastic gallon jug with water. Next, switch on your flashlight and balance it upside-down on the mouth of the jug. Or, you can use a headlamp. The container will function like a lantern.



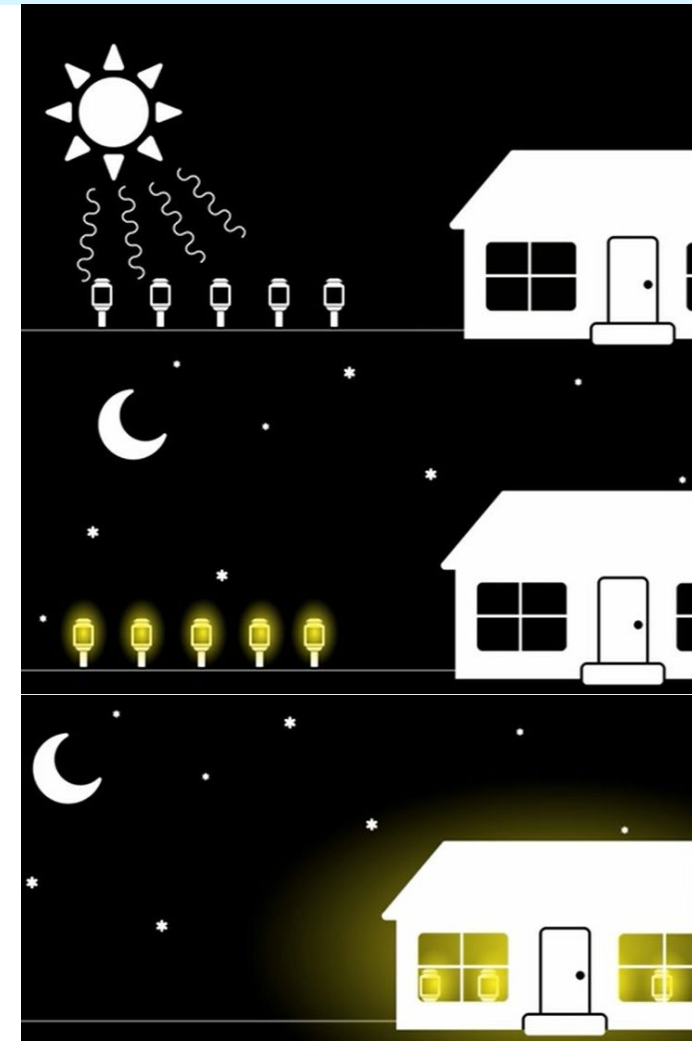
# Use daylight to brighten your home at night



No need for extra batteries when you got the power of the sun

Bring solar-power yard lights into your house for instant light at night. The next morning when the sun is back out, bring the lamps back out to the yard to recharge.

*\*Great nightlight for your kiddos!*





# A full freezer stays colder longer

**Bags of water keep food cold and water fresh**

Fill gallon-sized *reusable* plastic bags with water and put them in the freezer. This way, if the power goes out, your freezer will stay cold for longer and you'll have some drinking water saved up.



# Turn your washing machine into a cooler

Hurricane party anyone?



Your washer can be used as a cooler filled with ice in case of a power outage. The great thing about this is as it melts you won't have to worry about drainage.

# Potty Place for Fido

When you gotta go, you gotta go...

You can't walk your dogs in the middle of a hurricane, but you can try to trick your potty-trained pooches into using the bathroom safely indoors...

Buy artificial turf from the pet store or take leftover pieces of sod and place them inside a kiddie pool.



# Navigating Federal Disaster Aid: *Resources for Community Understanding & Preparedness*

Niki L. Pace, Louisiana Sea Grant

NOAA Hurricane Preparedness Summit

April 24, 2024



# The Team

- Project Team – Louisiana Sea Grant
  - Niki Pace & Melissa Daigle, Louisiana Sea Grant Law & Policy Program
  - Dominique Seibert & Carol Franze, MEP Louisiana Sea Grant/LSU AgCenter
- Project Funders
  - Coastal Research Response Center
  - NOAA Disaster Response Center



# Project Overview



Help Louisiana residents better understand the various types of federal aid available after natural disasters and how the aid is distributed



Focus on:

Stafford Act (FEMA) – Year 1

Fisheries Disasters + Additional Stafford Act – Year 2



Goal: provide readily available outreach materials on these topics in English, Spanish, and Vietnamese that can be easily shared via social media; Develop materials that can be replicated in other locations

# Goals

## Factsheets

A series of factsheets with translations into Vietnamese and Spanish

## Videos

Short white board videos related to disaster relief  
Videos will be closed captioned in English, Vietnamese, and Spanish

## Project Website

Will host factsheets, videos, and project information

## Engagement

Focus groups with community members to road test materials and refine outreach materials  
Pre-hurricane season – public outreach events

# Factsheets Series

- Disaster Declarations
- Common Types of Federal Aid
- Housing Assistance
- Applying for Aid from FEMA

Disaster Fact Sheet  
Number 4

## APPLYING FOR FEMA DISASTER ASSISTANCE

If a major disaster has been declared in your area, you may be eligible to receive financial assistance from FEMA. There are four ways to apply for federal disaster assistance:

### APPLY ONLINE:

Visit [DisasterAssistance.gov](https://www.disasterassistance.gov) and click the "Apply Online" tab. To find out whether assistance is available in your area, enter the state and city or zip code where the damage occurred. Once you click "next", the page will ask you to select the disaster that affected you. If there is more than one disaster that caused damage, an application for each disaster must be filled out separately. Select the disaster that caused your damage, then select the type of assistance that you need, such as for home or property damage or other expenses like food and shelter. You will then enter the date the damages happened and what caused those damages. From there, you will be redirected to [Login.gov](https://login.gov) to create an account. This website allows users to link multiple participating government accounts so that all applications can be found in one place. After creating an account and logging in, you will return to [DisasterAssistance.gov](https://www.disasterassistance.gov) to complete your application.

### APPLY IN THE FEMA APP:

To apply in the FEMA app, you can download the app for free on your smartphone. When you open the app, enter your name and zip code. After entering your information, the app will redirect you to the application tab, where you may complete and submit the application.

### APPLY BY PHONE:

To apply by phone, call 1-800-621-3362. An agent will ask you a series of questions identical to those found in the written application. During the call, you may be given important information, which you should write down for future reference. This includes an Application ID number, which will be used any time you or someone else in your household may need to contact FEMA about the claim. You should also create a [Login.gov](https://login.gov) account for access to important information about your claim.

### APPLY IN PERSON:

To apply in person, you can text "DRC" and your zip code to 43362 to find the closest Disaster Recovery Center near you. You should gather the documentation listed in the "Before You Apply" section below and proceed to your recovery center to fill out your application in person.

### BEFORE APPLYING, YOU WILL NEED:

You will be asked for this information during the application process:

- Social Security number(s)
- Address and zip code of the damaged property
- Annual household income
- Contact information (phone number, current mailing address, and email address)
- Insurance information (coverage, policy number, insurance company name):
  - Including homeowners, renters, flood, and business policies
- Date the damage happened
- Damage description (describe in detail the damages you incurred due to the disaster)
- Bank account information (for direct deposit of funds once approved)

Disaster Fact Sheet  
Number 1

## MAJOR STORM DISASTER DECLARATIONS

### What is a major storm disaster declaration?

A major storm disaster declaration refers to a formal process that requests federal assistance to deal with a major disaster that overwhelms state and local capacity under the Stafford Act. The formal request allows the federal government to provide support such as mobilizing the Federal Emergency Management Agency (FEMA) and the National Guard as well as other support, depending upon the situation.

### What types of events qualify for a major disaster declaration?

Major disasters can include events common to coastal Louisiana such as tropical storms, hurricanes, flooding, and tornadoes. They can also include other natural disasters like earthquakes, wildfires, and ice storms.

### Who can request a storm disaster declaration?

For storms and other natural disasters, the Governor of the state requests the disaster declaration. Only the Governor can make the request. Depending on conditions and forecasts, the Governor may request the declaration before the disaster actually occurs so that FEMA can assist with preparation and be in place to assist when the event happens, speeding up response times. In the request, the Governor sets out what type of federal aid they are requesting from the federal government for the specific disaster.

### Who decides if a storm disaster declaration will be issued?

After the Governor requests a disaster declaration, the President of the United States makes all formal disaster declarations for natural disasters, like hurricanes and major storms, and determines what aid will be provided for each event.

### What happens when a storm disaster declaration is declared?

When a disaster is declared, the declaration sets out what federal resources will be available, the start date of the disaster declaration, and the geographical area of the disaster (usually set out based on parish lines). Once the disaster declaration is in place, federal resources can start flowing to the impacted area. This may include things like sending FEMA to the impacted area as well as providing financial resources to state and local governments.

### What types of relief may be available?

Relief available will vary for each disaster declaration. For major storms like hurricanes, impacted areas often qualify for individual assistance (for persons living there) as well as other types of assistance to help state and local governments. State and

Disaster Fact Sheet  
Number 3

## HOUSING ASSISTANCE AFTER A MAJOR STORM

When there has been a major disaster, the federal government often offers housing assistance for people in need. There are two main types of housing assistance. First, housing assistance may be financial, which means that people will receive money to find and pay for housing. Second, housing assistance may be direct, which means that a person will not receive money, but they will receive a place to stay, such as a trailer or RV. The federal government decides what types of housing assistance will be available based on the type of major disaster that has taken place, and it will decide what type of assistance a person may be offered. A person only needs to apply for assistance one time to be considered for all types of housing assistance.

### COMMON TYPES OF FINANCIAL HOUSING ASSISTANCE

DISPLACEMENT ASSISTANCE is money that may be available to help people find short-term living arrangements after a major storm. This money is meant to help people who cannot afford to pay out-of-pocket for new housing after their homes were damaged by a storm. To get this assistance, a person must be unable to live in their home. This type of assistance is only meant to give people money to pay for short-term living arrangements while they make repairs to their home or look for longer-term living arrangements. This money could also be used to cover costs associated with staying with family and friends until a rental option can be secured. Disaster Assistance is a new resource available from FEMA as of March 22, 2024.

LODGING EXPENSE REIMBURSEMENT may be available to help people pay for hotels or motels that they stay in after they must evacuate their homes. To get this type of assistance, a person must be unable to live in their home. This can mean that their home is unsafe to stay in, that a person cannot get into their home due to obstacles like fallen power lines or trees, or if the government says they cannot go home. It does not matter if a person is a renter or homeowner. This type of housing assistance is reimbursement, which means that people pay for their hotels or motels out-of-pocket, and the federal government may pay them back later. This type of help may not be used to pay for people's stays in the homes of their family or friends. It also cannot be used to pay for extra hotel costs, such as laundry, TV, food, or pet charges. People who want to apply for this type of assistance should keep a receipt or itemized statement from the hotel or motel that they stay in. If someone has received Displacement Assistance, then they cannot receive Lodging Expense Reimbursement.

Disaster Fact Sheet  
Number 2

## COMMON TYPES OF FEDERAL DISASTER AID FOR MAJOR STORMS

The federal government provides several types of disaster aid related to major storm events. Aid programs can be provided to individuals as well as communities. The specific type of aid available will depend on the storm event and its disaster declaration. The disaster declaration will establish the locations and type of aid available for that disaster. The information below provides an overview of common types of aid following a major disaster. It is not an exhaustive list.

### COMMON TYPES OF INDIVIDUAL FEDERAL ASSISTANCE

INDIVIDUAL ASSISTANCE is direct assistance to individuals and households who have necessary expenses and serious needs they cannot meet due to the disaster. Individual assistance is available for up to 18 months from the date of the disaster declaration but must be registered for within 60 days of the major disaster, with limited exceptions. Individual assistance can cover certain expenses including funds to cover rent of alternative living units, funds to repair or replace residences, and funds to meet medical, dental, childcare, and funeral needs. It may also provide temporary housing units that the individual can purchase or lease. Individuals must apply for this assistance through FEMA.

UNEMPLOYMENT ASSISTANCE is available to any individual unemployed due to a major disaster. These benefits are available for as long as deemed appropriate but no longer than 26 weeks after the major disaster is declared.

CRISIS COUNSELING ASSISTANCE & TRAINING provides professional counseling services to victims of major disasters who have been traumatized by or exacerbated by the major disaster or its aftermath. These services include financial assistance to mental health organizations. To obtain assistance, the Governor must initiate an assessment of the need (which determines the estimated size and cost) for the services within 10 days of the disaster declaration. These services are free and confidential.

SMALL BUSINESS ASSOCIATION (SBA) LOANS may also be available to individuals and businesses. These low interest loans can assist property owners with the cost of repairs following a storm. Money from these loans is often received faster than some grant programs. However, loans must be repaid.

SERIOUS NEEDS ASSISTANCE (SNA) is a new cash relief program beginning March 22, 2024. This new program is designed to provide more immediate financial assistance for applicants with serious needs or expenses after a disaster. Serious needs might include food, water, fuel, infant formula, and other immediate expenses. SNA may also address unexpected needs relating to sheltering and evacuation. To qualify, applicants must be displaced from their homes or need to shelter elsewhere due to storm damage. Applicants must express serious needs when registering for assistance and request this assistance. Qualifying households will get a payment of \$750 to help cover those needs.

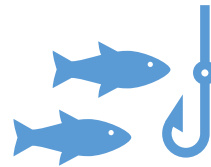


# Factsheets – In Development



## **Updates to FEMA's Individual Assistance Program**

Addresses new rule that was released in January 2022



## **Fisheries Disasters**

How do they work? Why are they different?



## **Storm Debris**

Local Governments – What you need to know for FEMA Reimbursement

Public – Why the Local Government is asking you to sort debris

These will also form basis of next video

# Video Series



Short whiteboard videos



Housed on the LSG YouTube page and shared via LSG social media websites



Topic 1 – How to find your Disaster Declaration

# Finding Your Disaster Declaration Video

Louisiana Sea Grant » Resources » Disaster Aid: Fact Sheets » Disaster Aid: Videos

## Federal Disaster Aid

[About](#) | [Disaster Fact Sheets](#) | [Videos](#)

### Videos



**Your Disaster Declaration**

[click to watch video](#)

# Project Website

## Disaster Aid: Fact Sheets

- [Home](#)
- [About Us](#)
- [Outreach](#)
- [Education](#)
- [Research](#)
- [LaNERR](#)
- [Communications](#)
- [Law & Policy](#)
- [Resources](#)
- [Opportunities](#)

Louisiana Sea Grant » Resources » Disaster Aid: Fact Sheets

### Federal Disaster Aid

[About](#) | [Disaster Fact Sheets](#) | [Videos](#)

### Disaster Fact Sheets

#### Major Storm Disaster Declarations

A major storm disaster declaration refers to a formal process that requests federal assistance to deal with a major disaster that overwhelms state and local capacity under the Stafford Act. The formal request allows the federal government to provide support such as mobilizing the Federal Emergency Management Agency (FEMA) and the National Guard as well as other support, depending upon the situation.

[Download Disaster Fact Sheet #1 >](#)

Also available:

- [DECLARACIONES DE DESASTRE POR TORMENTAS FUERTES – Spanish translation](#)
- [TUYÊN BỐ THẢM HỌA BÃO LỚN – Vietnamese translation](#)

#### Common Types of Federal Disaster Aid for Major Storms

The federal government provides several types of disaster aid related to major storm events. Aid programs can be provided to individuals as well as communities. The specific type of aid available will depend on the storm event and its disaster declaration. The disaster declaration will establish the locations and type of aid available for that disaster.

[Download Disaster Fact Sheet #2 >](#)

Also available:



# Engaging with Local Leaders

- Focus Groups – November 2023
  - CRS user group for SE Louisiana – primarily floodplain managers
  - Plaquemine Parish Local Leaders – parish council and emergency managers
- Community Leaders Workshop – May 21, 2024
  - Participants of focus groups and other interested leaders from SE Louisiana
  - Showcase this project and gather feedback, additional needs
  - Provide resources from partners on related topics:
    - Emergency Management, Insurance, Tornadoes, Home Elevations

# Public Engagement

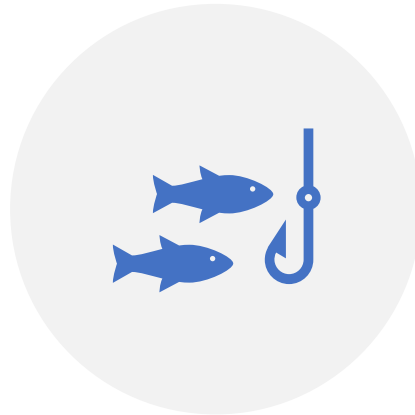
- Tabling Events in Local Communities
  - Plaquemines Parish – 2 events, over 2000 attendees
- Gulf of Mexico Climate & Resilience Community of Practice
  - Gulf-wide event, annual meeting taking place now
  - Communities & other professionals from across the Gulf



# Next Steps



CONTINUE TO WORK ON  
ADDITIONAL FACTSHEETS & VIDEOS



EXPANDING TO INCLUDE FISHERIES  
DISASTERS



CONTINUE OUTREACH EVENTS

# Thank you!

Contact:

Niki L. Pace

Louisiana Sea Grant

[nlpace@lsu.edu](mailto:nlpace@lsu.edu)

Project Website:

<https://www.laseagrants.org/resources/disaster-aid/>





# NOAA Hurricane Preparedness Summit 2024

**Nancy E. Kinner, Facilitator**  
**Coastal Response Research Center (CRRC)**  
**University of New Hampshire**

**April 25, 2024**



# Hurricane Summit 2024

## STEERING COMMITTEE

Nancy Kinner, UNH CRRC

Charlie Henry, NOAA OR&R GoM DRC

Lisa Symons, NOAA ONMS

Matthew Chasse, NOAA OCM

Brad Benggio, NOAA OR&R ERD

Capt Eric Johnson, NOAA HSPO

Kyla Breland, NOAA DPP

Jason Beaman, NOAA NWS



# HOW TO PARTICIPATE

- **Attendees:** Muted & camera off
- **Panelists:** Unmute & camera on ONLY when speaking
- **Questions for Panelists:** Please put them in the Q&A or Chat panel
- **Download GoToWebinar** application vs. online browser
- **If you have access issues, please contact Lisa [Lisa.Symons@noaa.gov](mailto:Lisa.Symons@noaa.gov), cell 301-529-1860 or Kathy at [kathy.mandsager@unh.edu](mailto:kathy.mandsager@unh.edu), cell 603.498.8010**



# Q&A Tool

- **Type questions in Q&A space as you think of them**
  - No need to wait until the Q&A session in the agenda
- Located in main tool bar
- Q&A and Chat will be monitored and questions collated
- Questions may be read aloud or addressed in the Q&A Tool



# For More Information

- Previous Hurricane Summit reports
- 2024 Hurricane Summit Survey Results
- Disaster Related Tools from NOAA and Partners
- All presentations (available post-workshop)

Available on workshop webpage:

<https://crrc.unh.edu/resource/5th-annual-noaa-hurricane-preparedness-summit-2024>



**THANK YOU FOR LISTENING**  
**.....And Away We GO.....**

**<https://crrc.unh.edu/resource/5th-annual-noaa-hurricane-preparedness-summit-2024>**





# 2024 NOAA Hurricane Preparedness Summit

## Wrap Up

**Kyla Breland, NOAA OR&R Disaster Preparedness Program  
Hurricane Summit Steering Committee Member**





# 2024 NOAA Hurricane Preparedness Summit

<https://crrc.unh.edu/resource/5th-annual-noaa-hurricane-preparedness-summit-2024>





## 2024 NOAA Hurricane Preparedness Summit

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# NOAA Support in Disaster Recovery: **Looking Back & Looking Ahead**

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April 25, 2024

# SESSION AGENDA



## Disaster Recovery Support Overview

### Operational Spotlights

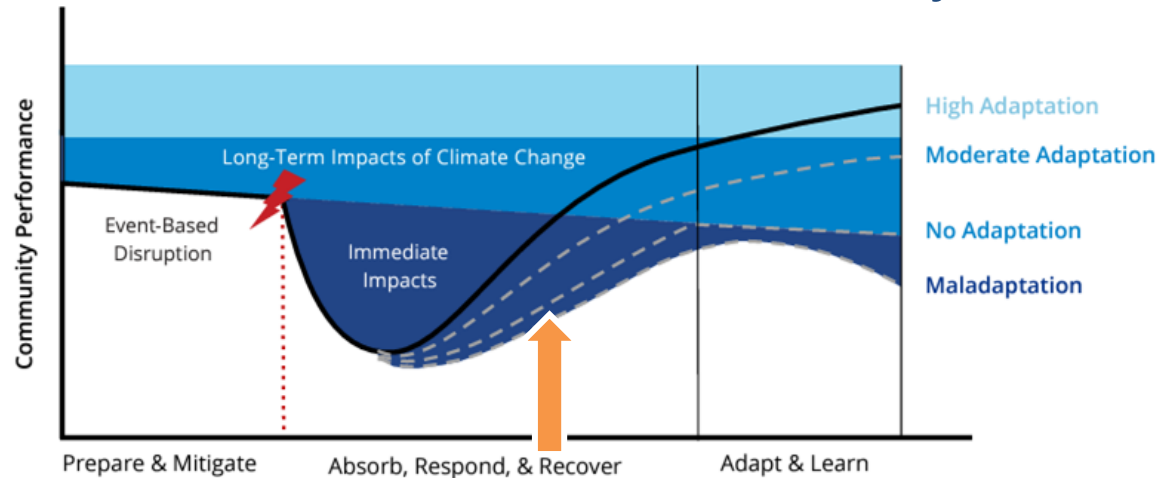
- Natural & Cultural Resources RSF: Post-Disaster Coral Reef Restoration in Puerto Rico
- Community Assistance RSF: Sea Grant & Louisiana Community Resilience Institute
- Economic RSF: Interagency Collaboration to Support Florida Aquaculture Workforce

### Discussion & Wrap Up

# RECOVERY SUPPORT OVERVIEW

## Purpose

Improve the resilience of coastal communities and economies and the health of coastal ecosystems



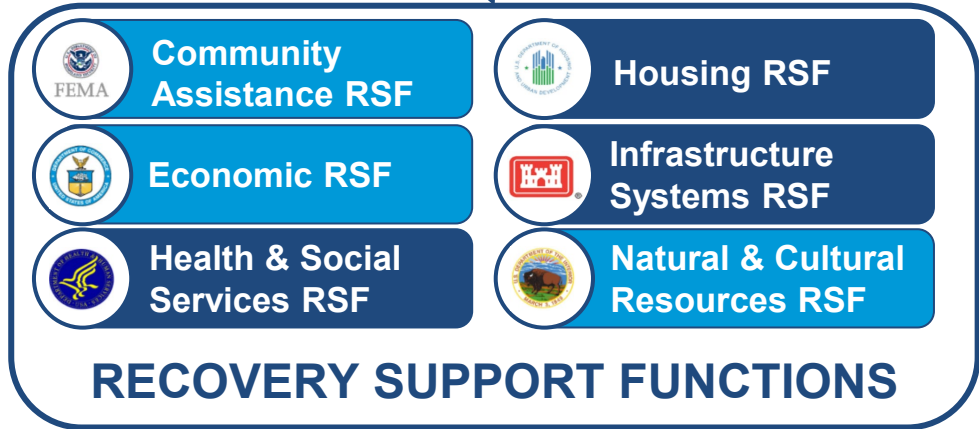
Actions to Reduce Impacts From Hazard Events and Climate Change

# Process



## National Disaster Recovery Framework

Second Edition  
June 2016



Images: FEMA



# Disaster Recovery

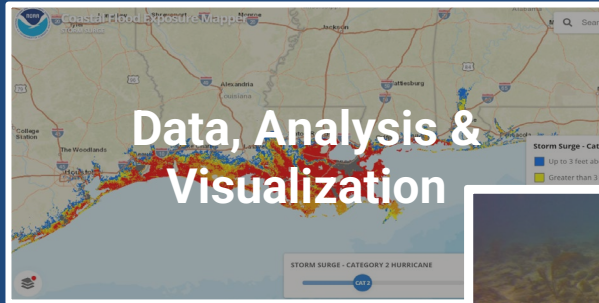
**Locally Executed**

**State Managed**

**Federally Supported**

State = State/Tribe/Territory

# Ways NOAA Can Help



# NOAA Focus Areas

The background of the slide is a photograph of several fishing boats docked in a harbor. The boats are white with blue accents and are equipped with various fishing gear, including masts and rigging. The water is calm, and the sky is a clear, light blue. The boats are arranged in a line, with some partially obscured by others. The overall scene is a typical view of a fishing port.

Planning for future conditions

Coastal and marine habitat restoration

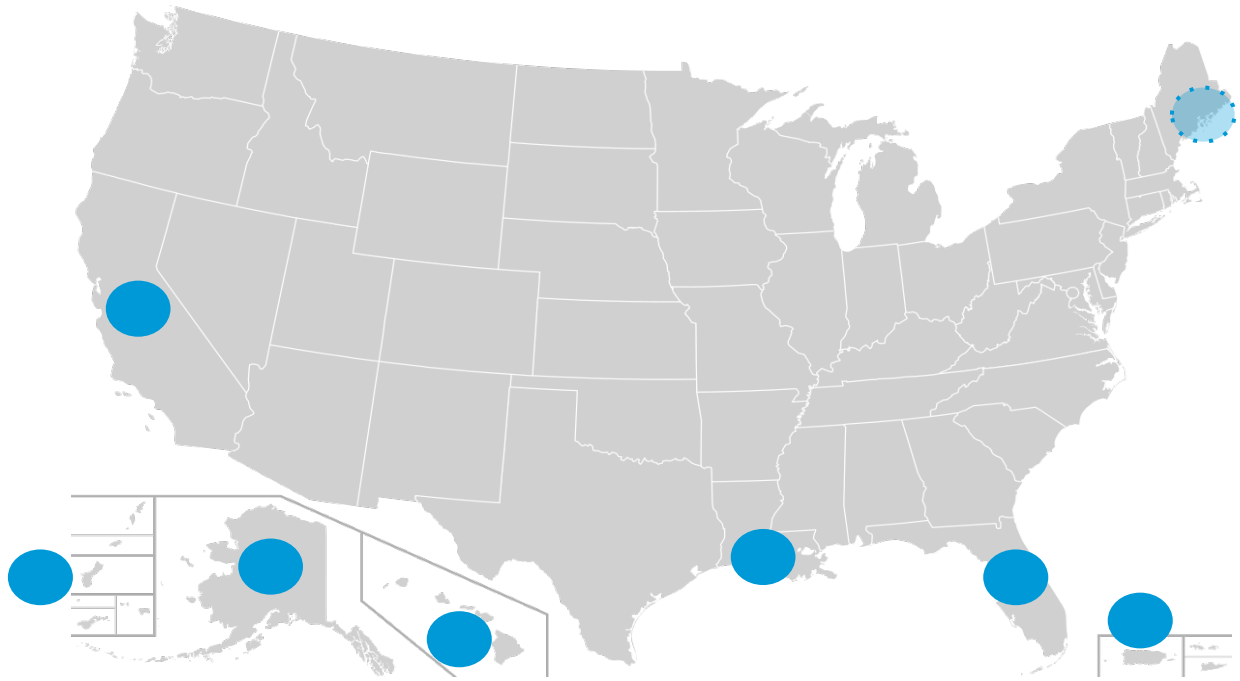
Incorporating nature - based solutions

Blue economy recovery

Community convening for pre - and post-disaster resilience planning



# Reflecting on Recent Missions



[Replace with slides from  
individual recovery  
presentations]



# Q & A

**Post-Disaster Coral Reef Restoration in Puerto Rico** // *Michael Nemeth, DOC-NOAA*

**Post-Disaster Partnering with Sea Grant** // *Kelly Samek, DOC-NOAA / Niki L. Pace, Louisiana Sea Grant*

**Interagency Collaboration to Support Aquaculture Workforce in Florida** // *Latanya Lowery, DOL-ETA / Rusty Skinner & Dale French, CareerSource Citrus Levy Marion / Milton Cochran, Sr., DOC-EDA*

**NOAA Disaster Recovery Support** // *Autumn Lotze, DOC-NOAA*



**Continue the conversation!**

---

**JULY 30 & 31**

**1pm - 5pm EDT | *Virtual*  
+ Pacific Islands Session**

---

**NOAA Disaster Recovery  
Support Workshop**

*Visit the [Workshop Google Site](#)  
for the latest information*

# Post-Disaster Partnering with Sea Grant

**Niki Pace**  
Louisiana Sea Grant

**Kelly Samek**  
NOAA National Sea Grant Office

April 25, 2024



*Photo: NGS*



# 2016 Floods

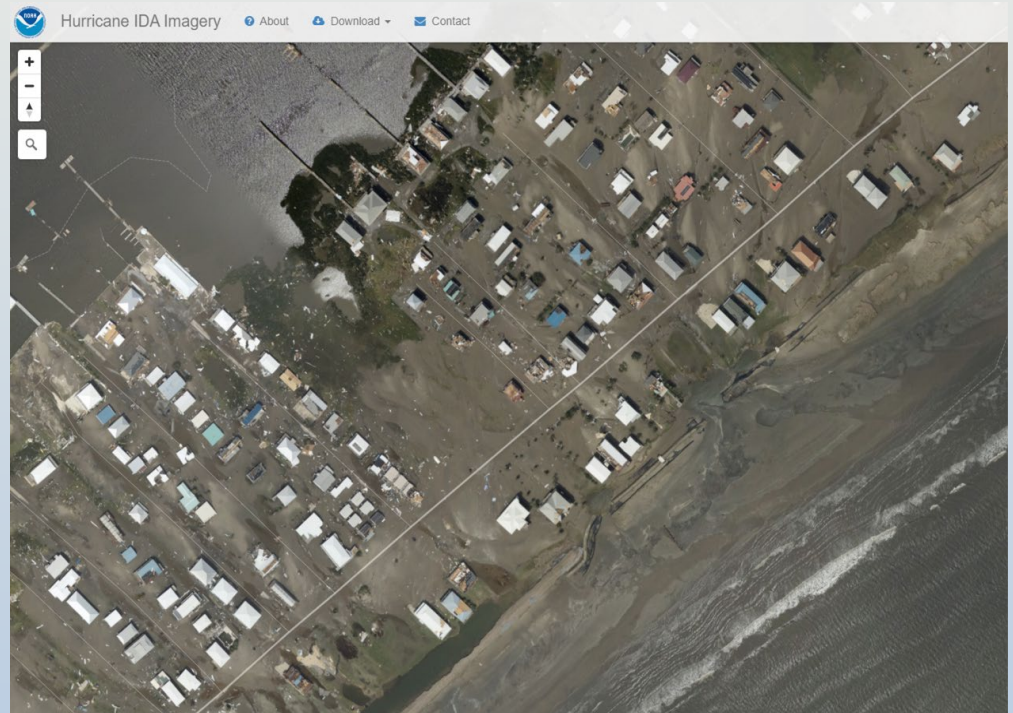
- Mission Assignment from FEMA to fund Louisiana Community Resilience Institute (LCRI) workshops conducted by LSU Coastal Sustainability Studio (CSS)
- CSS engaged elected officials from 11 affected communities to conduct a strategic resilience planning process resulting in a final report with best practices and specific recommendations

# Hurricane Laura (2020)

- Partnership replicated after Hurricane Laura by Interagency Agreement
- Engaged elected officials from 6 affected communities in southwestern Louisiana



# Hurricane Ida (2021)



- Used the same model again after Hurricane Ida
- Engaged elected officials from another 6 affected Louisiana communities



# Why Sea Grant?

- Institutional relationships between NSGO and the 34 Sea Grant programs can be leveraged to direct funding to partners



- Broad strategic plan means significant shared priorities with FEMA, others

# Lessons Learned

- IAA process lengthy; delayed implementation of G-Invoicing exacerbated issues
- Continuity is difficult to maintain when FEMA staff are deployed on an event basis and are subject to frequent rotation
- Future requests subject to additional screening for increased role of Sea Grant personnel or potential to advance specific Sea Grant objectives, as well as commitment of local FEMA region contact/participation

# Questions?

[kelly.samek@noaa.gov](mailto:kelly.samek@noaa.gov)  
[nlpace@lsu.edu](mailto:nlpace@lsu.edu)



# US DEPARTMENT OF LABOR REGIONAL OFFICE 3 - ATLANTA

## UNDERSTANDING



## NATIONAL DISLOCATED WORKER GRANTS (*NDWG*)

# NDWG Application & Technical Assistance

## Application Process

### Complete a:

1. SF 424

2. SF 424A

3. **NDWG APPLICATION**

Application for Federal Assistance SF-424

Proprietary  Non-Proprietary  Other (Specify: \_\_\_\_\_)

Application  Contract/Grant  Other (Specify: \_\_\_\_\_)

Change/Contract Modification  Renewal

1. State Required:  2. State Required:

3. State Required to State:  4. State Application Number: \_\_\_\_\_

5. Applicant Information

6. Legal Name: \_\_\_\_\_

7. Address

8. Organizational Unit

9. Name and contact information of person to be contacted on matters concerning this application

10. Telephone Number: \_\_\_\_\_

11. Fax Number: \_\_\_\_\_

1

Object Class Categories	SECTION B - BUDGET CATEGORIES				
	01	02	03	04	
a. Personnel	\$ 250,000.00	\$	\$	\$	\$ 250,000.00
b. Fringe Benefits	25,000.00				25,000.00
c. Travel	7,000.00				7,000.00
d. Equipment					
e. Supplies	3,750.00				3,750.00
f. Contractual	471,250.00				471,250.00
g. Construction					
h. Other	1,250.00				1,250.00
i. Total Direct Charges (sum of (a)-(h))	958,250.00				958,250.00
j. Indirect Charges	41,750.00				41,750.00
k. TOTALS (sum of (i) and (j))	1,000,000.00				1,000,000.00
l. Program Income	\$	\$	\$	\$	\$

Authorized for Local Reproduction  
Standard Form 424A (Rev. 9-97)  
Prescribed by OMB Circular A-102, Page 14

2

**NATIONAL DISLOCATED WORKER GRANT (NDWG)**  
**SUGGESTED AMENDMENT REQUEST FOR DISASTER RECOVERY**

**Disaster Recovery National NDWG**  
The information on this form must be submitted along with other required materials as described in the National Dislocated Worker Grant Program (NDWG) Training and Employment Guidance Letter No. 16-21 (TEGL 16-21); the use of this form itself is optional. Applicants are encouraged to use the Suggested Amendment Request to ensure all the information required for the amendment is clearly addressed. If more space is required than the requested amendment provides, please attach up to five additional pages of information.

Use the contents checklist below to identify the Sections of your approved full application and executed grant award that are being submitted with revisions.

**Contents**

- AMENDMENT REQUEST SUMMARY ..... 1
- SECTION 1. Application for Federal Assistance SF-424 ..... 3
- SECTION 2. Statement of Work - Overall Information ..... 3
- SECTION 3. Statement of Work - Abstract ..... 4
- SECTION 4. Statement of Work - Community Needs Assessment ..... 9
- SECTION 5. Statement of Work: Preliminary Project Implementation Plan ..... 12
- SECTION 6. Statement of Work - Enrollment and Expenditure Plan ..... 16
- SECTION 7. Project Budget - Non-Construction Programs SF-424A ..... 19
- SECTION 8. Project Budget - Budget Narrative ..... 19
- SECTION 9. Budget Form and Narrative Instructions ..... 29

3



# Eligible Participants



## Who is Eligible

### TEGL 16-21

1. Individuals temporarily or permanently **laid off** because of the disaster.
2. A dislocated worker (WIOA Section 3(15), 3(16) definition).
3. Long-term unemployed individuals.
4. **Self-employed individuals** (unemployed / underemployed because of the disaster).



# Rapid Response



## **What is rapid response and what is its purpose?**

[Federal Code - 20 CFR 682.300](#)

Rapid response may be delivered for activities such as mass job dislocation due to a natural disaster.

*Successful rapid response system includes:*

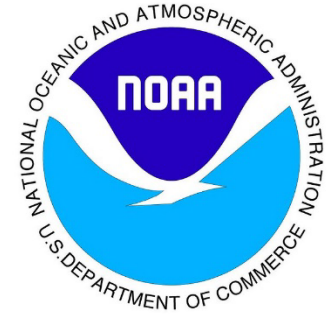
- ❑ Comprehensive business engagement
- ❑ **Convening, brokering, and facilitating the connections**
- ❑ Strategic planning
- ❑ *Collect/Analyze data to anticipate, prepare, & manage economic change.*



# Partnerships



FEMA

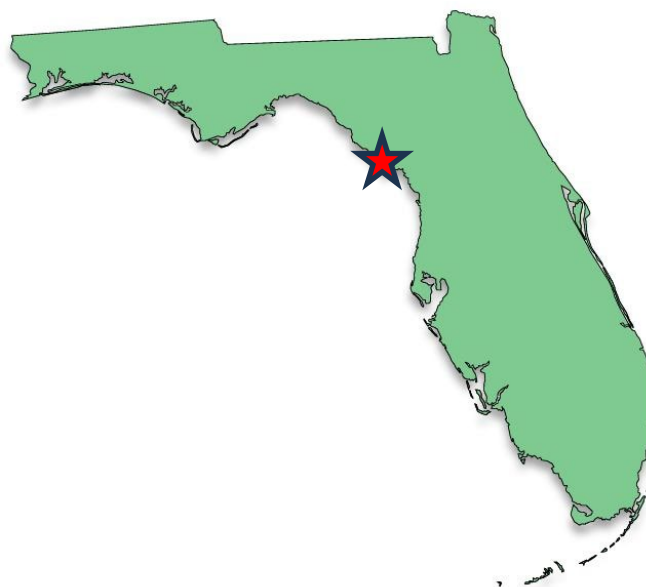






CareerSource  
CITRUS | LEVY | MARION

# Local Delivery of National Dislocated Worker Grant Services





- **Outreach**
- **Establishing Credibility**
- **Understanding the Local Issues**

## Program Structure/Partners

- Department of Labor
- Florida Department of Commerce
- University of Florida, Institute of Food and Agricultural Sciences
- Quality Labor Management
- CareerSource Citrus Levy Marion

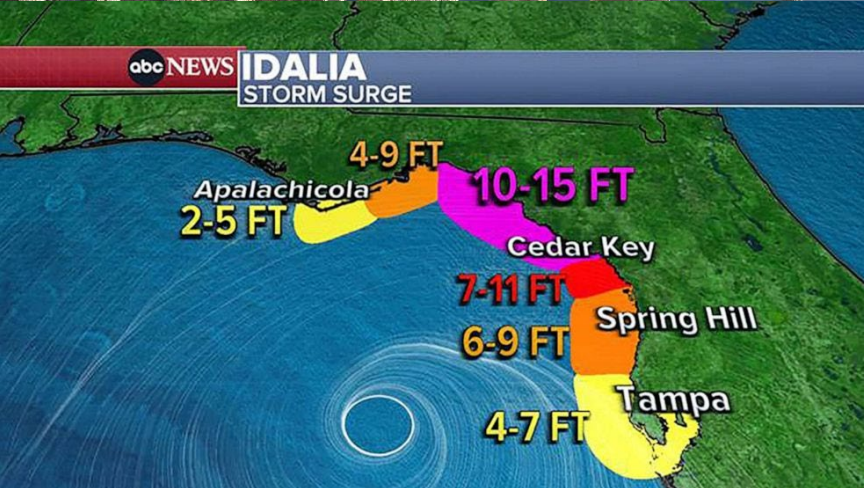


## Community Impact Since Program Launch

March 1, 2024

- Total Enrollments to Date: 174
- Total Community Impact: \$447,354.19
  - As of April 14, 2024
- Retention of Local Workforce





# DR-4734-FL ECONOMIC RECOVERY SUPPORT FUNCTION

UTILIZING U.S. DEPARTMENT OF LABOR NATIONAL DISLOCATED WORKER GRANTS TO SUPPORT AQUACULTURE RECOVERY

**E•D•A**

U.S. ECONOMIC DEVELOPMENT ADMINISTRATION

*Getting America Back to Work!*

# Clam Farming in Cedar Key, Florida and National Dislocated Worker Grants

## KEY TAKEAWAYS AND LESSONS LEARNED

- U.S. Department of Labor National Dislocated Worker Grants (DWG) are a great resource for getting funding to needed parties relatively quickly.
- An extensive public-private partnership is needed to ensure DWG funds are deployed in a timely manner.
- Local Workforce Boards play an essential role in putting people back to work after a disaster through DWGs.
- DWGs are a highly flexible tool in terms of application and use.
- In cases where DWG would be a good solution but the beneficiaries have little knowledge about the program, federal and state agencies with relationships within the disaster-affected communities play a key role in socializing.
- Project development and success depends upon effective socialization and education about the DWG program among key partners.

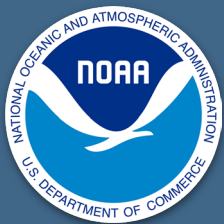


# Clam Farming in Cedar Key, Florida and National Dislocated Worker Grants

## KEY TAKEAWAYS AND LESSONS LEARNED

- Partnering with local partners (such as UF/IFAS extension agents in this case) who have a high level of trust among community stakeholders plays key role.
- Access to deep technical knowledge of the industry provides third-party validation of the needs and enables the local workforce board to tailor the program to best fit industry needs.
- The Cedar Key DWG project is an example of how partners can apply the DWG to meet unique industry needs.
- The Economic RSF can provide valuable technical and facilitative assistance in helping to “connect the dots” for the partners.
- It’s a team sport!

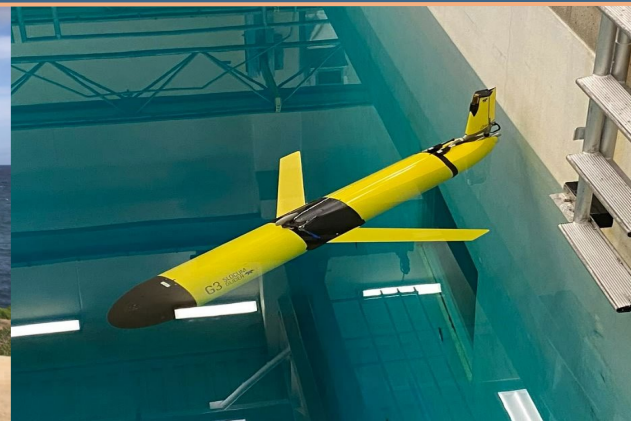




# UxSOC: Uncrewed Aircraft Systems (UAS) for Hurricanes

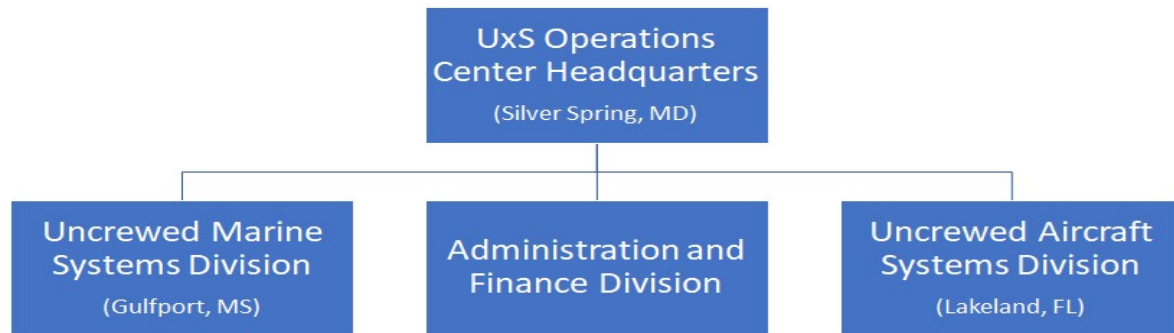
CDR Benjamin LaCour  
Associate Director, Requirements & Capabilities

April, 2024





# NOAA UxS Operations Center





# Small UAS Inside Hurricanes



# sUAS Inside the Storm



**Launched from the P3**

**Persist longer than dropsonds**

**Go where it's unsafe for the  
Hurricane Hunter Aircraft**

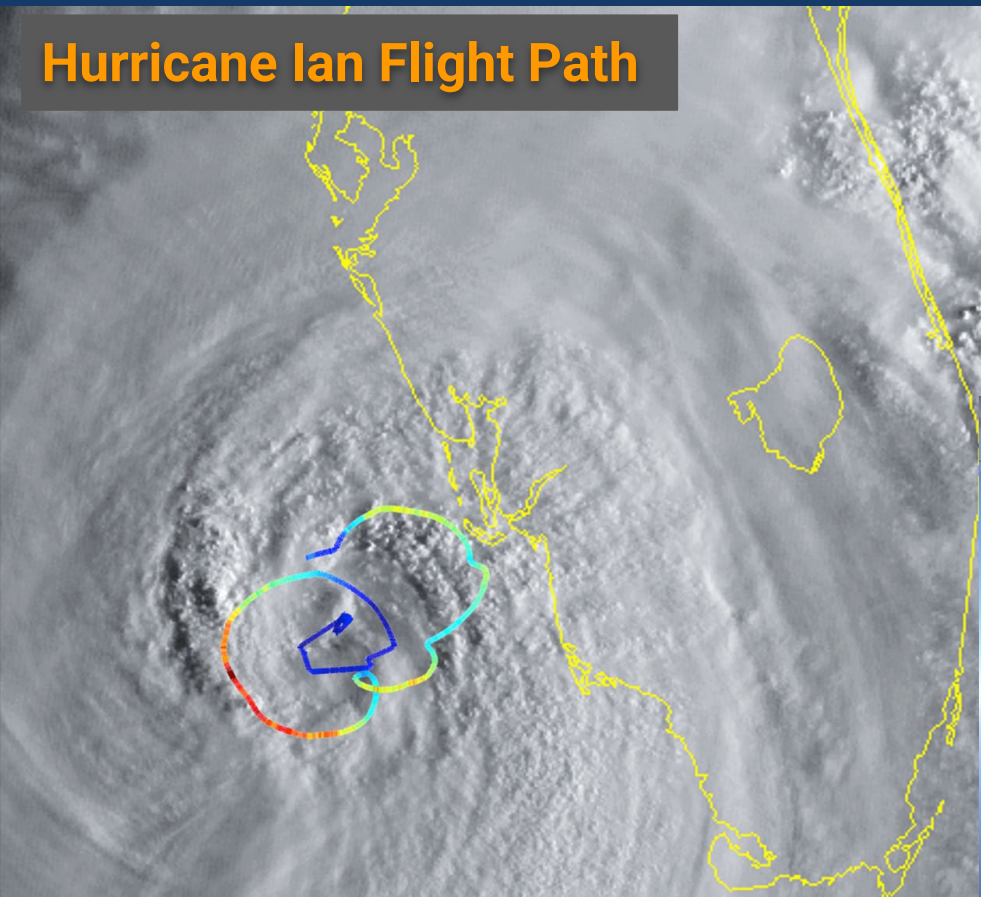
**Helping to derive structures of  
the Planetary Boundary Layer**

**Provide high resolution real-  
time data for enhanced  
situational awareness and  
model validation**

# sUAS Inside the Storm



## Hurricane Ian Flight Path



**Wind speed: 216mph (@2150 ft)**

**Endurance: 102 min**

**Distance from P3: 130 nm**



**Altius**

# sUAS Inside the Storm



Air Deployment



Swivel Wing

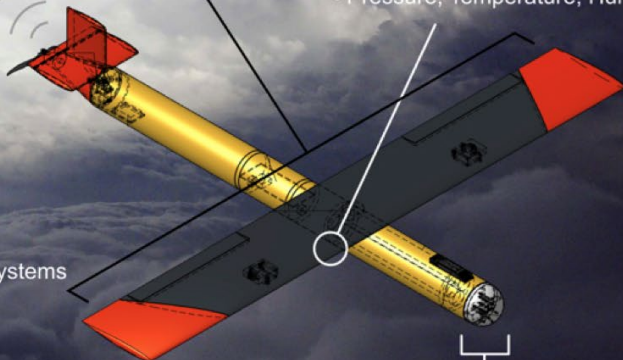
- Simple, Reliable Deployment

In Situ Atmospheric Probe

- Pressure, Temperature, Humidity

AVAPS Compatible

- Integration with Current NOAA Systems

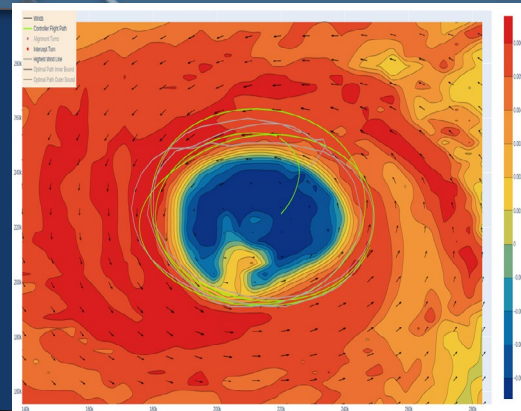


Flush-Air Sensing Nosecone

- Three-Dimensional Winds

S0 Air-Deployed UAS

- Robust, simple to operate, scientific platform



# At the Surface



- Storm hardened USVs give us valuable data about the air-sea flux, wave, and storm dynamics in and around hurricanes without putting our people at risk
- This real-time data give forecasters much better awareness as noted in advisories including SD
- It also is helping researchers to understand and improve these highly dynamic zones of the storm, leading to improved forecast skill

## 2023 Hurricane Season

- ❖ 7 Saildrones deployed
- ❖ 3 Eye wall penetrations
- ❖ 1 Storm sampled in 2 regions
- ❖ 20 mentions of SD data in advisories

The New York Times  
*'Saildrone' Footage Offers Rare Peek Inside a Category 4 Hurricane*



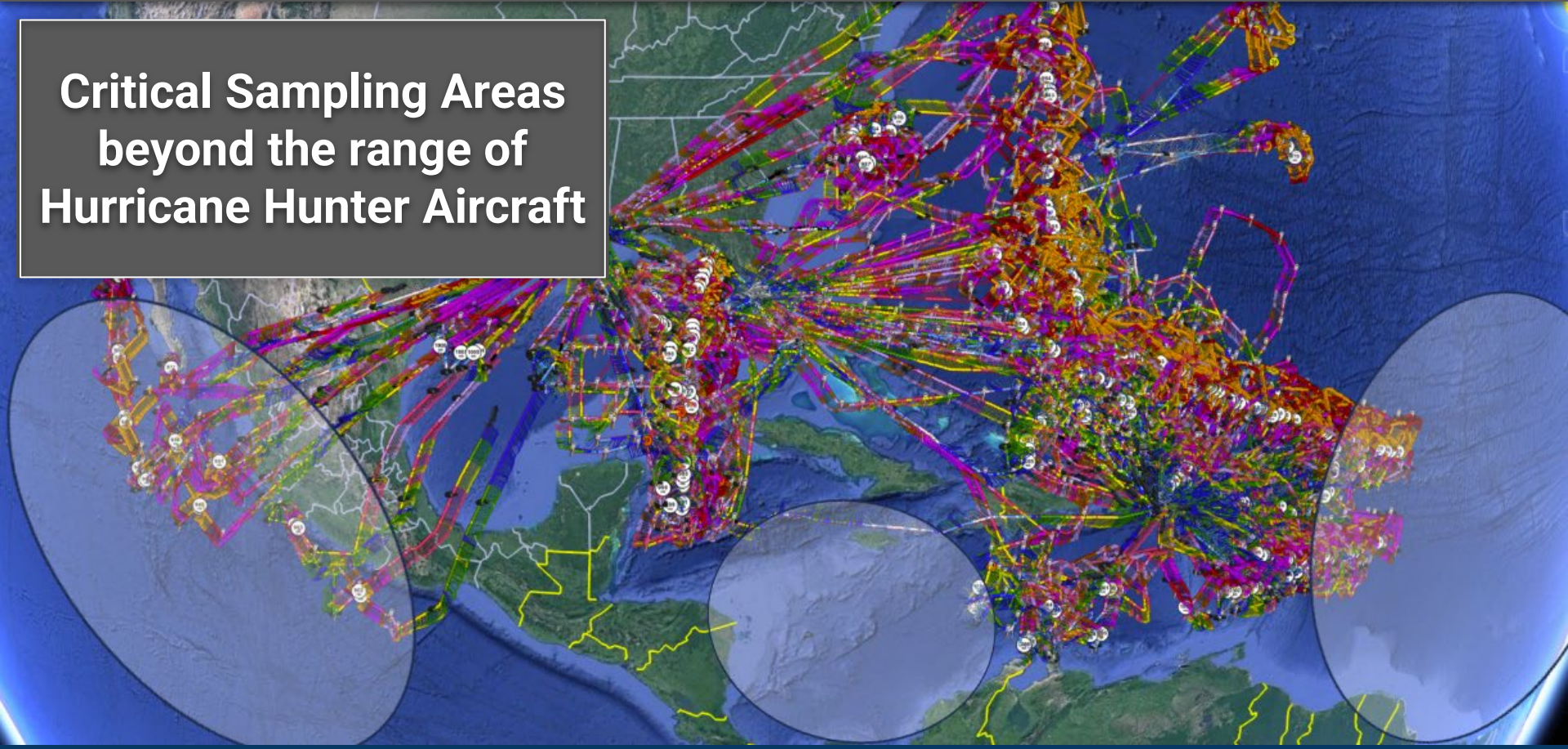


# On the Horizon: Long Range UAS for Hurricanes



# Gaps of Consequence

**Critical Sampling Areas  
beyond the range of  
Hurricane Hunter Aircraft**

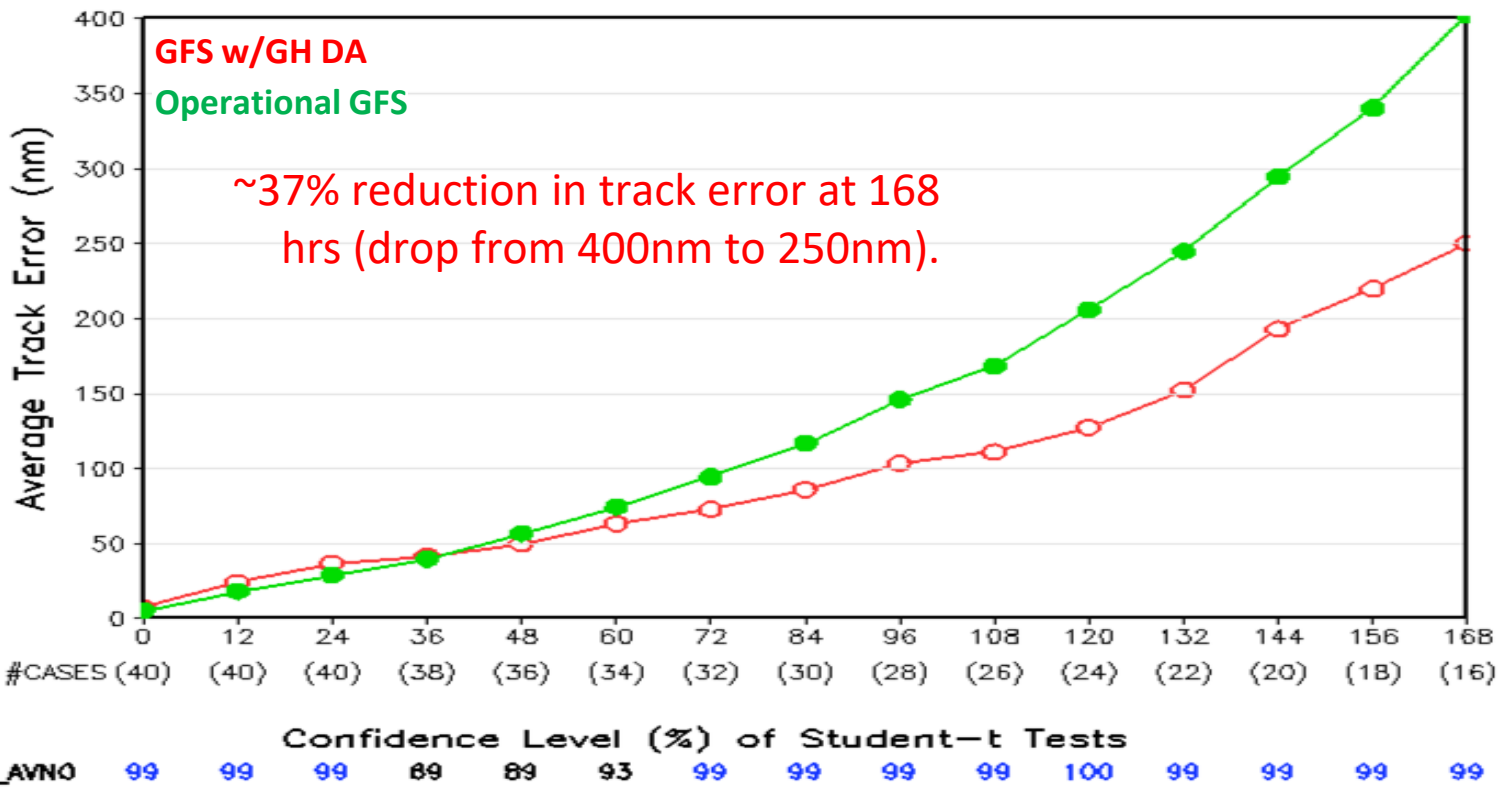






# Track Error Reduction

Hurricane Track Errors – Atlantic 2016  
Matthew\_\_20160928\_20161009\_4cyc



# Long Range UAS for Hurricane Forecasting



- Past tests with NASA's Global Hawk (Expensive) showed improvements in long range forecasts
- Exploring a low cost way to combine three technologies to get this needed data.



*Balloons, UAS, dropsondes*

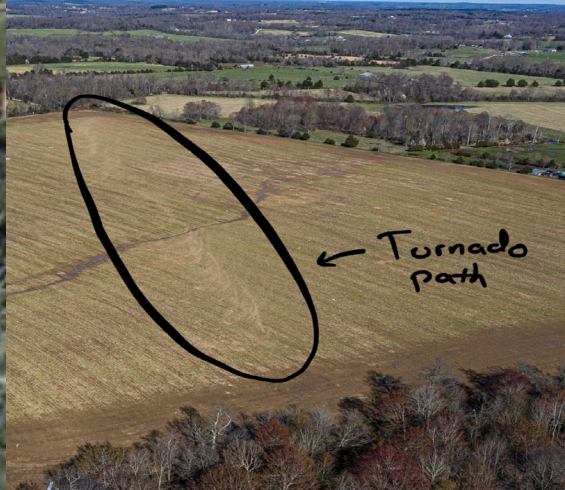




# UAS for Disaster Response



# UAS for Damage Assessment





# VADR



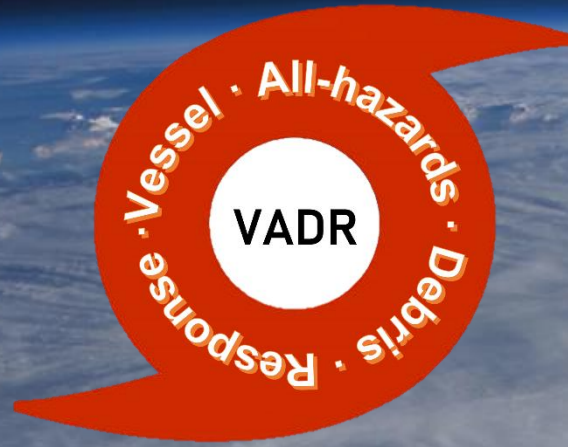
**Vessel, All-hazards, Debris Response Tool**  
Increasing efficiency and mission success

# Research Planning, Inc.

## Who we are

- RPI has been part of the NOAA team since 1978 (46 years)
- RPI has supported NOAA, USCG, and States:
  - ESI mapping
  - Conducting SCAT Training
  - SCAT data management (on-scene and remote)
  - Development of various job aids
    - Mangrove
    - *Sargassum*
    - UAS
  - Hurricane response
    - Aerial imagery assessment
    - VADR data management (on-scene and remote)
    - Environmental Unit (RARs and BMPs)



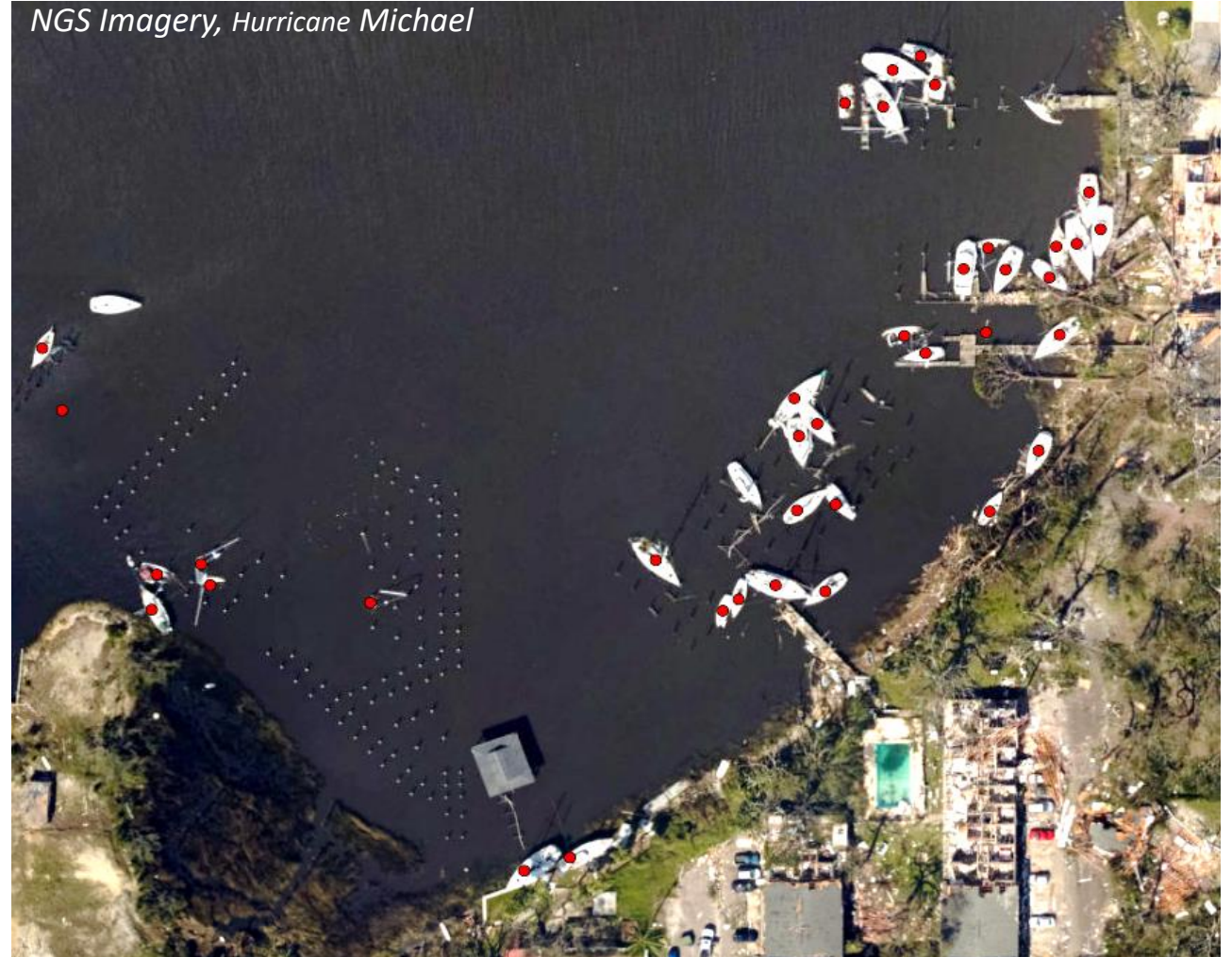


- Designed, Developed, and Maintained by Research Planning, Inc. (RPI)
- Built utilizing Esri field data collection application (Field Maps)
- Designed for MER and ESF-10 Responses
- VADR - Field Assessments via Mobile Devices
  - ArcGIS Online Data Management on Desktop for USCG
- Can provide access to EPA, FEMA, and state agencies
- VADR is now included as part of NOAA's response toolbox



# VADR Informs – IC, OPS, SITL, and ERMA

- Data can be added through Esri GIS programs (i.e., ArcGIS Pro)
- Data are collected, edited, and stored in the VADR Database
  - using a mobile application/device → Phone/Tablet and
  - an online GIS environment → ArcGIS Online
- VADR data are “pushed” to NOAA’s ERMA (COP) for visualization
  - breakdown of data are then shown in ERMA Dashboards
- Near real-time data updates:
  - VADR: 5 – 10 seconds from field to ICP
  - ERMA: ~5 minutes between data collected or edited in VADR to visualization in ERMA



# Hurricane Ian Pollution Targets

Total Targets	Map View Total	Target Not Found	Not Assessed
7,502	7,502	1,637	61
Assessed - Needs ESF-10 Monitoring or Action	ESF-10 Monitoring	ESF-10 Action	RP Action in Progress
585	376	139	73
Assessed - No ESF-10 Action	Removal Complete - Vessel Needs Recovery	ESF-10 Complete - Ready for DEM Contractor Recovery	Recovery Complete
2,612	288	54	2,319

## Target Detail in View



4 of 7,502



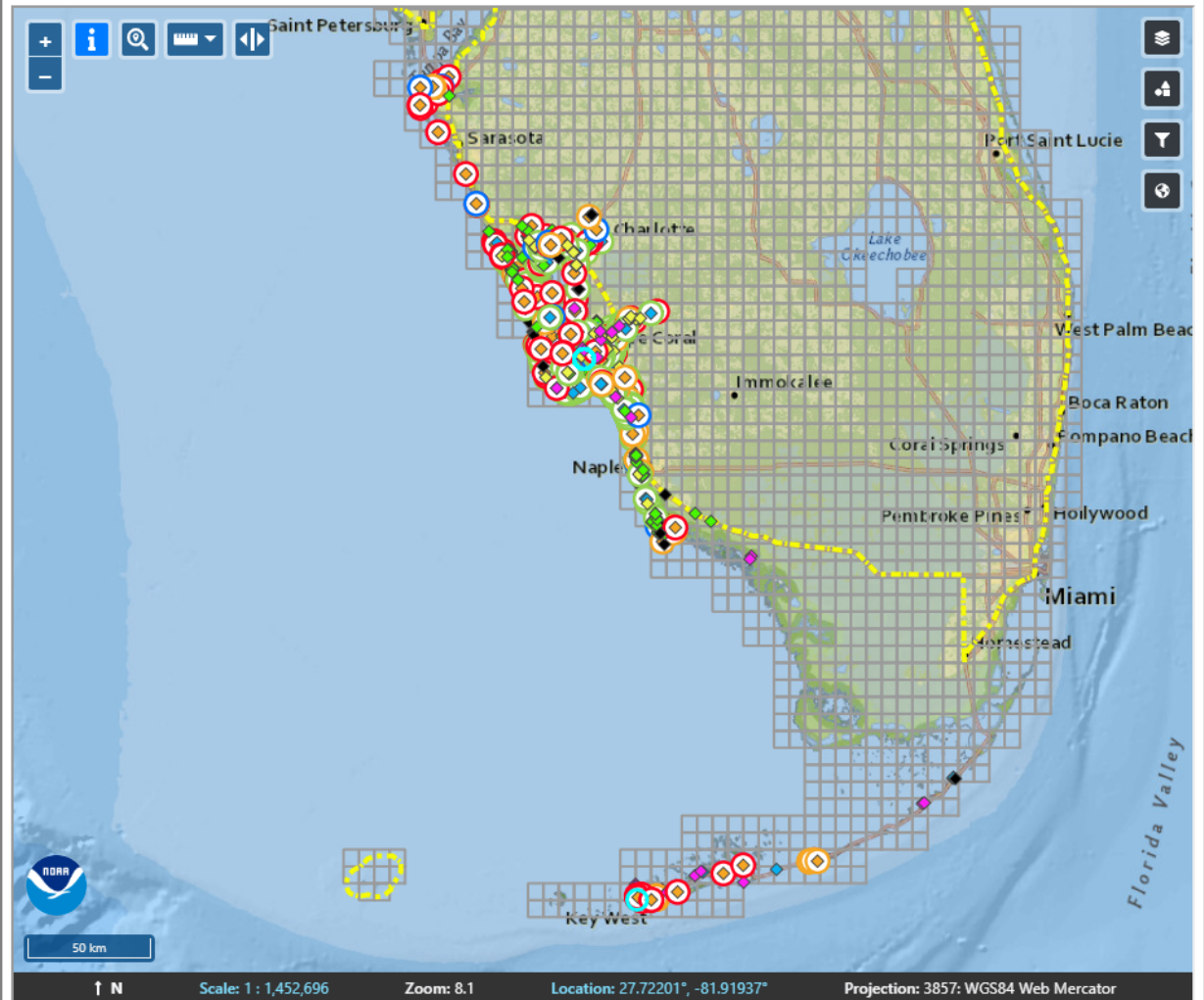
### Image URLs

[https://prod-erma-api.orr.noaa.gov/api/v1/url\\_proxy/ab235b3129d757cc1832ecd7e9f0a91c7b3070d0/](https://prod-erma-api.orr.noaa.gov/api/v1/url_proxy/ab235b3129d757cc1832ecd7e9f0a91c7b3070d0/)  
[https://prod-erma-api.orr.noaa.gov/api/v1/url\\_proxy/31424a1abad121ebc90c86d1707b1fdab1210b3f/](https://prod-erma-api.orr.noaa.gov/api/v1/url_proxy/31424a1abad121ebc90c86d1707b1fdab1210b3f/)  
[https://prod-erma-api.orr.noaa.gov/api/v1/url\\_proxy/f81ea23a6bc53b83a257fd0b206e4cce80ee6cb2/](https://prod-erma-api.orr.noaa.gov/api/v1/url_proxy/f81ea23a6bc53b83a257fd0b206e4cce80ee6cb2/)  
[https://prod-erma-api.orr.noaa.gov/api/v1/url\\_proxy/a1390ec9320c2f5e5f3621445e42df0676887548/](https://prod-erma-api.orr.noaa.gov/api/v1/url_proxy/a1390ec9320c2f5e5f3621445e42df0676887548/)  
[https://prod-erma-api.orr.noaa.gov/api/v1/url\\_proxy/d13ffb2b28d601396e78e980700b5873665f272d/](https://prod-erma-api.orr.noaa.gov/api/v1/url_proxy/d13ffb2b28d601396e78e980700b5873665f272d/)

### Unique ID

232348\_C035

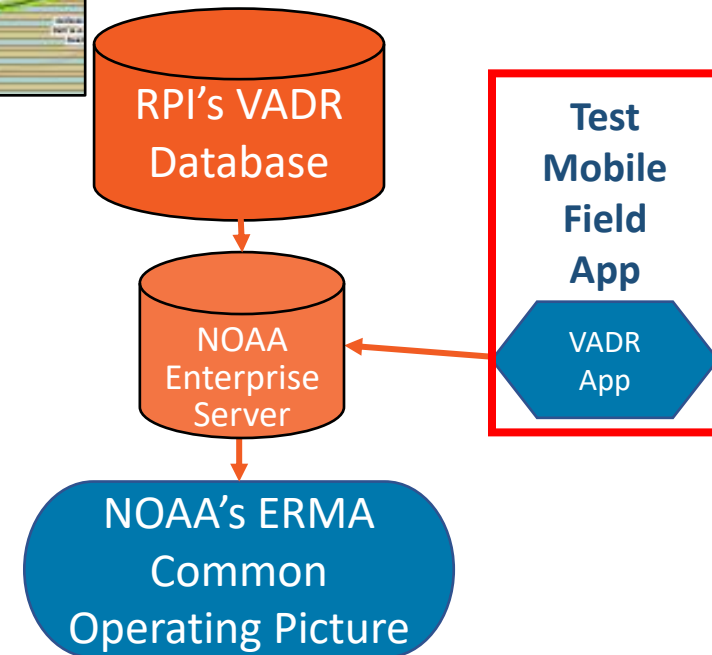
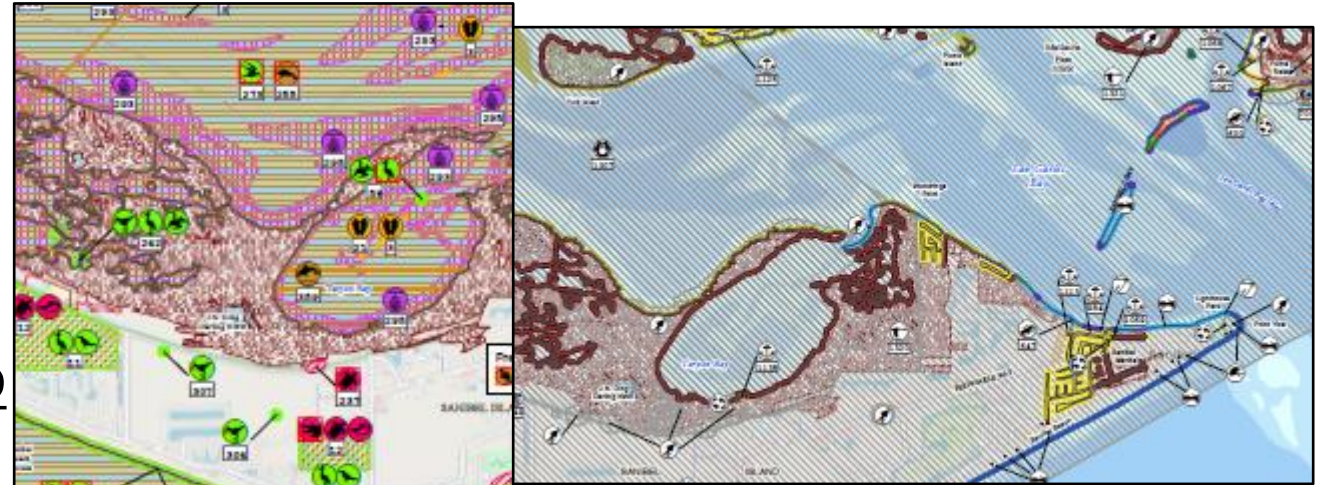
## Hurricane Ian Targets



# VADR Workflow

## Pre-storm Preparation: (2-4 days prior to landfall)

- Begin Coordination with NOAA SSCs and ERD
- Organize Environmental Sensitivity Index (ESI) data for potential area of impact
- Acquire readily available sensitive habitat data from the potentially affected state(s) such as:
  - Mangroves
  - Wetlands
  - Various types of management areas
- Review and modify the VADR database as needed
- Load the VADR database to the NOAA Enterprise server – Test Field Maps - VADR
- Update VADR user documents to reflect modifications and improvements



VADR Data are visualized in ERMA

# Aerial Imagery Assessment – post storm

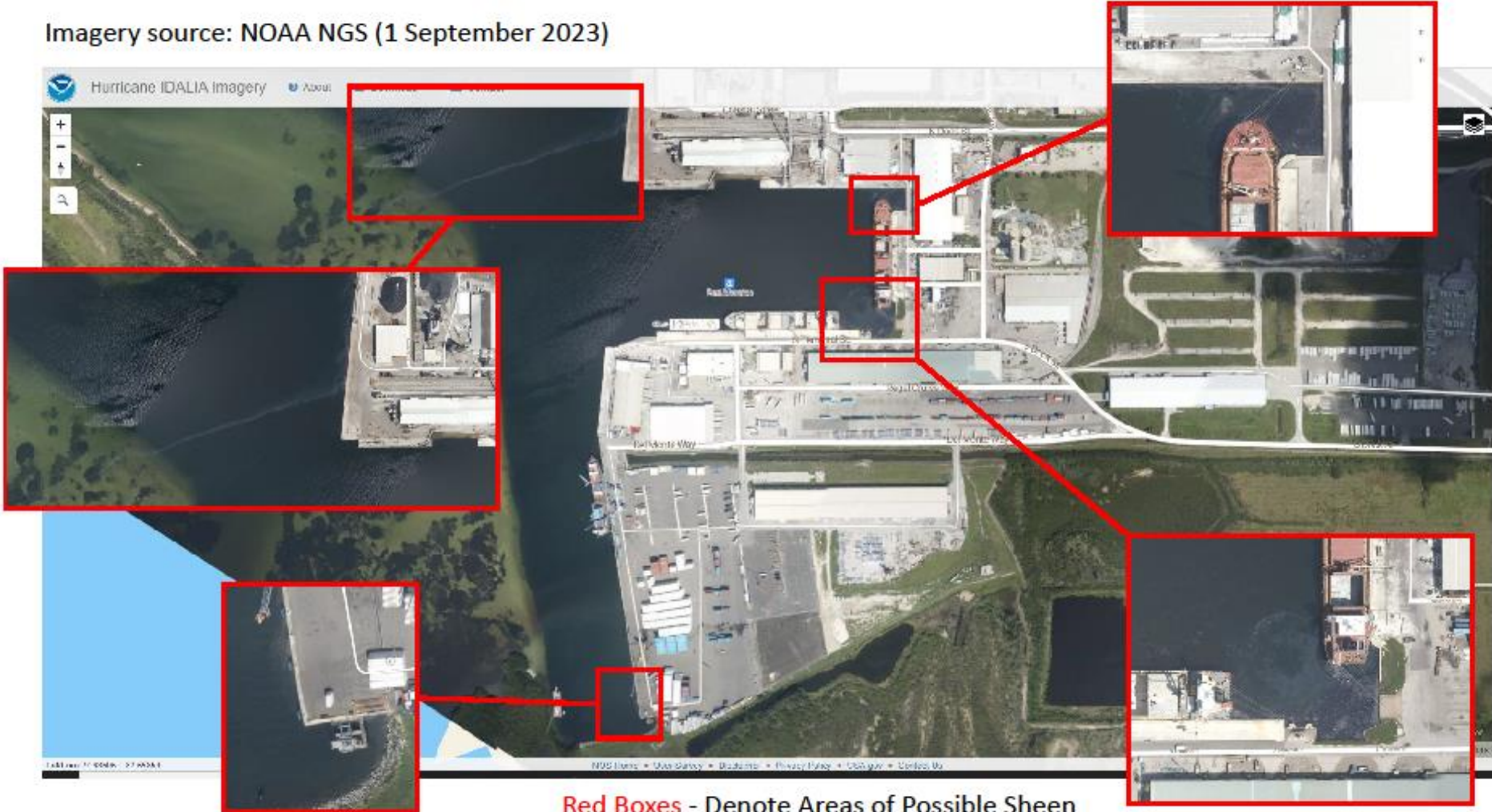
- Initial Debris Assessment - Targets
  - Targets identified from post-storm imagery - NOAA NGS and NICB GIC/Vexcel
  - Targets include - Derelict vessels and other hazardous marine debris as identified and attributed by RPI
- Observed pollution/sheen is reported to the NOAA SSC and CG
- Target data are uploaded to and managed in the VADR database
- VADR geodatabase is loaded to NOAA's Enterprise Server
- Coast Guard and State Assessment Teams verify these targets and assign one of the approved statuses
- Lesson Learned – manage inland extent of assessment



# Aerial Imagery Assessment

## Hurricane Idalia – Port Manatee, FL

Imagery source: NOAA NGS (1 September 2023)



Red Boxes - Denote Areas of Possible Sheen

# Aerial Imagery Assessment

## Why is post-storm imagery assessment important to the response?

1. Rapid assessment of extent of potential damage (just a few days after landfall and as imagery is acquired)
2. Safe, low-cost way to assess large, complex areas of impact and damage
3. High spatial accuracy of potential pollution threats
4. Identify hazards: environmental and navigational
5. Allows the CG to scale response

Hurricane (location, year)	Debris Identified from Aerial Assessment: # Targets
Ian (FL, 2022)	6266
Ida (LA, 2021)	1657
Zeta (LA, 2020)	18
Delta (LA, 2020)	~35
Sally (AL/FL, 2020)	1059
Michael (Panhandle FL, 2018)	1364
Florence (NC, 2018)	933
Maria (PR, 2017)	595
Maria (USVI, 2017)	1015
Irma (FL Keys, 2017)	4234

# VADR

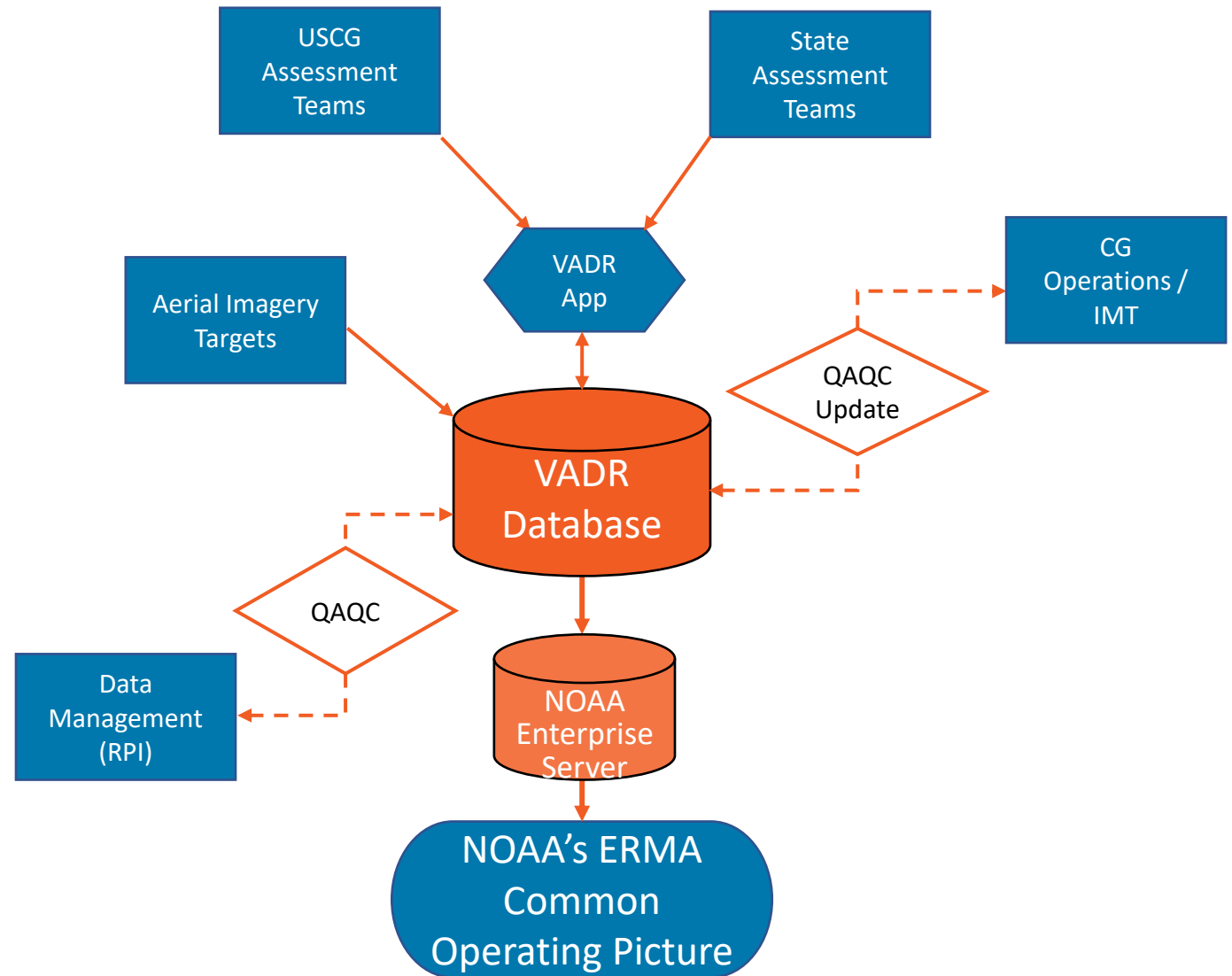
Database, Field, and Desktop Tools



# VADR Workflow

## Post-landfall: How is the VADR Database populated?

- RPI aerial debris assessment using post-storm imagery
- Assessment Teams (USCG and states)
  - validate the aerial assessed target
  - add new targets
  - update existing targets
- Data QAQC
  - RPI Data Management
  - Operations Unit
  - USCG Data Management – Information Management Team (IMT)
  - Forward Ops Branch IMT
- NRC Reports, NESDIS, State Identified Targets

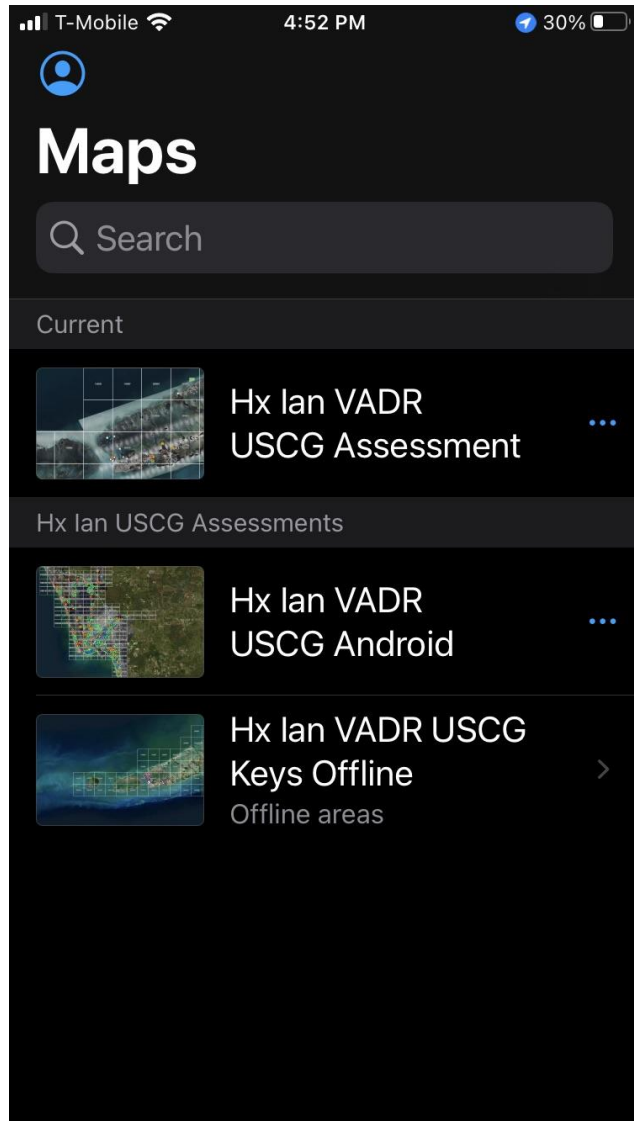


VADR Data are visualized in ERMA



# VADR – Different Maps... Different Roles

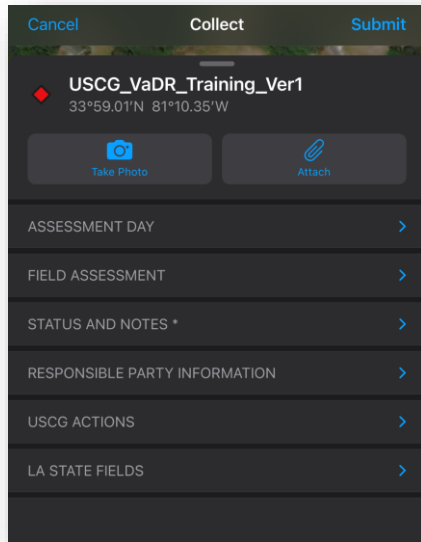
## VADR (Field Maps)



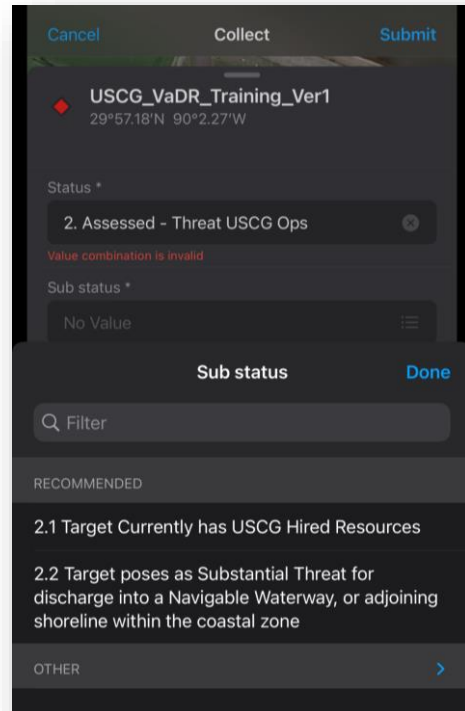
- Instead of each part of the response seeing all the fields, we can limit which fields are visible and editable based on the survey being done
- Field Maps offers many advantages, such as:
  - cascading group
  - conditional questions and selections
  - and different form views
- This results in a shorter form than having to scroll through all the fields
- Data Management workspace has all fields active and editable
- Easy to update to reflect the needs of the response
- Supports Offline Maps

# VADR – Field Maps

## Cascading Groups

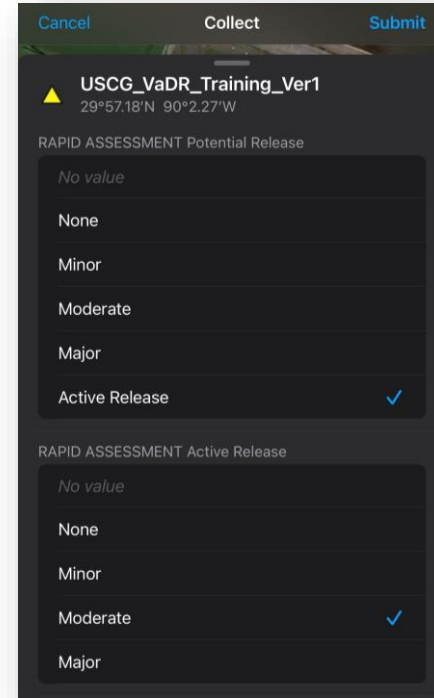


Questions are separated into groups that can be expanded or collapsed



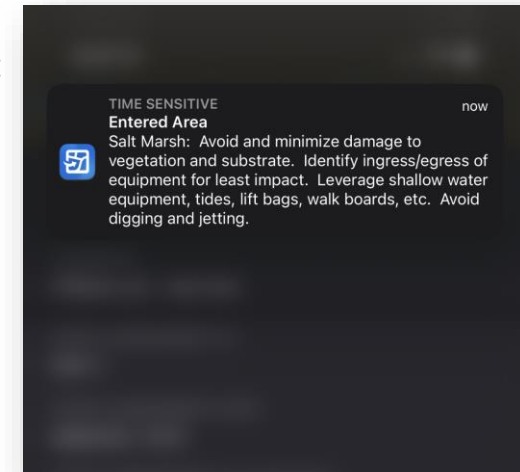
Sub Status filters recommended answers based on the Status

## Conditional Questions



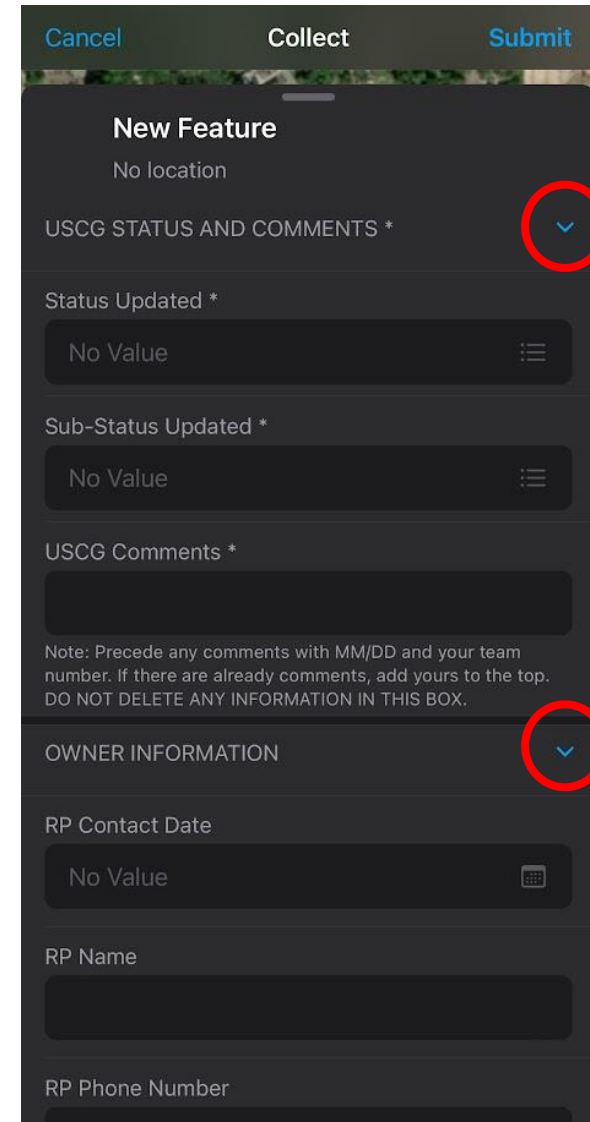
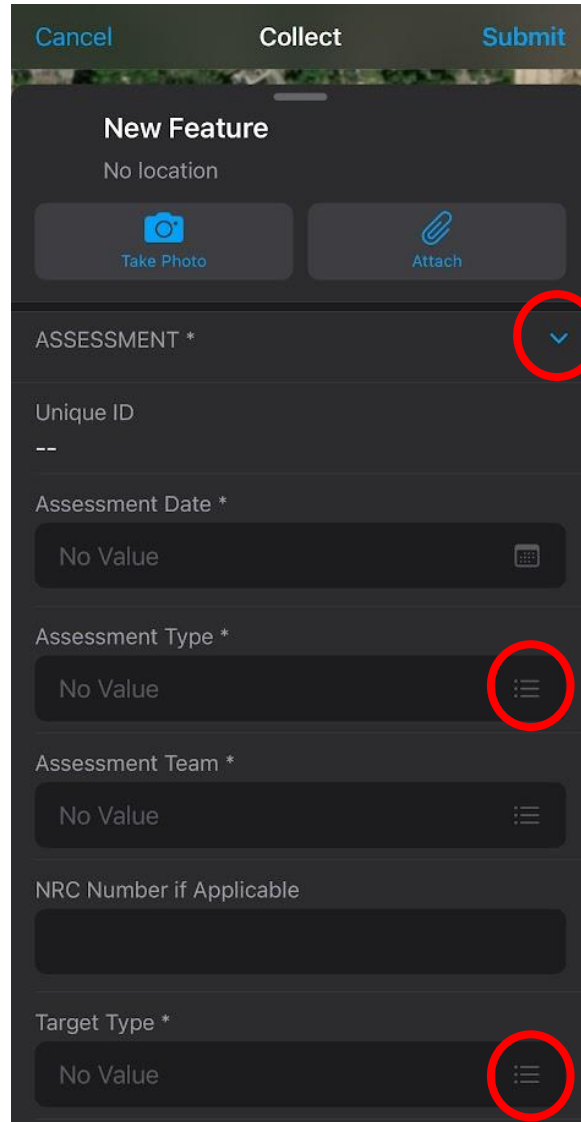
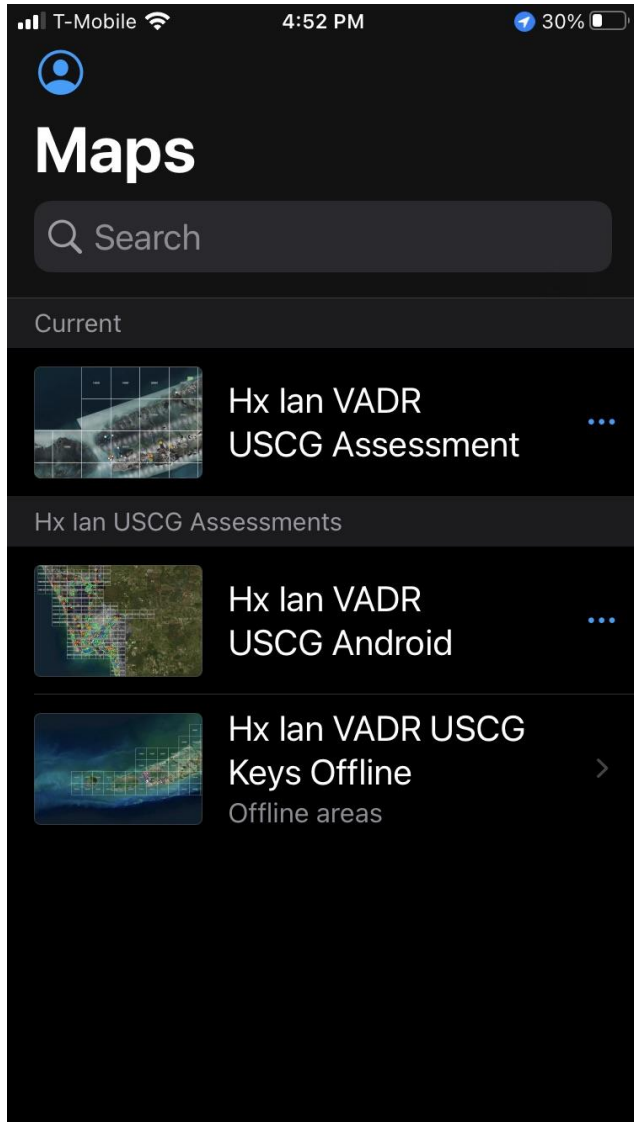
The survey question RAPID ASSESSMENT Active Release is only visible when selecting the Active Release Option in the above question

## Geotrigger Alert

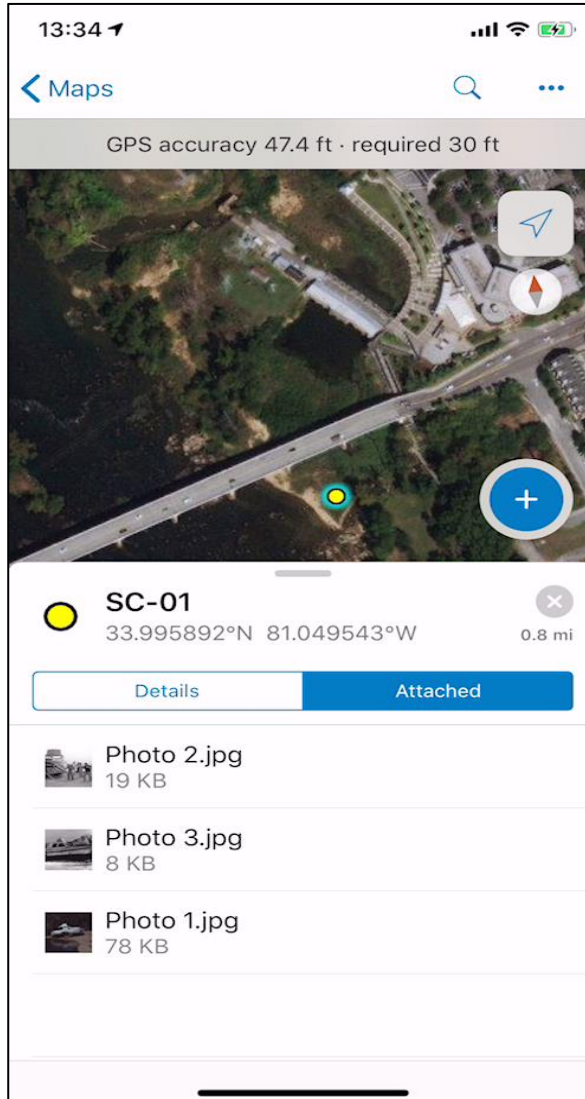


You are in a Salt Marsh! Follow the BMPs

# VADR – Field Maps



# Photo Archive for each Target



## VADR (Field Maps)



- Photos can be added to an existing record or a new record
- Photos are stored with the record for each target in the geodatabase
- Photo archive of Assessment, Removal, and Environment
- Photos can be accessed through:
  - Field Maps App
  - ArcGIS Online
  - ERMA
- Photos from many sources can be added to the target
  - UAS
  - CG overflights
  - Other State and Federal partners

# Sensitive Habitat Awareness

## Section 106 and ESA Awareness

- Compiled GIS layers for sensitive habitats
  - SW Florida ESI Maps
  - FWC GIS
  - Resource data providers
    - FWC – FWRI
    - USFWS
- Custom scripts that intersect all “targets” with the ESA layers
  - Results are written to the “SensitiveLayer” field in VADR
- Customized popup in VADR alerting users that they are in a sensitive habitat and instructing them to refer to the BMPs



 **Sensitive Target: 163261\_048**   
30.325955°N 87.368351°W 718 km

**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 species protected under the ESA and MMPA (sea turtles, manatees, dolphins, whales, Gulf sturgeon, smalltooth sawfish, and giant manta ray). Review complete BMPs.

**Sensitive Habitat Area:** N/A

**Salt Marsh Habitat:** N/A

**Wetland Habitat:** N/A

**Seagrass:** This target may be located within a seagrass area. Avoid and minimize bottom impacts (grounding, prop scarring, etc.) during recovery and removal operations. Designate an ingress/egress pathway over previously damaged areas or sandy bottom. Use shallow draft equipment, high tide, and other shallow water methodologies. See complete BMPs.

**National Seashore:** N/A

**Aquatic Preserve:** N/A

### **Sensitive Site Advisory**

Consult BMPs for the following: Gasparilla Sound-Charlotte Harbor Aquatic Preserve, West Indian Manatee, Smalltooth Sawfish There may be other BMPs not listed.

# Sensitive Habitat Awareness

Name	URL	Description
Environmental Sensitivity Index (ESI) wetlands	<a href="https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/download-esi-maps-and-gis-data#Florida">https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/download-esi-maps-and-gis-data#Florida</a>	Environmental risk if an oil or chemical spill occurs in these resources (such as wetlands and human-used areas).
Environmental Sensitivity Index (ESI) shorelines	<a href="https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/download-esi-maps-and-gis-data#Florida">https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/download-esi-maps-and-gis-data#Florida</a>	Environmental risk if an oil or chemical spill occurs in these resources (such as shorelines and human-used areas).
State Aquatic Preserves	<a href="https://geodata.dep.state.fl.us/datasets/FDEP:florida-aquatic-preserves/about">https://geodata.dep.state.fl.us/datasets/FDEP:florida-aquatic-preserves/about</a>	This coverage and replace polygons used for enforcement of National Estuarine System of their sampling and water collection Program (SWAMP) accompany the ensure standards associated m
Florida State Parks	<a href="https://geodata.dep.state.fl.us/datasets/FDEP:florida-state-parks-boundaries/about">https://geodata.dep.state.fl.us/datasets/FDEP:florida-state-parks-boundaries/about</a>	The dataset includes contains land
National Estuarine Research Reserves (NERR)	<a href="https://cdmo.baruch.sc.edu/get/gis_index.cfm">https://cdmo.baruch.sc.edu/get/gis_index.cfm</a>	The National each of their actively collect Program (SWAMP) accompany the ensure standards associated m
National Wildlife Refuge (FNAI)	<a href="https://hub.arcgis.com/datasets/sfwmd:national-wildlife-refuge-fnai-1/about">https://hub.arcgis.com/datasets/sfwmd:national-wildlife-refuge-fnai-1/about</a>	Administrative boundaries and Cities from NAVTEQ, Tribal Land Admin Boundaries, State and National Parks (FNAI). Florida Na This is a polygon data layer for public (and some private) land: Inventory (FNAI) has identified as having natural resource value partially for conservation purposes. The term "Managed Area" and this dataset is also known as FLMA.
Critical Wildlife Areas in Florida (points)	<a href="https://geodata.myfwc.com/datasets/myfwc:critical-wildlife-areas-florida/about">https://geodata.myfwc.com/datasets/myfwc:critical-wildlife-areas-florida/about</a>	Critical Wildlife Areas (CWAs) are established by the FWC under protect important wildlife concentrations from human disturbance during critical periods of their life cycles, such as nesting or migration. For each CWA, the boundaries and periods of time when portions of the area may be posted are defined in the CWA establishment order. Public access is prohibited within CWAs if posted, "Closed to public access." Dogs, vehicles and vessels are also prohibited from posted areas. The boundary may be larger than the posted area due to the dynamic nature of habitat structure and use. Thus, the area closed each year may change.

248713\_C037

**Sensitive Site Advisory**

Consult BMPs for the following: West Indian Manatee, Smalltooth Sawfish

There may be other BMPs not listed.

248713\_C037

OBJECTID	7121
Unique ID	248713_C037
Date of Assessment	11/19/2022, 8:50
Assessment Type	On-scene
Assessment Team	Assessment Team
NRC Number if Applicable	
Target Type	Vessel
Commercial or Recreational Vessel	Recreational - Sail
Location Type	Private Dock
Location Name	

143562\_003

**Sensitive Site Advisory**

Consult BMPs for the following: Mangrove, Key West National Wildlife Refuge, Piping Plover

There may be other BMPs not listed.

143562\_003

OBJECTID	7484
Unique ID	143562_003
Date of Assessment	12/2/2022, 5
Assessment Type	
Assessment Team	
NRC Number if Applicable	
Target Type	Vessel
Commercial or Recreational Vessel	
Location Type	
Location Name	

248714\_004

**BMPs Not Applicable**

248714\_004

OBJECTID	410
Unique ID	248714_004
Date of Assessment	10/27/2022, 10:15 AM
Assessment Type	On-scene
Assessment Team	Assessment Team 2
NRC Number if Applicable	
Target Type	Vessel
Commercial or Recreational Vessel	Recreational
Location Type	Unknown
Location Name	
Location Habitat	Land
Condition	Displaced



# Training for Field Assessment Teams

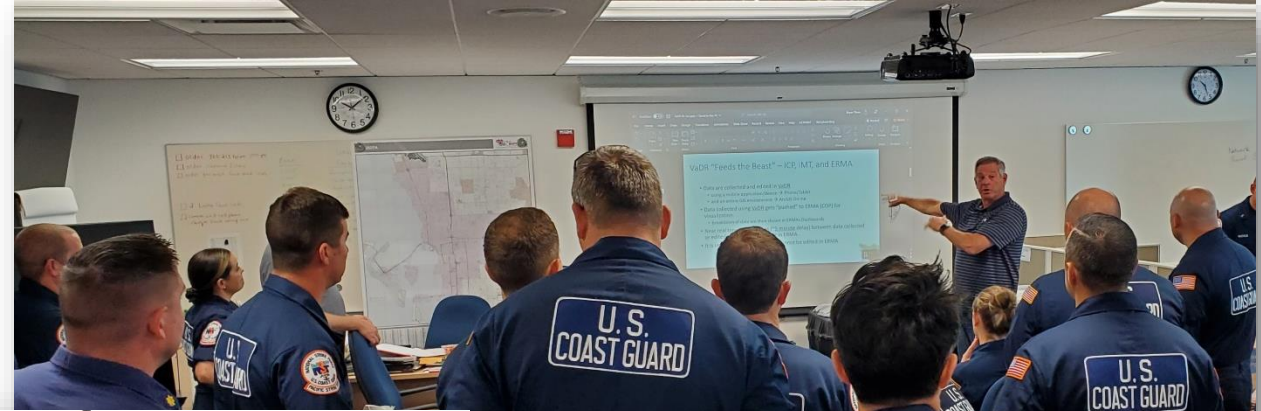
Mission success requires training and coordination!

## Pre-storm “off-season”

- Off-season training can be coupled with SCAT classes or as stand-alone exercises. Contact your SSC!

## On-scene Just-In-Time

- Just-in-time training is provided on scene by the RPI Data Management Team as field personal rotate into the response.



# Desktop VADR – ArcGIS Online Webmap

The screenshot displays the ArcGIS Online webmap interface. On the left, a 'Layers' panel lists several data layers, with 'Hx\_Ian\_VADR\_ESF10' selected. The central map shows a satellite view of a coastal area with various data points overlaid, including yellow diamonds and blue squares. On the right, an 'Edit feature' panel is open, showing fields for 'Snapping', 'Pollution Threat', 'Pollution', 'Status', 'Status Updated', 'Sub-Status Updated', 'USCG Comments', 'Priority', 'Actions', 'Petroleum Products (Gallons)', and 'HAZMAT (Pounds)'. The 'Status' field is set to '3. Assessed - Needs ESF-10 Monitoring or Actic', and the 'Sub-Status Updated' field is set to '3.1 ESF-10 Monitoring'. The 'USCG Comments' field contains the text '28OCT22: vessel in mangrove unk pollution - MSTC DEBRUM. 27OCT22 T6: Target is not'. The 'Update' and 'Delete' buttons are visible at the bottom of the panel.

Layers

- Monroe\_LE\_DVs
- Salvage Priorities
- Hx\_Ian\_VADR\_ESF10
- Hx\_Ian\_VADR\_ESF10 HAZMAT Priorities
- Hx\_Ian\_VADR\_ESF10 Priorities
- Hx\_Ian\_VADR\_MER\_sensitive
- Hx\_Ian\_VADR\_ESF10 Sub Status
- Florida Grids
- Comm\_Shrimp\_Fleet
- Military\_Bases\_Ian\_AOR
- FWSBoundaries\_Ian\_AOR
- Coastal Boundary
- vexcel\_grayscale\_ov\_rgb\_us

Add

Lee County, FL, Lee County, Florida, Maxar | This feature, attributes and domains, were designed by Research Planning, Inc. (RPI). Credit citation, Vessel, All-hazards, and Debris... Powered by Esri



# Thank You!

## Research Planning, Inc

<https://www.researchplanning.com/>

[info@researchplanning.com](mailto:info@researchplanning.com)



### Data Management Team

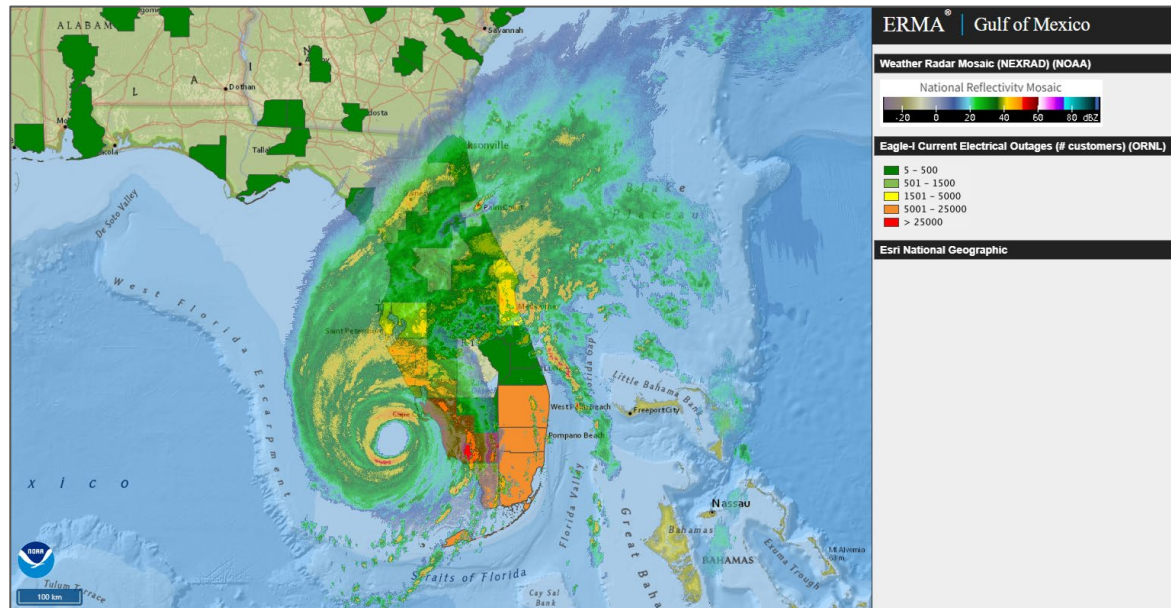
Mark White

Bryan Thom

Jennifer Horsman



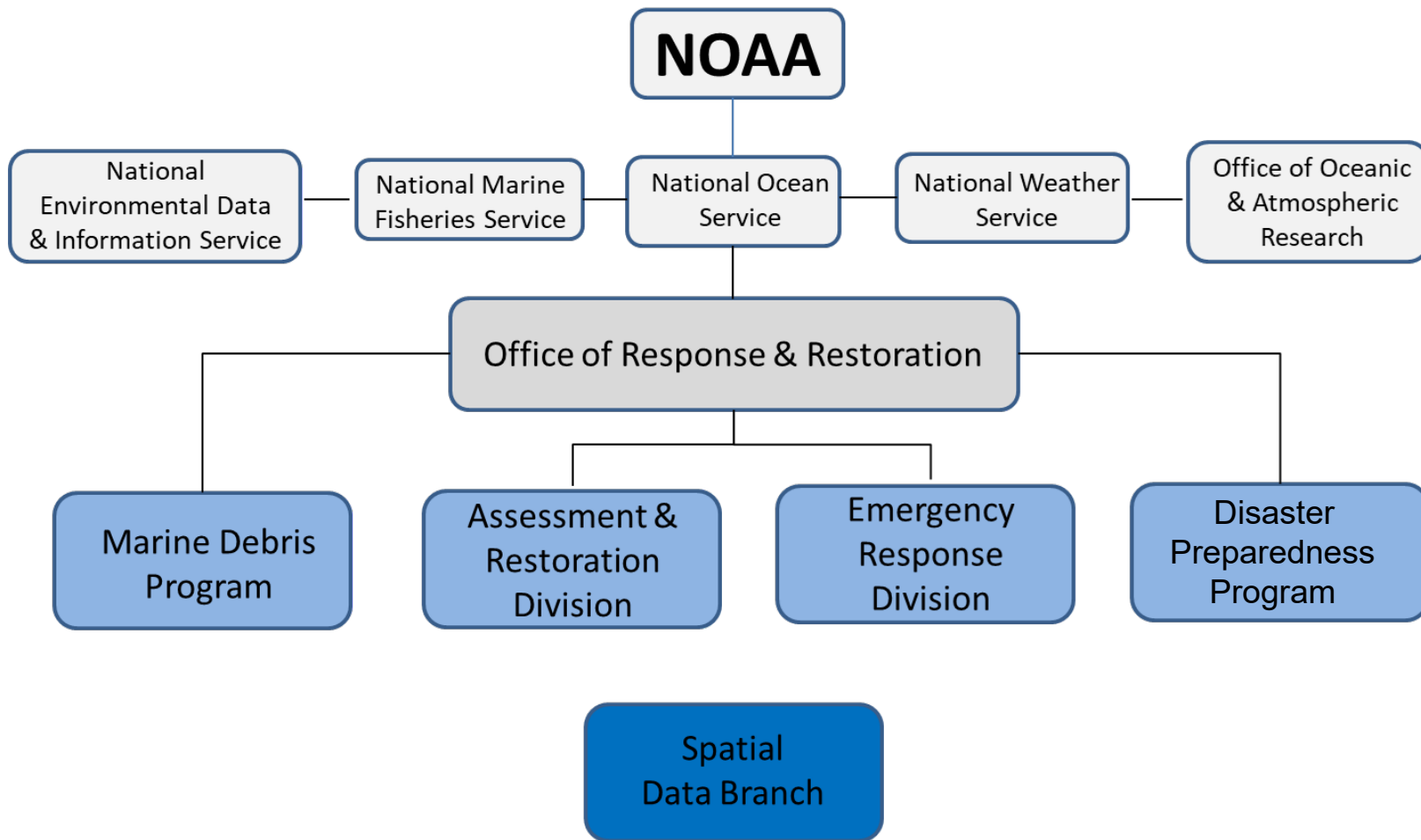
# The Environmental Response Management Application ERMA<sup>®</sup>



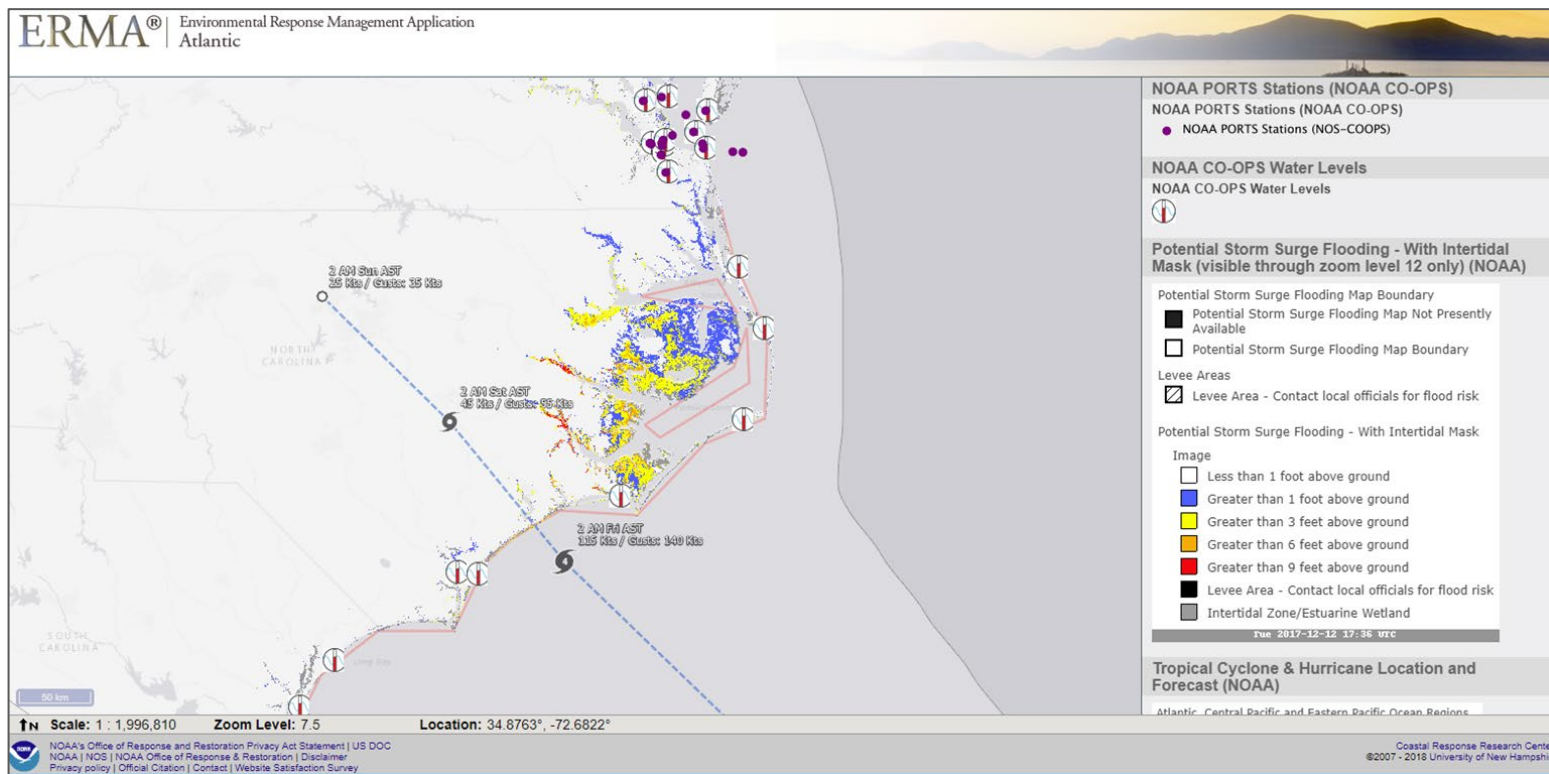
George Marino  
Office of Response & Restoration  
Assessment and Restoration Division  
Spatial Data Branch

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





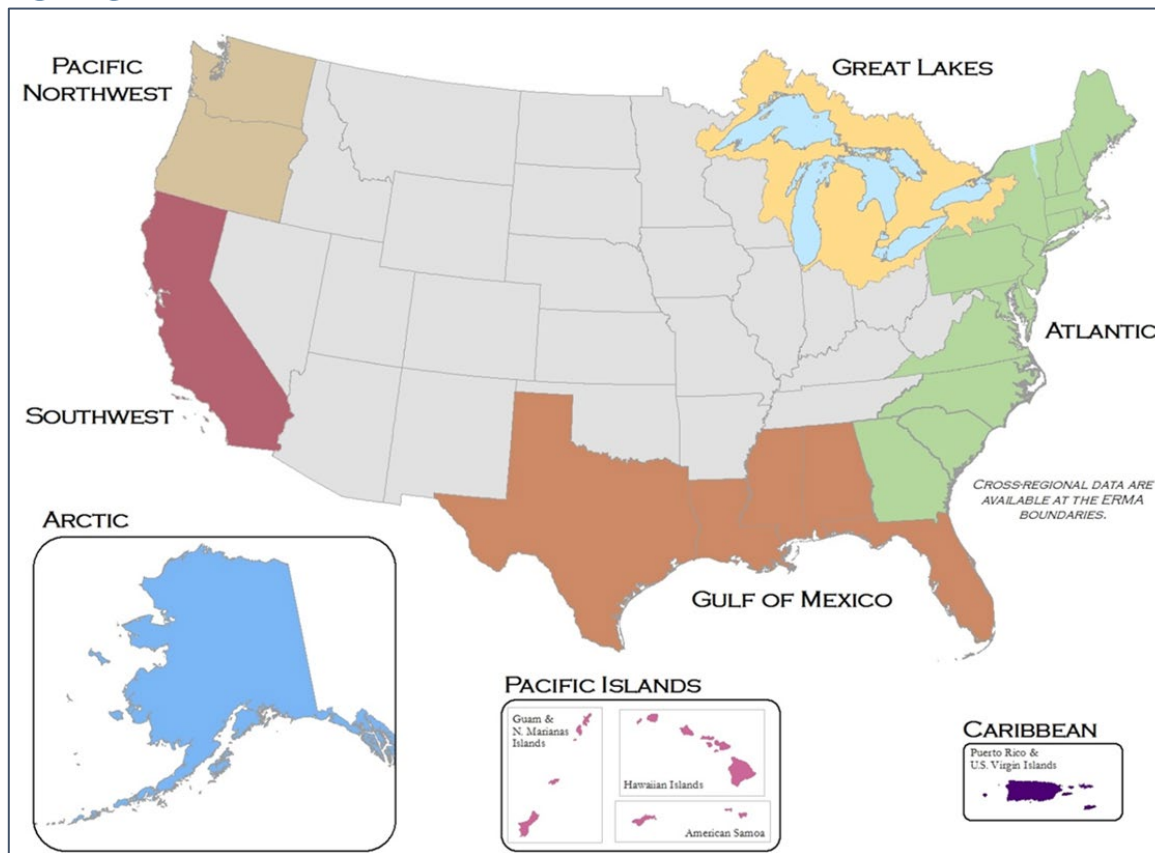
# ERMA is an online mapping tool for visualizing environmental information relevant to oil spills and natural disasters.



# Key Functionality

- Access ERMA via any Web browser. No special software needed.
  - Mobile-optimized view available.
- 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, Filter Views, and Query Tools.
- Download and share certain datasets

# ERMA Regions



# ERMA Layout

The screenshot displays the ERMA Atlantic web application interface. The main map area shows the Eastern United States and parts of Canada and Mexico. Several components are highlighted with orange callout boxes:

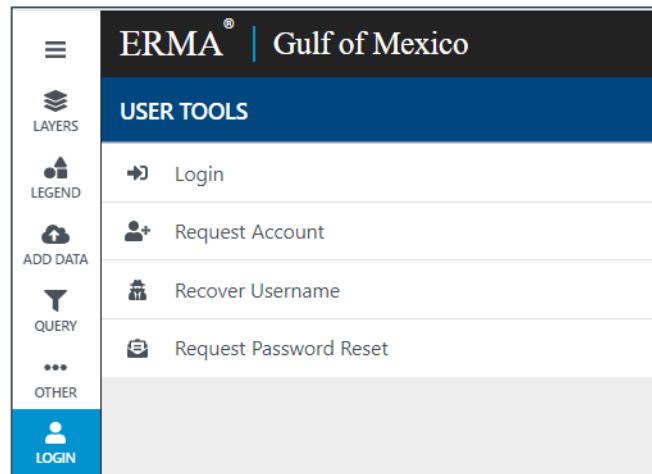
- Search:** A search bar at the top left with a dropdown menu containing: Layers / Views / Folders, Geographic Locations, Latitude and Longitude, Recent Data, and Vessel Search.
- Map Controls:** A toolbar on the left side of the map.
- Map Tools:** A toolbar on the left side of the map, adjacent to the Map Controls.
- Map Key:** A scale bar and north arrow at the bottom left.
- Menu Bar:** A blue bar at the top right containing the ERMA logo and the text "Atlantic".
- Layers:** A sidebar on the right titled "LAYERS" with sub-sections: Environmental Quality & Monitoring, Imagery & Remote Sensing, Natural Resources, Habitats, & Managed Areas, Coastal Resources & Habitats, Critical Habitat, Cultural Resources & Human Use, Essential Fish Habitat (NOAA NMFS), and Environmental Sensitivity Index (NOAA ESI). The ESI section is expanded to show a list of ESIs with checkboxes.
- Bookmarks:** A "Bookmarks" button at the top right of the Layers sidebar.
- Shortcut Menu:** A box on the right side of the ESI list containing: view metadata, zoom to extent, bring to front, send to back, and view data.
- Login/out:** A button at the bottom right of the map area.

At the bottom of the map, the following information is displayed: Scale: 1:13,809,508; Zoom: 4.6; Location; Projection: 3857; WGS84 Web Mercator.



# ERMA Accounts

- Public access - no login required
- Restricted accounts:
  - Verified by NOAA
  - Various levels of access
    - Active incidents
    - Sensitive datasets
    - NRDA/Trustee
    - Drills
  - Password reset 90 days; inactive accounts 6 months
  - Data available only to appropriate users and use



ERMA URL: <https://erma.noaa.gov/gulfofmexico>

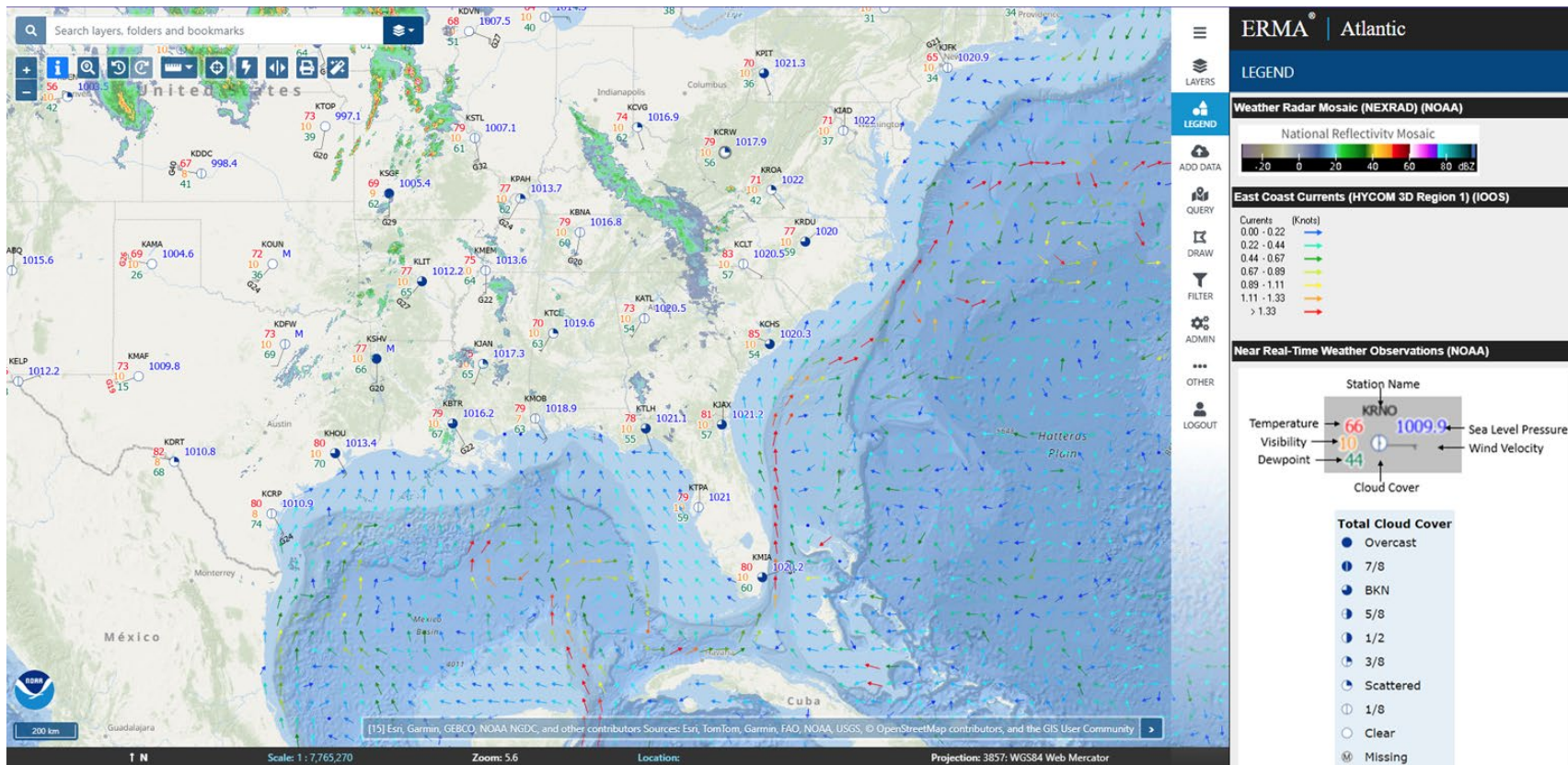
Account Support: [orr.ermaaccounts@noaa.gov](mailto:orr.ermaaccounts@noaa.gov)



# 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
- Tools to explore data

# Near Real Time Weather



**ERMA® | Atlantic**

**LEGEND**

**Weather Radar Mosaic (NEXRAD) (NOAA)**

National Reflectivity Mosaic

Color scale: -20, 0, 20, 40, 60, 80 dBZ

**East Coast Currents (HYCOM 3D Region 1) (IOOS)**

Currents (Knots)

- 0.00 - 0.22
- 0.22 - 0.44
- 0.44 - 0.67
- 0.67 - 0.89
- 0.89 - 1.11
- 1.11 - 1.33
- > 1.33

**Near Real-Time Weather Observations (NOAA)**

Station Name: KRNO

Temperature: 66

Sea Level Pressure: 1009.9

Visibility: 10

Wind Velocity: 44

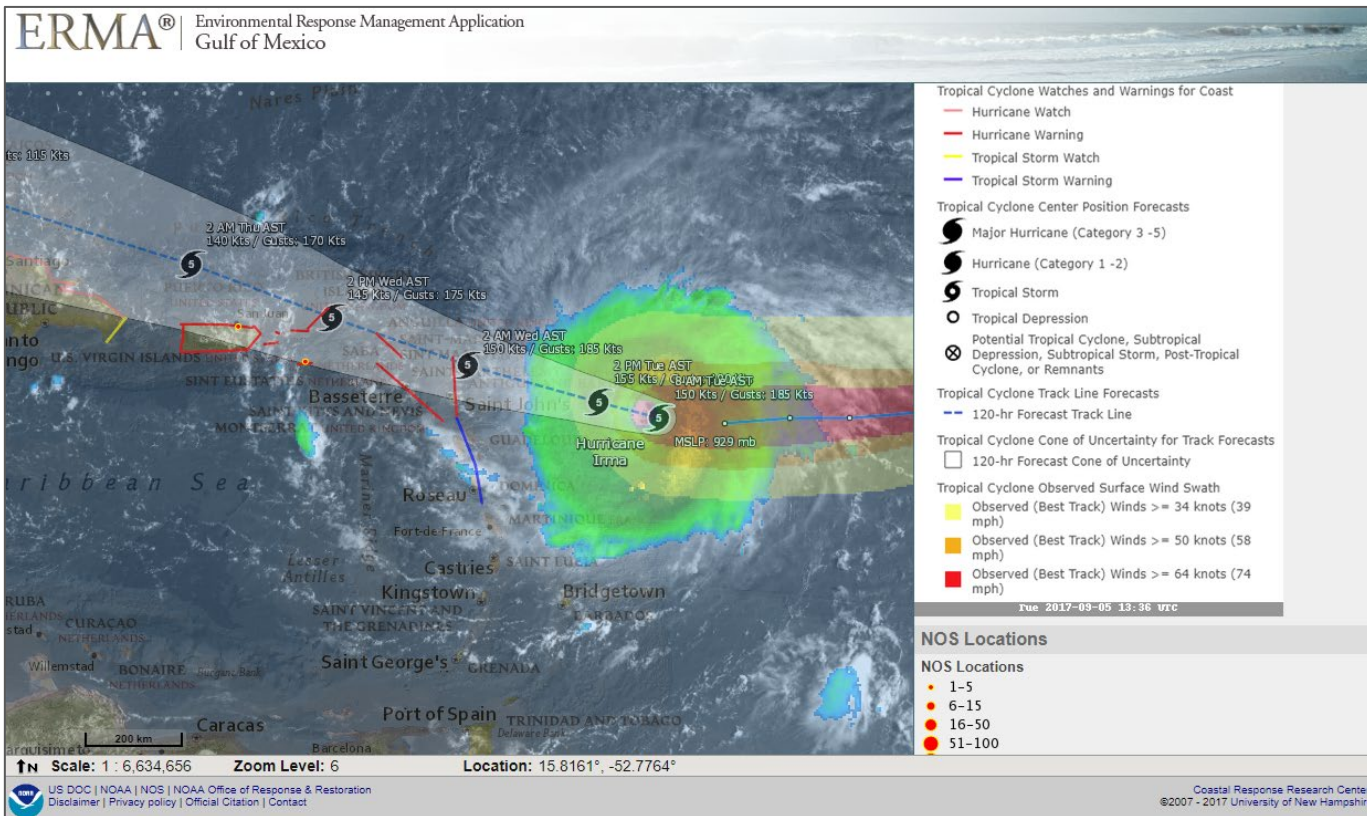
Dewpoint: 44

Cloud Cover

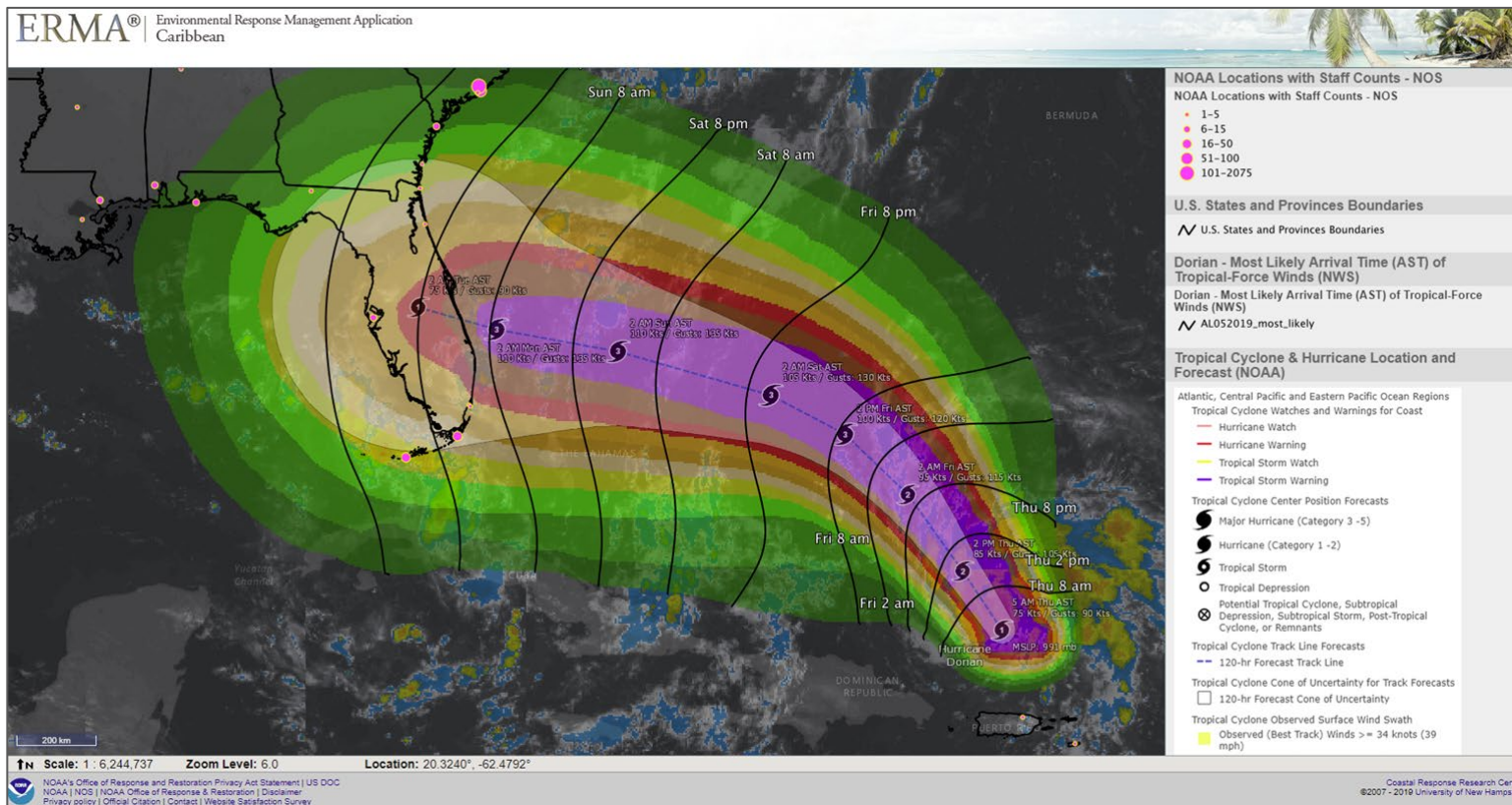
**Total Cloud Cover**

- Overcast
- 7/8
- BKN
- 5/8
- 1/2
- 3/8
- Scattered
- 1/8
- Clear
- Missing

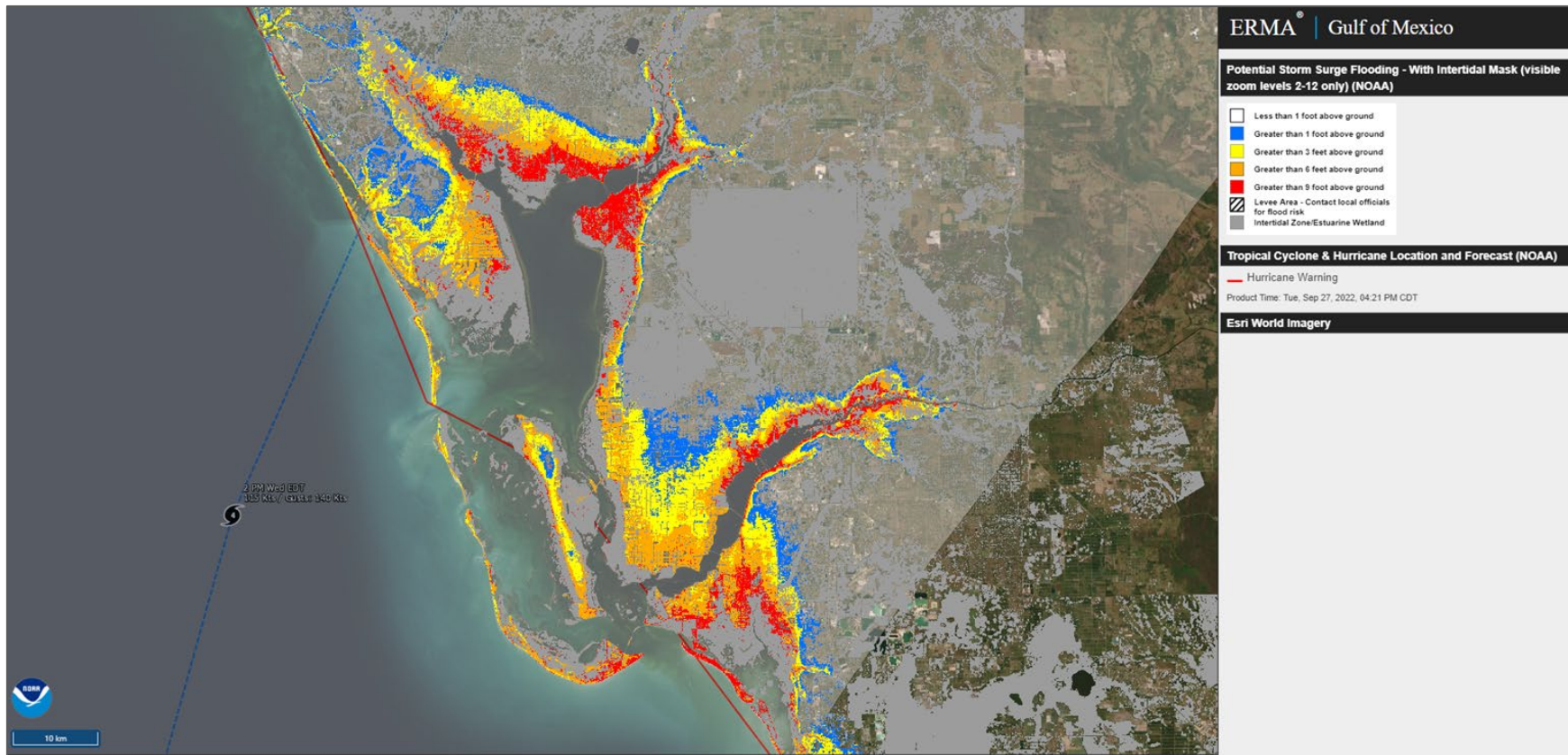
# Storm Tracking



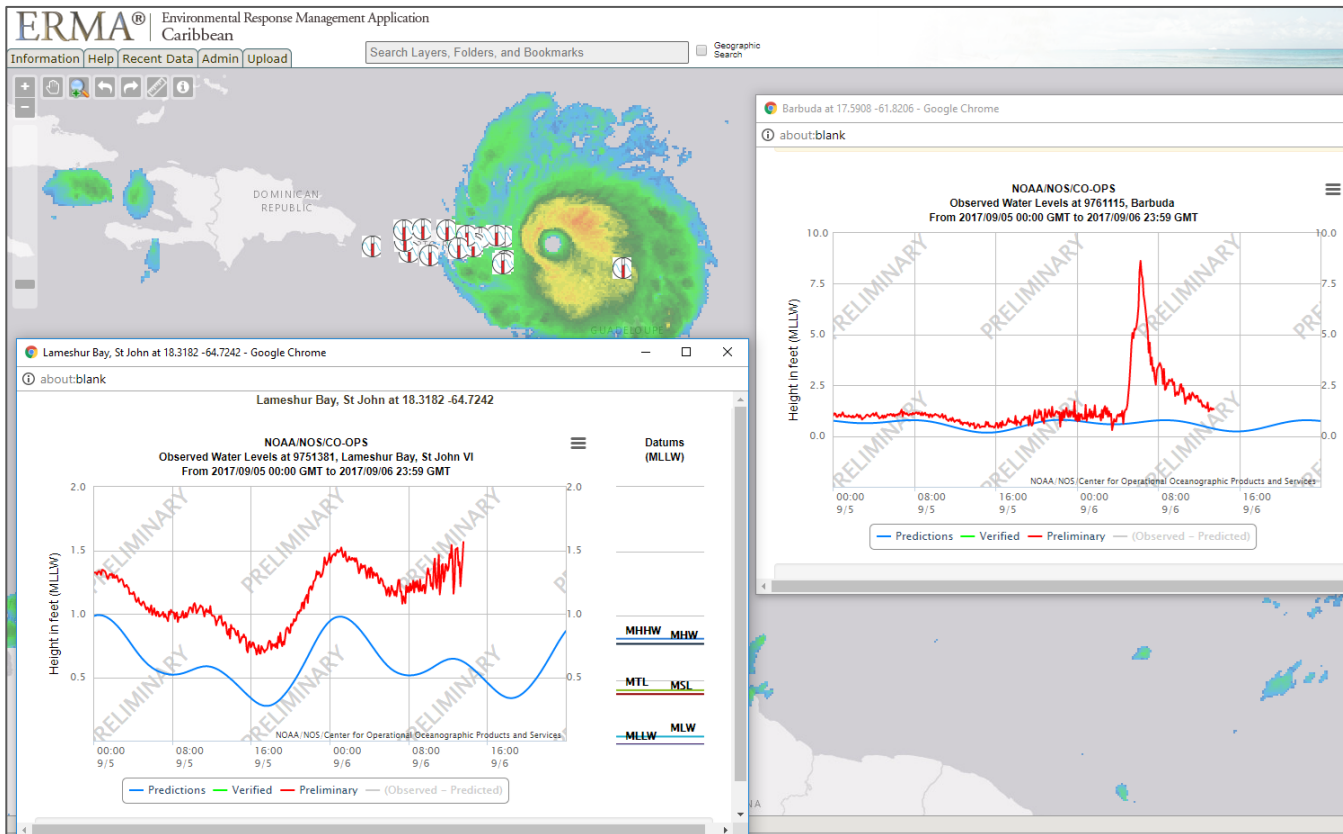
# Arrival Times of Winds



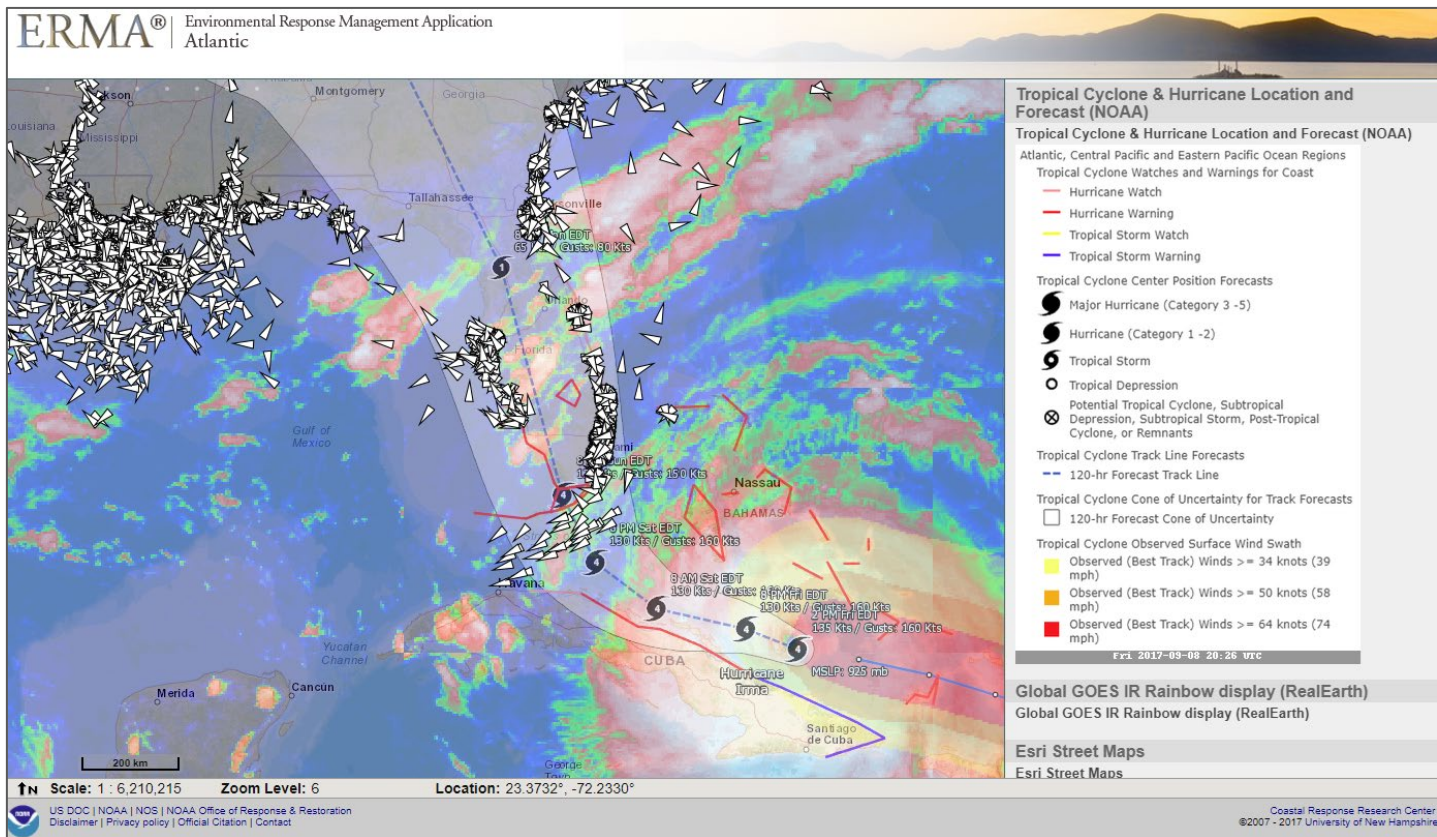
# Storm Surge Modeling



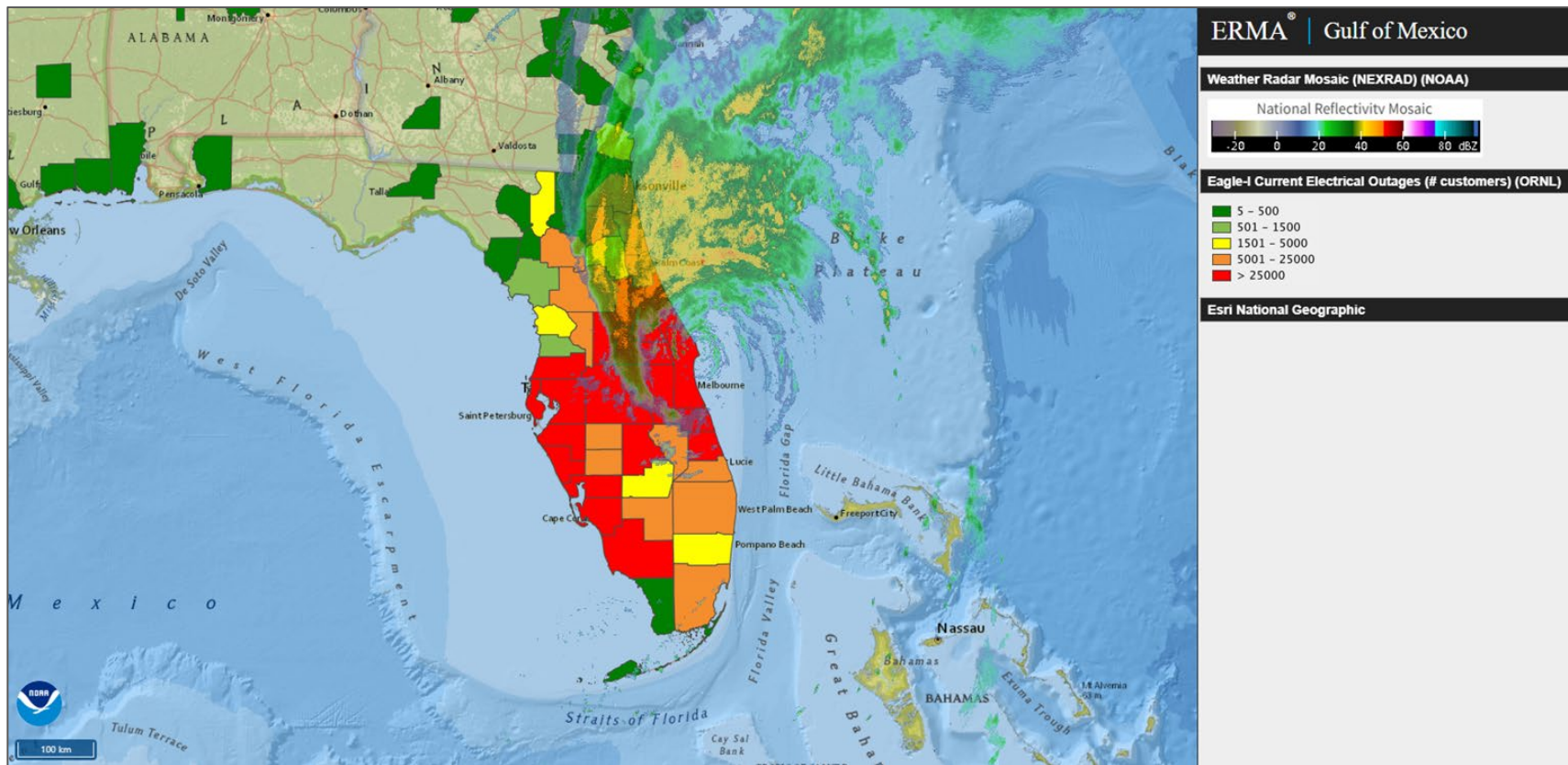
# Water Levels



# Vessel Tracking

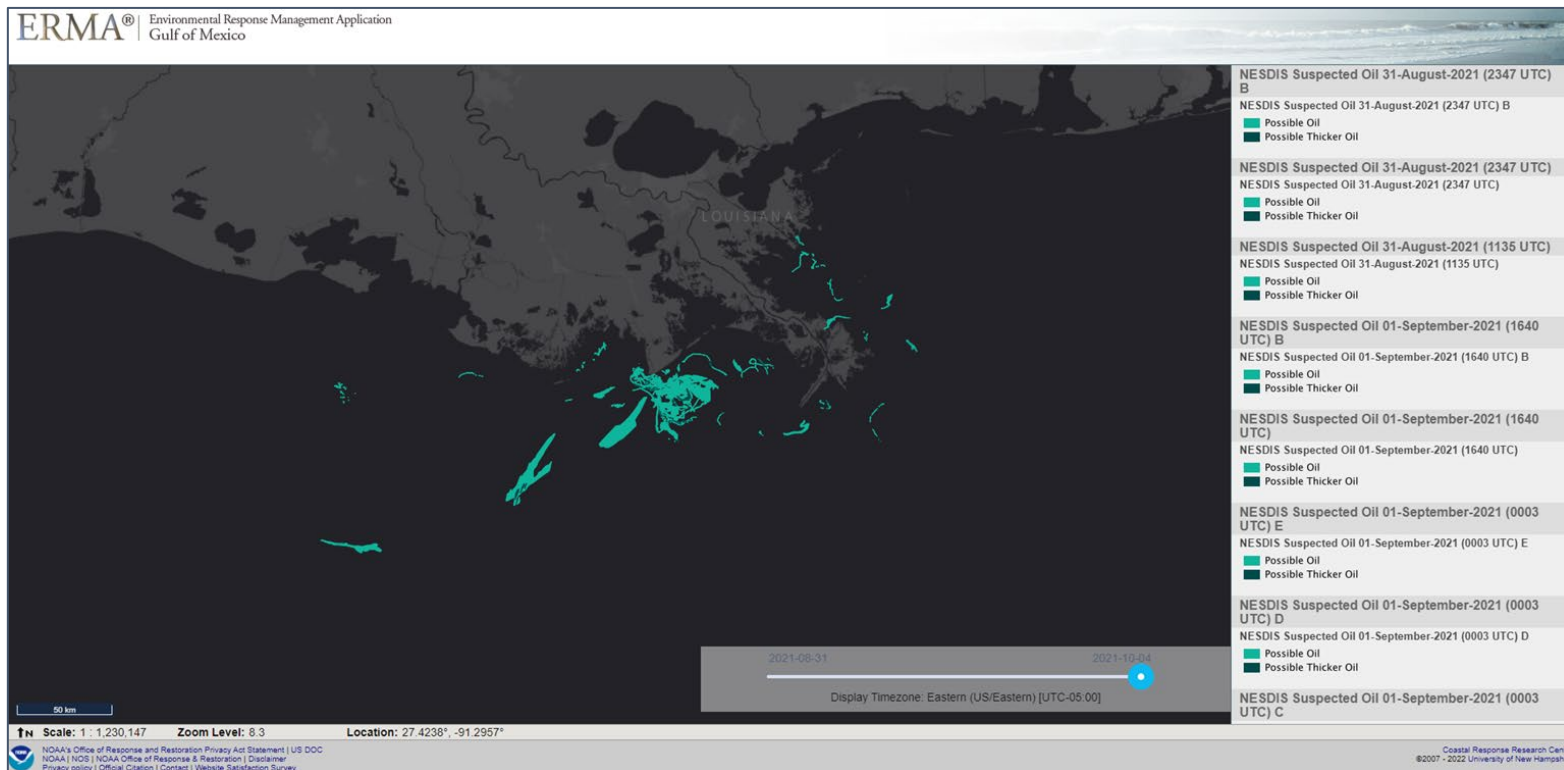


# Power Outages





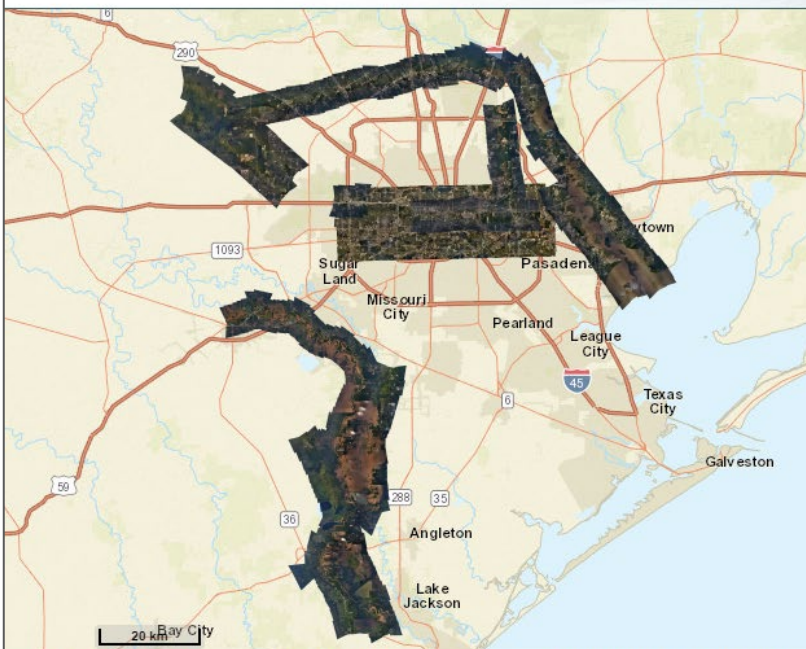
# Marine Pollution Surveillance Reports (MPSR)




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

# NGS Response Aerial Photography


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



**Esri Street Maps**  
Esri Street Maps  
Aerial Imagery 2017-08-31b (NOAA NGS)  
Aerial Imagery 2017-08-31b (NOAA NGS)



**Aerial Imagery 2017-08-31a (NOAA NGS)**  
Aerial Imagery 2017-08-31a (NOAA NGS)



↑N Scale: 1 : 753,135 Zoom Level: 9 Location: 29.4774°, -94.5800°

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

Coastal Response Research Center  
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# NGS Response Aerial Photography



The screenshot displays the ERMA web application interface for the Gulf of Mexico. The main map area shows a split view of aerial photography. A dialog box is open, titled "Select the dynamic layers to swipe", with two options: "Right" for "Hx Ian Aerial Photography 20220930d (NOAA NGS)" and "Left" for "Gulf of Mexico Pre-Storm Aerial Imagery 2022 (NOAA NGS)". A slider below the options is currently positioned towards the right. The interface includes a search bar at the top left, a toolbar with navigation and tool icons, and a legend on the right side. The legend lists the following layers: "Gulf of Mexico Pre-Storm Aerial Imagery 2022 (NOAA NGS)", "Hx Ian Aerial Photography 20220930d (NOAA NGS)", and "MapBox Hybrid Imagery". The bottom of the screen shows a scale of 1:758, a zoom level of 19, and a north arrow.

Search layers, folders and bookmarks

Select the dynamic layers to swipe

- Right ▾ Hx Ian Aerial Photography 20220930d (NOAA NGS)
- Left ▾ Gulf of Mexico Pre-Storm Aerial Imagery 2022 (NOAA NGS)

ERMA® | Gulf of Mexico

LAYERS

LEGEND

- Gulf of Mexico Pre-Storm Aerial Imagery 2022 (NOAA NGS)
- Hx Ian Aerial Photography 20220930d (NOAA NGS)
- MapBox Hybrid Imagery

ADD DATA

QUERY

DRAW

ADMIN

OTHER

LOGOUT

20 m

1 N

Scale: 1 : 758

Zoom: 19

Location:

Projection: 3857: WGS84 Web Mercator

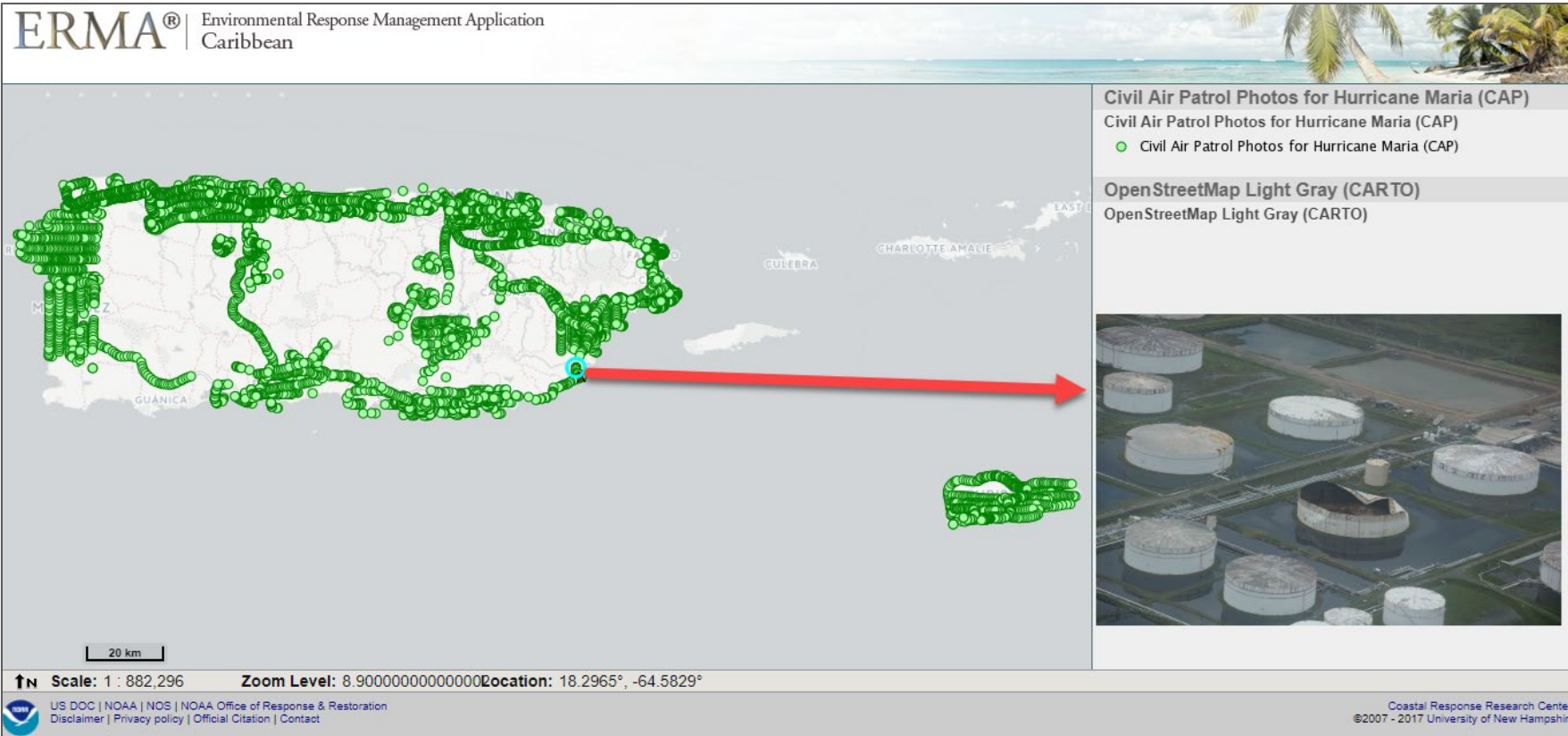
# Other Imagery - Geospatial Insurance Consortium (GIC)

- Private industry source of imagery that we have used in the past
- Access lapsed last year, whether we will regain use is TBD



# Other Imagery - Civil Air Patrol (CAP)

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)

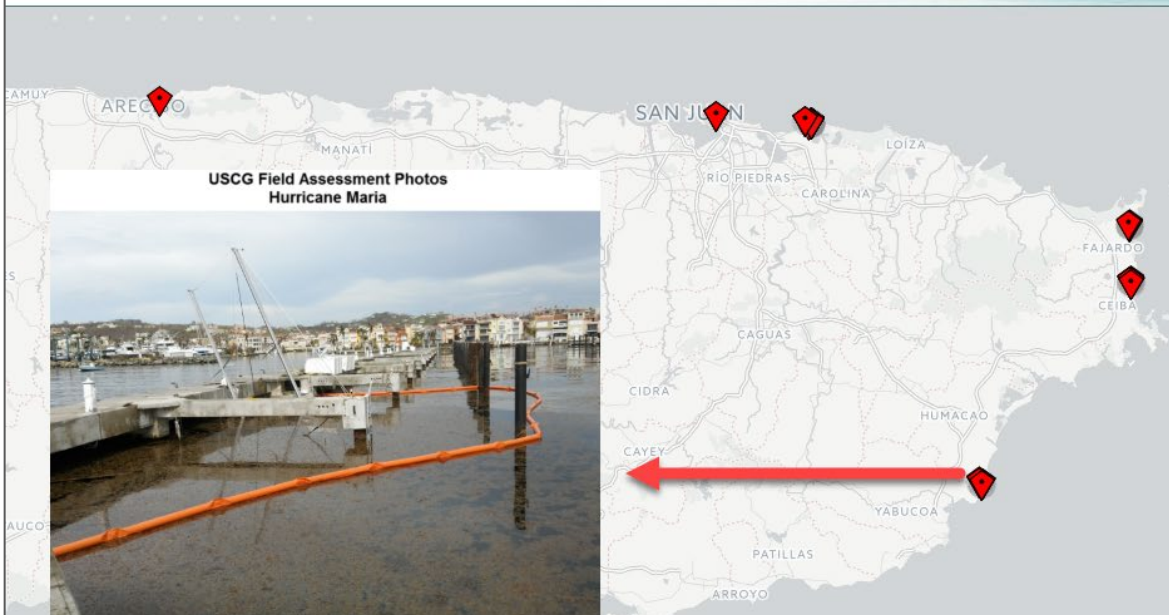
Scale: 1 : 882,296    Zoom Level: 8.9000000000000000    Location: 18.2965°, -64.5829°

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

ERMA® | Environmental Response Management Application  
Caribbean



W 65° 47.796'  
N 18° 04.641'

10/6/2017  
7:57:57 AM, 18.4531°, -65.8444°

**USCG Field Photos 10-03-2017**

USCG Field Photos 10-03-2017



**USCG Field Photos 10-01-2017**

USCG Field Photos 10-01-2017



**USCG Field Photos 10-05-2017**

USCG Field Photos 10-05-2017



**USCG Field Photos 10-04-2017**

USCG Field Photos 10-04-2017



**USCG Field Photos 10-06-2017**

USCG Field Photos 10-06-2017

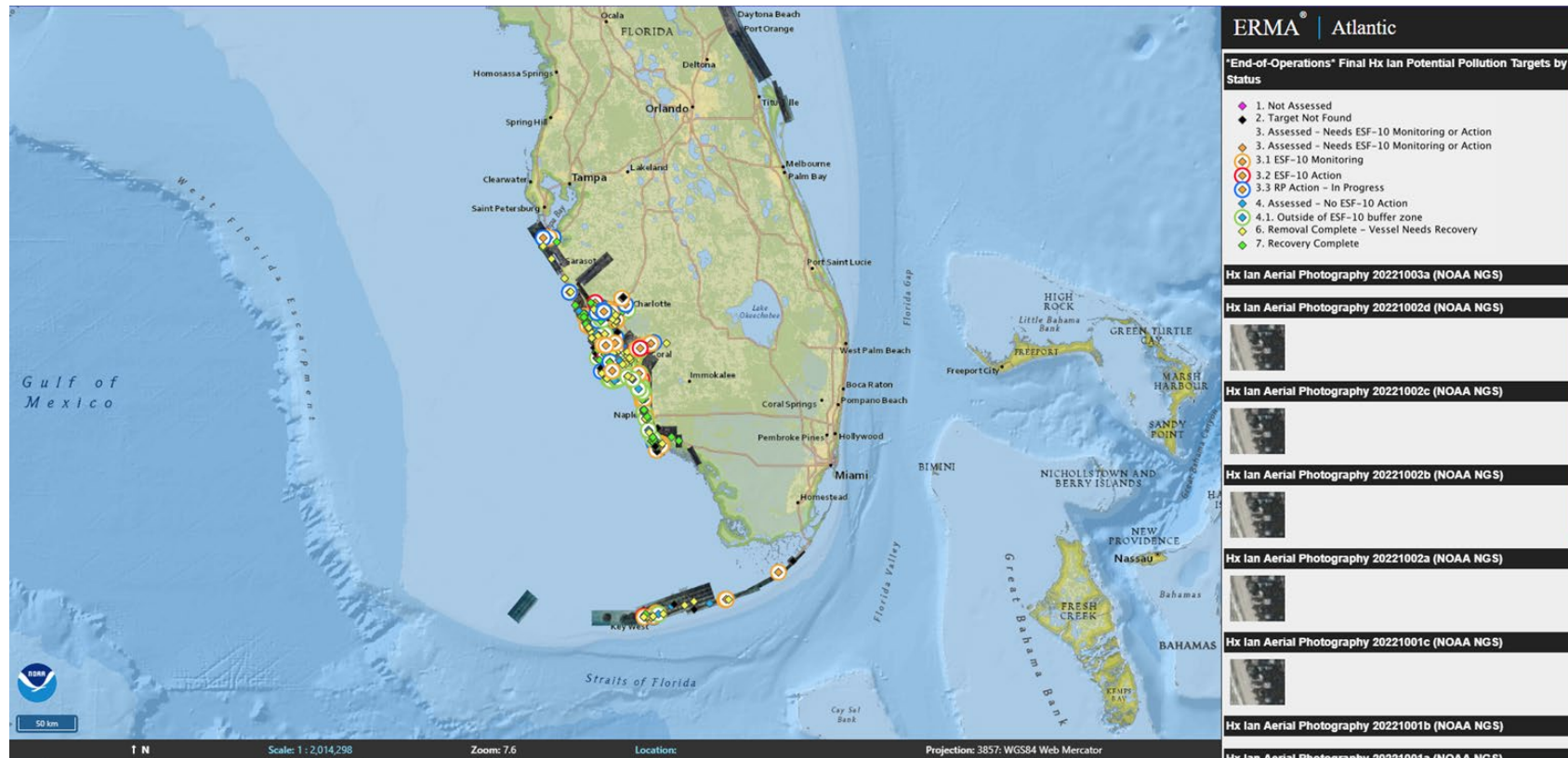


**USCG Field Photos 10-07-2017**

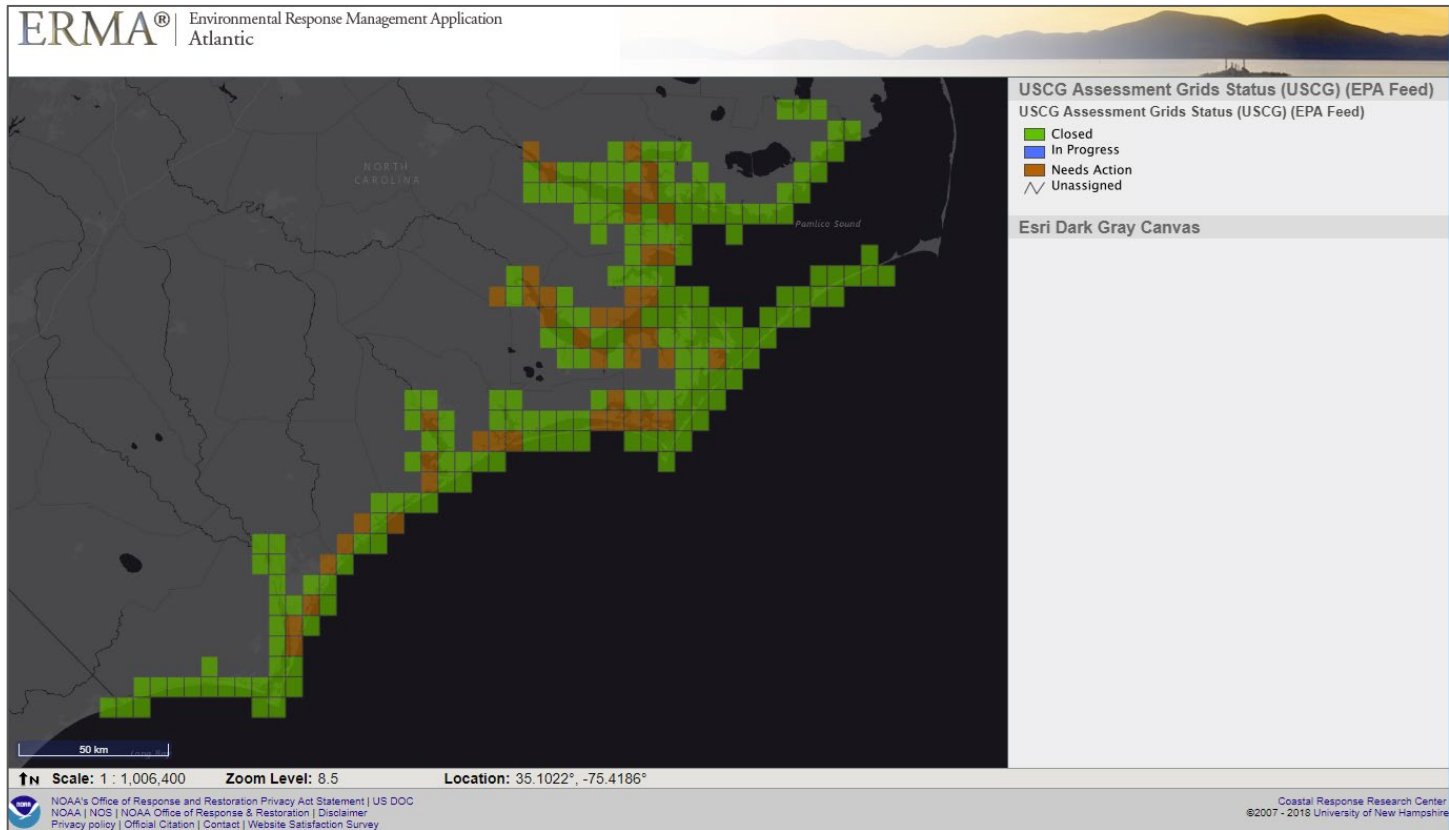
USCG Field Photos 10-07-2017



# Identified Debris from Imagery

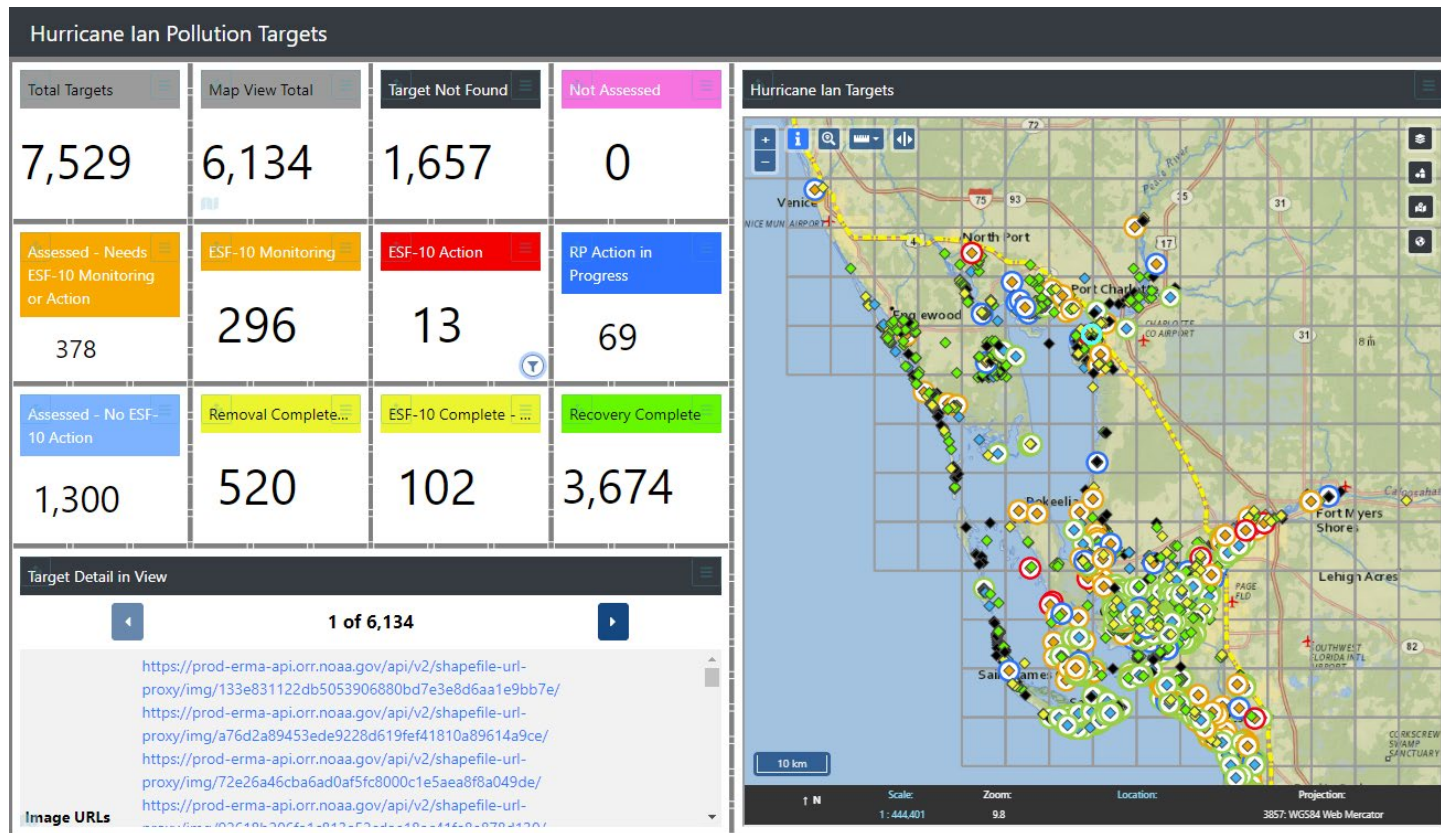


# Operational Grids





# Pollution Target Dashboard



# Pollution Target Dashboards - Filter Views

### Hurricane Ian Pollution Targets

Total Targets	Map View Total	Target Not Found	Not Assessed
7,529	6,134	1,657	0
Assessed - Needs ESF-10 Monitoring or Action	ESF-10 Monitoring	ESF-10 Action	RP Action in Progress
378	296	13	69
Assessed - No ESF-10 Action	Removal Complete...	ESF-10 Complete - ...	Recovery Complete
1,300	520	102	3,674

Target Detail in View

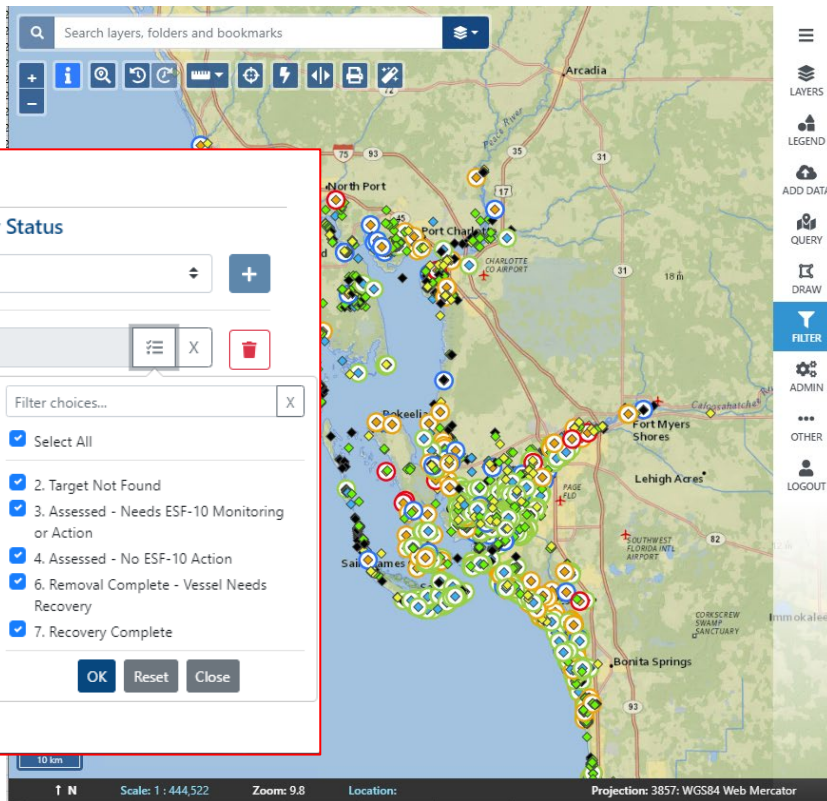
1 of 6,134

<https://prod-erma-api.orr.noaa.gov/api/v2/shapefile-url-proxy/img/133e831122db5053906880bd7e3e8d6aa1e9bb7e/>  
<https://prod-erma-api.orr.noaa.gov/api/v2/shapefile-url-proxy/img/a76d2a89453ede9228d619fef41810a89614a9ce/>  
<https://prod-erma-api.orr.noaa.gov/api/v2/shapefile-url-proxy/img/72e26a46c6ad0af5fc8000c1e5aea8f8a049de/>  
<https://prod-erma-api.orr.noaa.gov/api/v2/shapefile-url-proxy/img/02618230664e417e73d428e446e9276d420/>

**Image URLs**

### Hurricane Ian Targets

# Filter Views



## Edit Filters

### \*End-of-Operations\* Final Hx lan Potential Pollution Targets by Status

Select a column to filter:



status\_updated



Filter choices...

- Select All
- 2. Target Not Found
- 3. Assessed - Needs ESF-10 Monitoring or Action
- 4. Assessed - No ESF-10 Action
- 6. Removal Complete - Vessel Needs Recovery
- 7. Recovery Complete

OK

Reset

Close

Close

A screenshot of the ERMA (Emergency Response Management System) interface for the Gulf of Mexico. The interface is dark-themed and features a sidebar on the left with navigation options: LAYERS, LEGEND, ADD DATA, QUERY, DRAW, FILTER (highlighted), ADMIN, OTHER, and LOGOUT. The main content area displays 'MAP FILTERS' with three buttons: 'Activate All Filters', 'Deactivate All Filters', and 'Remove All Filters'. Below these buttons, a filter is applied: '\*End-of-Operations\* Final Hx lan Potential Pollution Targets by Status', showing '0 filters'. There are also icons for a search and a refresh.

# Query and Save Data

The screenshot displays the ERMA (Environmental Response Management Application) interface for the Gulf of Mexico. The main map area shows a large blue polygon drawn over the Gulf of Mexico, containing numerous small, multi-colored data points. The map includes labels for various locations such as Sarasota, Port Charlotte, Punta Gorda, Lehigh Acres, Immokalee, Bonita Springs, and Naples. A search bar at the top left contains the text "Search layers, folders and bookmarks". Below the search bar is a toolbar with icons for map navigation and editing. The bottom of the map area features a scale bar (20 km), a NOAA logo, and technical information: "Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community", "Scale: 1 : 637,736", "Zoom: 9.3", "Location:", and "Projection: 3857; WGS84 Web Mercator".

The right sidebar is titled "ERMA® | Gulf of Mexico" and contains a "QUERY TOOLS" section. This section is divided into two steps:

- 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 stop drawing.** You may also import an existing shape from the Draw panel.

**All shapes drawn on the map will be used.** 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.

Buttons: CREATE POLYGON, DELETE SELECTED, DELETE ALL, DISPLAY WKT
- Step 2: Select a Query Tool**

A dropdown menu is open, showing the following options:
 
  - Select A Query Tool -----
  - Select A Query Tool -----
  - Query ERMA Data** (highlighted)
  - NOAA ESI Query Tool
  - U.S. Fish and Wildlife Service IPaC Query Tool

Button: RUN QUERY



# 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>	<input checked="" type="checkbox"/>

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**

Shapefile (column names truncated to 10 characters)

Shapefile (column names truncated to 10 characters)

GeoJSON

Comma Separated Values (no geometries)

MS Excel Format (no geometries)

**Terms of Use**

# ACKNOWLEDGMENTS

## NOAA:

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

## Genwest:

- Michael Greer
- Adam Rotert
- Zach Winters-Staszak
- 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)







# NOS Coastal Inundation Dashboard

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**Edward Davis** - Oceanographer

NOAA National Ocean Service (NOS) - Center for Operational Products & Services (CO-OPS)  
Coastal Hazards Branch

**NOAA Hurricane Preparedness Summit**  
April 25, 2024



# What is CO-OPS

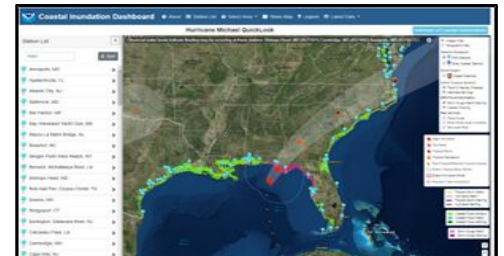
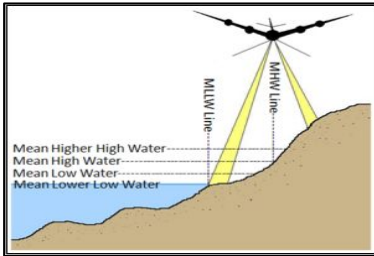
*CO-OPS is the authoritative source for accurate, reliable, and timely tides, water levels, currents, and other oceanographic information*

**Mission:** Provide meaningful oceanographic data for the Nation

**Vision:** Support the Nation's economy and safeguard coastal communities with oceanographic information accessible by anyone, at any time, from any place.

## What we do:

- Produce datums that support mapping and charting
- Support safe and efficient navigation through predictions, real-time observations, and model guidance
- Provide decision-support to address coastal hazards and inundation



# Water Level Observations

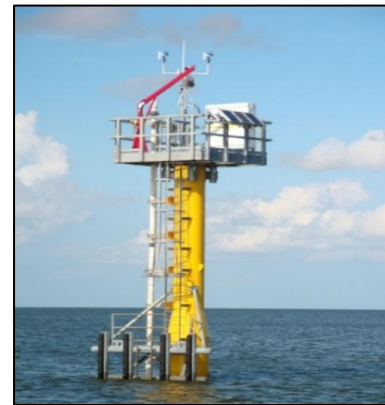
---

## National Water Level Observation Network (NWLON)

- Real-time water level & meteorological data at 210 long-term stations

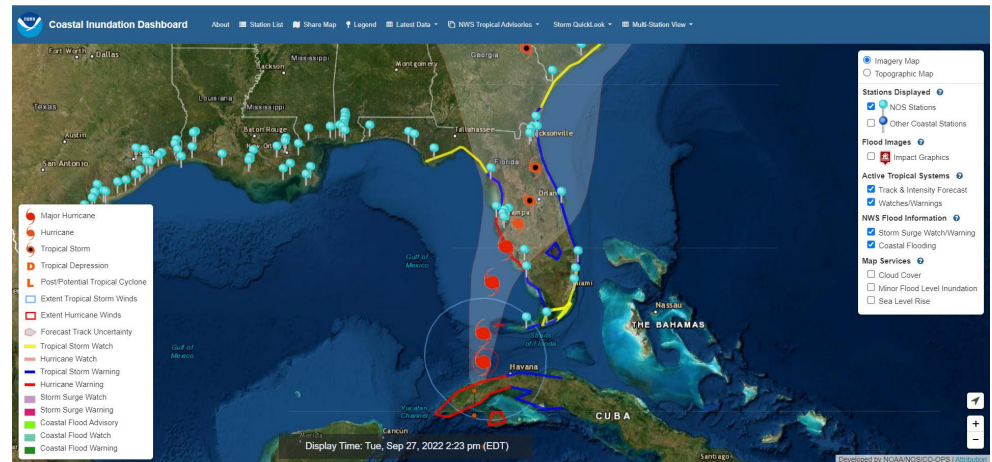
## Partnership real-time water level stations (cost-share)

- Physical Oceanographic Real-Time System (PORTS)
  - Currently 38 PORTS serving 84 of the 150 top U.S. seaports with more systems planned



# Coastal Inundation Dashboard


- Interactive web-map application targeted towards coastal decision makers and planning community
- Real-time & historic flood information at NOS water level stations
  - Including Great Lakes
- Water level data at tidal stations shown relative to Mean Higher High Water (MHHW) tidal datum
  - Average daily highest tide
- Create custom shareable map links

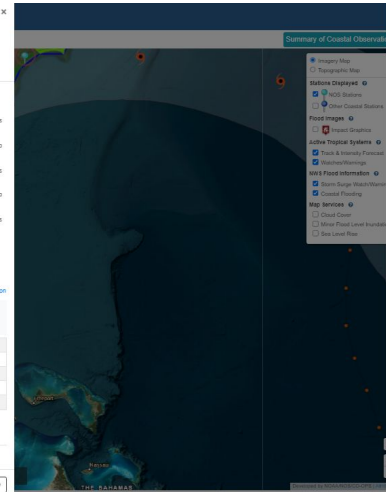
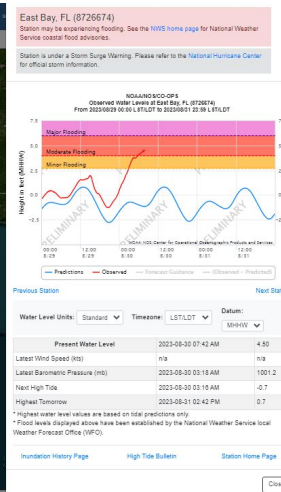
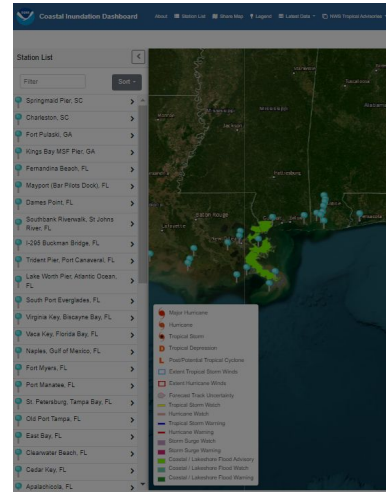


<https://tidesandcurrents.noaa.gov/inundationdb/>

# Coastal Flood Impact Thresholds

- Established by local NWS Weather Forecast Offices (WFOs)
  - Takes into account local geography and flood mitigation
  - Provides a trigger point for NWS coastal flood advisory products
- Application compares observed water levels with station's minor flood threshold
  - Flood "alerts" are displayed as blinking station markers on the map and as messages within the station pop-up

	Minor (CF Advisory)	Moderate (CF Warning)	Major (Warning)
<b>Picture</b>			
<b>Hazard</b>	<ul style="list-style-type: none"> <li>Low threat of property damage...and no direct threat to life.</li> <li>1 to 2 ft of inundation in shoreline and vulnerable areas.</li> </ul>	<ul style="list-style-type: none"> <li>Elevated threat of property damage...with a risk to life if one places themselves in unnecessary danger.</li> <li>2 to 3 ft of inundation in shoreline and vulnerable areas.</li> <li>Minor to no inundation of surrounding coastal communities.</li> </ul>	<ul style="list-style-type: none"> <li>Significant threat to life and property.</li> <li>3+ ft of inundation in shoreline and other vulnerable areas.</li> <li>Minor to moderate inundation (1 to 3 ft) of surrounding coastal communities that rarely experience coastal flooding.</li> </ul>
<b>Impact</b>	<ul style="list-style-type: none"> <li>A few shoreline and vulnerable roadways and adjacent properties will experience shallow flooding.</li> </ul>	<ul style="list-style-type: none"> <li>Several shoreline and vulnerable area home and businesses will experience water inside.</li> <li>Several low-lying coastal and shoreline roads will be closed.</li> <li>A few cars may take on water or even be destroyed.</li> </ul>	<ul style="list-style-type: none"> <li>Evacuations will be necessary for the most vulnerable shoreline and coastal areas.</li> <li>Many coastal communities will experience damage...with some shoreline and flood prone homes and businesses being destroyed.</li> <li>Many cars will likely be submerged or washed away.</li> <li>Several sections of nearshore roads and escape routes will be impassable and a few could be washed out.</li> <li>Flood waters may extend well inland in low lying areas.</li> </ul>



# Map Features: Impact Graphics

- Over 200 Images taken during past flood events along with associated water level measurements at the nearest water level station
  - Relates measured water levels with on-the-ground impacts
  - Please send photos!
- Potential future integration of webcams

Imagery Map  
Topographic Map

Stations Displayed  
 NOS Stations  
 Other Coastal Stations

Flood Images  
 Impact Graphics

Active Tropical Systems  
 Track & Intensity Forecast  
 Watches/Warnings

NWS Flood Information  
 Storm Surge Watch/Warning  
 Coastal Flooding

Map Services  
 Cloud Cover  
 Minor Flood Level Inundation  
 Sea Level Rise



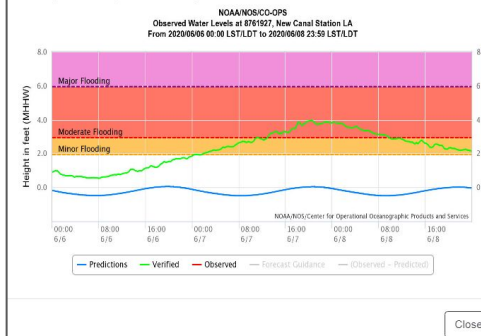
Impact Location: U.S. 11 in Irish Bayou, Lake Pontchartrain, LA



Date: 6/7/2020

Flood Level: 3.96 feet above MHHW

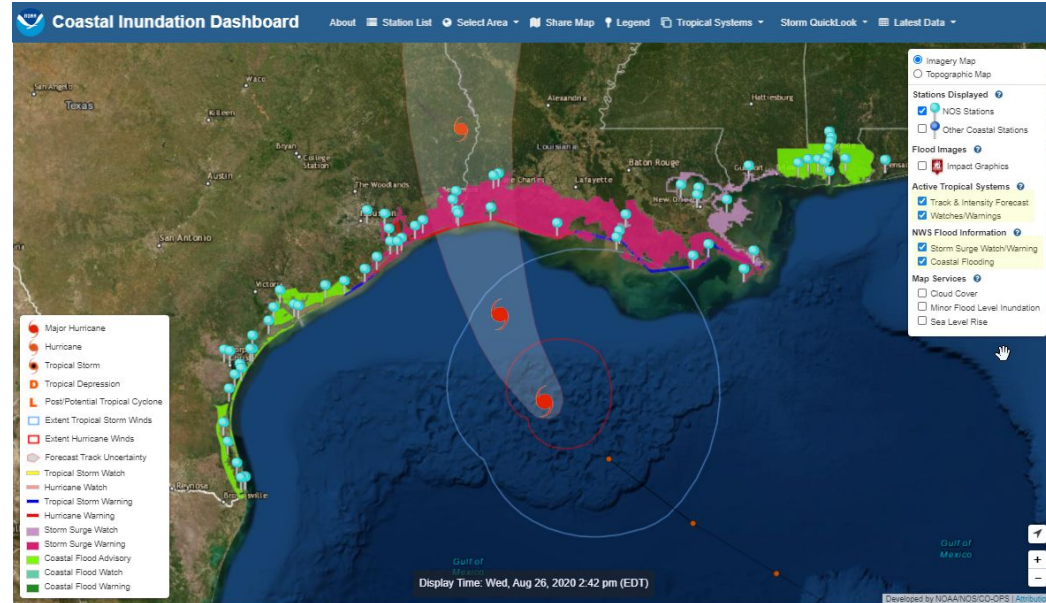
Impact: Many roads throughout southeast Louisiana outside of levee protection including U.S. 11 pictured here were covered with rising water from Tropical Storm Cristobal. Photo Credit: David Grunfeld, NOLA.com, The Times-Picayune.



# Map Features: NWS Tropical Cyclone & Coastal Flooding Products

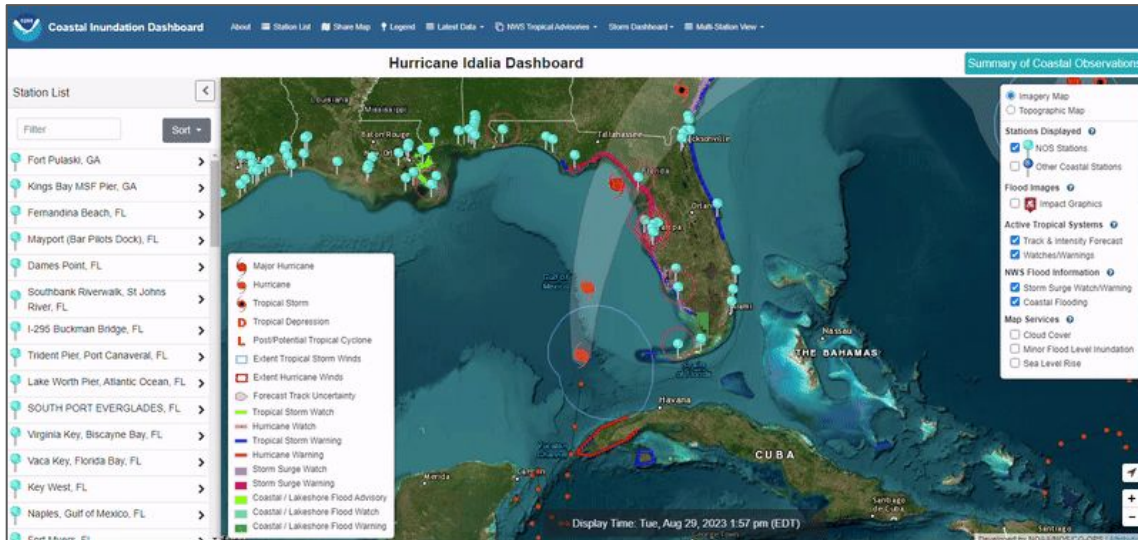
## Monitoring storm surge in real-time

- Latest National Hurricane Center (NHC) tropical cyclone forecast information
  - Forecast track and cone of uncertainty
  - Extent of tropical storm and hurricane force winds
  - Storm surge watch/warning
- Coastal flood watches, warnings and advisories issued from NWS WFOs
  - Advisory text displayed by clicking on watch/warning area
- Data updates on the fly from NWS



# Custom Storm Dashboards

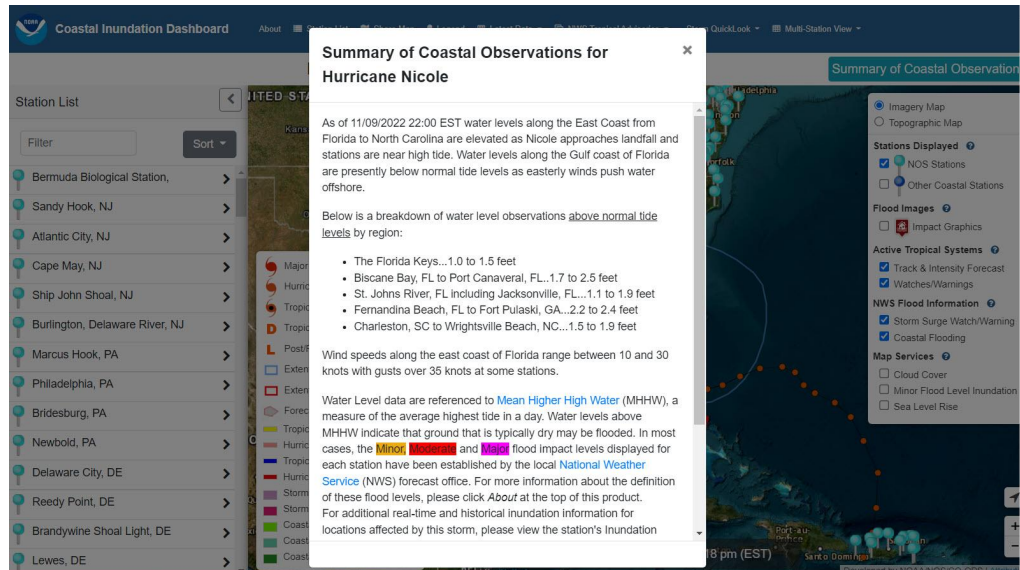
- CO-OPS will stand up a custom storm dashboard if a tropical watch or warning is issued for the U.S. coast with a shareable URL while the storm is active
  - For example, <https://tidesandcurrents.noaa.gov/inundationdb/storm/Idalia.html>
- All relevant storm information is displayed by default at locations impacted
- Storm link shared via NOS & NOAA social media and storm dashboard linked on CO-OPS home page





# Daily Updates and Live Monitoring

- CO-OPS team members update the custom storm dashboard at 0900, 1700, 2300 during an event.
- Supplemental text analysis is updated, as well as storm track, and relevant watches/warnings
- A summary of storm surge observations is also provided.



# Map Features: View Data for Multiple Stations

## Latest Data

- Latest observed and 72 hour peak water levels
- Latest wind and barometric pressure observations
- Sortable columns

Coastal Stations [Great Lake Stations](#)

Search:

[Refresh](#) [Export to CSV](#)

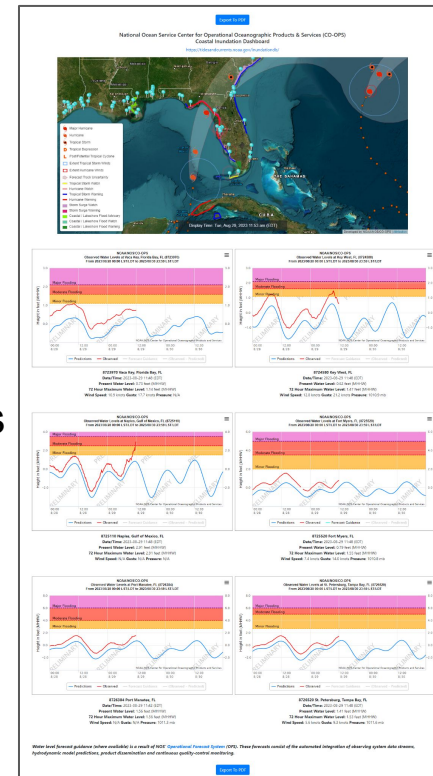
Latest Observations (water level values in feet above MHHW)

Station	Date/Time (Local)	Obs. WL	Pred. Tide	Obs. Pred.	72hr Max WL	Wind (kts)	Gust (kts)	Air Press. (mb)
9444090 Port Angeles, WA	2023-01-09 11:24 (PST)	1.43	-0.58	2.01	1.78	11.9	21.4	992.6
9431847 Port Orford, OR	2023-01-09 11:24 (PST)	1.37	-0.16	1.53	1.92	23.7	28.4	1003.2
9442396 La Push, Quillayute River, WA	2023-01-09 11:24 (PST)	1.28	-0.80	2.08	2.17	8.8	20.4	988.4
9432780 Charleston, OR	2023-01-09 11:24 (PST)	1.17	-0.53	1.70	2.12	4.5	11.7	1001.5
9449880 Friday Harbor, WA	2023-01-09 11:24 (PST)	1.13	-0.64	1.77	2.33	9.5	13.8	995.0
9419750 Crescent	2023-01-09 11:18 (PST)	0.99	-0.13	1.12	1.84	16.7	21.0	1005.9

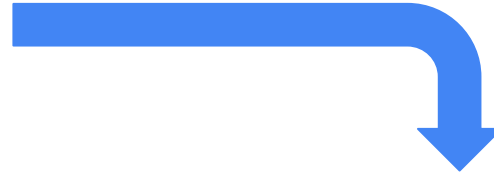
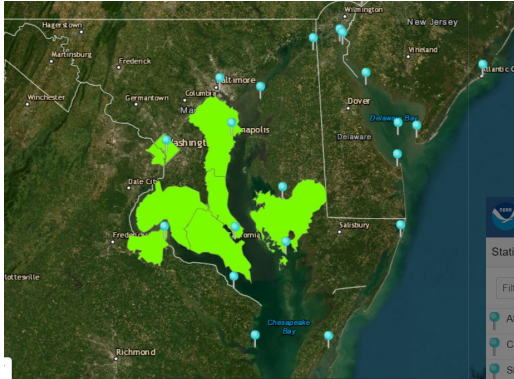


## Multi-Station View

- Select up to 20 coastal stations and generate a page with the latest water level time series plots for each.
- Great for monitoring storm surge events across a region
- PDF export option for printing



# Map Features: Real-Time NWS Forecast/Warning Text



A screenshot of the NOAA Coastal Inundation Dashboard. On the left is a 'Station List' with a filter and sort dropdown, listing stations from Atlantic City, NJ to Baltimore, MD. The main area shows a map with a pop-up window titled 'COASTAL FLOOD ADVISORY IN EFFECT FROM 3 PM THIS AFTERNOON TO 9 PM EDT THIS EVENING'. The pop-up text includes: 'Issued by: NWS Baltimore MD/Washington DC', 'Area: District of Columbia, Arlington/Falls Church/Alexandria', and 'Details: Coastal Flood Advisory issued April 19 at 9:57AM EDT until April 19 at 9:00PM EDT by NWS Baltimore MD/Washington DC'. It lists 'WHAT...', 'WHERE...', 'WHEN...', and 'IMPACTS...' sections. At the bottom of the pop-up, it says 'Source: NWS Alert Web Service'. On the right side of the dashboard, there is a 'Map Services' panel with options like Imagery Map, Topographic Map, NGS Stations, and Flood Images.

## When NWS Forecast is Issued:

- NWS forecast polygons included for:
  - Tropical Storm and Hurricane watches and warnings
  - Storm surge warnings
  - Coastal flooding watches and warnings
- Polygons are updated on CID map from NWS in real-time
- NWS forecast text will pop-up in associated polygons.

# Map Features: Sea Level Rise & Minor Coastal Inundation

Source: NOAA's Office of Coastal Management (OCM)

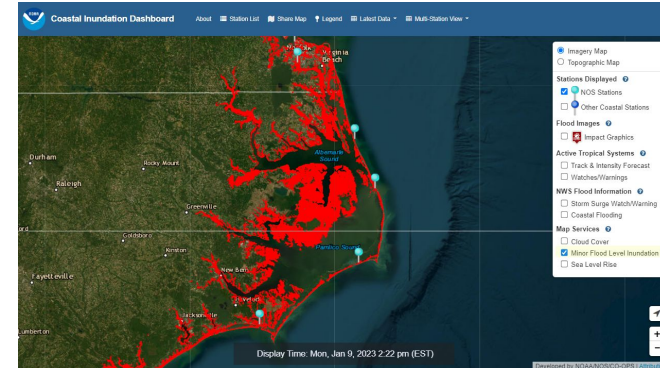
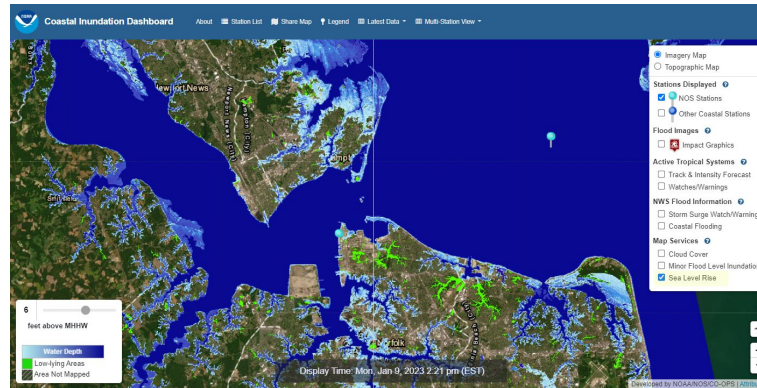
## ■ Sea Level Rise Viewer

- Select 1 - 10 feet of sea level rise and see impacted geographic areas
- Can also be used to identify impact areas from forecasted storm surge

## ■ Minor Flood Level Inundation

- Coastal areas that would experience inundation at the minor flood impact threshold

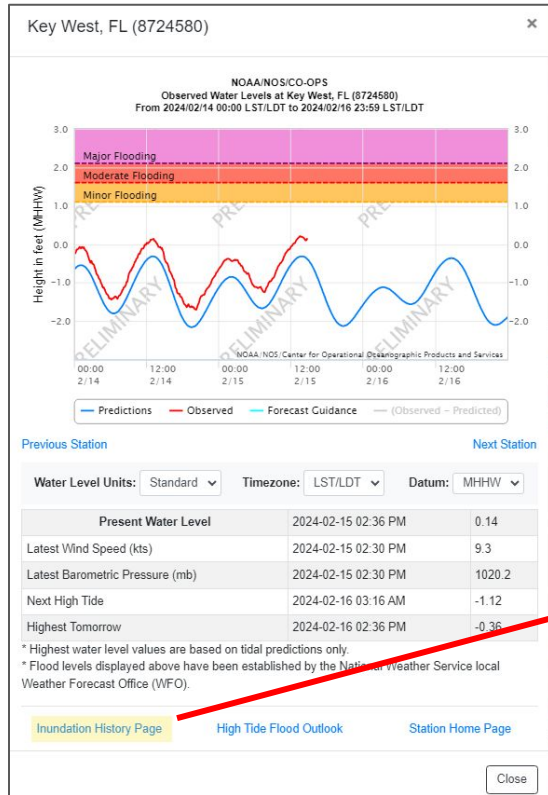
<https://coast.noaa.gov/slr/>



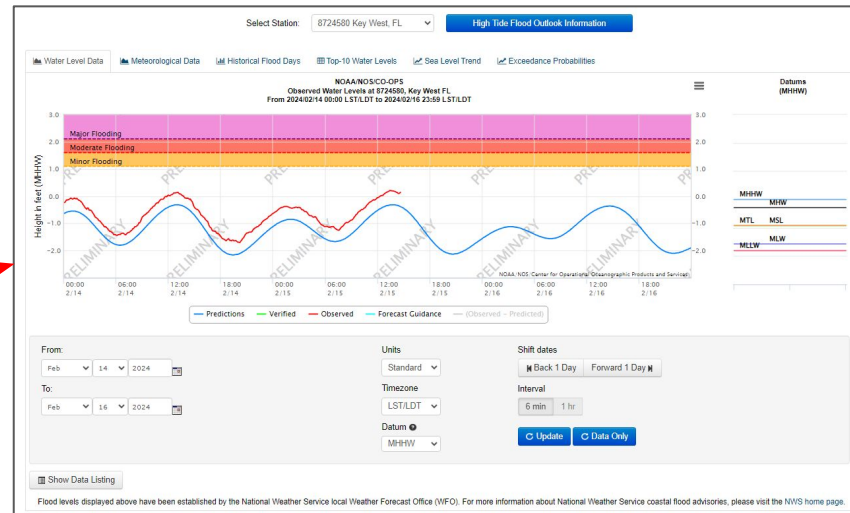


# Water Level Station Features

# Station Features: Real-time & Historic Water Level Observations

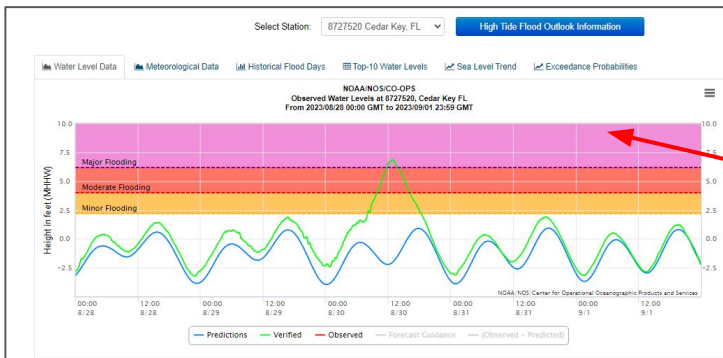


- Available for all NOS water level stations
- View observed water levels and model forecast relative to local flood impact thresholds
  - Water level forecast from [NOS Operational Forecast System \(OFS\)](#) hydrodynamic models (where available)



# Station Features: Top-10 Station Water Levels

- Peak historical observations at water level stations
- Quickly access water level for a given storm surge event
- Updated monthly



Select Station: 8727520 Cedar Key, FL High Tide Flood Outlook Information

Water Level Data Meteorological Data Historical Flood Days Top-10 Water Levels Sea Level Trend Exceedance Probabilities

NOA/NOS/CO-OPS  
Top-10 Highest Water Levels  
8727520, Cedar Key FL

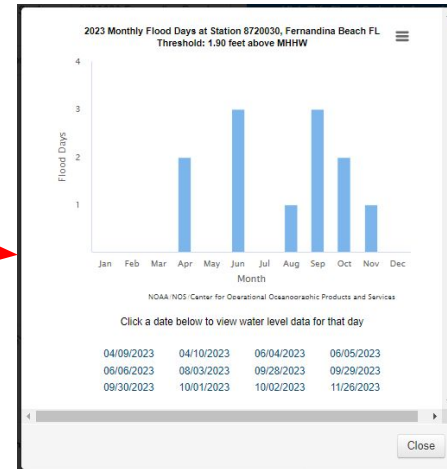
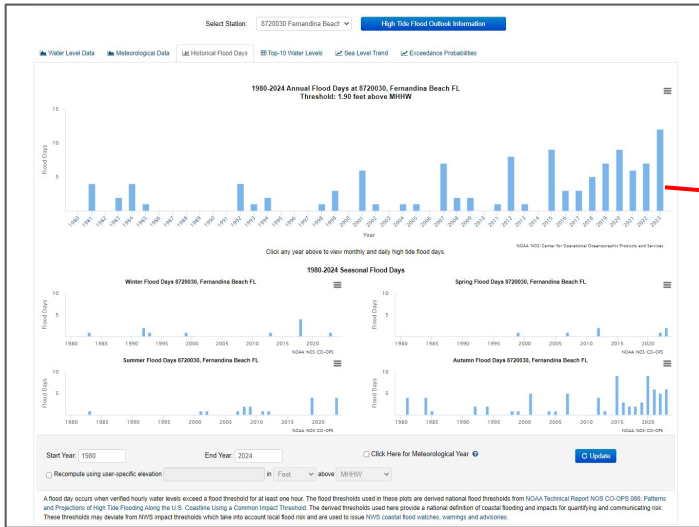
Units: Standard Datum: MHHW JSON Link XML Link

Date	Height (Feet above MHHW)	Event Category	Event	Source
<a href="#">August 30, 2023</a>	6.89	Tropical	Hurricane Idalia	Observed Peak Water Level
<a href="#">September 2, 2016</a>	6.10	Tropical	Hurricane Hermine	Observed Peak Water Level
<a href="#">August 31, 1985</a>	5.41	Tropical	Hurricane Elena	Last Recorded Water Level
<a href="#">March 13, 1993</a>	4.96	Extra Tropical	1993 Storm of the Century	Observed Peak Water Level
<a href="#">June 19, 1972</a>	4.15	Tropical	Hurricane Agnes	Observed Peak Water Level
<a href="#">October 10, 2018</a>	4.09	Tropical	Hurricane Michael	Observed Peak Water Level
<a href="#">June 9, 1966</a>	4.00	Tropical	Hurricane Alma	Observed Peak Water Level
<a href="#">July 10, 2005</a>	3.99	Tropical	Hurricane Dennis	Observed Peak Water Level
<a href="#">June 5, 1995</a>	3.65	Tropical	Hurricane Allison	Observed Peak Water Level
<a href="#">June 6, 2016</a>	3.63	Tropical	Tropical Storm Colin	Observed Peak Water Level

Listing of the top historical water levels, along with the associated weather event (if known). Most values are based on the 6-minute peak water level observed at the tide gauge. Top historical water levels prior to 1996 are typically based on hourly observations. At times where observed water levels are unavailable, values may be taken from high water marks. For additional information or data, please visit the Extreme Water Levels website.

# Station Features: Historical Flood Days

- Number of days where observed water levels at coastal stations exceeded minor flooding
- View data seasonally and quickly access water level observations for a specific “flood day”
- Recompute based on a user-defined flood threshold

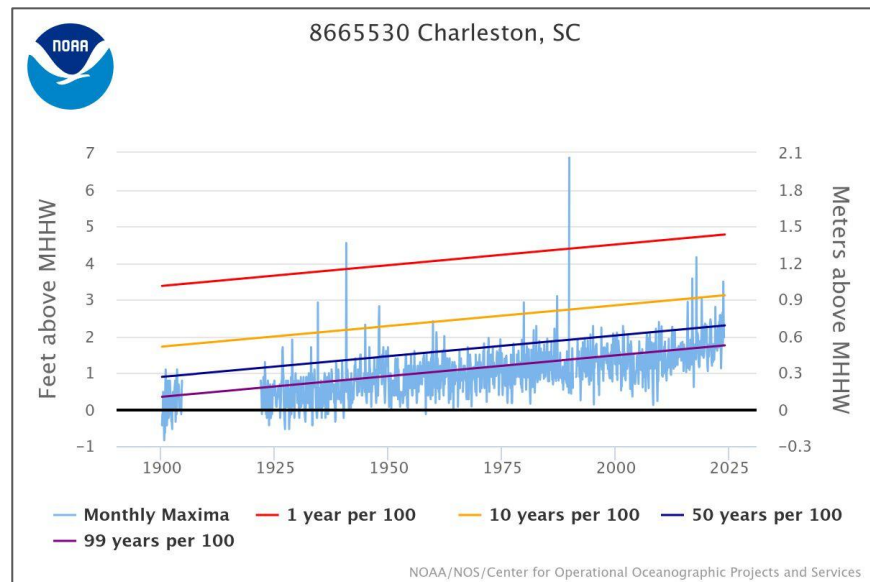
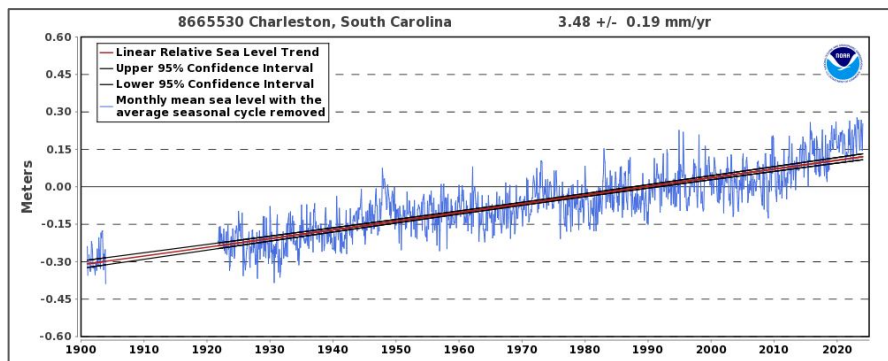


\* For comparison of flood days geospatially, the default minor flood threshold used is based on a [statistical \(regression-based\) relationship](#) between the NWS minor flood threshold and the tide range



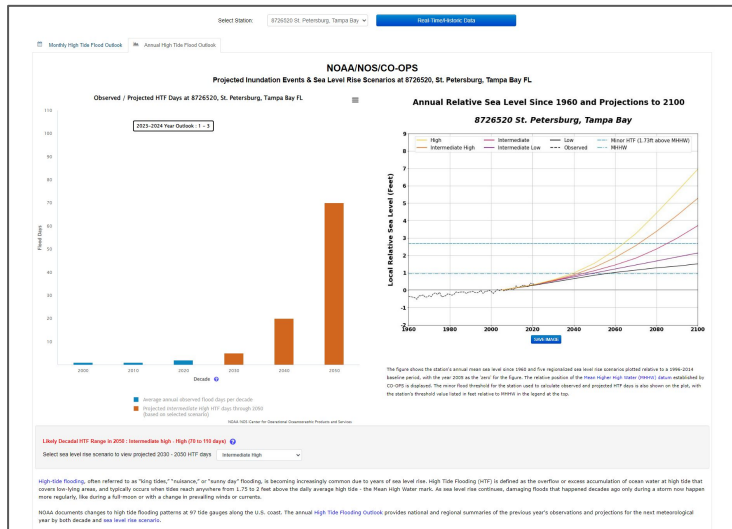
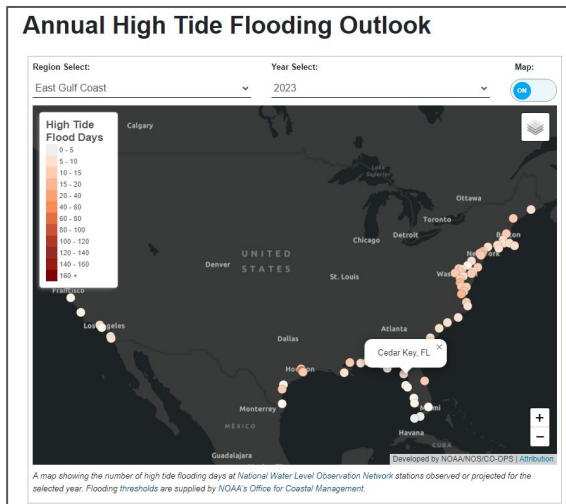
# Station Features: Sea Level Trends & Exceedance Probabilities

- Historical sea level trend and annual 1-year, 2-year, 10-year and 100-year exceedance levels
- Available for coastal stations with > 30 years of water level observations



# Station Features: Annual High Tide Flood Outlook

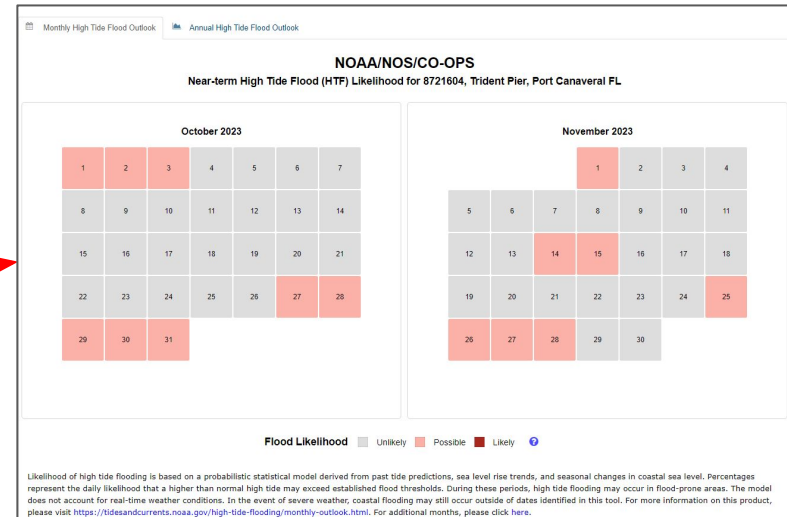
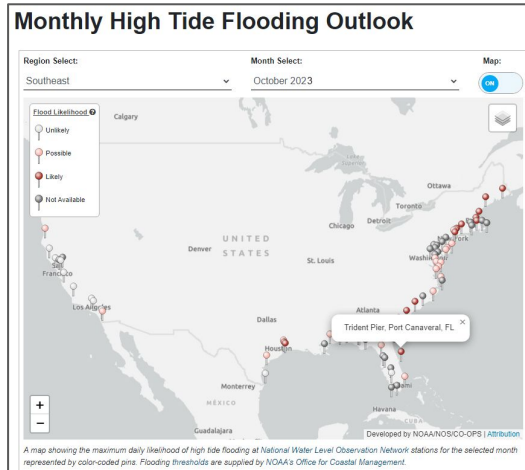
- Visualization of projected annual and decadal high tide flood (HTF) days
  - Next meteorological year (May - April)
  - Decadal projections for 2030, 2040 & 2050 based on selected sea level rise scenario
- HTF range for 2050 based on most likely sea level rise scenario range



<https://tidesandcurrents.noaa.gov/high-tide-flooding/annual-outlook.html>

# Station Features: Monthly High Tide Flood Outlook

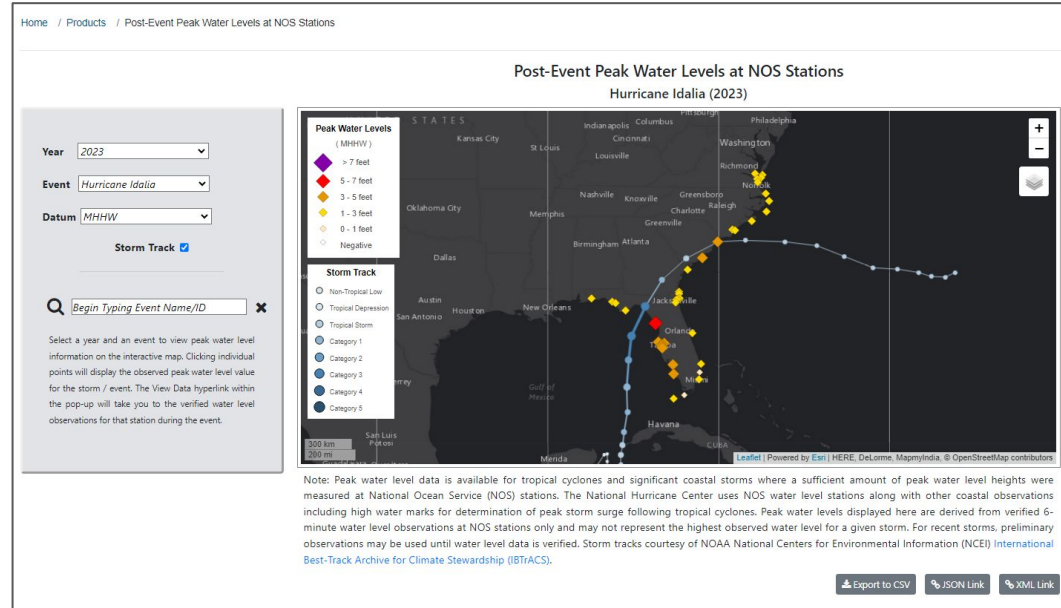
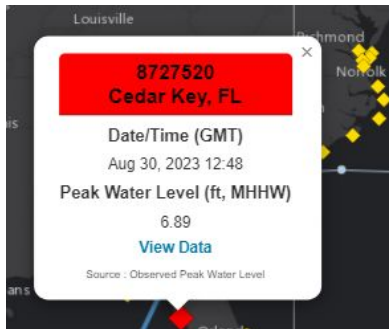
- Highlights possible or likely days for high tide flooding up to a year out
- Based on above normal tides and climatological factors
- Updated monthly



<https://tidesandcurrents.noaa.gov/high-tide-flooding/monthly-outlook.html>

# After the Storm: Post-Event Peak Water Levels

- CO-OPS compiles peak water levels at NOS stations following significant tropical cyclones
- Data are available via an online web map application and accessible via API
  - Data can be downloaded in CSV format
- Links directly with station data during the storm



<https://tidesandcurrents.noaa.gov/peakwaterlevels/>



# Questions?



April 25, 2024

# Hurricane Glider Briefing

LCDR Aaron Colohan | *U.S. IOOS*



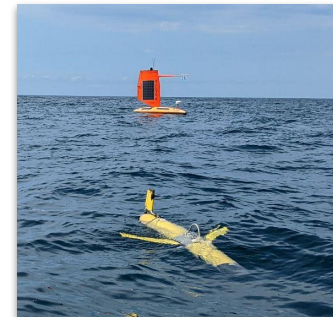
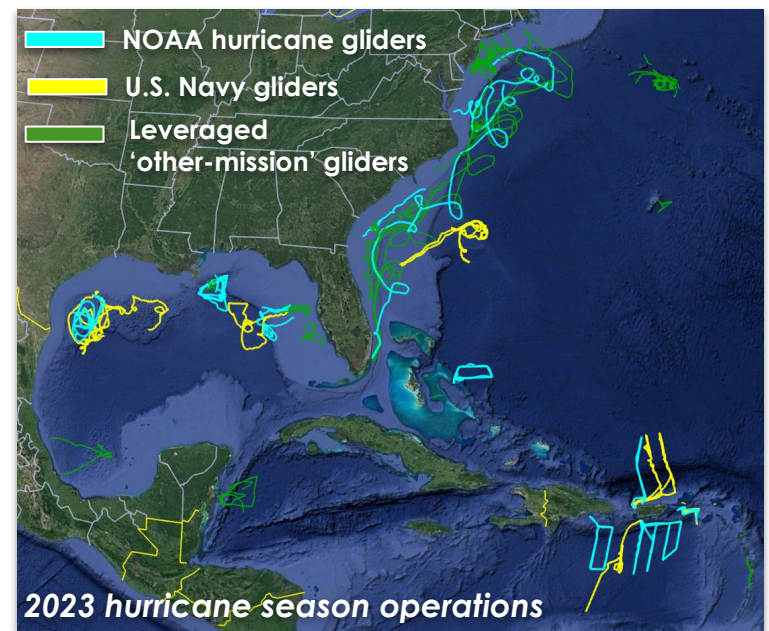
# NOAA Hurricane Gliders

**Goal:** Contribute to NOAA hurricane intensity forecasts through subsurface monitoring of ocean features linked to hurricane intensity changes.

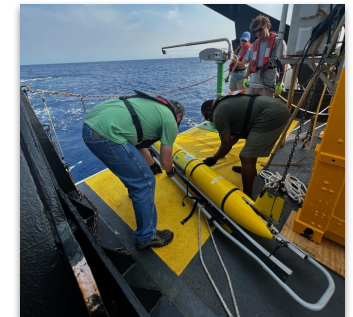
**Cost:** ~ funded primarily via Disaster Supplementals.

## Benefits:

- Glider temperature and salinity data make significant real-time corrections to the operational NOAA ocean model used to feed hurricane models.
  - A realistic ocean simulation can reduce hurricane intensity forecast error by 56% (Le Henaff et al. 2021).
- 25+ participating institutions across federal government, academic, and private industry result in operational efficiencies and cost-savings.
- U.S. Navy contributes 10-12 gliders per year, filling observing gaps. Deployment/recoveries funded by OMAO/UxSOC
- Gliders are one component of a coordinated ocean observing strategy that includes other complementary UxS, like Saildrones.
- NOAA/IOOS National Glider Data Assembly Center is a data management system that enables NOAA to leverage all gliders data, regardless of mission purpose, for use by the ocean model.
- Data contribute to off-season model development/improvements.
- Gliders can stay at sea for months in harsh conditions, replacing the need for costly ship transects and avoiding crew safety concerns.



*Glider co-location with a nearby Saildrone*



*3 Navy gliders were deployed off the NOAA Ship Nancy Foster*



# Goal: Help improve hurricane intensity forecasts



- Essential Ocean Features linked to hurricane intensity changes
- Limited subsurface observations available to initialize models

*Gliders have been essential towards filling those observing gaps*

- Long-term monitoring of dynamic ocean features
- Water column T/S observations assimilated by global ocean models
- Gliders help keep the ocean models that feed hurricane models on track





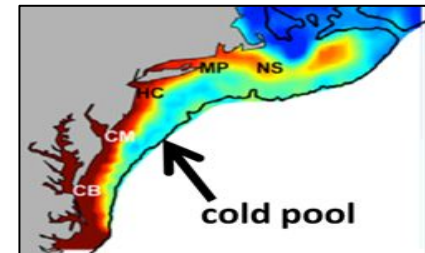
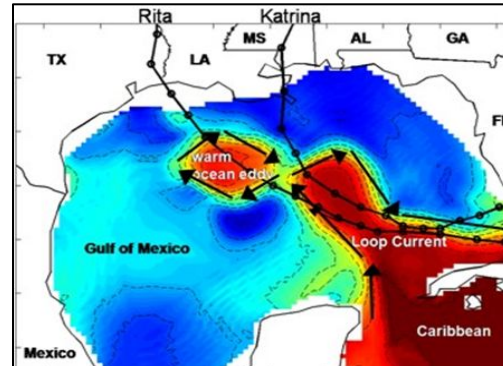
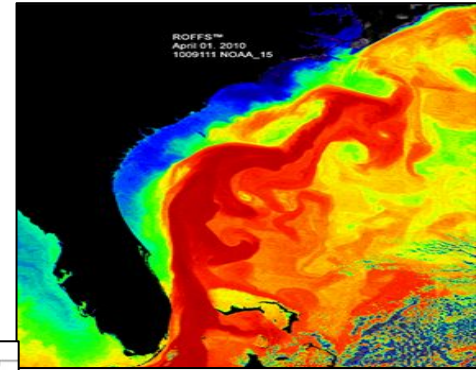
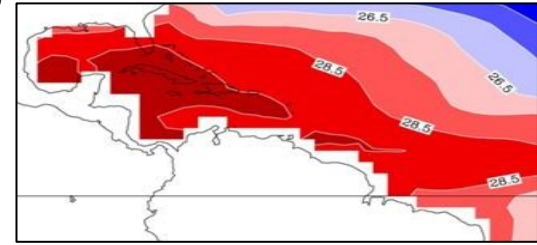
# The Ocean Affects Hurricanes

## Essential Ocean Features

- Known to cause rapid intensification and de-intensification
- Occur close to populated and vulnerable coastlines
- Challenging for models to get right due to dynamic nature and limited observations

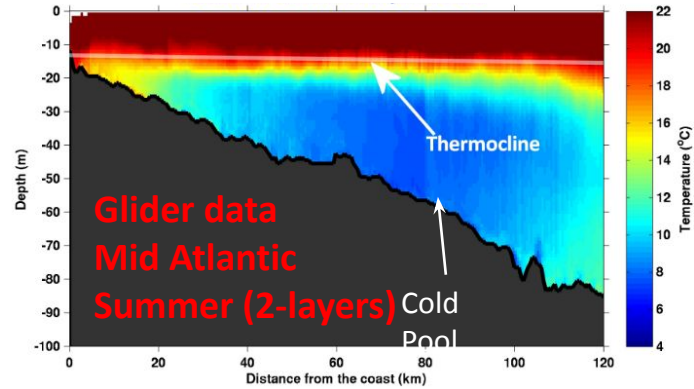
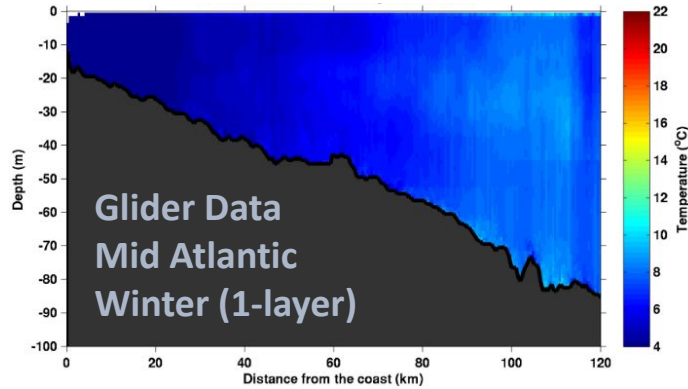
## Examples

- Loop Current
- Atlantic Warm Pool
- Gulf Stream
- Mid-Atlantic Cold Pool

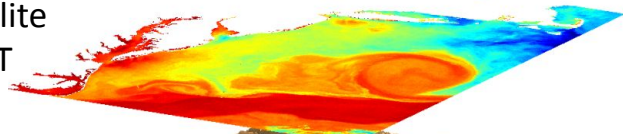


# Mid Atlantic Bight Essential Feature: Cold Pool

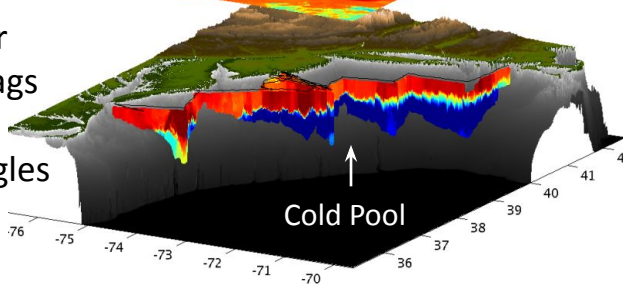
A 1000 km long, shelf-wide cold bottom layer beneath a warm summer surface layer



Satellite  
SST



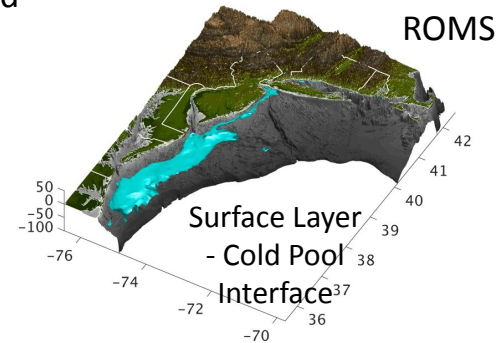
Glider  
Zig-Zags  
or  
Triangles



Assimilated  
into  
Regional  
Ocean  
Models

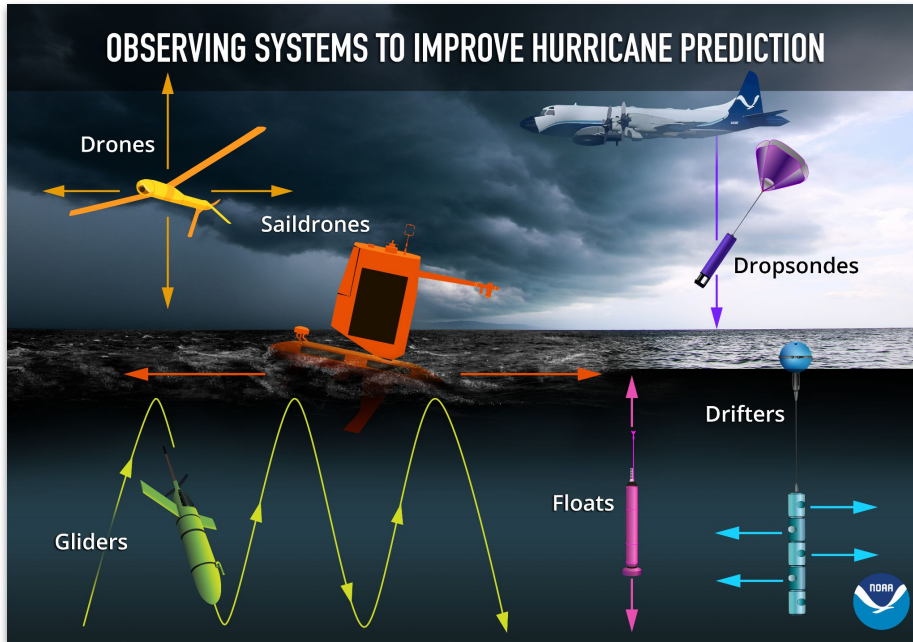


12° C on May 15, 2017



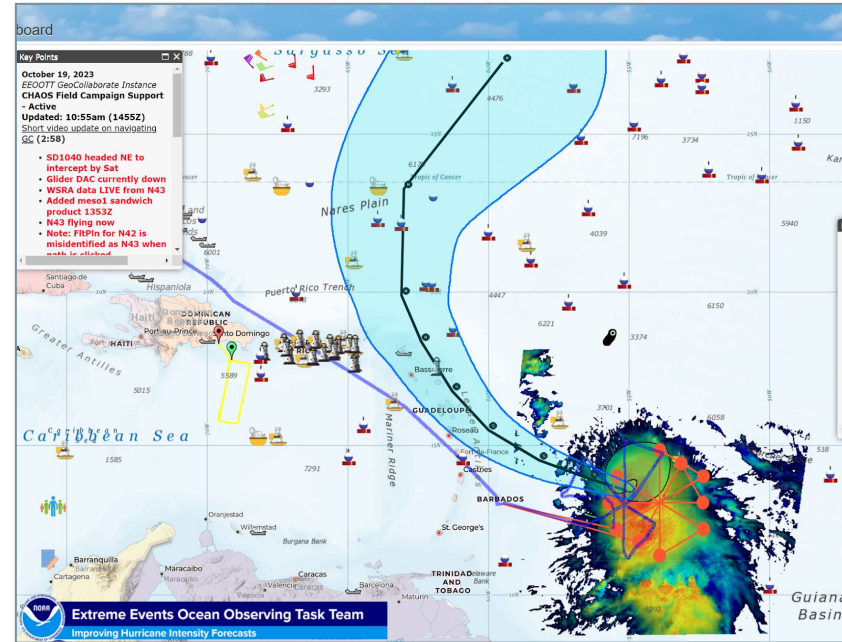
***The Cold Pool is not monitored from space – we use Gliders, HF Radar, and Models***

# Gliders are one component...



NOAA/PMEL

...of an integrated observing system

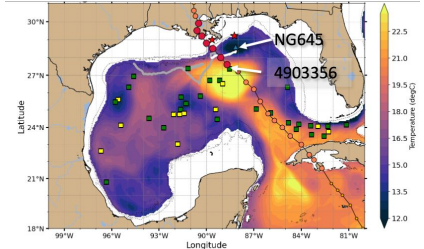
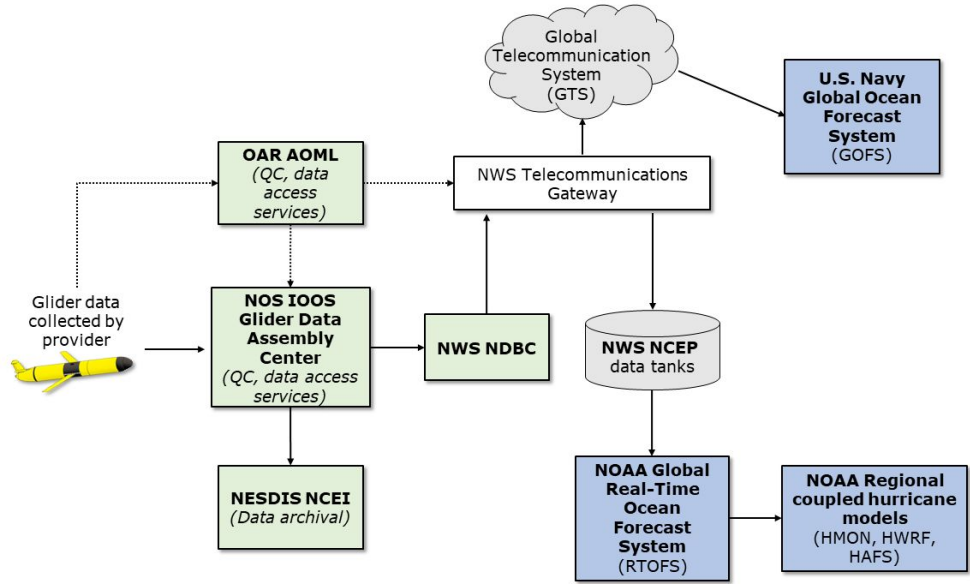


GeoCollaborate

...and a contribution to CHAOS: Coordinated Hurricane Atmosphere-Ocean Sampling



# A de facto operational network



*The IOOS Glider DAC allows us to leverage all glider data!*

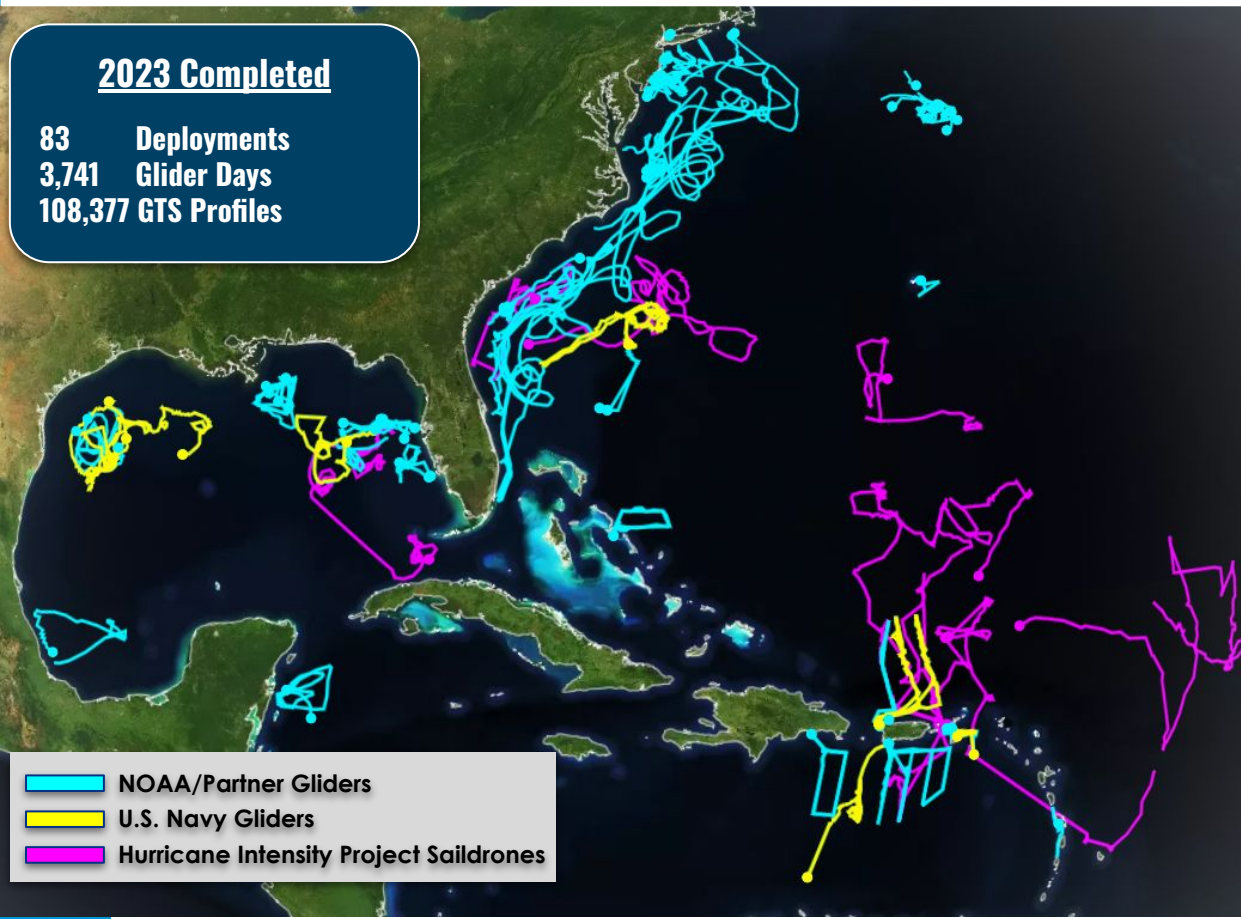
Capacity (expertise, fleet, facilities) | Data management | Usage (research and operations)

# 2023 Operations Overview



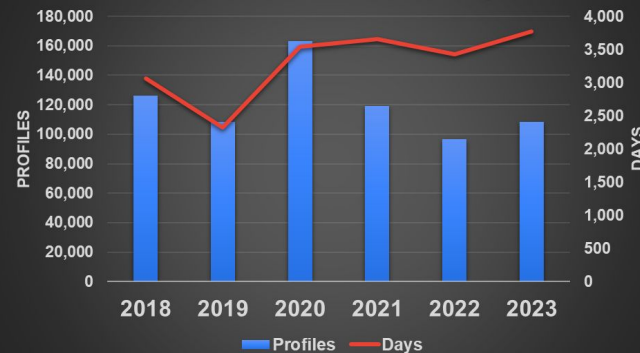
## 2023 Completed

83 Deployments  
3,741 Glider Days  
108,377 GTS Profiles



- NOAA/Partner Gliders
- U.S. Navy Gliders
- Hurricane Intensity Project Saildrones

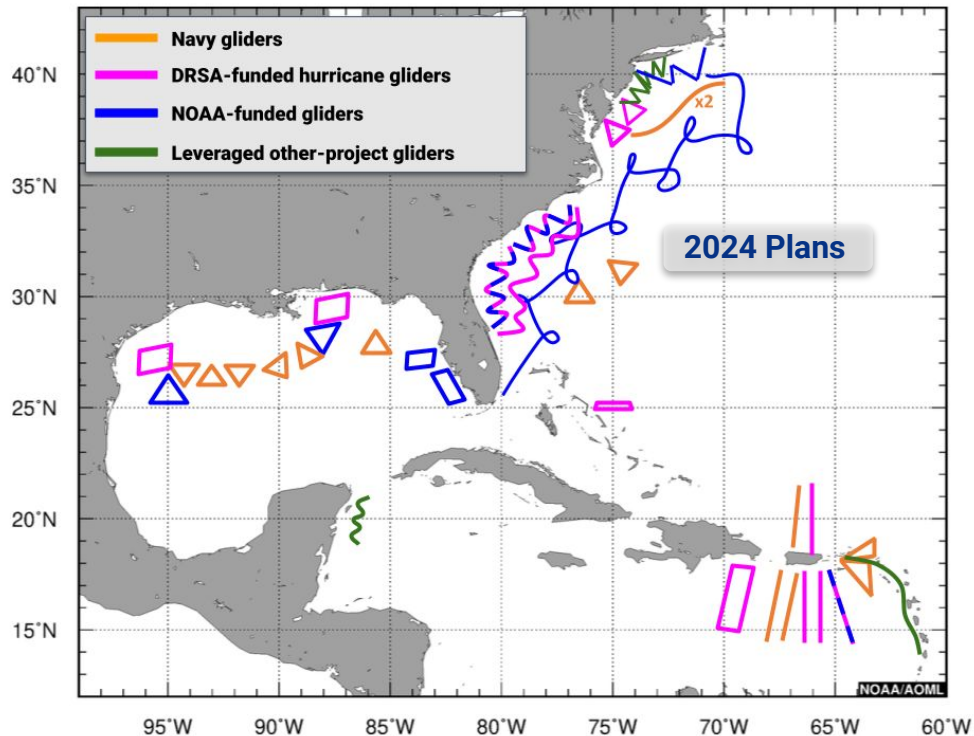
## Annual Glider Profiles & Days





# 2024 Plans

- 46 planned missions
  - 21 funded with Disaster Supplemental (DRSA)
  - 15 Navy gliders
  - 10 other NOAA-funded gliders
- Final year of FY22 Disaster Supplemental support
- Continued coordination with OAR



# Partnerships make it possible

Region	Tropical Atlantic & Caribbean	Mid-Atlantic Bight	Gulf of Mexico	South Atlantic Bight
Operator	<p>CARICOOS Cape Eleuthera Institute CIMAS ANAMAR</p>	<p>MARACOOS Ocean Information for a Changing World Mid-Atlantic Regional Association Coastal Ocean Observing System RUTGERS UNIVERSITY OF NEW JERSEY UNIVERSITY OF DELAWARE UMass VIMS Stony Brook University</p>	<p>GCOOS GULF OF MEXICO COASTAL OCEAN OBSERVING SYSTEM UNIVERSITY OF SOUTHERN MISSISSIPPI ATM</p>	<p>SECOORA Southeast Coastal Ocean Observing Regional Association Skidaway Institute of Oceanography UNIVERSITY OF GEORGIA</p>
Support	<p>University of the Virgin Islands IOCARIBE OCOVI UxS Operations Center</p>	<p>MONMOUTH UNIVERSITY OAP UxS Operations Center Global Ocean Monitoring and Observing</p>	<p>UxS Operations Center Shell</p>	<p>THE UNIVERSITY OF NORTH CAROLINA at CHAPEL HILL UxS Operations Center Global Ocean Monitoring and Observing</p>
Leveraged	<p>THE G. UNGER VETLESEN FOUNDATION NYSEDA BIOS HELMHOLTZ OCEAN WIND</p>	<p>USF UNIVERSITY OF SOUTH FLORIDA ROSE MARINE LABORATORY</p>	<p>USF UNIVERSITY OF SOUTH FLORIDA</p>	<p>USF UNIVERSITY OF SOUTH FLORIDA</p>



Lead by:



Questions?



## APPENDIX C

### Tools Information Sheet



## 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.

### OFFICE OF RESPONSE AND RESTORATION (OR&R)

- [ADIOS](#) The Automated Data Inquiry for Oil Spills (ADIOS) 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 (ADV) 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 (CAFE) 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 (CAMEO) 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

## OR&R DISASTER PREPAREDNESS PROGRAM

- [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 (ERMA) 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 (ESI) 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 (GNOME) 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 (MDMAP) 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 partner

## CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES (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.

## OR&R DISASTER PREPAREDNESS PROGRAM

- [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.

### OFFICE FOR COASTAL MANAGEMENT (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.
- [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.

### NATIONAL GEODETIC SURVEY (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

### OFFICE OF COAST SURVEY (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.

## OR&R DISASTER PREPAREDNESS PROGRAM

- [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 (NWS)

- [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. It is updated four times each day.
- [7-Day Graphical Tropical Weather Outlook\\*](#) Similar to the 2-Day Outlook, this product depicts areas of potential tropical development over the next seven days. It is updated four times each day.
- [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.
- [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.
- [Local NWS Weather Forecast Office Pages\\*](#) Click on your location on the map and it will take you to the local NWS Weather Forecast Office that covers that area. This is where all local tropical weather impacts and threats will be communicated for each storm.

## OR&R DISASTER PREPAREDNESS PROGRAM

- [National Water Prediction Service](#)\* This online map-based tool provides comprehensive information on official water level observations and forecasts for coastal and inland locations. It serves as the one-stop portal for NWS water prediction information, including observed precipitation, observed and forecast hydrograph at approximately 9,000 locations, impact and historical information at these locations, and flood inundation maps being phased in from 2023-2026 nationally.

### NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION (NCEI)

- [Severe Weather Access Tools](#) This online severe weather products site provide access to data on destructive storms and other severe weather. The interactive radar map, storm event database, and severe weather data inventory can be used to find detailed information about local, intense, often damaging storms such as thunderstorms, hail storms, and tornadoes, but can also describe more widespread events such as tropical systems, blizzards, nor'easters, and derechos.
- [Weather and Climate Toolkit](#) This online platform allows for users to visualize and export weather and climate data, including Radar, Satellite and Model data. The toolkit also provides access to weather/climate web services provided from NCEI and other organizations.

### FEDERAL PARTNER TOOLS

- [Coastal Change Hazards Portal](#) This U.S. Geological Survey (USGS) online portal allows users to have interactive access to coastal change science and data for our Nation's coasts. Explore data and products on extreme storms, shoreline change, and sea-level rise.
- [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.

## APPENDIX D

### 2024 Hurricane Summit Survey Report





# UNH Coastal Response Research Center 2024 Hurricane Pre-Summit Survey

**Prepared by:**

Zachary S. Azem, M.A.  
Sean P. McKinley, M.A.

The Survey Center  
University of New Hampshire  
March, 2024

*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.

Dr. Andrew E. Smith, Director  
UNH Survey Center  
9 Madbury Road, Suite 402  
Durham, New Hampshire 03824  
603-862-2226  
[Andrew.Smith@unh.edu](mailto:Andrew.Smith@unh.edu)

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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. On February 15, 2024, survey invitations were sent via email to three hundred eighteen (318) members of the hurricane response, preparedness, and recovery community, with reminders sent to non-responders on February 20th, February 26th, and February 29th. The survey was closed on March 4th. One hundred twenty-four (124) respondents completed the survey, resulting in a response rate of 39%. The following figures display survey results for each question. Appendix A contains detailed tabular results, Appendix B contains the open-ended responses, and Appendix C 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 among those who work for or are a contractor for NOAA, the majority 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 Gulf of Mexico, the nation as a whole, the Southeast, or the Pacific Islands. The vast majority say their agency or organization has a hurricane preparedness/response plan. Three in five 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. Three in five respondents also have a role working with Recovery Support Functions (RSF) with nearly half of those respondents engaging with the Natural and Cultural Resources RSF or general recovery support.

### Challenges

When asked what are the biggest challenges they anticipate during the 2024 hurricane season, nearly half say Funding and Other Resources and Individual Preparedness, Health, and Safety. About one-third say Communications and Organizational or Facility Resilience are among the biggest challenges, while only one in six say the same about Access and Usability of NOAA Tools and Services. Among those who identified Individual Preparedness, Health, and Safety as a challenge, respondents are most likely to say managing staff fatigue post storm and keeping family safe during active response or recovery activities are specific areas that contribute to this challenge. Among those who identified Organizational or Facility Resilience as a challenge, respondents are most likely to say unreliability or loss of utilities and facility/critical infrastructure and assets resilience to potential storm impacts are specific areas that contribute to this challenge. Among those who identified Communications as a challenge, respondents are most likely to say staff turnover, internally and externally, and lack of reliable communication with local, tribal, territorial, state, and/or federal partners are specific areas that contribute to this challenge. Among those who identified Funding and Other Resources as a challenge, respondents are most likely to say access to funding for response and recovery activities and resource limitations are specific areas that contribute to this challenge. Among those who identified Access and Usability of NOAA Tools and Services as a challenge, respondents are most likely to say personnel trained to use NOAA tools and services and staff being aware of the range of NOAA tools and services available are specific areas that contribute to this challenge. Respondents are most likely to have successfully implemented mitigation strategies in the areas of Individual Preparedness, Health, and Safety, and Communications in prior hurricane seasons.

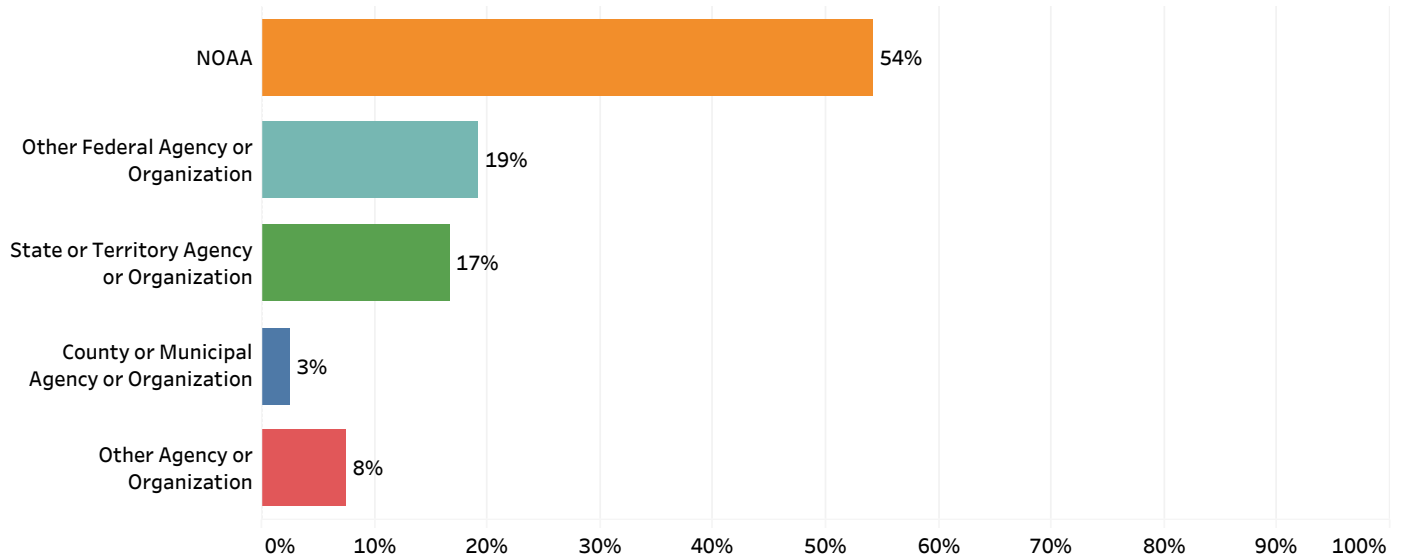
### Hurricane/Disaster Preparedness

Nearly all respondents say that they personally and their agency or organization is very or somewhat prepared for fulfilling their hurricane response roles and responsibilities. Half of respondents say they feel their organization's preparedness for fulfilling their hurricane response roles have improved while two in five say they have stayed the same. Among those who say their preparedness has improved, respondents are most likely to mention a review or update of plans, coordination, and training. Among those who say their preparedness stayed the same, they are most likely to cite staffing as an existing limitation they still face. When asked which specific disaster response and planning tools or products they would like more information or training on during the summit, at least one-third would more information or training on Unmanned Aerial Systems (41%), Vessel and Debris Response (39%), Remote Sensing Division Photogrammetry (38%), NWS Tropical Products and Services (36%), Environmental Response Management Application (36%), and NOAA Center for Operational Oceanographic Products and Services (33%).

## Organizational Activities

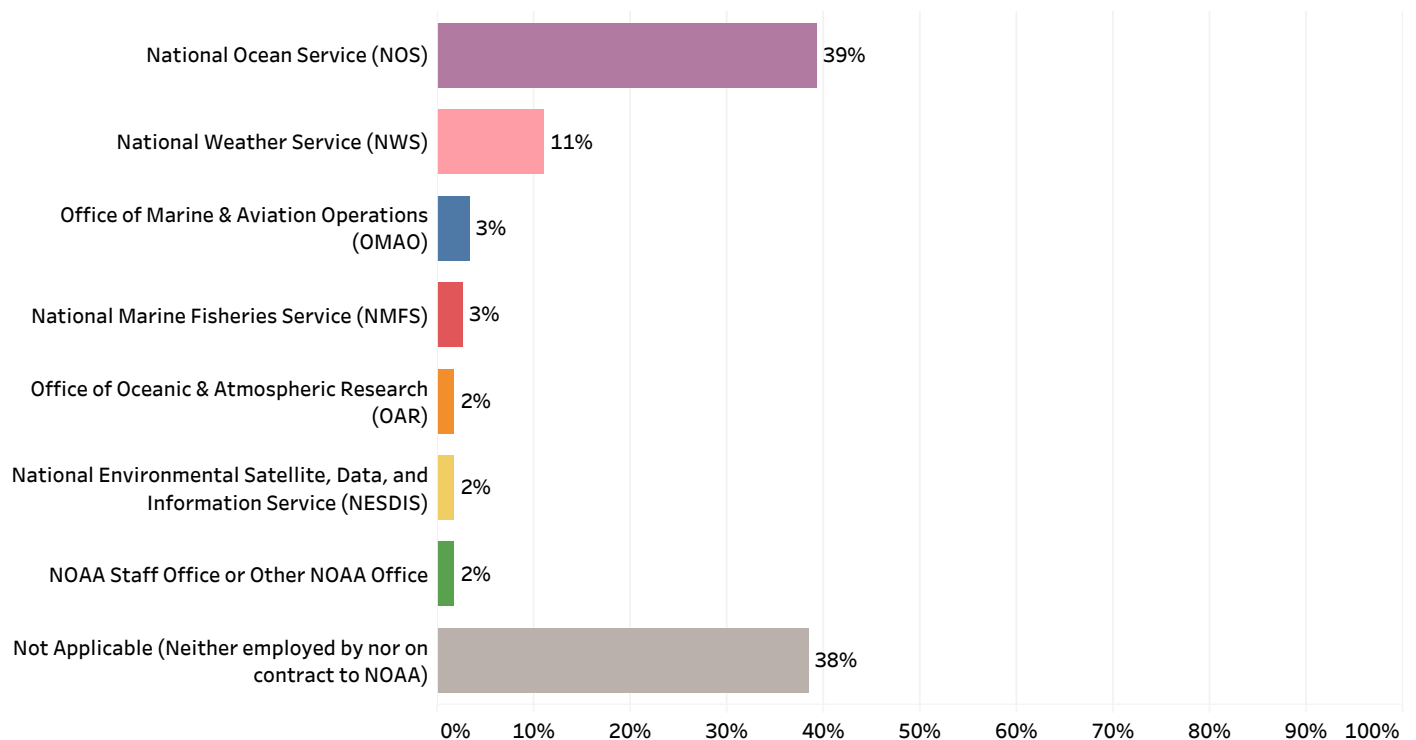
Just over half of respondents (54%) say that their organization or agency is NOAA and 19% say they are part of another federal agency or organization. Seventeen percent are part of a state or territory agency or organization, 3% are part of an agency or organization at the county or municipal level, and 8% are part of a different agency or organization.

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



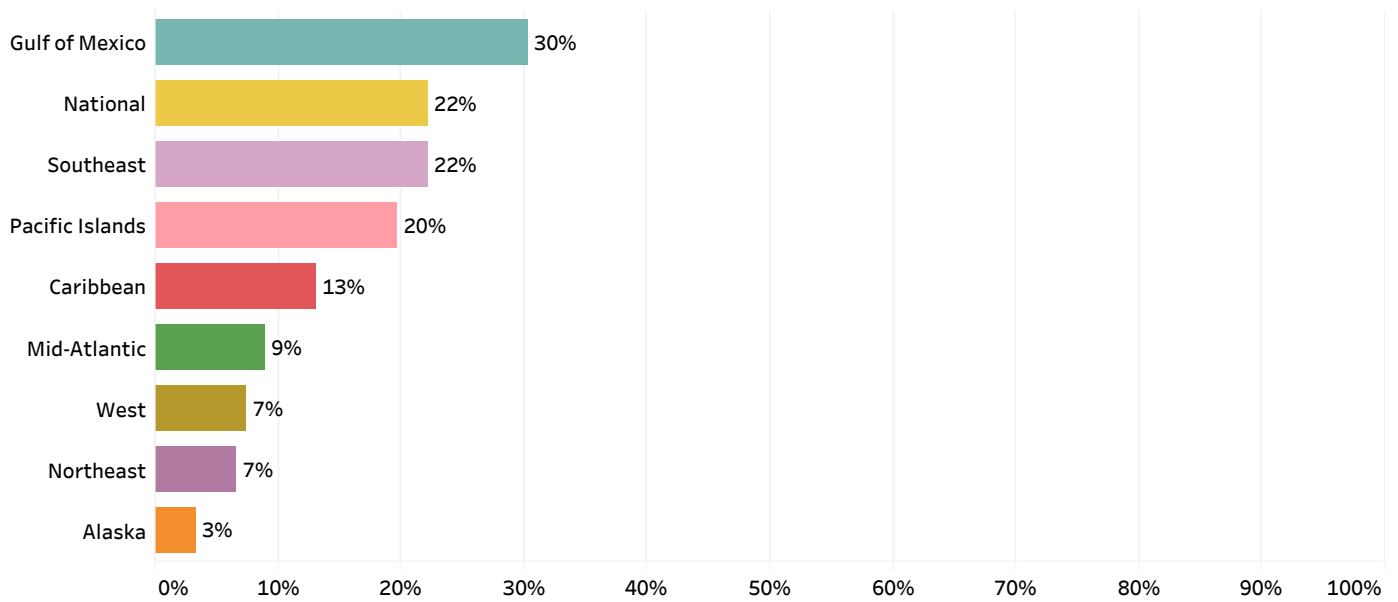
Two in five respondents (39%) say that the National Ocean Service is their line office, while far fewer say that the National Weather Service (11%), Office of Marine & Aviation Operations (3%), National Marine Fisheries Service (3%), Office of Oceanic & Atmospheric Research (2%), or National Environmental Satellite, Data, and Information Service (2%) is their line office. Two percent of respondents say that they work in the NOAA Staff Office or another NOAA Office while 38% say the question is not applicable because they are neither employed by nor on contract to NOAA.

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



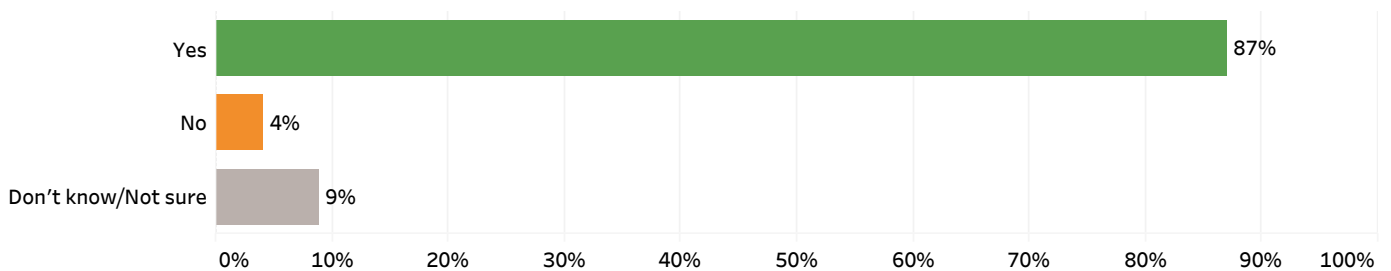
Three in ten respondents (30%) say that they represent the Gulf of Mexico while 22% say that they represent the nation, 22% represent the Southeast, and 20% represent the Pacific Islands. Fewer respondents say that they represent the Caribbean (13%), the Mid-Atlantic (9%), the West (7%), the Northeast (7%), or Alaska (3%).

**Figure 3: What region or state do you represent?**



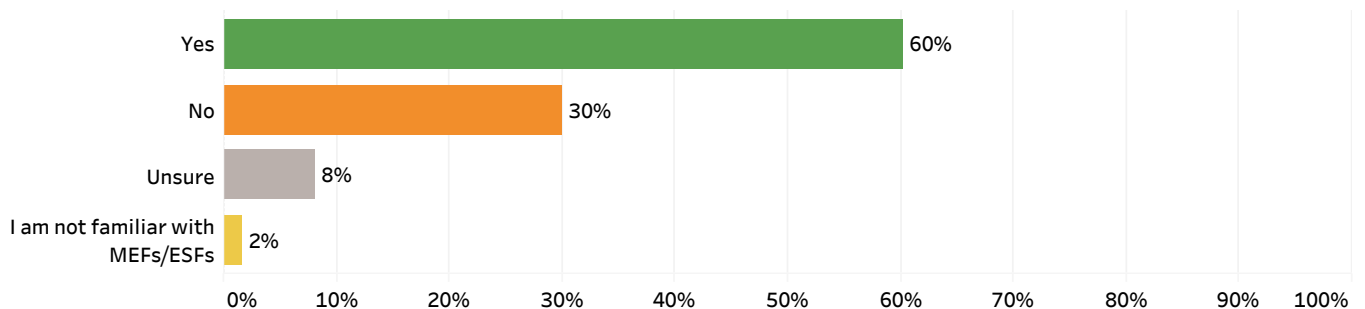
The vast majority of respondents (87%) say that their organization or agency has a hurricane preparedness or response plan that they are aware of, 4% say they don't have one, and 9% don't know or are unsure.

**Figure 4: Does your organization or agency have a hurricane preparedness/response plan that you are aware of?**



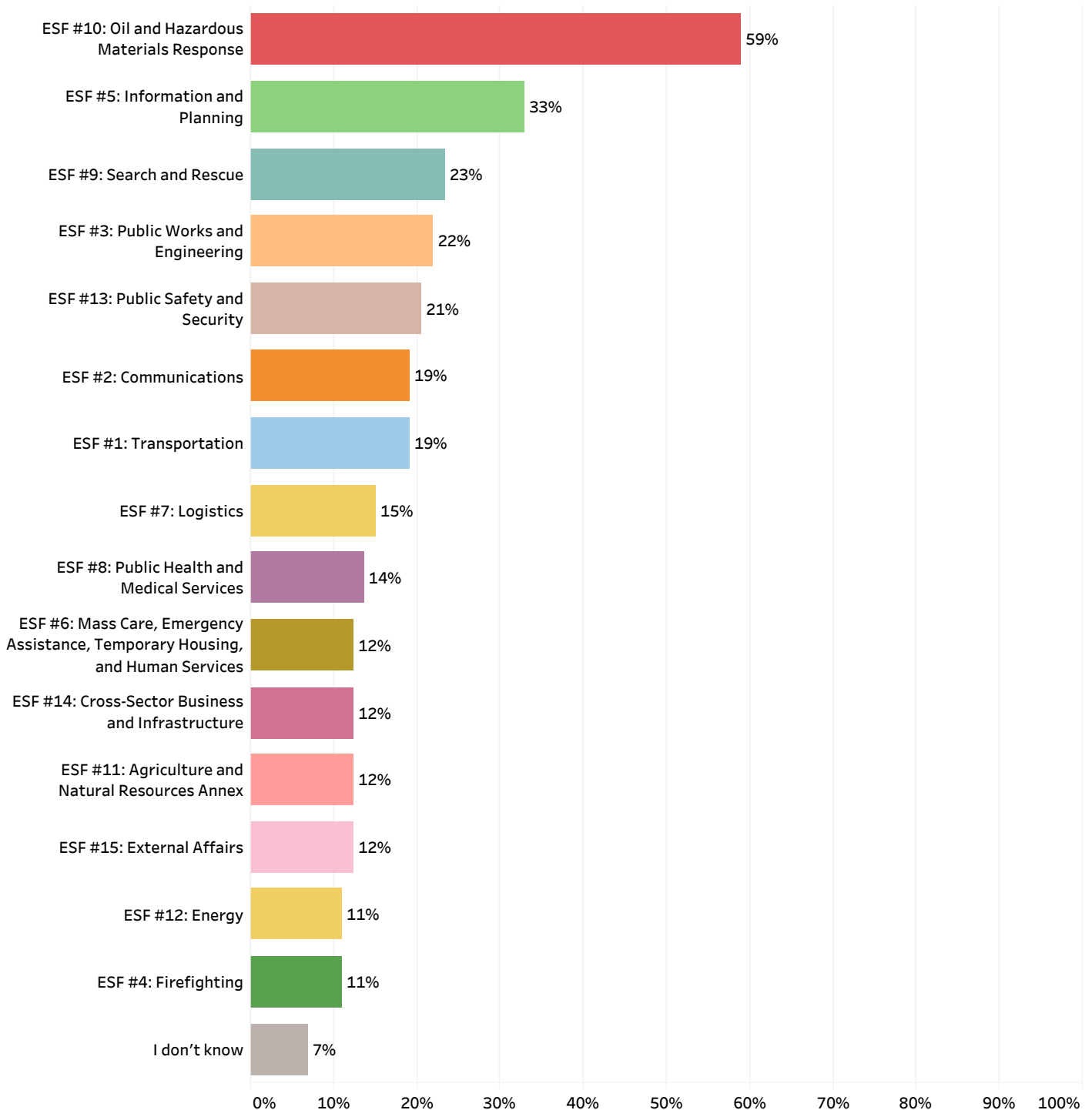
Three in five respondents (60%) say that in their position with their organization or agency, they have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response, 30% do not have this kind of role, 8% are unsure, and 2% say they are not familiar with MEFs or ESFs.

**Figure 5: In your position within your organization or agency, do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response?**



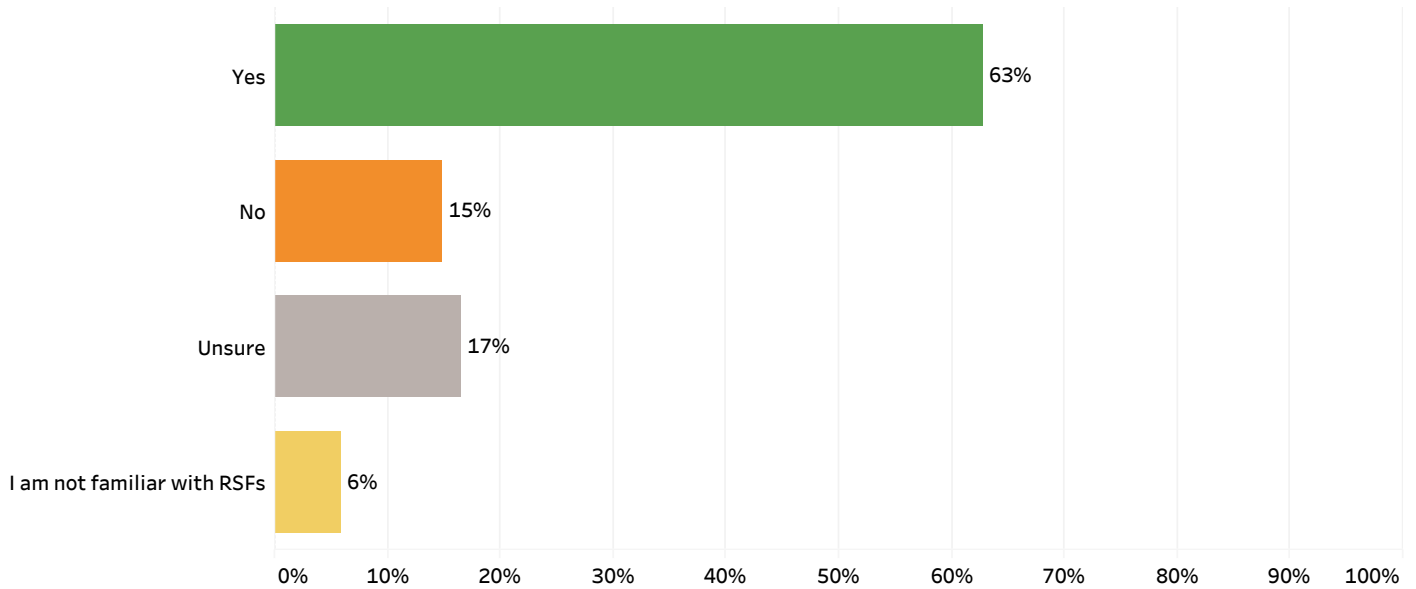
Among respondents who indicate they have an MEF or ESF role in hurricane response (N=73), more than half (59%) say that their office has or would engage with ESF #10: Oil and Hazardous Materials Response while one-third (33%) has or would engage with ESF #5: Information and Planning. About one-quarter have or would engage with ESF #9: Search and Rescue (23%), ESF #3: Public Works and Engineering (22%), or ESF #13: Public Safety and Security (23%). Fewer respondents have or would engage with ESF #2: Communications (19%), ESF #1: Transportation (19%), ESF #7: Logistics (15%), ESF #8: Public Health and Medical Services (14%), ESF #6: Mass Care, Emergency Assistance, Temporary Housing, and Human Services (12%), ESF #14: Cross-Sector Business and Infrastructure (12%), ESF #11: Agriculture and Natural Resources Annex (12%), ESF #15: External Affairs (12%), ESF #12: Energy (11%), or ESF #4: Firefighting (11%).

Figure 6: Please select the ESFs your office has or would engage with: (Select all that apply)



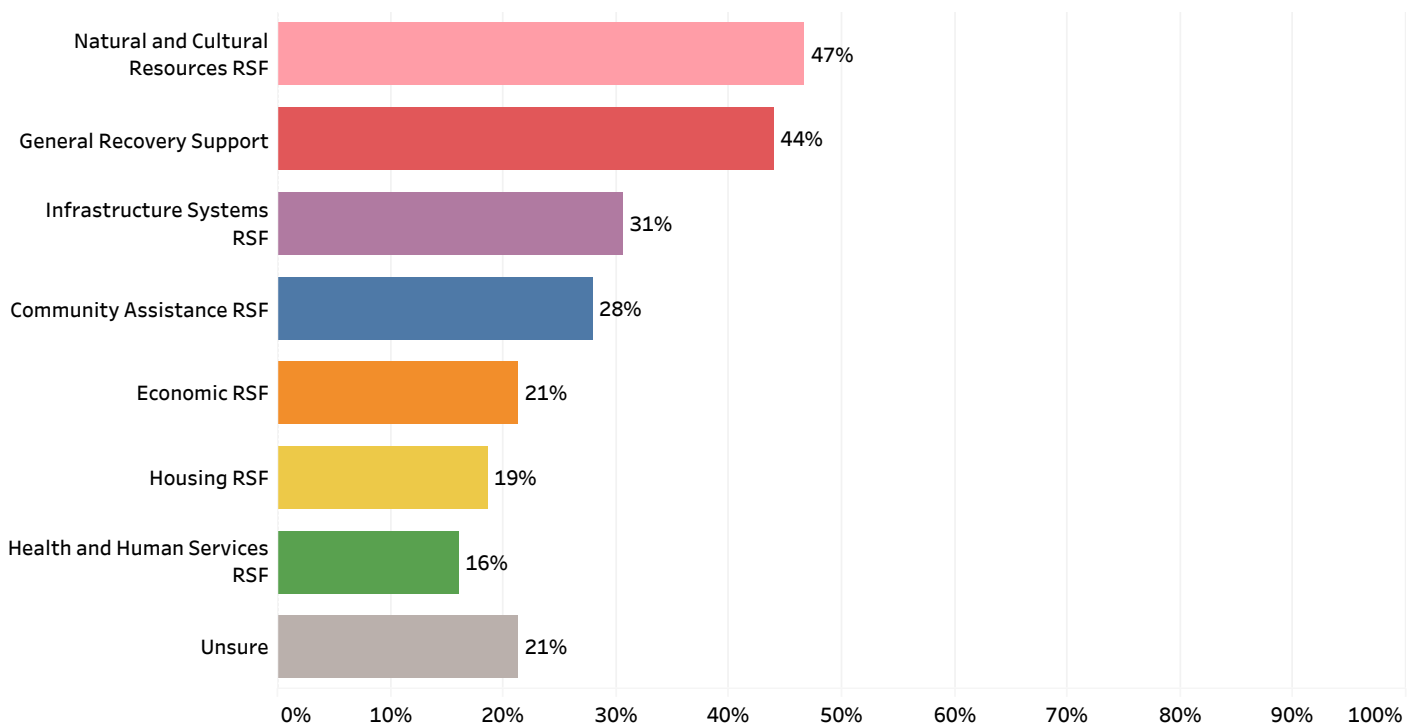
Nearly two-thirds of respondents (63%) say that their organization or agency have a role working with Recovery Support Functions (RSF) or generally supporting FEMA disaster recovery operations, 15% say their organization or agency does not have this role, 17% are unsure if they have this role, and 6% are not familiar with RSFs.

**Figure 7: Does your organization or agency have a role working with Recovery Support Functions (RSF) or generally supporting FEMA disaster recovery operations?**



Among respondents who say that their organization or agency has a role working with RSFs (N=75), nearly half of respondents say their office has or would engage with the Natural and Cultural Resources RSF (47%) or with General Recovery Support (44%). Less than one-third of respondents say their office has or would engage with the Infrastructure Systems RSF (31%), Community Assistance RSF (28%), Economic RSF (21%), Housing RSF (19%), or Health and Human Services RSF (16%). One-fifth of respondents (21%) are unsure of the RSFs their office has or would engage with.

**Figure 8: Please select the RSFs your office has or would engage with: (Select all that apply)**

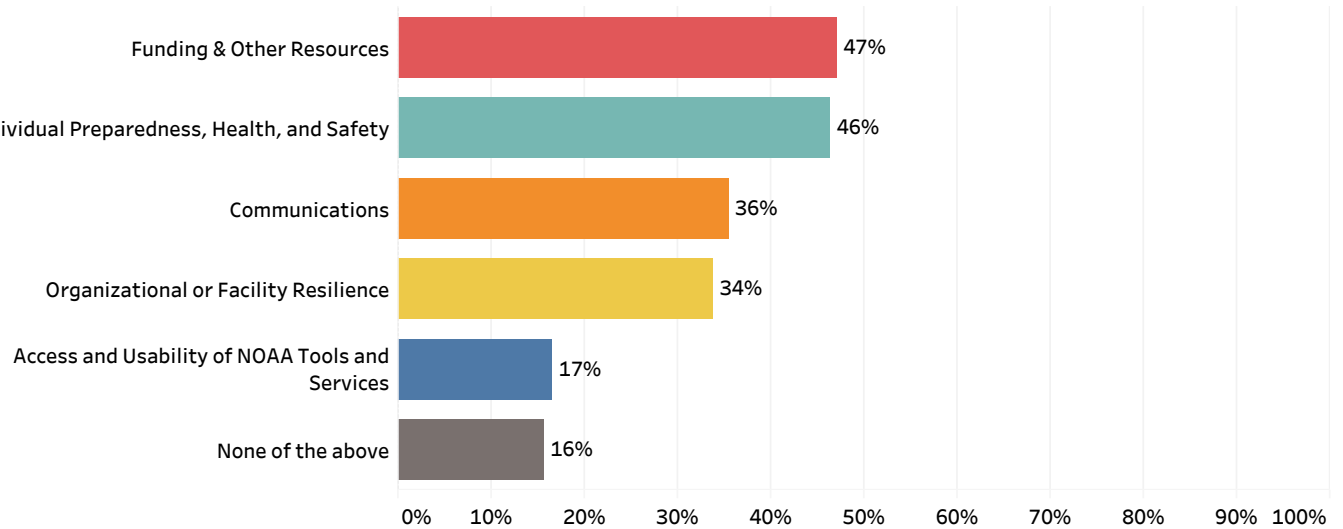




## Challenges

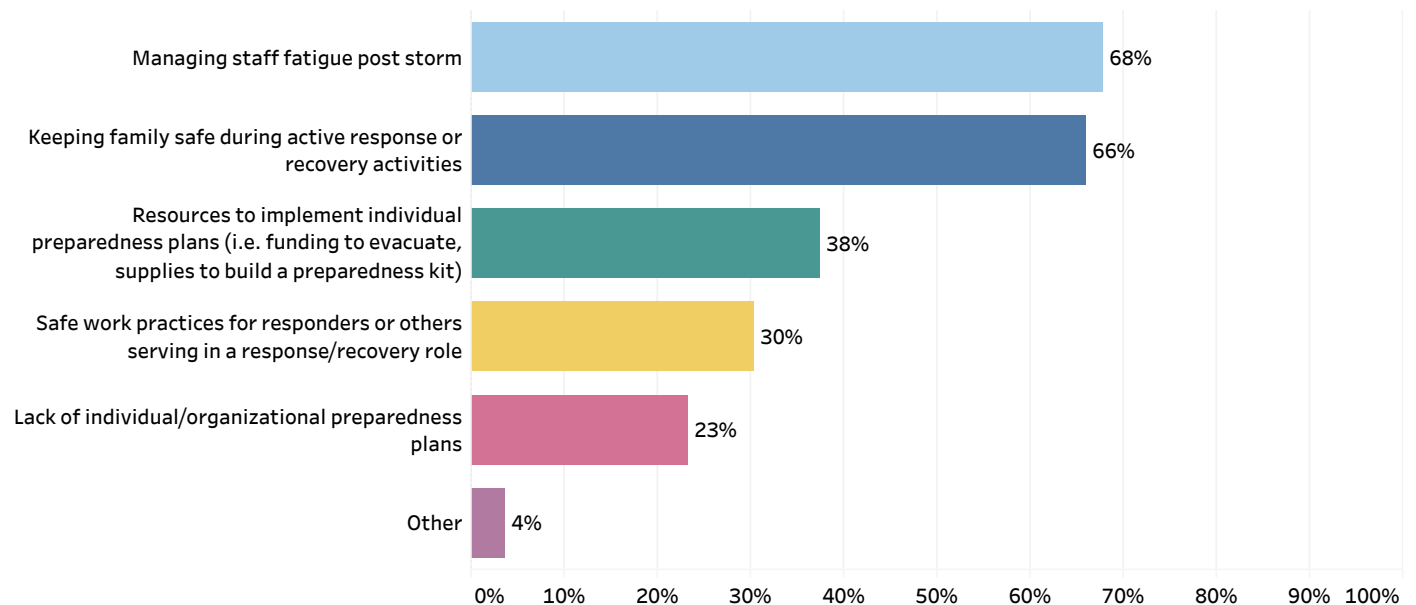
Nearly half of respondents say that Funding & Other Resources (47%) and Individual Preparedness, Health, and Safety (46%) are among the biggest challenges they anticipate during the 2024 hurricane season while about one-third cite Communications (36%) and Organizational or Facility Resilience (34%) as among the biggest challenges. Only 17% say that Access and Usability of NOAA Tools and Services is among the biggest challenges during the 2024 hurricane season while 16% say none of the above are among the biggest challenges.

Figure 9: Select the biggest challenges you anticipate during the 2024 hurricane season (Select all that apply)



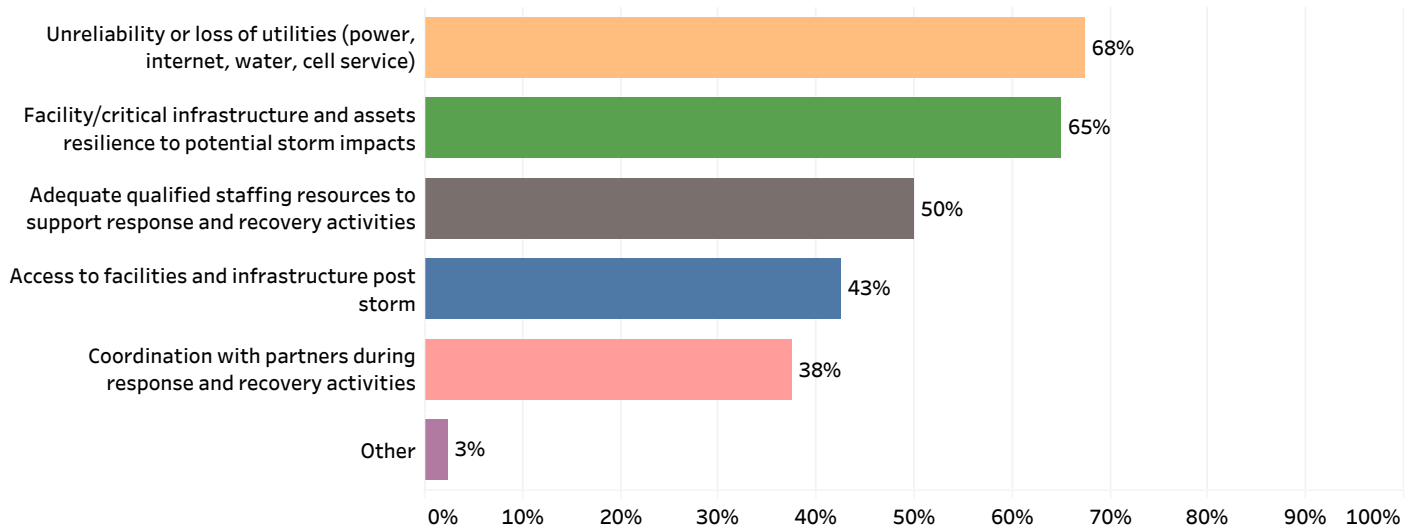
Among respondents who said Individual Preparedness, Health, and Safety is one of the biggest challenges during the 2024 hurricane season (N=56), two-thirds say that managing staff fatigue post storm (68%) and keeping family safe during active responses or recovery activities (66%) are specific areas contributing to this challenge. Fewer respondents say that resources to implement individual preparedness plans (38%), safe work practices for responders or others serving in a response/recovery role (30%), or a lack of individual/organizational preparedness plans (23%) are specific areas that contribute to this challenge.

Figure 10: You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas contribute to this challenge? (Select all that apply)



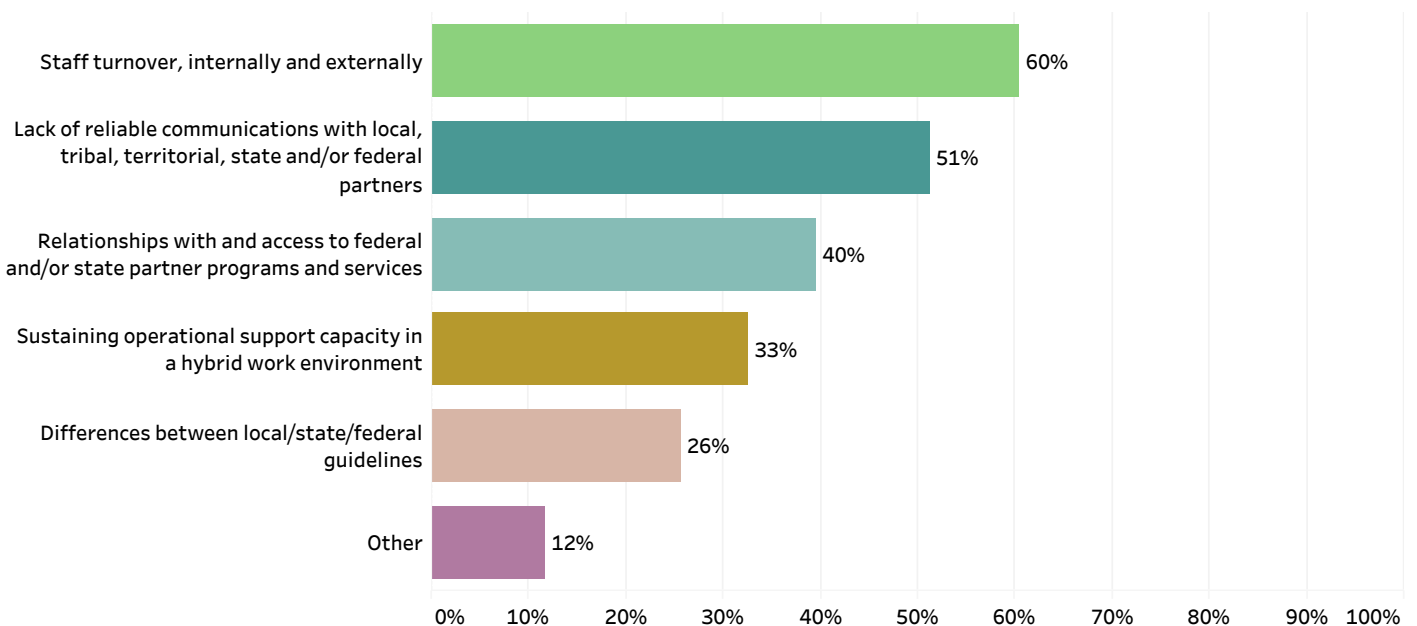
Among respondents who said Organizational or Facility Resilience is one of the biggest challenges during the 2024 hurricane season (N=40), two-thirds say that unreliability or loss of utilities (68%) and facility/critical infrastructure and assets resilience to potential storm impacts (65%) are specific areas contributing to this challenge, while half (50%) mention adequate qualified staffing resources to support response and recovery activities. Fewer respondents say that access to facilities and infrastructure post storm (43%) or coordination with partners during response and recovery activities (38%) are specific areas that contribute to this challenge.

**Figure 11: You identified 'Organizational or Facility Resilience' as a challenge. What specific areas contribute to this challenge? (Select all that apply)**



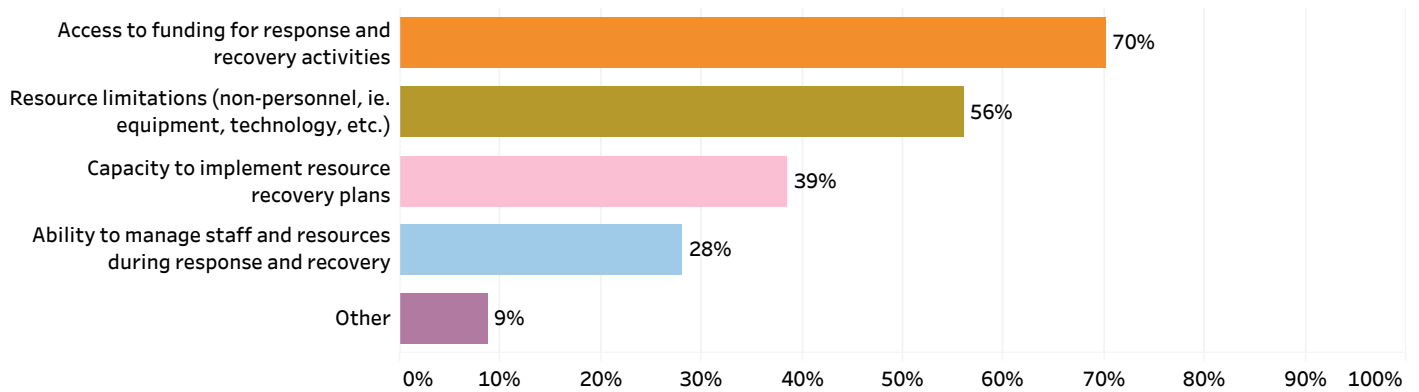
Among respondents who said Communication is one of the biggest challenges during the 2024 hurricane season (N=43), three in five (60%) say that staff turnover, internally and externally, is a specific area contributing to this challenge while half (51%) say the same about a lack of reliable communications with local, tribal, territorial, state and/or federal partners. Fewer respondents say that relationships with and access to federal and/or state partner programs and services (40%), sustaining operational support capacity in a hybrid work environment (33%), or differences between local, state, and federal guidelines (26%) are specific areas that contribute to this challenge.

**Figure 12: You identified 'Communications' as a challenge. What specific areas contribute to this challenge? (Select all that apply)**



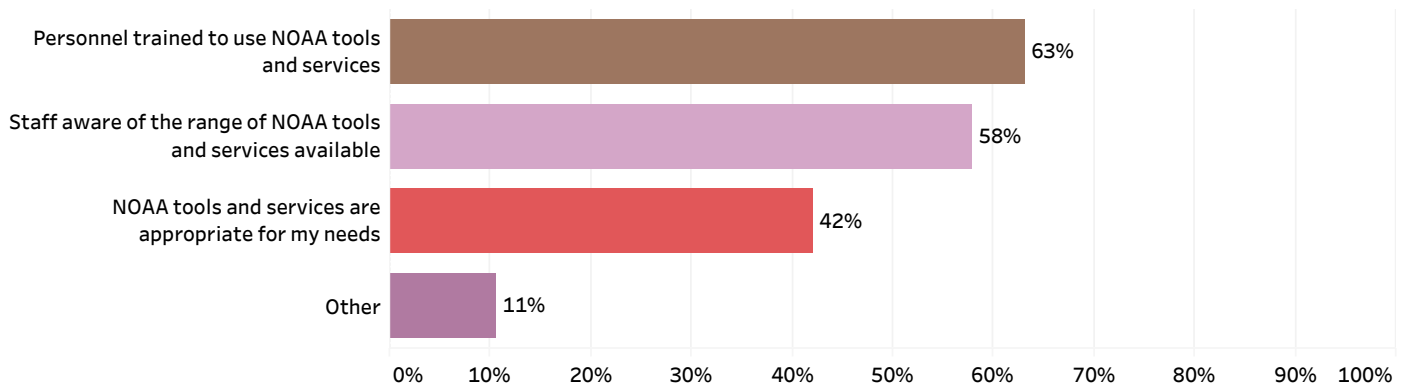
Among respondents who said Funding & Other Resources is one of the biggest challenges during the 2024 hurricane season (N=57), the majority say that access to funding for response and recovery activities (70%) and resources limitations (56%) are specific areas contributing to this challenge. Fewer respondents say the capacity to implement resource recovery plans (39%) or the ability to manage staff and resources during response and recovery (28%) are specific areas that contribute to this challenge.

**Figure 13: You identified 'Funding & Other Resources' as a challenge. What specific areas contribute to this challenge? (Select all that apply)**



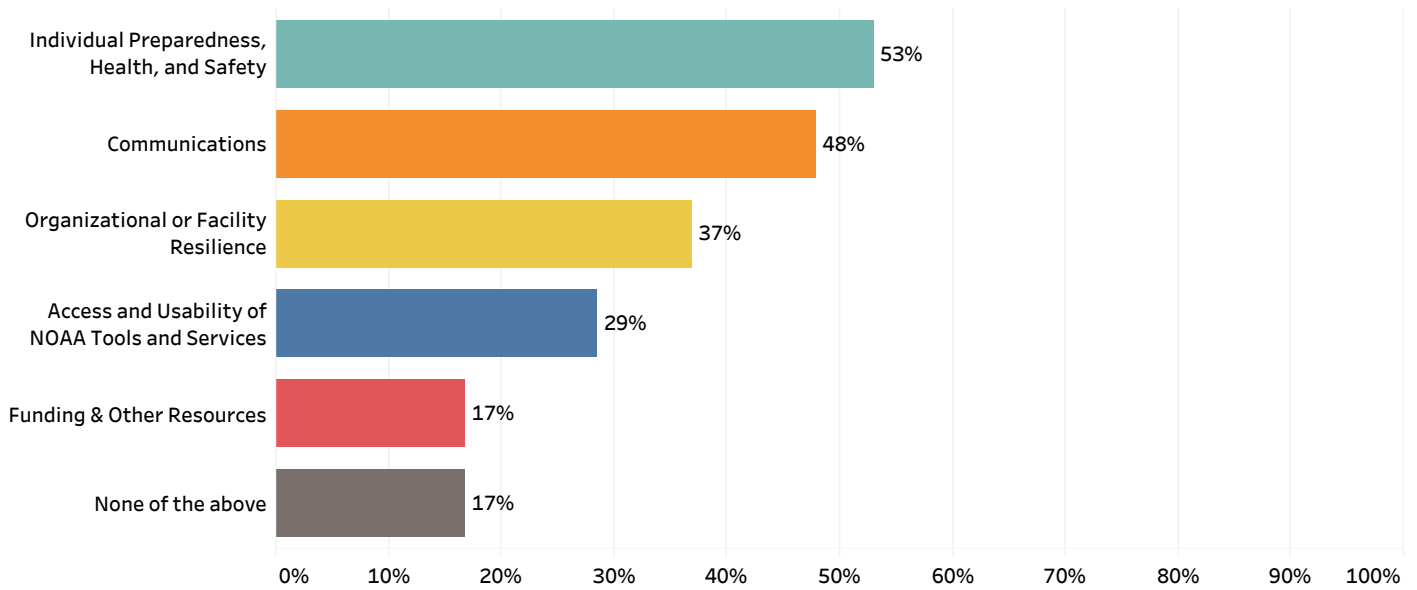
Among respondents who said Access and Usability of NOAA Tools and Services is one of the biggest challenges during the 2024 hurricane season (N=19), the majority say that personnel trained to use NOAA tools and services (63%) and staff being aware of the range of NOAA tools and services available (58%) are specific areas contributing to this challenge while 42% mention NOAA tools and services are appropriate for their needs.

**Figure 14: You identified 'Access and Usability of NOAA Tools and Services' as a challenge. What specific areas contribute to this challenge? (Select all that apply)**



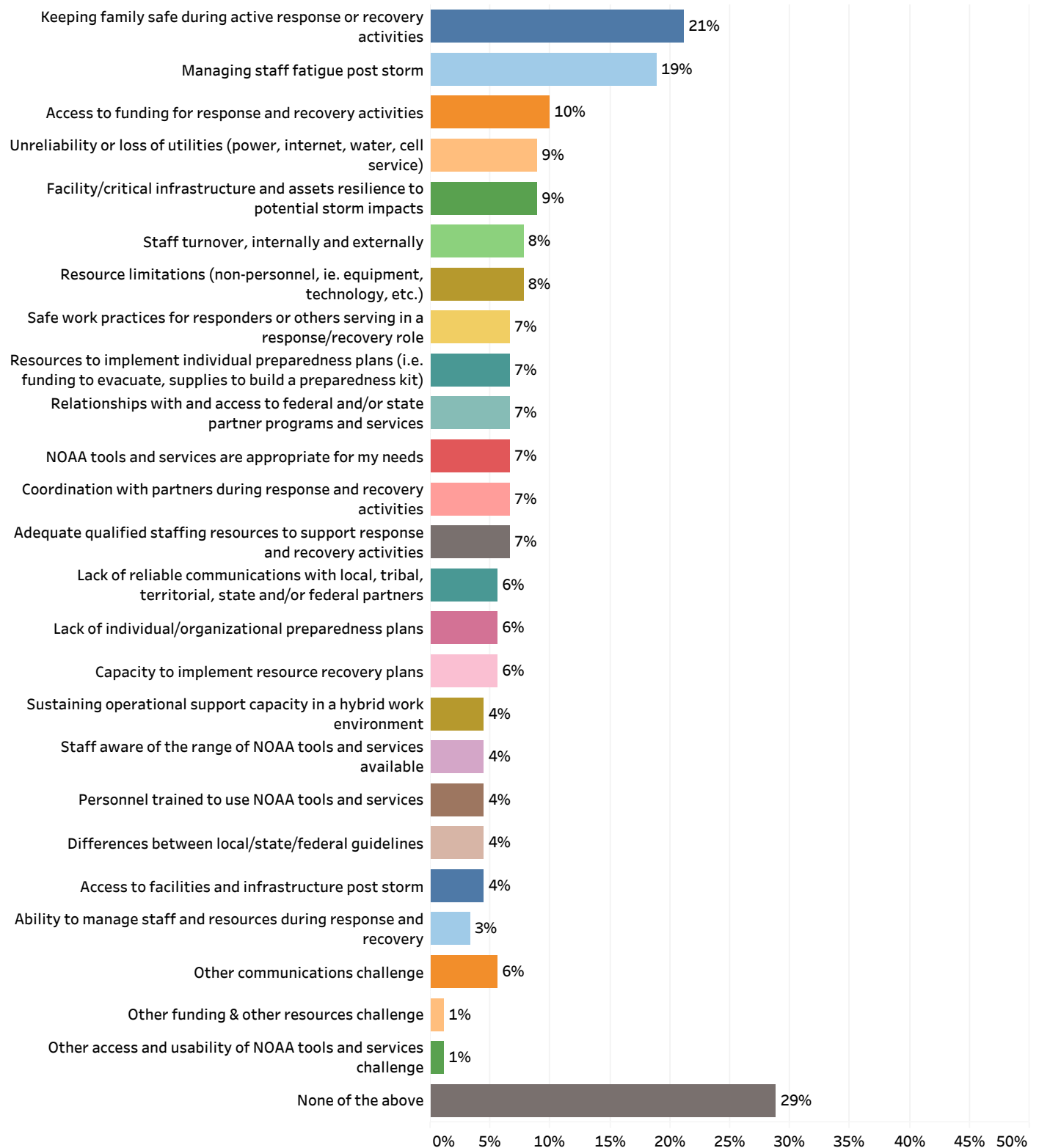
In past hurricane seasons, roughly half of respondents say that they have successfully implemented mitigation strategies in areas of Individual Preparedness, Health, and Safety (53%) and Communications (48%). Fewer respondents have successfully implemented mitigation strategies in the areas of Organizational or Facility Resilience (37%), Access and Usability of NOAA Tools and Services (29%), or Funding & Other Resources (17%). Seventeen percent of respondents say that they have not successfully implemented mitigation strategies in any of these areas.

**Figure 15: Looking at prior hurricane seasons, for which of the following general challenges have you successfully implemented mitigation strategies? (Select all that apply)**



When asked which challenges that respondents have mitigation strategies for and plan on implementing in the future, respondents were more likely to say they have mitigation strategies for keeping family safe during active response or recovery activities (21%), managing staff fatigue post storm (19%), access to funding for response and recovery activities (10%), unreliability or loss of utilities (9%), and facility/critical infrastructure and assets resilience to potential storm impacts (9%).

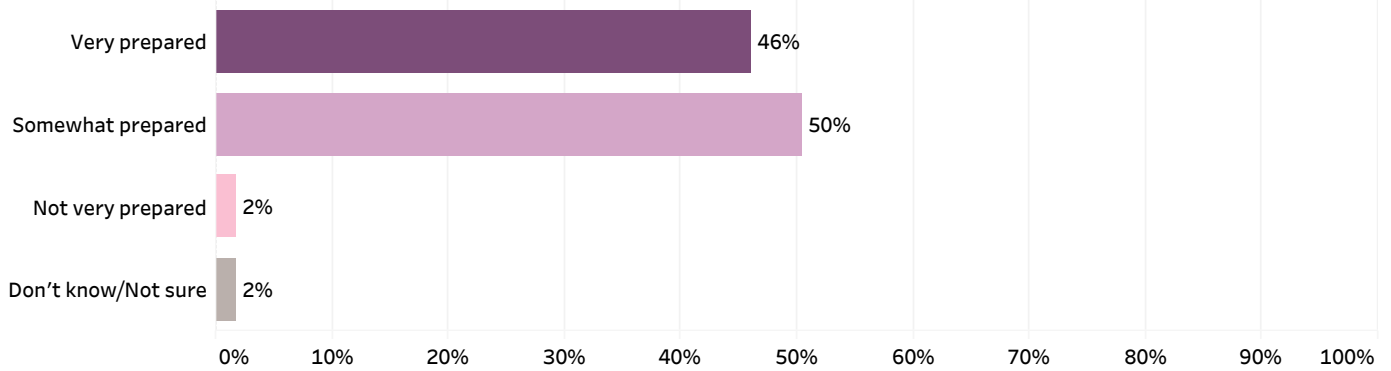
**Figure 16: Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future: (Select all that apply)**



## Hurricane/Disaster Preparedness

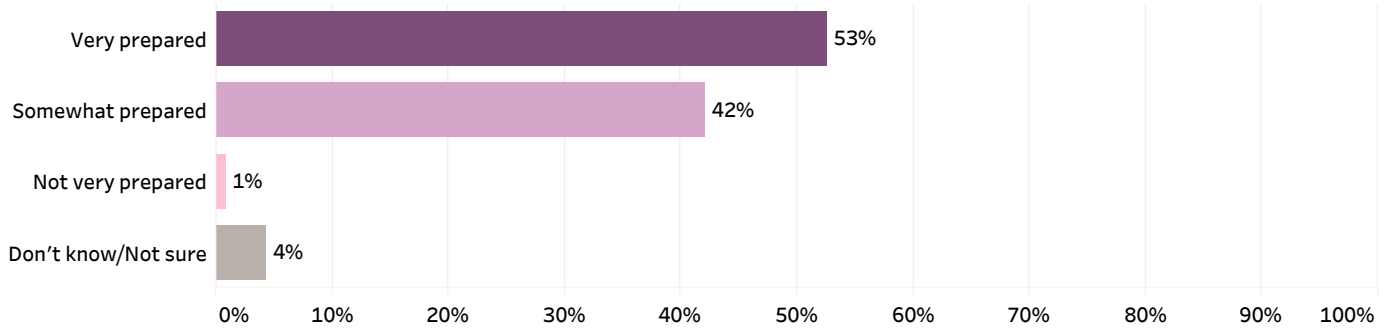
Forty-six percent of respondents consider themselves very prepared for fulfilling their hurricane response and recovery roles and responsibilities, 50% consider themselves to be somewhat prepared, 2% are not very prepared, and 2% don't know how prepared they are.

**Figure 17: How prepared are you personally for fulfilling your hurricane response and recovery roles and responsibilities?**



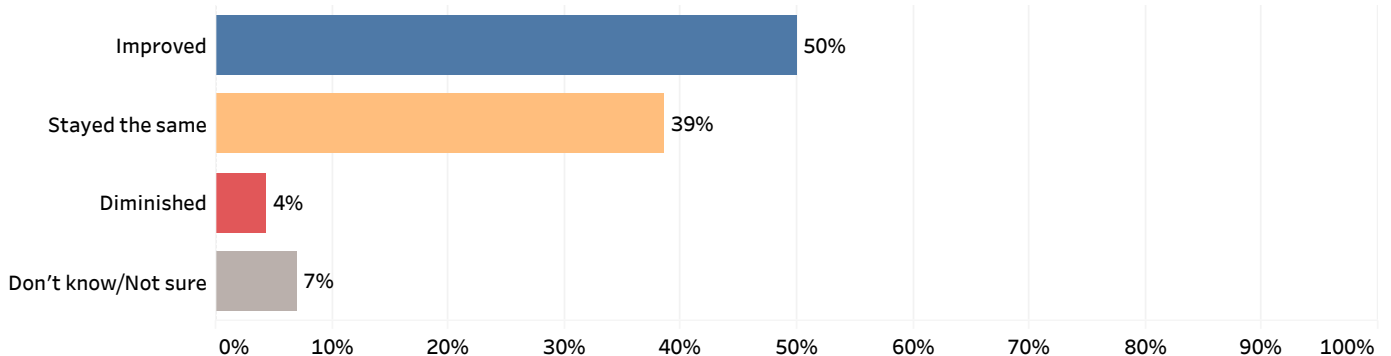
Fifty-three percent of respondents say that their organization is very prepared for fulfilling its hurricane response and recovery roles and responsibilities, 42% consider their organization to be somewhat prepared, 1% are not very prepared, and 4% don't know how prepared their organization is.

**Figure 18: How prepared is your organization for fulfilling its hurricane response and recovery roles and responsibilities?**



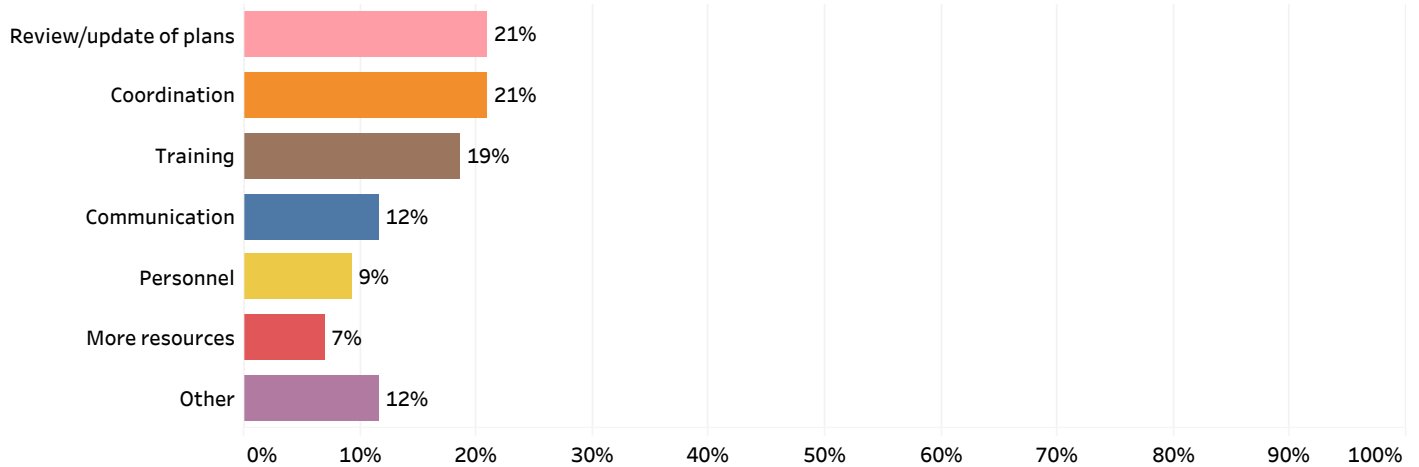
Half of respondents (50%) say that their organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities has improved over the past year, 4% say it has diminished, 39% say it has stayed the same, and 7% don't know or are unsure.

**Figure 19: Over the past year, do you feel your organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities has improved, diminished, or stayed the same?**



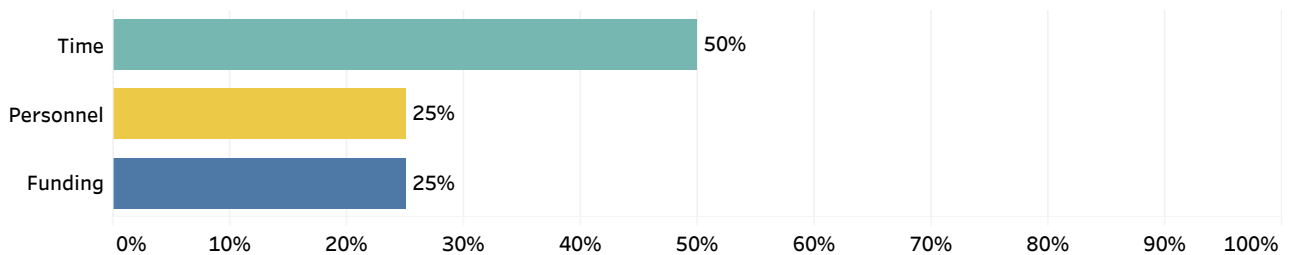
Among respondents who say that their organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities has improved over the past year (N=43), 21% each say the improvements made to their organization's preparedness were a review or update of plans or to their coordination. Nineteen percent of respondents say they made improvements to training while fewer mention improvements to communication (12%), personnel (9%), or adding more resources (7%).

Figure 20: What improvements were made to your organization's preparedness? (Coded)



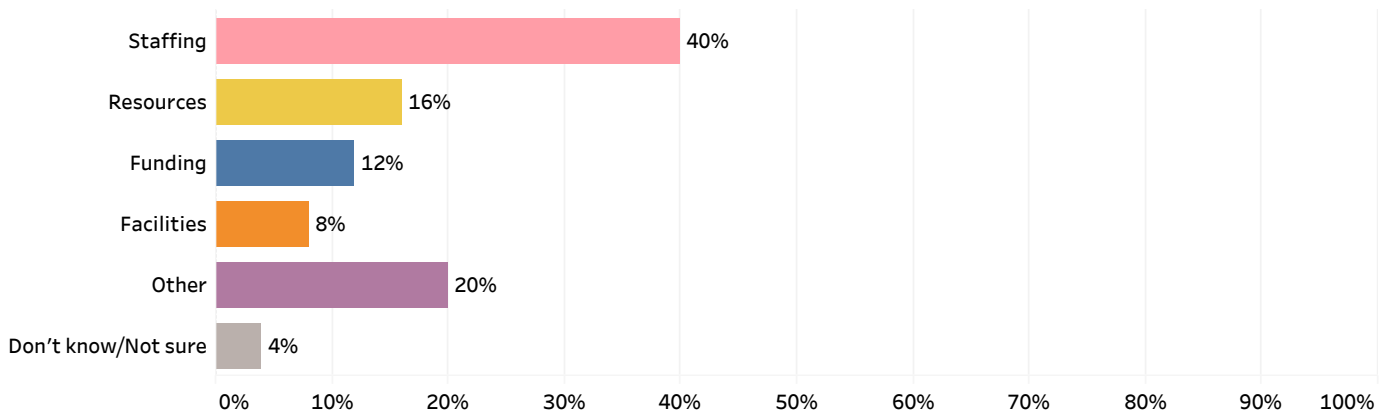
Among respondents who say that their organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities has been diminished over the past year (N=4), 50% say this was due to a lack of sufficient time, 25% due to personnel, and 25% due to funding.

Figure 21: What challenges led to your organization's preparedness being diminished? (Coded)



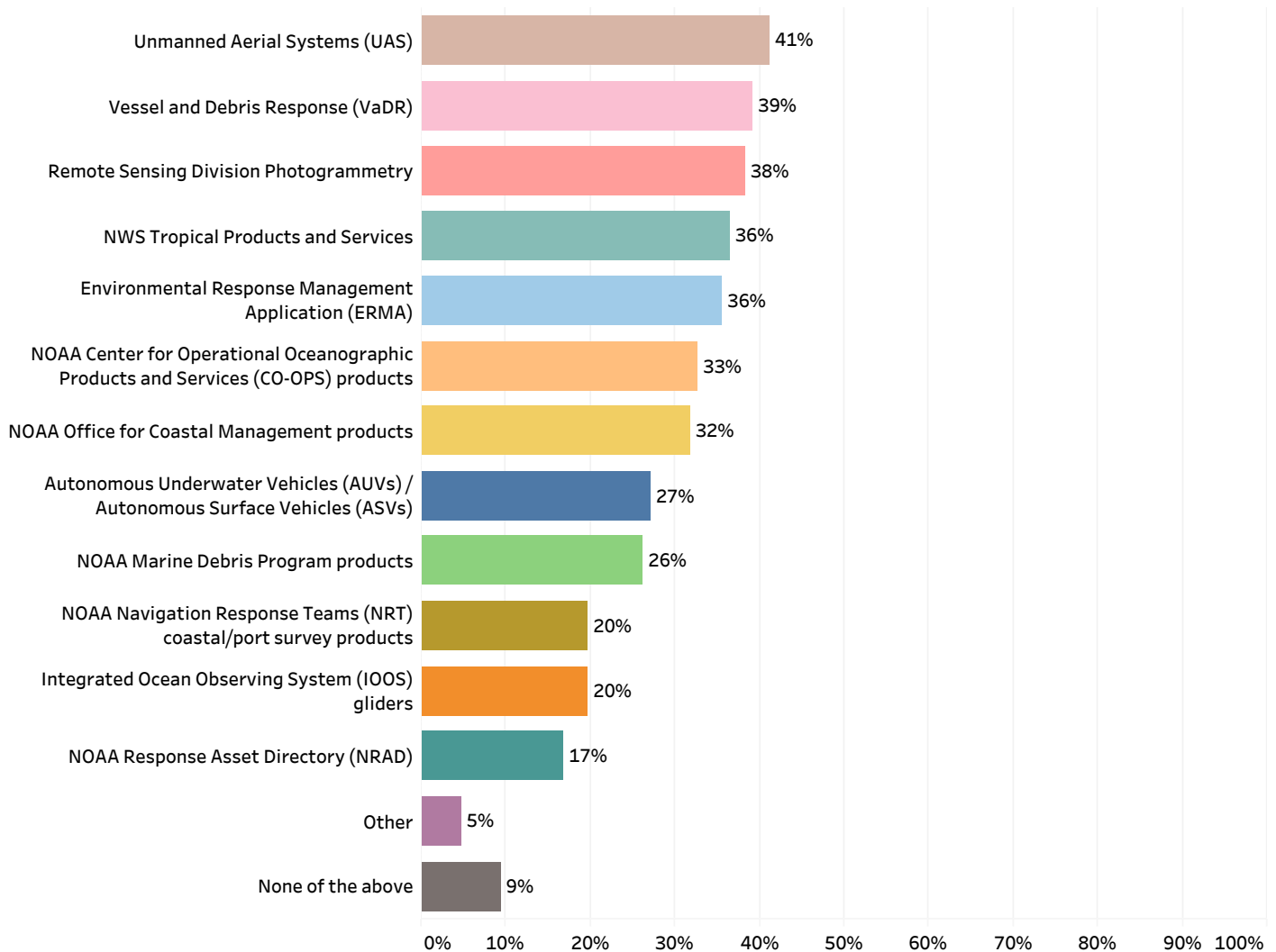
Among respondents who say that their organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities have stayed the same (N=25), 40% say staffing is an existing limitation their organization faces regarding preparedness while 16% mention resources, 12% mention funding, and 8% mention facilities.

Figure 22: What are the existing limitations your organization faces regarding its preparedness? (Coded)



When asked which specific disaster response and planning tools or products they would like more information or training on during the summit, at least one-third would more information or training on Unmanned Aerial Systems (41%), Vessel and Debris Response (39%), Remote Sensing Division Photogrammetry (38%), NWS Tropical Products and Services (36%), Environmental Response Management Application (36%), and NOAA Center for Operational Oceanographic Products and Services (33%). Fewer respondents would like more information or training on NOAA Office for Coastal Management products (32%), Autonomous Underwater or Surface Vehicles (27%), NOAA Marine Debris Program products (26%), NOAA Navigation Response Teams coastal/port survey products (20%), Integrated Ocean Observing System gliders (20%), or NOAA Response Asset Directory (17%).

**Figure 23: Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit? (Select all that apply)**



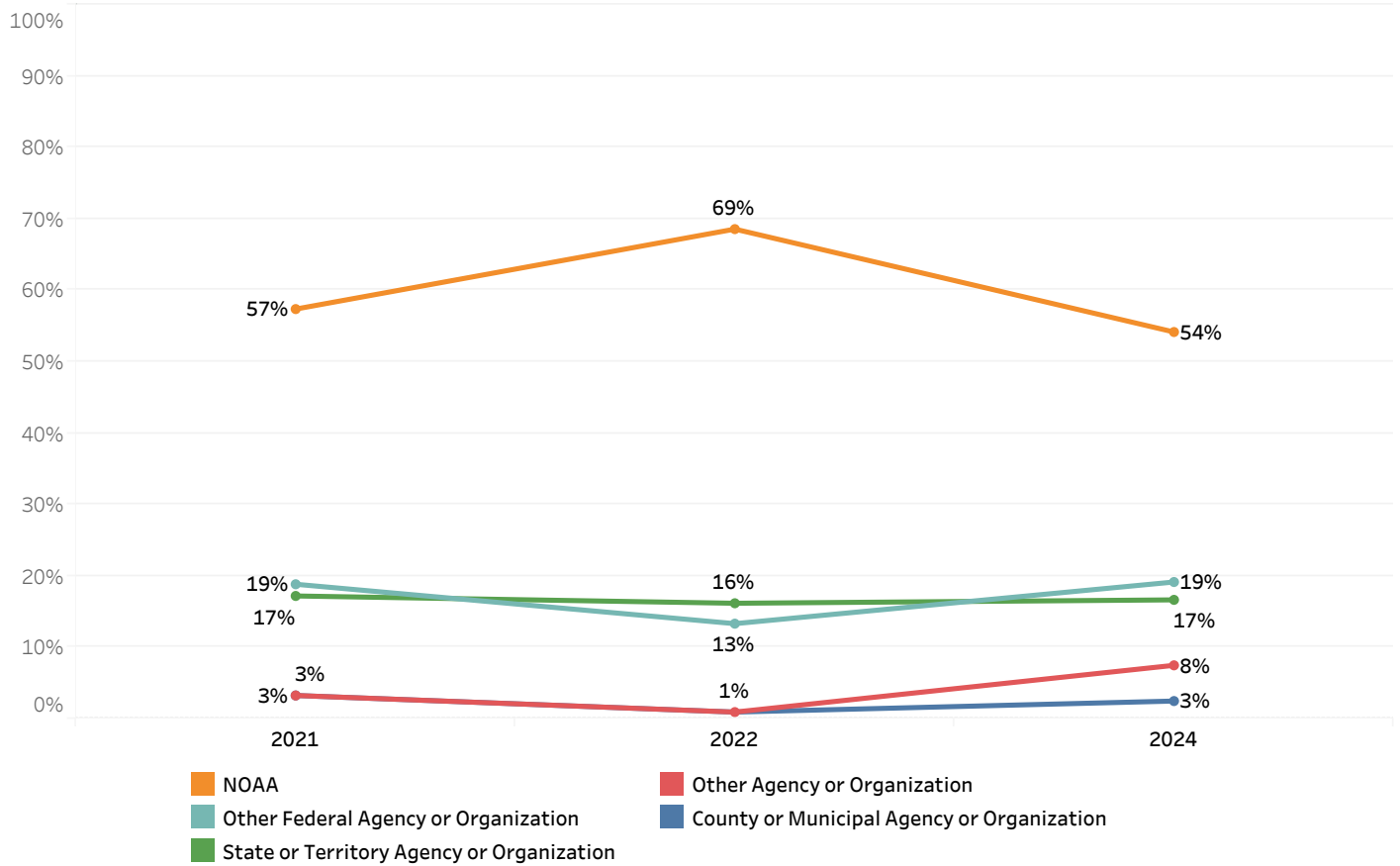


## Comparisons to Previous Surveys

There were a few similar questions asked on the 2021 and 2022 iterations of this survey. Those data points are provided in the following charts.

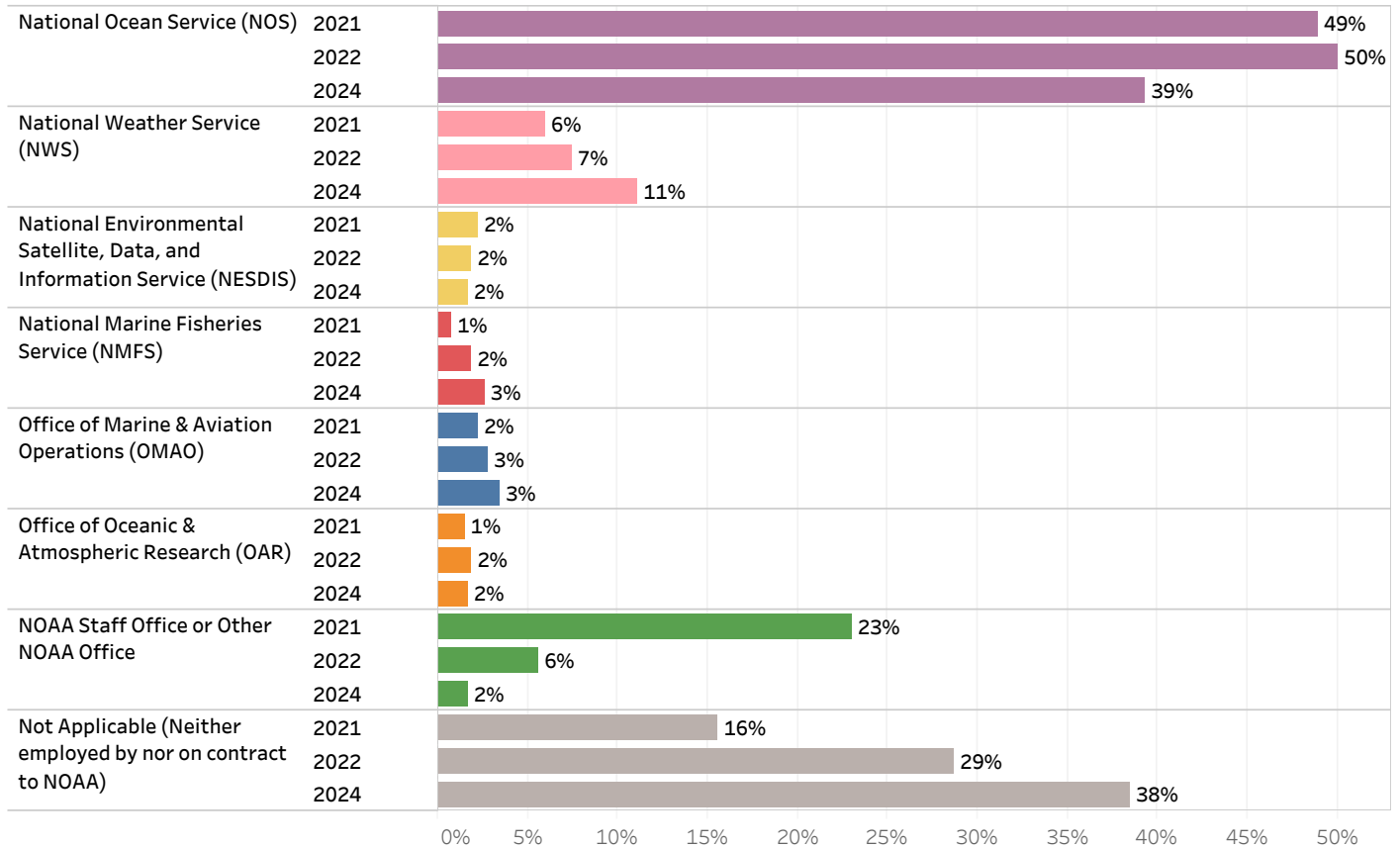
Respondents are less likely to say their agency or organization is NOAA than in 2022 and are slightly more likely to say their agency is federal agency other than NOAA.

Figure 24: Organization/Agency - By Year



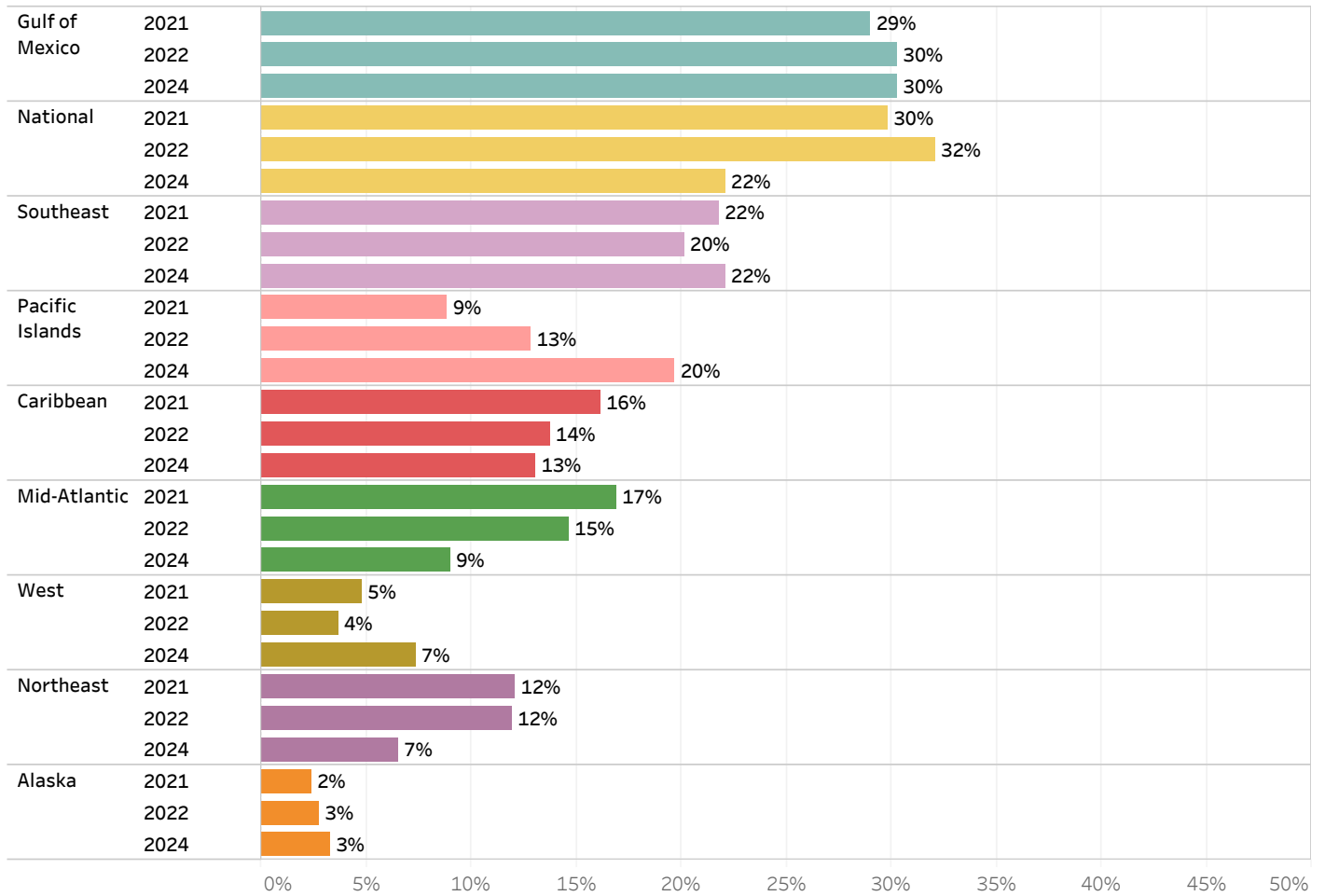
Respondents are slightly less likely to have the National Ocean Service as their line office than in previous surveys and are slightly more likely to have their line office be the National Weather Service or for the question to not be applicable.

Figure 25: Line Office - By Year



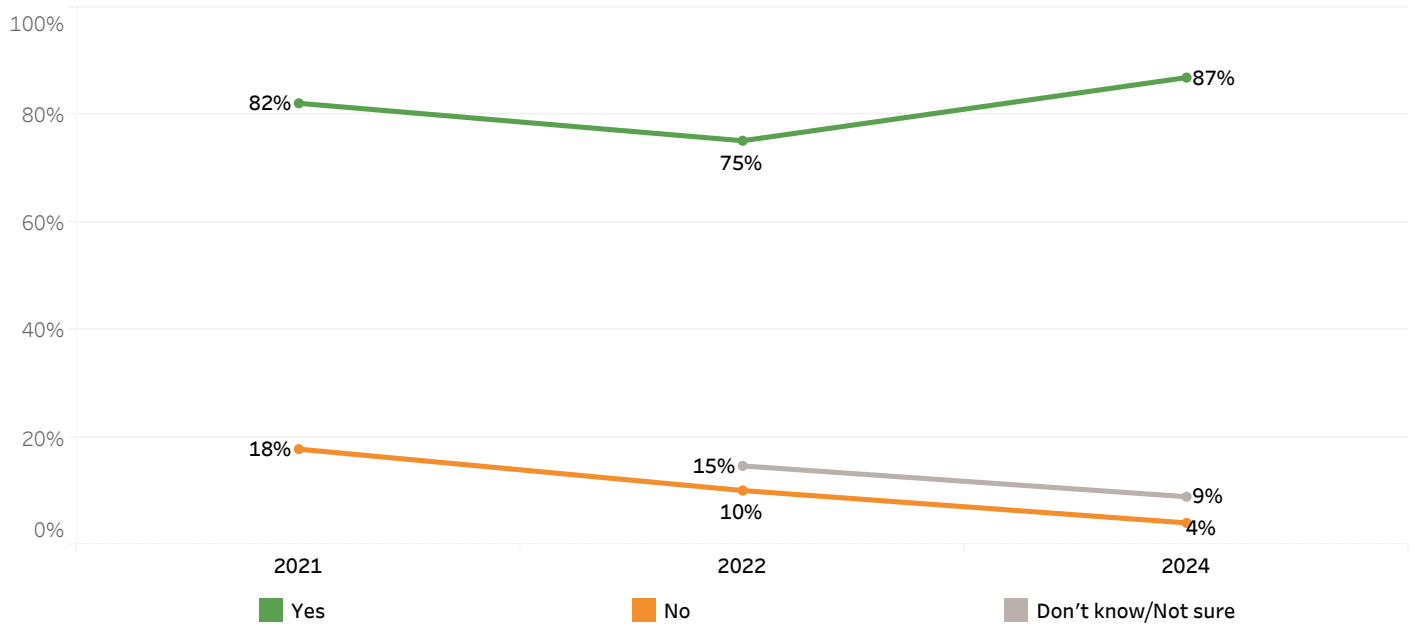
Respondents are slightly less likely than in previous years to say they represent the nation, the Mid-Atlantic, or the Northeast and are slightly more likely to say they represent the Pacific Islands.

Figure 26: Region or state represented - By Year



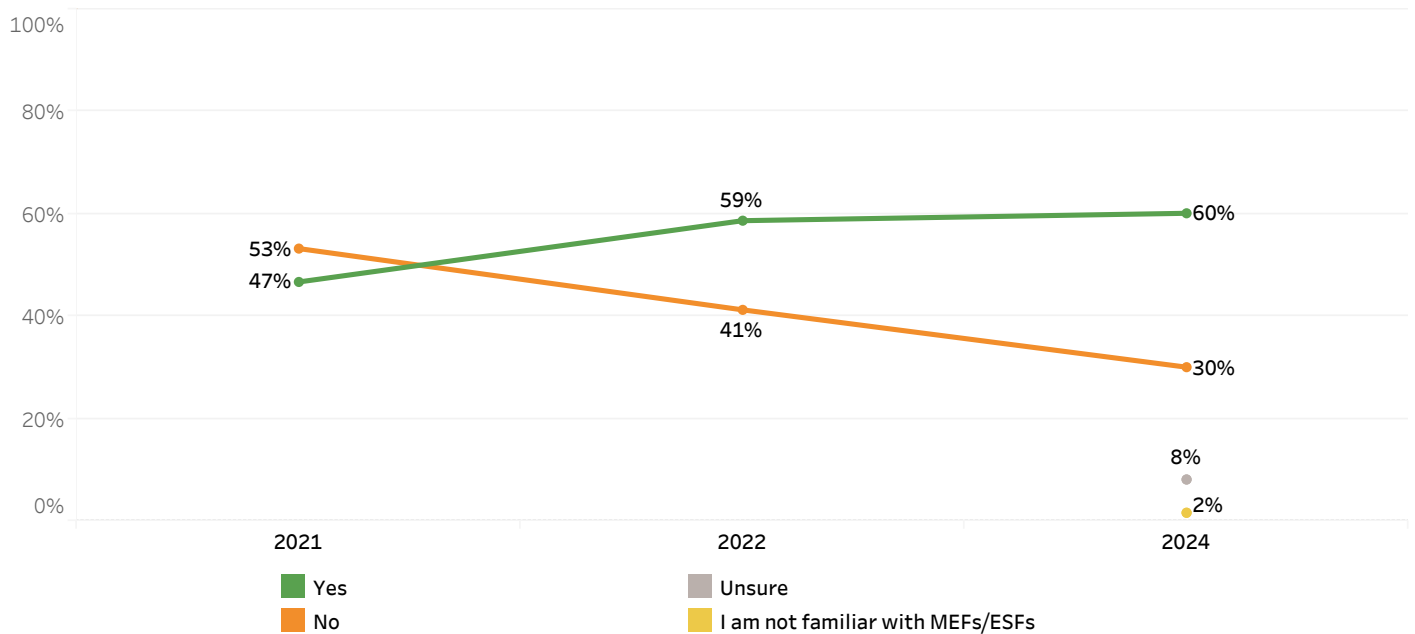
Respondents are slightly more likely than in previous years to say that their organization or agency has a hurricane preparedness or response plan that they are aware of.

**Figure 27: Does organization/agency have hurricane preparedness/response plan - By Year**



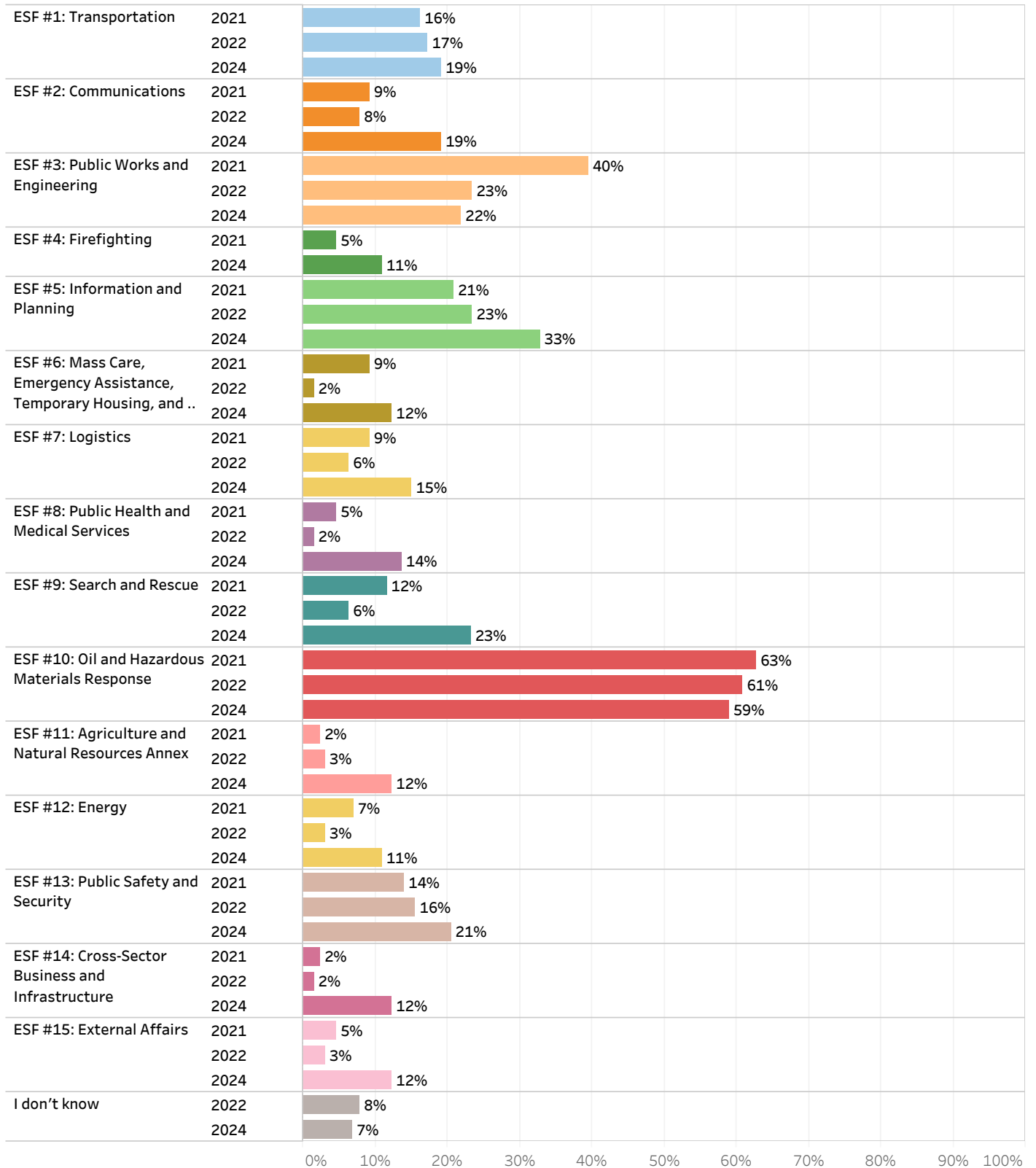
Respondents are as likely as in 2022 to say that they have a Mission Essential Function or Emergency Support Function role in hurricane response.

**Figure 28: Have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response - By Year**



Respondents are slightly more likely than in previous years to say their office has or would engage with ESF #2: Communications, ESF #5: Information and Planning, ESF #7: Logistics, ESF #8: Public Health and Medical Services, ESF #9: Search and Rescue, ESF #11: Agriculture and Natural Resources Annex, ESF #14: Cross-Sector Business and Infrastructure, and ESF #15: External Affairs.

Figure 29: ESFs your office has or would engage with - By Year



## Appendix A

Q1 What is the name of your organization/agency? (Coded)

	County or Municipal Agency or Organization	NOAA	Other Agency or Organization	Other Federal Agency or Organization	State or Territory Agency or Organization	N
<b>Overall</b>	3%	54%	8%	19%	17%	120
<b>Region</b>						
Alaska		75%	25%			4
Caribbean		44%	25%	19%	13%	16
Gulf of Mexico		42%	11%	17%	31%	36
Mid-Atlantic		73%	18%		9%	11
National		77%	12%	12%		26
Northeast		13%	13%	38%	38%	8
Pacific Islands	13%	63%	4%	21%		24
Southeast		63%	4%	19%	15%	27
West		78%	11%	11%		9
<b>ESF</b>						
ESF #1	7%	57%		21%	14%	14
ESF #2	7%	57%	7%	14%	14%	14
ESF #3	6%	56%		13%	25%	16
ESF #4	13%	38%		25%	25%	8
ESF #5	4%	58%	4%	21%	13%	24
ESF #6	11%	33%		22%	33%	9
ESF #7	18%	36%	9%	18%	18%	11
ESF #8	10%	30%		20%	40%	10
ESF #9	6%	29%		41%	24%	17
ESF #10	2%	49%	5%	26%	19%	43
ESF #11	11%	33%		22%	33%	9
ESF #12	13%	38%		25%	25%	8
ESF #13	7%	60%		13%	20%	15
ESF #14	11%	44%	11%	11%	22%	9
ESF #15	11%	44%	11%	11%	22%	9
<b>RSF</b>						
Community Assistance	5%	50%		25%	20%	20
Economic	7%	60%		13%	20%	15
General Recovery Support	6%	47%	3%	31%	13%	32
Health & Human Services	9%	18%		55%	18%	11
Housing	8%	15%		54%	23%	13
Infrastructure Systems	5%	29%		52%	14%	21
Natural & Cultural Resources	3%	62%	6%	21%	9%	34

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%	3%	39%	11%
<b>Org or Agency Type</b>	NOAA	2%	5%	66%	17%
	Other Federal	5%			5%
	State or Territory				
<b>Region</b>	Alaska	25%		50%	
	Caribbean			43%	14%
	Gulf of Mexico	3%	3%	31%	6%
	Mid-Atlantic	9%		55%	
	National	4%		63%	11%
	Northeast			14%	
	Pacific Islands		4%	29%	21%
	Southeast		4%	44%	15%
	West			56%	
<b>ESF</b>	ESF #1			31%	15%
	ESF #2			21%	29%
	ESF #3			38%	13%
	ESF #4				25%
	ESF #5			21%	33%
	ESF #6				22%
	ESF #7				18%
	ESF #8				22%
	ESF #9	7%			13%
	ESF #10	2%		41%	5%
	ESF #11				25%
	ESF #12				25%
	ESF #13	7%		13%	27%
	ESF #14				22%
	ESF #15				33%
<b>RSF</b>	Community Assistance			29%	14%
	Economic			38%	13%
	General Recovery Support			13%	29%
	Health & Human Services				8%
	Housing				8%
	Infrastructure Systems			10%	10%
	Natural & Cultural Resources		3%	49%	6%

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

		Office of Marine & Aviation Operations (OMAO)	Office of Oceanic & Atmospheric Research (OAR)	NOAA Staff Office or Other NOAA Office	Not Applicable (Neither employed by nor on contract to NOAA)	N
<b>Overall</b>		3%	2%	2%	38%	117
<b>Org or Agency Type</b>	NOAA	5%	2%	3%	2%	65
	Other Federal				90%	21
	State or Territory	6%			94%	18
<b>Region</b>	Alaska			25%		4
	Caribbean			7%	36%	14
	Gulf of Mexico			3%	54%	35
	Mid-Atlantic	9%		18%	9%	11
	National	4%	4%	7%	7%	27
	Northeast			14%	71%	7
	Pacific Islands	4%		8%	33%	24
	Southeast	4%	4%	4%	26%	27
	West			22%	22%	9
<b>ESF</b>	ESF #1	8%		8%	38%	13
	ESF #2	7%		7%	36%	14
	ESF #3			6%	44%	16
	ESF #4			13%	63%	8
	ESF #5	4%	4%	4%	33%	24
	ESF #6			11%	67%	9
	ESF #7	9%		9%	64%	11
	ESF #8			11%	67%	9
	ESF #9	7%		7%	67%	15
	ESF #10	5%		2%	44%	41
	ESF #11			13%	63%	8
	ESF #12			13%	63%	8
	ESF #13	7%		7%	40%	15
	ESF #14	11%	11%	11%	44%	9
	ESF #15			11%	56%	9
<b>RSF</b>	Community Assistance			5%	52%	21
	Economic			6%	44%	16
	General Recovery Support	6%		6%	45%	31
	Health & Human Services			8%	83%	12
	Housing			8%	85%	13
	Infrastructure Systems	10%		5%	67%	21
	Natural & Cultural Resources	3%		3%	37%	35



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

		Alaska	Caribbean	Gulf of Mexico	Mid-Atlantic	National
<b>Overall</b>		3%	13%	30%	9%	22%
<b>Org or Agency Type</b>	NOAA	5%	11%	23%	12%	31%
	Other Federal		13%	26%		13%
	State or Territory		10%	55%	5%	
<b>Region</b>	Alaska	100%	50%	100%	75%	50%
	Caribbean	13%	100%	31%	19%	19%
	Gulf of Mexico	11%	14%	100%	8%	5%
	Mid-Atlantic	27%	27%	27%	100%	27%
	National	7%	11%	7%	11%	100%
	Northeast	25%	38%	25%	25%	25%
	Pacific Islands	13%	8%	13%	13%	13%
	Southeast	7%	26%	33%	7%	11%
	West	33%	22%	33%	33%	33%
<b>ESF</b>	ESF #1	7%	21%	21%	7%	36%
	ESF #2	7%	21%	29%	21%	21%
	ESF #3	6%	25%	31%	6%	38%
	ESF #4	13%	25%	25%	13%	25%
	ESF #5	4%	21%	21%	13%	13%
	ESF #6	11%	22%	33%	11%	22%
	ESF #7	9%	18%	36%	18%	18%
	ESF #8	10%	20%	40%	10%	20%
	ESF #9	12%	12%	41%	18%	24%
	ESF #10	9%	14%	35%	14%	28%
	ESF #11	11%	33%	33%	11%	22%
	ESF #12	13%	25%	25%	13%	25%
	ESF #13	13%	33%	33%	13%	27%
	ESF #14	11%	22%	22%	22%	33%
	ESF #15	11%	22%	33%	11%	22%
<b>RSF</b>	Community Assistance	5%	19%	24%	14%	14%
	Economic	6%	31%	44%	13%	13%
	General Recovery Support	3%	18%	27%	9%	15%
	Health & Human Services	8%	25%	25%	8%	8%
	Housing	7%	21%	36%	7%	7%
	Infrastructure Systems	4%	17%	17%	9%	17%
	Natural & Cultural Resources	3%	20%	23%	6%	26%

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

		Northeast	Pacific Islands	Southeast	West	N
<b>Overall</b>		7%	20%	22%	7%	122
<b>Org or Agency Type</b>	NOAA	2%	23%	26%	11%	65
	Other Federal	13%	22%	22%	4%	23
	State or Territory	15%		20%		20
<b>Region</b>	Alaska	50%	75%	50%	75%	4
	Caribbean	19%	13%	44%	13%	16
	Gulf of Mexico	5%	8%	24%	8%	37
	Mid-Atlantic	18%	27%	18%	27%	11
	National	7%	11%	11%	11%	27
	Northeast	100%	25%	25%	25%	8
	Pacific Islands	8%	100%	8%	25%	24
	Southeast	7%	7%	100%	7%	27
	West	22%	67%	22%	100%	9
<b>ESF</b>	ESF #1	29%	21%	29%	7%	14
	ESF #2	14%	21%	36%	7%	14
	ESF #3	19%	19%	19%	13%	16
	ESF #4	25%	38%	38%	13%	8
	ESF #5	8%	33%	38%	8%	24
	ESF #6	22%	44%	22%	11%	9
	ESF #7	18%	36%	18%	9%	11
	ESF #8	20%	30%	30%	10%	10
	ESF #9	18%	18%	24%	6%	17
	ESF #10	14%	16%	23%	12%	43
	ESF #11	22%	33%	22%	11%	9
	ESF #12	38%	38%	25%	13%	8
	ESF #13	13%	27%	33%	7%	15
	ESF #14	22%	33%	22%	11%	9
	ESF #15	22%	44%	22%	11%	9
<b>RSF</b>	Community Assistance	14%	43%	14%	14%	21
	Economic	13%	31%	31%	13%	16
	General Recovery Support	15%	36%	21%	9%	33
	Health & Human Services	17%	42%	33%	8%	12
	Housing	14%	43%	21%	14%	14
	Infrastructure Systems	26%	30%	17%	9%	23
	Natural & Cultural Resources	11%	29%	26%	6%	35

Q4 Does your organization or agency have a hurricane preparedness/response plan that you are aware of?

		Yes	No	Don't know/Not sure	N
<b>Overall</b>		87%	4%	9%	123
<b>Org or Agency Type</b>	NOAA	91%		9%	65
	Other Federal	91%	4%	4%	23
	State or Territory	85%	10%	5%	20
<b>Region</b>	Alaska	100%			4
	Caribbean	88%	6%	6%	16
	Gulf of Mexico	92%		8%	37
	Mid-Atlantic	82%	9%	9%	11
	National	85%	4%	11%	27
	Northeast	88%	13%		8
	Pacific Islands	92%		8%	24
	Southeast	93%	4%	4%	27
	West	100%			9
	<b>ESF</b>	ESF #1	100%		
ESF #2		100%			14
ESF #3		94%		6%	16
ESF #4		100%			8
ESF #5		100%			24
ESF #6		89%		11%	9
ESF #7		100%			11
ESF #8		100%			10
ESF #9		100%			17
ESF #10		88%	5%	7%	43
ESF #11		100%			9
ESF #12		100%			8
ESF #13		100%			15
ESF #14		89%	11%		9
ESF #15		100%			9
<b>RSF</b>	Community Assistance	95%	5%		21
	Economic	100%			16
	General Recovery Support	94%	3%	3%	33
	Health & Human Services	92%	8%		12
	Housing	86%	7%	7%	14
	Infrastructure Systems	91%	9%		23
	Natural & Cultural Resources	89%	6%	6%	35

Q5 In your position within your organization or agency, do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response?

		Yes	No	Unsure	I am not familiar with MEFs/ESFs	N
<b>Overall</b>		60%	30%	8%	2%	123
<b>Org or Agency Type</b>	NOAA	57%	37%	6%		65
	Other Federal	78%	13%	4%	4%	23
	State or Territory	60%	25%	15%		20
<b>Region</b>	Alaska	100%				4
	Caribbean	56%	38%	6%		16
	Gulf of Mexico	62%	27%	11%		37
	Mid-Atlantic	73%	18%	9%		11
	National	67%	30%	4%		27
	Northeast	88%	13%			8
	Pacific Islands	63%	33%	4%		24
	Southeast	63%	30%	4%	4%	27
	West	56%	33%	11%		9
<b>RSF</b>	Community Assistance	76%	24%			21
	Economic	69%	31%			16
	General Recovery Support	79%	18%	3%		33
	Health & Human Services	83%	17%			12
	Housing	79%	21%			14
	Infrastructure Systems	74%	26%			23
	Natural & Cultural Resources	71%	29%			35

Q6 Please select the ESFs your office has or would engage with (Select all that apply)

		ESF #1: Transportation	ESF #2: Communications	ESF #3: Public Works and Engineering	ESF #4: Firefighting	ESF #5: Information and Planning
<b>Overall</b>		19%	19%	22%	11%	33%
<b>Org or Agency Type</b>	NOAA	22%	22%	24%	8%	38%
	Other Federal	18%	12%	12%	12%	29%
	State or Territory	17%	17%	33%	17%	25%
<b>Region</b>	Alaska	25%	25%	25%	25%	25%
	Caribbean	33%	33%	44%	22%	56%
	Gulf of Mexico	14%	18%	23%	9%	23%
	Mid-Atlantic	13%	38%	13%	13%	38%
	National	28%	17%	33%	11%	17%
	Northeast	57%	29%	43%	29%	29%
	Pacific Islands	20%	20%	20%	20%	53%
	Southeast	24%	29%	18%	18%	53%
West	20%	20%	40%	20%	40%	
<b>ESF</b>	ESF #1	100%	50%	50%	50%	50%
	ESF #2	50%	100%	50%	50%	86%
	ESF #3	44%	44%	100%	44%	50%
	ESF #4	88%	88%	88%	100%	88%
	ESF #5	29%	50%	33%	29%	100%
	ESF #6	78%	78%	89%	78%	78%
	ESF #7	64%	82%	64%	64%	73%
	ESF #8	70%	70%	80%	80%	70%
	ESF #9	47%	47%	47%	47%	41%
	ESF #10	23%	21%	35%	19%	23%
	ESF #11	78%	78%	78%	78%	89%
	ESF #12	100%	88%	88%	88%	88%
	ESF #13	60%	60%	47%	53%	53%
	ESF #14	78%	89%	78%	78%	78%
	ESF #15	78%	89%	78%	78%	100%
<b>RSF</b>	Community Assistance	38%	44%	44%	38%	75%
	Economic	55%	45%	45%	45%	82%
	General Recovery Support	38%	35%	27%	23%	54%
	Health & Human Services	60%	60%	60%	70%	80%
	Housing	55%	55%	64%	55%	64%
	Infrastructure Systems	47%	47%	41%	41%	47%
	Natural & Cultural Resources	24%	28%	44%	28%	44%

Q6 Please select the ESFs your office has or would engage with (Select all that apply)

		ESF #6: Mass Care, Emergency Assistance, Temporary Housing, and Human Services	ESF #7: Logistics	ESF #8: Public Health and Medical Services	ESF #9: Search and Rescue
<b>Overall</b>		12%	15%	14%	23%
<b>Org or Agency Type</b>	NOAA	8%	11%	8%	14%
	Other Federal	12%	12%	12%	41%
	State or Territory	25%	17%	33%	33%
<b>Region</b>	Alaska	25%	25%	25%	50%
	Caribbean	22%	22%	22%	22%
	Gulf of Mexico	14%	18%	18%	32%
	Mid-Atlantic	13%	25%	13%	38%
	National	11%	11%	11%	22%
	Northeast	29%	29%	29%	43%
	Pacific Islands	27%	27%	20%	20%
	Southeast	12%	12%	18%	24%
	West	20%	20%	20%	20%
<b>ESF</b>	ESF #1	50%	50%	50%	57%
	ESF #2	50%	64%	50%	57%
	ESF #3	50%	44%	50%	50%
	ESF #4	88%	88%	100%	100%
	ESF #5	29%	33%	29%	29%
	ESF #6	100%	78%	89%	89%
	ESF #7	64%	100%	64%	82%
	ESF #8	80%	70%	100%	100%
	ESF #9	47%	53%	59%	100%
	ESF #10	19%	21%	21%	37%
	ESF #11	78%	78%	89%	89%
	ESF #12	88%	88%	88%	88%
	ESF #13	47%	47%	53%	60%
	ESF #14	78%	89%	78%	89%
	ESF #15	78%	89%	78%	78%
<b>RSF</b>	Community Assistance	38%	38%	38%	38%
	Economic	45%	45%	45%	45%
	General Recovery Support	23%	31%	23%	31%
	Health & Human Services	60%	60%	70%	70%
	Housing	73%	55%	64%	64%
	Infrastructure Systems	35%	41%	41%	53%
	Natural & Cultural Resources	24%	24%	28%	28%

Q6 Please select the ESFs your office has or would engage with (Select all that apply)

		ESF #10: Oil and Hazardous Materials Response	ESF #11: Agriculture and Natural Resources Annex	ESF #12: Energy	ESF #13: Public Safety and Security
<b>Overall</b>		59%	12%	11%	21%
<b>Org or Agency Type</b>	NOAA	57%	8%	8%	24%
	Other Federal	65%	12%	12%	12%
	State or Territory	67%	25%	17%	25%
<b>Region</b>	Alaska	100%	25%	25%	50%
	Caribbean	67%	33%	22%	56%
	Gulf of Mexico	68%	14%	9%	23%
	Mid-Atlantic	75%	13%	13%	25%
	National	67%	11%	11%	22%
	Northeast	86%	29%	43%	29%
	Pacific Islands	47%	20%	20%	27%
	Southeast	59%	12%	12%	29%
	West	100%	20%	20%	20%
	<b>ESF</b>	ESF #1	71%	50%	57%
ESF #2		64%	50%	50%	64%
ESF #3		94%	44%	44%	44%
ESF #4		100%	88%	88%	100%
ESF #5		42%	33%	29%	33%
ESF #6		89%	78%	78%	78%
ESF #7		82%	64%	64%	64%
ESF #8		90%	80%	70%	80%
ESF #9		94%	47%	41%	53%
ESF #10		100%	19%	16%	26%
ESF #11		89%	100%	78%	78%
ESF #12		88%	88%	100%	88%
ESF #13		73%	47%	47%	100%
ESF #14		89%	78%	78%	78%
ESF #15		78%	78%	78%	78%
<b>RSF</b>	Community Assistance	63%	38%	38%	44%
	Economic	64%	45%	45%	55%
	General Recovery Support	58%	23%	27%	38%
	Health & Human Services	80%	60%	60%	70%
	Housing	82%	55%	55%	55%
	Infrastructure Systems	82%	35%	41%	47%
	Natural & Cultural Resources	76%	28%	24%	36%

Q6 Please select the ESFs your office has or would engage with (Select all that apply)

		ESF #14: Cross-Sector Business and Infrastructure	ESF #15: External Affairs	I don't know	N
<b>Overall</b>		12%	12%	7%	73
<b>Org or Agency Type</b>	NOAA	11%	11%	5%	37
	Other Federal	6%	6%	6%	17
	State or Territory	17%	17%	8%	12
<b>Region</b>	Alaska	25%	25%		4
	Caribbean	22%	22%		9
	Gulf of Mexico	9%	14%	9%	22
	Mid-Atlantic	25%	13%		8
	National	17%	11%	11%	18
	Northeast	29%	29%		7
	Pacific Islands	20%	27%	7%	15
	Southeast	12%	12%		17
	West	20%	20%		5
	<b>ESF</b>	ESF #1	50%	50%	
ESF #2		57%	57%		14
ESF #3		44%	44%		16
ESF #4		88%	88%		8
ESF #5		29%	38%		24
ESF #6		78%	78%		9
ESF #7		73%	73%		11
ESF #8		70%	70%		10
ESF #9		47%	41%		17
ESF #10		19%	16%		43
ESF #11		78%	78%		9
ESF #12		88%	88%		8
ESF #13		47%	47%		15
ESF #14		100%	78%		9
ESF #15		78%	100%		9
<b>RSF</b>	Community Assistance	38%	38%		16
	Economic	45%	45%		11
	General Recovery Support	27%	27%		26
	Health & Human Services	60%	60%		10
	Housing	55%	55%		11
	Infrastructure Systems	41%	35%		17
	Natural & Cultural Resources	24%	24%	8%	25



Q7 Does your organization or agency have a role working with Recovery Support Functions (RSF) or generally supporting FEMA disaster recovery operations?

		Yes	No	Unsure	I am not familiar with RSFs	N
<b>Overall</b>		63%	15%	17%	6%	121
<b>Org or Agency Type</b>	NOAA	68%	12%	15%	5%	65
	Other Federal	68%	14%	9%	9%	22
	State or Territory	45%	10%	35%	10%	20
<b>Region</b>	Alaska	50%	50%			4
	Caribbean	63%	31%	6%		16
	Gulf of Mexico	64%	14%	17%	6%	36
	Mid-Atlantic	55%	36%	9%		11
	National	56%	15%	22%	7%	27
	Northeast	75%	25%			8
	Pacific Islands	88%	8%	4%		24
	Southeast	59%	11%	19%	11%	27
West	67%	22%	11%		9	
<b>ESF</b>	ESF #1	79%		14%	7%	14
	ESF #2	86%	7%	7%		14
	ESF #3	94%			6%	16
	ESF #4	100%				8
	ESF #5	83%	4%	13%		24
	ESF #6	100%				9
	ESF #7	82%	18%			11
	ESF #8	90%		10%		10
	ESF #9	71%	18%	12%		17
	ESF #10	77%	12%	7%	5%	43
	ESF #11	89%		11%		9
	ESF #12	100%				8
	ESF #13	93%	7%			15
	ESF #14	89%	11%			9
	ESF #15	89%	11%			9

Q8 Please select the RSFs your office has or would engage with:

		Community Assistance RSF	Economic RSF	General Recovery Support	Health and Human Services RSF
<b>Overall</b>		28%	21%	44%	16%
<b>Org or Agency Type</b>	NOAA	23%	21%	35%	5%
	Other Federal	33%	13%	67%	40%
	State or Territory	44%	33%	44%	22%
<b>Region</b>	Alaska	50%	50%	50%	50%
	Caribbean	40%	50%	60%	30%
	Gulf of Mexico	23%	32%	41%	14%
	Mid-Atlantic	50%	33%	50%	17%
	National	20%	13%	33%	7%
	Northeast	50%	33%	83%	33%
	Pacific Islands	43%	24%	57%	24%
	Southeast	19%	31%	44%	25%
	West	50%	33%	50%	17%
<b>ESF</b>	ESF #1	55%	55%	91%	55%
	ESF #2	58%	42%	75%	50%
	ESF #3	50%	36%	50%	43%
	ESF #4	75%	63%	75%	88%
	ESF #5	60%	45%	70%	40%
	ESF #6	67%	56%	67%	67%
	ESF #7	67%	56%	89%	67%
	ESF #8	67%	56%	67%	78%
	ESF #9	50%	42%	67%	58%
	ESF #10	31%	22%	47%	25%
	ESF #11	75%	63%	75%	75%
	ESF #12	75%	63%	88%	75%
	ESF #13	50%	43%	71%	50%
	ESF #14	75%	63%	88%	75%
	ESF #15	75%	63%	88%	75%
<b>RSF</b>	Community Assistance	100%	62%	67%	48%
	Economic	81%	100%	75%	50%
	General Recovery Support	42%	36%	100%	30%
	Health & Human Services	83%	67%	83%	100%
	Housing	71%	57%	71%	71%
	Infrastructure Systems	57%	39%	74%	52%
	Natural & Cultural Resources	46%	37%	37%	31%

Q8 Please select the RSFs your office has or would engage with:

		Housing RSF	Infrastructure Systems RSF	Natural and Cultural Resources RSF	Unsure	N
<b>Overall</b>		19%	31%	47%	21%	75
<b>Org or Agency Type</b>	NOAA	5%	14%	49%	26%	43
	Other Federal	47%	73%	47%	7%	15
	State or Territory	33%	33%	33%	33%	9
<b>Region</b>	Alaska	50%	50%	50%	50%	2
	Caribbean	30%	40%	70%	10%	10
	Gulf of Mexico	23%	18%	36%	27%	22
	Mid-Atlantic	17%	33%	33%	17%	6
	National	7%	27%	60%	20%	15
	Northeast	33%	100%	67%		6
	Pacific Islands	29%	33%	48%	14%	21
	Southeast	19%	25%	56%	19%	16
	West	33%	33%	33%	33%	6
<b>ESF</b>	ESF #1	55%	73%	55%	9%	11
	ESF #2	50%	67%	58%	8%	12
	ESF #3	50%	50%	79%	14%	14
	ESF #4	75%	88%	88%	13%	8
	ESF #5	35%	40%	55%	10%	20
	ESF #6	89%	67%	67%	11%	9
	ESF #7	67%	78%	67%	11%	9
	ESF #8	78%	78%	78%	11%	9
	ESF #9	58%	75%	58%	17%	12
	ESF #10	28%	44%	59%	19%	32
	ESF #11	75%	75%	88%	13%	8
	ESF #12	75%	88%	75%	13%	8
	ESF #13	43%	57%	64%	14%	14
	ESF #14	75%	88%	75%	13%	8
	ESF #15	75%	75%	75%	13%	8
<b>RSF</b>	Community Assistance	48%	62%	76%		21
	Economic	50%	56%	81%		16
	General Recovery Support	30%	52%	39%		33
	Health & Human Services	83%	100%	92%		12
	Housing	100%	86%	71%		14
	Infrastructure Systems	52%	100%	70%		23
	Natural & Cultural Resources	29%	46%	100%		35

Q9 Select the biggest challenges you anticipate during the 2024 hurricane season: (Select all that apply)

		Access and Usability of NOAA Tools and Services	Communications	Funding & Other Resources
<b>Overall</b>		17%	36%	47%
<b>Org or Agency Type</b>	NOAA	17%	29%	55%
	Other Federal	14%	50%	32%
	State or Territory	15%	30%	30%
<b>Region</b>	Alaska	50%		75%
	Caribbean	38%	38%	56%
	Gulf of Mexico	19%	31%	44%
	Mid-Atlantic	36%	45%	45%
	National	22%	22%	52%
	Northeast	38%		38%
	Pacific Islands	13%	58%	71%
	Southeast	15%	26%	44%
	West	44%	44%	78%
<b>ESF</b>	ESF #1	14%	29%	43%
	ESF #2	29%	43%	43%
	ESF #3	13%	25%	75%
	ESF #4	25%	38%	63%
	ESF #5	25%	42%	58%
	ESF #6	22%	33%	56%
	ESF #7	27%	55%	55%
	ESF #8	20%	30%	50%
	ESF #9	18%	35%	41%
	ESF #10	23%	28%	49%
	ESF #11	33%	44%	56%
	ESF #12	25%	38%	63%
	ESF #13	27%	33%	47%
	ESF #14	33%	44%	56%
	ESF #15	22%	44%	56%
<b>RSF</b>	Community Assistance	24%	52%	62%
	Economic	25%	44%	56%
	General Recovery Support	15%	48%	45%
	Health & Human Services	25%	58%	67%
	Housing	21%	57%	50%
	Infrastructure Systems	22%	52%	48%
	Natural & Cultural Resources	23%	40%	57%

Q9 Select the biggest challenges you anticipate during the 2024 hurricane season: (Select all that apply)

		Individual Preparedness, Health, and Safety	Organizational or Facility Resilience	None of the above	N
<b>Overall</b>		46%	34%	16%	121
<b>Org or Agency Type</b>	NOAA	35%	29%	15%	65
	Other Federal	59%	45%	23%	22
	State or Territory	55%	35%	20%	20
<b>Region</b>	Alaska	25%		25%	4
	Caribbean	56%	19%	13%	16
	Gulf of Mexico	58%	39%	17%	36
	Mid-Atlantic	36%	27%	18%	11
	National	33%	44%	11%	27
	Northeast	50%	25%	25%	8
	Pacific Islands	58%	25%		24
	Southeast	30%	15%	33%	27
	West	44%	11%		9
	<b>ESF</b>	ESF #1	43%	36%	29%
ESF #2		43%	36%	7%	14
ESF #3		50%	38%	6%	16
ESF #4		50%	25%	13%	8
ESF #5		42%	25%	13%	24
ESF #6		56%	33%		9
ESF #7		55%	36%		11
ESF #8		40%	30%	20%	10
ESF #9		53%	47%	18%	17
ESF #10		44%	35%	19%	43
ESF #11		44%	33%	11%	9
ESF #12		50%	25%	13%	8
ESF #13		53%	27%	20%	15
ESF #14		44%	33%		9
ESF #15		67%	33%		9
<b>RSF</b>	Community Assistance	48%	29%	10%	21
	Economic	44%	19%	25%	16
	General Recovery Support	48%	30%	24%	33
	Health & Human Services	50%	42%	17%	12
	Housing	64%	36%	7%	14
	Infrastructure Systems	43%	35%	17%	23
	Natural & Cultural Resources	43%	29%	17%	35

Q10 You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Keeping family safe during active response or recovery activities	Lack of individual/organizational preparedness plans	Managing staff fatigue post storm
<b>Overall</b>		66%	23%	68%
<b>Org or Agency Type</b>	NOAA	70%	17%	57%
	Other Federal	54%	8%	85%
	State or Territory	64%	45%	55%
<b>Region</b>	Alaska	100%		
	Caribbean	100%	56%	78%
	Gulf of Mexico	57%	5%	76%
	Mid-Atlantic	50%	25%	25%
	National	67%	22%	67%
	Northeast	75%	25%	50%
	Pacific Islands	79%	21%	57%
	Southeast	100%	25%	75%
	West	25%	25%	25%
	<b>ESF</b>	ESF #1	100%	17%
ESF #2		83%	17%	83%
ESF #3		75%	38%	50%
ESF #4		100%	25%	75%
ESF #5		80%	40%	70%
ESF #6		100%	20%	60%
ESF #7		83%	17%	83%
ESF #8		100%	25%	75%
ESF #9		78%	11%	78%
ESF #10		53%	21%	58%
ESF #11		100%	25%	75%
ESF #12		100%	25%	75%
ESF #13		100%	25%	88%
ESF #14		100%	25%	75%
ESF #15		83%	17%	83%
<b>RSF</b>	Community Assistance	70%	30%	80%
	Economic	71%	43%	71%
	General Recovery Support	81%	31%	81%
	Health & Human Services	83%	33%	83%
	Housing	67%	22%	78%
	Infrastructure Systems	70%	20%	90%
	Natural & Cultural Resources	80%	33%	73%

Q10 You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Resources to implement individual preparedness plans (i.e. funding to evacuate, supplies to build a preparedness kit)	Safe work practices for responders or others serving in a response/recovery role	Other	N
<b>Overall</b>		38%	30%	4%	56
<b>Org or Agency Type</b>	NOAA	43%	35%	9%	23
	Other Federal	31%	54%		13
	State or Territory	36%			11
<b>Region</b>	Alaska	100%			1
	Caribbean	56%	33%	22%	9
	Gulf of Mexico	24%	29%	5%	21
	Mid-Atlantic	50%	50%		4
	National	33%	56%	11%	9
	Northeast	50%			4
	Pacific Islands	57%	14%		14
	Southeast	38%	13%	25%	8
	West	100%			4
<b>ESF</b>	ESF #1	50%	17%		6
	ESF #2	50%	17%	17%	6
	ESF #3	63%	38%	13%	8
	ESF #4	75%	25%		4
	ESF #5	70%	20%	20%	10
	ESF #6	80%	20%		5
	ESF #7	50%	33%		6
	ESF #8	75%	25%		4
	ESF #9	33%	44%		9
	ESF #10	42%	47%	5%	19
	ESF #11	75%	25%		4
	ESF #12	75%	25%		4
	ESF #13	50%	13%	13%	8
	ESF #14	75%	25%		4
	ESF #15	67%	17%		6
<b>RSF</b>	Community Assistance	70%	20%		10
	Economic	71%	14%		7
	General Recovery Support	50%	31%	6%	16
	Health & Human Services	67%	33%		6
	Housing	67%	33%		9
	Infrastructure Systems	50%	30%		10
	Natural & Cultural Resources	53%	20%	7%	15

Q11 You identified 'Organizational or Facility Resilience' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Access to facilities and infrastructure post storm	Adequate qualified staffing resources to support response and recovery activities	Coordination with partners during response and recovery activities
<b>Overall</b>		43%	50%	38%
<b>Org or Agency Type</b>	NOAA	47%	32%	32%
	Other Federal	33%	89%	44%
	State or Territory	29%	57%	29%
<b>Region</b>	Caribbean	100%	100%	100%
	Gulf of Mexico	43%	50%	29%
	Mid-Atlantic	67%	33%	33%
	National	55%	36%	45%
	Northeast			50%
	Pacific Islands	33%	100%	17%
	Southeast		25%	
	West	100%	100%	
<b>ESF</b>	ESF #1	60%	40%	40%
	ESF #2	20%	40%	20%
	ESF #3	33%	83%	50%
	ESF #4	50%	100%	50%
	ESF #5	33%	83%	33%
	ESF #6	33%	100%	33%
	ESF #7	25%	75%	50%
	ESF #8	33%	100%	33%
	ESF #9	14%	71%	43%
	ESF #10	36%	57%	57%
	ESF #11	67%	100%	67%
	ESF #12	50%	100%	50%
	ESF #13	50%	50%	50%
	ESF #14	33%	67%	33%
	ESF #15	33%	100%	33%
<b>RSF</b>	Community Assistance	33%	83%	67%
	Economic	67%	67%	100%
	General Recovery Support	50%	60%	40%
	Health & Human Services	40%	80%	60%
	Housing	40%	80%	60%
	Infrastructure Systems	25%	50%	38%
	Natural & Cultural Resources	50%	50%	60%



Q11 You identified 'Organizational or Facility Resilience' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Facility/critical infrastructure and assets resilience to potential storm impacts	Unreliability or loss of utilities (power, internet, water, cell service)	Other	N
<b>Overall</b>		65%	68%	3%	40
<b>Org or Agency Type</b>	NOAA	74%	68%	5%	19
	Other Federal	56%	67%		9
	State or Territory	43%	57%		7
<b>Region</b>	Caribbean	67%	100%		3
	Gulf of Mexico	57%	64%		14
	Mid-Atlantic	100%	100%	33%	3
	National	64%	45%		11
	Northeast	50%	50%		2
	Pacific Islands	100%	100%		6
	Southeast	50%	50%		4
	West	100%	100%		1
	<b>ESF</b>	ESF #1	80%	60%	
ESF #2		100%	100%	20%	5
ESF #3		50%	50%		6
ESF #4		100%	100%		2
ESF #5		83%	100%		6
ESF #6		67%	67%		3
ESF #7		100%	100%	25%	4
ESF #8		67%	67%		3
ESF #9		71%	71%	14%	7
ESF #10		57%	64%	7%	14
ESF #11		67%	100%		3
ESF #12		100%	100%		2
ESF #13		75%	75%		4
ESF #14		100%	100%	33%	3
ESF #15		100%	100%		3
<b>RSF</b>	Community Assistance	67%	67%		6
	Economic	67%	67%		3
	General Recovery Support	90%	90%	10%	10
	Health & Human Services	80%	80%		5
	Housing	60%	60%		5
	Infrastructure Systems	88%	88%	13%	8
	Natural & Cultural Resources	70%	70%		10

Q12 You identified 'Communications' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Differences between local/state/federal guidelines	Lack of reliable communications with local, tribal, territorial, state and/or federal partners	Relationships with and access to federal and/or state partner programs and services
<b>Overall</b>		26%	51%	40%
<b>Org or Agency Type</b>	NOAA	21%	37%	37%
	Other Federal	36%	82%	45%
	State or Territory	33%	33%	33%
<b>Region</b>	Caribbean	33%	83%	67%
	Gulf of Mexico	36%	55%	27%
	Mid-Atlantic	40%	60%	40%
	National	33%	17%	67%
	Pacific Islands	14%	71%	50%
	Southeast	29%		14%
	West	25%	75%	50%
<b>ESF</b>	ESF #1	25%	25%	75%
	ESF #2	33%	17%	33%
	ESF #3	50%	25%	50%
	ESF #4	33%	33%	67%
	ESF #5	20%	60%	50%
	ESF #6	33%	33%	67%
	ESF #7	33%	33%	33%
	ESF #8	33%	33%	67%
	ESF #9	50%	33%	33%
	ESF #10	33%	42%	42%
	ESF #11	50%	50%	75%
	ESF #12	33%	33%	67%
	ESF #13	20%	20%	60%
	ESF #14	50%	25%	50%
	ESF #15	25%	50%	75%
<b>RSF</b>	Community Assistance	27%	64%	55%
	Economic	43%	57%	71%
	General Recovery Support	25%	56%	50%
	Health & Human Services	43%	71%	57%
	Housing	38%	75%	50%
	Infrastructure Systems	33%	58%	42%
	Natural & Cultural Resources	43%	57%	64%

Q12 You identified 'Communications' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Staff turnover, internally and externally	Sustaining operational support capacity in a hybrid work environment	Other	N
<b>Overall</b>		60%	33%	12%	43
<b>Org or Agency Type</b>	NOAA	68%	26%	16%	19
	Other Federal	55%	55%	9%	11
	State or Territory	67%	17%	17%	6
<b>Region</b>	Caribbean	50%	50%	17%	6
	Gulf of Mexico	64%	36%	18%	11
	Mid-Atlantic	40%			5
	National	67%	17%	17%	6
	Pacific Islands	64%	36%	7%	14
	Southeast	57%	29%	43%	7
	West	100%			4
	<b>ESF</b>	ESF #1	75%	50%	
ESF #2		50%	17%	17%	6
ESF #3		75%	25%		4
ESF #4		67%	33%		3
ESF #5		70%	40%	10%	10
ESF #6		67%	33%		3
ESF #7		67%	33%		6
ESF #8		67%	33%		3
ESF #9		50%	33%		6
ESF #10		42%	33%	17%	12
ESF #11		50%	50%		4
ESF #12		67%	33%		3
ESF #13		60%	40%	20%	5
ESF #14		50%	25%		4
ESF #15		75%	25%		4
<b>RSF</b>	Community Assistance	82%	36%	18%	11
	Economic	100%	29%	14%	7
	General Recovery Support	69%	38%	6%	16
	Health & Human Services	71%	57%	14%	7
	Housing	75%	38%		8
	Infrastructure Systems	50%	33%	17%	12
	Natural & Cultural Resources	57%	36%	14%	14

Q13 You identified 'Funding & Other Resources' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Ability to manage staff and resources during response and recovery	Access to funding for response and recovery activities	Capacity to implement resource recovery plans
<b>Overall</b>		28%	70%	39%
<b>Org or Agency Type</b>	NOAA	22%	64%	39%
	Other Federal	57%	71%	29%
	State or Territory	17%	100%	33%
<b>Region</b>	Alaska	33%	100%	33%
	Caribbean	33%	78%	22%
	Gulf of Mexico	44%	94%	31%
	Mid-Atlantic		80%	20%
	National	14%	71%	36%
	Northeast		100%	
	Pacific Islands	35%	59%	53%
	Southeast	25%	83%	17%
	West	14%	86%	43%
<b>ESF</b>	ESF #1	50%	67%	17%
	ESF #2	67%	83%	17%
	ESF #3	33%	75%	25%
	ESF #4	60%	80%	20%
	ESF #5	64%	57%	21%
	ESF #6	60%	80%	20%
	ESF #7	67%	83%	17%
	ESF #8	60%	80%	20%
	ESF #9	57%	86%	14%
	ESF #10	29%	86%	19%
	ESF #11	60%	80%	20%
	ESF #12	60%	80%	20%
	ESF #13	57%	86%	14%
	ESF #14	60%	80%	20%
	ESF #15	60%	80%	20%
<b>RSF</b>	Community Assistance	46%	69%	31%
	Economic	56%	67%	44%
	General Recovery Support	53%	73%	27%
	Health & Human Services	63%	63%	38%
	Housing	71%	71%	43%
	Infrastructure Systems	45%	64%	36%
	Natural & Cultural Resources	30%	80%	40%

Q13 You identified 'Funding & Other Resources' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		Resource limitations (non-personnel, ie. equipment, technology, etc.)	Other	N
<b>Overall</b>		56%	9%	57
<b>Org or Agency Type</b>	NOAA	50%	11%	36
	Other Federal	86%	14%	7
	State or Territory	67%		6
<b>Region</b>	Alaska	67%		3
	Caribbean	56%	11%	9
	Gulf of Mexico	50%	6%	16
	Mid-Atlantic	60%		5
	National	43%	21%	14
	Northeast	67%		3
	Pacific Islands	71%		17
	Southeast	58%	17%	12
	West	43%		7
<b>ESF</b>	ESF #1	83%	17%	6
	ESF #2	83%		6
	ESF #3	50%	17%	12
	ESF #4	100%		5
	ESF #5	64%	7%	14
	ESF #6	100%		5
	ESF #7	100%		6
	ESF #8	100%		5
	ESF #9	100%		7
	ESF #10	52%	5%	21
	ESF #11	100%		5
	ESF #12	100%		5
	ESF #13	86%		7
	ESF #14	100%		5
	ESF #15	100%		5
<b>RSF</b>	Community Assistance	69%		13
	Economic	56%		9
	General Recovery Support	60%		15
	Health & Human Services	88%		8
	Housing	86%		7
	Infrastructure Systems	73%		11
	Natural & Cultural Resources	50%	10%	20

Q14 You identified 'Access and Usability of NOAA Tools and Services' as a challenge. What specific areas contribute to this challenge? (Select all that apply)

		NOAA tools and services are appropriate for my needs	Personnel trained to use NOAA tools and services	Staff aware of the range of NOAA tools and services available	Other	N
<b>Overall</b>		42%	63%	58%	11%	19
<b>Org or Agency Type</b>	NOAA	50%	10%	50%	50%	10
	Other Federal	33%		100%	100%	3
	State or Territory	33%		100%	67%	3
<b>Region</b>	Alaska	100%			50%	2
	Caribbean	50%	17%	50%	67%	6
	Gulf of Mexico	57%	14%	57%	57%	7
	Mid-Atlantic	75%		50%	50%	4
	National	67%	17%	17%	33%	6
	Northeast	67%		33%	67%	3
	Pacific Islands	67%			67%	3
	Southeast	67%	33%		33%	3
	West	50%		25%	50%	4
<b>ESF</b>	ESF #1	100%		50%	100%	2
	ESF #2	50%	25%	50%	75%	4
	ESF #3	100%		50%	100%	2
	ESF #4	100%		50%	100%	2
	ESF #5	33%	17%	50%	67%	6
	ESF #6	100%		50%	100%	2
	ESF #7	67%		67%	100%	3
	ESF #8	100%		50%	100%	2
	ESF #9	67%		67%	100%	3
	ESF #10	50%		70%	90%	10
	ESF #11	67%		67%	100%	3
	ESF #12	100%		50%	100%	2
	ESF #13	50%	25%	50%	75%	4
	ESF #14	67%	33%	33%	67%	3
	ESF #15	100%		50%	100%	2
<b>RSF</b>	Community Assistance	60%		60%	100%	5
	Economic	75%		50%	100%	4
	General Recovery Support	60%	20%	40%	80%	5
	Health & Human Services	100%		67%	100%	3
	Housing	100%		67%	100%	3
	Infrastructure Systems	60%		80%	100%	5
	Natural & Cultural Resources	50%		75%	100%	8

Q15 Looking at prior hurricane seasons, for which of the following general challenges have you successfully implemented mitigation strategies?  
(Select all that apply)

		Access and Usability of NOAA Tools and Services	Communications	Funding & Other Resources
<b>Overall</b>		29%	48%	17%
<b>Org or Agency Type</b>	NOAA	28%	44%	11%
	Other Federal	27%	50%	23%
	State or Territory	15%	55%	25%
<b>Region</b>	Alaska	50%	25%	25%
	Caribbean	44%	38%	19%
	Gulf of Mexico	26%	60%	29%
	Mid-Atlantic	45%	36%	9%
	National	46%	46%	15%
	Northeast	25%	50%	25%
	Pacific Islands	29%	38%	13%
	Southeast	30%	48%	15%
West	22%	11%	11%	
<b>ESF</b>	ESF #1	36%	57%	14%
	ESF #2	46%	46%	15%
	ESF #3	53%	40%	33%
	ESF #4	50%	63%	25%
	ESF #5	30%	35%	9%
	ESF #6	56%	56%	33%
	ESF #7	50%	50%	30%
	ESF #8	50%	70%	30%
	ESF #9	35%	59%	24%
	ESF #10	38%	48%	21%
	ESF #11	44%	56%	22%
	ESF #12	50%	63%	25%
	ESF #13	33%	47%	13%
	ESF #14	56%	56%	22%
	ESF #15	50%	50%	25%
<b>RSF</b>	Community Assistance	38%	48%	29%
	Economic	38%	56%	25%
	General Recovery Support	21%	48%	15%
	Health & Human Services	50%	67%	33%
	Housing	50%	64%	43%
	Infrastructure Systems	30%	57%	26%
	Natural & Cultural Resources	41%	53%	21%

Q15 Looking at prior hurricane seasons, for which of the following general challenges have you successfully implemented mitigation strategies?  
(Select all that apply)

		Individual Preparedness, Health, and Safety	Organizational or Facility Resilience	None of the above	N
<b>Overall</b>		53%	37%	17%	119
<b>Org or Agency Type</b>	NOAA	52%	31%	22%	64
	Other Federal	68%	45%	5%	22
	State or Territory	45%	40%	20%	20
<b>Region</b>	Alaska	50%	50%	25%	4
	Caribbean	63%	50%	19%	16
	Gulf of Mexico	63%	46%	11%	35
	Mid-Atlantic	45%	36%	27%	11
	National	42%	27%	15%	26
	Northeast	63%	50%		8
	Pacific Islands	58%	46%	17%	24
	Southeast	44%	33%	19%	27
	West	33%	33%	44%	9
<b>ESF</b>	ESF #1	50%	29%	14%	14
	ESF #2	62%	46%	15%	13
	ESF #3	73%	40%	13%	15
	ESF #4	75%	63%	13%	8
	ESF #5	57%	39%	17%	23
	ESF #6	67%	44%	22%	9
	ESF #7	80%	70%	10%	10
	ESF #8	80%	60%	10%	10
	ESF #9	76%	59%	12%	17
	ESF #10	62%	45%	7%	42
	ESF #11	78%	56%	11%	9
	ESF #12	63%	50%	13%	8
	ESF #13	53%	40%	33%	15
	ESF #14	67%	56%	11%	9
	ESF #15	63%	50%	25%	8
<b>RSF</b>	Community Assistance	62%	48%	19%	21
	Economic	44%	56%	25%	16
	General Recovery Support	52%	48%	21%	33
	Health & Human Services	67%	50%	8%	12
	Housing	57%	43%	14%	14
	Infrastructure Systems	61%	48%	9%	23
	Natural & Cultural Resources	62%	50%	15%	34



Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		Ability to manage staff and resources during response and recovery	Access to facilities and infrastructure post storm	Access to funding for response and recovery activities	Adequate qualified staffing resources to support response and recovery activities
<b>Overall</b>		3%	4%	10%	7%
<b>Org or Agency Type</b>	NOAA	2%	4%	9%	
	Other Federal	6%	6%	13%	25%
	State or Territory			8%	8%
<b>Region</b>	Alaska				
	Caribbean		8%	8%	17%
	Gulf of Mexico		4%	4%	4%
	Mid-Atlantic				
	National		10%	10%	5%
	Northeast			17%	
	Pacific Islands	14%		10%	10%
	Southeast			12%	
	West				
<b>ESF</b>	ESF #1	10%	10%	10%	10%
	ESF #2	8%		8%	8%
	ESF #3	7%		7%	13%
	ESF #4	14%		14%	14%
	ESF #5	15%		5%	15%
	ESF #6	11%		11%	22%
	ESF #7	9%		9%	9%
	ESF #8	13%		13%	25%
	ESF #9	7%		7%	21%
	ESF #10	3%	3%	13%	13%
	ESF #11	13%		13%	25%
	ESF #12	14%		14%	14%
	ESF #13	9%	9%	9%	9%
	ESF #14	11%		11%	11%
	ESF #15	11%		11%	11%
<b>RSF</b>	Community Assistance	18%	6%	18%	18%
	Economic	30%	10%	20%	20%
	General Recovery Support	13%	9%	9%	13%
	Health & Human Services	20%	10%	20%	30%
	Housing	15%	8%	15%	23%
	Infrastructure Systems	11%	6%	17%	17%
	Natural & Cultural Resources	8%	8%	24%	12%

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		Capacity to implement resource recovery plans	Coordination with partners during response and recovery activities	Differences between local/state/federal guidelines	Facility/critical infrastructure and assets resilience to potential storm impacts
<b>Overall</b>		6%	7%	4%	9%
<b>Org or Agency Type</b>	NOAA	2%	2%	2%	4%
	Other Federal	13%	19%	13%	19%
	State or Territory			8%	
<b>Region</b>	Alaska				
	Caribbean	17%	17%	8%	8%
	Gulf of Mexico	4%	4%	7%	4%
	Mid-Atlantic				
	National		10%	5%	5%
	Northeast				
	Pacific Islands	10%	5%		19%
	Southeast				6%
West					
<b>ESF</b>	ESF #1	10%	20%	10%	20%
	ESF #2	8%	8%	8%	23%
	ESF #3	7%	7%	13%	13%
	ESF #4	14%	14%	14%	29%
	ESF #5	10%	10%	5%	20%
	ESF #6	11%	11%	11%	22%
	ESF #7	9%	9%	9%	18%
	ESF #8	13%	13%	13%	25%
	ESF #9	7%	14%	7%	14%
	ESF #10	3%	13%	3%	6%
	ESF #11	13%	25%	13%	25%
	ESF #12	14%	14%	14%	29%
	ESF #13	9%	18%	9%	18%
	ESF #14	11%	11%	11%	22%
	ESF #15	11%	11%	11%	22%
<b>RSF</b>	Community Assistance	18%	12%	12%	24%
	Economic	30%	20%	20%	20%
	General Recovery Support	13%	17%	9%	17%
	Health & Human Services	20%	20%	20%	40%
	Housing	15%	15%	15%	23%
	Infrastructure Systems	11%	11%	11%	22%
	Natural & Cultural Resources	8%	12%	12%	16%

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		Keeping family safe during active response or recovery activities	Lack of individual/organizational preparedness plans	Lack of reliable communications with local, tribal, territorial, state and/or federal partners	Managing staff fatigue post storm
<b>Overall</b>		21%	6%	6%	19%
<b>Org or Agency Type</b>	NOAA	17%	4%		17%
	Other Federal	25%		19%	38%
	State or Territory	23%	15%	8%	8%
<b>Region</b>	Alaska				
	Caribbean	25%		8%	17%
	Gulf of Mexico	26%			30%
	Mid-Atlantic		13%	13%	
	National	19%	5%		14%
	Northeast	17%	17%		17%
	Pacific Islands	14%	10%	14%	19%
	Southeast	24%			6%
	West				17%
<b>ESF</b>	ESF #1	30%	10%	10%	20%
	ESF #2	8%	8%	8%	15%
	ESF #3	20%	13%	7%	7%
	ESF #4	14%	14%	14%	14%
	ESF #5	15%	5%	15%	15%
	ESF #6	11%	11%	11%	11%
	ESF #7	18%	9%	9%	18%
	ESF #8	13%	13%	13%	13%
	ESF #9	29%	7%	7%	21%
	ESF #10	23%	6%	6%	16%
	ESF #11	13%	13%	25%	13%
	ESF #12	14%	14%	14%	14%
	ESF #13	18%	9%	9%	36%
	ESF #14	11%	11%	11%	11%
	ESF #15	11%	11%	11%	22%
<b>RSF</b>	Community Assistance	12%	6%	12%	18%
	Economic	20%	10%		10%
	General Recovery Support	26%	9%	9%	35%
	Health & Human Services	20%	10%	20%	10%
	Housing	15%	8%	8%	23%
	Infrastructure Systems	17%	6%	11%	17%
	Natural & Cultural Resources	20%	8%	8%	12%

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		NOAA tools and services are appropriate for my needs	Personnel trained to use NOAA tools and services	Relationships with and access to federal and/or state partner programs and services	Resource limitations (non-personnel, ie. equipment, technology, etc.)
<b>Overall</b>		7%	4%	7%	8%
<b>Org or Agency Type</b>	NOAA	9%	4%	4%	9%
	Other Federal	6%	13%	19%	13%
	State or Territory			8%	
<b>Region</b>	Alaska	100%			
	Caribbean	25%	8%	17%	8%
	Gulf of Mexico	11%	11%	4%	7%
	Mid-Atlantic	38%		13%	
	National	14%			10%
	Northeast	33%			
	Pacific Islands	10%		10%	10%
	Southeast	12%			
	West	33%			
<b>ESF</b>	ESF #1	10%			10%
	ESF #2	8%			8%
	ESF #3	7%			7%
	ESF #4	14%			14%
	ESF #5	5%	5%	10%	15%
	ESF #6	11%			11%
	ESF #7	9%	9%		9%
	ESF #8	13%			13%
	ESF #9	7%	7%		7%
	ESF #10	13%	6%	3%	3%
	ESF #11	13%		13%	13%
	ESF #12	14%			14%
	ESF #13	9%			9%
	ESF #14	11%			11%
	ESF #15	11%		11%	11%
<b>RSF</b>	Community Assistance	12%	6%	6%	18%
	Economic	20%	10%	10%	20%
	General Recovery Support	9%	4%	9%	17%
	Health & Human Services	20%	10%	10%	30%
	Housing	15%	8%	8%	15%
	Infrastructure Systems	11%	6%	6%	17%
	Natural & Cultural Resources	12%	8%	12%	8%

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		Resources to implement individual preparedness plans (i.e. funding to evacuate, supplies to build a preparedness kit)	Safe work practices for responders or others serving in a response/recovery role	Staff aware of the range of NOAA tools and services available	Staff turnover, internally and externally
<b>Overall</b>		7%	7%	4%	8%
<b>Org or Agency Type</b>	NOAA	4%	6%	4%	4%
	Other Federal	6%	19%	13%	19%
	State or Territory	8%			
<b>Region</b>	Alaska				
	Caribbean	8%	8%	8%	8%
	Gulf of Mexico	7%	11%	7%	4%
	Mid-Atlantic			13%	
	National		5%		10%
	Northeast				
	Pacific Islands	10%	5%		14%
	Southeast	6%			
	West				
<b>ESF</b>	ESF #1				20%
	ESF #2				8%
	ESF #3		7%		13%
	ESF #4				14%
	ESF #5	10%			10%
	ESF #6				11%
	ESF #7		9%	9%	27%
	ESF #8				13%
	ESF #9		14%	7%	14%
	ESF #10		10%	10%	10%
	ESF #11				13%
	ESF #12				14%
	ESF #13	9%			18%
	ESF #14				11%
	ESF #15	11%			11%
<b>RSF</b>	Community Assistance	6%	6%	6%	18%
	Economic		10%	10%	30%
	General Recovery Support	13%	9%	4%	22%
	Health & Human Services		10%	10%	30%
	Housing		8%	8%	23%
	Infrastructure Systems		6%	6%	17%
	Natural & Cultural Resources	4%	4%	8%	16%

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		Sustaining operational support capacity in a hybrid work environment	Unreliability or loss of utilities (power, internet, water, cell service)	Other access and usability of NOAA tools and services challenge	Other communications challenge
<b>Overall</b>		4%	9%	1%	6%
<b>Org or Agency Type</b>	NOAA		4%		6%
	Other Federal	19%	19%		6%
	State or Territory		8%		8%
<b>Region</b>	Alaska				
	Caribbean	8%			8%
	Gulf of Mexico	4%	4%		7%
	Mid-Atlantic				
	National			5%	5%
	Northeast		17%		
	Pacific Islands	10%	24%		5%
	Southeast		6%		18%
	West				
<b>ESF</b>	ESF #1		30%		
	ESF #2		15%		8%
	ESF #3		13%		
	ESF #4		29%		
	ESF #5	10%	20%		5%
	ESF #6		22%		
	ESF #7	9%	18%		
	ESF #8		25%		
	ESF #9		21%		
	ESF #10	3%	10%		6%
	ESF #11	13%	25%		
	ESF #12		29%		
	ESF #13		18%		9%
	ESF #14		22%	11%	
	ESF #15		33%		
<b>RSF</b>	Community Assistance	6%	18%		12%
	Economic		10%		10%
	General Recovery Support	9%	22%		4%
	Health & Human Services	10%	30%		10%
	Housing		15%		
	Infrastructure Systems	6%	22%		11%
	Natural & Cultural Resources	4%	8%		8%

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future:  
(Select all that apply)

		Other funding & other resources challenge	None of the above	N
<b>Overall</b>		1%	29%	90
<b>Org or Agency Type</b>	NOAA		34%	47
	Other Federal	6%	19%	16
	State or Territory		23%	13
<b>Region</b>	Alaska			2
	Caribbean		25%	12
	Gulf of Mexico	4%	22%	27
	Mid-Atlantic		50%	8
	National		33%	21
	Northeast			6
	Pacific Islands		24%	21
	Southeast		18%	17
	West		50%	6
<b>ESF</b>	ESF #1		30%	10
	ESF #2		38%	13
	ESF #3		33%	15
	ESF #4		29%	7
	ESF #5		25%	20
	ESF #6		33%	9
	ESF #7		36%	11
	ESF #8		25%	8
	ESF #9		29%	14
	ESF #10		23%	31
	ESF #11		25%	8
	ESF #12		29%	7
	ESF #13		18%	11
	ESF #14		33%	9
	ESF #15		33%	9
<b>RSF</b>	Community Assistance		24%	17
	Economic		20%	10
	General Recovery Support		17%	23
	Health & Human Services		20%	10
	Housing		23%	13
	Infrastructure Systems		28%	18
	Natural & Cultural Resources		16%	25

Q19 How prepared are **you personally** for fulfilling your hurricane response and recovery roles and responsibilities?

		Very prepared	Somewhat prepared	Not very prepared	Don't know/Not sure	N
<b>Overall</b>		46%	50%	2%	2%	115
<b>Org or Agency Type</b>	NOAA	42%	56%		2%	62
	Other Federal	62%	33%		5%	21
	State or Territory	44%	44%	11%		18
<b>Region</b>	Alaska	50%	50%			4
	Caribbean	43%	57%			14
	Gulf of Mexico	44%	50%	3%	3%	36
	Mid-Atlantic	40%	50%	10%		10
	National	56%	44%			25
	Northeast	38%	63%			8
	Pacific Islands	29%	67%		4%	24
	Southeast	59%	41%			27
	West	38%	63%			8
	<b>ESF</b>	ESF #1	43%	50%		7%
ESF #2		57%	36%		7%	14
ESF #3		44%	50%		6%	16
ESF #4		38%	50%		13%	8
ESF #5		46%	50%		4%	24
ESF #6		44%	44%		11%	9
ESF #7		36%	55%		9%	11
ESF #8		40%	50%		10%	10
ESF #9		47%	47%		6%	17
ESF #10		57%	40%		2%	42
ESF #11		33%	56%		11%	9
ESF #12		38%	50%		13%	8
ESF #13		64%	29%		7%	14
ESF #14		33%	56%		11%	9
ESF #15		33%	56%		11%	9
<b>RSF</b>	Community Assistance	38%	57%		5%	21
	Economic	31%	69%			16
	General Recovery Support	45%	52%		3%	33
	Health & Human Services	25%	67%		8%	12
	Housing	43%	50%		7%	14
	Infrastructure Systems	39%	57%		4%	23
	Natural & Cultural Resources	46%	51%		3%	35



Q20 How prepared is **your organization** for fulfilling its hurricane response and recovery roles and responsibilities?

		Very prepared	Somewhat prepared	Not very prepared	Don't know/Not sure	N
<b>Overall</b>		53%	42%	1%	4%	114
<b>Org or Agency Type</b>	NOAA	56%	38%	2%	5%	61
	Other Federal	57%	43%			21
	State or Territory	33%	61%		6%	18
<b>Region</b>	Alaska	75%	25%			4
	Caribbean	64%	29%		7%	14
	Gulf of Mexico	51%	43%		6%	35
	Mid-Atlantic	70%	30%			10
	National	64%	32%		4%	25
	Northeast	63%	38%			8
	Pacific Islands	38%	58%	4%		24
	Southeast	67%	33%			27
	West	50%	38%		13%	8
<b>ESF</b>	ESF #1	71%	21%		7%	14
	ESF #2	64%	29%		7%	14
	ESF #3	50%	44%		6%	16
	ESF #4	50%	38%		13%	8
	ESF #5	46%	50%		4%	24
	ESF #6	44%	44%		11%	9
	ESF #7	55%	36%		9%	11
	ESF #8	40%	50%		10%	10
	ESF #9	59%	35%		6%	17
	ESF #10	60%	38%		2%	42
	ESF #11	33%	56%		11%	9
	ESF #12	50%	38%		13%	8
	ESF #13	71%	21%		7%	14
	ESF #14	56%	33%		11%	9
	ESF #15	44%	44%		11%	9
<b>RSF</b>	Community Assistance	52%	48%			21
	Economic	50%	50%			16
	General Recovery Support	59%	41%			32
	Health & Human Services	58%	42%			12
	Housing	57%	43%			14
	Infrastructure Systems	61%	39%			23
	Natural & Cultural Resources	54%	43%	3%		35

Q21 Over the past year, do you feel your organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities has improved, diminished, or stayed the same?

		Improved	Diminished	Stayed the same	Don't know/Not sure	N
<b>Overall</b>		50%	4%	39%	7%	114
<b>Org or Agency Type</b>	NOAA	45%	3%	45%	6%	62
	Other Federal	43%	14%	43%		21
	State or Territory	71%		18%	12%	17
<b>Region</b>	Alaska	75%		25%		4
	Caribbean	36%	14%	36%	14%	14
	Gulf of Mexico	50%	8%	39%	3%	36
	Mid-Atlantic	40%		50%	10%	10
	National	44%		56%		25
	Northeast	100%				7
	Pacific Islands	63%	4%	25%	8%	24
	Southeast	52%	4%	37%	7%	27
	West	63%		25%	13%	8
<b>ESF</b>	ESF #1	71%	7%	21%		14
	ESF #2	57%	7%	36%		14
	ESF #3	69%	6%	25%		16
	ESF #4	63%	13%	25%		8
	ESF #5	50%	4%	42%	4%	24
	ESF #6	78%	11%	11%		9
	ESF #7	64%	9%	27%		11
	ESF #8	70%	10%	20%		10
	ESF #9	53%	6%	41%		17
	ESF #10	59%	5%	37%		41
	ESF #11	78%	11%	11%		9
	ESF #12	75%	13%	13%		8
	ESF #13	57%	7%	36%		14
	ESF #14	67%	11%	22%		9
	ESF #15	67%	11%	22%		9
<b>RSF</b>	Community Assistance	60%	15%	25%		20
	Economic	63%	13%	25%		16
	General Recovery Support	52%	9%	39%		33
	Health & Human Services	50%	17%	33%		12
	Housing	64%	21%	14%		14
	Infrastructure Systems	55%	14%	32%		22
	Natural & Cultural Resources	50%	9%	38%	3%	34

Q22 What improvements were made to your organization's preparedness? (Coded)

		Communication	Coordination	More resources	Personnel
<b>Overall</b>		12%	21%	7%	9%
<b>Org or Agency Type</b>	NOAA	25%	25%	5%	5%
	Other Federal		13%	13%	
	State or Territory		11%		11%
<b>Region</b>	Alaska		50%		
	Caribbean		50%		
	Gulf of Mexico		17%		8%
	Mid-Atlantic	33%			
	National		14%	14%	
	Northeast				20%
	Pacific Islands	17%	33%		8%
	Southeast	17%	25%	17%	8%
	West		33%		
<b>ESF</b>	ESF #1		29%		29%
	ESF #2	17%	17%		33%
	ESF #3		17%		17%
	ESF #4		33%		33%
	ESF #5	11%	33%		22%
	ESF #6		25%		25%
	ESF #7		40%		40%
	ESF #8		25%		25%
	ESF #9		17%		17%
	ESF #10		20%		13%
	ESF #11		50%		25%
	ESF #12		25%		25%
	ESF #13		40%		20%
	ESF #14		25%	25%	25%
	ESF #15		25%		50%
<b>RSF</b>	Community Assistance	13%	13%		13%
	Economic		29%		14%
	General Recovery Support		29%		7%
	Health & Human Services		25%		25%
	Housing		17%		17%
	Infrastructure Systems	10%	10%		10%
	Natural & Cultural Resources	8%	15%	8%	8%

Q22 What improvements were made to your organization's preparedness? (Coded)

		Review/update of plans	Training	Other	N
<b>Overall</b>		21%	19%	12%	43
<b>Org or Agency Type</b>	NOAA	25%	10%	5%	20
	Other Federal	25%	38%	13%	8
	State or Territory	22%	22%	33%	9
<b>Region</b>	Alaska	50%			2
	Caribbean	25%	25%		4
	Gulf of Mexico	25%	25%	25%	12
	Mid-Atlantic	67%			3
	National	43%	29%		7
	Northeast	20%	60%		5
	Pacific Islands	25%		17%	12
	Southeast	25%		8%	12
	West	33%		33%	3
<b>ESF</b>	ESF #1	14%	29%		7
	ESF #2	33%			6
	ESF #3	17%	50%		6
	ESF #4	33%			3
	ESF #5	33%			9
	ESF #6	25%	25%		4
	ESF #7	20%			5
	ESF #8	25%	25%		4
	ESF #9	33%	33%		6
	ESF #10	27%	33%	7%	15
	ESF #11	25%			4
	ESF #12	25%	25%		4
	ESF #13	40%			5
	ESF #14	25%			4
	ESF #15	25%			4
<b>RSF</b>	Community Assistance	50%		13%	8
	Economic	43%	14%		7
	General Recovery Support	29%	36%		14
	Health & Human Services	50%			4
	Housing	33%	17%	17%	6
	Infrastructure Systems	30%	30%	10%	10
	Natural & Cultural Resources	31%	23%	8%	13

Q24 What are the existing limitations your organization faces regarding its preparedness? (Coded)

		Facilities	Funding	Resources	Staffing	Other	Don't know/Not sure	N
<b>Overall</b>		8%	12%	16%	40%	20%	4%	25
<b>Org or Agency Type</b>	NOAA	8%	15%	15%	38%	15%	8%	13
	Other Federal			33%	67%			6
	State or Territory	33%				67%		3
<b>Region</b>	Alaska					100%		1
	Caribbean		33%		33%	33%		3
	Gulf of Mexico	10%	30%	10%	30%	20%		10
	Mid-Atlantic				60%	40%		5
	National	25%			50%		25%	4
	Pacific Islands			40%	40%	20%		5
	Southeast		25%	25%	50%			4
	West				50%	50%		2
<b>ESF</b>	ESF #1	50%			50%			2
	ESF #2		33%		67%			3
	ESF #3				33%	33%	33%	3
	ESF #4				100%			2
	ESF #5		17%	17%	50%	17%		6
	ESF #6				100%			1
	ESF #7				100%			3
	ESF #8				100%			2
	ESF #9				83%	17%		6
	ESF #10			17%	50%	25%	8%	12
	ESF #11				100%			1
	ESF #12				100%			1
	ESF #13		25%		50%	25%		4
	ESF #14				100%			2
	ESF #15			50%	50%			2
<b>RSF</b>	Community Assistance				67%	33%		3
	Economic				50%	50%		2
	General Recovery Support		11%	22%	56%	11%		9
	Health & Human Services			25%	75%			4
	Housing			50%	50%			2
	Infrastructure Systems			20%	80%			5
	Natural & Cultural Resources		14%	29%	29%	14%	14%	7

Q25 Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit?  
(Select all that apply)

		Autonomous Underwater Vehicles (AUVs) / Autonomous Surface Vehicles (ASVs)	Environmental Response Management Application (ERMA)	Integrated Ocean Observing System (IOOS) gliders	NOAA Center for Operational Oceanographic Products and Services (CO-OPS) products
<b>Overall</b>		27%	36%	20%	33%
<b>Org or Agency Type</b>	NOAA	25%	31%	27%	46%
	Other Federal	35%	50%	20%	15%
	State or Territory	44%	44%		25%
<b>Region</b>	Alaska	50%	50%	50%	75%
	Caribbean	14%	36%	7%	43%
	Gulf of Mexico	43%	54%	23%	37%
	Mid-Atlantic	10%	30%	20%	50%
	National	24%	36%	20%	48%
	Northeast	29%	14%		14%
	Pacific Islands	24%	24%	33%	33%
	Southeast	16%	40%		24%
	West	29%	43%	29%	29%
<b>ESF</b>	ESF #1	38%	31%		31%
	ESF #2	25%	42%	8%	50%
	ESF #3	38%	46%	15%	54%
	ESF #4	43%	43%		43%
	ESF #5	18%	45%	9%	36%
	ESF #6	57%	57%		57%
	ESF #7	40%	40%	10%	30%
	ESF #8	44%	44%		44%
	ESF #9	56%	50%	13%	31%
	ESF #10	39%	45%	24%	34%
	ESF #11	38%	50%		38%
	ESF #12	43%	43%		43%
	ESF #13	38%	31%	15%	54%
	ESF #14	38%	50%		50%
	ESF #15	38%	38%	13%	50%
<b>RSF</b>	Community Assistance	37%	53%	21%	47%
	Economic	40%	60%	13%	40%
	General Recovery Support	28%	41%	16%	34%
	Health & Human Services	27%	55%	9%	36%
	Housing	50%	67%	17%	33%
	Infrastructure Systems	33%	33%	24%	29%
	Natural & Cultural Resources	24%	39%	24%	30%

Q25 Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit?  
(Select all that apply)

		NOAA Marine Debris Program products	NOAA Navigation Response Teams (NRT) coastal/port survey products	NOAA Office for Coastal Management products	NOAA Response Asset Directory (NRAD)
<b>Overall</b>		26%	20%	32%	17%
<b>Org or Agency Type</b>	NOAA	14%	22%	29%	15%
	Other Federal	30%	25%	35%	25%
	State or Territory	56%	6%	25%	6%
<b>Region</b>	Alaska	25%	50%	75%	50%
	Caribbean	14%	29%	43%	7%
	Gulf of Mexico	40%	17%	31%	20%
	Mid-Atlantic	20%	30%	40%	20%
	National	12%	32%	32%	20%
	Northeast	29%	29%	14%	
	Pacific Islands	24%	19%	43%	24%
	Southeast	16%	12%	20%	8%
	West	29%	29%	43%	43%
<b>ESF</b>	ESF #1	23%	31%	38%	23%
	ESF #2	25%	33%	42%	8%
	ESF #3	31%	23%	38%	15%
	ESF #4	29%	29%	57%	29%
	ESF #5	27%	18%	36%	9%
	ESF #6	43%	29%	57%	29%
	ESF #7	30%	20%	50%	10%
	ESF #8	33%	22%	44%	33%
	ESF #9	25%	25%	31%	25%
	ESF #10	24%	24%	24%	16%
	ESF #11	25%	25%	50%	13%
	ESF #12	43%	43%	57%	14%
	ESF #13	15%	46%	54%	31%
	ESF #14	38%	38%	63%	25%
	ESF #15	38%	25%	50%	13%
<b>RSF</b>	Community Assistance	47%	32%	53%	21%
	Economic	40%	27%	33%	13%
	General Recovery Support	22%	31%	34%	16%
	Health & Human Services	36%	36%	64%	36%
	Housing	42%	25%	58%	33%
	Infrastructure Systems	29%	38%	43%	24%
	Natural & Cultural Resources	18%	24%	30%	9%

Q25 Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit?  
(Select all that apply)

		NWS Tropical Products and Services	Remote Sensing Division Photogrammetry	Unmanned Aerial Systems (UAS)
<b>Overall</b>		36%	38%	41%
<b>Org or Agency Type</b>	NOAA	36%	37%	34%
	Other Federal	45%	40%	65%
	State or Territory	19%	38%	44%
<b>Region</b>	Alaska	75%	25%	50%
	Caribbean	64%	43%	36%
	Gulf of Mexico	46%	31%	49%
	Mid-Atlantic	30%	10%	10%
	National	16%	40%	40%
	Northeast	29%	57%	43%
	Pacific Islands	48%	38%	38%
	Southeast	32%	24%	28%
	West	43%	29%	29%
<b>ESF</b>	ESF #1	46%	38%	23%
	ESF #2	42%	17%	33%
	ESF #3	31%	46%	46%
	ESF #4	43%	29%	43%
	ESF #5	55%	23%	36%
	ESF #6	43%	43%	43%
	ESF #7	60%	20%	30%
	ESF #8	44%	33%	44%
	ESF #9	44%	31%	56%
	ESF #10	32%	39%	50%
	ESF #11	63%	38%	38%
	ESF #12	57%	29%	29%
	ESF #13	38%	23%	38%
	ESF #14	38%	38%	38%
	ESF #15	50%	38%	38%
<b>RSF</b>	Community Assistance	58%	26%	26%
	Economic	60%	20%	20%
	General Recovery Support	38%	41%	38%
	Health & Human Services	64%	18%	27%
	Housing	50%	42%	42%
	Infrastructure Systems	38%	33%	38%
	Natural & Cultural Resources	36%	30%	33%



Q25 Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit?  
(Select all that apply)

		Vessel and Debris Response (VaDR)	Other	None of the above	N
<b>Overall</b>		39%	5%	9%	107
<b>Org or Agency Type</b>	NOAA	34%	2%	12%	59
	Other Federal	45%			20
	State or Territory	50%	6%	6%	16
<b>Region</b>	Alaska	25%		25%	4
	Caribbean	21%	14%	14%	14
	Gulf of Mexico	46%	6%	6%	35
	Mid-Atlantic	10%		30%	10
	National	36%	8%	8%	25
	Northeast	43%		14%	7
	Pacific Islands	33%		10%	21
	Southeast	28%	4%	20%	25
	West	29%		29%	7
	<b>ESF</b>	ESF #1	31%		8%
ESF #2		25%		8%	12
ESF #3		46%	8%		13
ESF #4		57%			7
ESF #5		23%	5%	5%	22
ESF #6		57%			7
ESF #7		40%		10%	10
ESF #8		56%			9
ESF #9		44%		6%	16
ESF #10		42%	5%	8%	38
ESF #11		38%			8
ESF #12		57%			7
ESF #13		31%			13
ESF #14		50%	13%	13%	8
ESF #15		38%			8
<b>RSF</b>	Community Assistance	42%	5%		19
	Economic	47%			15
	General Recovery Support	28%	6%	3%	32
	Health & Human Services	45%			11
	Housing	42%			12
	Infrastructure Systems	43%		10%	21
	Natural & Cultural Resources	48%	3%	9%	33

## Appendix B

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

- ACD Consults and Sulzer Group consulting for LA and NM EOC
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Conservation and Natural Resources State Lands Division
- Alabama Department of Environmental Management
- City & County of Honolulu Department of Emergency Management
- City and County of Honolulu
- City and County of Honolulu - Dept. of Emergency Management
- Coastal Response Research Center
- Departamento de Recursos Naturales y Ambientales
- Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management
- EPA
- EPA
- EPA
- FEMA
- FEMA
- FEMA R9
- Florida Fish & Wildlife Conservation Commission
- Florida Fish and Wildlife Conservation Commission (FWC)
- Florida Keys National Marine Sanctuary, NOAA
- Graduate School of Planning University of Puerto Rico Rio Piedras Campus
- Guam Homeland Security and Office of Civil Defense
- Guam Homeland Security/Office of Civil Defense
- Guam Homeland Security/Office of Civil Defense
- Guam Housing Corporation
- Lynker - I'm a contractor for NOAA
- Maine Emergency Management Agency
- Maryland Sea Grant
- Massachusetts Office of Coastal Zone Management
- MDMR
- Mission-Aransas NERR (Unv. of Texas Marine Science Institute)
- National Oceanic and Atmospheric Administration (NOAA)
- National Weather Service Tallahassee, FL
- NCCOS
- NESDIS
- NOAA
- NOAA
- NOAA
- NOAA
- NOAA



- NOAA Office for Coastal Management
- NOAA OR&R
- NOAA ORR
- NOAA, Office of Coast Survey
- NOAA/ NWS
- NOAA/Florida Keys National Weather Service and NOAA/SECART
- NOAA/National Weather Service
- NOAA/NESDIS
- NOAA/NOS/OCS
- NOAA/NOS/ORR/ERD
- NOAA/NWS Central Pacific Hurricane Center
- NOAA/NWS/WFO Jacksonville, Fl
- NOAA/ORR/DPP
- NOAA\NWS
- NOAA-NWS-WSO PAGO PAGO
- Puerto Rico Sea Grant
- Research Planning, Inc.
- Research Planning, Inc. (RPI)
- Rookery Bay National Estuarine Research Reserve
- Rookery Bay NERR
- Rookery Bay NERR
- SC Department of Health and Environmental Control, Ocean and Coastal Resource Management
- StormCenter Communications
- Texas Division of Emergency Management (TDEM)
- Texas General Land Office
- Texas General Land Office
- TXGLO
- TXGLO
- U.S. Coast Guard
- United States Coast Guard First District
- University of Texas at Austin, Marine Science Institute
- University of the Virgin Islands
- US Coast Guard
- US Coast Guard
- USCG
- USCG
- USFWS Caribbean FO
- Weeks Bay NERR

**Q10 You identified ‘Individual Preparedness, Health, and Safety’ as a challenge. What specific areas contribute to this challenge? - Other (Please Specify)**

- Clear procedures from response and funding authorities
- Having time off work available to make individual and family preparedness actions ahead of the storm

**Q11 You identified ‘Organizational or Facility Resilience’ as a challenge. What specific areas contribute to this challenge? - Other (Please Specify)**

- Facility is at sea level

**Q12 You identified ‘Communications’ as a challenge. What specific areas contribute to this challenge? - Other (Please Specify)**

- All comms depending on power and no reliable back up power
- Disconnect between boots on the ground and EOC teams/task forces. For recent Hxs, voluntary multi-agency teams have been stood up to attempt to fill this gap.
- I worry about our partners' ability to access (and even be aware of) resources post-event, and I worry about the lack of post-disaster recovery/redevelopment plans that could foster greater resilience/adaptation.
- Interpretation of scientific data, specifically NOAA provided severe weather watches, warnings, advisories and (especially) graphics.
- Messaging around the services and financial support NOAA fisheries has the authority to provide is often miscommunicated or misunderstood

**Q13 You identified ‘Funding & Other Resources’ as a challenge. What specific areas contribute to this challenge? - Other (Please Specify)**

- Clear and consistent mission assignment issuances and practices
- General office resource limitations due to a challenging hiring environment.
- Once federal response ends, a great deal of marine debris is left behind because it was ineligible for FEMA reimbursement. MDP will not be able to provide funding support until much later and only if the US Congress passes supplemental funding to NOAA.
- Staff, partners and others not being aware of funding available for aid
- We have very limited authority on providing disaster-related assistance to the fishing industry. We are extremely short staffed so providing personnel to support other agency functions is limited or almost impossible

**Q14 You identified ‘Access and Usability of NOAA Tools and Services’ as a challenge. What specific areas contribute to this challenge? - Other (Please Specify)**

- NOAA has too many portals websites and hubs. Combine those with other agencies and it is overwhelming. We bring disparate datasets together in a collaborative environment.
- Reliability of internet/network access to use NOAA Tools and Services

**Q16 Briefly describe a mitigation strategy you have successfully implemented that addressed a challenge:**

- A dashboard that succinctly explains the efforts per applicable line office (and even program office levels) as well as required data inputs and associated date/ time stamps.
- AAR for the yearly storm cycles.
- Access to a satellite phone/communications
- advance preparedness so that evacuation, response, etc. can be more efficient and effective
- Annex 19 of the Region 6 Regional Contingency Plan provides awareness and expectations for USCG pollution response role (distinction between day-to-day operations versus post major disaster declaration).
- As [position redacted], OCS has been working with USCG & USACE in previous years and have established good comms.
- At NWS Southern Region Headquarters, we've implemented an ICS system to respond to weather events. This has helped us ensure that office's needs are supported and sets us up to respond quickly to issues as they arise.  
We've also implemented training programs for communications best practices, which are updated annually.
- better communication plan
- Challenge: To quick collect post-storm field data, process it, and communicate the finding to partners.  
Strategy: Migrated to digital field and office collection and processing platforms. In the process of building a Dashboard for communicating the information to partners.
- Checking and practicing using satellite phone.  
Getting NOAA emergency generator.
- Collaborated with the U.S. Coast Guard, Florida Fish and Wildlife Conservation Commission, Monroe County Emergency Management, and the City of Key West to improve risk communication to the vulnerable liveaboard populations in the Florida Keys.
- Communicating weather information: our locally hosted website was overwhelmed during the 2018 hurricane season. Migration to the unified (and more robust) "hurricanes.gov" host has kept that from happening again. Phone access to weather information could also be overloaded. Previously recorded forecasts and observations were limited to a handful of dedicated, rollover phone lines. For 2024, we now have a cloud-based host (Twilio) that has a surge capability that can handle as many phone calls as needed.
- Communication improvements within OR&R to ensure all potential responders are aware of response capabilities not only within OR&R but also NOS.
- Conducted outreach to increase our agency's Response Support Corps, met with FEMA to improve the administrative process for Mission Assignment funding, met with Texas to improve the process for making data publicly available
- CO-OPS continues to add new functions to its Coastal Inundation Dashboard decision support tool to ensure that coastal water level information is communicated in a robust way before, during and after tropical events. CO-OPS has also stood up a post-storm peak water level web mapping tool to disseminate storm peak water levels shortly after tropical events.
- Coordination teams to address contractor training and compliance, continued meetings in prep of the upcoming Hx season to get ahead of the issues presented with recent Hxs, updated BMPs, multi-language BMPs, contractor training, and working towards formalizing a resource advisor program...to name a few.

- Currently working with USCG District 5 on an upcoming ESF10 TTX to prepare USCG Sectors. Informed D5 of the various NOAA tools, products, services that we can provide to support ESF10 missions.
- Designed, deployed, and managed the Vessel, All-hazards, Debris Response (VADR) database and field data collection tools to support ERD and the USCG MER and ESF-10 missions.
- Developed calendars for staff availability and rotations.  
Developed cost tracking spreadsheets for you by all NOAA responders (FTE & contractors).  
Smart and dedicated CORs and finance lead who have been able to accept funds from MAs and get them allocated to contracts and budget codes for reimbursement.  
Training in advance of storm season to talk with and prepared partners with priorities and protocols for activation of MAs and establishment of known objectives based on changing policies.
- Developed pandemic specific health and safety guidelines for responders to mitigate risk of exposure.  
Participated in development of facility specific hurricane preparedness plan.
- Developed written instructions with photos for shutting down our IT infrastructure ahead of a storm. The instructions are laminated and kept near our equipment so anyone will be able to walk through the process. (We have no IT personnel on site.)
- Developing networks and an understanding of other federal agency capabilities long before an incident occurs.
- Documentation materials have all been converted to digital with offline accessibility.
- Drills and training in use of different tools so we are ready to go on scene and support NOAA and USCG.
- Education and awareness about storm preparedness provided to extended family.  
Ensuring a detailed communications plan with redundancy or alternate communication resources.
- Ensuring pre hurricane water and food supplies for Service employees if the need arises, emergency generators for each employee if needed.
- evacuation
- Evacuation decision plans for family  
Use of range of NOAA weather and response products and services
- First Net Cellular Service
- FWC has been the recipient of NOAA supplemental funding grants to assist with removal of vessels and debris.
- Having a site hurricane plan helped secure assets before evacuation.
- Having pre-landfall coordination call. Having trained personnel, having sat phones and other communications
- Home hardening, alternative power sources
- Identifying vulnerable infrastructure and investing in hardening for resilience.
- If a disaster has significantly impacted a fishery, we have the ability to temporarily waive electronic reporting requirements. This is usually communicated via an electronic news bulletin. 1. We continue to have radio announcements in case internet is down. 2. we have added the permit office phone number to our radio announcement for those with questions 3. we have added additional financial resource information to our bulletins to help get the word out to the fishing community about more immediate financial assistance available to them than what NOAA Fisheries has the authority to provide.

- Implementation of monthly training for our field staff on complex recovery processes and projects. This includes having resources available they can reach out to if needed.
- Implemented a Decision Support Coordinator to help ensure consistency of messaging to the public and partners between National Centers (NHC, WPC, etc.) and field offices (WFOs, RFCs, etc.)
- Improvements to phone tree. Improvements to stakeholder involvement. Attention to gaps in current response plans.
- Improving COOP/backup plans
- In brief, we have a local hazard mitigation plan that has resulted in some mitigation actions. Additionally, using mitigation in a different sense, we have continue to work with whole community partners to enhance response capabilities including budget and fiscal processes to facilitate response and recovery.
- Incorporating a tutorial video on our external organization page that assists viewers/the general public in understanding how to use a tool to view post hurricane aerial imagery
- Integrating several layers (continuity) of misinformation monitoring and public information dissemination
- Lab preparation plans
- Leave Early
- Make building improvements. Socializing our hurricane plan.
- Nearshore marine surveys to evaluate impacts and identify marine debris hotspots.
- Not qualified to provide detailed answers for this question
- Occupant Emergency Plan has Hurricane Preparedness
- Organization purchased portable back up battery units for field staff.
- Our reserve actively participates in a hurricane preparedness day in May (prior to hurricane season), in which our team tries to "break" the plan and makes sure that we have all the supplies (shutters, trailers, anchors and straps for items that could fly away, etc.) and personnel that would be activated upon a hurricane approaching. Additionally, we have reserve "work-days" where reserve staff and volunteers go around the grounds to make sure there are not any immediate dangers to the facility or to guests if there is high wind and rain- we live in FL, so a summer storm can do serious damage if we are not actively prepared.
- People first. Focusing on staff needs to ensure they are mentally, emotionally and physically prepared. This was a concept I adopted prior to Typhoon Mawar in May 2023. This enabled us as an office to engage the typhoon fully ready, prepared and in high spirits as one single unit. This carried us into the storm, through the storm and through its aftermath, in high spirits and emotional strength.
- Phone tree to record personnel safety during an emergency.
- Planning ahead for my family, so I know they are safe as I respond
- Preparation of coastal change diagnostic to identify priorities and COAs
- Proactive approach when approaching storm are on the horizon, Conducted a hurricane checklist before a minor storm last year. Executed staff notifications, updated contact information, secured all vessels and debris. Conducted SATPHONE Checks.
- Purchase of satellite phones
- Purchased satellite phones for use at all of our units in case of traditional communications system failure.
- Refined response capabilities between local, state, and federal partners by implementing the Natural Disaster Operating Workgroup (NDOW) to make wide disaster response and recovery



more efficient and effective by reducing redundant response activities from multiple agencies (EPA, NOAA, USCG, USFWS, TGLO, TCEQ, TPWD, WMD-CST).

- Revised our severe weather action plan to make it applicable to both hurricanes and winter storms. Added a recovery section to our severe weather action plan post Hurricane Harvey.
- Sending storm preparation fact sheets to our partners
- The Commonwealth of Massachusetts provides technical assistance to coastal communities to help them implement mitigation strategies.
- The development and application of field data collection tools that allow for real time updates of dashboard utilized in the EOC.
- The First Coast Guard District has Five Sectors from Maine to New York/New Jersey. These are Sectors Northern New England, Boston, Southeastern New England, Long Island Sound and New York. Each Sector has a Marine Transportation System Recovery Plan and a Heavy Weather Plan. These plans provide the guidance for post storm recovery of ports and waterways.
- The use of satellite phones.
- UAV and airspace deconfliction during hurricane response, always have a Visual Observer when search and rescue operations are ongoing.
- Updated and tested Emergency Notification System
- Updated mitigation planning
- Using Hazard Mitigation grants 20 years ago, replaced wooden power poles with concrete poles, resulting in minimizing the destruction of power lines, which in-turn led to faster energy recovery and millions of dollars saved in parts and equipment.
- Using the natural base solution as part of the mitigation strategies
- We created the A Captain of the Port guide to NOAA emergency hydrographic survey Version 1.1 to help communicate with the USCG and other about our capabilities.
- We developed a communications protocol during hurricanes for staff in NOAA/NOS Office for coastal Management
- We have a multi-level response plan in place that activates different staff to accomplish different tasks to insure safety of staff and facilities depending on type, level, and intensity of a storm (based on NOAA weather, state, and local county Emergency Response requirements).
- We have backfitting our office to be more resilient during long duration TC events.
- We have established communications protocols for our office, and we update contact information prior to the start of storm season. We have also provided satellite phones for staff on islands.
- We moved away from Florida after being impacted by a hurricane in prior seasons.
- We successfully implemented a training program for staff assigned to Damage Assessment Teams, and we have continued to refine the training and field procedures over the past several years.
- We use GeoCollaborate to provide trusted data in our ESF14 support to the All Hazards Consortium that has 45,000 stakeholders.
- While tracking the storm path, identify and implement pre-positioned reservations for lodging, communications, and supplies to proactively move out of the storms path but remain close enough to respond after the passage.

**Q18 Briefly describe one mitigation strategy you are planning to implement that addresses previously identified challenges.**

- A better understanding of the position titles and some key people within FEMA who can help connect the dots for marine related response options in the ESF/RSF phases.
- Advocate for the reserve to have satellite phones and to work to create a local network of community leaders that help to disseminate information to the team.  
Require breaks to reduce staff fatigue and provide shaded/cooled options for when working out in the elements. Prepare hydration kits for each reserve vehicle.
- As potential to MDP responders join the team, they are trained in basic NOAA response procedures, made familiar with internal NOAA and NOS tools and assets, and given MDP specific lessons learned from previous response efforts.
- At home safety and planning
- Being a lead in a 'Morale Committee' that helps keep folks engage and focus, when times are tough.
- Coastal hazards are a national priority for Coastal Zone Management Programs. OCM can coordinate and encourage preparedness and mitigation strategies within state CZM 306 and 309 funding.
- Conducting outreach to increase the size of the Agency's Response Support Corps
- considering getting an emergency generator for our house
- Continue being frugal in these tight budget (CR) times, as well as continuing to share Tools and Use of them with others.
- Continue working with FEMA to implement an ESA consultation matrix for both response and recovery.
- Education
- Emphasizing the importance of social science and public interpretation of NOAA products, and to adjust messaging to ensure "common denominator" tactic is used to help increase understanding and correct engagement and assimilation of time critical information by internal and external stakeholders.
- Ensuring offices have the information to access support resources, including them with communications during the ICS calls and throughout the event.
- Establishing and implementing fatigue standards as well as behavioral health resources for our program office responders.
- For staff to be able to respond, they must plan for family and property safety and protection ahead of the storm. We message this regularly, yet a large percentage of staff still report that they do not have individual or family plans or believe that they are prepared for the next storm. Therefore, we have not yet achieved the criteria in this survey as successful. We make progress, but not to the level that I would score successful.
- Having phone numbers for staff and students; taking mental health first aid training
- Hire more people to fill staff positions
- Hiring additional Limited Period Positions to support the recovery workload
- I would like to spread awareness of the newly available mobile apps (apple and google) for the Homeowner Handbooks that provide information for homeowners on preparedness, recovery, and insurance. I would also like to spread awareness of the Housing Resilience Guide from SmartHome American and the Gulf Coast Community Design Studio. I continue to foster dialog amongst partners about the challenges from and intersections between growing climate-driven risk and insurance affordability and availability issues.

- Identifying additional trusted NOAA data to put to work supporting non-technical decision makers.
- If needed, evacuation; ensure we have emergency supply kit updated
- Implementing evacuation for family and pets
- Increase partner visits during the off season to be sure we reestablish relationships before an event. Invest in satellite data communications as a backup to terrestrial internet. Utilize partial service backup (COOP) to mitigate staff burnout during long events.
- Making sure every staff member has a place to evacuate to if needed.
- New generator upgrades
- On the personal side, I have set-up a communication plan with family in the event one is needed. Also have briefed USCG D5 on the tools and assets that NOAA has to support a hurricane response.
- Our facilities team is very proactive in building preparedness
- Preparing cost estimates for debris assessment, removal, disposal and recovery efforts in different regions.
- Public education is part of our Coastal Resilience Grant Program projects.
- Regarding staff fatigue post storm, establishing the critical support services needed from the office and structuring a minimal schedule flow to support the needs while also allowing staff to take time to address their own homes, families, and mental wellbeing.
- Through local, state and federal partnerships, bury power, cable, fiber optics and other lifeline services underground to minimize the destruction of these essential utilities during a natural disaster.
- Training in understand coastal state diagnostic and planning analysis
- Update of comprehensive emergency management plan to increase the likelihood of a successful, coordinated response. Plan is intended to reduce bottlenecks in the emergency management agency and reduce single points of failure in emergency management processes.
- Updated BMPs and associated trainings (See previous answer for full response)
- Visual observer guide for other agencies to use instead of requiring internal personnel.
- We are planning to establish an after event protocol. It will outline when a storm has hit, what we should be doing and communicating to equitably address any impacts to fishing communities
- Work with our COR so that new call orders are issued quickly. Hoping that NOAA finance can figure out how to get PRFA \$ into their system.
- Working closer with partners
- Working to create a clear system/personnel/asset tracker to allow HSPO to rapidly identify risk levels.

**Q22 What improvements were made to your organization's preparedness?**

- Additional training of personnel.
- Annual updates to the Severe Storm and Hurricane Response Plan, as well as preparedness drills and exercises.
- Better cross office communication and better network to reach out to and ask questions.
- Better products to reach our core partners.
- Better sheltering identification tools with partners
- Better internal city employee training

- brought on the right personnel.
- California has never had a hurricane disaster until mid 2023 with Tropical Storm Hilary. This year, CA suffered again with multiple atmospheric river storms and are expected to receive a disaster declaration soon. Both CalOES and FEMA R9 have had to 'learn' how to respond and recovery from flooding and high winds, when most of the emergency management has centered around wildfires.
- Communications with stakeholders and identification of gaps.
- Continue to hold annual hurricane exercises and train members to fill positions in an Incident Command or Unified Command post
- Coordination efforts by DPP
- Creating and hiring more positions - to include a Preparedness & Homeland Security Director
- Deployment to FEMA EHP and ESF10 to assist in Emergency consultation, development of BMPs and technical assistance for natural resources as needed.
- Enhanced and centralized coordination and response
- Expansion of the DV Program and creation of the Marine Debris Program
- Greater emphasis on training and plans
- I see that NWS is focused on how to improve their tools and communication with the public and other users (emergency management, state, and local govt.)
- Identification of additional trusted data services to access and share across platforms.
- Lessons learned from previous years are implemented into updated plans
- Mitigation answer before. The biggest challenge is staff turnover.
- More funding to address the issue. Overall increased awareness throughout the Southeast.
- More meetings
- More organized with communications
- More training, drills, and updates to software for apps.
- New platforms, new equipment, increased staff.
- NOAA routinely adjusts response and recovery efforts based on outcomes of white washes at the end of each year.
- Our facilities continue to recover from Hurricane Harvey- and with that rebuild, we should be able to recover in the future faster (facility-wise).
- People First mindset. Ensuring the full office works as one unit and in transparency, before, during and after the event.
- Post pandemic opportunities for necessary in person training completion to meet deployable safety and readiness requirements.
- Pre and post-storm checklists - for readiness.  
Streamlined approach to meet staffing needs.
- Proactive tropical cyclone posture with enhanced awareness of employee work locations within an affected geographic area, improved cross-line office communication and coordination during and after a tropical cyclone event that impacts the US & territories.
- Regular reviews always bring improvement.
- Relationships with Coastal Municipal Governments
- streamlined some internal processes for producing communication products
- Stronger culture of preparedness in the jurisdiction at individual, community, and organizational levels.
- Stronger partnerships and improved communications

- Training, preparation and equipment upgrades will allow us a faster more efficient transition from shelter to field work.
- Update of plans. Recently going through typhoon Mawar Category 4 storm which reacquainted the population and government agencies with storm prep
- Vacant positions filled
- We got practices at doing marine surveys and potentially integrating that information into the RSF phase following typhoon Mawar on Guam.
- We have continued to improve processes associated with post-storm damage assessment of beachfront structures.
- We regularly do service assessments after significant hurricane events and make changes to improve our operations
- We will be having an agency wide roles and responsibilities exercise
- Within the MDP, we have developed comprehensive training materials for new staff, as well refining internal documents that help MDP staff if they are deployed to a Joint Field Office or Incident Command Post

**Q23 What challenges led to your organization's preparedness being diminished?**

- Decreased funding and personnel.
- Personnel turnover
- Time. The last major typhoon that ravaged Guam happened 20 years before Typhoon Mawar (24 May 24). Local, state and federal officials' response to a natural disaster grew atrophy, and this is the time to rekindle our consequence management institutional knowledge and best practices.
- Under BIL and IRA we have had to stand up multiple large funding competitions, and are in the process of standing up a significant technical assistance program. All of this work diminishes our capacity to help with post-disaster recovery.

**Q24 What are the existing limitations your organization faces regarding its preparedness?**

- As we utilize mostly contract labor for our responders, keeping everyone coordinated as each responds to the dynamic environment of a major hurricane.
- Contractor resources
- Equipment for operating under disaster conditions.
- FEMA
- Financial resources
  - Network limitations
  - Software support limitations
- Focused on other issues
- Funding
- Funding to enhance current hardening against storm impacts and improve facilities storm resilience. Elevate buildings and other facilities in low-lying areas.
- I scored this as "stayed somewhat the same" as we were not challenged last year (2023) by a major storm to test improvements from the year before that (2022). I would like to think that we have improved, but without being put a test, you just don't truly know.
- Low staffing
- Manpower to do day-to-day work and prepare at the same time
- New staff that have not experienced an active hurricane season in their current roles.

- None
- One field office being in a very hurricane prone area (Florida panhandle).
- Our response model for displaced vessels and storm debris has not been consistent from hurricane season to hurricane season, resulting in some confusion about how future storms will be handled.
- Personnel turnover and experience.
- Possibly being able to deploy staff.
- Rotation of personnel in and out of leadership and response positions
- Some facilities are sited in vulnerable locations.
- Staffing and budget.
- Staffing and expertise; resources tend to be devoted primarily to day-to-day operations and maintenance.
- Time and resources always seem to be the limiting factor. We don't have the additional time in order to make additional arrangements since it is not required and therefore, we do not have the physical (mechanical) and fiduciary (grants) resources to implement changes.
- Understaffing.
- Vacancies, limited budgets
- We do not have a stockpile of food and water for staff who will be forced to work during a hurricane event. There is also inadequate space in our office for rest/sleep during long-duration events when people aren't able to leave between shifts.
- We rely on traditional communications tools (emails, cell phone calls/text, NOAA ENS); they may not work if the storm causes area-wide power outages.
- we're pretty well prepared

**Q25 Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit? - Other (Please Specify)**

- Accessing RSD flight plans before flying, areas of marine debris resulting in non-navigable waterways
- Artificial Intelligence applications for spill detection and/or response
- Civil Air Patrol image asset deliverables.
- Mental Health Resources related to disasters
- Water level forecasts and monitoring

**Q26 Are there any topics or issues that you would like to see a NOAA Hurricane Summit address in the future?**

- Anything Debris related or infrastructure recovery that can assist our Local jurisdictions.
- Artificial Intelligence applications to spill detection, spill response, spill mitigation.
- Balancing resource protection with Hx response/debris removals and "gap funding" between FEMA response and supplemental funding.
- Behavioral health aspects of response - more specifically interested in the topic or potential benefit of offering Mental Health First Aid training to supervisors and responders.
- Building a personal preparedness kits for home and car with tips and tricks to keep costs down.
- Consider and treat the mountain zone different than Coastal specially in the Wind and the effect by elevations

- Coral reefs as critical infrastructure and mechanisms for FEMA to more easily fund action in the ESF and RSF phases to protect and recover reefs following damage.
- Dissemination of information/resources to underserved communities
- How can NOAA foster greater adoption of post-disaster redevelopment planning that will foster resilience gains during recovery (vs just building back everything the same way and in the same places.) Implications of the rapid intensification and slower speeds (which leads to more rainfall) we are seeing in tropical systems -- for preparedness, response, and recovery.
- How to bring multiple datasets together and shared across platforms using GeoCollaborate which now has NOAA-wide sole source approval for line office acquisition as an SBIR Phase III technology.
- Improving preparedness and relationships with federal and state partners for funding issues, mission assignments, identified triggers for declaration of Stafford act per state, allowances and limitations for each MA, planning for emergency response support vs project management and recovery activities
- Interagency coordination between resource agencies.
- Keep up the good work and tool development for us emergency management practitioners in the field
- Lack of resources and support provided in the territories following a large storm event (e.g. Aerial imagery)
- Longevity and continuity of NOAA in the Western Pacific; specifically in the areas of operations in Guam, CNMI and American Samoa.
- Mental health before, during and after disasters. Equity in disaster decision making and response
- Multirisk and cascade event effects
- No
- No
- No, NOAA does a very good job forecasting and forwarding on weather briefs to our organization
- No
- None at this time
- None at this time
- Plan sustainability. Great plans are great, but can they stand the test of time and include the resources necessary to maintain them.
- Staffing and bench capacity for multiple events or long-term deployments
- The disconnect between boots on the ground personnel and higher-level managers on hurricane safety and preparedness planning. There is no formal guidance on what is required for preparedness for our offices or personnel, and not all offices have safety experts. Is leadership aware of this? This survey asks if a hurricane plan exists, but those aren't required. Offices develop them on their own. Is also shows a disconnect in what is expected and what is just best practices.
- The use of storytelling to better prepare communities and individuals, to ensure effective response and evacuation if needed.
- Unsure
- Use of aerial and underwater unmanned surveillance platforms in determining the effectiveness of dispersant application. Data Management Plan for surface and subsurface dispersant application under the revised Subpart J of the NCP.

- Utilizing before and immediately after the storm imaging and lidar assets from fixed wing and low orbit hirez imagery.
- What is the forecast as to storms and impacts if our climate continues to change. What should we plan for 3 to 5 or even 10 years from now as it takes many years for government changes to occur.
- Yes - a better understanding of the impacts of hurricanes and other natural disasters on the spread of invasive species is needed in order to develop mitigation strategies.



## Appendix C

# 2024 Hurricane Summit - Pre-Summit Survey

### INTRO

The 2024 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 5th 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 2024 participants in the Hurricane Summit (April 24 & 25) 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 (Neither employed by nor on contract to NOAA) (99)

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 that you are aware of?

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

Q5 In your position within [\\${e://Field/ORG}](#), do you have a Mission Essential Function (MEF) or Emergency Support Function (ESF) role in hurricane response?

- Yes (1)
- No (2)
- Unsure (98)
- I am not familiar with MEFs/ESFs (99)

*Display This Question:*

*If Q5 = 1*

Q6 Please select the ESFs your office has or would engage with:

*(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)

Q7 Does  $\{e://Field/ORG\}$  have a role working with Recovery Support Functions (RSF) or generally supporting FEMA disaster recovery operations?

- Yes (1)
- No (2)
- Unsure (98)
- I am not familiar with RSFs (99)

Display This Question:

If Q7 = 1

Q8

Please select the RSFs your office has or would engage with:

*(Select all that apply)*

- Natural and Cultural Resources RSF (1)
- Economic RSF (2)
- Community Assistance RSF (3)
- Infrastructure Systems RSF (4)
- Health and Human Services RSF (5)
- Housing RSF (6)
- General Recovery Support (7)
- Unsure (98)

Q9 Select the biggest challenges you anticipate during the 2024 hurricane season:

*(Select all that apply)*

- Individual Preparedness, Health, and Safety (1)
- Organizational or Facility Resilience (2)
- Communications (3)
- Funding & Other Resources (4)
- Access and Usability of NOAA Tools and Services (5)
- None of the above (99)

*Display This Question:*

*If Q9 = 1*

Q10

You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas contribute to this challenge?

*(Select all that apply)*

- Safe work practices for responders or others serving in a response/recovery role (1)
  - Keeping family safe during active response or recovery activities (2)
  - Managing staff fatigue post storm (3)
  - Lack of individual/organizational preparedness plans (4)
  - Resources to implement individual preparedness plans (i.e. funding to evacuate, supplies to build a preparedness kit) (5)
  - Other (please specify) (97)
-

*Display This Question:*

*If Q9 = 2*

Q11 You identified 'Organizational or Facility Resilience' as a challenge. What specific areas contribute to this challenge?

*(Select all that apply)*

- Adequate qualified staffing resources to support response and recovery activities (1)
  - Unreliability or loss of utilities (power, internet, water, cell service) (2)
  - Facility/critical infrastructure and assets resilience to potential storm impacts (3)
  - Access to facilities and infrastructure post storm (4)
  - Coordination with partners during response and recovery activities (5)
  - Other (please specify) (97)
- 

*Display This Question:*

*If Q9 = 3*

Q12

You identified 'Communications' as a challenge. What specific areas contribute to this challenge?

*(Select all that apply)*

- Lack of reliable communications with local, tribal, territorial, state and/or federal partners (i.e., reliable cell service, access to internet connections, etc.) (1)
  - Staff turnover, internally and externally (2)
  - Differences between local/state/federal guidelines (3)
  - Relationships with and access to federal and/or state partner programs and services (i.e., being able to reach the correct people) (4)
  - Sustaining operational support capacity in a hybrid work environment (5)
  - Other (please specify) (97)
- 

*Display This Question:*

*If Q9 = 4*

Q13

You identified 'Funding & Other Resources' as a challenge. What specific areas contribute to this challenge?

*(Select all that apply)*

- Access to funding for response and recovery activities (1)
  - Resource limitations (non-personnel, ie. equipment, technology, etc.) (2)
  - Ability to manage staff and resources during response and recovery (3)
  - Capacity to implement resource recovery plans (4)
  - Other (please specify) (97)
-



*Display This Question:*

*If Q9 = 5*

Q14

You identified 'Access and Usability of NOAA Tools and Services' as a challenge. What specific areas contribute to this challenge?

*(Select all that apply)*

- Staff aware of the range of NOAA tools and services available (1)
  - NOAA tools and services are appropriate for my needs (2)
  - Personnel trained to use NOAA tools and services (3)
  - Other (please specify) (97)
- 

Q15 Looking at prior hurricane seasons, for which of the following general challenges have you successfully implemented mitigation strategies? (Select all that apply)

- Individual Preparedness, Health, and Safety (1)
- Organizational or Facility Resilience (2)
- Communications (3)
- Funding & Other Resources (4)
- Access and Usability of NOAA Tools and Services (5)
- None of the above (99)

Q16 Briefly describe a **mitigation strategy** you have successfully implemented that addressed a challenge:

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Display This Question:

If You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas... q://QID33/SelectedChoicesCount Is Greater Than 0

Or Or You identified 'Organizational or Facility Resilience' as a challenge. What specific areas contri... q://QID34/SelectedChoicesCount Is Greater Than 0

Or Or You identified 'Communications' as a challenge. What specific areas contribute to this challenge?... q://QID35/SelectedChoicesCount Is Greater Than 0

Or Or You identified 'Funding & Other Resources' as a challenge. What specific areas contribute to this challenge?&nbsp; &nbsp; (Select all that apply) q://QID36/SelectedChoicesCount Is Greater Than 0

Or Or You identified 'Access and Usability of NOAA Tools and Services' as a challenge. What specific areas contribute to this challenge?&nbsp; &nbsp; (Select all that apply) q://QID37/SelectedChoicesCount Is Greater Than 0

Q17 Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future: (Select all that apply)

Display This Choice:

If Q10 = 1

(1)

Safe work practices for responders or others serving in a response/recovery role

Display This Choice:

If Q10 = 2

Keeping family safe during active response or recovery activities (2)

Display This Choice:

If Q10 = 3

Managing staff fatigue post storm (3)

Display This Choice:

If Q10 = 4

Lack of individual/organizational preparedness plans (4)

Display This Choice:

If Q10 = 5

Resources to implement individual preparedness plans (i.e. funding to evacuate, supplies to build a preparedness kit) (5)

Display This Choice:

If Q10 = 97

*And And You identified 'Individual Preparedness, Health, and Safety' as a challenge. What specific areas contribute to this challenge?&nbsp; &nbsp; (Select all that apply) Text Response Is Not Empty*

\${Q10/ChoiceTextEntryValue/6} (6)

*Display This Choice:*

*If Q11 = 1*

Adequate qualified staffing resources to support response and recovery activities (7)

*Display This Choice:*

*If Q11 = 2*

Unreliability or loss of utilities (power, internet, water, cell service) (8)

*Display This Choice:*

*If Q11 = 3*

Facility/critical infrastructure and assets resilience to potential storm impacts (9)

*Display This Choice:*

*If Q11 = 4*

Access to facilities and infrastructure post storm (10)

*Display This Choice:*

*If Q11 = 5*

Coordination with partners during response and recovery activities (11)

*Display This Choice:*

*If Q11 = 97*

*And And You identified 'Organizational or Facility Resilience' as a challenge. What specific areas contribute to this challenge? (Select all that apply) Text Response Is Not Empty*

\${Q11/ChoiceTextEntryValue/6} (12)

*Display This Choice:*

*If Q12 = 1*

Lack of reliable communications with local, tribal, territorial, state and/or federal partners (i.e., reliable cell service, access to internet connections, etc.) (13)

*Display This Choice:*

*If Q12 = 2*

Staff turnover, internally and externally (14)

*Display This Choice:*

*If Q12 = 3*

Differences between local/state/federal guidelines (15)

*Display This Choice:*

*If Q12 = 4*

Relationships with and access to federal and/or state partner programs and services (i.e., being able to reach the correct people) (16)

*Display This Choice:*

*If Q12 = 5*

Sustaining operational support capacity in a hybrid work environment (17)

*Display This Choice:*

*If Q12 = 97*

*And And You identified 'Communications' as a challenge. What specific areas contribute to this challenge?(Select all that apply) Text Response Is Not Empty*

\${Q12/ChoiceTextEntryValue/6} (18)

*Display This Choice:*

*If Q13 = 1*

Access to funding for response and recovery activities (19)

*Display This Choice:*

*If Q13 = 2*

Resource limitations (non-personnel, ie. equipment, technology, etc.) (20)

*Display This Choice:*

*If Q13 = 3*

Ability to manage staff and resources during response and recovery (21)

*Display This Choice:*

*If Q13 = 4*

Capacity to implement resource recovery plans (22)

*Display This Choice:*

If Q13 = 97

And And You identified 'Funding & Other Resources' as a challenge. What specific areas contribute to these challenges?&nbsp; &nbsp; (Select all that apply) Text Response Is Not Empty

\${Q13/ChoiceTextEntryValue/5} (23)

Display This Choice:

If Q14 = 1

Staff aware of the range of NOAA tools and services available (24)

Display This Choice:

If Q14 = 2

NOAA tools and services are appropriate for my needs (25)

Display This Choice:

If Q14 = 3

Personnel trained to use NOAA tools and services (26)

Display This Choice:

If Q14 = 97

And And You identified 'Access and Usability of NOAA Tools and Services' as a challenge. What specific areas contribute to these challenges?&nbsp; &nbsp; (Select all that apply) Text Response Is Not Empty

\${Q14/ChoiceTextEntryValue/4} (27)

None of the above (99)

*Display This Question:*

*If Of the challenges you've identified, please select any that you have mitigation strategies for that you are planning to implement in the future: (Select all that apply) q://QID40/SelectedChoicesCount Is Greater Than 0*

*And Q17 != 99*

Q18 Briefly describe one **mitigation strategy** you are planning to implement that addresses previously identified challenges.

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Q19 How prepared are **you personally** for fulfilling your hurricane response and recovery roles and responsibilities?

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

Q20 How prepared is **your organization** for fulfilling its hurricane response and recovery roles and responsibilities?

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

Q21 Over the past year, do you feel your organization's preparedness for fulfilling hurricane response and recovery roles and responsibilities has improved, diminished, or stayed the same?

- Improved (1)
- Diminished (2)
- Stayed the same (3)
- Don't know/Not sure (98)

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*Display This Question:*

*If Q21 = 1*

Q22 What improvements were made to your organization's preparedness?

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*Display This Question:*

*If Q21 = 2*

Q23 What challenges led to your organization's preparedness being diminished?

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*Display This Question:*  
*If Q21 = 3*

Q24 What are the existing limitations your organization faces regarding its preparedness?

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Q25 Which of the following specific disaster response and planning tools/products would you like more information/training on during the summit? (Select all that apply)

- NOAA Center for Operational Oceanographic Products and Services (CO-OPS) products (1)
  - NOAA Office for Coastal Management products (2)
  - NOAA Marine Debris Program products (3)
  - Remote Sensing Division Photogrammetry (4)
  - NOAA Navigation Response Teams (NRT) coastal/port survey products (5)
  - Integrated Ocean Observing System (IOOS) gliders (6)
  - Unmanned Aerial Systems (UAS) (7)
  - Autonomous Underwater Vehicles (AUVs) / Autonomous Surface Vehicles (ASVs) (8)
  - NOAA Response Asset Directory (NRAD) (9)
  - Environmental Response Management Application (ERMA) (10)
  - Vessel and Debris Response (VaDR) (11)
  - NWS Tropical Products and Services (12)
  - Other: (Please specify) (97)
- 
- None of the above (99)

Q26 Are there any topics or issues that you would like to see a NOAA Hurricane Summit address in the future?

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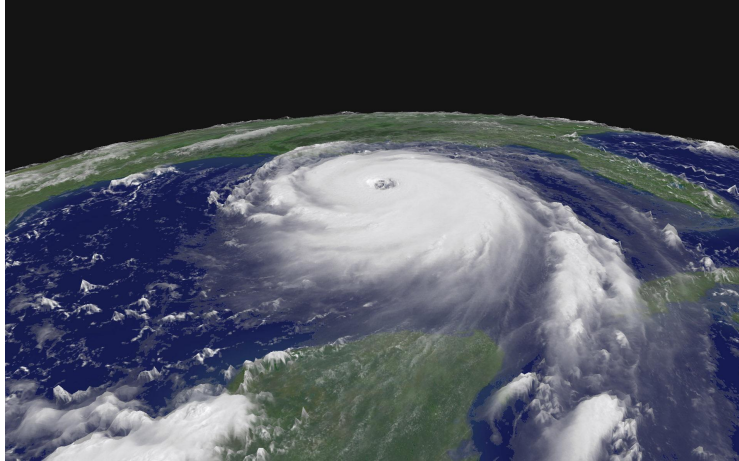
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END Thank you very much for taking the time to complete this survey. If you have any questions about the summit, please contact Kathy Mandsager at the Coastal Response Research Center ([Kathy.mandsager@unh.edu](mailto:Kathy.mandsager@unh.edu)).

## APPENDIX E

### Perceived and Real Impacts of NOAA's Annual Hurricane Summits (2020 – 2023)



## **Perceived and Real Impacts of NOAA's Annual Hurricane Summit**

### **Executive Summary**

Since 2020, NOAA has partnered with the Coastal Response Research Center (CRRC) to facilitate webinars focusing on NOAA's hurricane preparedness and readiness for personnel (people), mission, and infrastructure (PMI). Each spring, one or more virtual events were conducted to debrief NOAA and others about the previous hurricane season and inform preparedness for the upcoming season. Each summit allowed NOAA and other partners to learn from previous experience and improve organizational preparedness and resilience in the face of challenges related to climate change and extreme weather events.

Between 2020 and 2022, participant' surveys were conducted to support the planning of future summits. These surveys also collected important information about challenges that organizations face, best practices and lessons learned from their experiences, challenges they've faced, and strategies for mitigating impacts. This analysis provides an overview of the perceived and real impacts of lessons learned and information gained from the summit and derived from participant feedback.

## **NOAA Hurricane Summits**

The NOAA Hurricane Summit was conceived and planned in 1999 as an in-person, three-day Hurricane Summit for the National Ocean Service (NOS) to occur in spring 2020 ahead of the 2020 hurricane season. Its purpose was to inform the preparedness of NOS staff for the 2020 hurricane season by using the lessons learned from past events to plan for future hurricane response efforts with a focus on staff, facilities, partners, and other key resources, as well as, mission related activities and response actions. At the time, the nation was grappling with the impacts of the COVID-19 pandemic, eliminating the possibility of an in-person meeting and necessitating a move to a virtual format. In subsequent years, the virtual format remained but the summit evolved into a NOAA-wide event organized by NOS with the support of different NOAA and external partners.

The first summit was divided into three separate virtual events. The first was held on April 23, 2020, focusing on how NOAA was implementing lessons learned from the previous hurricane season and how pandemic related restrictions were impacting planning for the 2020 hurricane season. Days two and three, held in the summer of 2020, focused on best practices, risk management, and challenges of response and recovery during a pandemic. The second summit, held on June 21 and 23, 2021, focused on best practices, lessons learned, and future challenges for hurricane preparedness, response and recovery. The third summit, held on April 20-21, 2022, building on the 2021 hurricane season, looked to identify best practices and lessons learned while recognizing the challenges specific to the Pacific Island region. While the fourth summit, held on April 19-20, 2023 focused on advancing NOAA's ability to adapt and respond to the effects of a changing climate and extreme weather events.

The objectives of the summits have been slightly different in each of the four summits completed since 2020, however, there are commonalities between all four. These are:

- Understanding best practices and lessons learned from the prior hurricane season
- Improved coordination across NOAA and with federal, state, local, territorial, and tribal partners
- Enhancing Personnel, Mission, and Infrastructure (PMI) within NOAA to support hurricane preparedness, response, and recovery.
- Understanding gaps and challenges in hurricane preparedness across NOAA and partners

These commonalities are woven into each summit through presentations, evaluation and discussion. This analysis will look at specific findings based on these commonalities and how the audience adapted or incorporated them into future planning or actions for subsequent hurricane seasons. Audience survey data from 2021 and 2022 are used to provide insights into the perceived and real impacts of lessons learned and information gained from the summits.

## Survey Instruments

The University of New Hampshire Survey Center conducted several surveys on behalf of the University of New Hampshire's Coastal Response Research Center (CRRRC). The CRRRC was employed to provide planning, facilitation and evaluation support to NOAA for each Summit in order to better understand the hurricane response, preparedness, and recovery community.

Separate pre-summit participant surveys were implemented prior to the 2020 summit and the response data is reflected in the 2020 summit report. The first survey focused on hurricane preparedness and response and received 56 responses. The second survey included hurricane response but with a more targeted focus on emergency support functions. This survey received a total of 46 responses. Following 2020, additional pre-summit surveys to federal and non-federal participants were implemented in 2021 and 2022. One hundred and thirty-five (135) respondents completed the survey between April 7 and April 15, 2021. And one hundred and nine (109) respondents completed the survey between February 7 and February 22, 2022.

Each of the summits included speakers from various backgrounds providing different perspectives, lessons learned, and next steps related to hurricane preparedness and response considering the pandemic. Question and answer sessions were included throughout each summit, as well as, polling questions to obtain feedback from participants. In summit polling data was not included in this analysis.

## Key Summit Findings & Recommendations:

Upon review, the four summits focused on several common themes. Under these themes, ongoing challenges and recommendations reported out during the summit series looked to communicate best practices and lessons learned internally within NOAA, and with NOAA's closest partners and other stakeholders. The ability to identify solutions to challenges faced during hurricane season and apply those lessons to future hurricane responses is a key objective of these summits. The common themes from 2020-2024 include:

- Individual preparedness, health, and safety
- Staff and Facility Resilience
- Communications

Due to differences in each participant survey, the analysis and findings are generalized to provide some external awareness of perceived insights on summit impacts over time. Findings from this review are included to support future NOAA Hurricane summits. However, it's important to show that each summit identified specific recommendations for NOAA and partner organizations based on the summit content and feedback related to each event. These are described below under the common themes.

### **Individual Preparedness, Health, and Safety**

A common theme mentioned through the summit series was that an individual's health and safety is the top priority when discussing hurricane preparedness and response. In 2020, NOAA and its key partners were learning and understanding how to navigate the pandemic while meeting mission activities. At the time of this summit, uncertainties remained regarding NOAA's overall posture for providing continuity of operations during the pandemic for response missions. Actions to address employee health and safety during the pandemic, for both remote and on-scene response actions, were still being developed.

Paraphrasing some summit recommendations, staff mental health, fatigue, and burnout are ongoing concerns for the hurricane preparedness and response community. The capacity and capabilities of staff to meet organizational mission requirements and their personal protective measures and preparedness continue to be an important component of avoiding the negative impacts of disasters. As noted in 2020, "Staff and public safety is and should remain the top priority during all operations."

Some of the lesson learned and recommended best practices communicated to participants and their organizations include:

- Improve communication and coordination among NOAA and SLT partners on refining storm surge and flood impact messaging.
- All staff (i.e., employees, contractors) that live in areas where hurricane impacts can occur should have personal, family, and pet disaster/evacuation plans that include adequate home supplies for at least 5-14 days
- Develop an outreach and education plan dedicated to informing NOAA employees about the Total Worker Health Program, available resources, and assigned behavioral health professionals.
- Promote and offer its employees the range of professional training opportunities recommended by NOAA Behavioral Health and Wellness to improve stress and fatigue management.
- Follow all applicable guidance (local, state, and federal) related to the pandemic including social distancing, using PPE, and personal hygiene.

### **Staff and Facility Resilience**

A second common theme across the summit series was the ability of NOAA and partner facilities to become more resilient to storm impacts, specifically from hurricanes. The loss of utilities or other essential operational activities at impacted facilities can affect the organization's ability to provide essential support activities (i.e., ESFs, MEFs, and PMEFS) and other response and recovery activities during and following a hurricane.

Recommendations noted from the four summits include the recognition that "NOAA and partner facilities may not be resilient to hurricane impacts". Or that "Supply chains and equipment availability will be impacted by a major storm and should be considered as part of pre-storm



preparation.” In summary, NOAA and partners can learn from each other's experiences to improve facility resilience and pre-planning is vital for staff and facility preparedness.

Some of the lesson learned and recommended best practices communicated to participants and their organizations include:

- Institute opportunities for exchanging information and processes about facility and staff resilience between NOAA staff and partners. This will increase NOAA's understanding of effective on the ground resilience and improve staff relationships with a range of coastal partner organizations.
- For mission support, critical supplies and equipment should be purchased before a storm event and pre-staged in safe, accessible locations.
- 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.
- 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.
- Evaluate the storm resiliency of NOAA facilities and identify potential points of failure of interconnected infrastructure.
- Develop mechanisms to improve the resilience of NOAA and partner facilities to hurricane impacts using existing or new funding sources.
- Collect information on the functional recovery times (the restoration of the system's services as needed to allow users to resume most of their pre-hurricane activities) of NOAA and partner infrastructure systems to develop strategies that would improve infrastructure resilience and the interdependent capacity of coastal communities to recover from hurricane hazards.

### **Communications**

The third common theme across the summit series was the ongoing issue of communications between NOAA, partners, and the public, especially underserved communities. The fact that NOAA and partners use different tools and platforms have created difficulties collaborating and communication during hurricanes. This is especially true when conveying pre-/during-/post-storm information about preparedness, response, and recovery efforts.

Recommendations noted from the four summits include the need for a better cross-agency common operating picture to make better informed decisions. Communications that are not tailored to the audience are not effective and can disproportionately impact communities with little to no outreach. By tailoring key messages to underserved communities, NOAA can mitigate hurricane impacts to them. Additionally, there should be routine efforts to outreach about new tools and data sets that can support hurricane preparedness and response. Lastly, “Many NOAA line offices have their own internal situational awareness boards, but there is no combined

board to ensure broad agency-wide awareness during a collaborative response, such as a hurricane.”

Some of the lesson learned and recommended best practices communicated to participants and their organizations include:

- Continue to build relationships with partners to gain insight and awareness of available tools. Identify agency-wide COP for consistent use across all line offices (e.g., Web EOC, ERMA) Develop a cache of COP tools to be housed/available on the NOAA Disaster Coordination Dashboard and the HSPO ICC/ICP.
- Identify underserved and vulnerable communities to determine appropriate communication channels and messages. Identify trusted agents within the communities that can serve as ambassadors to extend the reach of messaging. Use available tools (e.g., SVI) to identify vulnerable communities for targeted outreach.
- Develop channels of communication ahead of time so that they are known, available, and trusted in advance.
- Communication plans and message development should be done in close partnership with local/regional NWS WFO and local municipalities to ensure communities can interpret risk and be empowered to take action.
- Improve communication and coordination among NOAA and SLT partners on refining storm surge and flood impact messaging.
- Pre-planning is critical, especially for communities that may be cut off from logistical support or communications (e.g., remote Pacific islands)
- 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.
- Messaging should occur in multiple languages to reach potentially impacted communities
- Improve training and usage of communications systems (i.e., Emergency Notification System (ENS)) with NOAA staff that could be impacted by the loss of utilities during hurricanes.
- Identify virtual operation best practices from NOAA line offices to develop, refine, and maintain a hybrid virtual/telework policy that is highly adaptable to meet mission and personnel priorities.
- Develop a suite of virtual tools that all internal NOAA and external partners can rely on for efficient and effective communication.
- Develop a situational awareness board that includes all impacted NOAA line offices impacted during an event.
- Increase communication capacity to keep engaged internally and with partners during planning and response operations.

## Survey Results

### Individual Preparedness, Health, and Safety

In 2020, 81% of respondents indicated that their biggest challenge for the upcoming hurricane season was how they were going to keep their people safe. This survey occurred during the height of the COVID 19 pandemic. In 2021, the most significant challenges identified were related to managing pandemic related fatigue (61%) and complacency related to pandemic safety guidelines (58%). In 2022, these challenges dropped to 30% and 26% respectively.

In 2020, respondents identified specific mitigation strategies to improve keeping their people safe during the pandemic. The top two strategies that were described most often by organizations were:

- Remote support for employees
- Following agency/state/federal COVID-19 guidelines. This includes *“Purchase and use of PPE, masks, social distancing, limiting personnel interactions, wipe down common areas, foot traffic directional, only one person in a room at a time, etc.”*

Multiple additional mitigation strategies related to the top two were also identified and included “Limit small boat operations to just significant response efforts, two person crew versus a normal three person crew”, “Minimizing on-scene personnel”, and “Designate certain people to secure the building with staggering their work hours to maintain a social distance” to name a few.

**Figure 7a: Based on the following list of best practices, please select each practice you used during the 2020 hurricane season and if you intend to use that best practice in the 2021 hurricane season.**

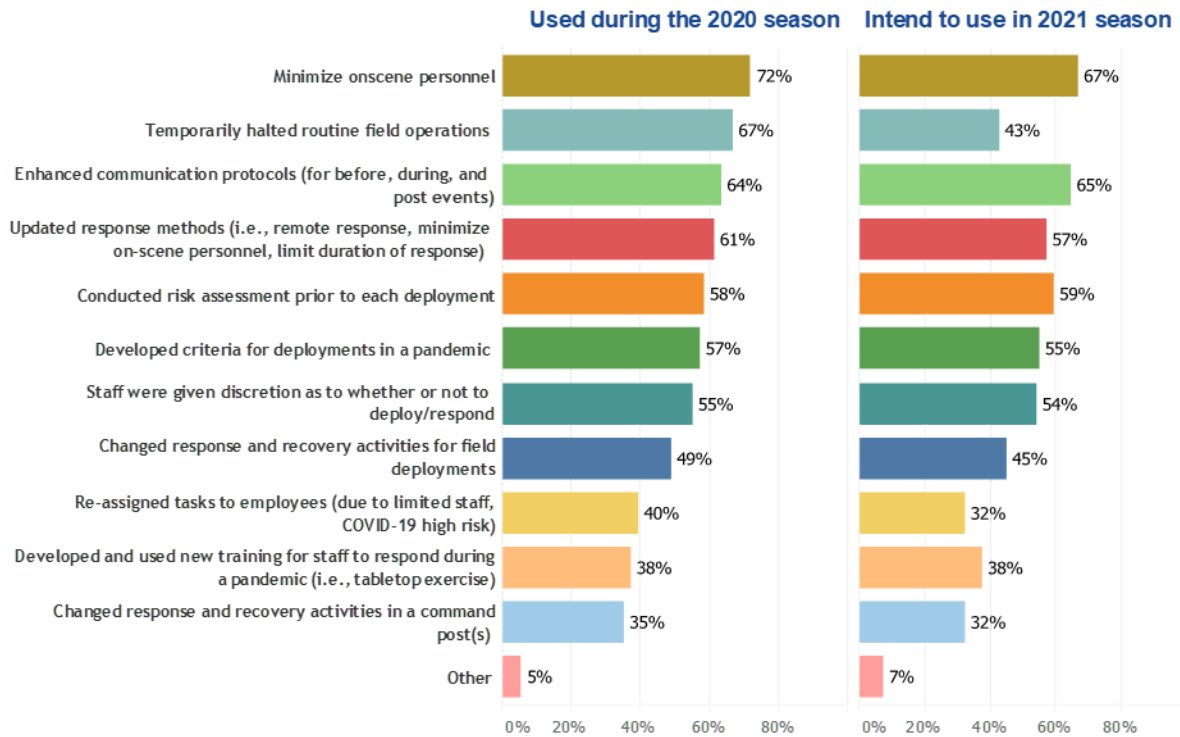


Figure 1. Best practice use and intended use from 2021 Pre-Summit Survey. UNH Survey Center April 2021.

The 2021 pre-summit survey of participants (Figure 1), showed that several of these best practices were used during the 2020 and are planned for use during the 2021 season. A significant number of participants noted that best practices used in 2020 are still relevant in 2021 but their intended use is slightly decreasing. It should also be noted that in 2021 two new challenges connected to *Individual Preparedness, Health, and Safety* (e.g., managing pandemic related fatigue and complacency related to pandemic safety guidelines) emerged following the implementation of best practices connected to keeping people safe. Only 47% of respondents thought that keeping people safe and maintaining access to adequate protection during response activities were still challenges. A similar percentage of respondents found ways to mitigate this using best practices and lessons learned.

Although the pandemic continued to impact NOAA and partner response capacity and capability, the 2022 pre-summit survey identified two important changes from 2021. Respondents indicated that pandemic related fatigue and keeping staff safe during response activities had become much less of a challenge for their organizations and was correlated with a huge increase in the percentage of respondents who implemented mitigation strategies that address those same challenges.

Furthermore, the 2022 summit began to address related follow-on *Individual Preparedness, Health, and Safety* challenges attributed to the pandemic. The summit identified additional best practices to mitigate the fatigue and complacency associated challenges. Within NOAA, educating staff about the range of professional training opportunities and services around behavioral health and wellness were identified as ways to mitigate impacts to staff health. Additionally, more focus on developing personal, family, and pet disaster/evacuation plans for staff that live in areas where hurricane impacts can occur was also identified as important.

### **Staff and Facility Resilience**

Staff and facility resilience was a specific component of the 2020 summit and the pre-summit participant survey. In that survey, respondents identified “Return to pre-storm operational capacity” as a top three challenge with 46% of respondents. The issue of staff and facility resilience was identified multiple times throughout the summit and was a focus of Day 2 with partners. The 2021 pre-summit survey (Figure 1) noted specific challenges including 51% of respondents anticipate that unreliability or loss of utilities to be a major challenge. While 40% of respondents noted the same for “return to pre-storm operational capacity”. Maintaining facilities was not as large of concern with 28% anticipating it as a challenge for their organization.

The 2020 and 2021 summits recognized that the loss of essential utilities (i.e., power, water) at NOAA or partner facilities does impact organizational hurricane response and recovery activities. Specific mitigation strategies to address this issue included:

- Evaluate the storm resiliency of NOAA facilities and identify potential points of failure of interconnected infrastructure.
- Develop mechanisms to improve the resilience of NOAA and partner facilities to hurricane impacts using existing or new funding sources.
- Collect information on the functional recovery times (the restoration of the system’s services as needed to allow users to resume most of their pre-hurricane activities) of NOAA and partner infrastructure systems to develop strategies that would improve infrastructure resilience and the interdependent capacity of coastal communities to recover from hurricane hazards.

Some more specific best practices identified by NOAA and partners included common sense things like securing equipment and materials; making necessary preparations to suspend ongoing experiments involving biological materials and/or hazardous chemicals if needed; any boat not in the water should be trailered and gathered in the maintenance area, and any boat in the water should be fueled up and readied to transport staff and equipment; a general visual survey should be conducted around each building and loose items should be brought inside or secured to prevent loss or damage by wind; and propane and/or heating fuel tank shall be turned off to name a few.

Heading into 2022, the pre-summit survey (Figure 2) noted that two of the top three challenges identified by respondents included “unreliability or loss of utilities” at 45% and “facility readiness, preparedness, resilience, and response” at 33%.

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

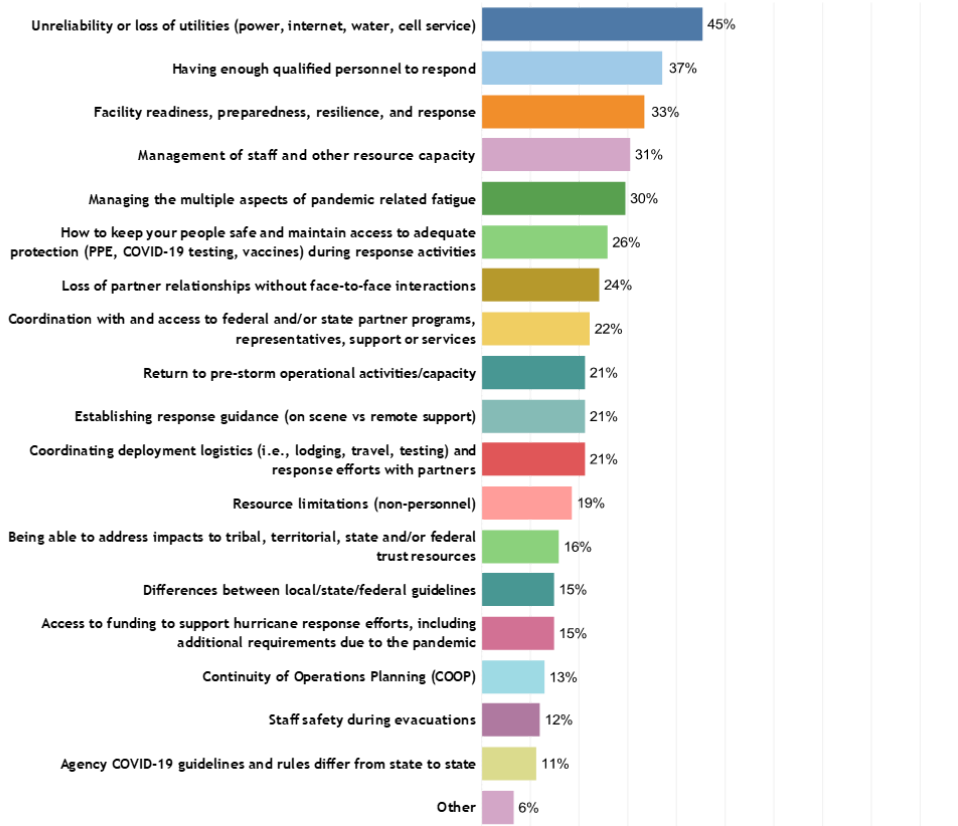


Figure 2. 2022 Hurricane Season Challenges. UNH Survey Center March 2022.

Of these two challenges, only 23% of respondents for “facility readiness, preparedness, resilience, and response” and 19% for “unreliability or loss of utilities” had identified ways to mitigate them. Some of the best practices that were identified in the 2022 summit to address these issues included:

- For mission support, critical supplies and equipment should be purchased before a storm event and pre-staged in safe, accessible locations.
- 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.

Another strategy to address staff and facility resilience was identified as part of the 2023 summit and focused on creating opportunities to exchange information and processes about facility and staff resilience between NOAA staff and partners.

## Communications

In 2020, the inaugural hurricane summit had a focus on communications with an objective to enhance NOAA communications surrounding a potential hurricane-related disaster. The pre-summit participant survey noted that 66% of respondents had communications related preparedness responsibilities. With the pandemic woven throughout the 3 day summit, it was not directly identified as a challenge. Communications was noted as a concern when one participant identified “maintaining adequate communications in the event of infrastructure disruption” in response to a survey question. However, the survey did show that remote work had increased dramatically, increasing the importance of communications in hurricane preparedness and response.

In 2021, the pre-summit survey noted several communications related best practices (Figure 1). As the 3rd most identified best practice identified by respondents, “Enhanced communications protocols”, it was used by 64% of respondents in 2020 and nearly the same percentage intended to use this during the 2021 hurricane season. Another practice of note identified by more than 30% of respondents was “Developed and used new training for staff to respond during a pandemic”. Other less common communications related best practices or mitigation strategies identified in the survey included: close coordination/increased communication and preparing and communication prior to an event. Additionally, the survey identified one communications related challenge “Coordination with and access to federal or state partner programs, representatives, support or services” and affirmed by greater than 30% of respondents.

Communications related challenges were identified more broadly in 2023 as survey respondents noted the following challenges

- Loss of partner relationships without face-to-face interactions (24% of respondents)
- Coordination with and access to federal or state partner programs, representatives, support or services (22% of respondents)
- Coordinating deployment logistics and response efforts with partners (21% of respondents)

While respondents also identified they had found mitigation strategies to address these challenges. Out of the three previously identified, only 23% found ways to address “Coordinating deployment logistics and response efforts with partners” with the other challenges all identified by 15% of respondents or less.

In 2023, several key messages emerged from the summit. Outside of the typical findings focused on improving coordination and communications within NOAA and with partners, one message stood out. There is a need for communications strategies that address the changing needs of communities impacted by hurricanes, especially with historically underserved communities. Several recommendations from the Summit address this issue and are described earlier in this document.

There were several summit report recommendations identified could improve communications for NOAA internally and with external partners including:

- 2021 Improve training and usage of communications systems (i.e., Emergency Notification System (ENS)) with NOAA staff that could be impacted by the loss of utilities during hurricanes.
- 2021 Identify virtual operation best practices from NOAA line offices to develop, refine, and maintain a hybrid virtual/telework policy that is highly adaptable to meet mission and personnel priorities.
- 2021 Develop a suite of virtual tools that all internal NOAA and external partners can rely on for efficient and effective communication.
- 2021 Develop a situational awareness board that includes all impacted NOAA line offices impacted during an event.

## Review Findings

Based on the evaluation data provided, there appears to be a connection between the identification of organizational challenges related to *Individual Preparedness, Health, and Safety* and best practices to address those challenges. Best practices related to the perceived challenges identified in a summit under this theme correlates with a decreased concern among respondents in subsequent years as organizations implement best practices.

Additionally, evaluation data from 2020 to 2024 did not show an appreciable difference in how organizations are able to use the summit to inform their efforts to improve *Staff and Facility Resilience*. Although staff and facility resilience to hurricane impacts is a common part of each summit, evaluation data did not support any specific conclusions other than it being an ongoing challenge where NOAA and partner organizations could increase their sharing of best practices and lessons learned. Future surveys and summit sessions could more specifically target this theme and identify trends and improve our evaluation of the effectiveness of NOAA's Hurricane Summits moving forward.

*Communications* was consistently part of the summit content from 2020-2024. However, as a topic, it was not consistently evaluated for impact through the pre-summit survey instruments. Over time, more focus on specific communications related issues (e.g., underserved communities and communication risk) were addressed during the summit and specific recommendations were identified. Concurrently, the survey instruments did not capture any specific improvements around the issue of communications. During the summits, the dialog around the issue did evolve and became a large part of the discussion. A more targeted analysis and survey data will help address how participants are benefiting from the summits. It should be noted that large scale national factors (i.e. pandemic) could impact the focus of future summits.

Regardless, the summits have increased the conversation both internally and with partners around hurricane preparedness, response and recovery. It remains to be seen what measurable impacts can be derived from the effort.



## Recommendations Moving Forward

- Be more intentional in developing summit survey instruments to better understand the impacts of NOAA's Hurricane Summit on organizations as they work to improve their preparedness, response, and recovery to future hurricanes or extreme storms.
  - ◆ Develop a suite of metrics to measure annual impacts connected to the summit
- Consistent application of survey questions would be helpful for future Summits to measure trends over time.
  - ◆ Each pre and post summit survey should have a suite of identical questions to measure implementation trends and identify opportunities for improvement
  - ◆ Contract with the CRRC to conduct a detailed analysis of the survey data.
- Consider implementing a post summit survey to get a better sense of the audience intent to apply information gathered during the Summit for the upcoming hurricane season.
  - ◆ Develop a post-summit survey that can be implemented to gauge audience intent regarding specific information or topics discussed at the summit.
  - ◆ Include questions related to specific NOAA products and services available to partners and internally within the organization.
- Targeted and consistently applied data collection and analysis of key topics hurricane preparedness, response and recovery over time can improve impact analysis.
- Consider implementing an external review of the Summit at the 10-year mark to ensure the financial investment in the Summit is appropriately valued.

## Supporting Documentation

Coastal Response Research Center, NOAA Hurricane Preparedness Summit 2023. April 19 & 20, 2023. <https://crrc.unh.edu/resource/noaa-hurricane-preparedness-summit-2023>

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University of New Hampshire Survey Center, UNH Coastal Response Research Center 2022 Hurricane Pre-Summit Survey. March 2022.

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