

# **Southernmost Weather Reporter**

**National Weather Service  
Weather Forecast Office  
Key West, FL**



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National Weather Service • Key West, FL

## Welcome to the January 2022 Edition!

Welcome to the Winter 2022 edition of the Southernmost Weather Reporter! Our NOAA/Florida Keys National Weather Service team once again has assembled an excellent collection of articles for you, featuring weather and climate synopses, impact-based decision support reviews, and public outreach activity summaries. In addition, you will read about our new NOAA Heritage Program Project, great work by our 2021 NOAA Hollings Scholar, and a new Spanish Webpage. Finally, we have quite a few new faces around the office this year, and we will introduce you to some of those folks!

The National Weather Service is a public science and service agency that affects American lives and livelihoods on a daily basis. In October 2021, we adjusted our mission statement to both reflect and tie together the science, service, and societal impacts components of our work. The revised mission statement reads, *"Provide weather, water, and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy."* This mission statement reinforces the importance of the responsible application of sound science, the necessity of working closely with our federal, state, local, and industry partners, and the reality that important decisions are made based on our work, ranging from taking the boat out on the weekend to protective actions in advance of hurricane threats. Speaking of the "H" word, enjoy the "off season", but use the storm-free time to update your preparedness plans, whether for yourself, your family, or your organization. As always, feel free to reach out to our team at [your](#) Florida Keys National Weather Service, serving the Florida Keys and adjacent coastal waters since 1870, for your local weather, water, and climate needs!

Sincerely,

Kennard "Chip" Kasper  
Meteorologist-in-Charge  
NOAA/Florida Keys National Weather Service



### JANUARY 2022 INSIDE THIS EDITION:

Welcome	1
2021 Atlantic Tropical Cyclone Season	2-3
Staff Changes	3
Adapting Impact-Based Support During Pandemic	4-5
Sofia de Solo	5
Virtual Outreach Events	6-7
Manuel Ramos-Rodriguez	7
Spanish Services Program	8
Diversity Initiatives	9
Allison Plumadore	10
NOAA Hollings Scholar	10
Travis Washington	11
NOAA Heritage Project	11-12
Charlie Coffman	12
Support for Oil Removal Operation	13-14
Mathew Goncalves	15
Summer 2021	15-16
Keys Prescribed Burn	16-17



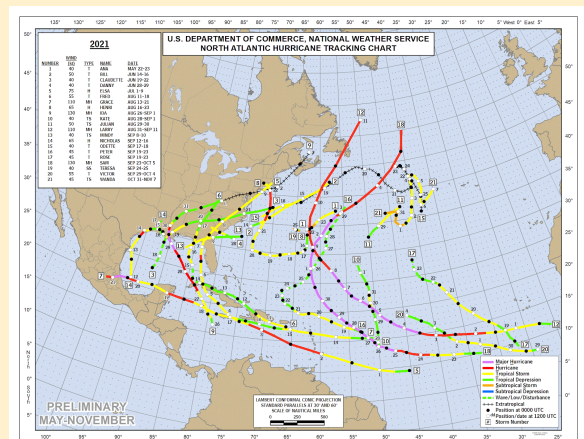
# 2021 Atlantic Tropical Cyclone Season Summary

By: Lexia Williams

After a record-breaking 2020 Atlantic hurricane season, 2021 proved to be another troublemaker, becoming the third-most active on record, and the sixth consecutive above-average season. Hurricane Elsa, which formed on July 1<sup>st</sup>, surpassed 2020's Tropical Storm Edouard as the earliest-forming fifth named storm on record by five days. June was a record active month, tying 1886, 1909, 1936, and 1968 with three named storms forming during the month. There were a total of twenty-one named storms in 2021, with seven becoming hurricanes and four becoming major hurricanes. In comparison, an average hurricane season observes fourteen named storms, seven hurricanes, and three major hurricanes. In early May, the National Oceanic and Atmospheric Administration (NOAA) hinted that another above-average season was likely, predicting thirteen to twenty named storms, with six to ten becoming hurricanes and three to five becoming major hurricanes. In 2021, all storms combined resulted in an estimated \$70 billion dollars in damage, making it the fourth-costliest Atlantic hurricane season on record.

Similar to last year, the season did not come as a surprise, as several large-scale atmospheric conditions pointed to the active season coming to fruition. During the beginning of the season, the El Niño Southern Oscillation (ENSO) was in a neutral phase, with the anticipation of La Niña returning later in the season, which was confirmed on October 14<sup>th</sup> by NOAA. ENSO neutral phases point to an above-normal season, in which sea surface temperatures in the Tropical Atlantic and Caribbean Sea are warmer-than-average, Atlantic trade winds are weaker, and the West African monsoon is enhanced. Mid-season forecasts in August from NOAA also captured the active season, with no major changes to the forecasted number of storms, hurricanes, and major hurricanes, indicating that the season was progressing as forecasted.

Despite the number of tropical cyclones that impacted the Gulf of Mexico and the Caribbean Sea in 2021, the Florida Keys were largely spared of any significant impacts. The Island Chain saw minor impacts from Tropical Storm Elsa and Tropical Storm Fred as they passed west of Key West, before making landfall along the Florida Panhandle. In association with Elsa, a wind gust of 70 miles per hour was measured Key West International Airport, and over the water, a wind gust of 67 miles per hour was measured at the Smith Shoal Light WeatherFlow Mesonet Station. A rain gauge located on Washington Street in Key West measured an impressive 10.94 inches of rain. Thankfully, the only damage recorded was minor damage to trees in the Lower Keys.

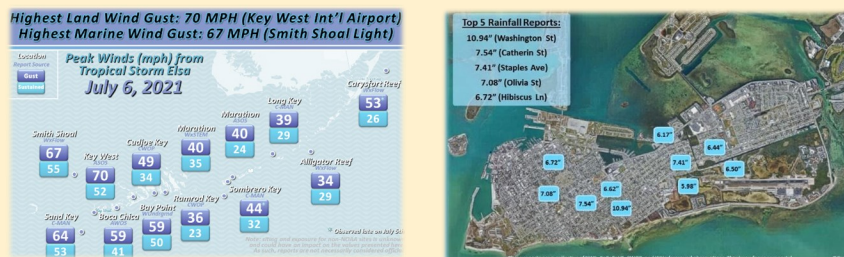


Preliminary tracks for the 2021 tropical cyclone season.

(Continued on Page 3)

## 2021 Atlantic Tropical Cyclone Season Summary (Continued)

It should be noted that a significant change in the naming of storms was implemented in May, which was the retirement of the Greek alphabet, should the normal list of names become exhausted. The World Meteorological Organization (WMO) instead created a supplemental list of names, as a backup, given another 2005 or 2020 Atlantic Hurricane season is experienced. At the beginning of the season, the WMO also retired Dorian, Laura, Eta, and Iota from the regular list of names.



Highest observed wind speeds and gusts (mph) at various land and marine locations and 48-hour observed rainfall (in.) from Tropical Storm Elsa.

## 2021 Florida Keys National Weather Service Staff Changes

By: Bryce Tyner

In 2021, there were several staff changes at the Florida Keys National Weather Service:

- Martin Rieman accepted an Electronics Technician position at the National Weather Service (NWS) Office in Tallahassee, Florida. He completed his service at the Florida Keys NWS in February 2021.
- Andy Haner accepted a Lead Meteorologist position at the NWS Office in Tallahassee, Florida. He completed his service for the Florida Keys NWS in February 2021.
- Charlie Coffman joined the office in April 2021 as Electronic Systems Analyst.
- William Churchill accepted a position for the Weather Prediction Center as Senior Branch Forecaster in April 2021. He completed his service at the Florida Keys NWS in April 2021.
- Alan Albanese retired from federal service in April 2021 as a Lead Meteorologist. Alan served thirty years as a meteorologist for the Florida Keys NWS.
- Luis Ingram-Westover accepted a promotion to Lead Meteorologist at the Florida Keys NWS in May 2021.
- Sofia de Solo, Manuel Ramos-Rodriguez, and Allison Plumadore began their careers as Meteorologists at the Florida Keys NWS in August 2021.
- Mathew Goncalves joined the team at the Florida Keys NWS in September 2021 as Electronics Technician.
- Travis Washington joined the Florida Keys NWS as Lead Meteorologist in October 2021, following his service to the NWS Office in San Juan, Puerto Rico.

We wish the best to those moving on to new opportunities. For those joining the Florida Keys NWS, we embrace you with a warm welcome!

# Adapting Impact-Based Decision Support to Pandemic Challenges

By: Jon Rizzo

The Florida Keys National Weather Service (NWS) provides forecast advice and weather interpretative services to our local emergency personnel and public safety officials, enabling them to make informed decisions when weather conditions may strongly impact lives and property in the Florida Keys. These Impact-Based Decision Support Services (IDSS) are sometimes provided by a NWS meteorologist deployed to a local Emergency Operations Center (EOC). EOCs, when activated, may involve dozens to perhaps a couple hundred personnel, all present in the same facility to support emergency operations and community recovery from a centralized location.



However, have you ever wondered how such in-person services could be conducted safely for several days during a pandemic? And, can IDSS be more than just a scheduled weather briefing? The solution was born through close coordination and partnership between the Florida Keys NWS Office and Monroe County Emergency Management. This included rigorous training over several years, flexibilities in the technology used to support virtual meetings, and a new concept of meteorologist “deployment.”

First, training of several NWS personnel in the Incident Command System (ICS), which provides a common framework and hierarchy for responding to emergency incidents of all kinds, enabled the office to effectively “plug into” the rigorous incident planning cycle led by Monroe County Emergency Management. Weather support could be easily modified to fit multiple needs, from “all-hands” approach and media inclusion to more focused, tactical response briefs.

Jon Rizzo virtually briefs core partners on the latest forecast for Tropical Cyclone Elsa.

Next, Monroe County Emergency Management led a major effort during the pandemic response to

incorporate virtual meeting software, including multiple training sessions and virtual incident exercises. More than just a tool for remote briefings, the software enabled unique breakout rooms mimicking the actual incident command structure, where those assigned to specific functions (including operations, planning, logistics, administration and finance) could collaborate and assign tasks. These tools more easily allowed every weather brief and every communication to be recorded for reference.

*(Continued on page 5)*

## Adapting Impact-Based Decision Support to Pandemic Challenges (Continued)

Tropical Cyclone Elsa, which approached the Florida Keys as a Tropical Storm late during the July 4th holiday weekend, provided an opportunity to put these tools into practice while maintaining safe social distancing and other public health protective practices. The Florida Keys NWS “deployed” its Warning Coordination Meteorologist (WCM), Jon Rizzo, to his office! This was a true deployment, where the WCM could have access to a NWS workstation and network, as well as the virtual EOC tools without being continuously immersed nor tasked with the critical meteorological forecast and warning operations. Weather impact reports directly from the field, processed through the EOC or through first responders, were easily shared with the NWS meteorologists through shared documents. Jon also communicated with agency public affairs and public information officers using freely-available mobile chat tools and shared documents. There were internal benefits in both readily-accessible consultations with the meteorologists on the NWS operations floor during times least disruptive to the forecast process, as well as increasing safety from not having to be physically present during the pandemic on the operations floor.

These practices all led to maximized content, quality, and efficiency of IDSS to Monroe County Emergency Management and the municipalities during the Tropical Storm Elsa incident. While some weather events, including major hurricanes impacts, may still require a full, in-person EOC and similarly-deployed meteorologist, the training, functional tools and best practices of virtual deployment from Tropical Storm Elsa provides a robust, efficient remote option for providing IDSS to some of our most closely-linked core partners.

## Getting to Know the New Staff: Sofia de Solo

### ***What were you doing before joining the team at the Florida Keys National Weather Service (NWS)?***

Before officially joining the team, I was a Pathways student intern at the Florida Keys National Weather Service, but I was working mostly remotely due to the COVID-19 pandemic. I was also completing my Master of Science Degree in meteorology at Mississippi State University, studying rapidly weakening hurricanes.

### ***Where do you see yourself in ten years?***

In ten years, I hope to still be living by the ocean. I also hope to have established a well-respected career in the National Weather Service, making me a reliable and trustworthy coworker. More specifically, my goal is to be flying into hurricanes or in a position that better prepares me to do so.

### ***What do you like to do in your free time?***

In my free time I like to watch a lot of baseball, play softball, or do anything in the water. This includes boating up in Tavernier with my family or chilling on the beach in a hammock!



# Outreach Activities While in a Pandemic: Virtual Visits to Elementary Schools

By: Keren Rosado-Vazquez

Due to the ongoing COVID-19 pandemic, we at the Florida Keys National Weather Service (NWS) had to reinvent ourselves and create interactive virtual outreach presentations for students in elementary schools. To keep the NWS mission of protecting lives and property alive, it is important to engage with the younger generations, with the hope to spark curiosity and inspire the next generation of meteorologists. With this in mind, I had the opportunity to do three virtual outreach activities during Winter 2021, Spring 2021, and Summer 2021.



Poinciana Elementary School virtual outreach event

The first virtual outreach visit was held in February 2021. This virtual visit was to Del Prado Elementary in Palm Beach County, Florida. I conducted two presentations that were 30 minutes each and accommodated 77 fifth grade students. This outreach activity was organized by the Thompson Earth Systems Institute: Scientist in Every Florida School. Topics included: recognizing how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time; distinguishing the various forms of precipitation; weather-related

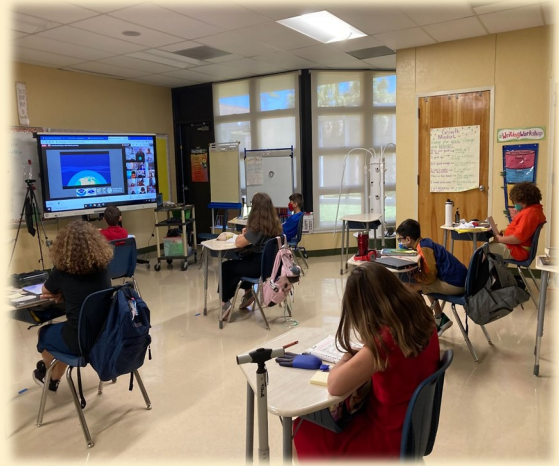
differences, such as temperature and humidity, found among different environments, such as swamps, deserts, and mountains; and describing the characteristics of the different climate zones (temperature and precipitation) as they relate to latitude, elevation, and proximity to bodies of water.

A second virtual outreach visit was held for Poinciana Elementary School in Key West in August 2021. The topic for this presentation was on hurricane hazards and how to prepare for hurricanes.

*(Continued on page 7)*

## Outreach Activities While in a Pandemic: Virtual Visits to Elementary Schools (Continued)

The third virtual outreach visit was held in April 2021. Sixty-five second grade students from the Collier Academy participated in this virtual presentation. Collier County Academy is located in Collier County, Florida and is a 100% online public school. This outreach activity was also organized by the Thompson Earth Systems Institute: Scientist in Every Florida School. For this presentation, the focus was on severe weather events, including watch and warning products issued by the NWS, and safety during severe weather events.



Collier Academy second grade online classroom

## Getting to Know the New Staff: Manuel Ramos-Rodriguez

### *What were you doing before joining the team at the Florida Keys National Weather Service (NWS)?*

Before joining the Florida Keys National Weather Service, I was completing my Master of Science degree in applied meteorology at Plymouth State University. While there, I was also a Graduate Research Assistant under Dr. Eric Hoffman and an Instrumentation and Technology Assistant for their meteorology department. As a research assistant, I did work involving extratropical transition and dissipation of landfalling tropical cyclones. This past summer, I also helped organize a virtual weather camp for high school students in Puerto Rico as part of the Puerto Ricans in Atmospheric Science and Meteorology (PCAM) committee. This weather camp was meant to show high school students different career paths in meteorology, while also having them do weather related experiments and meet different meteorologists.

### *Where do you see yourself in ten years?*

That is a tough question to answer now that I think about it; joining the National Weather Service was a dream of mine for a long time. Now that I finally reached that goal, I find myself with different opportunities and crossroads ahead. I hope to have a successful career with the National Weather Service that includes having opportunities to help both members of the local community here in the Keys and other students back home in Puerto Rico, who are also aiming for a career in meteorology.

### *What do you like to do in your free time?*

I like traveling and spending time with family and friends. I also enjoy trying different restaurants and cuisines, watching movies and series, taking pictures, and playing video games. I'm also a big sports fan, especially basketball and baseball. Recently, I've been trying to explore the Keys as much as I can during my free time!



# A New Program at the Florida Keys National Weather Service is Born: The Spanish Services Program!

By: Keren Rosado-Vazquez

The primary goal of the Spanish Services Program will be engagement with the Spanish speaking community in the Florida Keys. This effort is needed because:

- Our mission of protecting life and property requires us to be able to communicate threats, potential impacts, and risk to *all of our partners and constituents, and the proportion of those partners and constituents who speak Spanish as a first language is as high as 17%.*
- Administration and departmental strategic priorities emphasize becoming a more diverse, inclusive, equitable, and accessible organization.

Our local Spanish Services program builds on previous local efforts, and connects with existing Spanish outreach and translation initiatives within the NWS and across NOAA.

Spanish Services local initial efforts will include the following:

1. Improving our [Spanish webpage](#). Besides the everyday local weather, we also have additional information in Spanish related to safety and local authorities. Promoting the availability of safety and local authorities information in Spanish is vital to ensuring our community is weather ready.

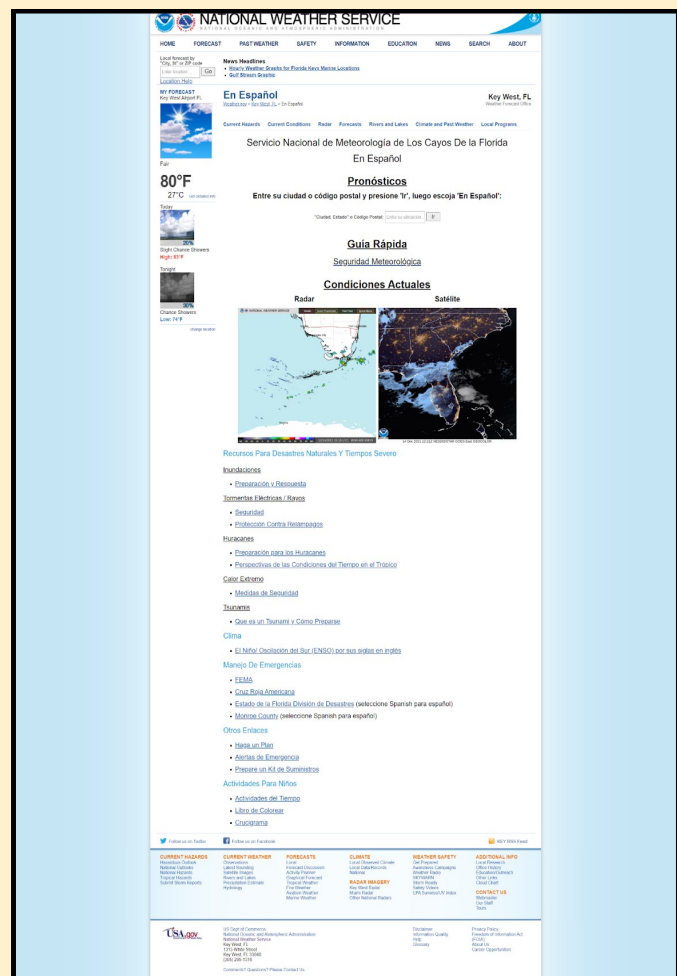
2. Widely communicating key messages for high-impact weather, water, and climate impacts in Spanish (e.g. Hurricane Local Statement (HLS) via social media).

3. Establishing a Spanish language capacity in Twitter for "auto tweets" of warnings. This capability is not available for Special Marine Warnings (SMW), and marine forecast zones are currently being translated into Spanish. The "auto tweets" for SMWs in Spanish will be available soon (nationwide).

4. Reaching out to Spanish language radio and TV stations personnel in the Florida Keys.

5. Development of a Spanish SKYWARN training capability.

6. Recruiting organizations with significant Spanish-speaking populations as Weather-Ready Nation Ambassadors.



Screenshot of the new Spanish Services Program webpage

# New Roads and New Opportunities for Diversity and Inclusion Initiatives

By: Luis Ingram-Westover

The National Weather Service (NWS) has been very active in working towards a more inclusive and belonging workplace. In 2020, I joined the NOAA Pride Employee Resource Group (ERG) as an executive committee member. NOAA Pride is focused on supporting the needs of the NOAA Lesbian, Gay, Bisexual, Transgender, and Queer or Questioning (LGBTQ+) community and its allies. The ERG promotes the employment, advancement, and retention of persons with differing sexual orientation, gender identity, and gender expression at NOAA. They also serve as a resource to assist managers and staff in identifying and resolving employment, retention, and work environment issues affecting LGBTQ+ employees.

Specifically, my role within the ERG has been to lead the subcommittee on recruitment and retention. As part of the position, I led a virtual outreach event for Valparaiso University. During this outreach event, several members of NOAA Pride were recruited to give a quick three minute presentation about their position or job within NOAA. These talks helped highlight NOAA Pride and show students, especially those who identify as LGBTQ+, there are people like them within NOAA as well as supportive allies.

In addition, establishing my role as Team Lead for the subcommittee has allowed me to gain progress towards NOAA becoming a sponsor for a LGBTQ+ STEM conference. NOAA Pride has afforded me the necessary connections and resources to get this idea up to senior leadership. This year saw a lot of headway to making this goal become a reality, and we hope to have a sponsorship by fall of 2022. If sponsorship is approved, it would be the first time that NOAA would become a part of a LGBTQ+ STEM conference and would open the doors to an abundance of opportunities for a more diversified workforce.

Finally, the 2nd NOAA Florida Diversity & Inclusion (D&I) Workshop was held in June 2021. The first year's attendance was approximately seventy-five people, and this year's attendance was nearly double. Those who had attended the first workshop in June 2020 saw how valuable the workshop was, and they helped spread the word to their colleagues. There were even individuals from outside of the Florida NOAA offices who were in attendance for the second workshop. We truly appreciate all of the employees within NOAA who are actively trying to learn about (D&I) topics.



2nd NOAA Florida D&I Workshop held virtually in June 2021.

## Getting to Know the New Staff: Allison Plumadore

### *What were you doing before joining the team at the Florida Keys National Weather Service (NWS)?*

Before joining the team at Florida Keys National Weather Service, I was attending Purdue University, in West Lafayette, Indiana, pursuing a Master of Science in earth, atmospheric, and planetary sciences.

### *Where do you see yourself in ten years?*

In ten years, I see myself being a Warning Coordination Meteorologist. This has been my dream job since I was little, and I would love to be able to help out in the community.

### *What do you like to do in your free time?*

In my free time, I enjoy doing outdoor activities. You can usually find me at the beach, swimming at the pool, taking my dog for a walk, or riding my bike around the island!

## Applications of Machine Learning Techniques for Waterspout Prediction: Summer Hollings Project 2021

By: Bryce Tyner

The Florida Keys are home to one of the highest waterspout frequencies in the world. These waterspouts traditionally have been understood from the perspective of smaller time and space scales. However, recent research has shown waterspout events often are triggered by certain synoptic (larger scale) weather patterns, with possible predictability several days in advance of occurrence. For his research project in the summer of 2021, Hollings Scholar Jonny Benoit (Brown University) collaborated with members of the Florida Keys National Weather Service (NWS) to conduct statistical analyses and utilize machine learning techniques to examine possible synoptic scale influences on waterspout favorability in the Florida Keys.

Statistical analyses conducted were able to highlight the variables important for waterspout prediction as well as where they are spatially important. This was done by comparing grid point values of various reanalysis fields on days with waterspout reports along the Florida Keys with the values on days without such reports. The most relevant synoptic variability was found to be related to changes in the strength and location of a quasi-steady feature in the North Atlantic, the Bermuda High, and the resulting changes in the synoptic scale wind circulation. Waterspouts were found to occur more frequently when the Bermuda High is weaker or displaced further southeastward in the North Atlantic. This results in a decrease in the strength of the associated anticyclonic circulation as well as slackened flow over the Florida Peninsula, ultimately affecting local sensible weather.

These relevant wind and pressure features were combined with other significant variables to train a supervised machine learning algorithm to predict waterspout occurrence. Machine learning, aided by statistically-founded feature selection, allows for a new waterspout prediction method that incorporates synoptic scale features. Upon successful tuning, this algorithm will be used operationally at the Florida Keys NWS to predict favorable conditions for waterspout occurrence several days in advance..

Jonny presented the results of the study at the American Geophysical Union (AGU) annual meeting in December 2021. Jonny will also join Florida Keys NWS Meteorologist Bryce Tyner and Science and Operations Officer Andy Devanas to present the results at the American Meteorological Society (AMS) annual meeting in January 2022.



## Getting to Know the New Staff: Travis Washington

### *What were you doing before joining the team at the Florida Keys National Weather Service (NWS)?*

I've been with the National Weather Service for six and a half years, working in Shreveport, LA and San Juan, PR. I hold a Bachelor of Science in interdisciplinary physics from Florida State University, with a focus in meteorology and physical oceanography, and a Master of Science from the Florida Institute of Technology (FIT), along with two years of Ph. D. work. During my graduate years at FIT, my focus was air-sea interaction and numerical modeling of tropical cyclones using the Weather Research and Forecasting Model (WRF). While at the American Meteorological Society Annual Meeting in 2017, I was awarded second place in the poster session for my presentation, "Numerical Studies of Lower Boundary Forcing on Tropical Storm Fay." Completing this presentation increased my intensity and passion for tropical cyclones. Because of this, I decided to pursue a doctorate degree at The Florida Institute of Technology. My doctoral studies focused on tropical cyclone rapid intensification and decay, using the Hurricane Research and Forecasting Model (HWRF) along with the Weather Research Forecasting Model (WRF).

### *Where do you see yourself in ten years?*

I don't keep a running clock in my head on things involving my future, so I don't know where the wind or my mind will take me. But, at this time, I would like to be near a coastal location with a beach less than an hour away. Eventually, I would like to oversee a program at NOAA or the National Weather Service Headquarters.

### *What do you like to do in your free time?*

I am an introvert who likes quietness, and I spend most of my time watching sports or science channels. However, I like going out occasionally and hanging out with friends and family.

## NOAA Heritage Project Complete!

**By: Nancy Barnhardt**

In November 2019, a few team members from the Florida Keys National Weather Service (NWS) Office set out to complete a project that would encompass the history of NOAA and NWS in the Florida Keys, dating back to the mid 1800s, to showcase NOAA's technological advancements and highlight significant weather and non-weather events in Florida Keys history. Our project idea was to create a wall art timeline display of events of the history of NOAA and the Florida Keys NWS, made possible by the NOAA Heritage Program, which works to preserve NOAA's heritage throughout the country. The NOAA Heritage Program has funded many projects since 2005, such as oral histories, displays, exhibits, and small-scale heritage asset preservation. We were fortunate enough to add our timeline art installation to the list. Observing Program Leader David Ross at the Florida Keys NWS was the mastermind of this project, with meteorologists Katherine Lenninger and Nancy Barnhardt helping to lead alongside; however, the entire office played a role in making this vision become a reality.



*(Continued on Page 12)*

## NOAA Heritage Project Complete! (continued)

While working on this project, we partnered with NOAA's Florida Keys National Marine Sanctuary, Monroe County Emergency Management, Monroe County Public Library, and the Florida Keys History and Discovery Center to gather as much information and history as we could. These partners were key in discovering many interesting events and pictures that would have otherwise been missed. While this was meant to be an in-person collaboration with our partners, the COVID-19 pandemic had other plans. Luckily, through email exchanges, the team was able to garner a plethora of information that would later be integrated into the timeline.

Countless hours went into researching the history of the Florida Keys NWS and its origins in Key West. A map was included on our timeline to highlight each climate observation location throughout the history of the Weather Service in Key West.

Another all-important part of life in the Florida Keys is the hurricane history. While there have been many hurricane impacts in the Keys, only the major hurricanes, or those with interesting tracks, were displayed on the physical timeline. Since there was an abundance of other impacts and valuable history we wanted to incorporate into the timeline, but not enough space for it all, an online story map was also made to incorporate a richer set of impactful historical events in the

Florida Keys. This story map not only spans the history of the federal weather services in Key West, but also features various technological advancements of NOAA (and NOAA predecessor agencies, both weather and non-weather). This project was unveiled in May of 2021 and resides in the Florida Keys NWS office building in a prominent location for tour groups to be able to see, once tours commence again. While completing this project, each team member learned an incredible amount about the unique history of the Florida Keys NWS and the Florida Keys, and it makes us proud to be a part of an incredible history!



NOAA Heritage Project team members proudly show present the completed timeline.

## Getting to Know the New Staff: Charlie Coffman

***What were you doing before joining the team at the Florida Keys National Weather Service?***

I was working for the Department of Defense, managing all of the air traffic control electronics equipment at Naval Air Station Key West.

***Where do you see yourself in ten years?***

Continuing to learn and provide electronics and IT support to the Florida Keys National Weather Service Office.

***What do you like to do in your free time?***

There are too many hobbies to mention, but my favorite ones are scuba diving and fishing.

# National Weather Service Supports United States Coast Guard Oil Removal Operation

By: Chris Rothwell

On May 5th, 1942, a U-boat about 75 miles to the northwest of the Dry Tortugas torpedoed the steam tanker *Munger T. Ball*. Shortly thereafter, lookouts on the steam tanker *Joseph M. Cudahy* spotted the burning *Ball* and changed course for Tampa, knowing U-boats were lurking in the area. The master of the *Cudahy* attempted to avoid torpedoes by steering a zigzag pattern towards Tampa. Despite their best efforts, the *Cudahy* was torpedoed, possibly by the same U-boat, just a few hours after the *Ball*. Fifty-seven souls were lost that night between the two tankers. More than 1500 merchant marine ships sunk during World War II's Battle of the Atlantic, 46 of those in the Gulf of Mexico.

For many years, divers frequented a deep water wreck in the southeastern Gulf of Mexico. Persistent sheens above the wreck earned the site the nickname, "the Oil Wreck." NOAA's Marine Pollution Surveillance Program detected potential oil slicks at the site for many years using new satellite technology specifically tuned to detect pollution. NOAA's Remediation of Underwater Legacy Environmental Threats (RULET) project identified this site as a location recommended for further assessment and potential removal of both fuel oil and oil cargo. Hurricane Irma's close approach in 2017, combined with an uptick in sheening in 2019, prompted Coast Guard Captain Adam Chamie, the Federal On Scene Coordinator (FOSC), to initiate an assessment on what RULET and historical accounts identified as the sunken tanker *Joseph M. Cudahy*.



A commercial diver prepares for a descent down to the *Ball*.



The 256' *Shelia Bordelon* used for dive and oil recovery operations.

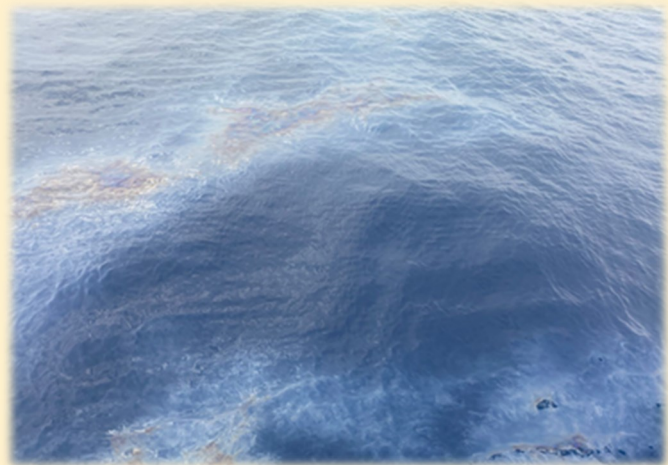
The United States Coast Guard (USCG) Sector Key West Incident Management Team began operations on June 9, 2021, in conjunction with the Coast Guard's National Strike Force, the District Seven Response Advisory Team, the Office of Environmental Management, the Salvage Engineering Response Team, the Navy Supervisor of Salvage and Diving, NOAA, the Maritime Administration, the lead contractor Resolve Marine Group, more than fifteen subcontractors, and the offshore supply vessel the *Shelia Bordelon*. In a surprising twist, a marine archeological study determined the *Cudahy* was actually the *Munger T. Ball*. Divers and Remotely Operated Vehicles removed more than 35,000 gallons of heavy oil from the *Ball*, with combined efforts totaling 28,800 work hours. The 40-day coordinated response effort concluded after Capt. Chamie oversaw an on-site memorial ceremony and burial-at-sea honors for the crewmen who lost their lives.

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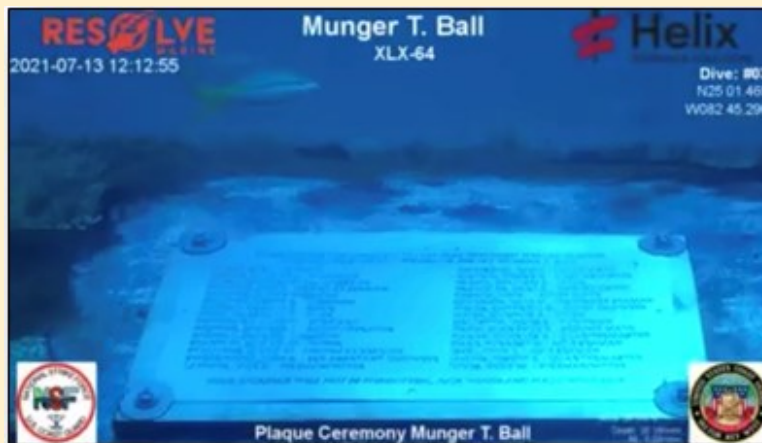


## National Weather Service Supports United States Coast Guard Oil Removal Operation (continued)

The Florida Keys National Weather Service (NWS) has been involved with the USCG-NOAA response to the *Cudahy* (before it was known to be the *Ball*) since 2013, when surface-based shipwreck surveys began. Planning efforts during subsequent Florida Keys Area Committee Meetings called upon our local knowledge and marine expertise to help the FOSC and NOAA decide on an appropriate weather window (outside of the peak of hurricane season and not within the windiest months of the year). During the assessment and recovery operation in June and early July, the Florida Keys NWS provided twice-daily marine spot forecasts, highlighting the first 24-hours, with a marine weather outlook through the next seven days. The radar desk provided direct satellite phone communication to the Situation Unit Leader and to the on-site operations command for hazardous convective weather, including two convective events which shut down pumping operations. Our spot forecasts provided critical intelligence for changes in operations, including a temporary demobilization and sortie to St. Petersburg as Tropical Storm Elsa moved north through the southeastern Gulf of Mexico. Feedback on the operation provided by Captain Adam Chamie:



Oil sheen at the *Munger T. Ball* wreck site.



A memorial plaque placed on top of the wreck to remember the 30 lost souls during the sinking of the *Munger T. Ball*.

*"A job truly well done by Resolve, all the contractors involved on the ship and in supporting roles, the many Coast Guard men and women from a variety of units throughout the country, and our dedicated partners from NOAA, the Navy, NMS, MARAD, and the many others who contributed their expertise and time so we could all come together to remove this threat from our coast. I'd also like to thank all those involved in commemorating those who made that ultimate sacrifice - it took almost 80 years but as a team we did it. Thank you to everyone who played a role, big and small; this is something for us all to be proud of, and I was honored to be a part of this team."*

V/R,  
CAPT Adam Chamie"

## Getting to Know the New Staff: Mathew Goncalves

### ***What were you doing before joining the team at the Florida Keys National Weather Service?***

From 2012-2017, I served as a United States Navy Communications (COMMS) Electronics Technician. Responsibilities and duties included expeditionary warfare satellite communication (SATCOM), ultra high frequency (UHF) and very high frequency (VHF) radio system maintenance, micro-miniature repair, and management of data systems. From 2017-2021, I served as a Key West Tactical Combat Training Range Communications Engineering Tech. Duties and roles included serving as a UHF/VHF radio subject matter expert, configuration management, cybersecurity workforce, site security representative, primary communications security (COMSEC) custodian, and classified material custodian.

### ***Where do you see yourself in ten years?***

Working for NOAA!

### ***What do you like to do in your free time?***

Some of my hobbies include fishing, freediving, cooking, and enjoying quality time with my family.

## Summer 2021 in the Florida Keys

**By: Dave Ross**

Summer 2021 in the Florida Keys was generally wetter than average. Rainfall at both island chain climate sites ended around 1 and 2 inches above average, at Key West (14.37") and Marathon (15.34"), respectively. This lands both in the top 3<sup>rd</sup> of wettest summers on record, but a ways from the wettest ones recorded at each location. The wettest summer on record for the Key West area, dating back to 1871, was 2005 with 26.20 inches of rainfall. The wettest summer for the Marathon area, dating back to 1950, was 1988 with 27.43 inches of rainfall measured.

Temperatures this past summer were 1.2 degrees below average at Key West (83.8°F) and 1.0 degree below average at Marathon (84.1°F). These values were near the median for summertime averages looking at both sites' period of record. Records for temperature date back to 1873 for Key West and 1950 for Marathon.

Record-wise, this year was significantly quieter than last summer, with just eleven records set or tied versus the fifty from 2020. In a shift from last year, the most common records (four each) were for low maximum temperatures and daily rainfall. Marathon recorded three of each of those, including a record low maximum of 81°F on July 6<sup>th</sup> that broke the previous record by four degrees and tied the monthly low maximum record, previously set on July 22<sup>nd</sup>, 2001.

*(Continued on Page 16)*

## Summer 2021 in the Florida Keys (continued)

<b>SUMMER 2021 RECORDS</b> (Set or Tied)	<b>DAILY TEMPERATURE</b>				<b>DAILY RAINFALL</b>
	Maximum	Low Maximum	High Minimum	Minimum	
<b>Key West</b>					
<i>Summer</i>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>1</b>
<i>June</i>	0	0	2	0	0
<i>July</i>	0	1	0	0	1
<i>August</i>	0	0	0	0	0
<b>Marathon</b>					
<i>Summer</i>	<b>0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>
<i>June</i>	0	1	0	0	0
<i>July</i>	0	1	1	0	3
<i>August</i>	0	1	0	0	0

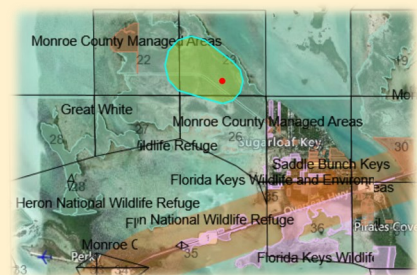
Summary of daily records that were either set or tied at Key West and Marathon during Summer 2021, with a monthly breakdown of records below the seasonal total. Daily temperature records date back to July 1872 for the Key West area and June 1950 for the Marathon area. Daily precipitation records date back to January 1871 for the Key West area and June 1950 for the Marathon area.

That concludes the look back at the summer of 2021, but for the latest outlooks regarding the months ahead, readers should visit the Climate Prediction Center (CPC) at [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov). The CPC is one of nine national centers of the National Weather Service and they specialize in producing operational predictions that cover time scales from a week to seasonal outlooks. These forecasts cover the land, ocean, and atmosphere, even extending into the stratosphere.

## Florida Keys Meteorologists Aid in Prescribed Burn

By: Luis Ingram-Westover

A prescribed burn was conducted on Upper Sugarloaf Key in the Key Deer National Wildlife Refuge in October 2021. There were multiple units represented, including the Key Deer National Wildlife Refuge, Florida Panther National Wildlife Refuge, crews who oversee Merritt Island National Wildlife Refuge, and the Florida Keys National Weather Service (NWS). Other crews on hand to monitor the fire were the Monroe County Fire Department, Nature Conservancy, and Florida Forest Service. Leading up to the prescribed burn, Florida Keys NWS meteorologists provided specialized, fine-tuned fire weather forecasts to support burn operations.



Map of prescribed burn area.

(Continued on Page 17)



## Florida Keys Meteorologists Aid in Prescribed Burn (continued)



A drone is prepped to drop potassium permanganate to ignite the burn.

For this prescribed burn event, three methods (terratorch, hand torches, and a drone) were utilized to conduct the prescribed burn. The terratorch ejects a stream of flammable fuel that is a mixture of diesel and propane along with a jelly component to it. The jelly acts as an adhesive to allow the fuel mixture to stick to the vegetation and allows fire crews to better target what they are trying to burn. During this particular prescribed burn, it allowed fire crews to reach areas that were further away from the road. Hand torches were used to light fires right along the road, and the drone was used for the interior sections of the planned burn area. The planned burn area had very little ground clutter, and so the fire was slow to spread.

The drones that were used carried a payload containing plastic balls filled with a compound called potassium permanganate, which were then injected with glycerol (anti-freeze) and dropped from the

drone. It takes about 20-30 secs before the mixture becomes combustible and ignites the fine fuels it lands on. The particular drone used on this fire could carry about 250 of the plastic spheres, and each flight lasted about 15-25 minutes, depending on battery life.



Firefighters provide ground support to ensure the prescribed burn remains under control at all times.



The prescribed burn aids in removal of overgrown brush on Upper Sugarloaf Key.

Overall, the prescribed burn served as a great opportunity to continue building trusting relationships with core partners in the Florida Keys.

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