THE COASTAL BREEZE

Brownsville/Rio Grande Valley

Summer 2022

IN THIS ISSUE

Welcome to the Summer issue of the Coastal Breeze. We have a issue that is sure to delight! Find out about different tools, trainings and outreach we do as meteorologists, becoming climate ready here in the Valley, some weather folklore and find out what we would do if we controlled the weather. Also meet our newest forecaster and say goodbye to a seasoned veteran as he accepts a promotion to another office.

Enjoy and stay cool!

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Hello, Everyone! I am "pinch-hitting" for our Meteorologist-In-Charge (MIC), Mike Buchanan, this time around, as he has been on vacation and attending an important meeting at our Regional Headquarters in Fort Worth, TX. It has been somewhat of a slow start (knock on wood!) to the 2022 Atlantic Hurricane Season, with just three named storms and zero hurricanes as of this writing in mid-July. However, the climatological peak of the season in August and September is just around the corner. And, nearly all of the seasonal predictions continue to anticipate a very active season, with somewhere in the range of six to 12 hurricanes forecast to occur.

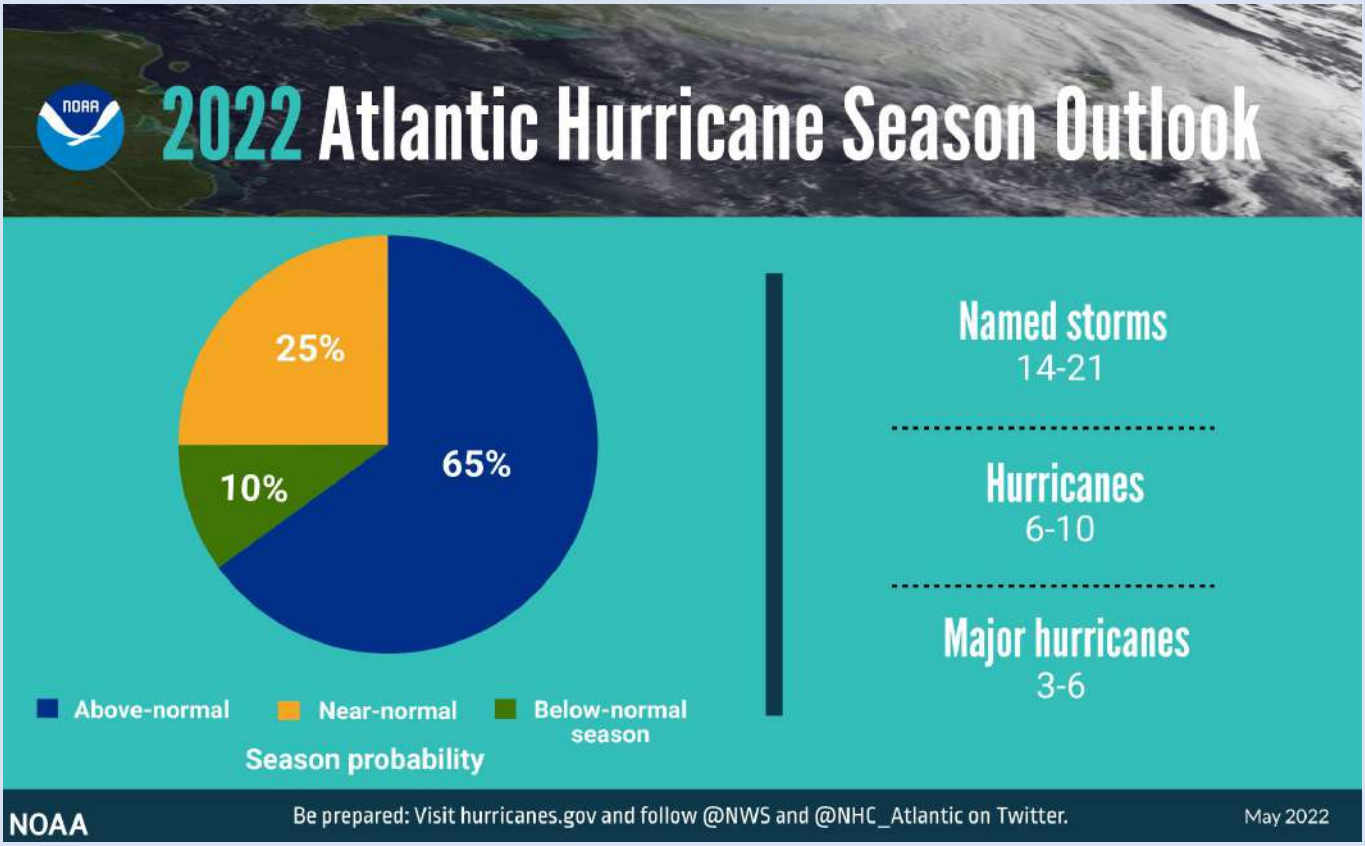


Figure 1: Official NOAA Hurricane Season Outlook issued in late May 2022.

While most of the hurricanes in recent decades to make landfall along the Lower Texas Coast [e. g., Hanna (2020) and Dolly (2008)] have originated relatively close by, either in the Gulf of Mexico or the western Caribbean Sea, did you know that long-track hurricanes developing in the Main Development Region of the central and eastern tropical Atlantic have also impacted our area? One such storm was the (officially unnamed) "Cuba-Brownsville" Hurricane of 1933. It took a somewhat unusual path, passing *north* of the Greater Antilles and never entering the Caribbean, enroute to making landfall as a Category 3 storm near South Padre Island.

Unfortunately, 40 lives were lost (Roth 2010). Coincidentally, another hurricane made landfall *the very same day* (04 September) in Florida! Can you imagine that happening today?

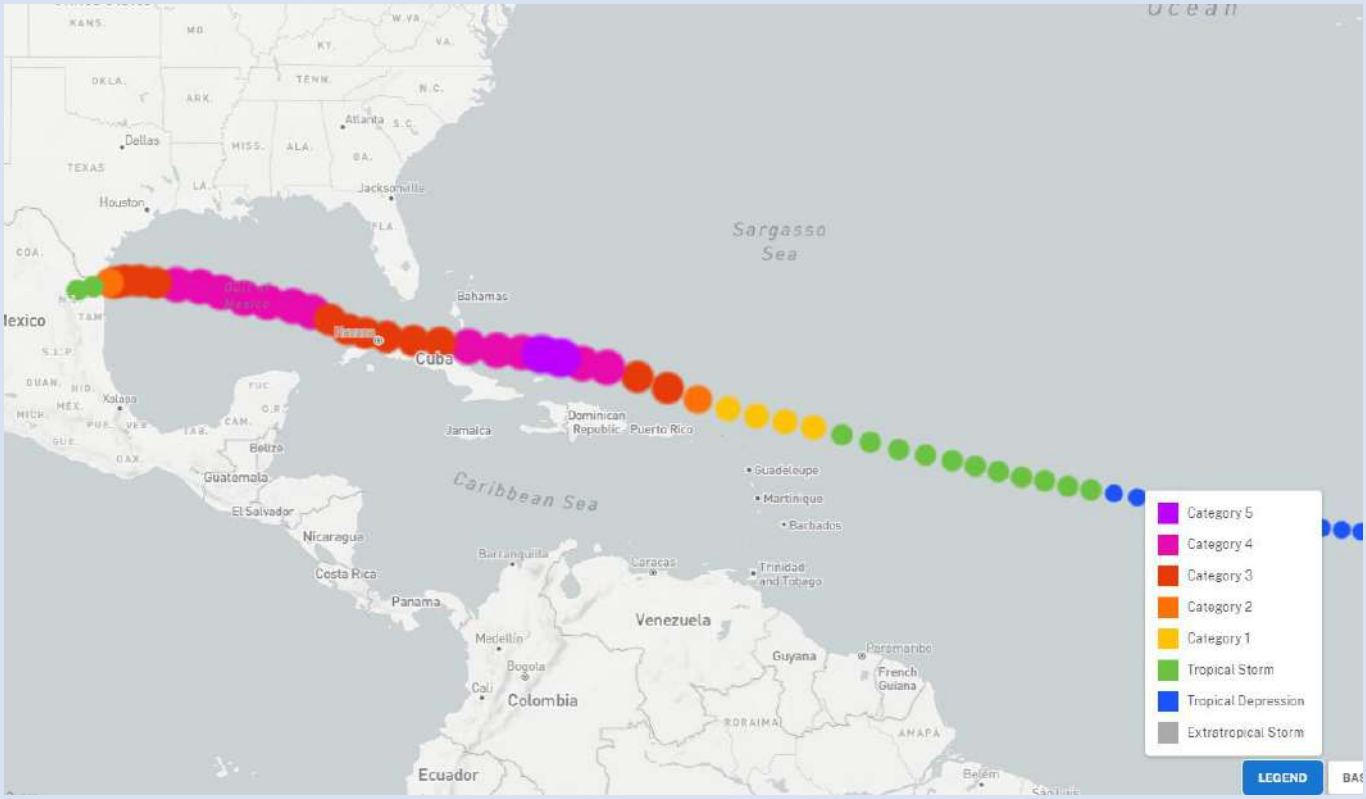


Figure 2: Track of the "Cuba-Brownsville" Hurricane (1933). Image courtesy of Historical Hurricane Tracks from NOAA Office for Coastal Management website.

As a reminder of some of the actions our office might take in the face of such a long-track hurricane forecast to reach the Lower Texas Coast, the Tropical Weather Team led the forecast staff through an exercise based largely on this historical track from 1933. By entering locations along its observed path, the Hurrevac web-based software was used to emulate several key aspects of the storm. Staff were faced with making decisions at various points relative to the "H-hour", or the time when tropical-storm force winds are expected to reach the coast, making further preparations much more difficult. A few of the discussion points were

- H-120 hours: Would we need assistance from other National Weather Service offices in order to meet our mission? Would staff on vacation need to be recalled?
- H-39 hours: What would we need to do if the forecast from the National Hurricane Center drastically changes? Where would we issue Hurricane and Tropical Storm Warnings *inland*, away from the coast?

- H-24 hours: With a potential Category 4 hurricane bearing down on Brownsville, would management need to make the difficult decision to evacuate the office?

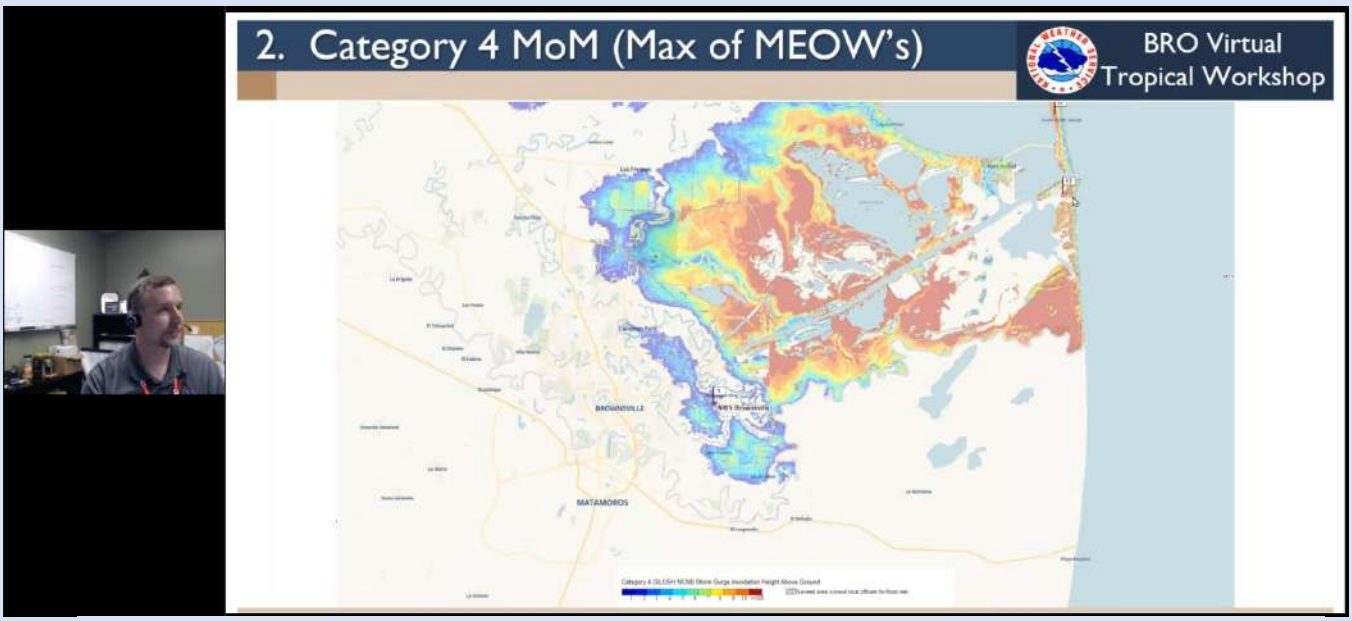


Figure 3: During the 2022 NWS Brownsville Tropical Weather Virtual Workshop, Science and Operations Officer Josh Schroeder leads a discussion on storm surge impacts that might be expected from a storm like the 1933 Cuba-Brownsville hurricane.

Talking through these scenarios allowed everyone to get into the mindset of what we would have to do when faced with such a long-track hurricane. These types of storms may allow adequate time to prepare, but the potential impacts could be catastrophic! Whether an active season or a less-active season is forecast, remember that, when it comes to hurricanes, "it only takes one" if that happens to be the storm that impacts ***your*** community.

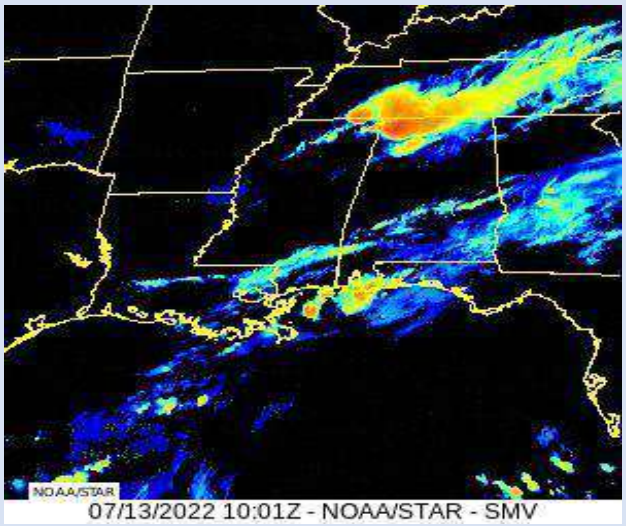
For More Information About Hurricane Preparedness Please Visit:

https://www.weather.gov/bro/2022hurricaneguide

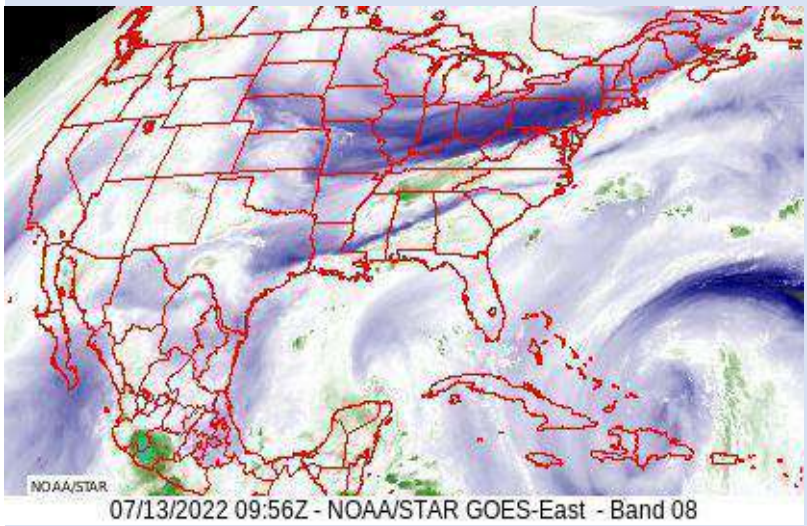
Meteorologists rely on satellite imagery for many different uses while monitoring the weather. The satellite products are differentiated by certain channels they are programmed to use and special microwave windows that they see through. Satellite meteorology is a specialty area that requires knowledge of what all of the satellite products are most useful for depending on their channels and microwave windows. As for this article, we will only dive into what we use these tools for and how they help us forecast the weather.

Geostationary and polar satellites are the types of satellite products that we use the most. They are especially useful overnight when weather processes can't always be seen due to the lack of sunlight. Or, satellite is used when there is a lack of surface observations in places like the ocean. Radar and surface observations are helpful for monitoring the environment at or near ground level. However, it is also important for us to see the bigger picture of what is happening on a larger scale over the entire country or even over the entire globe!

Satellite imagery can show many different weather phenomena and can help us even predict what may happen next. Satellite is useful for identifying where the dry and moist air is located and where there are boundaries set up such as cold and warm fronts. These fronts are often associated with larger scale weather patterns such as a low- or high-pressure systems and these can also be seen with different satellite products. Using different channels and microwave windows, we are able to see clouds at different heights.

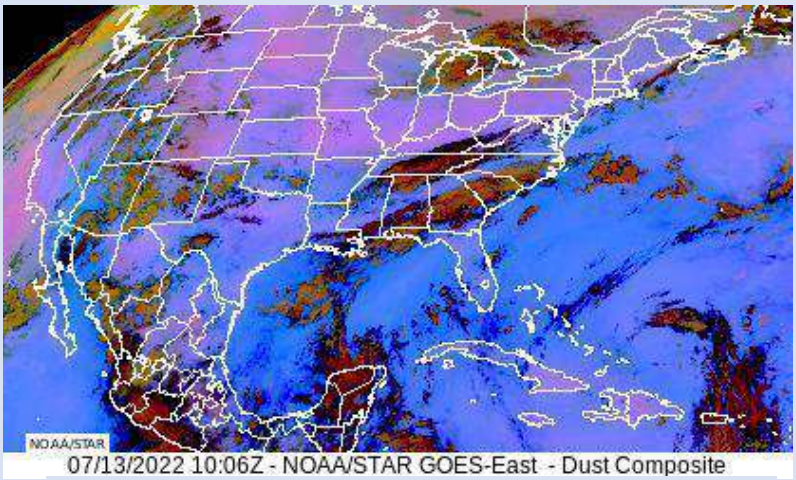


Above: Southern Mississippi Valley Sector: Sandwich RGB Showing Thunderstorms Across the Southeastern U.S..



Left: Upper Level Water Vapor Infrared Image

This can be especially useful when it comes to severe weather so we can identify the storms that are intensifying or dying based on how high their cloud tops rise. They can also show different aerosols such as dust and smoke. If satellite imagery shows a smoke plume before a fire is reported, we can contact the local fire department in that area to inform them of what is happening.



Upper Level Water Vapor Infrared Image

Lastly, these products keep us informed on tropical activity over the oceans. As mentioned previously, there are not enough observations to cover all of those areas. Satellites helps us track incoming disturbances from the Atlantic Ocean and forecast where they may go. We rely heavily on satellite imagery information to monitor the intensity and location of tropical storms, hurricanes, and tropical depressions.

There are plenty of other uses for satellites that may have not even been mentioned in this article! It is such a useful product for us meteorologists to have so that we can have eyes on all levels of the atmosphere to keep our community safe. We do our best to make our forecast using all of the tools available to us so that we can fully understand how the upper level of the atmosphere affects what happens near the surface. Satellite products give us a bird-eye view of the atmosphere and are crucial in forecasting and decision making when it comes to high impact weather.

Goes 16 Geocolor Of Hurricane Irma

RIP CURRENT TRAINING FOR CAMERON COUNTY BEACH PATROL

By Laura Farris

Our relationship with both the Cameron County Beach Patrol and South Padre Island Ocean Rescue are very important to us at NWS BRO. Why is that? Well, out of all of the weather-related fatalities in our County Warning Area (which includes the 8 southernmost counties of Texas), rip currents are by far the leading cause of death for our residents. Our goal is to partner with our beach patrol agencies to help reduce this statistic and keep those who come to enjoy our beaches safe, and one of the ways we have been working on doing that is by sharing knowledge with each other.

In May, our Marine Focal Point and one of our meteorologists, Laura Farris, was invited by Cameron County Beach Patrol to give a presentation on the science behind rip currents to the new lifeguards who were going through lifeguard training. She was able to highlight the significance of the threat of rip currents and longshore currents to beachgoers, explain how both types of currents form, highlight the specific threats associated with each, explain how to identify these currents visually, and explain how we forecast the rip current risk operationally at our office. She enjoyed getting to meet some of the new lifeguards for this season!

Meteorologist Laura Farris

We greatly appreciate the dedication and commitment of our lifeguards to keep us all safe while at the beach! If you're planning on going to the beach this summer, remember to swim at beaches that have lifeguards on duty, brush up on your beach safety knowledge, and if you have the chance, let our lifeguards know how much you appreciate their vigilance!

CAMERON COUNTY PARKS
BEACH PATROL

If I controlled the weather temperatures during the day would be around low 90's to high 80's for the highs and lows would be upper 70's. Rain would occur frequently enough to keep plants happy, but not enough to cause flooding or any issues.
-Jeremy Katz, Meteorologist

If I controlled the weather...I'd make it magical for the four seasons, bringing happiness across the land.

Winter would feature gentle snowfall at night, followed by a sunny, cold, and quiet sunrise with children waxing down their sleds and building snowpeople, and parents enjoying the day with them.
Spring would bring welcome rain to turn the land green and bring beautiful flowers to gardens and meadows.
Summer would bring sunny warm days for the pool and beach, and balmy evenings for cookouts and celebrations. Non-severe thunderstorms would occur at night in order to keep grass green and gardens and crops growing; the storms would bring dancing lightning for children of all ages to witness.
Autumn would bring breezy fronts with rain, followed by crisp mornings and sunny, pleasantly cool afternoons that enhance the colors of the turning leaves. **-Barry Goldsmith, Warning Coordination Meteorologist**

If I controlled the weather….. I would create a rotating wind shear that stayed right over Boca Chica and S Vermillion, and when the truck carrying tons of M&M's came by, I would have it swoop down and gently blow the truck over into our parking lot, and then I would have a gentle hail storm come just over the parking lot so no one would mess with the M&Ms until I got there, then the hail storm would quit, I would bring all the M&Ms and share them with my fellow co-workers. After that, I would have some crepuscular rays shine through the clouds and it would be a glorious day afterwards.

-Greg Saunders, Electronics Technician

If I controlled the weather, we would wake up with bright sunshine everyday. Temperatures would hover in the low 80s for the day. Around 4 or 5 pm in the afternoon severe thunderstorms would develop and produce tornadoes in open fields. Around 7 or 8 pm the skies would clear out to produce a beautiful sunset and leaving a sky full of stars overnight with lows in the mid 60s.

-Amber McGinnis, Meteorologist

If I controlled the weather... I'd prevent tropical cyclones from making landfall. Instead, I'd have them spin over the ocean, generate some nice swells (but nothing too crazy so mariners can stay safe and all the surfers can get out there and enjoy it), and then dissipate over the open ocean. **-Laura Farris, Meteorologist**

If I controlled the weather... all hurricanes would be "fish storms". **-Joshua Schroeder, Science and Operations Officer**

If I controlled the weather everyday would be Fall. **-Kirk Caceres, Meteorologist**

If I could control the weather, I would acquire an island where people could go to vacation.
They would pay to spend a week or two at the island and enjoy whatever weather they would like, for a small fee of course.
-Pablo Gonzalez, Information Technology Officer

THE INCREASING NEED FOR THE RIO GRANDE VALLEY TO BECOME CLIMATE-READY

By Barry Goldsmith, Warning Coordination Meteorologist

Above left: The impact of extreme to exceptional drought on livestock and rangeland in the Rio Grande Valley in June 2011. Right: Widespread freshwater flooding near Los Fresnos, TX, in June 2018. Future droughts are expected to be longer and more extreme, but also be punctuated by potentially devastating floods which combine higher rainfall and rainfall rate with more urban runoff.

About a century ago, a wise Texas meteorologist once said that Texas is "a [state] of perpetual drought, broken by the occasional devastating flood". For the Rio Grande Valley, the recent past has proved this statement to be quite prescient. The following list of events explains why:

- Water Year 2010 (October 2009-September 2010) was among the wettest on record; Water Year 2011 was among the driest on record.
- Extreme to Exceptional Drought was common from 2011 through 2013.
- October 2015 featured several heavy rain events, leading to significant drainage flooding in the mid Valley.
- Severe (Level 2 of 4) Drought along the Lower Texas Coast in mid-June 2018 was erased by rainfall of 12 to 18 inches during the "Great June Flood" between June 18th and 22nd, which left an estimated $200 million in property damage in its wake.
- Moderate to Extreme (Levels 1 through 3) Drought in early September 2018 was erased by widespread heavy rainfall in mid-September.
- A second, "sequel" late June flood in 2019 left tens of millions of dollars in property damage.
- Flooding from Hurricane Hanna's rainfall in 2020 left at least $100 million in flood-related property and crop damage.
- Lack of water flowing from U.S. and Mexican tributaries into both Amistad and Falcon International Reservoirs left the combined share of lake levels at 30-year lows in July, 2022.

Since 2010, a notable warming trend across the Rio Grande Valley (Figure 1) has increased

evaporation rates and allowed for steady to rapid transition to dryness and drought, including several instances of "flash droughts" which can have negative consequences on dryland crops and livestock. During the same period, an increase in latent heat across warmer source regions of moisture for the region, including the Gulf of Mexico, western Caribbean Sea, and eastern tropical Pacific Ocean, has aided the ability of atmospheric energy – from spring fronts to tropical waves and cyclones – to produce excessive rainfall over short periods of time, overwhelming local drainage systems not designed to handle the associated runoff. The forecast over the next several decades is for a continuation of a steady to accelerated warming of the Valley, which will further exacerbate dryness, drought, and especially water supply issues. At the same time, the occasional influx of high latent-heat atmospheric events will punctuate droughts with excessive to extreme rainfall and rainfall rates. Each event has the potential for devastating impacts to the region.

Knowing this – we ***can*** be ready to act – now.

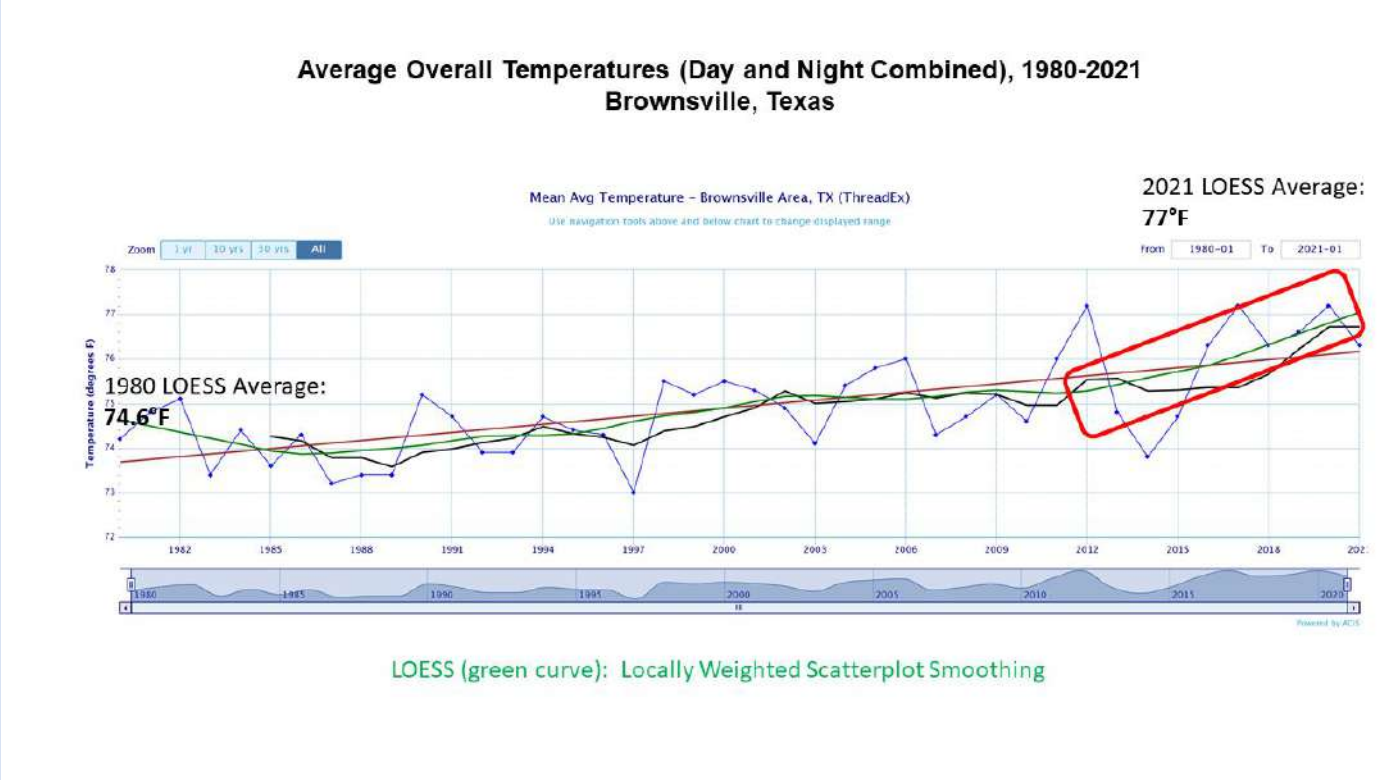


Figure 1. Average temperature trend for Brownsville, Texas, since 1980. Shown are actual annual averages (blue), linear regression line (red), and LOESS curve (green). Of note is the relatively rapid rise in the average temperature trend since 2011. The regression and LOESS values are the highest on record, dating back to 1878.

Building a Climate-Ready Rio Grande Valley

NOAA has embarked on a grand plan to build a "Climate-Ready Nation" through the remainder of the 2020s. Budget proposals beginning with Fiscal Year 2023 will include funding for improved long-range seasonal to annual climate forecasts, as well as a process to build climate resiliency across the globe. Climate resiliency begins at home and spreads outward to states, regions, and nations. For the Rio Grande Valley, our top Climate-Ready priorities are mitigation and adaptation to increasing dryness and water supply issues, punctuated by excessive rainfall and rainfall rates which could be unprecedented.

Drought and Water Adaptation

The Rio Grande Valley, on both sides of the river, is projected to see a population increase to more than 5 million people by the second half of the 21st Century. Agriculture is expected to increase a bit more as well. People, crops, and livestock will need sufficient water to thrive. The source of most of this water – tropical systems and thunderstorm complexes that impact the Sierra Madre Oriental and produce high runoff into U.S. and Mexican Reservoirs serving the Rio Grande Basin – may be insufficient and/or irregular to support these needs, especially in light of increasing evaporation and drought intensity from warming alone. Figure 2 shows projected warming for Cameron County through the end of the 21st Century (maximum temperature example).

Figure 2. Observed average annual maximum temperature (gray bars, through 2013) and projections (red and blue lines, along with gaussian probabilistic high and low possibilities) - Cameron County, TX, through 2100. Note that the average maximum temperature since 2013 has matched the value projected based on both lower and higher emissions (a little over 85°F). Graph courtesy of the Climate Explorer.

What We Can Do – Water Conservation!

A past edition of the *Coastal Breeze* (spring 2021, pages 7-8) highlighted efforts that we can make – from individuals to communities – in order to build our climate readiness to a generally drier and hotter Valley, where water supplies as we know them may not exist.These include those at the household level, from short-term to long-term:

- Take shorter showers
- Use low-flow toilets
- Use Energy Star rated water using appliances (dishwashers, clothes washers, etc.)
- When washing dishes or hands, only use water for rinsing – do not keep it running
- Consider xeriscaping your yard and garden
- If you have a grass yard, only mow every few weeks to allow moisture to be retained in the thicker grass
- If you irrigate, keep the time windows short and do so in the few hours prior to daybreak
- Consider rainwater harvesting or other higher-level water conservation techniques

Communities and agricultural interests should be using, or be investigating, larger-scale water conservation plans. Drip and Micro-irrigation are much more efficient techniques than "flood" irrigation for the Valley's famed citrus crops. Consideration of reclaimed water projects to aid in irrigation of community and residential yards, parks, and gardens is critical to reducing the burden on municipal water supplies. Seawater desalination is another option that is likely to build momentum in the coming decades – perhaps based on modest success of brackish groundwater desalination in Texas over the past decade.

Flood Mitigation and Adaptation

When the increasing dryness/drought periods are punctuated by the occasional, potentially devastating flood, will the Valley be ready? Consider the expected population increase, and agriculture land use, mentioned above. Will our interconnected series of drainage floodways, canals/channels, ditches, pipes, pumps, and detention ponds be sufficient to move runoff out of harm's way? The Great June Flood of 2018, as well as other floods between 2015 and 2021, spurred action from Valley Drainage Districts, most notably a $190 million bond initiative for Hidalgo County Drainage District No. 1 that is already reaping benefits. Other projects, from drainage improvements to regional detention facilities (RDF), are underway across the Valley. Still, much more needs to be done in the form of billions of dollars necessary to complete the Raymondville Drain and plan for continuous updates as the population grows into expanded neighborhoods.

Until current and future projects are completed, residents should become aware of their local

return flood frequencies.Within the 100-year flood plain ("100 year" actually means a 1 percent probability, per year, of a rainfall event of a magnitude over a time span, ranging from 5 minutes to 60 days), there are subdivisions with higher probabilities – especially those where new projects have not been initiated or completed. Those probabilities could be as high as 20 percent ("5-year" return frequency) and require much lower rainfall rates before damaging flooding begins.

Regardless of location inside the 100 year (1 percent probability per year) and 500 year (0.2 percent probability per year), Valley residents are urged to purchase a flood insurance policy, backed by FEMA's National Flood Insurance Program and typically provided through companies that also insure homes and autos. Flood (inundation) insurance coverage for the property and contents of many Valley homes can cost just a dollar a day – equivalent to replacing one beverage with a glass of water each day.

For more ambitious residents planning to be Climate-Ready inside the floodplain for decades to come, consideration should be given to both wet and dry flood proofing (as discussed in the autumn 2021 edition, pages 8-10, of the *Coastal Breeze*) to reduce the potential for flood damage or destruction, regardless of whether a flood insurance policy exists.

Beyond Drought and Flooding

As the Valley grows in population while temperatures continue to warm, demands on the power and utility grid will also increase.The potential for power brownouts or event black-outs during the peak of summer's oppressive heat will increase, based on an unknown amount of stress that may be placed on the system in the coming decades. Current and future residents should consider home and business energy conservation techniques, such as raising the thermostat when buildings are unoccupied, sealing and insulating buildings to reduce the amount of conditioned air leaving the structure, and including windows that open to allow fresh breezes to flow through them on non-summer-like days with moderate temperatures and lower humidity.

In Closing…

A warming climate will create long-term impacts to lives and livelihoods across the Rio Grande Valley as we move through the decades of the 21st Century. It does not mean we have to foresee an untenable future; rather, we have the means to adapt to the new reality, as well as build resilience to that reality. Armed with the knowledge to do so, the Rio Grande Valley can become Climate Resilient, Climate Responsive…and Climate Ready!

METEOROLOGIST ATTENDS TROPICAL BOOT CAMP

By Rick Hallman

Meteorologists in the National Weather Service are continually training to learn the latest in both physical and social science. At the end of May, Meteorologist Rick Hallman from NWS Brownsville was sent to the National Hurricane Center in Miami, FL for a Tropical Boot Camp residence training course. Through the week, Rick was able to interact with hurricane specialists, facilitators, and colleagues from across the National Weather Service to learn more about tropical science, available products, and messaging hazards to the public, broadcast media, emergency management, and political leaders. The week culminated in a large exercise simulating a tropical event, including multiple email and video briefings, media interviews, and press conferences.

Some of the key discussions during the boot camp centered on how best to convey the dangers of tropical events in order to save the most lives. The advancements in storm surge knowledge and forecasting has led to more focused evacuations, yet a percentage of the public still refuse to evacuate. Public attention is typically placed on the strength of the storm, or category of hurricane, rather than the potential impacts. Impact-based messaging from the National Weather Service will help paint the picture of what to expect and lead to better decision-making on all levels of interest before, during, and after tropical events.

Tropical Boot Camp Workshop

Meteorologists Across the U.S.Attend Tropical Boot Camp

WEATHER FACT OR FICTION

By Amber McGinnis

Weather myths are all around us and we have grown up learning about the weather through some of these, but who knows what is fact or fiction? Let's take a look at some more common (an not so common) weather myths and see how true they are.

Lightning without thunderstorms is called "Heat Lightning".

While it is true that this phase does exist, it is 100 percent untrue. Lightning can not happen without a thunderstorm. When people use this term it is due to them seeing lighting at night. What is actually happening is they are not seeing the towering clouds from a distant thunderstorm or hearing the thunder but they are seeing the lightning.

If the groundhog sees its shadow, winter will last longer.

This is untrue, a groundhog seeing his shadow can not predict how soon spring arrives. In fact, according to the National Centers for Environmental Information, in the last 10 years, Punxsutawney Phil's prediction has only been right 40% of the time.

Humidity causes you hair to curl.

As someone with curly hair, I know this is true and I even just found out that there are dome hygrometers (devices that measure humidity) that use human hair to measure humidity. How does this happen? Hair can absorb water in the air through hydrogens bonds. Since there is more water in hair it can form a higher number of these bonds which causes the hair to fold back on itself.

Some people can feel bad weather approaching in their bones.

This is true. When adverse weather approaches barometric pressure falls, humidity rises and sometimes temperatures fall. This has a tendency to affect people with joint pain/issues so they often can "feel" weather coming due to the increased pain or irritation in their joints.

Being out in cold air causes sickness.

This is fiction. In order to get sick you have to be exposed to bacteria or a virus. While this does tend to happen more frequently in winter when it is cold, the cold air doesn't cause the illness. Instead many factors contribute to an increase in illness during colder month including staying inside and in close quarters with people leading to higher germ spread. Likewise, cold viruses have been found to replicate faster and immune cells may be less effective at fighting off illness in cold weather.

Raindrops are shaped like teardrops.

We have drawn them this way since we were kids so it has to be true, right? FALSE. Due to surface tension when raindrops fall they look more like a hamburger bun.

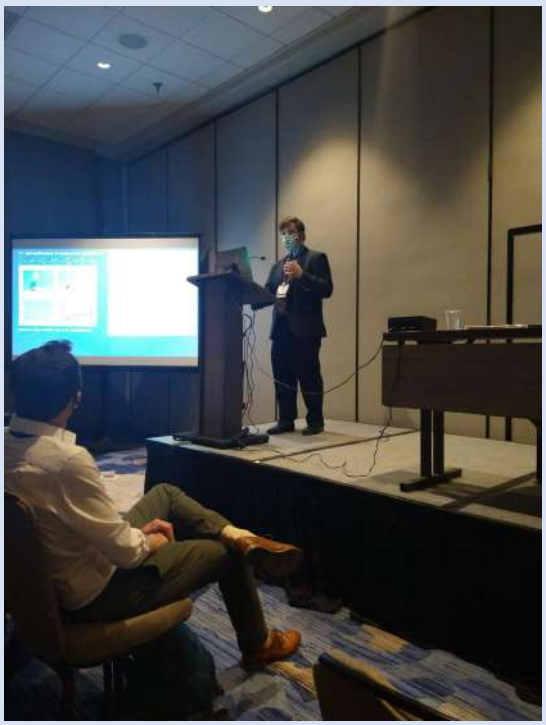
MEET OUR NEWEST FORECASTER

By Jeremy Katz

Hello, my name is Jeremy Katz and I am from Mandeville, LA. I grew up in Southeastern Louisiana and experienced various kinds of weather events like severe weather, winter weather, and hurricanes including Katrina. This has given me a wide perspective of weather that has influenced my curiosity of the weather. My experience with hurricane Katrina also was a large influence on what I wanted to do with my interest in weather. I saw firsthand the devastation that Katrina left behind and how it affected my family and friends. I wanted to direct my passion for weather and use it to help people protect themselves, their families, and property.

I did my undergraduate studies at University of Louisiana at Monroe (ULM) receiving my Bachelor of Science in Atmospheric Science. I started my graduate studies at Florida International University (FIU), in 2014 at Miami, FL. In 2016 I obtained my Master's degree in which I did research on boundary layer exchange coefficients. I then continued my graduate studies at FIU in pursuit of my Ph.D in research of hurricane intensification. I hope to obtain my Ph.D this fall. During my time at FIU, I was worked as both a Teaching assistant and Research assistant. My duties as a Teaching assistant gave me the opportunity to be the instructor of lab courses for Intro to Earth Science and Synoptic Meteorology. I enjoyed teaching students about the various Earth Sciences during my time there.

Moving to Brownsville has been a nice change from the hustle and bustle of Miami. I am excited about starting my career at the National Weather Service and serving the people of Deep South Texas and Rio Grande Valley.



TO NEW ADVENTURES

By Mike Castillo

After working for nearly 20 years at the National Weather Service forecast office here in Brownsville, lead forecaster Mike Castillo has moved to San Angelo, Texas. He was recently promoted as the Warning Coordination Meteorologist for the NWS forecast office there. Mike started his NWS career as a Meteorologist intern here in Brownsville in 1999, before being promoted to a journeyman forecaster a year later. He worked at the Brownsville office before briefly transferring to the NWS Houston/Galveston office in 2006. Mike returned to Brownsville in 2008 and was promoted to lead forecaster in 2010. He worked with many forecasters who had worked in Brownsville during their NWS career. Mike made many friendships with those same people over the many years he worked here. He enjoyed his time serving the people of the Rio Grande Valley and deep south Texas during his time here. Mike led several office programs while working in Brownsville including BLAST, hydrology, tropical operations and office awards. He was also recognized for his work during the 2020 Atlantic Hurricane Season by receiving the **2021 NWS Isaac Cline National Award for Hydrometeorology** with his co-workers.

"My heart will always remember the friends and people I have met over the years in Brownsville. Brownsville was my second home and I will never forget the friendships I made. I will miss those friendships and I will miss Brownsville, always." - Mike Castillo

We will miss Mike and his family as they begin their new adventure in San Angelo. We wish him the best of luck in his future endeavors.

THE NATIONAL WEATHER SERVICE BROWNSVILLE/RIO GRANDE VALLEY
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NWS Mission

Provide **weather**, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the **national** economy.

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