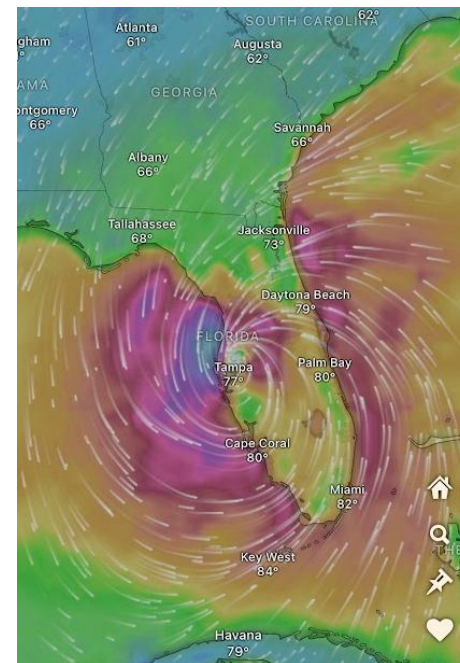
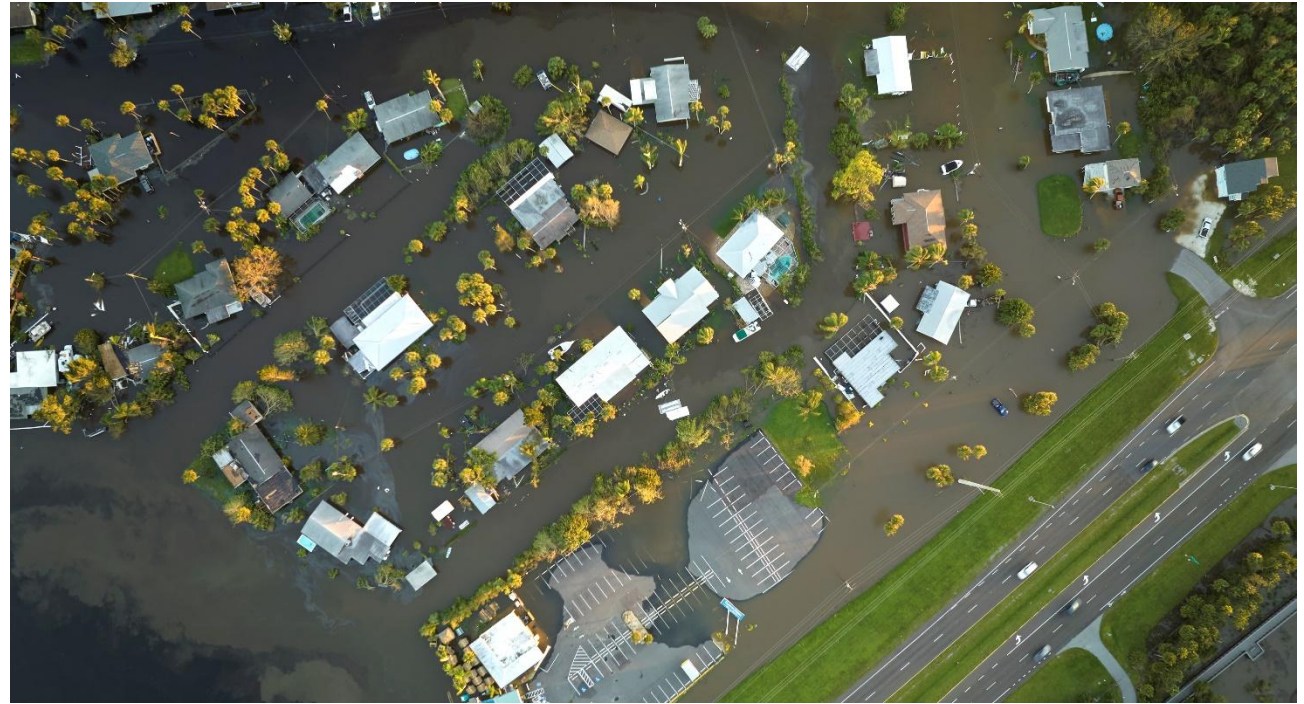


What happened? Return Period Estimates for Michael, Ian, Nicole, Idalia, Helene, and Milton

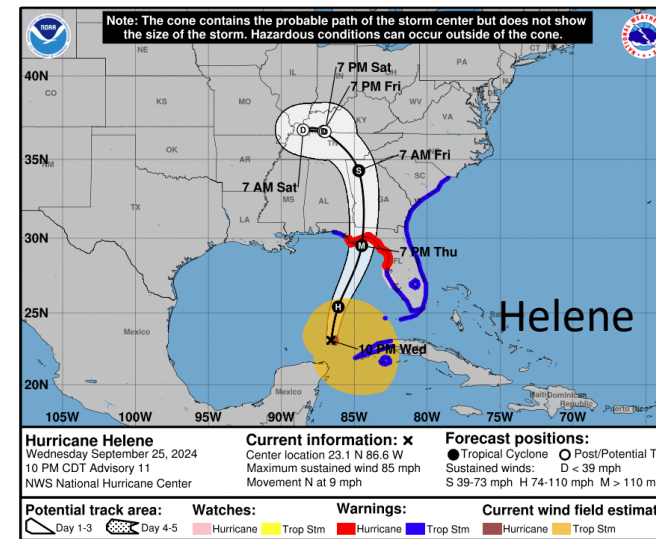
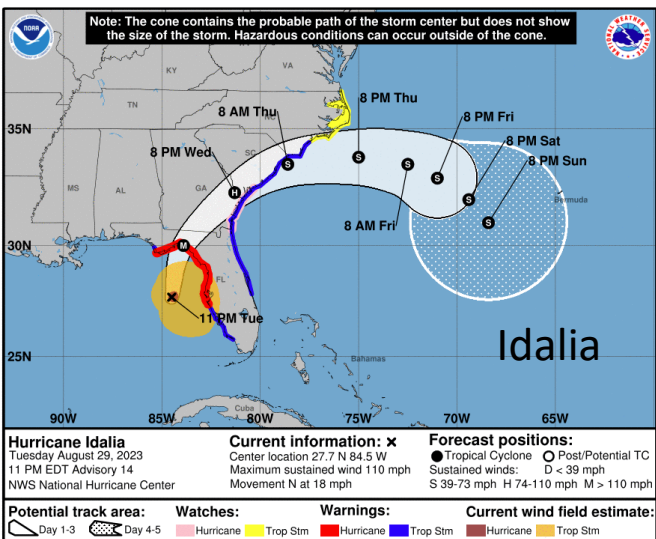
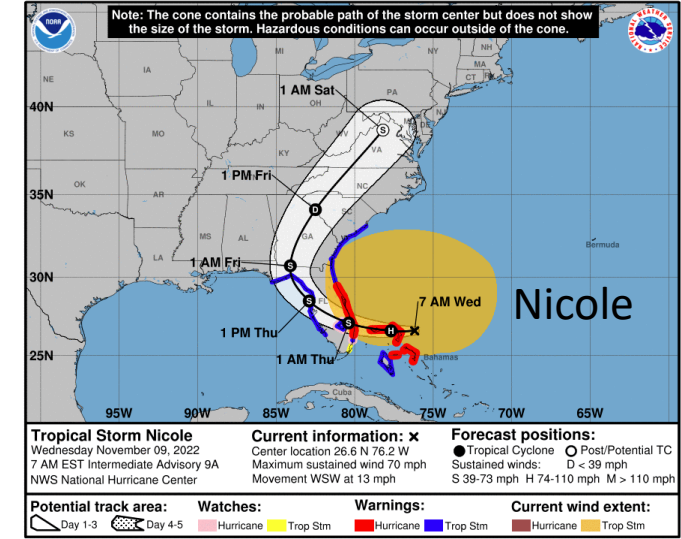
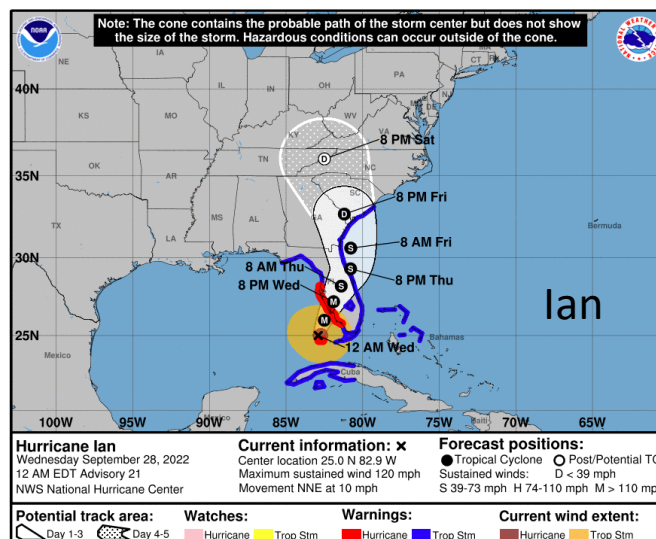
FWCA Navigating the Atlantic
Hurricane Season

December 3, 2024

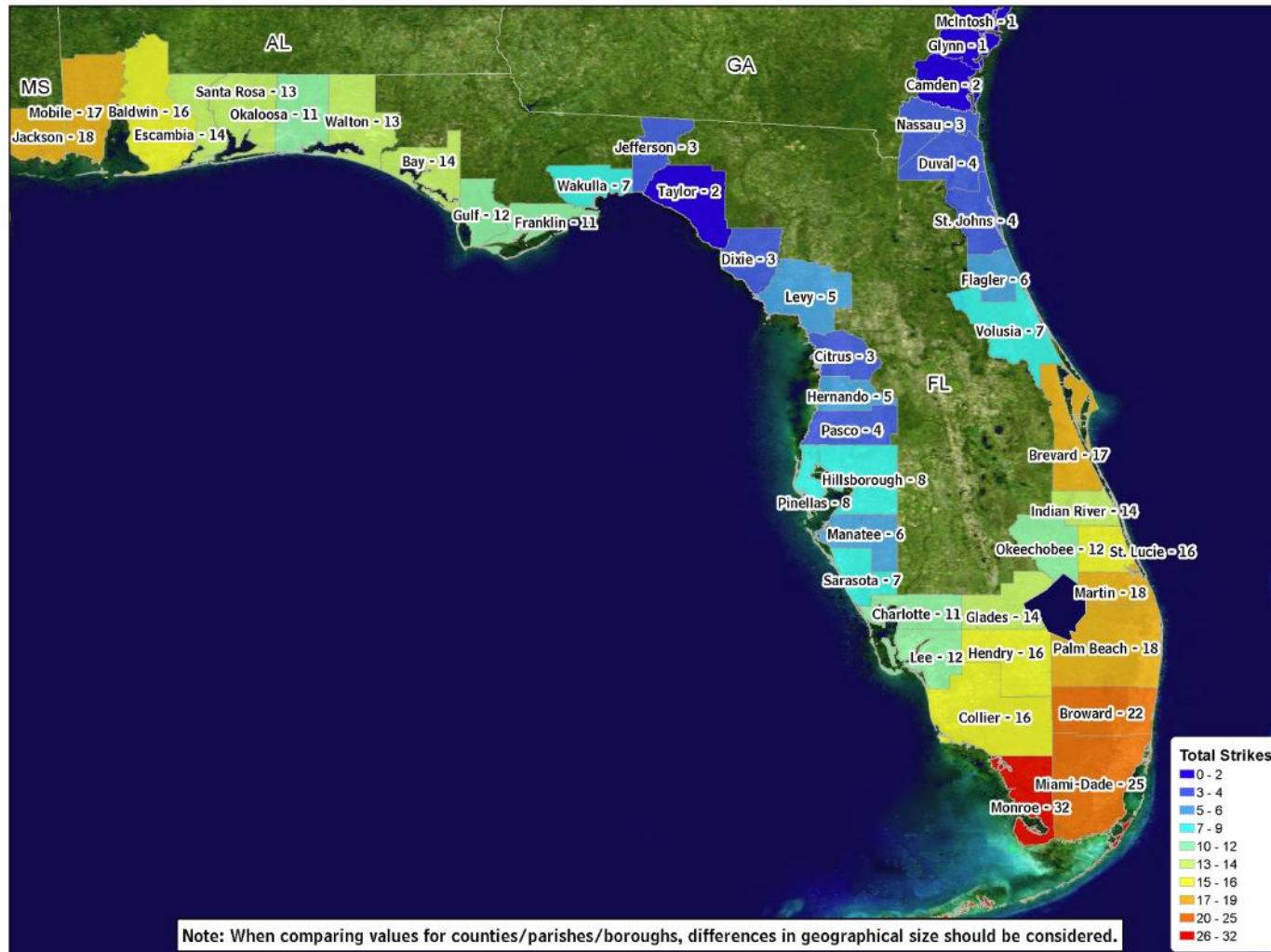
Michael DelCharco, P.E., CFM
Taylor Engineering, Inc.



Hurricane Tracks



Hurricane Strike by County – 1900-2010



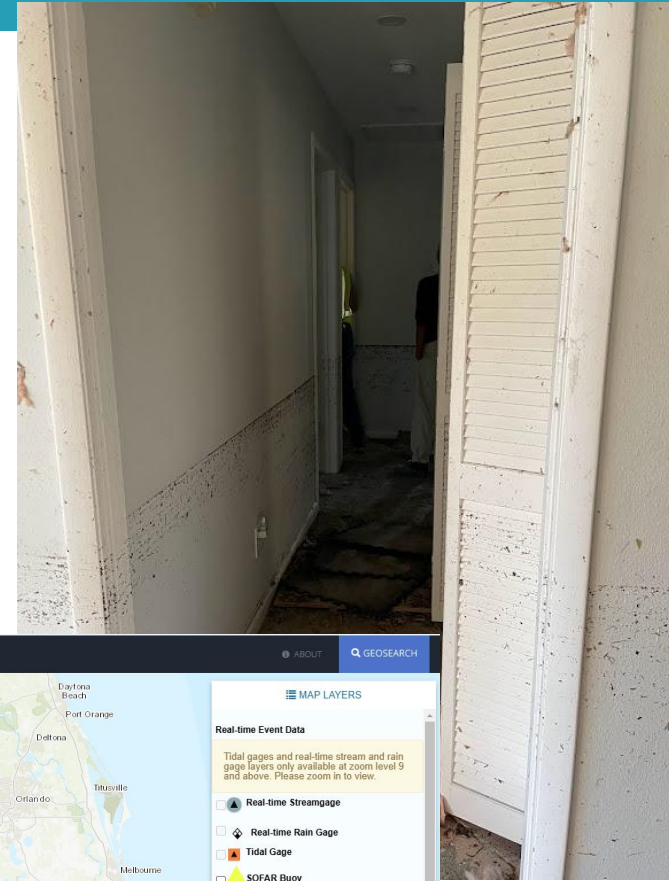
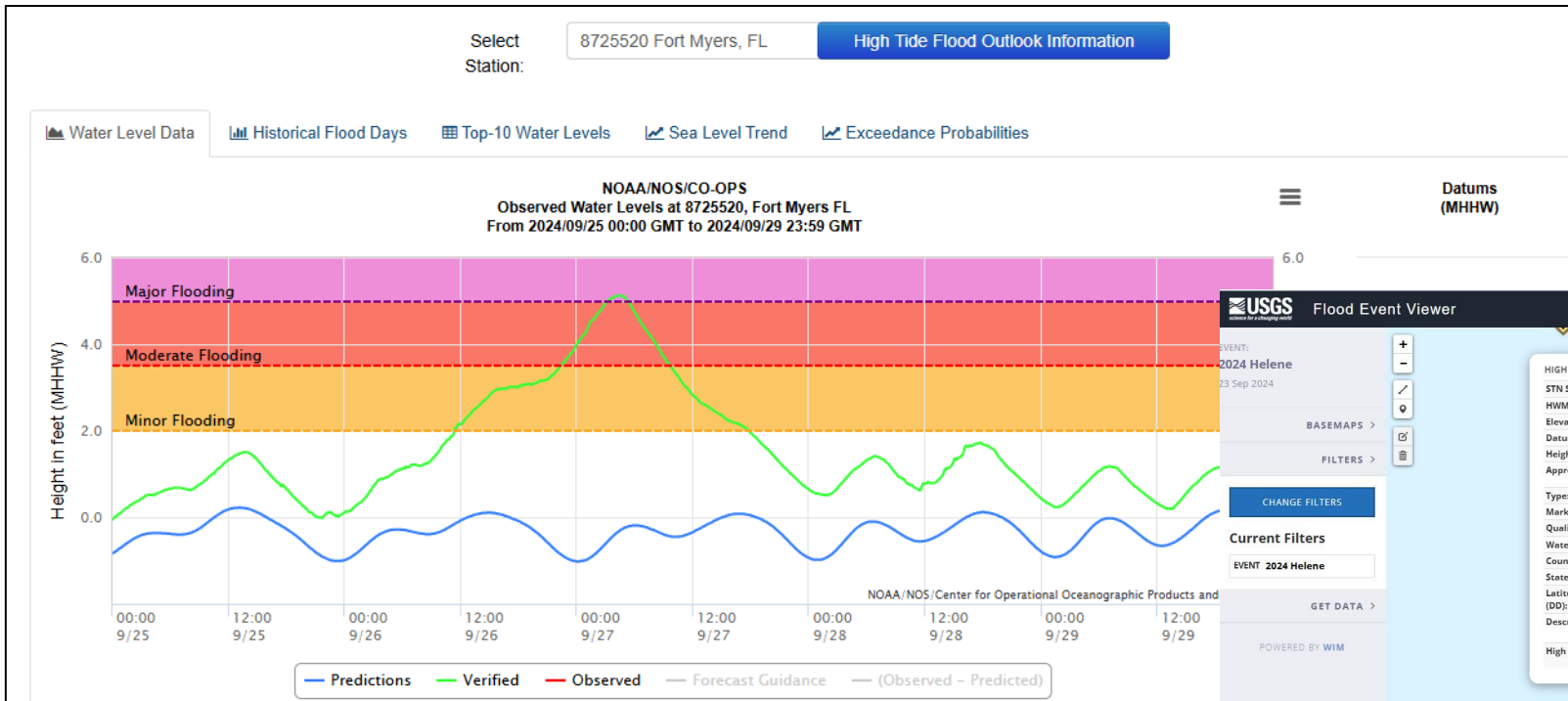
Total number of hurricane strikes by counties/parishes/boroughs, 1900-2010

Data from NWS NHC 46: Hurricane Experience Levels of Coastal County Populations from Texas to Maine. Jerry D. Jarrell, Paul J. Hebert, and Max Mayfield. August, 1992, with updates.

What happened? What is the event data?

Use NOAA, USGS, National Weather Service

💧 High water mark or continuous record data



USGS Flood Event Viewer

EVENT: 2024 Helene
23 Sep 2024

High Water Mark Details: View Details

STN Site No.:	FLSAR26282
HWM Label:	HWM 2
Elevation(ft):	10.79
Datum:	NAVD88
Height Above Ground:	1.05
Approval status:	Provisional
Type:	Seed line
Marker:	Marker
Quality:	Good: +/- 0.10 ft
Waterbody:	Gulf of Mexico
County:	Sarasota County
State:	FL
Latitude, Longitude (DD):	27.0734, -82.4506
Description:	Debris line on door on north side building

MAP LAYERS

Real-time Event Data

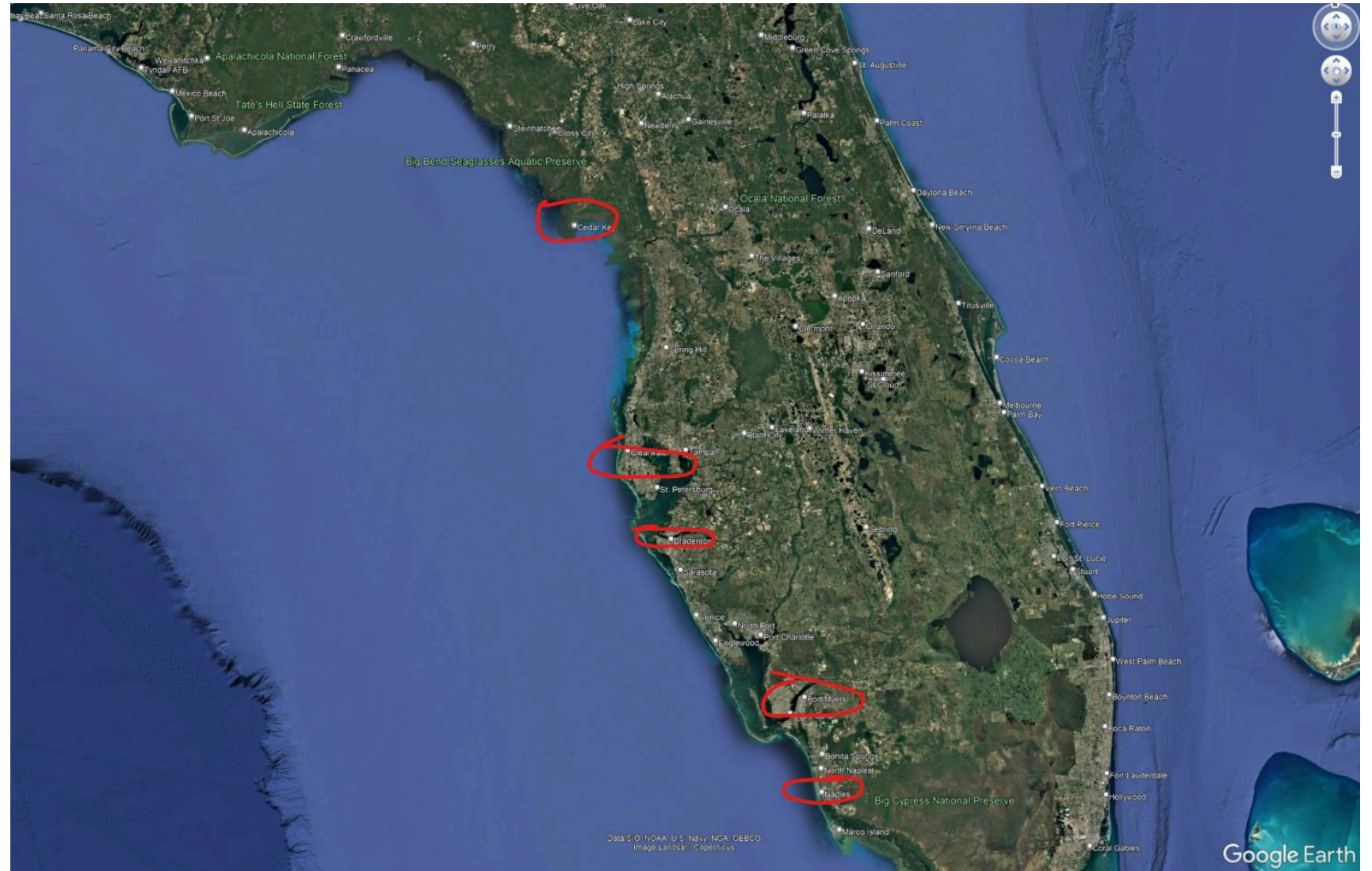
- Real-time Streamgauge
- Real-time Rain Gage
- Tidal Gage
- SOFAR Buoy
- Rapid Deployment Gage
- NOAA Tides and Currents Stations
- USGS H1V1S Cameras

Observed Event Data

- Barometric Pressure Sensor
- Water Level Sensor
- Meteorological Sensor
- Wave Height Sensor
- High Water Mark

NOAA Gage Locations – Continuous Event Data

- 📍 Cedar Key
- 📍 Clearwater Beach
- 📍 Port Manatee
- 📍 Naples, GoM



Compared to what?

💧 FEMA Flood Insurance Studies (FIS) have Still Water Elevations for Multiple Frequencies

- Based on ADCIRC/SWAN or ADCIRC/STWAVE very detailed hydrodynamic modeling
- Hundreds of synthetic storms modeled
- Statistical analysis of return period elevations
- But...it's a 2-D problem

Table 4.2 FEMA Still Water Elevations in Pasco County, Florida

Annual Exceedance Probability	Return Period (yrs)	Still Water Elevation (ft NAVD88)		
		Minimum	Average	Maximum
10%	10	+5.4	+5.8	+6.3
4%	25	+6.6	+7.2	+7.9
2%	50	+7.7	+8.5	+9.4
1%	100	+8.9	+10.1	+11.0
0.2%	500	+12.6	+13.9	+14.8

Do some math....

Storm	Landfall Date	Station ID	Location	MHHW (ft NAVD)	Peak WSE (ft NAVD)	Return Period (yrs)	Notes
Michael	10/10/2018	8727520	Cedar Key	1.54	5.63	< 10	
Michael	10/10/2018	8726724	Clearwater Beach	0.95	4.58	< 10	spike in record
Michael	10/10/2018	8726384	Port Manatee	0.58	2.65	< 10	
Michael	10/10/2018	8725520	Fort Myers	0.28	1.84	< 10	
Michael	10/10/2018	8725110	Naples, GoM	0.6	2.57	< 10	
Ian	9/28/2022	8727520	Cedar Key	1.54	-3.24	NA	reverse surge
Ian	9/28/2022	8726724	Clearwater Beach	0.95	-1.79	NA	reverse surge
Ian	9/28/2022	8726384	Port Manatee	0.58	-2.25	NA	reverse surge
Ian	9/28/2022	8725520	Fort Myers	0.28	7.52	60	
Ian	9/28/2022	8725110	Naples, GoM	0.6	6.79	30	gauge failed
Nicole	11/10/2022	8727520	Cedar Key	1.54	3.48	< 10	
Nicole	11/10/2022	8726724	Clearwater Beach	0.95	2.49	< 10	
Nicole	11/10/2022	8726384	Port Manatee	0.58	2.3	< 10	
Nicole	11/10/2022	8725520	Fort Myers	0.28	1.9	< 10	
Nicole	11/10/2022	8725110	Naples, GoM	0.6	-	-	gauge OOS

Do some math....

Storm	Landfall Date	Station ID	Location	MHHW (ft NAVD)	Peak WSE (ft NAVD)	Return Period (yrs)	Notes
Idalia	8/30/2023	8727520	Cedar Key	1.54	8.4	17	
Idalia	8/30/2023	8726724	Clearwater Beach	0.95	4.73	< 10	
Idalia	8/30/2023	8726384	Port Manatee	0.58	4.26	< 10	
Idalia	8/30/2023	8725520	Fort Myers	0.28	3.46	< 10	
Idalia	8/30/2023	8725110	Naples, GoM	0.6	3.54	< 10	
Helene	9/27/2024	8727520	Cedar Key	1.54	10.8	50	
Helene	9/27/2024	8726724	Clearwater Beach	0.95	7.62	50	
Helene	9/27/2024	8726384	Port Manatee	0.58	6.62	40	
Helene	9/27/2024	8725520	Fort Myers	0.28	5.39	20	
Helene	9/27/2024	8725114	Naples Bay	0.69	4.71	10	
Milton	10/10/2024	8727520	Cedar Key	1.54	0.85	NA	reverse surge
Milton	10/10/2024	8726724	Clearwater Beach	0.95	2.2	< 10	
Milton	10/10/2024	8726384	Port Manatee	0.58	1.84	< 10	
Milton	10/10/2024	8725520	Fort Myers	0.28	5.53	20	
Milton	10/10/2024	8725114	Naples Bay	0.69	5.77	20	

Take it with a grain of salt...



The Original Resiliency Players

- 🔹 Federal – Federal Emergency Management Agency (FEMA)
- 🔹 State – Florida Division of Emergency Management (FDEM)
- 🔹 Local – County Floodplain Management
- 🔹 Professional Association – Florida Floodplain Managers Association



The Original Resiliency Players

- 🔹 **Federal – Federal Emergency Management Agency (FEMA)**
 - 🔹 **National Flood Insurance Program (NFIP)**
 - 🔹 Make the maps, do studies on risk, provide flood insurance
 - 🔹 **Floodplain Management Division**
 - 🔹 Encourage resilient development
 - 🔹 Community Rating System - CRS
 - 🔹 **Grants Programs**
 - 🔹 Such as BRIC, Public Assistance Program, Hazard Mitigation Grant Program, Hazard Mitigation Assistance Grants
 - 🔹 Require state and local governments to have a hazard mitigation plan
 - 🔹 Local Mitigation Strategy
- 🔹 **State – Florida Division of Emergency Management (FDEM)**
- 🔹 **Local – County Floodplain Management**
- 🔹 **Professional Association – Florida Floodplain Managers Association**

The Original Resiliency Players

- 💧 **Federal – Federal Emergency Management Agency (FEMA)**
- 💧 **State – Florida Division of Emergency Management (FDEM)**
 - 💧 **Mission:** Coordinate, collaborate and communicate with our community stakeholders for a resilient Florida.
 - 💧 **Mitigation Division:**
 - 💧 Grants
 - 💧 Floodplain Management
 - 💧 Hazard Mitigation Planning
 - 💧 Residential Mitigation
 - 💧 State NFIP Coordinator
- 💧 **Local – County Floodplain Management**
- 💧 **Professional Association – Florida Floodplain Managers Association**

The Original Resiliency Players

- 🔹 **Federal – Federal Emergency Management Agency (FEMA)**
- 🔹 **State – Florida Division of Emergency Management (FDEM)**
- 🔹 **Local – County Floodplain Management**
 - 🔹 **Community official charged with tracking community participation in the NFIP via FEMA and State guidelines.**
 - 🔹 **Boots on the ground to track community adherence to floodplain management issues**
 - 🔹 **The local official makes substantial damage determinations**
 - 🔹 **Cost to repair > 50% then building must be brought into compliance**
- 🔹 **Professional Association – Florida Floodplain Managers Association**

The Original Resiliency Players

- ◆ **Federal – Federal Emergency Management Agency (FEMA)**
- ◆ **State – Florida Division of Emergency Management (FDEM)**
- ◆ **Local – County Floodplain Management**
- ◆ **Professional Association – Florida Floodplain Managers Association**
 - ◆ **State chapter of the national - Association of State Floodplain Managers (ASFPM)**
 - ◆ **Training, education, networking**
 - ◆ **Over 1,000 members – primarily public sector employees**

The Original Resiliency Player

💧 Professional Association – Florida Floodplain Managers Association

Mission: Providing leadership in floodplain management to reduce risk and loss caused by flood.

We believe that through coordination and education, the public and private sectors can advance cooperatively to reduce losses of life and property from floods, preserve the natural and cultural values of floodplains, and avoid actions that increase flood hazards

The Original Resiliency Player

FEMA to Florida cities hit by hurricanes: Rebuild higher or lose your flood insurance

BY ALEX HARRIS

UPDATED NOVEMBER 29, 2024 1:05 PM | 1



A damaged home caused by Hurricane Ian seen along Fort Myers Beach on Monday, October 3, 2022. AL DIAZ adiaz@miamiherald.com

- 💧 Floodplain Management is not for the faint of heart
- 💧 Substantial Damage is a tough call
 - 💧 So much local pressure
 - 💧 But, it is the right thing to break the cycle
- 💧 Del Schwalls – integral part of FFMA quoted in this article
- 💧 We need to be the resilient voice in Florida

The Original Resiliency Player



See You Next Year...

June 23 - 28, 2025

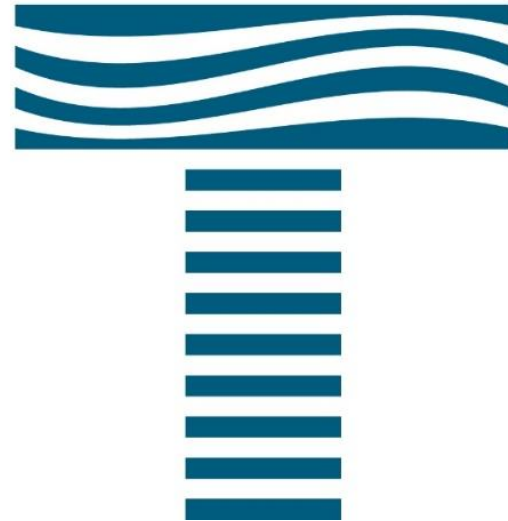
**Westin Cape Coral
Resort**

Cape Coral, FL



Questions?

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