Coastal Resilience Forum
2/12/2020

Notes

Dr. Cheryl Hapke, USF College of Marine Science

A Unified Approach to Mapping Florida's Coastal Waters: Process and Applications

- **Dr. Cheryl Hapke**, Research Professor at the University of South Florida, College of Maine Science and coordinator of the Florida Coastal Mapping Program (FCMaP), will present on the data inventory, gap analysis, and statewide prioritization accomplished over the past 2 years by the program. FCMaP is a Federal-State partnership working to provide modern, uniform, high resolution seafloor data for all of Florida's coastal waters in the next decade. Applications of the data include improving storm surge forecasts and coastal hazard assessments that are integral to sea level rise adaptation planning. Cheryl announced that the Coastal Mapping Summit will be held March 31, 2020 in St. Petersburg at FWRI. Registration ends February 25. https://www.eventbrite.com/e/fcmap-2020-florida-coastal-mapping-summit-tickets-90958245561
- The story map for the Florida Coastal Mapping Program can be found at arcg.is/1Of0OT0
- FCMaP has aligned their sea level rise adaptation planning guidance with the Florida Adaptation Planning Guidebook.

Paul Fanelli, NOAA

NOAA's Inundation Dashboard

- **Paul Fanelli**, Lead Oceanographer with the Data Monitoring and Assessment Team, at NOAA's Center for Operational Oceanographic Products and Services will present the new National Ocean Service (NOS) Coastal Inundation Dashboard web mapping tool. This application pulls together historical flooding information at NOS long-term water level stations along with real-time water level data, which can be used to monitor coastal inundation with causes ranging from high tide flooding to storm surge resulting from tropical cyclones. Paul explained that the tidal datum will be updated, as the most recent 19-year epoch will soon end. The Coastal Inundation Dashboard can be found here https://tidesandcurrents.noaa.gov/inundationdb/ and combines and expands upon other NOAA products for measuring, projecting, and visualizing coastal inundation.

Monroe County Team

Monroe County Climate and Sea Level Rise Planning

- **Erin L. Deady**, AICP, Esq., Consultant; **Rhonda Haag**, Chief Resilience Officer; and **Michael Roberts**, Assistant Director-Environmental Resources with Monroe County will provide an overview of the County's climate and sea level rise planning efforts including identifying vulnerabilities, improving datasets and integrating policies into its Comprehensive Plan. Since 2012, the County has been working to implement a cohesive climate and sea level rise planning process through funding, data collection and policy. https://www.keysroadsplan.com/ summarizes the County's efforts and focuses on their road planning projects.

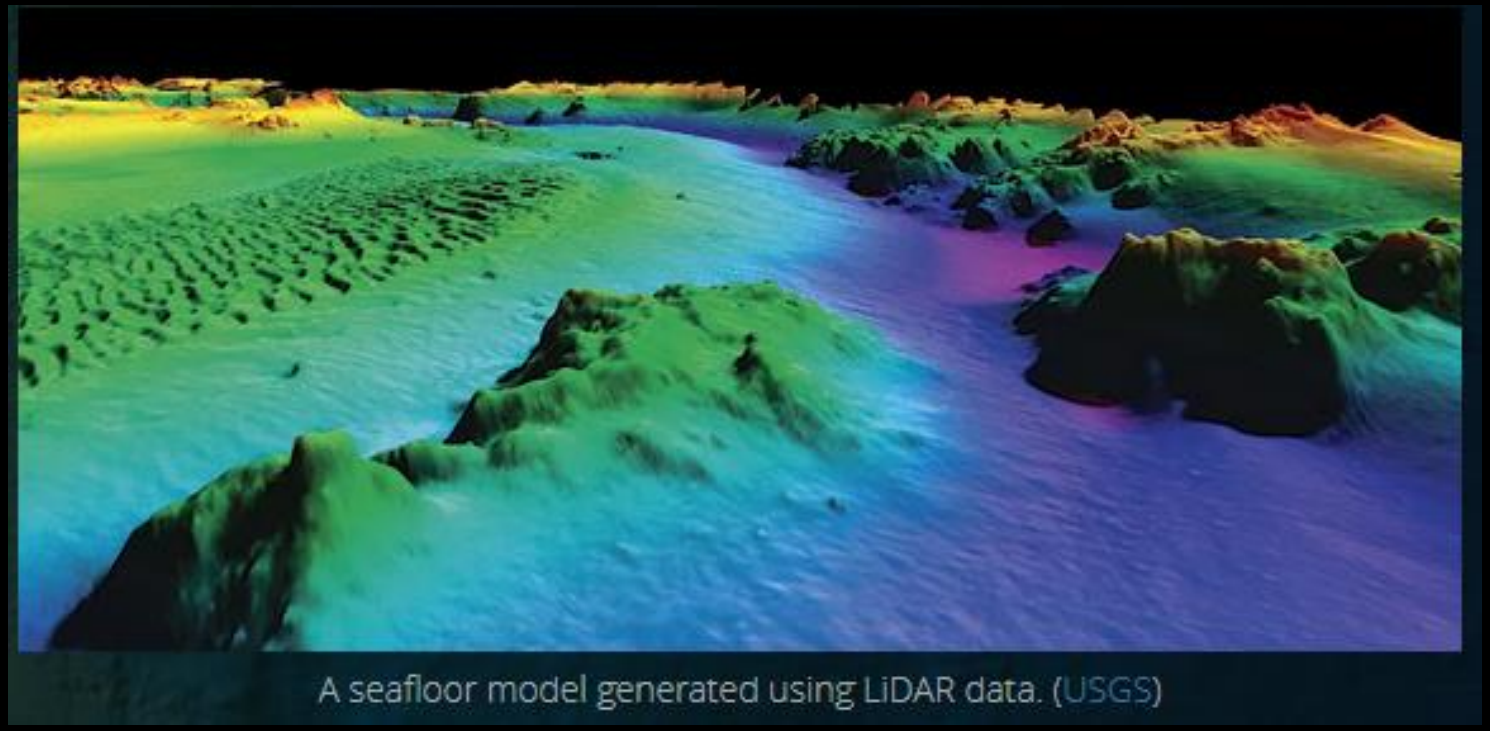
Announcements

1. Floodplain managers and professional engineers are eligible for 1 CEU by attending this webinar. Contact Whitney to receive your certificate.
2. Faith Clarke is no longer with DEP; please direct Forum items to Whitney.

3. We will be sending out an anticipated award email so that potential awardees can begin getting their processes lined up. The final list of awardees will not be available until after Governor DeSantis signs the budget. As soon as we are allowed to make that announcement, we will.
4. The applications for 21-22 grants will open in August. There will be some changes. 1st, we will be using an online application to help reduce errors and streamline the process. 2nd, there will be 2 parallel applications running: one for planning grants and one for implementation grants. They will both be competitive. We'll have more information for you at the May Forum, but please start thinking ahead!
5. Last year's Resilient Florida workshop was a big success, so we are doing it again! This year it will be in conjunction with the Florida Coastal Management Program Annual Meeting in Hutchinson Island on May 5-7. Watch your email for a save the date announcement.
6. From the City of Miami: On January 23, City leaders unveiled the new Miami Forever Climate Ready Strategy, one of Miami's biggest initiatives for combating climate change to date. As designed, the strategy will significantly reduce the increasing risks of flood, heat and storm impacts to the Magic City over the next 40 years. This initiative comes on the heels of a November decision by Mayor Suarez and the City of Miami Commission to declare a climate emergency in the City of Miami. The new plan answers the need for a clear strategy and solutions to tackle the climate crisis locally. Spearheaded by the City's Office of Resilience & Sustainability, Miami Forever Climate Ready focuses on the following five goal areas that will help Miami achieve resilience to the impacts of a changing climate. You can find the strategy online at miamiclimateready.com.
7. The next Coastal Resilience Forum will be May 13.

Florida Coastal Mapping Program (FCMaP)

Program Development and Adaptation Applications



A seafloor model generated using LiDAR data. (USGS)

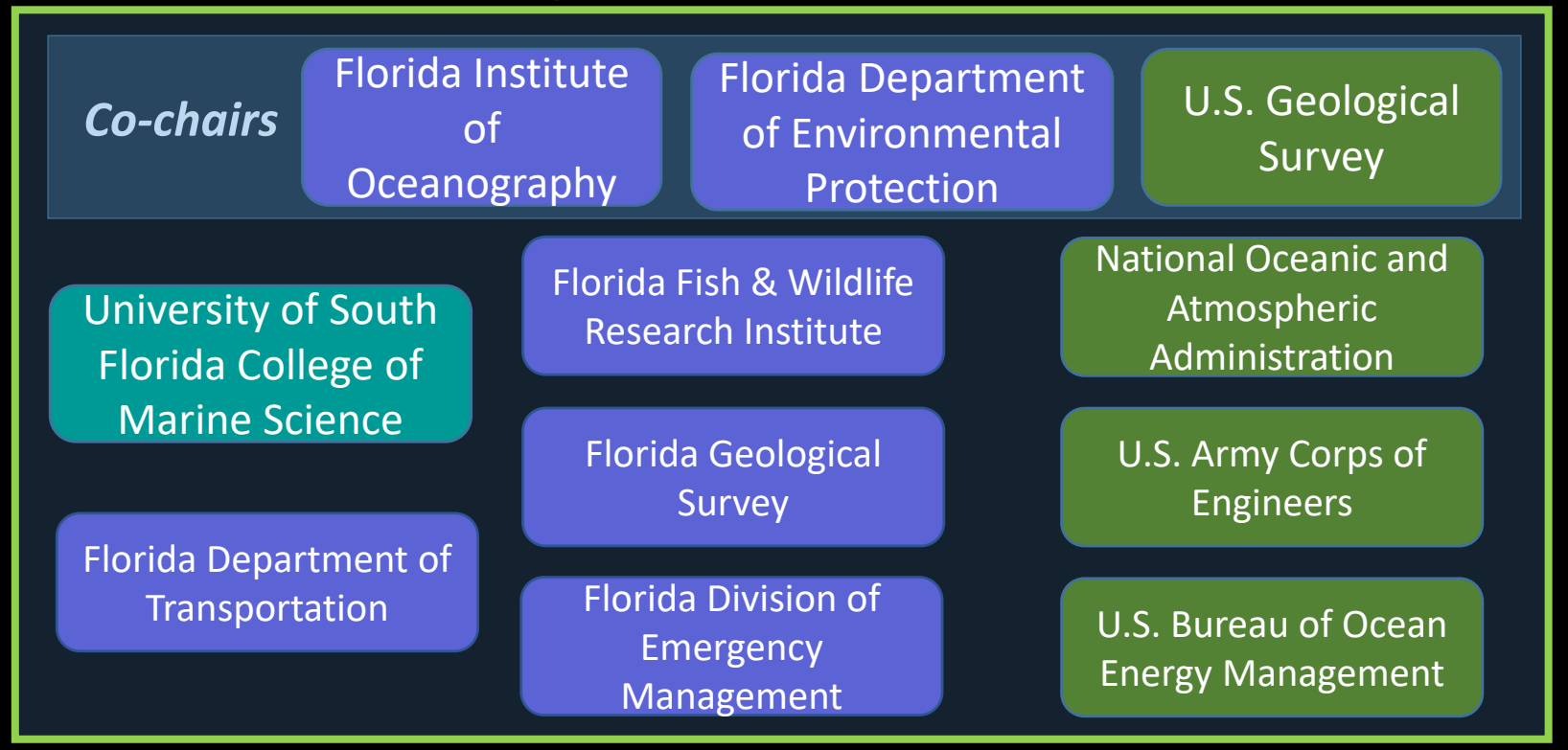
Cheryl Hapke, USF College of Marine Science
Ryan Druyor, FWRI
Rene Baumstark, FWRI
Xan Fredericks, USGS
Kim Jackson, FDEP

Why Map Florida's Coastal Waters?

- Extremely valuable coastal zone (over $30 billion in revenue per year); 1,300 miles of coastline, longest in the lower 48 states.
- Greatest number of recreational boats and saltwater fisherman in the US
- Large concentrations of people and infrastructure in the coastal zone.
- The coast is highly vulnerable to hurricanes and sea level rise impacts
- Many areas of the Florida coast have not been mapped, or existing maps are old and of low resolution
- High resolution maps of the seabed are a necessary for Blue economy - aquaculture & alternative energy
- Increase scientific baseline characterization of coastal resources and processes that drive changes

Florida Coastal Mapping Program

Steering committee + Coordinator



Working groups and technical teams

Steering committee agencies, academics, private industry

Inventory technical team; Prioritization technical team; prioritization implementation technical team; LBR working group

FCMaP Timeline

Jan. 2017: stand up Steering Committee

Feb 2017 – Dec 2017: Technical Team

- Compile inventory of existing coastal seafloor mapping data
- Populate portal with footprints and metadata
- Conduct gap analysis

Jan 2018: Partner & stakeholder workshop

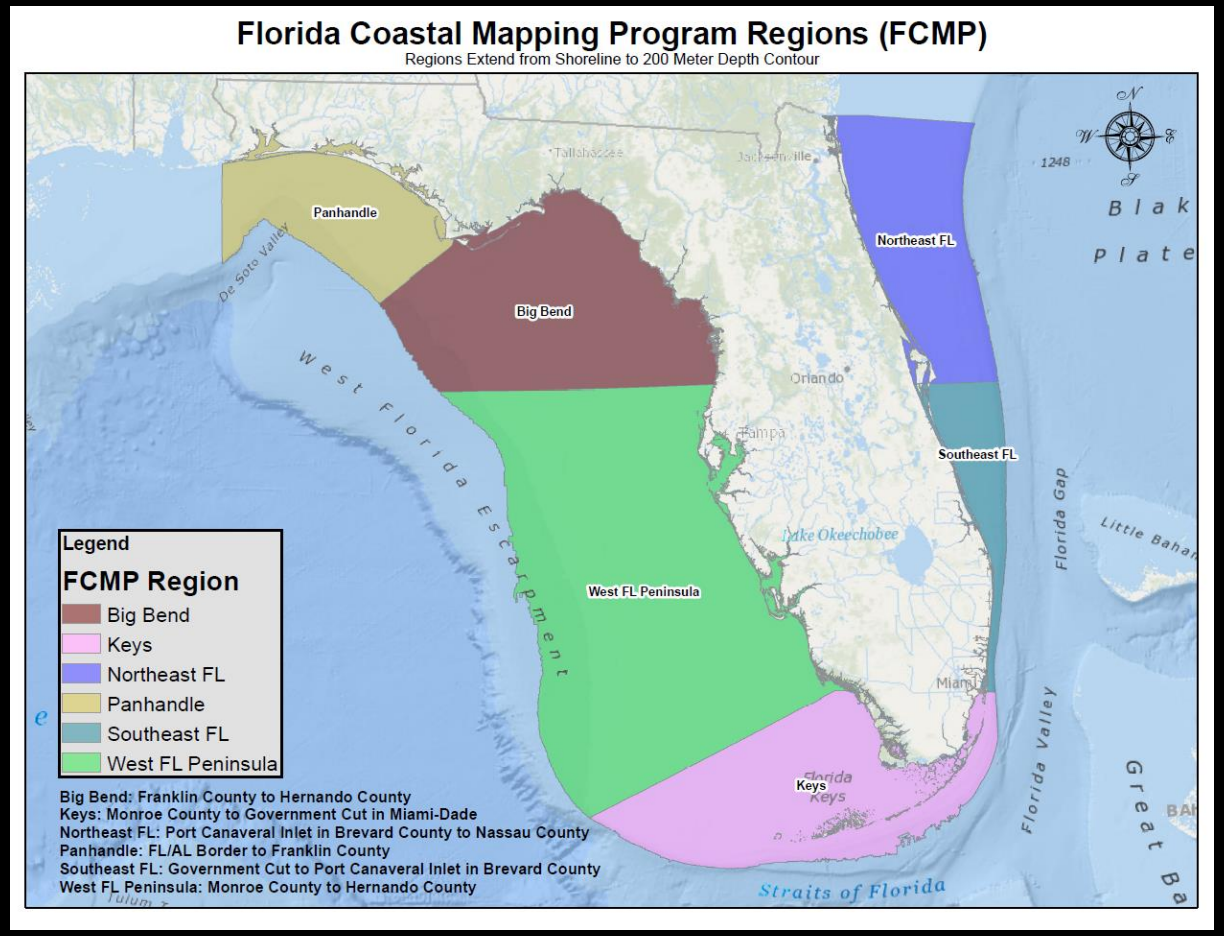
2018-19: Prioritization workshops for each region

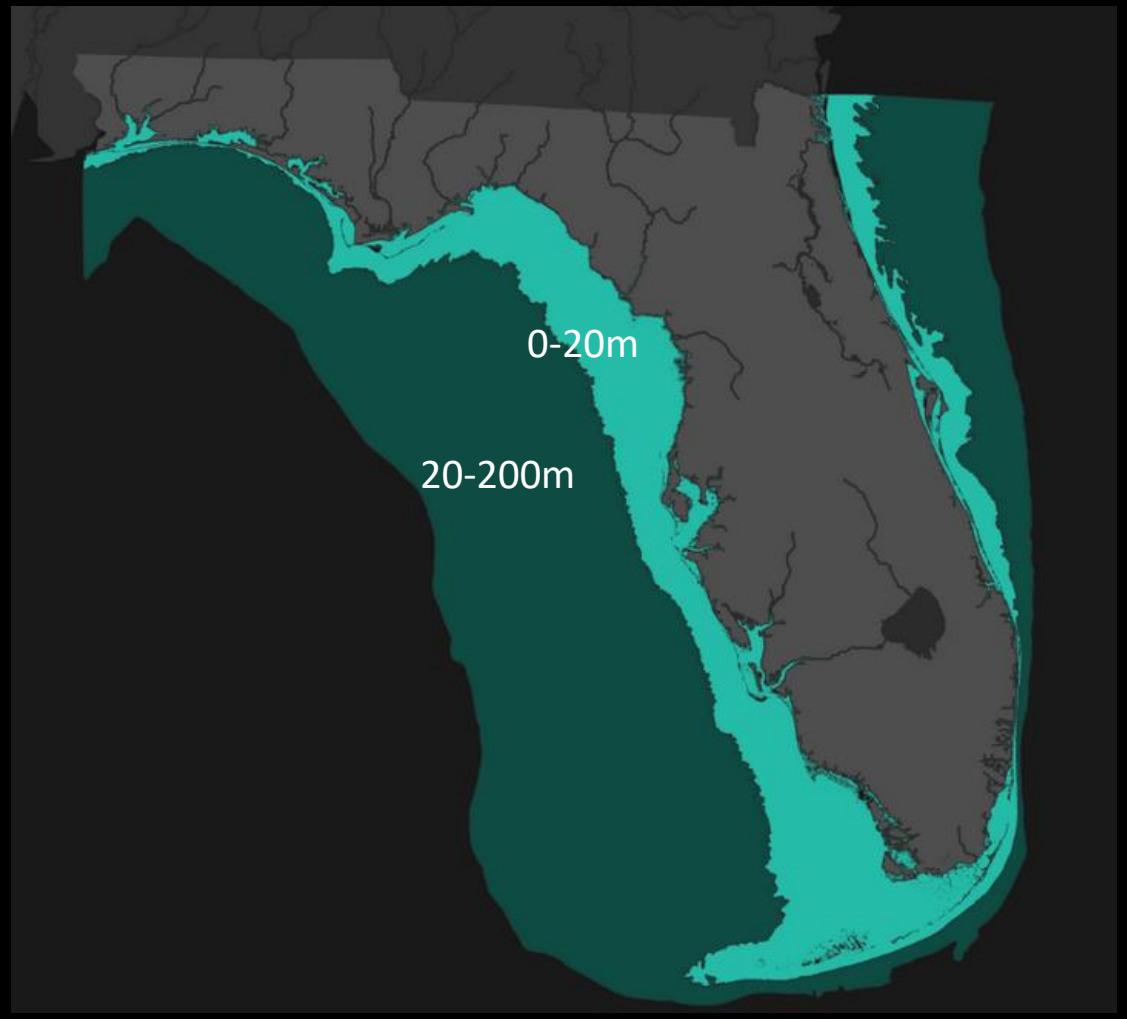
- Sept 2018: Big Bend (Cedar Key)
- Dec 2018: West FL Peninsula (St Pete)
- April 2019: Southeast FL & Keys, combined workshop (West Palm Beach)
- July 2019: Northeast FL (Jacksonville)
- August 2019: Panhandle (Pensacola)

A 2020 Florida Coastal Mapping Summit will be held March 31st, 2020, in St Petersburg, FL.

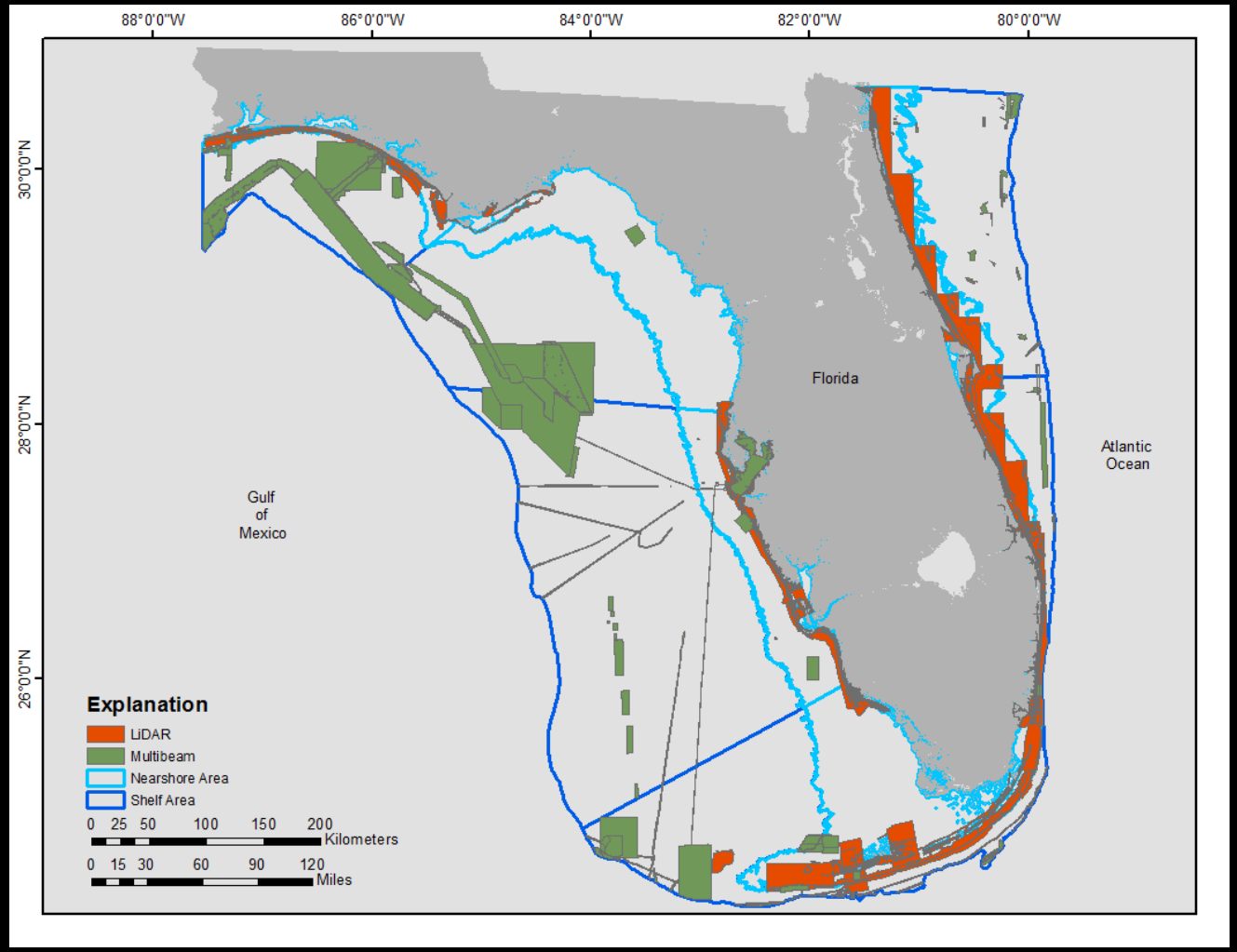
Register Here

FCMaP Regions and Depth Zones





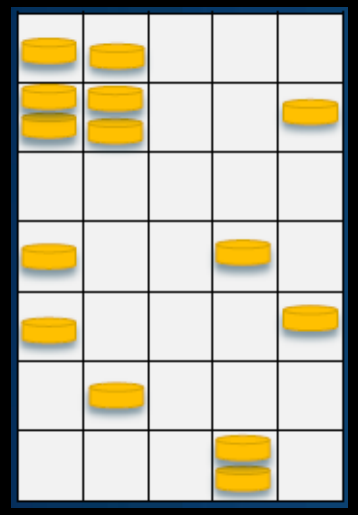
Lidar and Multibeam Bathymetry: Gap Analysis 2017



Inventory and prioritization
- 0-20m depth (nearshore)
- 20m-shelf edge (shelf)

Regions	Nearshore	Shelf
Panhandle	44%	43%
Big Bend	3%	23%
W FL Peninsula	28%	8%
Keys	27%	19%
Southeast FL	83%	20%
Northeast	60%	4%
All Regions	27%	16%

Mapping Prioritization – Participatory online GIS tool



Prioritize by allocating coins

- Priority location (Where)
- Degree of priority (When, # of coins/cell)

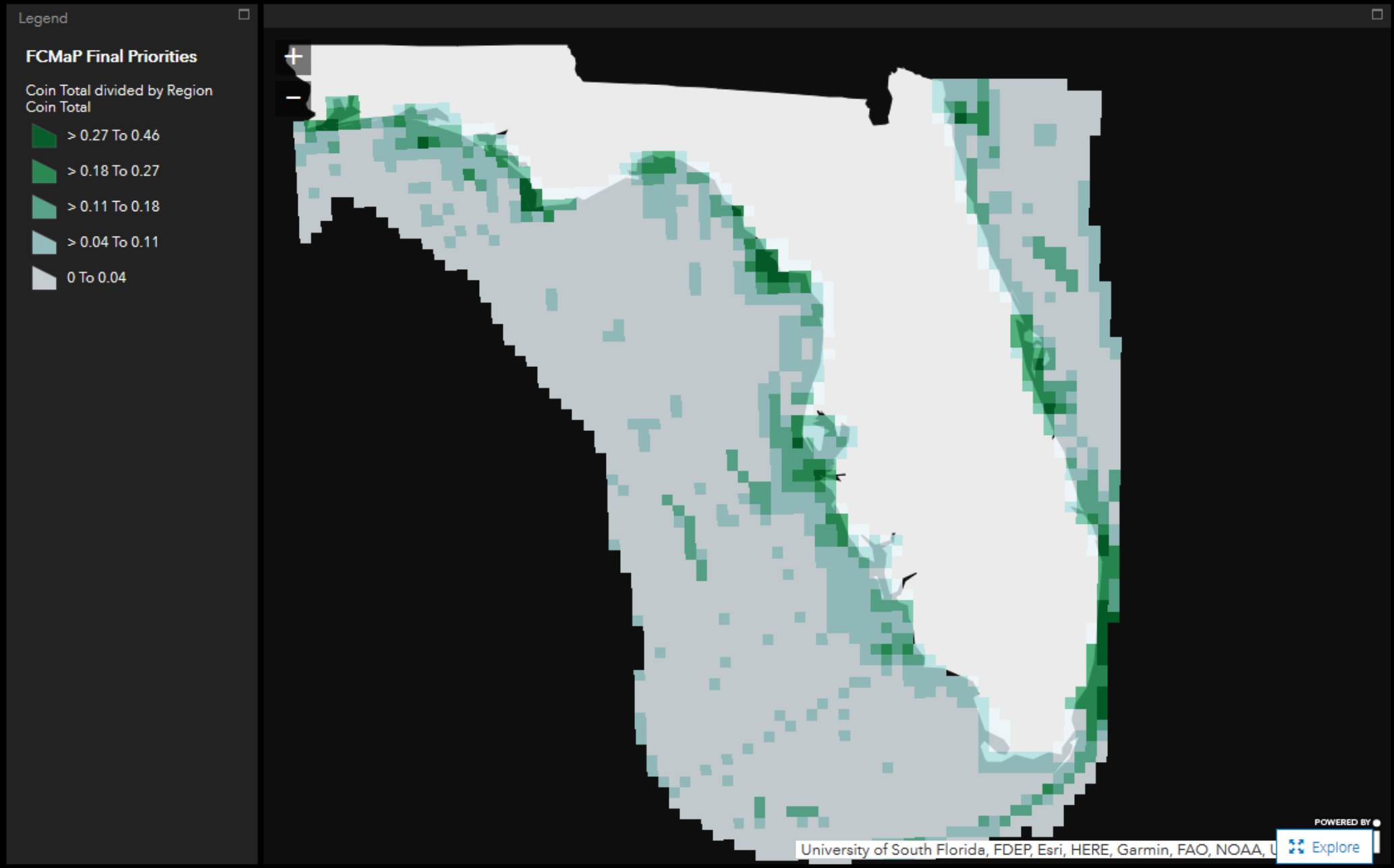
Stakeholder Groups:

- Region divided into 10 km^2 grid cells
- 614 cells
- Each user group received 123 coins (20% of total cells)
- No more than 12 coins per cell
- (10% of total coins)

Identify

- Reason it's a priority – what application is data needed for?
- What other data (beyond bathymetry) are needed?

Results: Statewide Prioritization



Results: Statewide Prioritization

37.3% Habitat Mapping and Coastal Geomorphology

25.9% Navigation, Safety, and Marine Infrastructure

15.9% Resource Management (sediment, minerals, coastal restoration and resilience)

12.4% General Knowledge Gap

7.6% Scientific Research and Education (biological, geological)

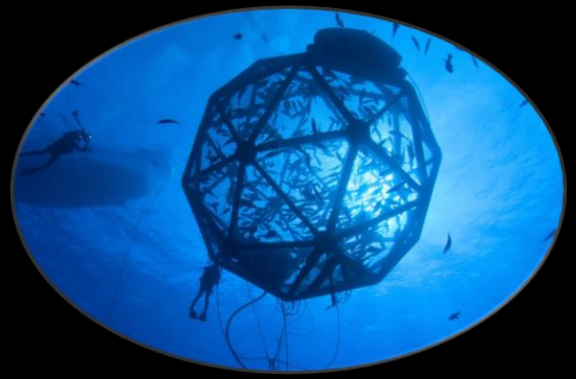
0.7% Cultural/Historical Resources (shipwrecks, debris fields)

0.2% Fishing and Fisheries (commercial/recreational fishing)

Credit FWC, Druyor, pers. Comm.

https://arcg.is/1Of0OT0

Florida Coastal Mapping Program: Applications



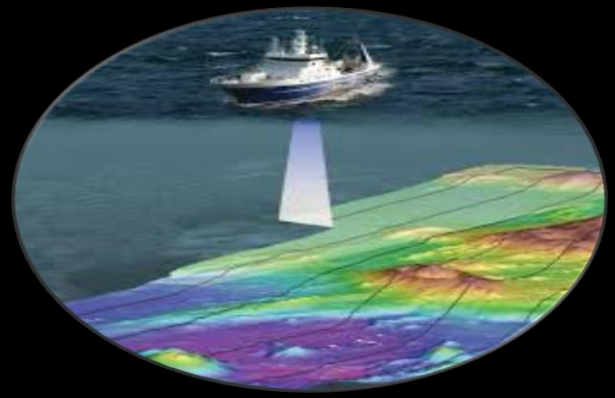
Aquaculture

Environment

Tourism

Research

Energy

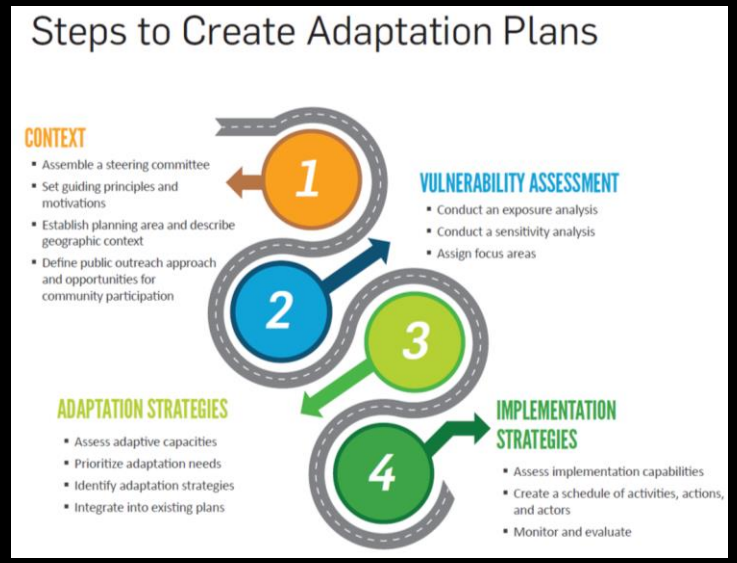


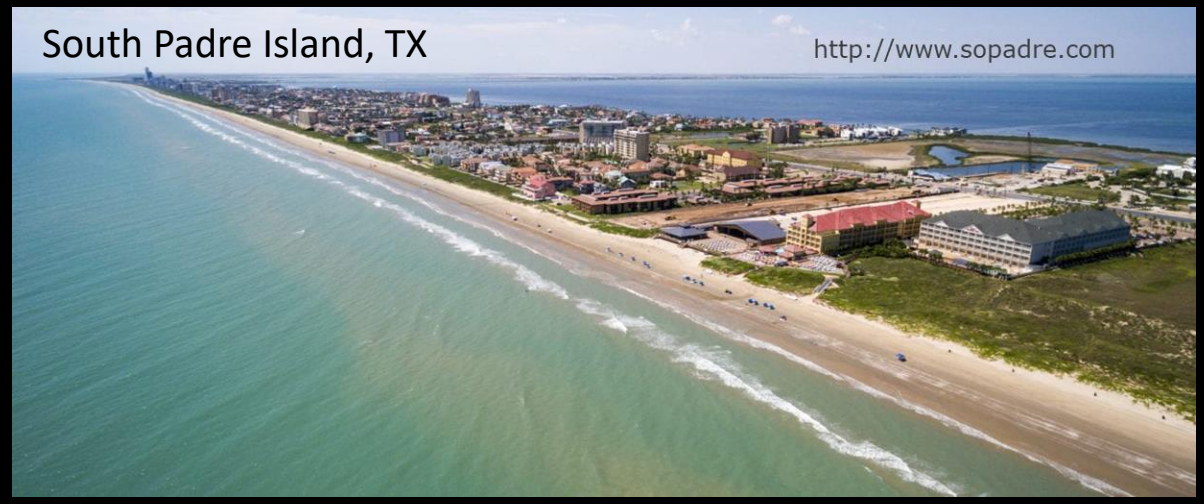
Sand Resources

Fisheries

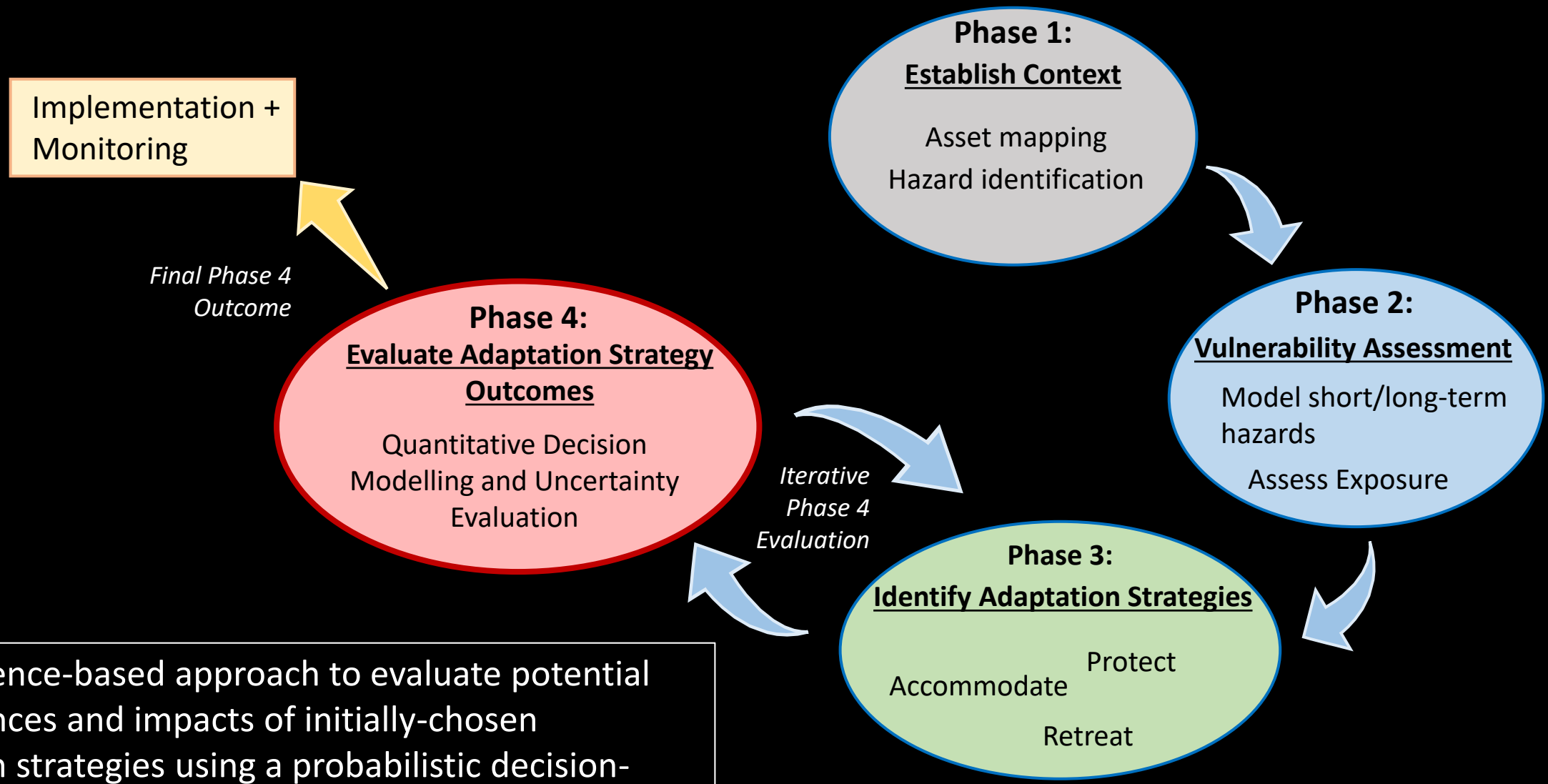
Safety

A Model-based Decision Support Framework for Coastal Community Sea-level Rise Adaptation Planning



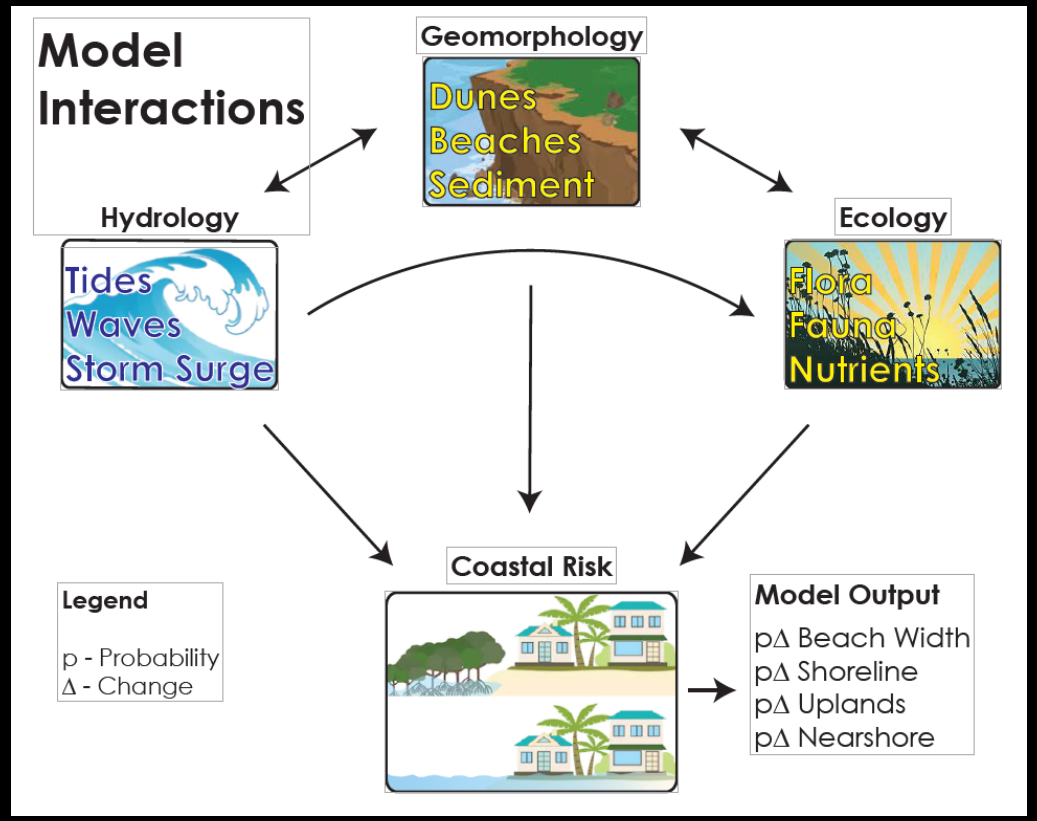


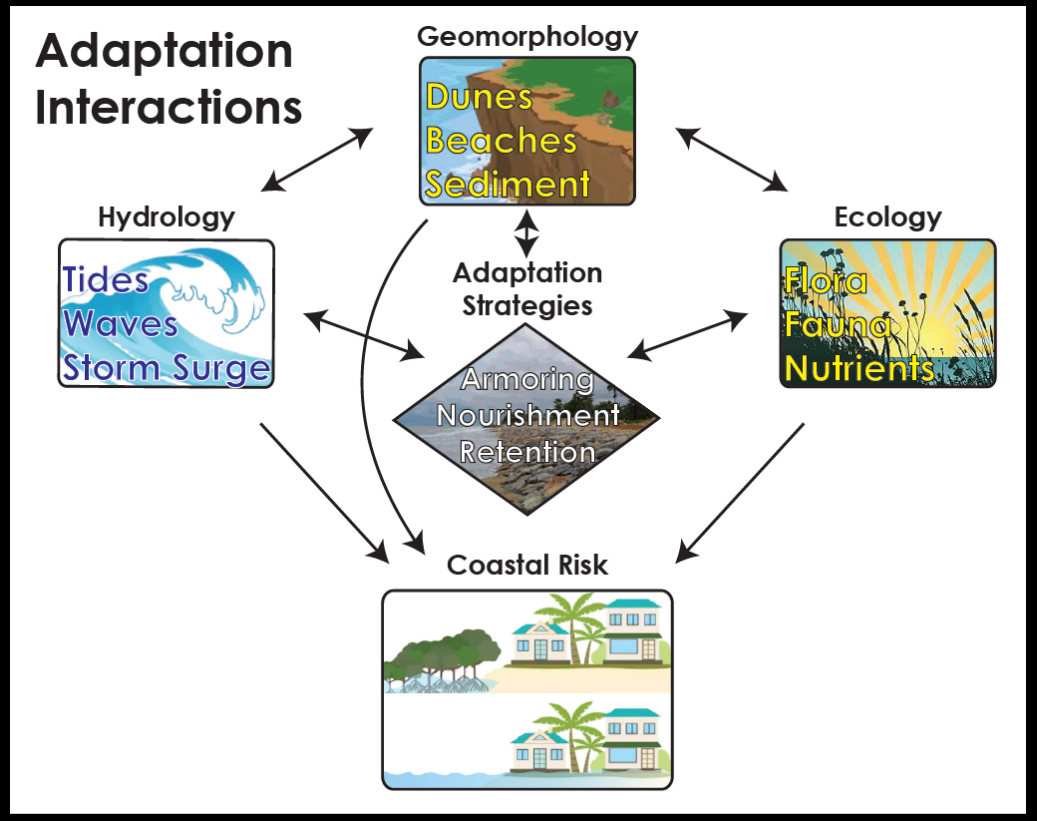
Model-based decision support framework



- Uses a science-based approach to evaluate potential consequences and impacts of initially-chosen adaptation strategies using a probabilistic decision-support framework

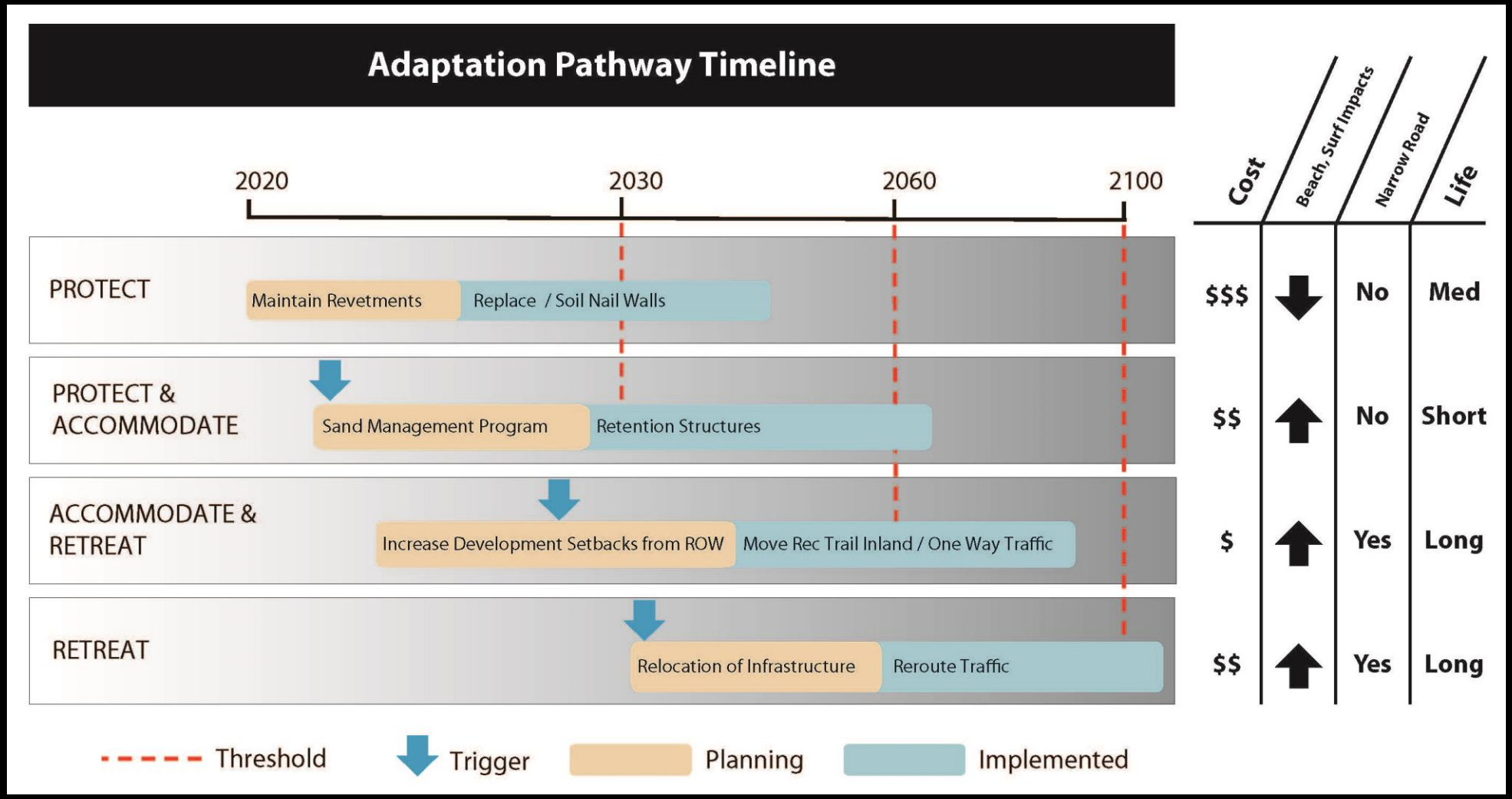
Bayesian Networks to Evaluate Adaptation Strategies





- Accommodate changes to the state (i.e. adaptation strategies) to evaluate impacts
- Update as new information is available or there are changes to the state (from natural or human causes)
- Can be used as an interactive tool to communicate complex information to communities

Adaptation Pathways Identify Triggers



FCMaP: What's Next?

- FLRACEP Proposal -> expand effort to include benthic habitat data
- Continued coordination with State agencies and Federal IWG-OCM, 3D Nation, Seabed 2030
- Education and Outreach to Florida State legislators -> budget requests in 2019, 2020, planned 2021
- Continued coordination for ships (or flights) of opportunity
- Explore and test innovative technologies (Saildrones, ASVs)
- Document data collected since 2017

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https://arcg.is/1Of0OT0

Summary and Future Work
Sea-level Rise Adaptation

- Coastal communities need assistance navigating towards the best adaptation plan for their setting/needs

- Probabilistic projections of physical changes over time due to various adaptation strategies will help determine when a change will be needed from one approach to another

- Expert knowledge on coastal processes and evolution is essential to sound decision-making

- Bayesian probabilistic models incorporate expert knowledge to evaluate outcomes of various adaptation strategies
  - → agile, data-driven, incorporates uncertainties
  - → can be used to communicate complex science

- Currently being developed for Captiva, FL and South Padre Island, TX

CO-OPS Coastal Inundation Dashboard & Storm QuickLook

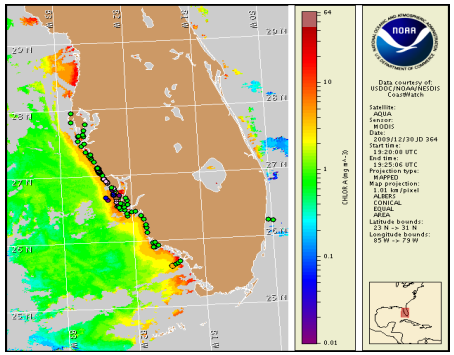
Paul Fanelli
Lead Oceanographer
National Ocean Service (NOS)
Center for Operational Oceanographic Products & Services (CO-OPS)

paul.fanelli@noaa.gov

What is CO-OPS?

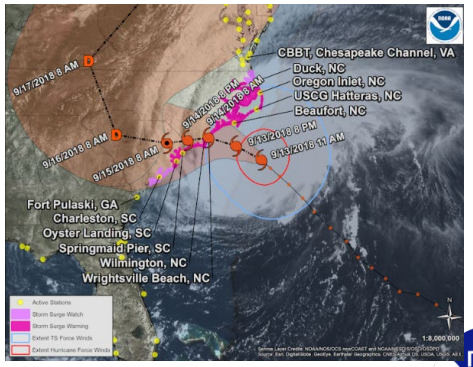
Meaningful oceanographic data for the Nation

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



Our work benefits:

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



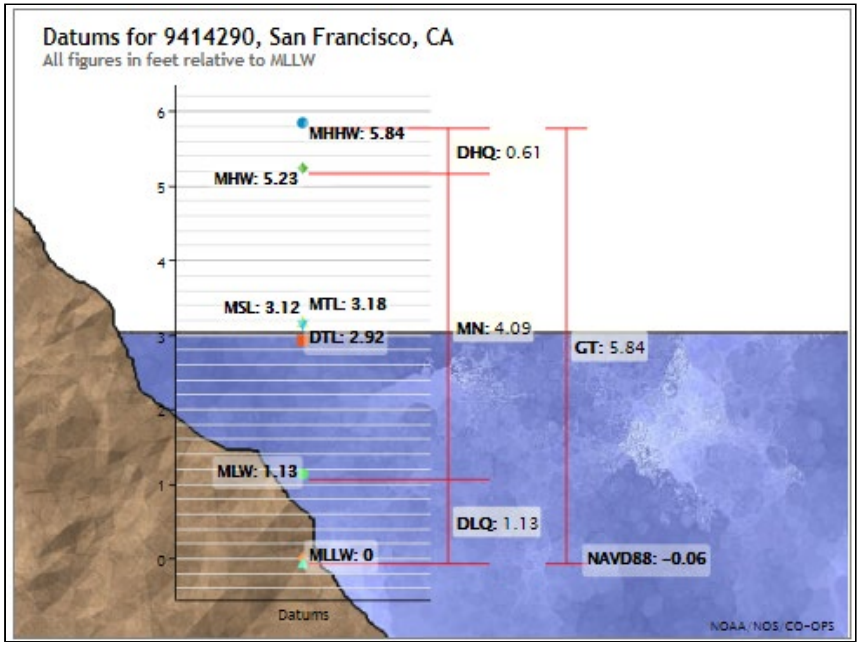
CO-OPS Role in Planning for and Monitoring Coastal Flooding

Real-time coastal water level observations and historical analysis

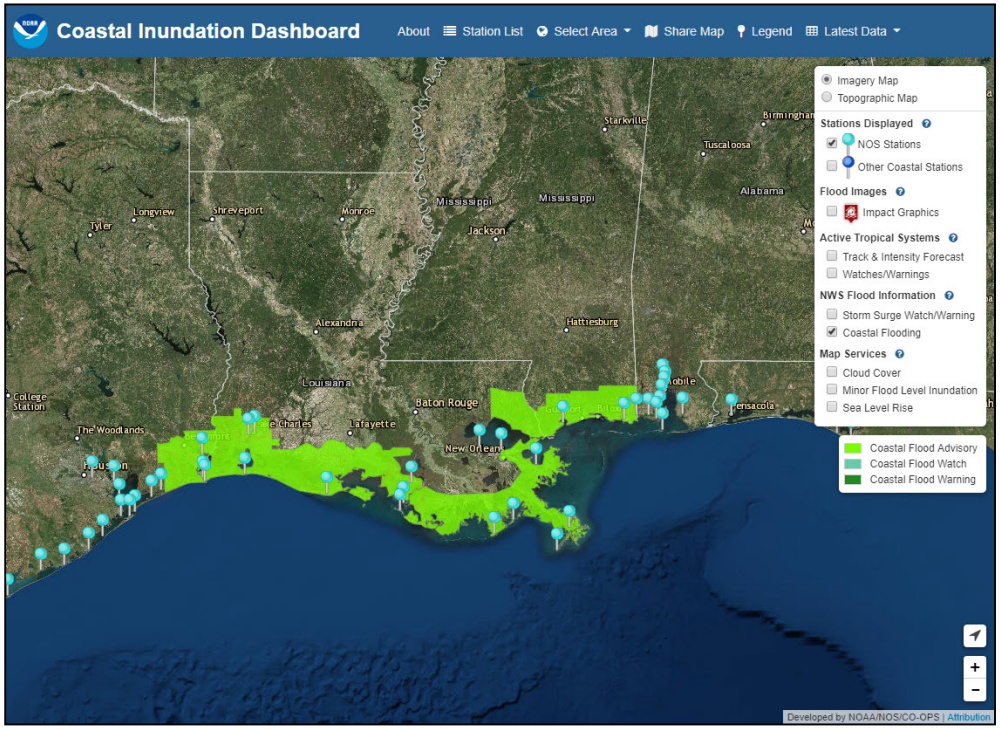
- Coastal Inundation Dashboard
  - Storm QuickLook
- Tidal datum analysis & support
- Sea Level Trends
- High Tide Flooding Outlooks

Tidal Datums (What's your "zero" line?)

- CO-OPS publishes tidal datums for thousands of stations
- Different tidal datums have different applications
  - Mean Lower Low Water (**MLLW**) – Navigation
  - Mean Sea Level (**MSL**) – Sea Level Rise
  - Mean Higher High Water (**MHHW**) – Coastal Flooding
- MHHW gives us the best approximation of when flooding inundation may begin along the immediate coast



Coastal Inundation Dashboard

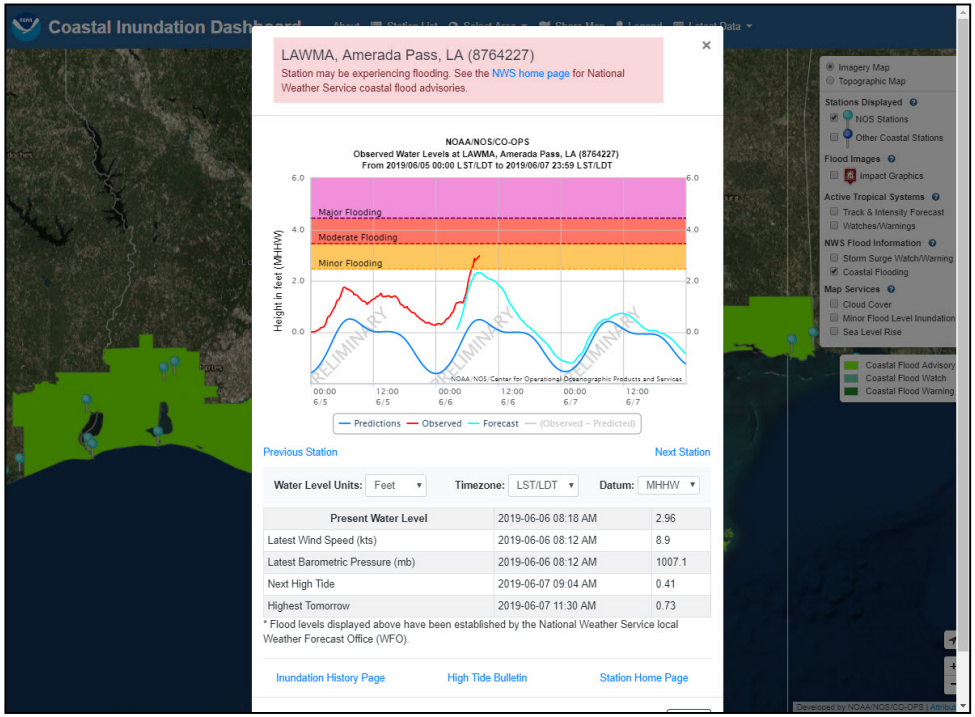


- Interactive map-based web application targeted towards coastal decision makers and planning community
- Real-time & historic flood information at NOS water level stations
- Customizable - create your own custom map URL!
- Water levels relative to MHHW (average daily highest tide)

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

Coastal Inundation Dashboard

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



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

Flood Impact Thresholds

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

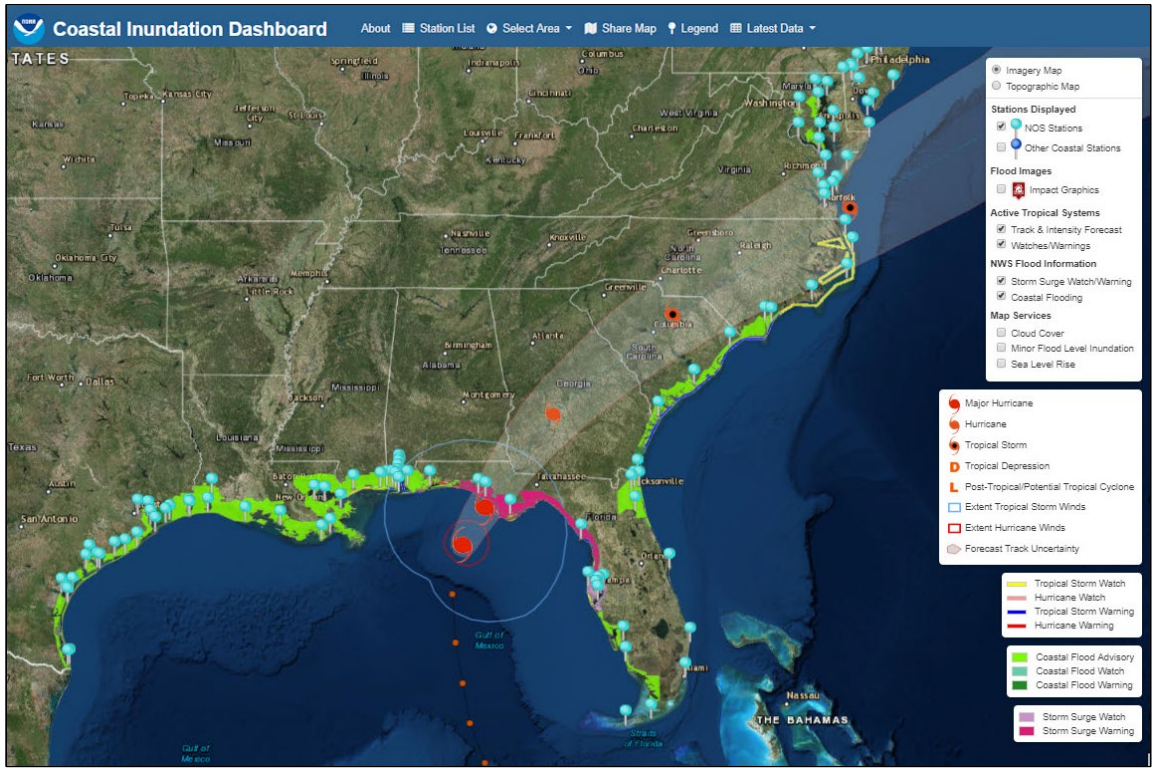
Coastal Flooding Thresholds

	Minor (CF Advisory)	Moderate (CF Warning)	Major (Warning)
Picture	 Westport	 Lindenhurst	 New Haven
Hazard	• **Low threat of property damage**...and no direct threat to life. • **1 to 2 ft of inundation** in shoreline and vulnerable areas.	• **Elevated threat of property damage**...with a risk to life if one places themselves in unneccesary danger. • **2 to 3 ft of inundation** in shoreline and vulnerable areas. • Minor to no inundation of surrounding coastal communities.	• **Significant threat to life and property.** • **3-5+ ft of inundation** in shoreline and other vulnerable areas. • Minor to moderate inundation (1 to 3 ft) of surrounding coastal communities that rarely experience coastal flooding.
Impact	• A few shoreline and vulnerable roadways and adjacent properties will experience shallow flooding.	• Several shoreline and vulnerable area home and businesses will experience water inside. • Several low-lying coastal and shoreline roads will be closed. • A few cars may take on water or even be destroyed.	• Evacuations will be necessary for the most vulnerable shoreline and coastal areas. • Many coastal communities will experience damage...with some shoreline and flood prone homes and businesses being destroyed. • Many cars will likely be submerged or washed away. • Several sections of nearshore roads and escape routes will be impassable and a few could be washed out. • Flood waters may extend well inland in low lying areas.

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

Tropical Cyclone Information

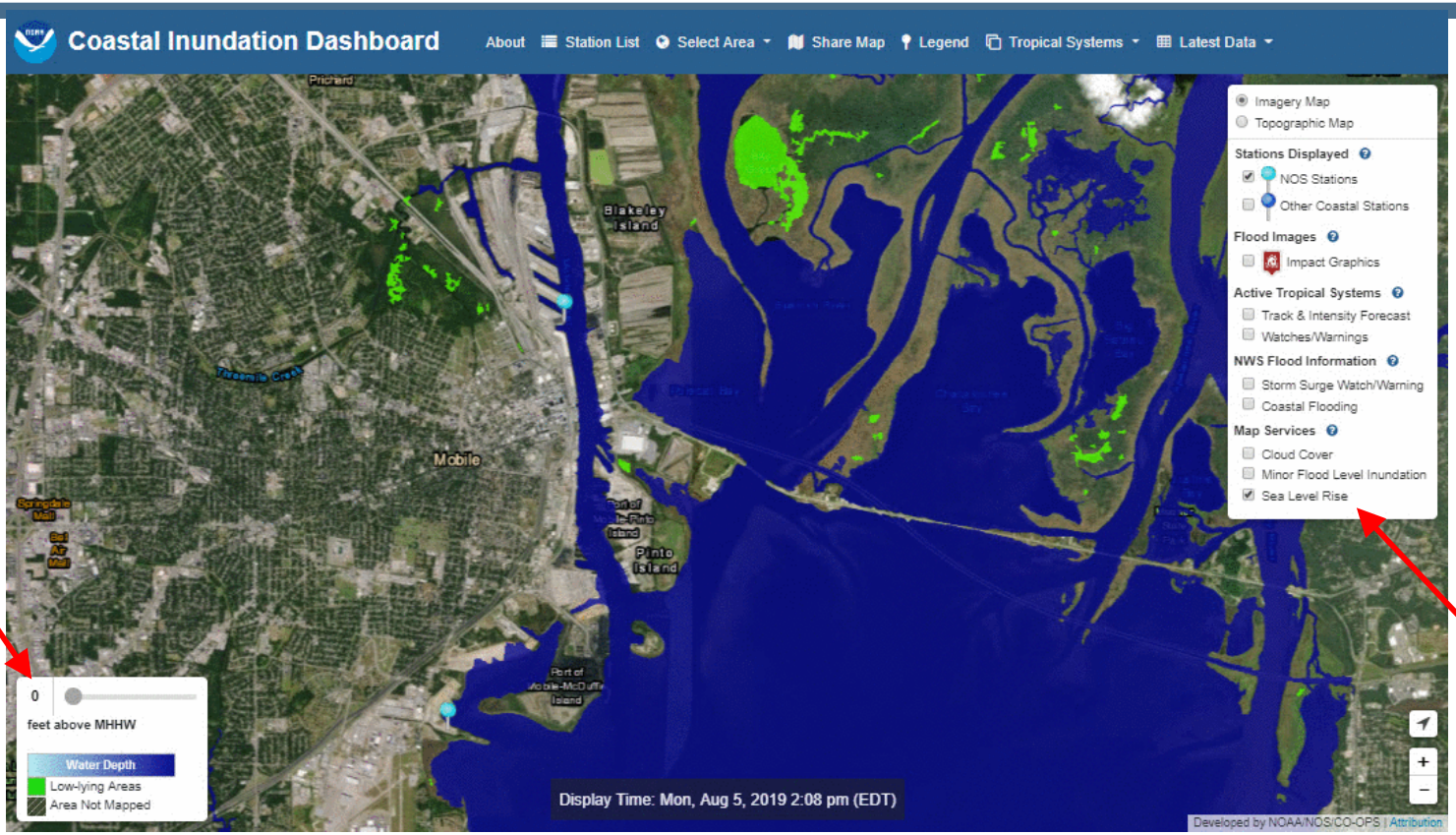
- Latest storm information and coastal watches/warnings and advisories update on-the-fly from NOAA's nowCOAST
  - Past/Forecast Track
  - Cone of Uncertainty
  - Tropical Storm/Hurricane Wind Extent
  - Storm Surge Watch/Warning
  - Coastal Flood Advisory/Watch/Warning



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

Office of Coastal Management (OCM) Sea Level Rise Viewer

- 0-10 feet above MHHW

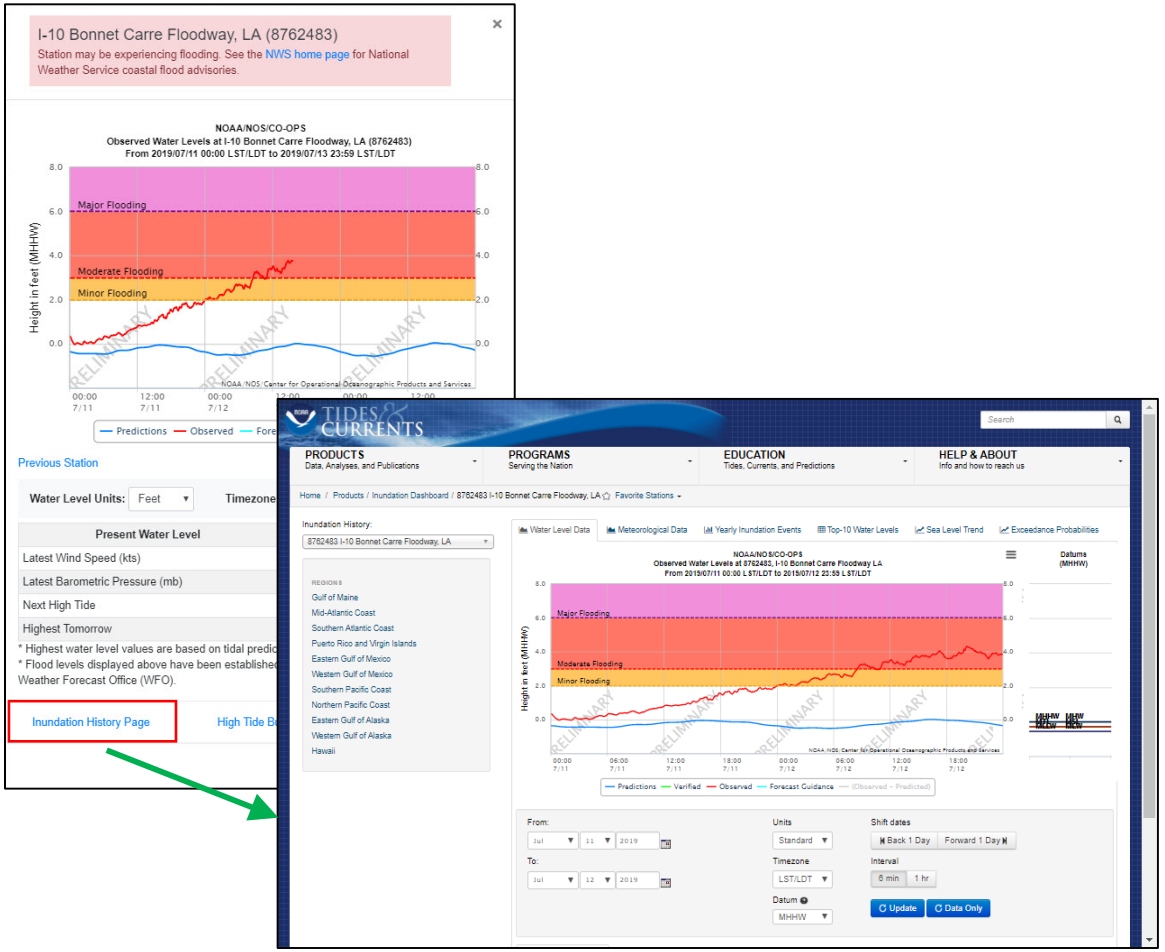


- Visualize geospatially what areas may be impacted by coastal inundation caused by sea level rise, storm surge, high tide flooding, etc.

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

Coastal Inundation Dashboard: Inundation History

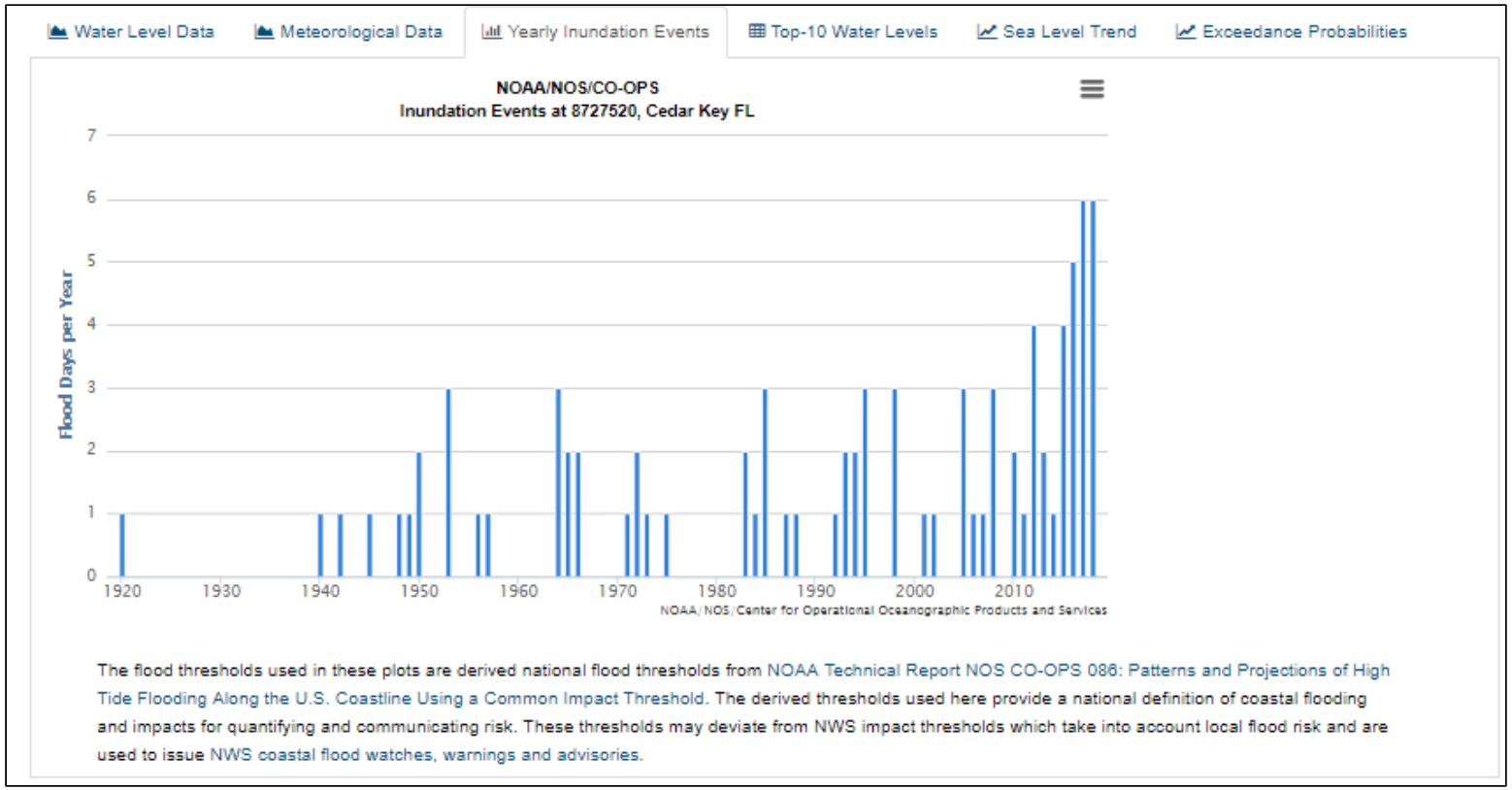
- Available by clicking *Inundation History Page* on any station pop-up
- Access real-time and historical water level & meteorological data
- Yearly Inundation Events
- Top-Ten Water Levels
- Sea Level Trend
- Exceedance Probabilities



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

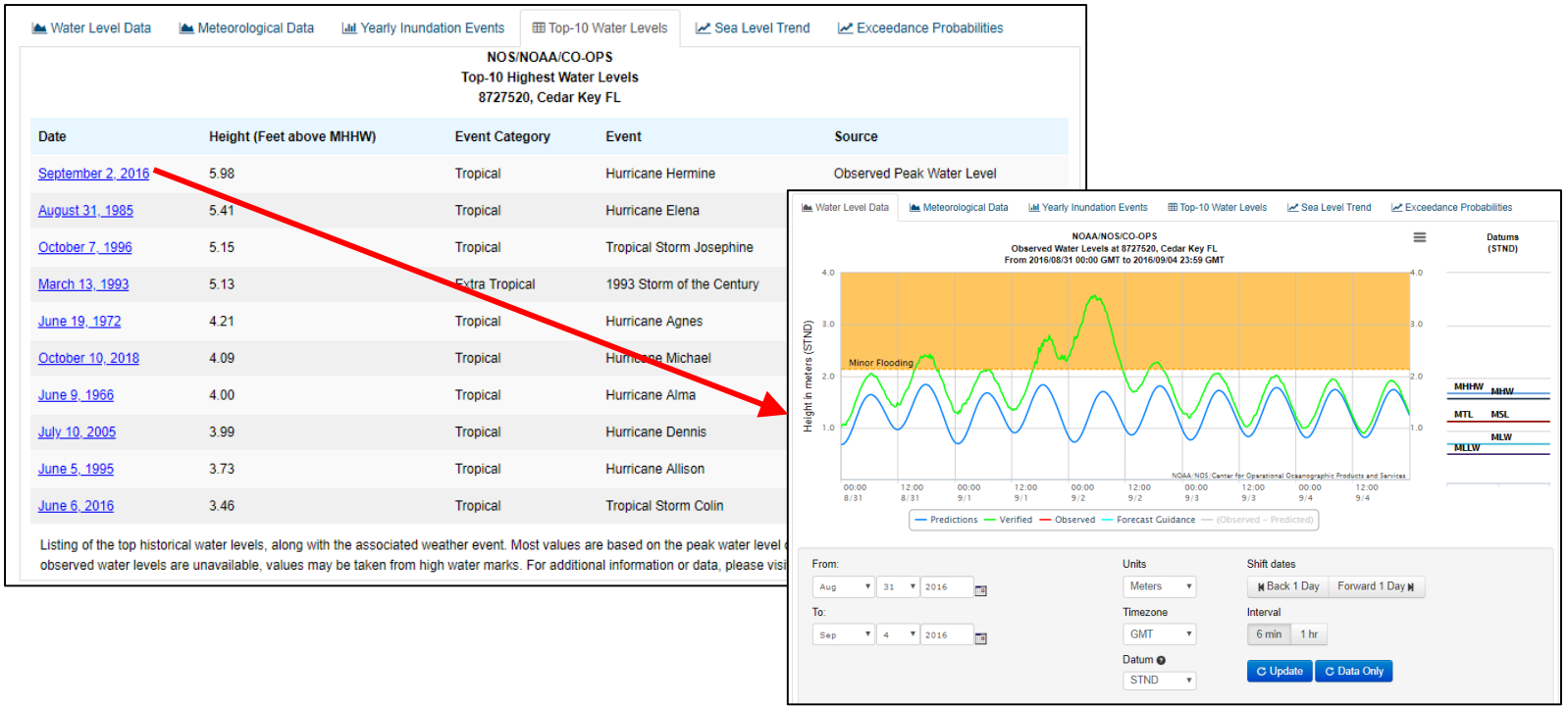
Coastal Inundation Dashboard: Yearly Inundation Events

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



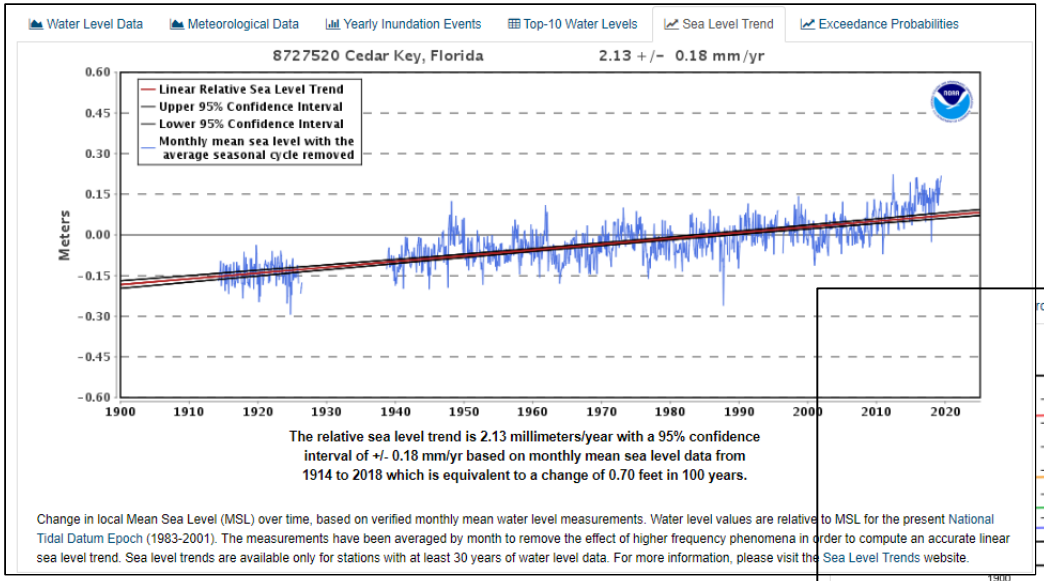
Coastal Inundation Dashboard: Top-10 Water Levels

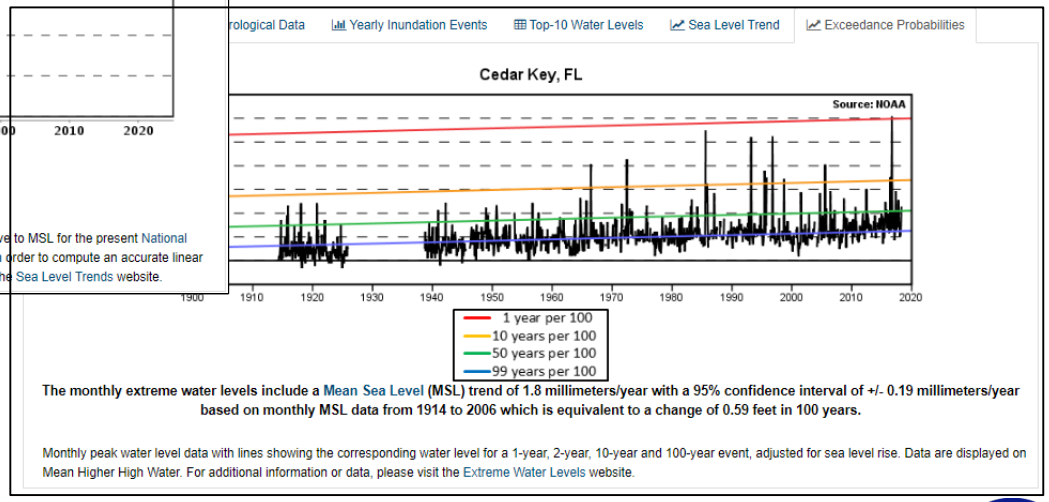
- Peak historic water levels, along with cause (if known)
- Links directly to data



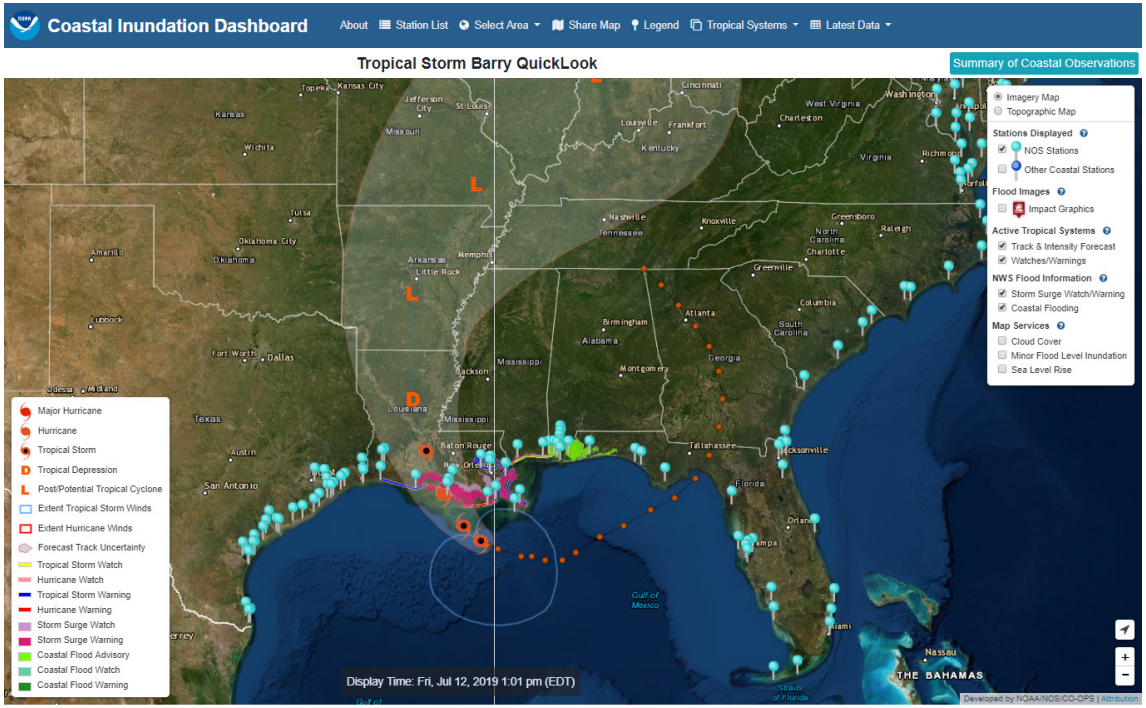
Coastal Inundation Dashboard: Sea Level Trend & Exceedance Probabilities

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





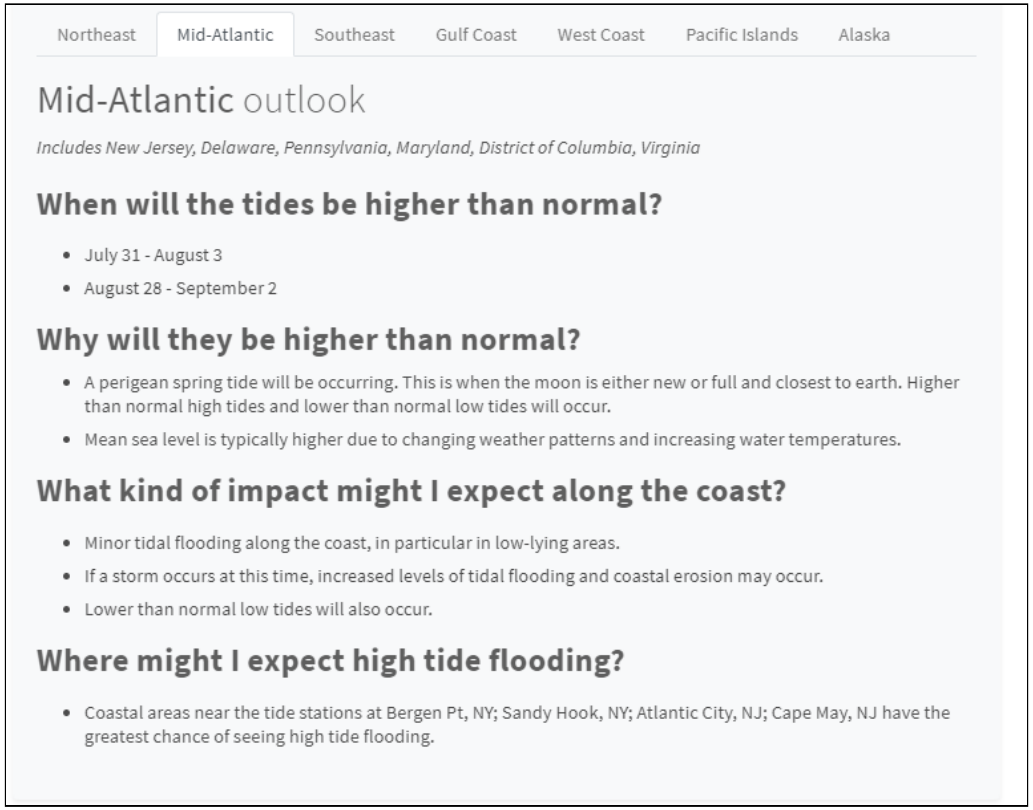
Monitoring Storm Surge: Storm QuickLook



- Storm-specific dashboard page with custom URL
  - Storm track/intensity, coastal watches/warnings and flood “alerts” update automatically
  - More complete coastal flood product
- Activated at first tropical storm or hurricane watch
- Summary of Coastal Observations
  - Text analysis updated 3 times daily

https://tidesandcurrents.noaa.gov/quicklook.html

Seasonal High Tide Bulletin



Northeast | Mid-Atlantic | Southeast | Gulf Coast | West Coast | Pacific Islands | Alaska

Mid-Atlantic outlook

Includes New Jersey, Delaware, Pennsylvania, Maryland, District of Columbia, Virginia

When will the tides be higher than normal?

- July 31 - August 3
- August 28 - September 2

Why will they be higher than normal?

- A perigean spring tide will be occurring. This is when the moon is either new or full and closest to earth. Higher than normal high tides and lower than normal low tides will occur.
- Mean sea level is typically higher due to changing weather patterns and increasing water temperatures.

What kind of impact might I expect along the coast?

- Minor tidal flooding along the coast, in particular in low-lying areas.
- If a storm occurs at this time, increased levels of tidal flooding and coastal erosion may occur.
- Lower than normal low tides will also occur.

Where might I expect high tide flooding?

- Coastal areas near the tide stations at Bergen Pt, NY; Sandy Hook, NY; Atlantic City, NJ; Cape May, NJ have the greatest chance of seeing high tide flooding.

- Based on tidal predictions
- Regional look at dates where tides will be higher than what is "normally" seen from day to day
- Additional factors that push water onshore will compound effects
  - Onshore winds
  - Storm surge
  - Excessive runoff

https://oceanservice.noaa.gov/news/high-tide-bulletin/welcome.html

Links

- Coastal Inundation Dashboard
  - https://tidesandcurrents.noaa.gov/inundationdb/
  - https://tidesandcurrents.noaa.gov/inundationdb_info.html
- Storm QuickLook
  - https://tidesandcurrents.noaa.gov/quicklook.html
- High Tide Bulletin
  - https://oceanservice.noaa.gov/news/high-tide-bulletin/welcome.html
- NOAA Technical Report NOS CO-OPS 086 - Patterns and Projections of High Tide Flooding

Climate Change & Sea Level Rise in the FL Keys: Monroe County Begins to Bridge the Gap

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Bridging the Gap Between Planning and Implementation

Planning

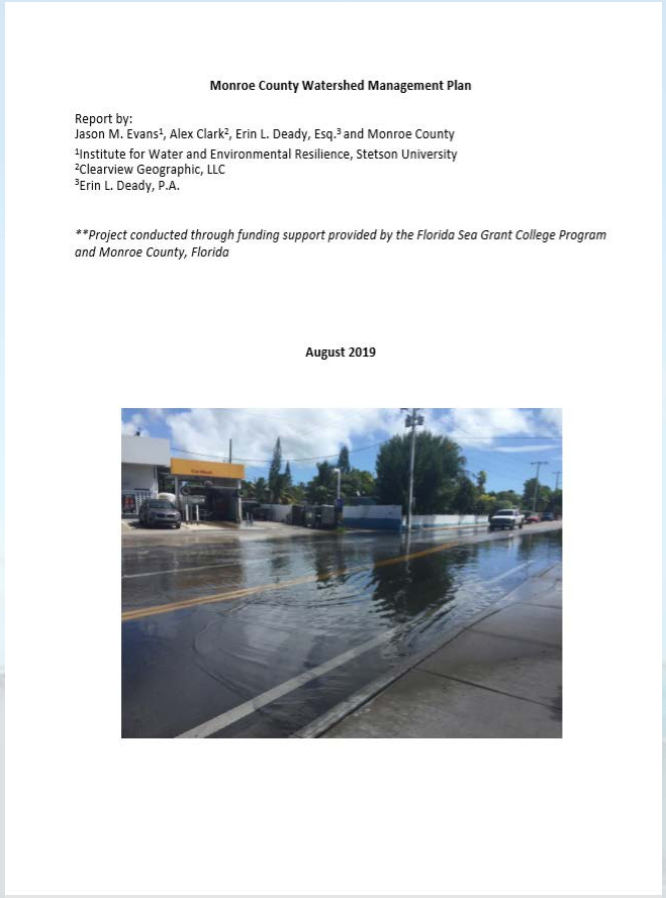
- Greenhouse Gas work for baseline years: 2005, 2008, 2010 and 2013
- Energy and Climate Element of Comp Plan (2013)
- Finalized GreenKeys Plan in 2016
- 165 Recommendations organized in 5-year Plan
- Recommendations included:
  - Data development (LiDAR)
  - Pilot Road Elevation projects
  - Coordination on CRS
  - Enhanced modeling (for roads and stormwater)
  - Sustainability initiatives

Key Implementation Steps:

- Countywide Mobile LiDAR
- Pilot Roads Planning in design
- Integration of CRS, Resiliency and Comprehensive Plan
- Countywide Roads and Stormwater Planning process

Implementation Examples: 1st Step: More Accurate Data and Tools

1. Implementation has resulted in 4 successful grants to date
   - Site specific resiliency/vulnerability planning projects on facilities (ALF/Park)
   - NOAA Grant included:
     - Collaboration with FEMA and development of CRS Class 4 compliant Watershed Management Plan analyzing SLR
     - Real time assessment of stormwater structures countywide
2. Linkages with CRS in pursuit of Class 4
   1. Repetitive Loss Analysis
   2. Stormwater Maintenance & Capital Plan
   3. Flood insurance outreach
   4. Watershed Management Plan



Monroe County Watershed Management Plan

Report by:
Jason M. Evans[1], Alex Clark[2], Erin L. Deady, Esq.[3] and Monroe County

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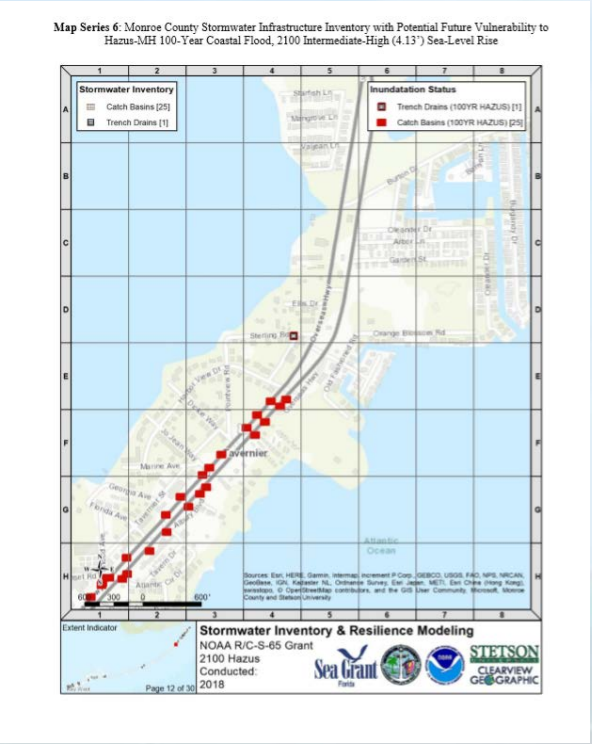
[2]Clearview Geographic, LLC
[3]Erin L. Deady, P.A.

***Project conducted through funding support provided by the Florida Sea Grant College Program and Monroe County, Florida*

August 2019



Map Series 6: Monroe County Stormwater Infrastructure Inventory with Potential Future Vulnerability to Hazus-MH 100-Year Coastal Flood, 2100 Intermediate-High (4.13') Sea-Level Rise

Implementation Examples: 1st Step: More Accurate Data Pilots

1. Pilot Projects in Big Pine (the Avenues) and Key Largo (Twin Lakes)
2. Meet 25 year projection of sea level rise + not exceed 7 days of flooding
    1. Interim Design Resolution
    2. Adopted 2017
3. Stormwater features include pumps: challenge is siting them (Comp Plan and right of way constraints)
4. 90% Design stage
5. Approximately $13 Million for 1 mile (but across two different areas with two different stormwater systems)

Shaw Drive, Keysnews.com

Implementation Examples:
1st Step: More Accurate Flood Data & LiDAR

1. Create database for localized tide/flood events- residents send photos of tidal flooding
2. Obtain digital building footprints and ground elevations for all structures
3. Obtain Mobile LiDAR elevations for roads and first floods- more accurate elevation readings for future analysis

Keys Countywide Roads and Stormwater Plan

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Task 1: Data Collection

Task 2: Engineering Analysis

Task 3: Concept Development

Task 4: Policy Review & Regulations

Task 5: Stakeholder & Public Outreach

Task 6: Implementation Plan

As part of the County's proactive sustainability approach this project is to merge climate change science and modeling, with transportation engineering and planning to develop a long-term roads adaptation plan based on design criteria, Sea Level Rise projections, adaptation methodology, policy/financing evaluation, and public/stakeholder outreach.

Average Length of County Roadway Segment	1,381.0	Feet	0.26	Miles
Total Length of County Maintained Roads	1,658,221.0	Feet	314.06	Miles
County Roads Spread Throughout 21 Different Keys, non-linear				
Total of 1202 Roadway Segments Throughout Project Limits				

Project Scope

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Data Collection
- Initial Assessment through GIS Analysis
- Tidal Data
- Roadway Data
- Stormwater Outfall Structures
- Site Assessment and Condition Survey
- Environmental Assessment

Engineering Analysis
- Sea Level Rise Projections
- King Tide Predictions
- Storm Surge, Wind Waves, and Extreme Event Analysis
- Vulnerability Assessment and Inundation Mapping
- Prioritization of Roadway Segments

Concept Development
- Roadway Design
- Utilities
- Maintenance of Traffic
- Signing and Pavement Marking
- Drainage Stormwater Management
- Environmental and Permitting
- Surveying and Mapping
- Geotechnical
- Landscape
- Bridges
- Cost Estimates and Benefit Cost Analysis

Policy Review and Regulations
- Future Growth Demands for Roads
- Roads Liability
- Levels of Service
- Regulatory Issues
- Implementation Strategies

Stakeholder and Public Outreach
- Educate Stakeholders and Public
- Receive Input
- Establish Consensus

Implementation Plan
- Adaptation Plan
- Prioritize Projects
- Funding Strategies

Project Status

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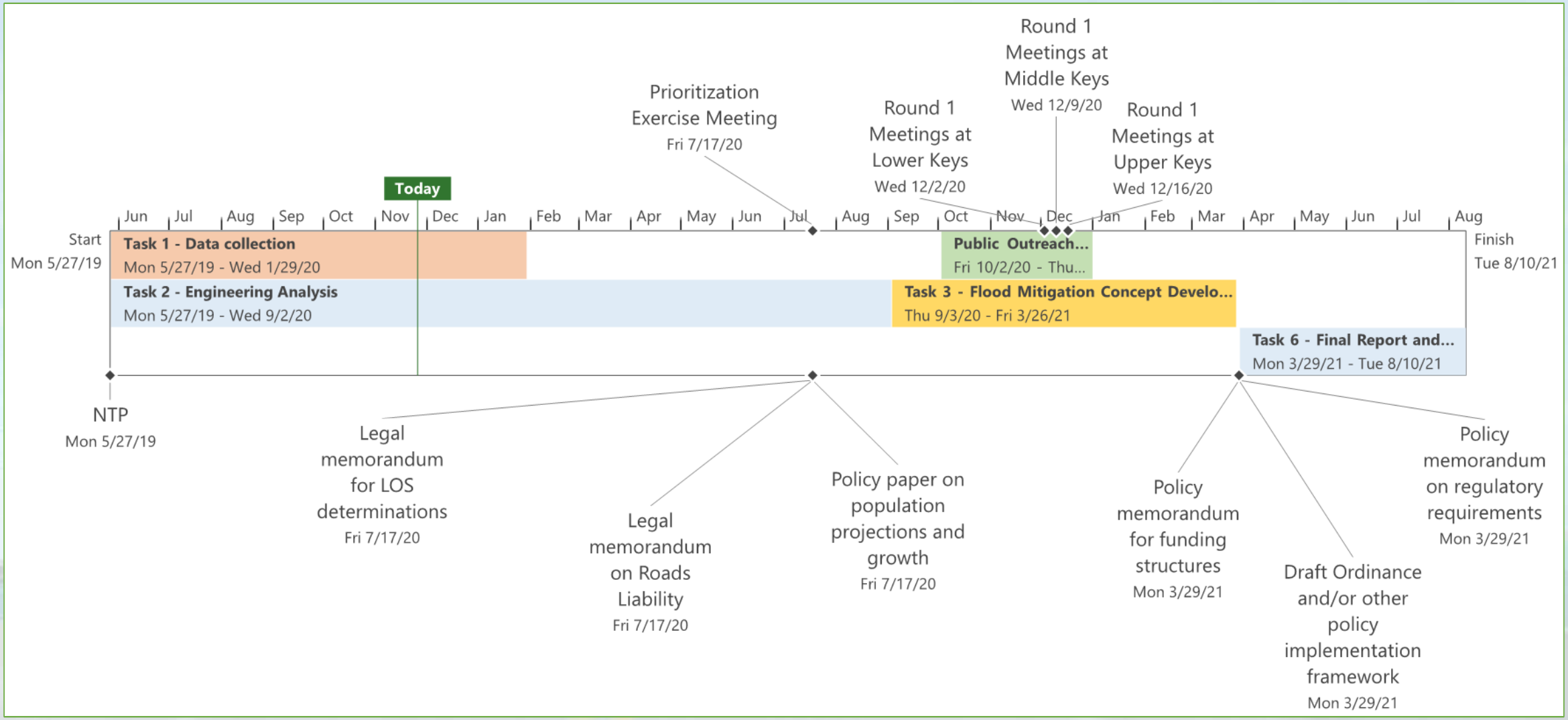

Sugarloaf Keys

A Case Study

Sugarloaf Keys

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Existing Roadway Elevations + Sea Level Rise Projections

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SE FL Climate Compact Projections 2045 Low

SE FL Climate Compact Projections 2045 High

Roadway Clearance	
< - 1 ft	0 ft - 0.5 ft
-1 ft - 0 ft	0.5 ft - 1.0 ft
	> 1.0 ft

Lower Sugarloaf

Solutions: Raise the Roadways

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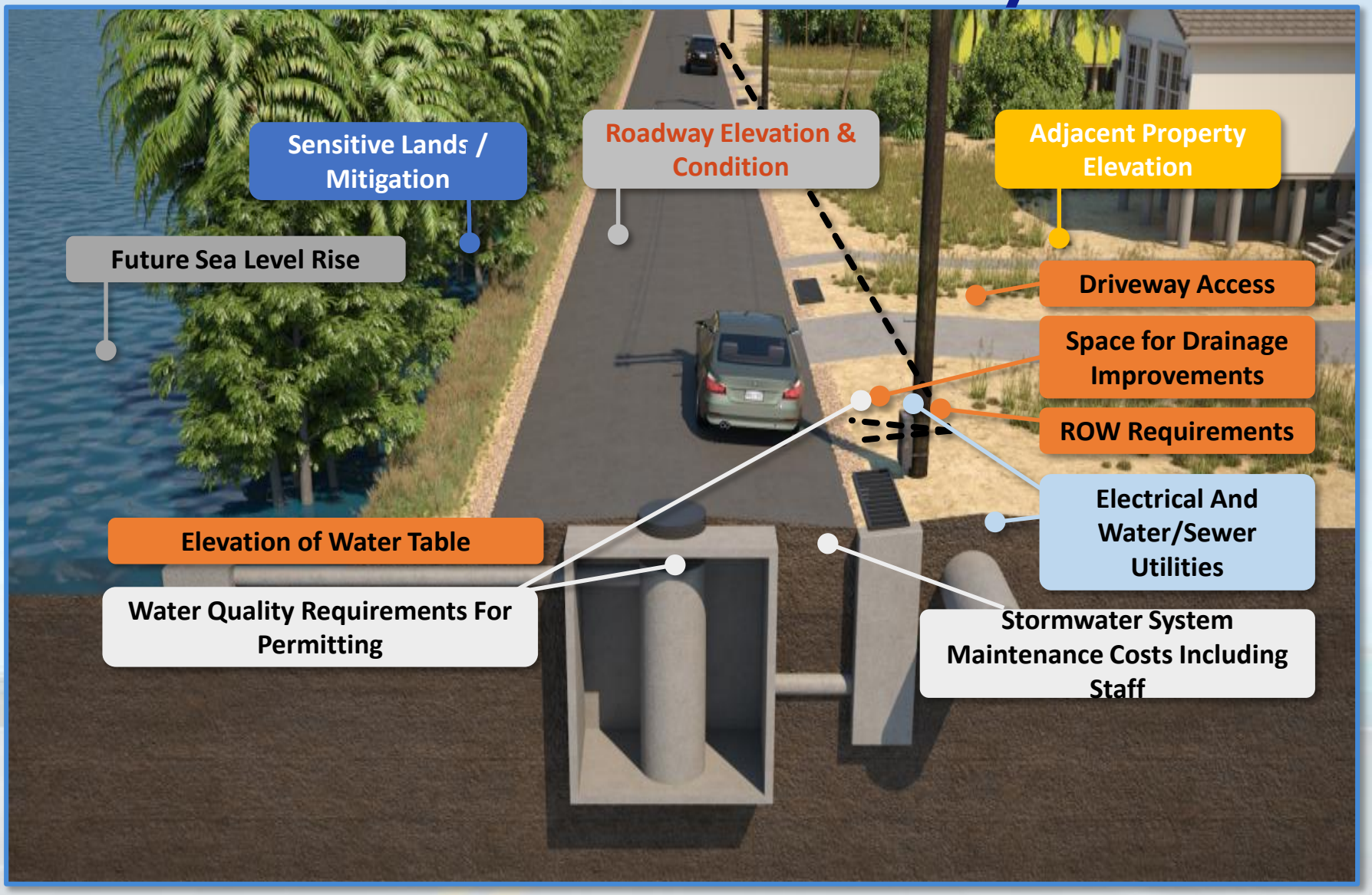
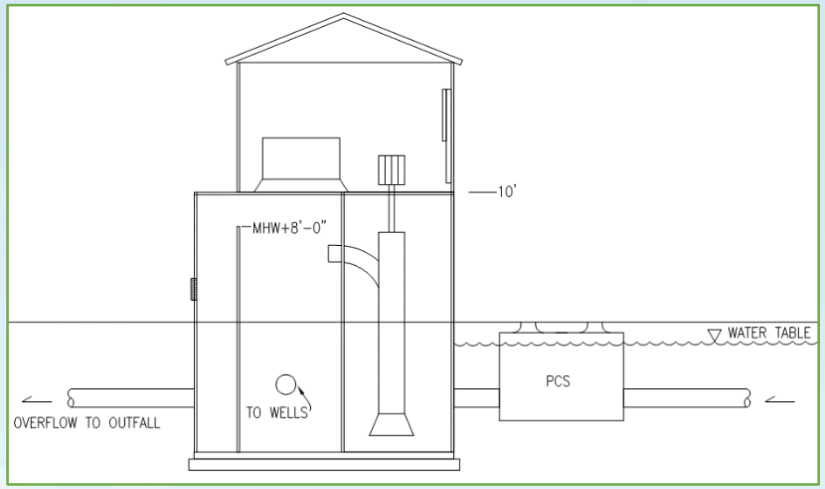
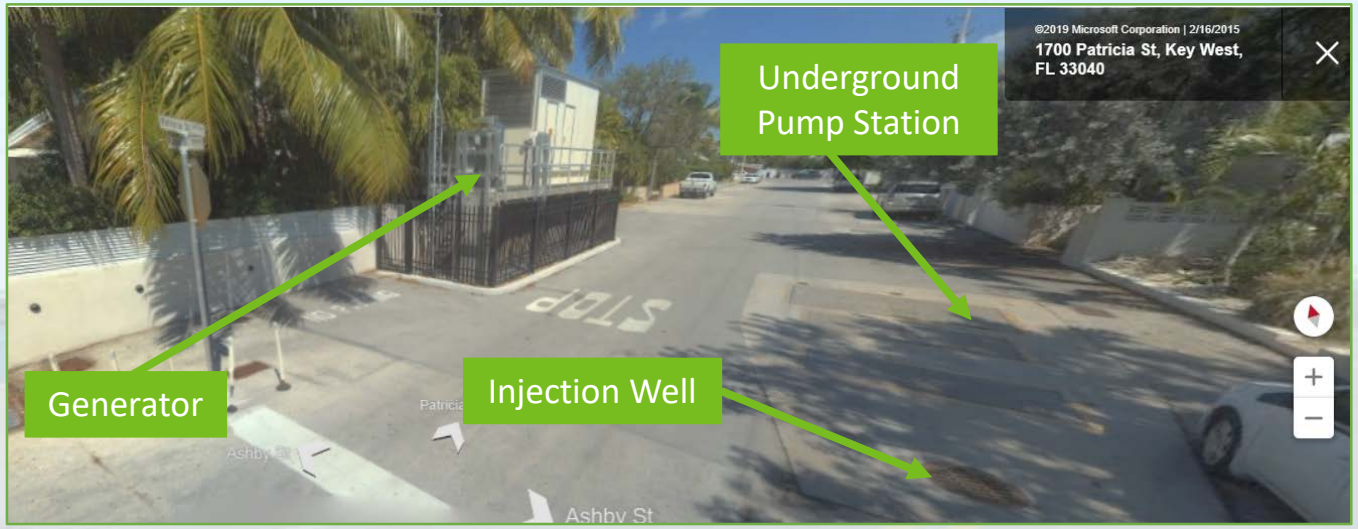


Solutions: Stormdrain Upgrades



Pump Station



Injection Well on Patricia Street, Key West

- There are several storm water management options. Different solutions applicable to different places
- Appropriate drainage infrastructure is dependent on policy, data analysis, engineering, and local conditions such as space available, water quality requirements, cost effectiveness, service requirements, groundwater levels, and soil permeability
- Pumping and treating storm water runoff requires additional infrastructure such as emergency generator and control box to keep operating under loss of power conditions
- Biggest challenges for implementation of injection wells are the high water table conditions, cost, R/W, and aesthetic requirements

What solution is best?

- ✓Solutions will vary depending on policy, data analysis, engineering, and local conditions. No silver bullet solution to be applied across the County
- ✓In some cases, combining roadway profile elevation, stormdrain upgrades and green engineering may be necessary to provide the best outcome
- ✓Proper public and stakeholder outreach must be conducted to ensure that impacted area is clearly understood and challenges previously identified can be overcome
- ✓Adaptation improvements can also be designed such that they can gradually be built throughout time as the need increases
- ✓The project's Vulnerability and Prioritization analysis will factor in multiple criticality values to determine the roadway segments and what improvements need to be implemented. Criticality values enable a comprehensive evaluation that establishes a more effective Adaptation Capital Plan that benefits the community.

Where the Rubber Meets the Road

Differences Across the Keys

- **Differing elevations and impacts across neighborhoods**
- There may be areas where we **cannot maintain** a certain level of service
- We are likely looking at a **"range" of conditions** for levels of service based on what may or may not be possible
- This will impact where people continue to live and how
- **Private property** owners may need to contribute
- What does that mean for **funding**?
  - Ongoing capital improvements
  - Special assessments for the differences
  - Disaster recovery funds
  - Bonding


Photo: Monroe County

Transparency in Science and Policy

- Where is our **future growth** and demand for infrastructure and services?
- Use updated vulnerability analysis to determine existing and **future conditions** impacted by sea level rise
- **Determine the technical opportunities and constraints with drainage to avoid impacting adjacent properties**
- We will need internal and external input


Photo: Monroe County

The New Vision of the Keys

- We may need to start looking at other methods of **construction** ("living with water")
- Other modes of **transportation** (based on water)

Photo: Monroe County TDC

Aligning Policy Initiatives: EAR 5/1/21

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Initiatives	Timeframe
Energy and Climate Element Updating now to incorporate all climate planning initiatives To be finalized in Evaluation and Appraisal Report based Comp Plan amendments	2013 Completed In process (RPG) 2020-2021
Peril of Flood Amendments To be finalized in Evaluation and Appraisal Report based Comp Plan amendments	In process (RPG) 2020-2021
Overall Integration of Sea Level Rise into other Comp Plan Elements To be finalized in Evaluation and Appraisal Report based Comp Plan amendments	In process (RPG) 2020-2021
Stormwater Policy Implementation Policy 1001.1.3 & 1001.1.6: Updating stormwater management regulations & inventory and analysis of existing public drainage facilities	In process (DEO Grant)

Existing Stormwater Comp Plan Policies

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- Policy 1001.1.1 (Water Quality Level of Service) : All projects shall be designed so that the discharges will meet Florida State Water Quality/Quantity Standards as set forth in Chapters 62-3 and 62-302.530, F.A.C, incorporated herein by reference. All projects should be designed in accordance with the Florida Department of Transportation and South Florida Water Management District standards and taking into account projections for climate change.
  - Policy being implemented through new Stormwater Manual and Layman's Brochure
- Policy 1001.1.6: Within three years of the adoption of the 2030 Comprehensive Plan, Monroe County shall evaluate the need to complete an inventory and analysis of existing public drainage facilities within the County and associated flooding issues.
  - Policy is being implemented through:
    - CRS Watershed Management Plan process
    - Updated and expanded in Countywide Roads and Stormwater Plan process

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Stormwater Implementation and Guidance Updates

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- Existing Code Requirement (Code Section 114-3):
  - Projects discharging to impaired waters or to Outstanding Florida Waters (OFW) are subject to additional requirements for mitigation of pollutant loads. Single-family and duplex residences are required to observe best management practices (BMP's) as identified in the sections of the county's manual of stormwater management practices …
- Current DEO Technical Assistance Grant: (1) Draft Stormwater Management Principles and Best Management Practices Manual and (2) associated Layman's Brochure. Deliverables will focus on options to eliminate or reduce off-property discharges and encourage reuse of captured storm runoff. Deliverables must account for:
  - Effects of sea level rise
  - Changes in intensity and frequency of storms
- Manual and Brochure will be primary implementation tool and updated periodically to reflect most current and effective BMPs.

Identifying the Issues for Future Planning

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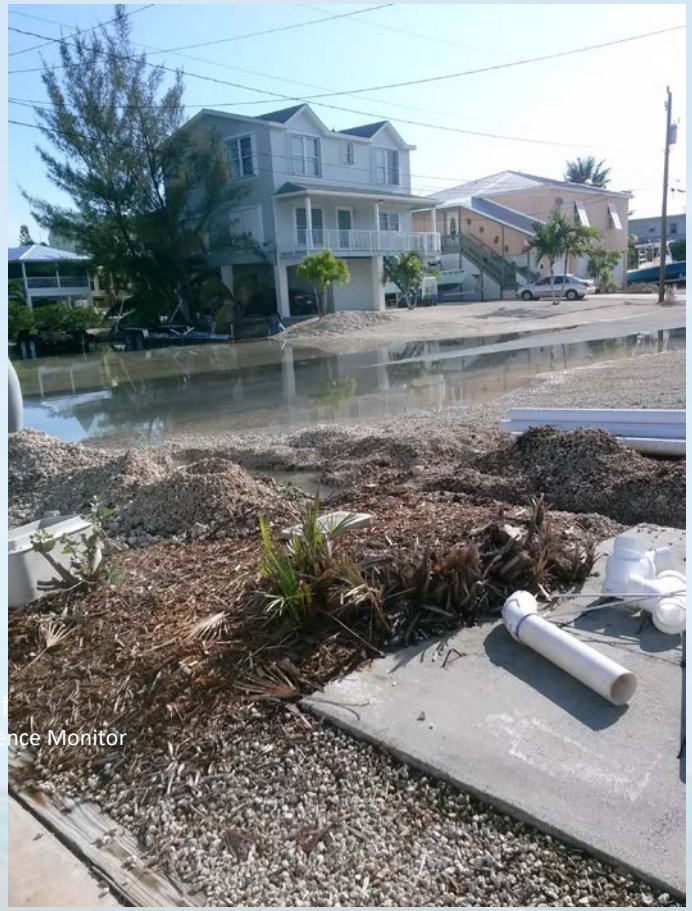
- Integration of Countywide Roads into capital improvements planning process
- Updating other vulnerability work beyond roads/stormwater to form the basis for establishing adaptation action areas
- Shoreline assessment and policies
- Disaster recovery and rebuilding more resiliently
- Remaining growth in the Keys (2023)
- ROGO and transfer of development rights (evaluation of sea level rise vulnerability)
- Framing infrastructure commitments (deficiencies and growth/expansion)
- Land acquisition and evaluation of sea level rise
- Recreation and open space opportunities



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Thank you!

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