



FEMA

# Monroe County Discovery Meeting

## Southeast Florida Coastal Study

July 21, 2014 – Key Largo

July 22, 2014 – Marathon

July 23, 2014 – Key West

**RiskMAP**

Increasing Resilience Together



# Welcome and Introductions

## ■ FEMA Region IV

- Mark Vieira – Project Manager
- Christina Lindemer – Technical Lead
- Henrietta Williams – Outreach Lead

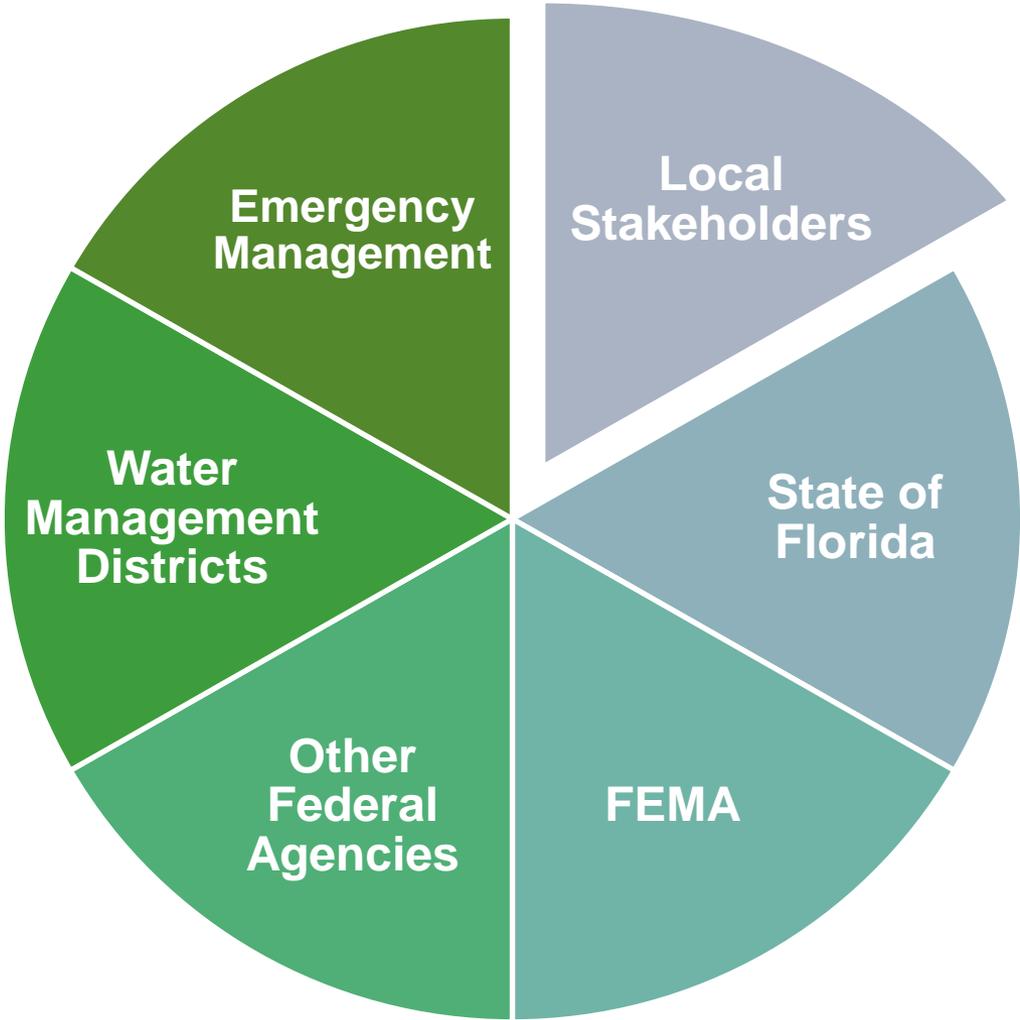


## ■ Production and Technical Services (PTS) Contractor

- Michael DelCharco – Project Manager
- Chris Mack – Technical Lead
- Dick Wild – Outreach Lead
- Michael Taylor – Discovery Lead



# Introductions



# Agenda

- Risk MAP Overview
- Coastal Project Overview
- Coastal Project Deliverables
- Discovery Process
- Stakeholder Input and Feedback

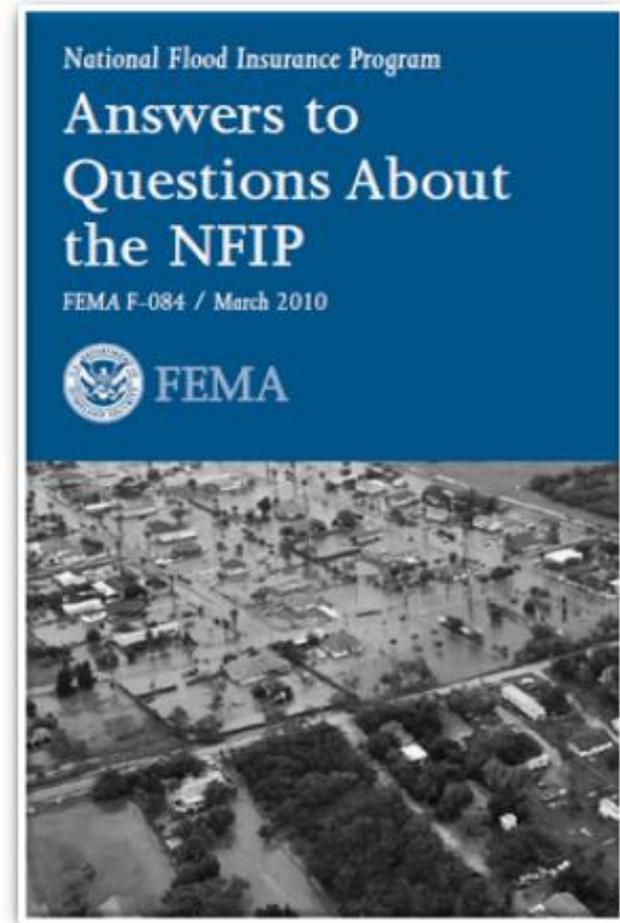


# Risk MAP Overview



# National Flood Insurance Program

- U.S. Congress established the National Flood Insurance Program with the passage of the National Flood Insurance Act of 1968
- Community adopts and enforces a floodplain management ordinance to reduce flood risk to new and existing development in mapped floodplains
- Federal government makes flood insurance available to property owners in participating communities



# Risk MAP Program Overview



- **Risk MAP Objective (Coastal)**

- To provide updated flood hazard data for 100% of the populated U.S. coast

# Risk MAP Program Overview

## Risk MAP

- Mapping
- Assessment
- Planning

## Vision

- Deliver quality data
- Increase public awareness
- Encourage local and regional action

# Program Overview

Study  
flooding at a  
watershed  
level

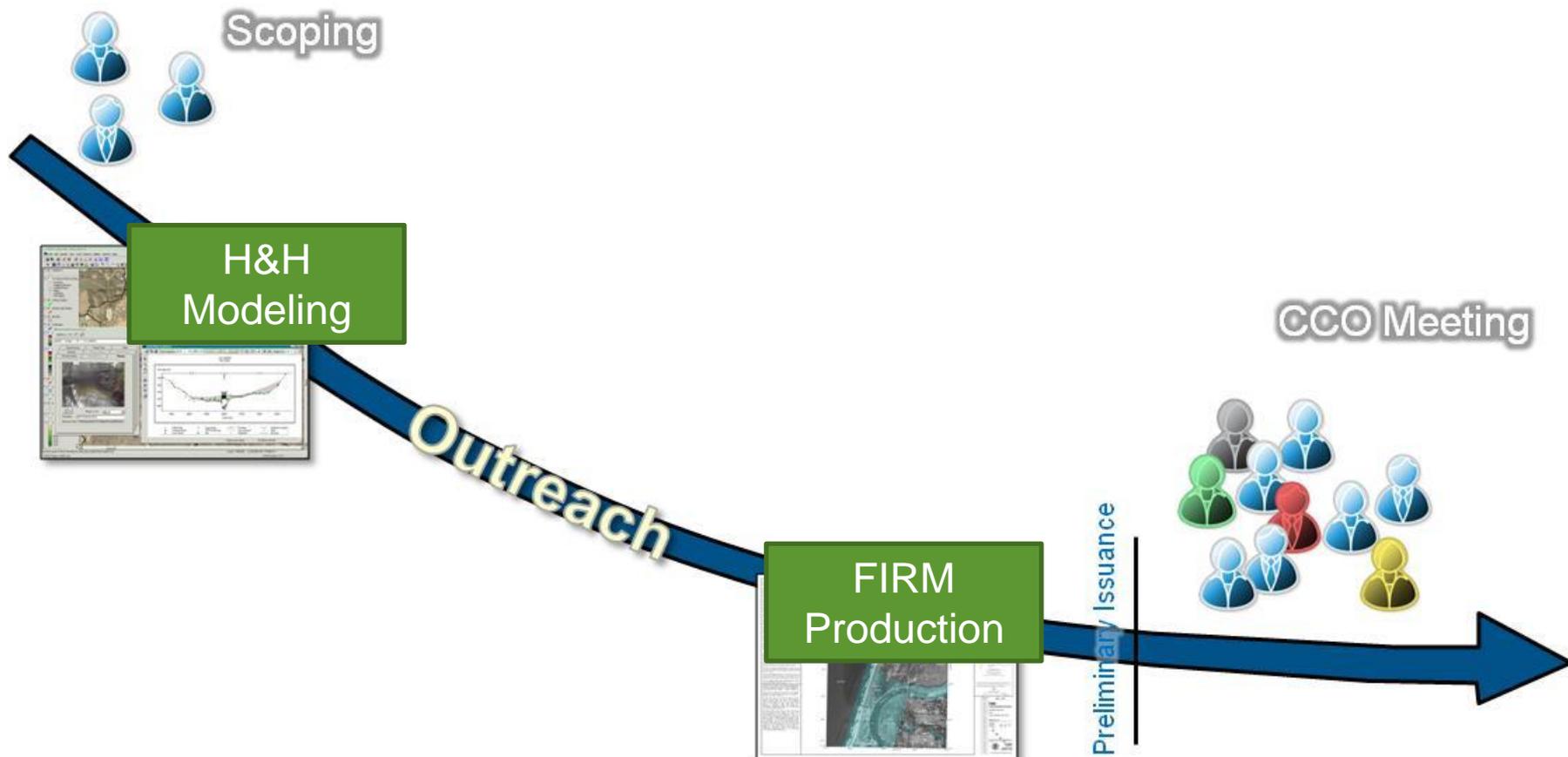
Strengthen  
local and  
state  
partnerships

Improve  
Local  
Mitigation  
Strategies  
and  
Floodplain  
Ordinances

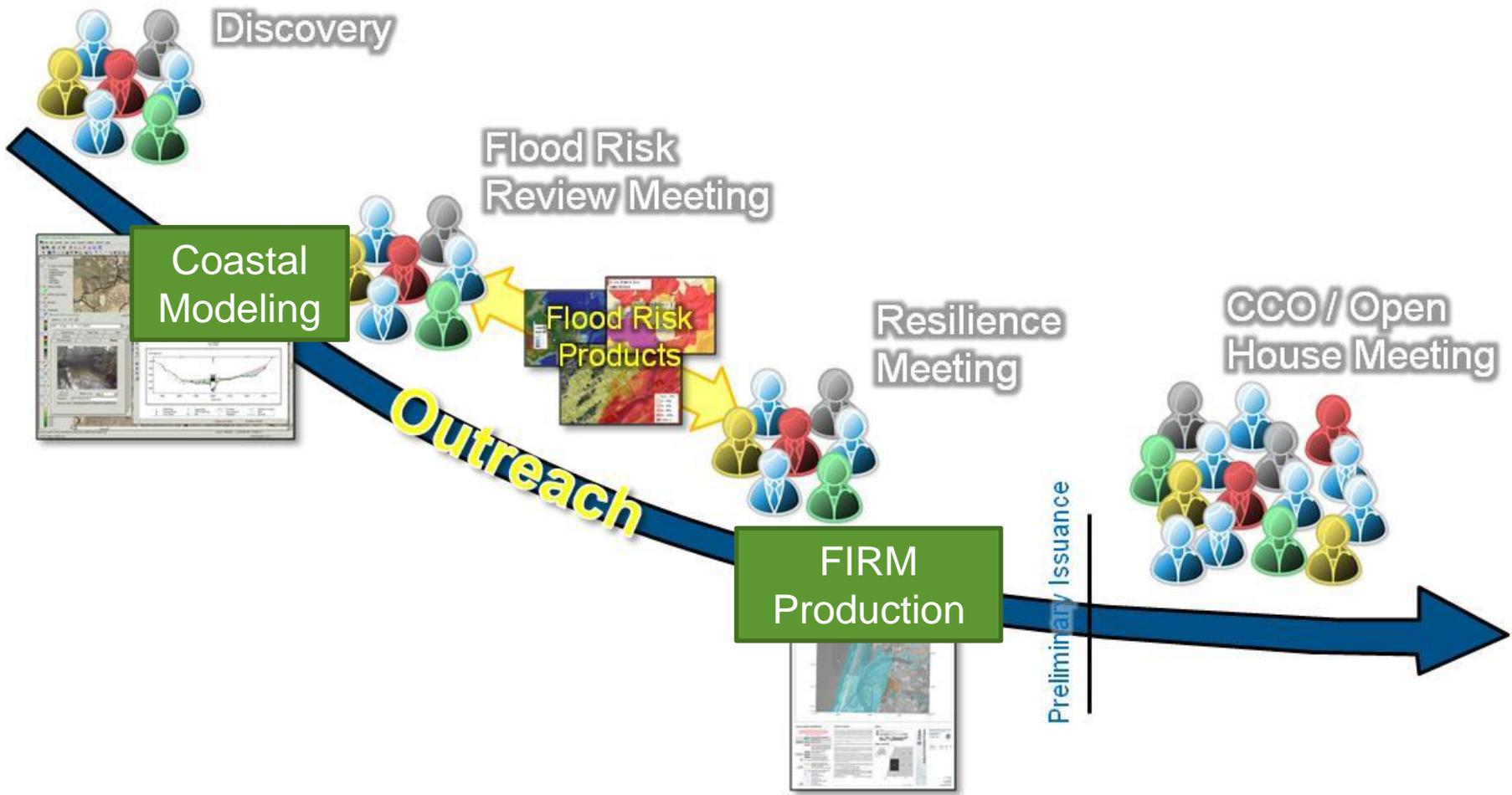
Make  
informed  
decisions  
about flood  
mitigation  
projects

Citizens  
understand  
flood risk

# Historical FEMA Project Timeline



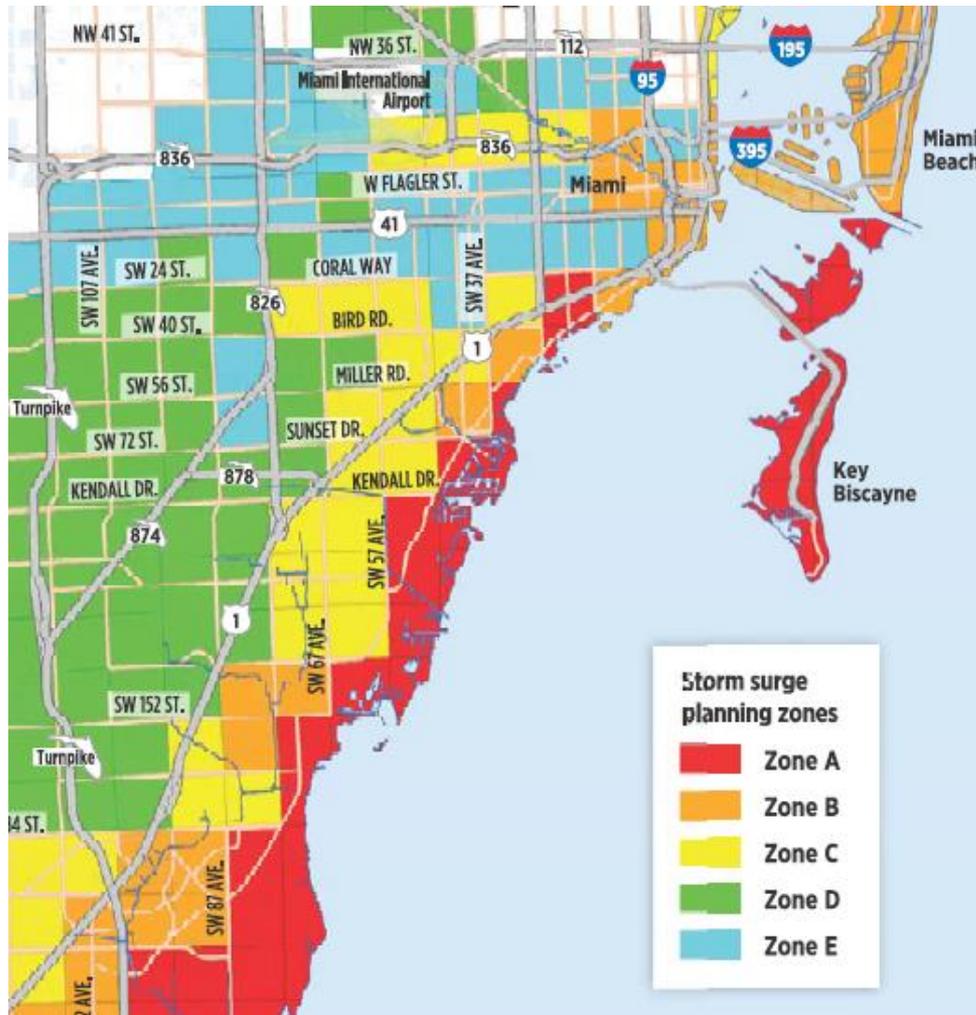
# Risk MAP Project Timeline



# Southeast Florida Coastal Study – Overview

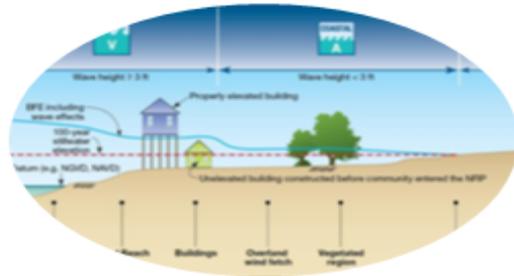


# Southeast Florida Coastal Study – What it's not...

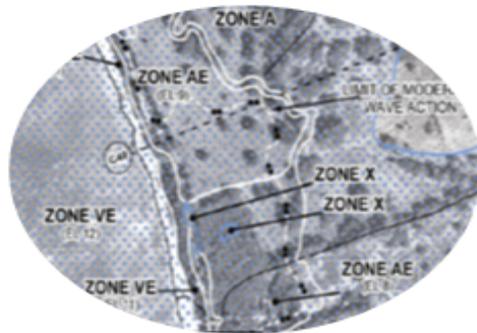


The new FEMA Coastal Study is NOT a Hurricane Evacuation Study and is not meant to replace your current Hurricane Evacuation Study.

# Southeast Florida Coastal Study – Project Goals



Determine revised Base Flood Elevations (BFEs) and flood inundation boundaries for 1% annual-chance (base) flood total water levels



Update the coastal Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) Panels



Assist communities with incorporating this information into risk assessment and hazard mitigation planning

# Southeast Florida Coastal Study – Process

Discovery

Data Acquisition

Coastal Engineering Analyses

Floodplain Mapping

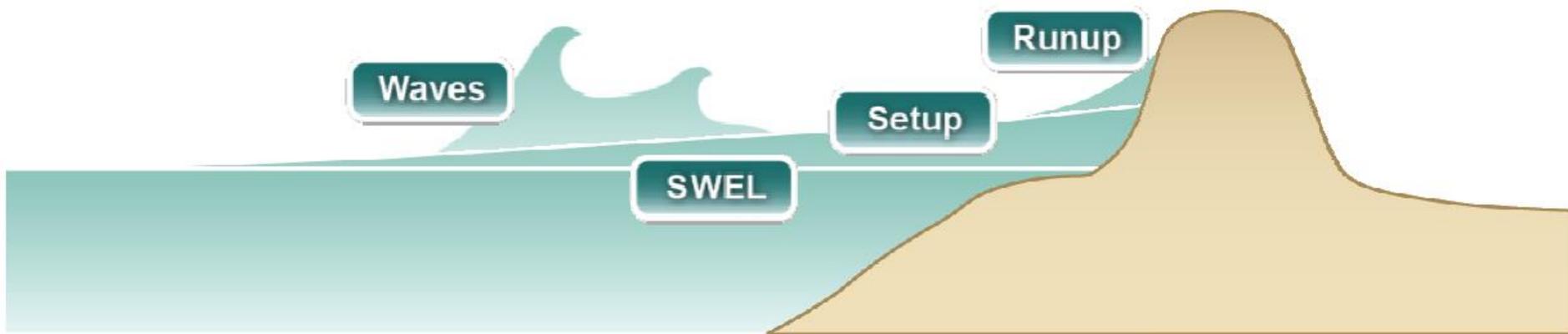
Produce Preliminary Flood Insurance Rate Maps

Post-Preliminary Processing

# Basic Elements of a Coastal Flood Risk Study

Base Flood Elevation (BFE) on FIRM includes 4 components:

1. Storm surge stillwater elevation (SWEL)
  2. Amount of wave setup
  3. Wave height above storm surge (SWEL) elevation
  4. Wave runup above storm surge elevation (where present)
- } Determined from storm surge model



# Basic Elements of a Coastal Flood Risk Study



Normal water level  
Storm surge level

Wave setup  
Wave action

# Basic Elements of a Coastal Flood Risk Study



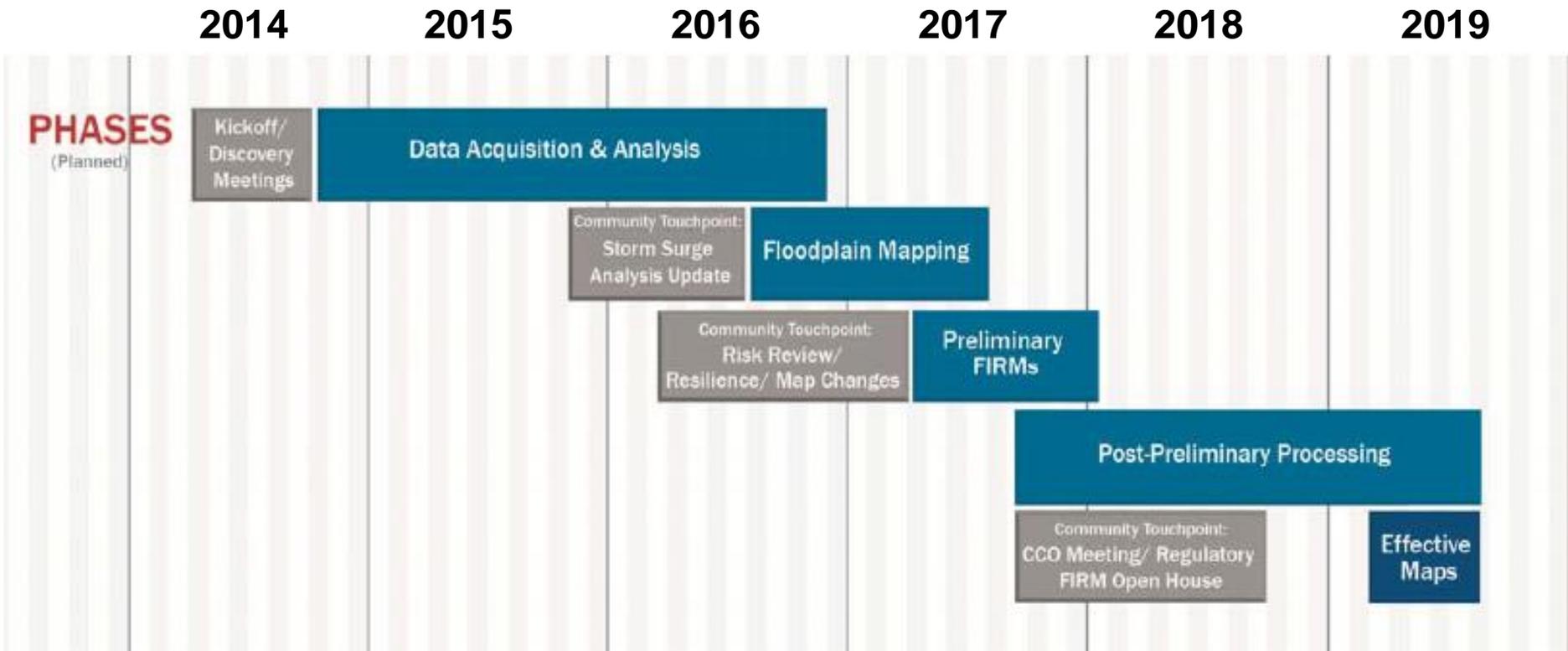
Dune erosion (540 ft<sup>2</sup>)

# Basic Elements of a Coastal Flood Risk Study



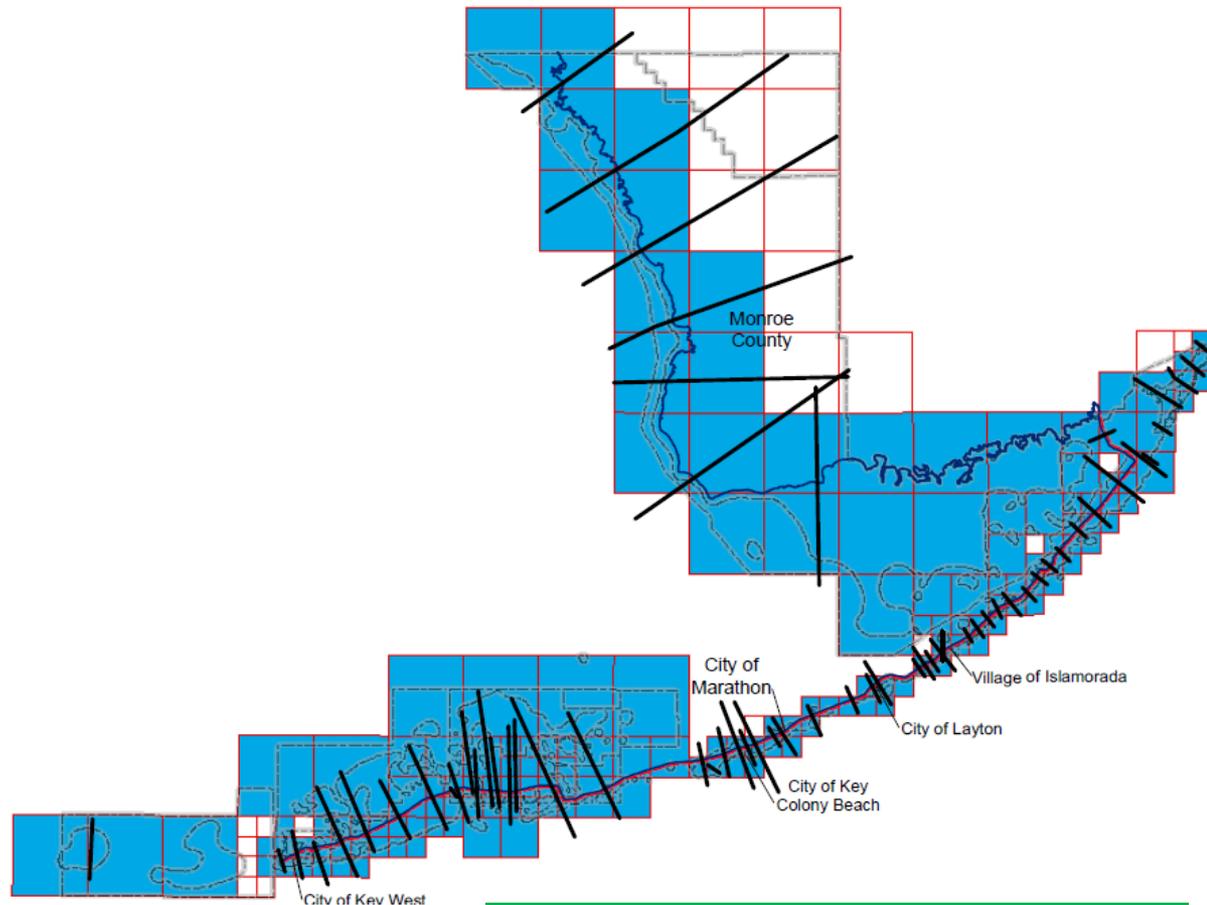
Dune erosion (removal)

# Southeast Florida Coastal Study – Project Schedule



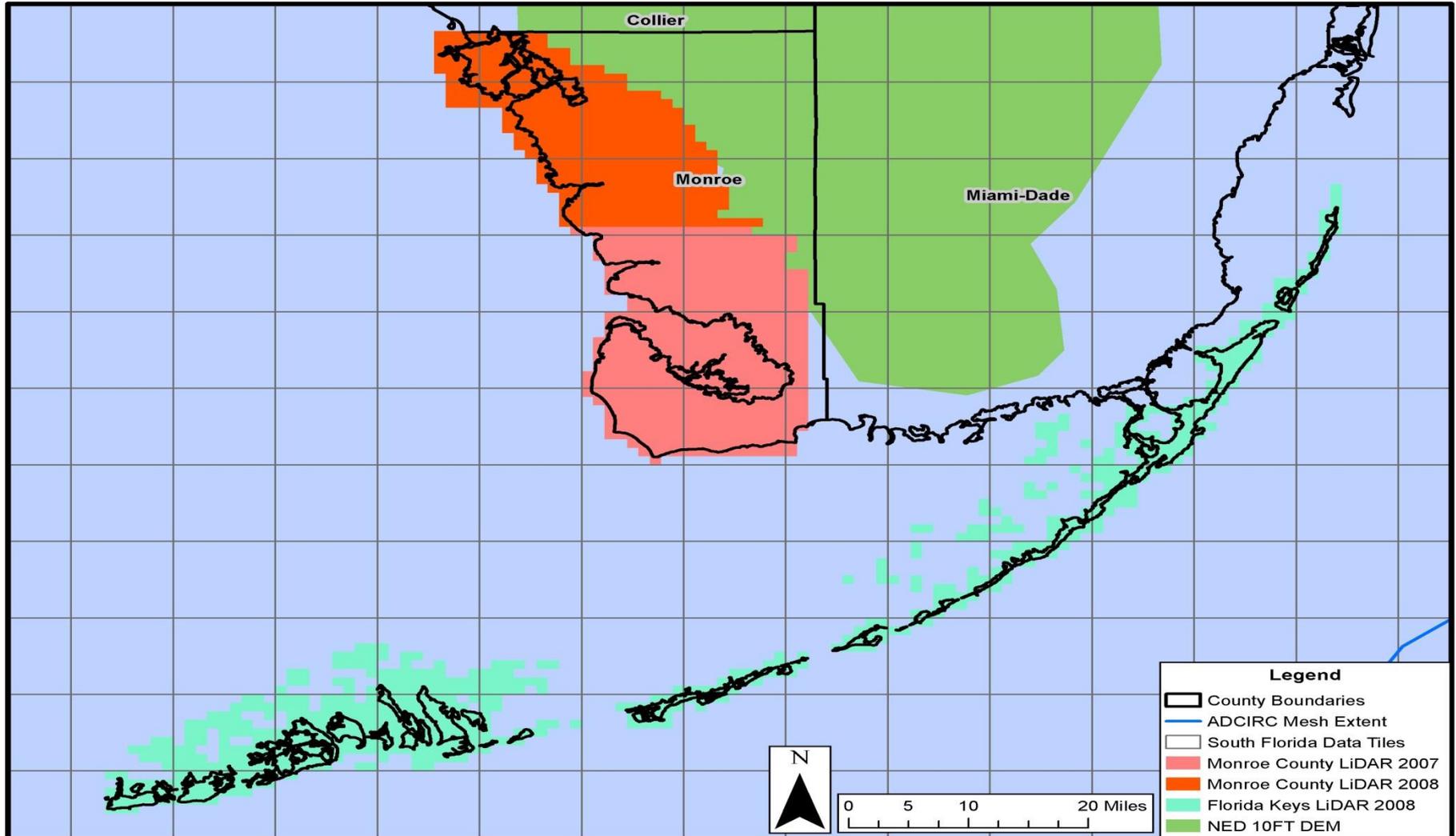
# Southeast Florida Coastal Study – Monroe of Work

<b>Shoreline Miles</b>	<b>120</b>
<b>Estimated WHAFIS Transects</b>	<b>360</b>
<b>Transects Per Mile</b>	<b>3</b>
<b>Estimated Panels</b>	<b>160</b>
<b>Communities</b>	<b>6</b>

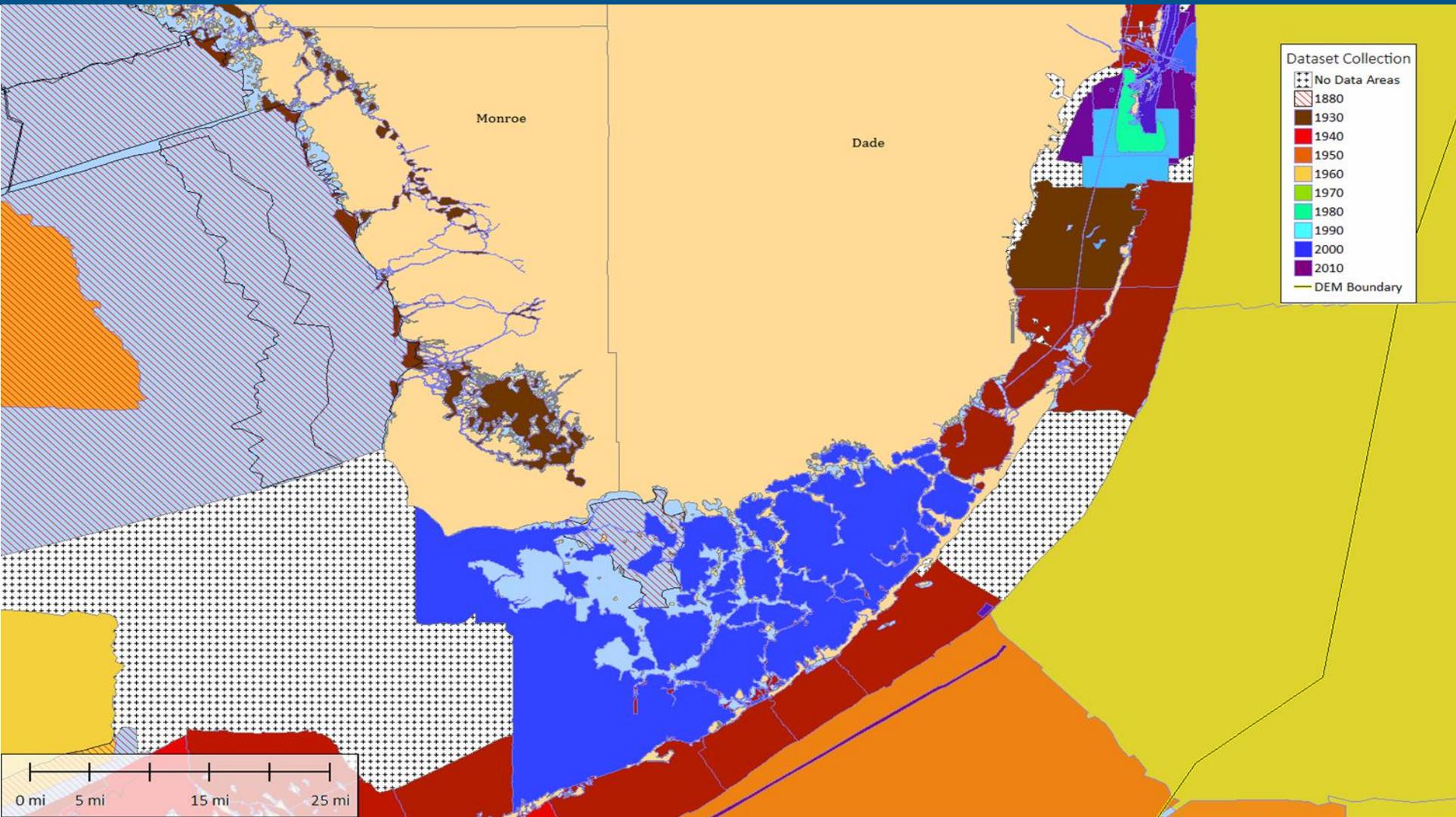


**Effective transects shown**

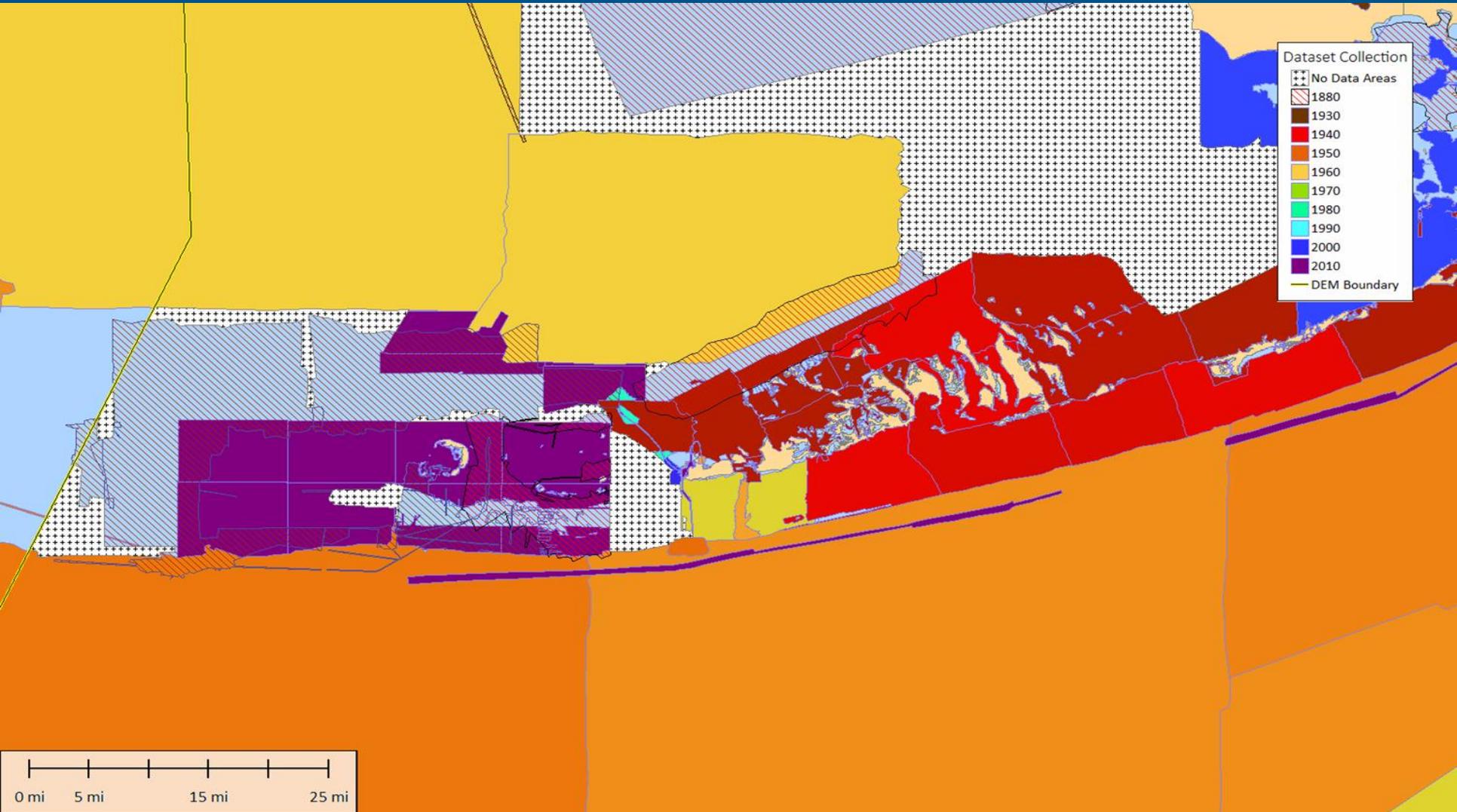
# Monroe County Topographic Data



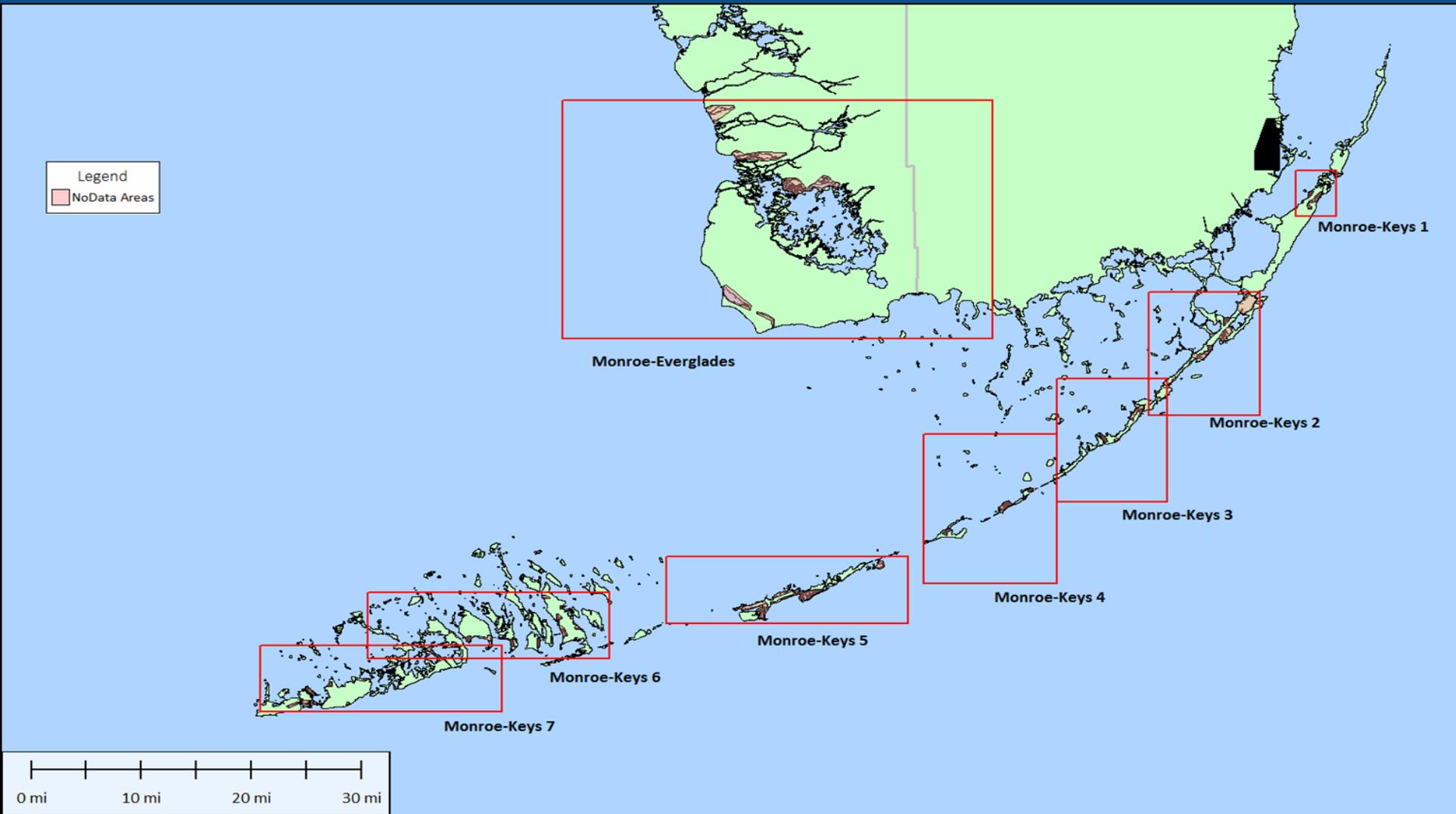
# Monroe Bathymetric: Datasets by Collection Date



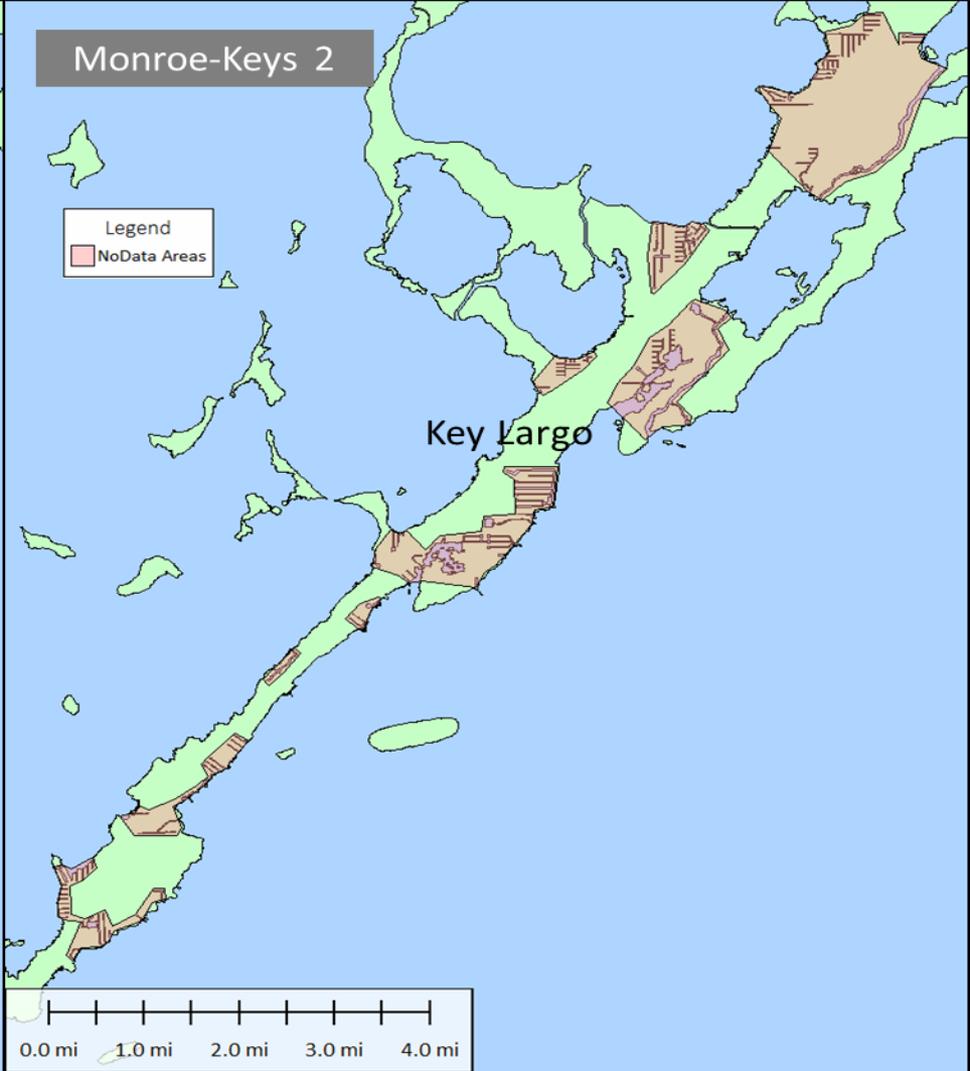
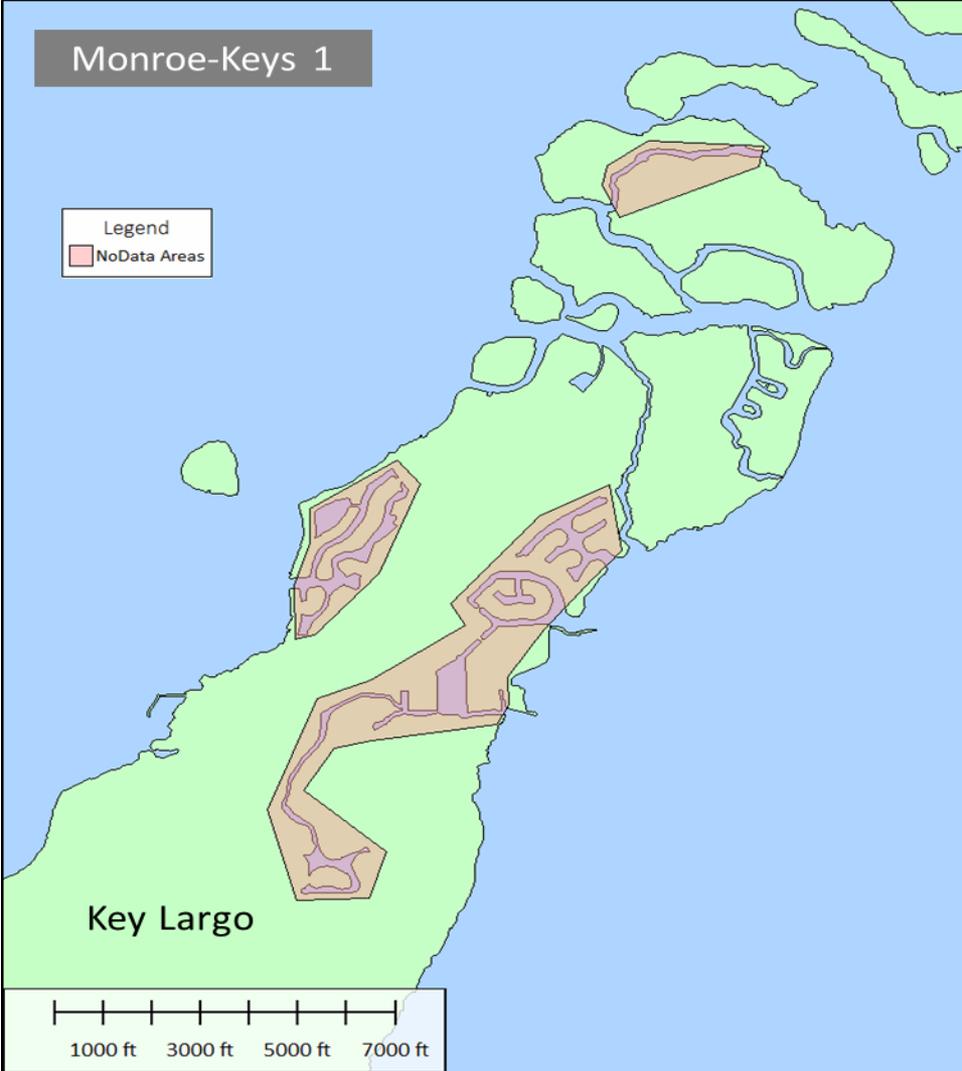
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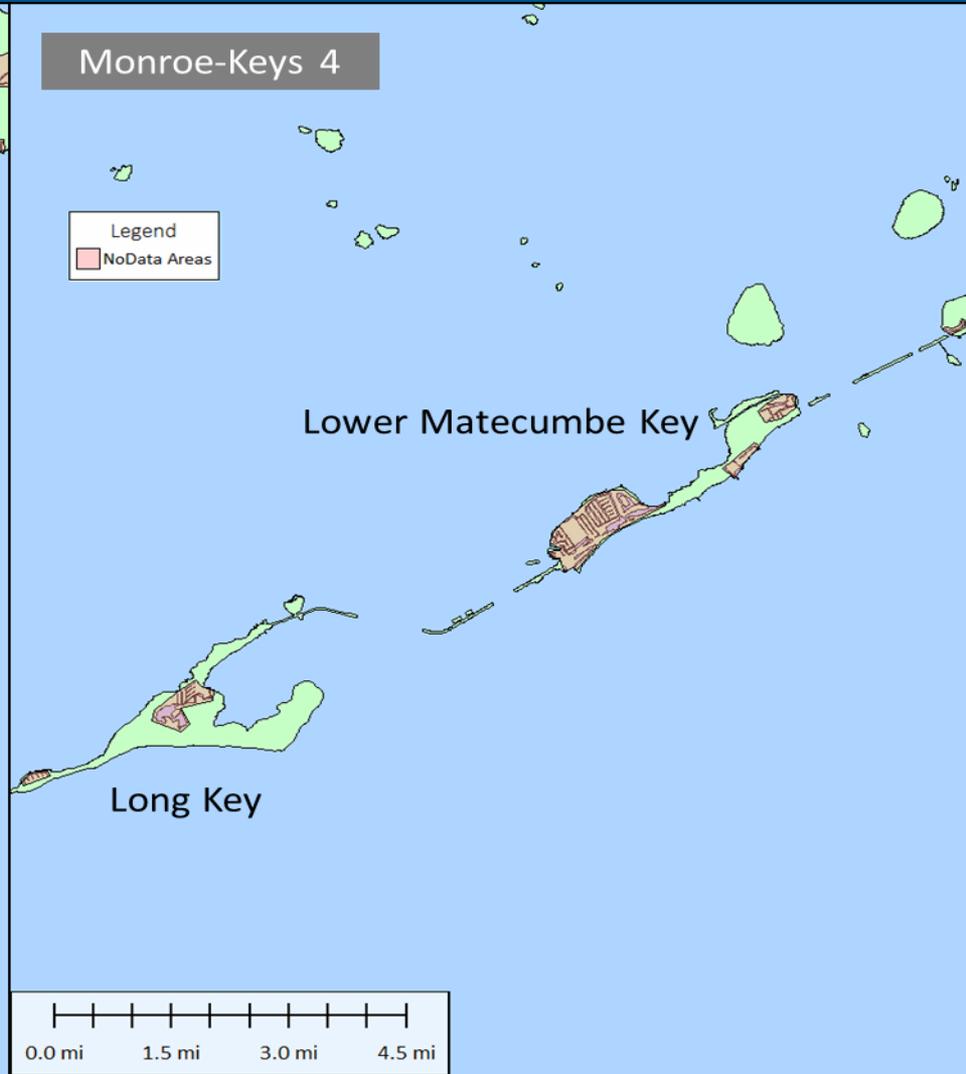
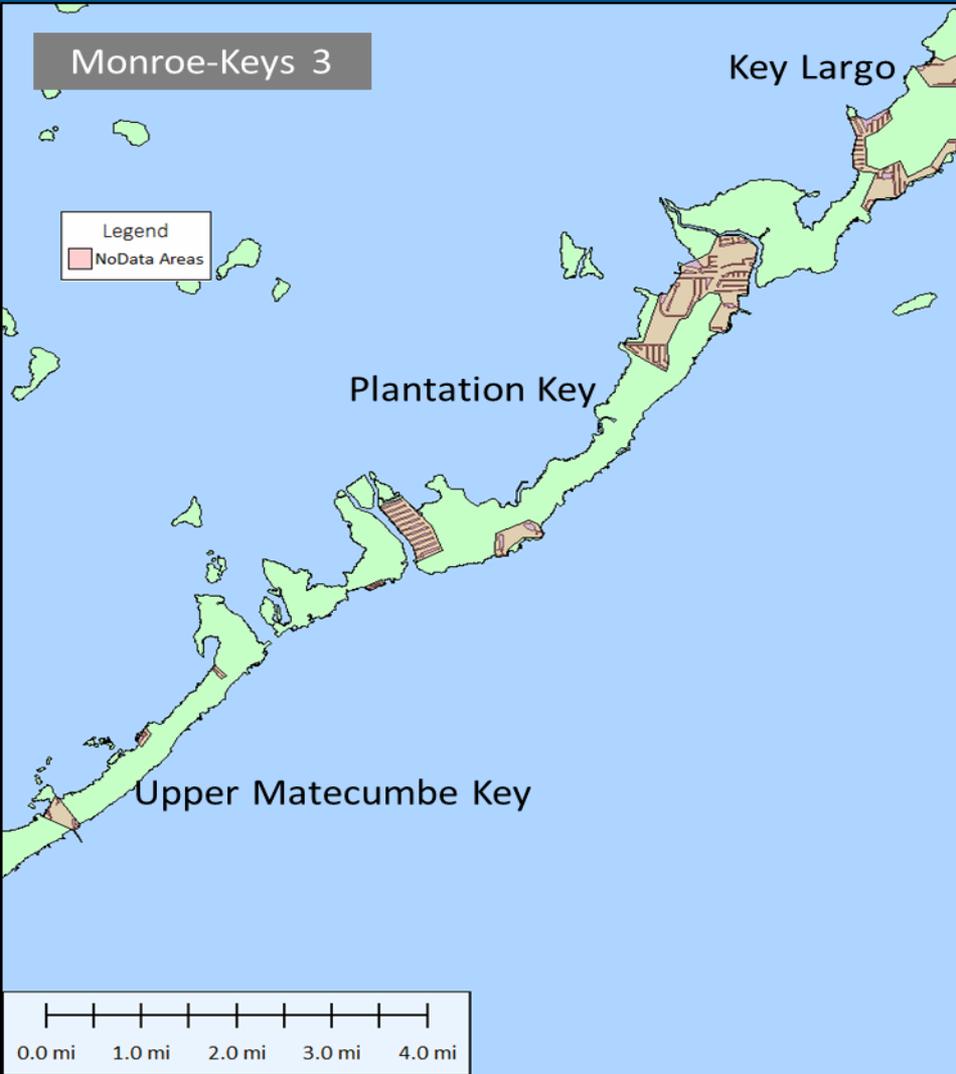
# Monroe Missing Data



# Monroe-Keys Missing Data

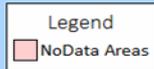


# Monroe-Keys Missing Data (con't)

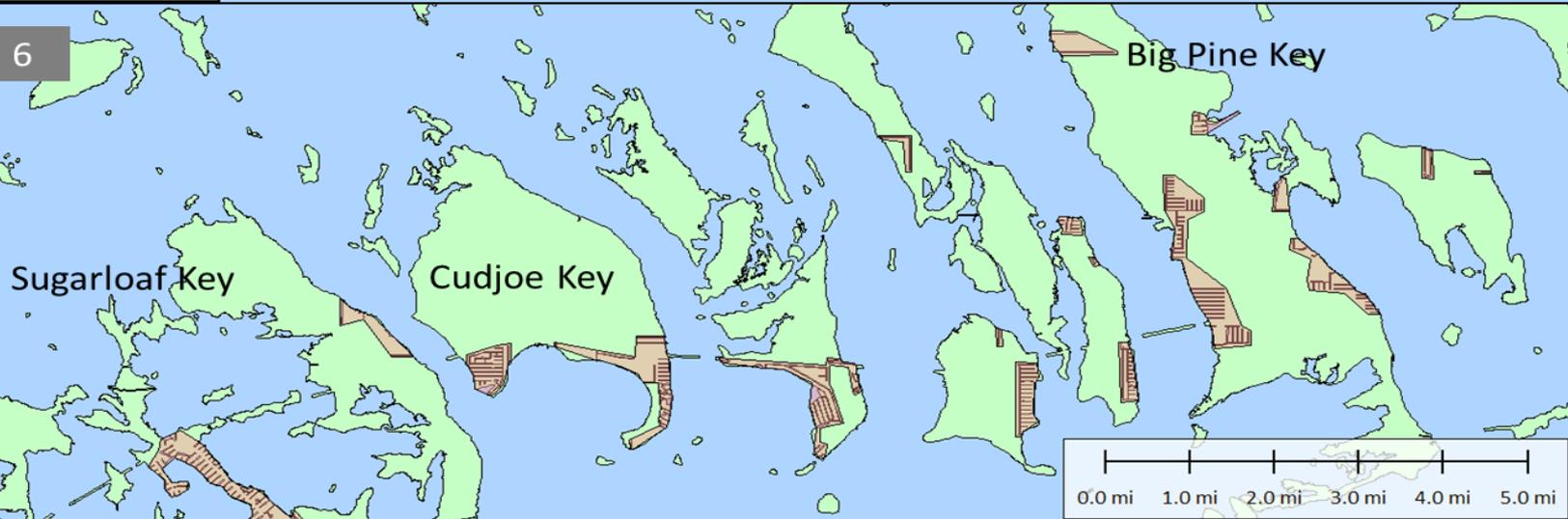
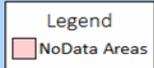


# Monroe-Keys Missing Data (con't)

## Monroe-Keys 5



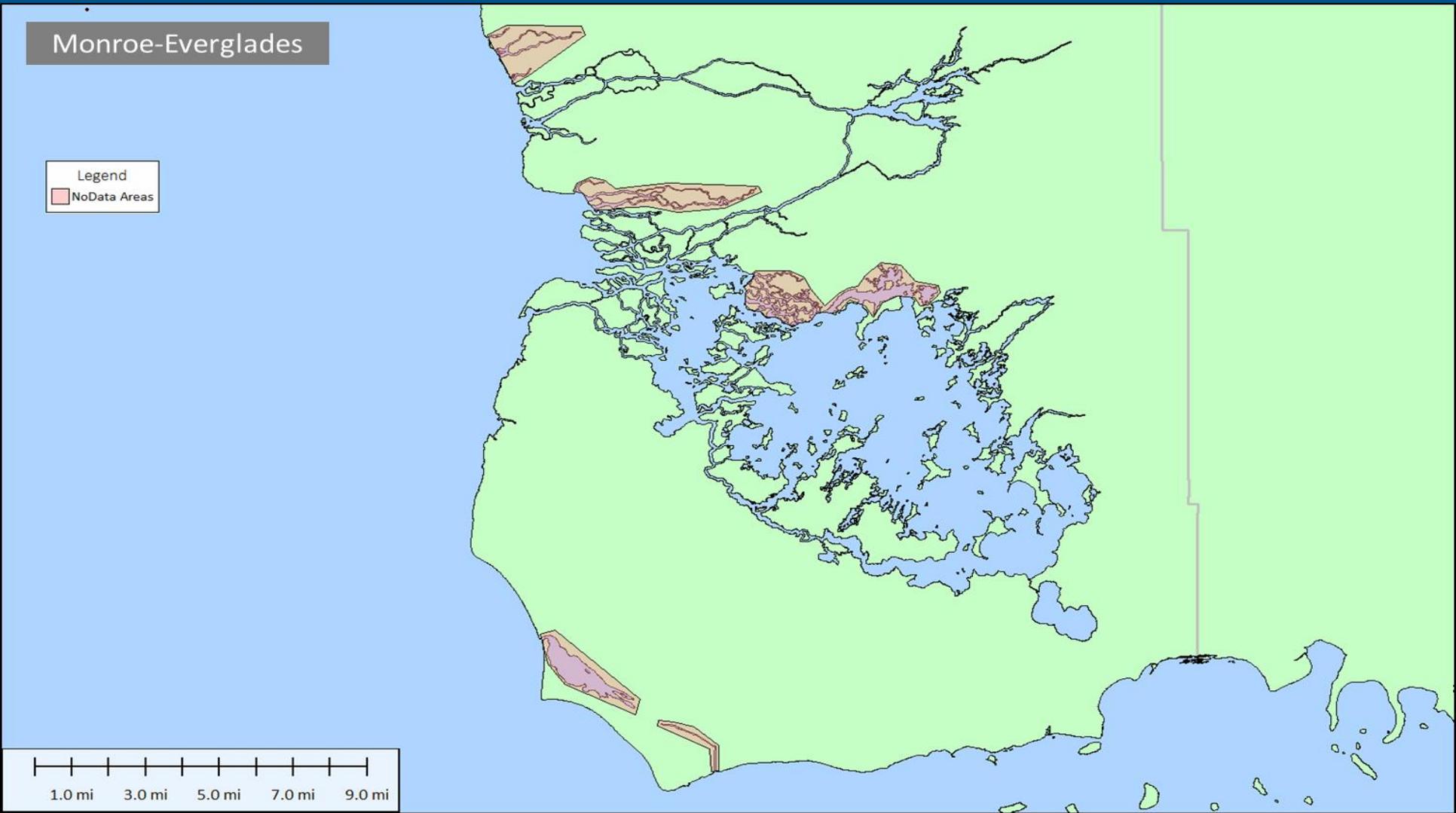
## Monroe-Keys 6



# Monroe-Keys Missing Data (con't)



# Monroe-Everglades Missing Data



# Southeast Florida Coastal Study – Surge and Wave Modeling

## ■ ADCIRC and SWAN Coupled Model

- Identical, unstructured mesh with shared parallel computing infrastructure
- Run sequentially in time
- Wave induced water level changes

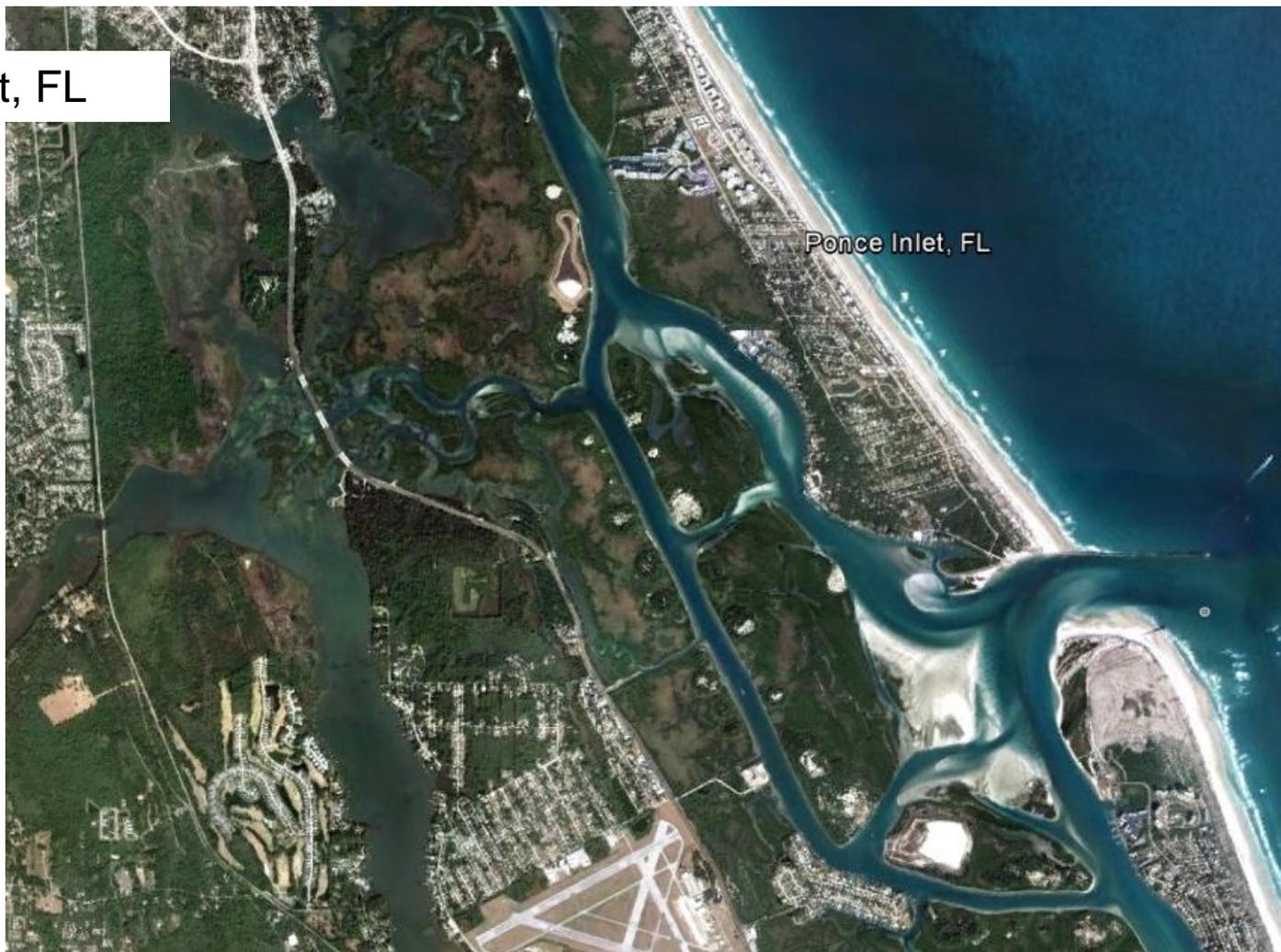
## ■ Mesh Development

- Good elevation data critical for terrain and bathymetry
- Identification of significant coastal features



# Hurricane Model Mesh – Example

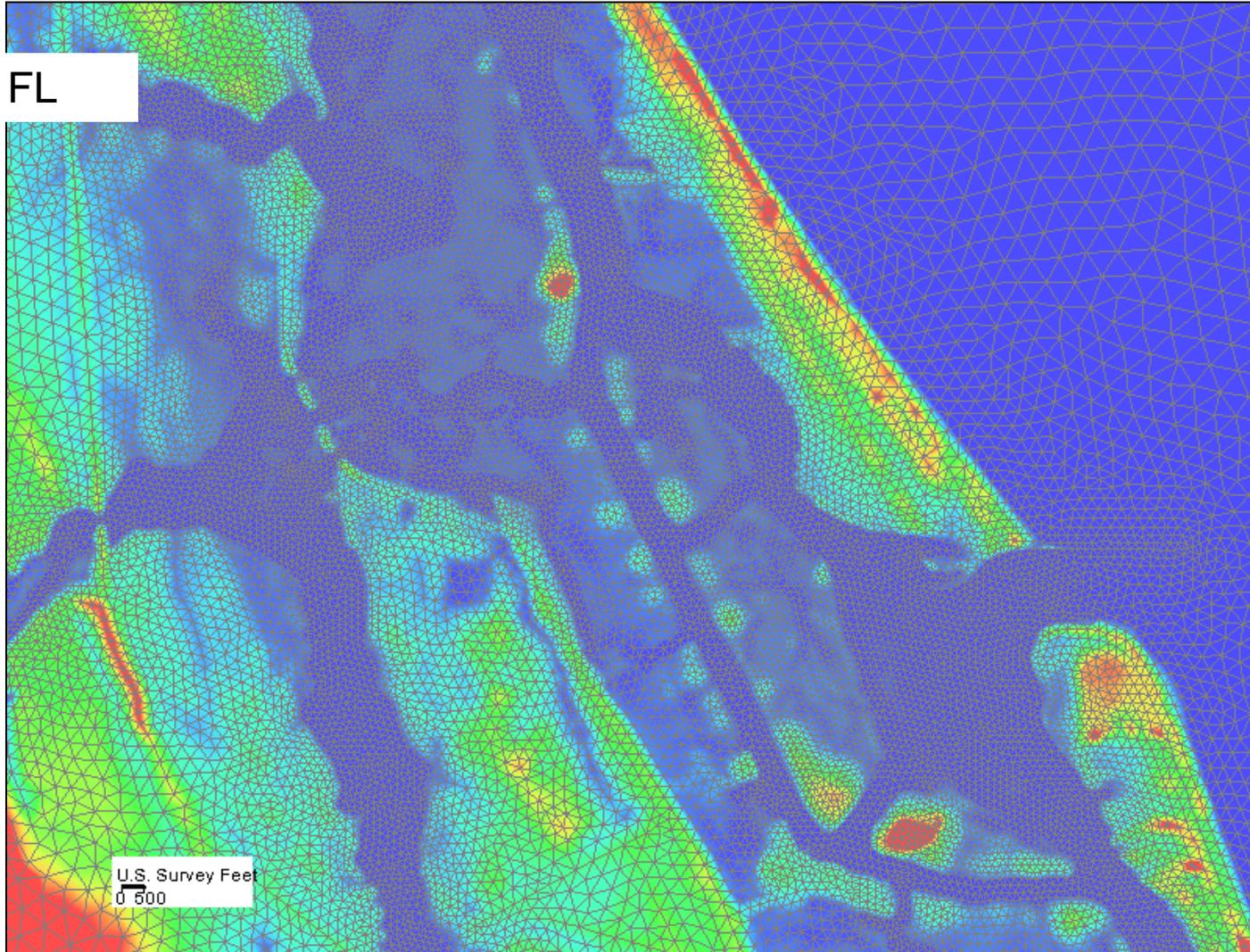
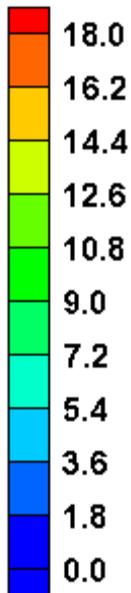
Ponce Inlet, FL



# Hurricane Model Mesh – Example

Ponce Inlet, FL

Elevation, ft-NAVD



# Southeast Florida Coastal Study – ADCIRC Mesh Development

- **Grid resolution drives costs**
  - What resolution is good enough? Too much or too little?
  - Canal/riverine features, levees/berms, hydraulic constrictions
- **Extensive sensitivity analyses**
  - Grid sizes, channel features/conveyance



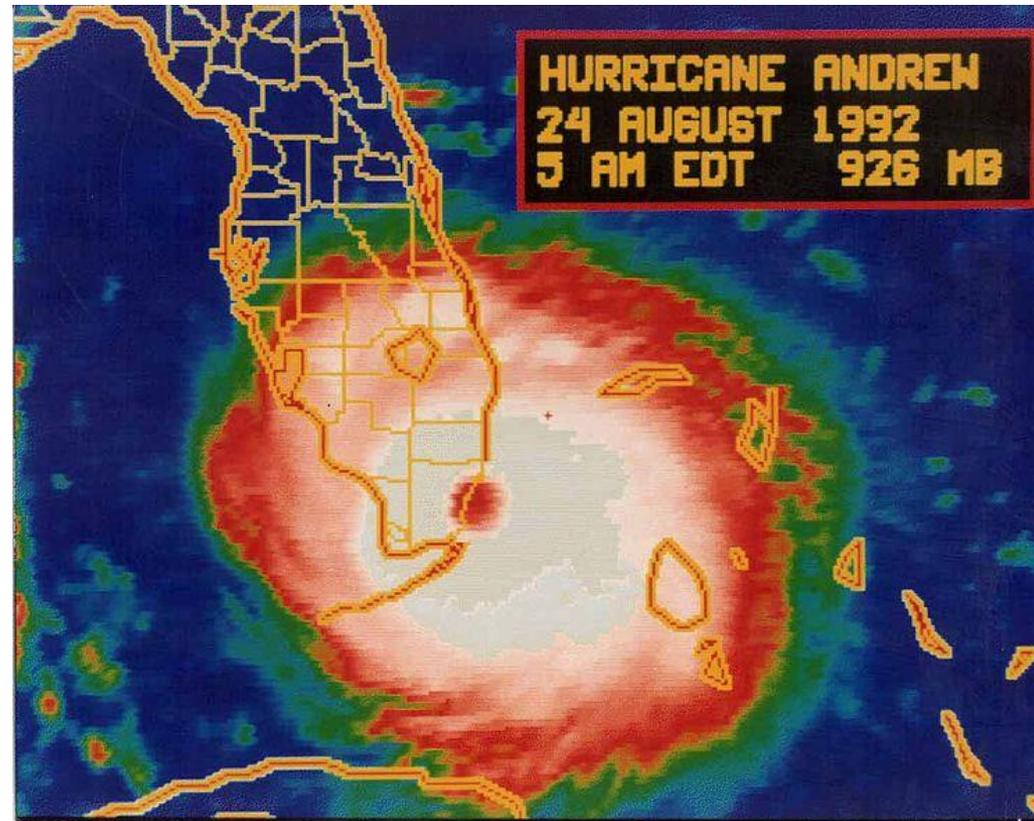
# Southeast Florida Coastal Study – Model Forcing and Validation

## ■ Tides

- ADCIRC response to tides
- Simulate multiple tides and examine results

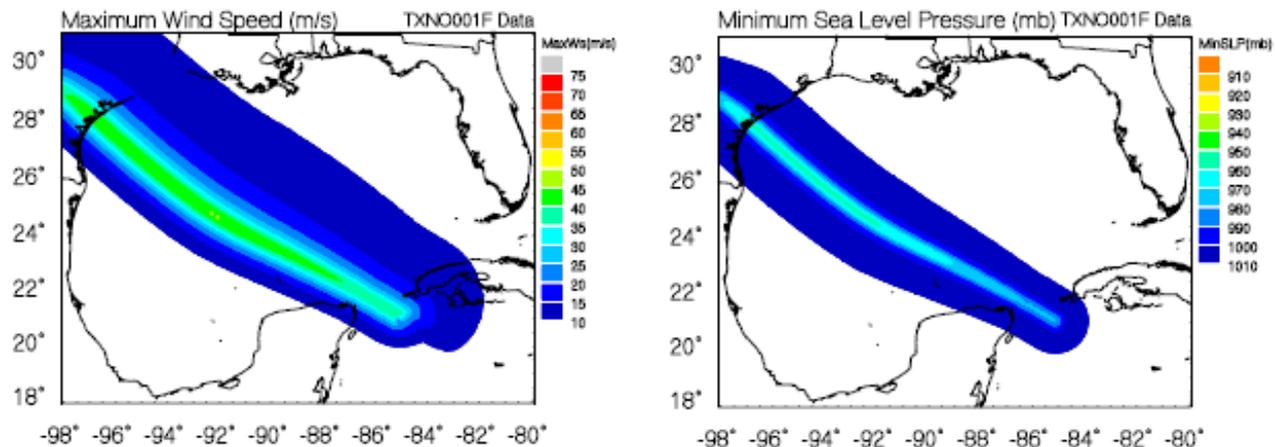
## ■ Historic Events

- Explore existing data
- Create wind field for historic events
- Simulate event and examine results



# Southeast Florida Coastal Study – Wind and Pressure Field Modeling

- Developed with JPM-OS procedure as objective – preliminary estimate of hundreds of storms
- Wind/pressure fields for the validation storms are based on observed data supplemented with theoretical values
- Team member Ocean Weather, Inc. (OWI)
- Example Oceanweather wind and pressure field (maximum)



# Southeast Florida Coastal Study – Statistical Approach

- **Develop an array of synthetic storms**
- **Five primary parameters**
  - Central pressure deficit
  - Radius to maximum wind speeds
  - Storm track heading
  - Forward velocity
  - Shoreline crossing point
- **Run enough storms to give valid statistical sample set**



## Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update

Final Draft

February 2007

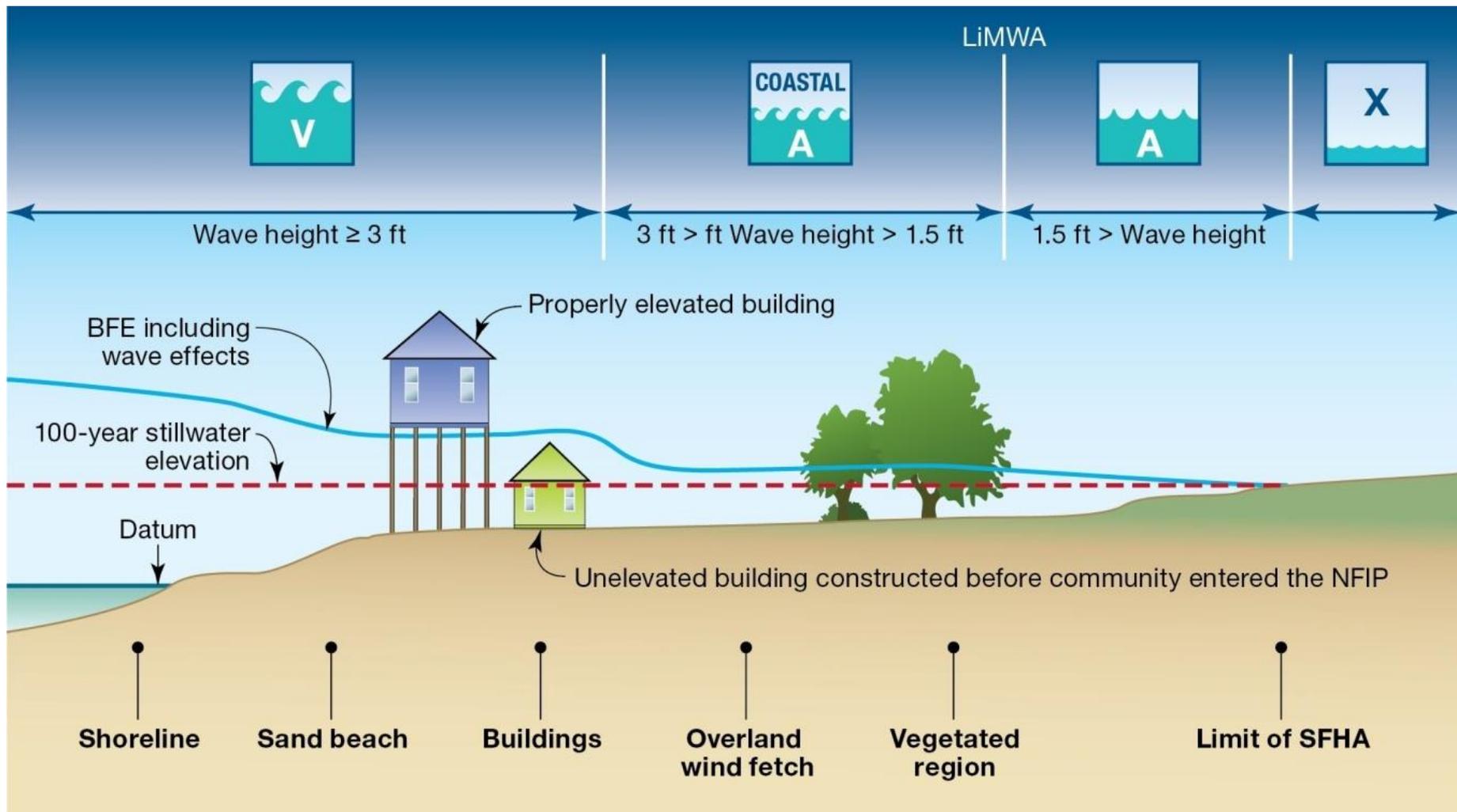


# Southeast Florida Coastal Study – Overland Wave Modeling

- **Wave Height Analysis for Flood Insurance Studies – WHAFIS**
  - 1-D model – using GIS allows huge amount of transects
  - Capable of variable obstructions including vegetation types (rigid and flexible) and buildings (area of obstruction)

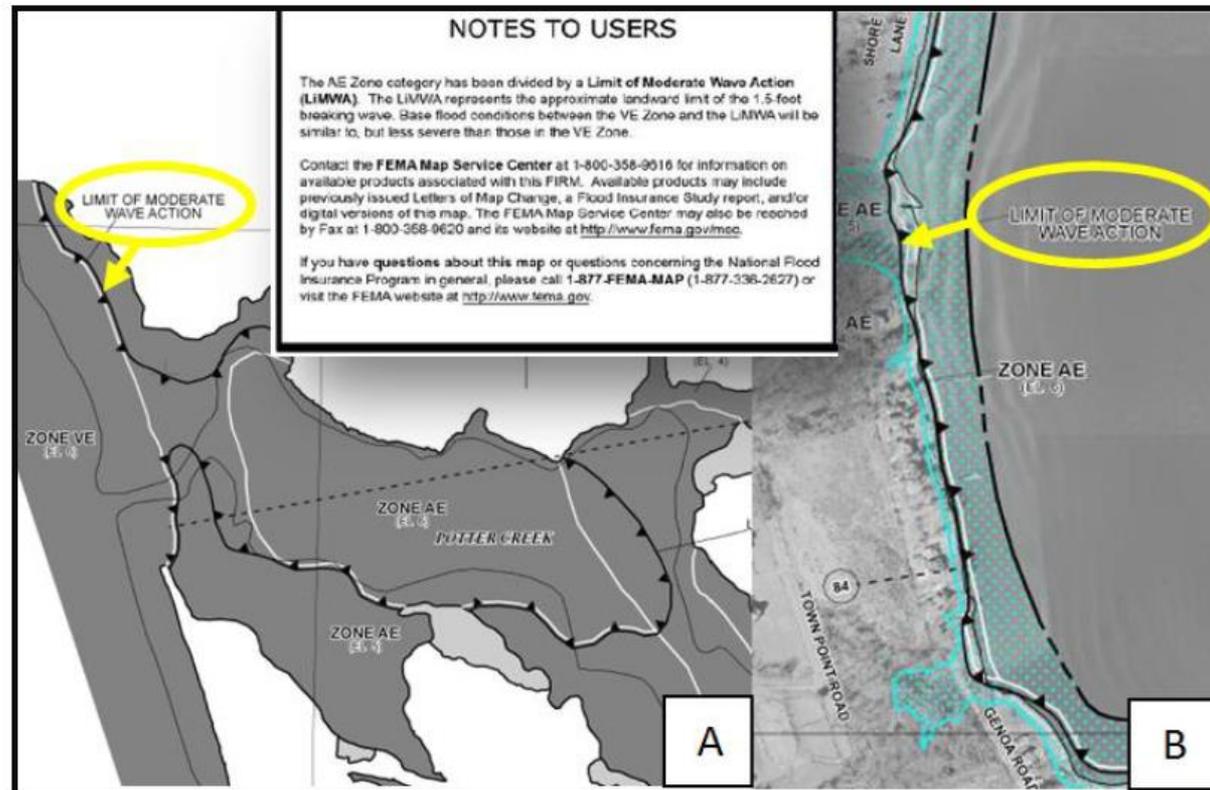


# Southeast Florida Coastal Study – Floodplain Mapping



# Limit of Moderate Wave Action (LiMWA)

- FEMA Procedure Memorandum No. 50, 2008
- At present not a regulatory requirement
- No Federal Insurance requirements tied to LiMWA
- CRS benefit for communities requiring VE Zone construction standards in areas defined by LiMWA or areas subject to waves greater than 1.5 ft.

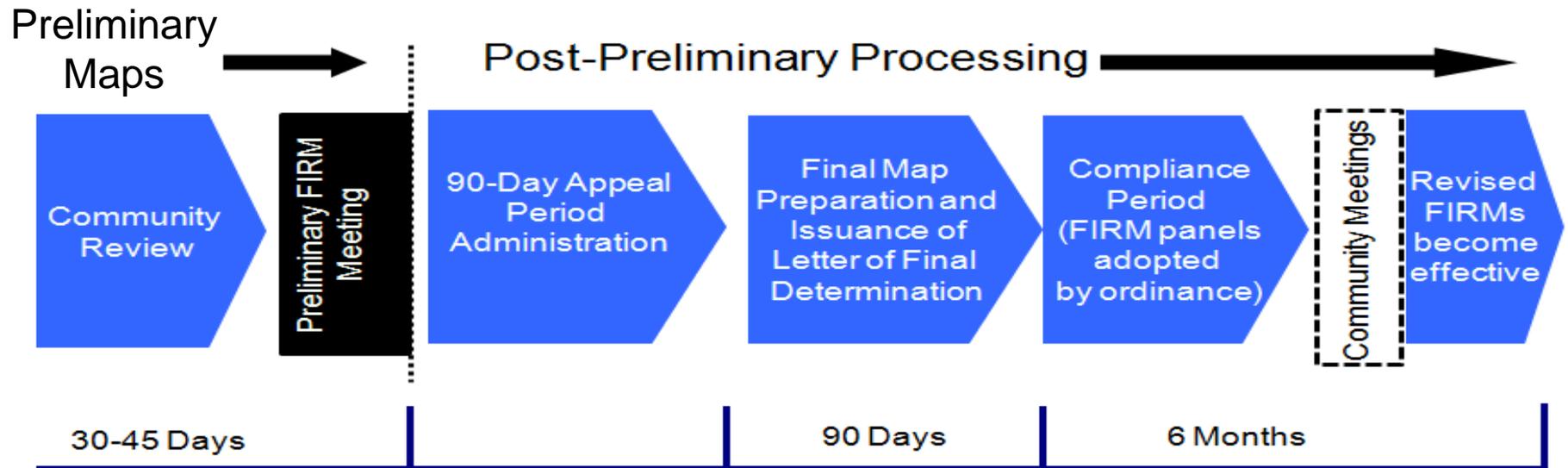


# Primary Frontal Dune (PFD)



*“a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms” –NFIP regulations*

# Southeast Florida Coastal Study – From Preliminary to Effective FIRMs



# Southeast Florida Coastal Study – Project Deliverables



# Updated Regulatory Products



## FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 2



### FLOOD COUNTY, USA AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CITY OF COASTLAND	123456
FLOOD COUNTY UNINCORPORATED AREAS	123457
TOWN OF FLOODVILLE	123458
CITY OF METROPOUS	123459
VILLAGE OF UPLAND*	123460

\*No Special Flood Hazard Areas Identified



**FEMA**

**EFFECTIVE:**  
DECEMBER 31, 2011

FLOOD INSURANCE STUDY NUMBER  
12345C1000X

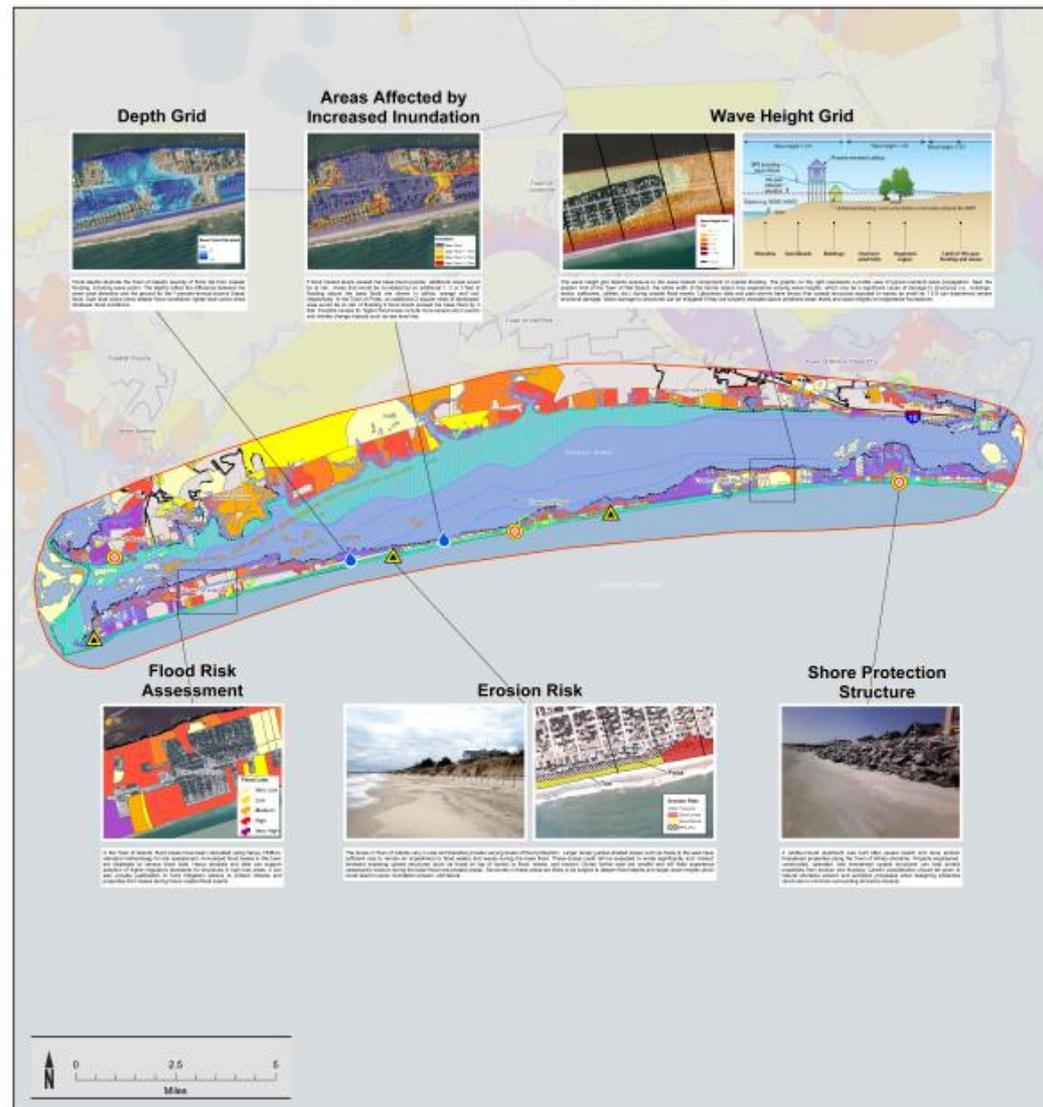
Version Number: 1.0.0.0

# A Suite of Coastal Non-Regulatory Products

- Coastal Flood Risk Map
- Changes Since Last FIRM
- Coastal Depth Grids
- Increased Inundation Areas
- Wave Height
- Primary Frontal Dune Erosion Areas
- Dune Peak
- HAZUS Analysis

# Coastal Flood Risk Map

## Flood Risk Map: Coastal USA



**MAP SYMBOLOLOGY**

Base Data	Flood Data	Flood Risk	Areas of Mitigation Interest
<ul style="list-style-type: none"> <li>Corporate Limits</li> <li>Major Roads</li> <li>Waterfront Boundary</li> <li>State Boundary</li> </ul>	<ul style="list-style-type: none"> <li>Rivers and Streams</li> <li>Resubdiv Area</li> <li>New OP&amp;B, Coastal Emerge, Influence Areas</li> <li>New Zone-VI</li> </ul>	<ul style="list-style-type: none"> <li>Very Low</li> <li>Low</li> <li>Medium</li> <li>High</li> <li>Very High</li> </ul>	<ul style="list-style-type: none"> <li>Unconnected Levees</li> <li>Non-attached Levees</li> <li>Dams</li> <li>Coastal Structures</li> <li>Stream Flow Constrictions</li> <li>Post-Storm Har Spill</li> <li>Key Emergency Routes</li> <li>Developed Dunes</li> <li>Freeport Flooding Events</li> <li>At-Risk Essential Facility</li> <li>Islands of Assistance (II) and Public Assistance (PA) Data</li> <li>Significant Level-Low Changes (within the past 5 years and looking forward 5 years)</li> <li>Areas of Significant Flooding at Coastal Erosion</li> <li>Nav/Lanes Embankments</li> <li>Other Flood Risk Areas</li> <li>Areas of Mitigation Success</li> <li>Other</li> </ul>

**COASTAL STUDY LOCATOR**

**Risk Mapping, Assessment, and Planning (Risk MAP)**

FRM FLOOD RISK MAP: COASTAL COASTAL USA

HUC # Code: N/A

For more information of data used for the non-regulatory map, please consult the Coastal USA Flood Risk Database and Flood Risk Report.

RELEASE DATE: 11/30/2011

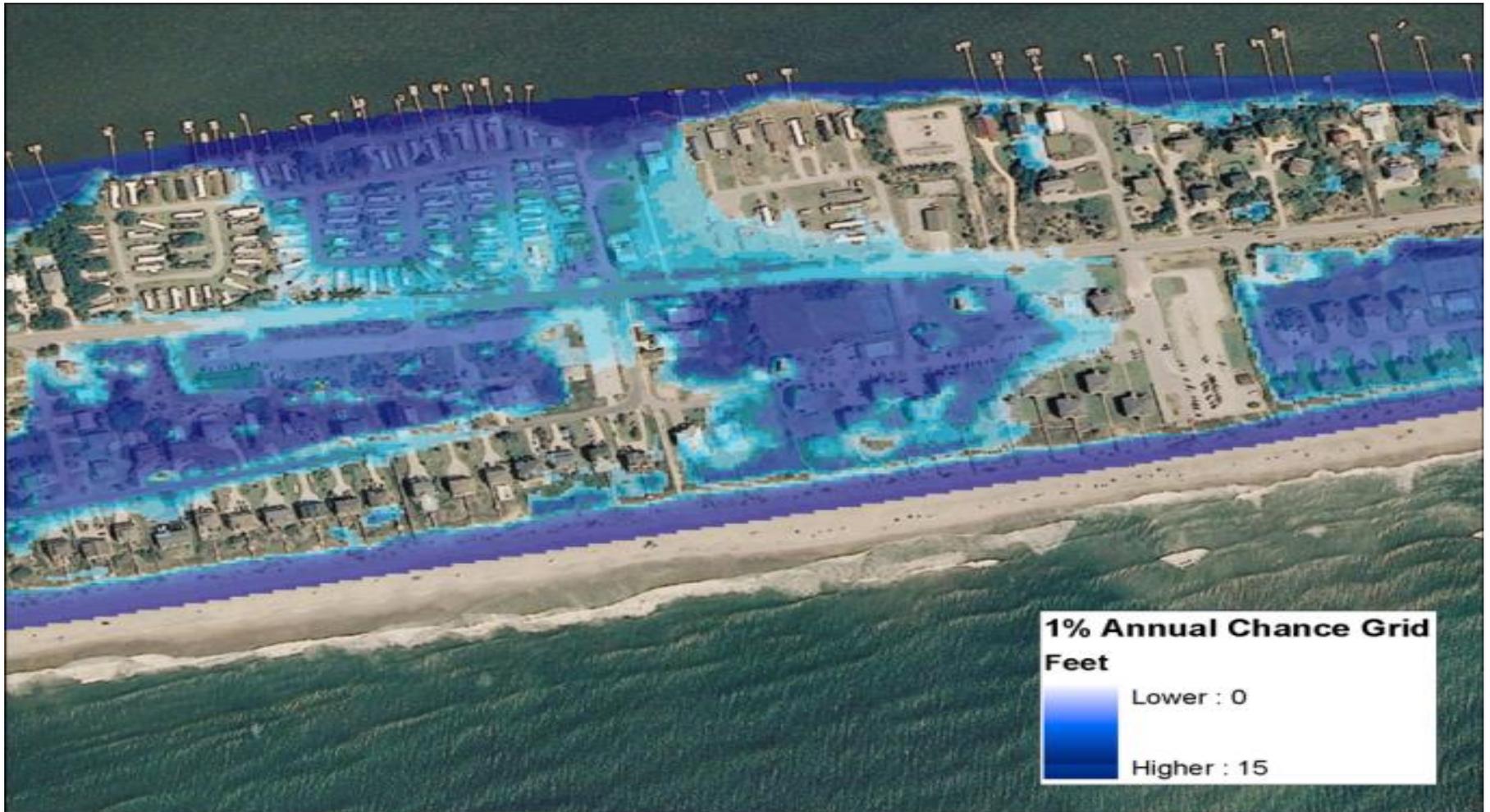
# Coastal Changes Since Last FIRM

- **Makes it easy for communities and homeowners to identify impacts of new FIRM**
- **Assists in prioritizing mitigation actions**
- **Helps identify reasons for changes**

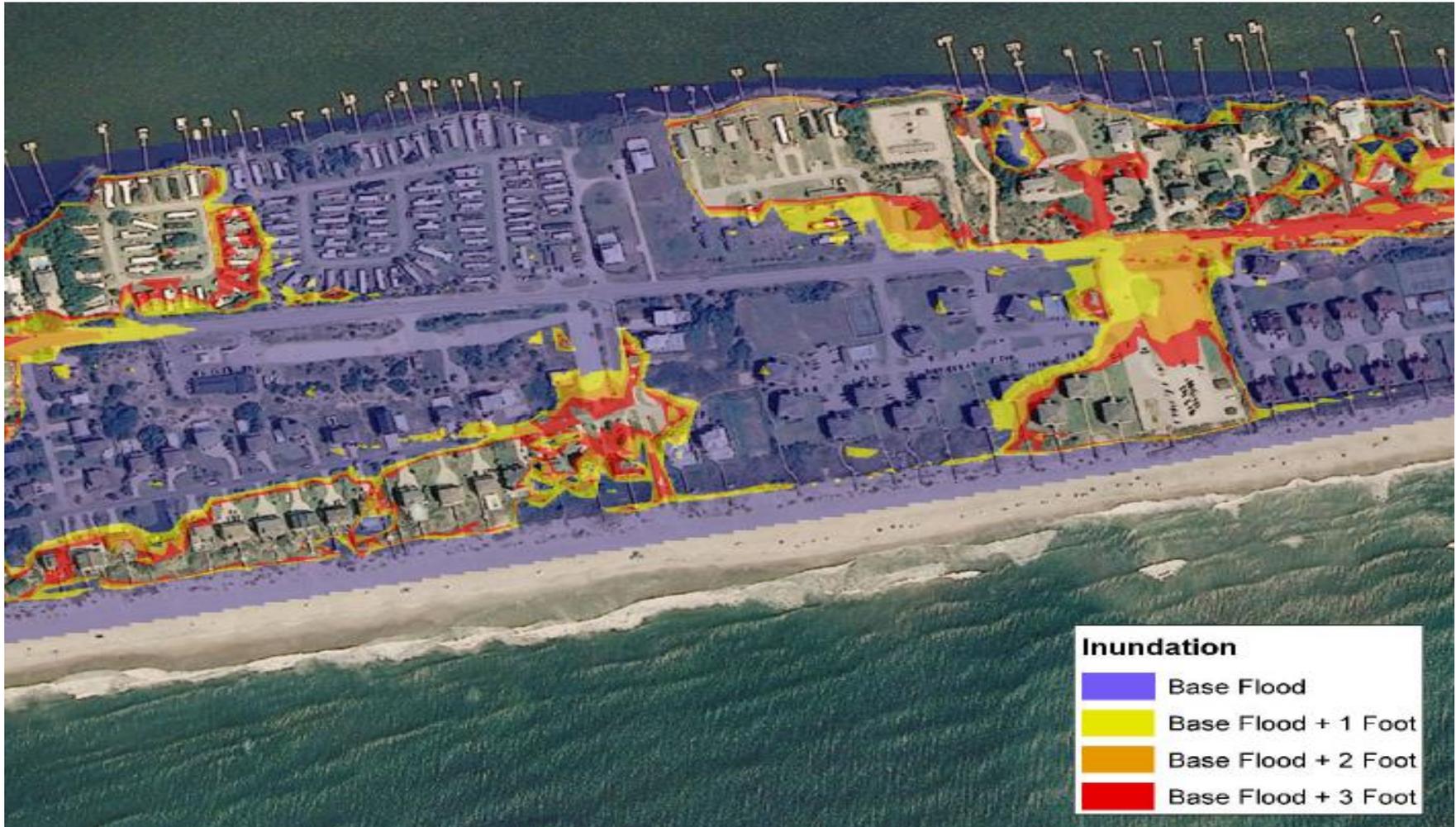
## Changes Since Last FIRM



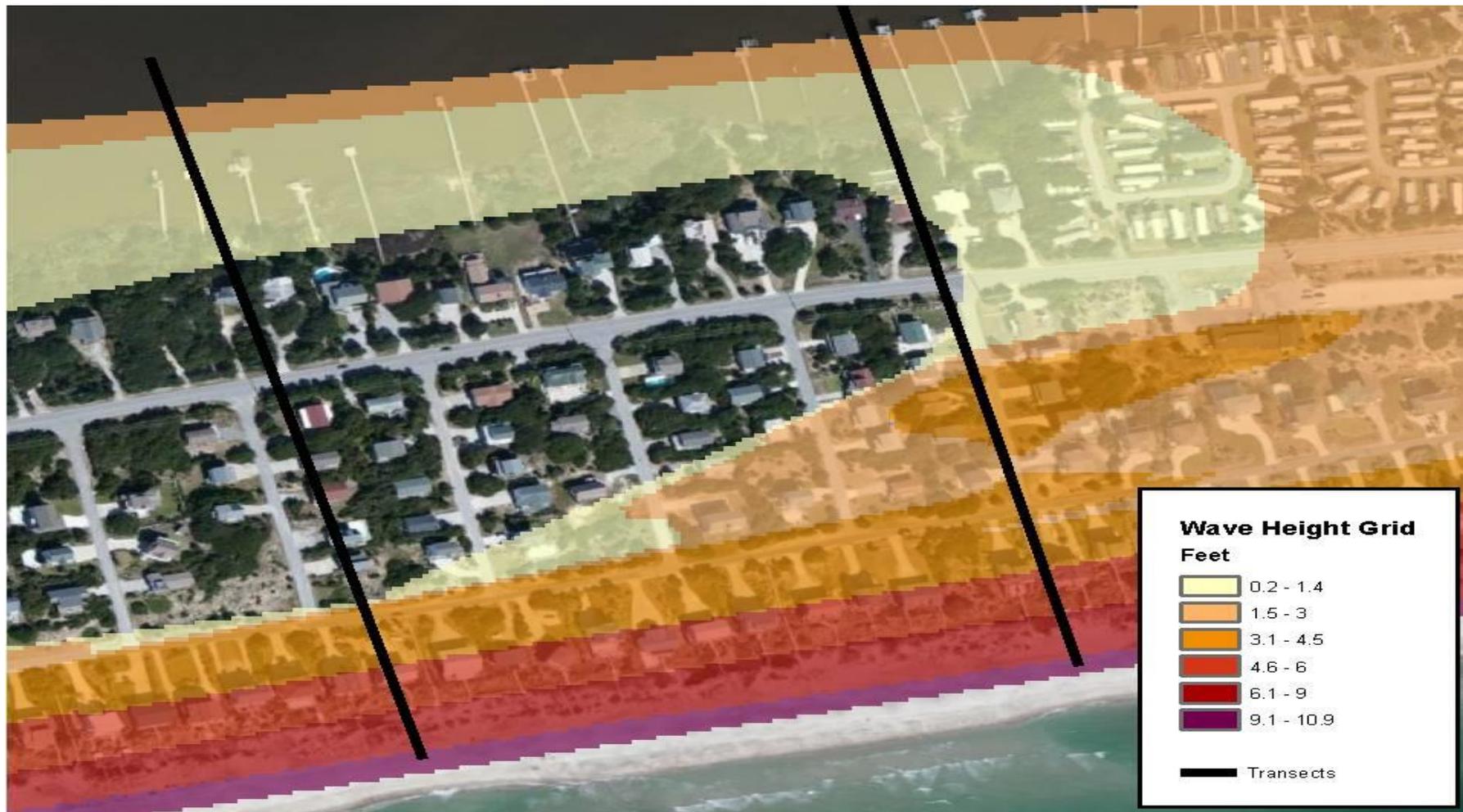
# Coastal Depth Grid



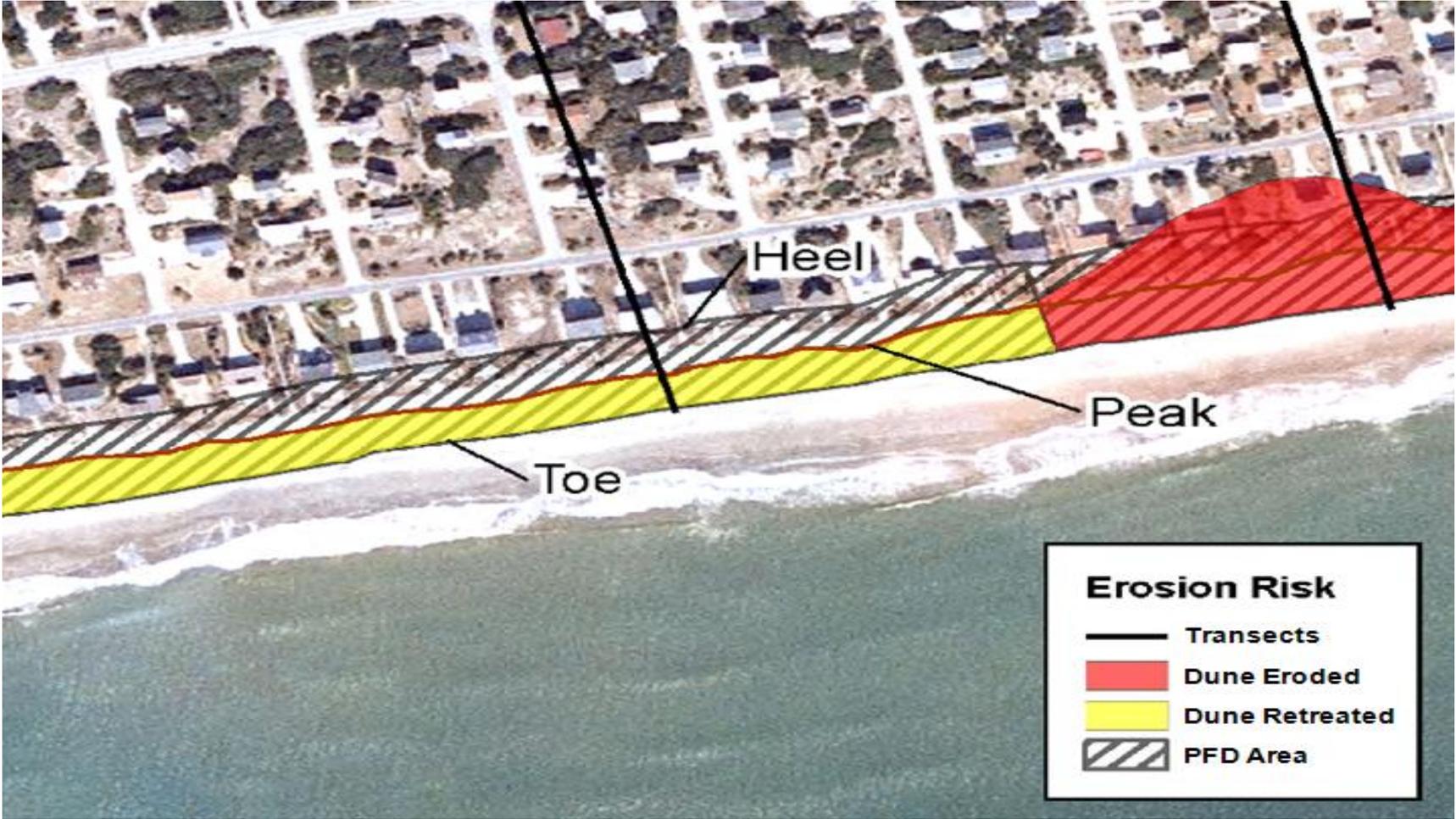
# Coastal Increased Inundation Areas



# Simplified Coastal Zones



# Dune Size and Location



# HAZUS Analysis



# Discovery Process



# Southeast Florida Coastal Study – Discovery Overview

Review current flood hazards and risks and  
collect data



Understand local mitigation activities and  
capabilities and hazard risk assessments



Develop outreach strategy for the life of the  
project

# Discovery Data Collected to Date

Effective Flood  
Data and  
Historical Flood  
Information

Community  
Assessment  
Surveys

Local Mitigation  
Strategies and  
Mitigation  
Projects

Key Project  
Stakeholders

# Local Knowledge – Data Availability

## Base map data / terrain data

- Terrain data – TOPO or BATHY
- Orthophotos
- Updated roads, political boundaries, and public works projects
- Land use data

## Coastal structures

- Seawalls, revetments, beach nourishment, protection structures
  - Specifications or as-built drawings
  - Historical flood performance
  - Repairs, maintenance, or reconstruction



# Local Knowledge – Data Availability

## Historic flood hazard information

- Erosion hazard areas
- Areas subject to wave damage and overtopping

## Current flood studies

- For existing or anticipated development or mitigation
- Flood studies or flood map revisions in progress (CLOMR LOMR)

## Stakeholder Ideas?



# Local Knowledge – Identify Key Stakeholders

1. Recommend other community staff
2. **Suggest additional stakeholders**
3. Let us know if your contact information changes



# Local Knowledge – Your Completed Questionnaire



## Southeast Florida Risk MAP Coastal Study Discovery Insight Gathering **MONROE COUNTY**

Thank you for taking the time to complete this questionnaire. The information that you provide will help FEMA understand the flood risk in your community. It will also help FEMA work with you to implement the Risk MAP program. The goal of the program is to increase public awareness and understanding of the flood hazard in your community and to inspire action to reduce risks to life and property from this hazard.

Some of the questions below will ask if your community has specific data sets applicable to this project. If so, please let us know if FEMA can use this data for the project in the Additional Comments box for each question.

BakerAECOM, LLC is FEMA's Production and Technical Services Contractor and is administrating this questionnaire. Please return your questionnaire to Michael Taylor, BakerAECOM, by e-mail at [Michael.Taylor@aecom.com](mailto:Michael.Taylor@aecom.com) or by fax at 404.965.9605. You can also mail your completed questionnaire to:

Michael Taylor  
AECOM  
1360 Peachtree Street NE, Suite 500  
Atlanta, GA 30309

# Mitigation Planning

## ■ Local Mitigation Strategies:

- Help guide your decisions on mitigation activities for all hazards you face
- Are an important resource responsible for responding to disasters
- Can help you apply for assistance to take action



# Local Mitigation Strategies

<b>County LMS</b>	<b>Expiration Date</b>
<b>Palm Beach</b>	<b>January 2015</b>
<b>Broward</b>	<b>March 2018</b>
<b>Miami-Dade</b>	<b>May 2015</b>
<b>Monroe</b>	<b>December 2015</b>



# Local Mitigation Strategy Updates

**Risk MAP Products can help enhance the flood risk portion of your Hazard Mitigation Plan**

**Risk MAP Products can help you identify and prioritize future flood mitigation activities**

# Southeast Florida Coastal Study – Outreach Efforts

## Community Engagement Tools

- e-Bulletins
- Webinar updates
- Project Charter

## Website

[www.southeastcoastalmaps.com](http://www.southeastcoastalmaps.com)

- Meeting materials
- Periodic updates

## Community Engagement

## Meetings

- Discovery and Kick-off Meeting
- Storm Surge Analysis Update Meeting
- Flood Risk Review Meeting
- Resilience Meeting
- CCO Meeting/Open House

## Contacts

- FEMA Study Manager
- Project Manager
- Discovery Lead
- Outreach Lead

# Southeast Florida Coastal Study – Community Meetings

Community Meetings

**Discovery Kick-Off  
Meeting**

**Discovery Meeting  
Technical Update  
Meeting**

**Storm Surge Analysis  
Update Meeting**

**Flood Risk Review  
Meeting**

**Resilience Meeting**

**Preliminary DFIRM  
Community  
Coordination Meeting**

**Public Open Houses**



# Next Steps

Today we will seek your input on flooding issues, development patterns, best available data, and mitigation projects.



Today we will work with you to review your community survey.



Today we will ask that you sign the Project Charter.



Based on today's discussion, will provide you with:

An Updated Discovery Map

A Discovery Report

# Southeast Florida Coastal Study – Points of Contact



**FEMA**

**BakerAECOM**

An Integrated Production Team

**Mark Vieira, PE**

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**[mark.vieira@fema.dhs.gov](mailto:mark.vieira@fema.dhs.gov)**

**Michael DelCharco, PE**

**904.472.0082**

**[Mdelcharco@taylorengeering.com](mailto:Mdelcharco@taylorengeering.com)**

**Christina Lindemer**

**770.220.5424**

**[christina.lindemer@fema.dhs.gov](mailto:christina.lindemer@fema.dhs.gov)**

**Michael Taylor, PE**

**404.946.9488**

**[Michael.Taylor@aecom.com](mailto:Michael.Taylor@aecom.com)**