

SEA LEVEL RISE IN THE FLORIDA KEYS – COMMUNITY PLANNING AND IMPLEMENTATION

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ICMA Conference Presenter



What Happens When the World Comes to Your Doorstep?

TODAY'S PRESENTATION:

- ⌘ When world issues such as the environment become immediately relevant to your local government.
- ⌘ How to get a true analysis of the issue?
- ⌘ How can you temper the controversy?
- ⌘ Creating community advocates and spokespersons.
- ⌘ Prepare those working on the front lines of your organization to handle such issues and collaborate with the community.





MONROE COUNTY, FLORIDA AN ISLAND COMMUNITY



ISSUE: Experiencing Sea-Level Rise and Related Effects of Climate Change

Non-Storm Related Flooding



Storm Related



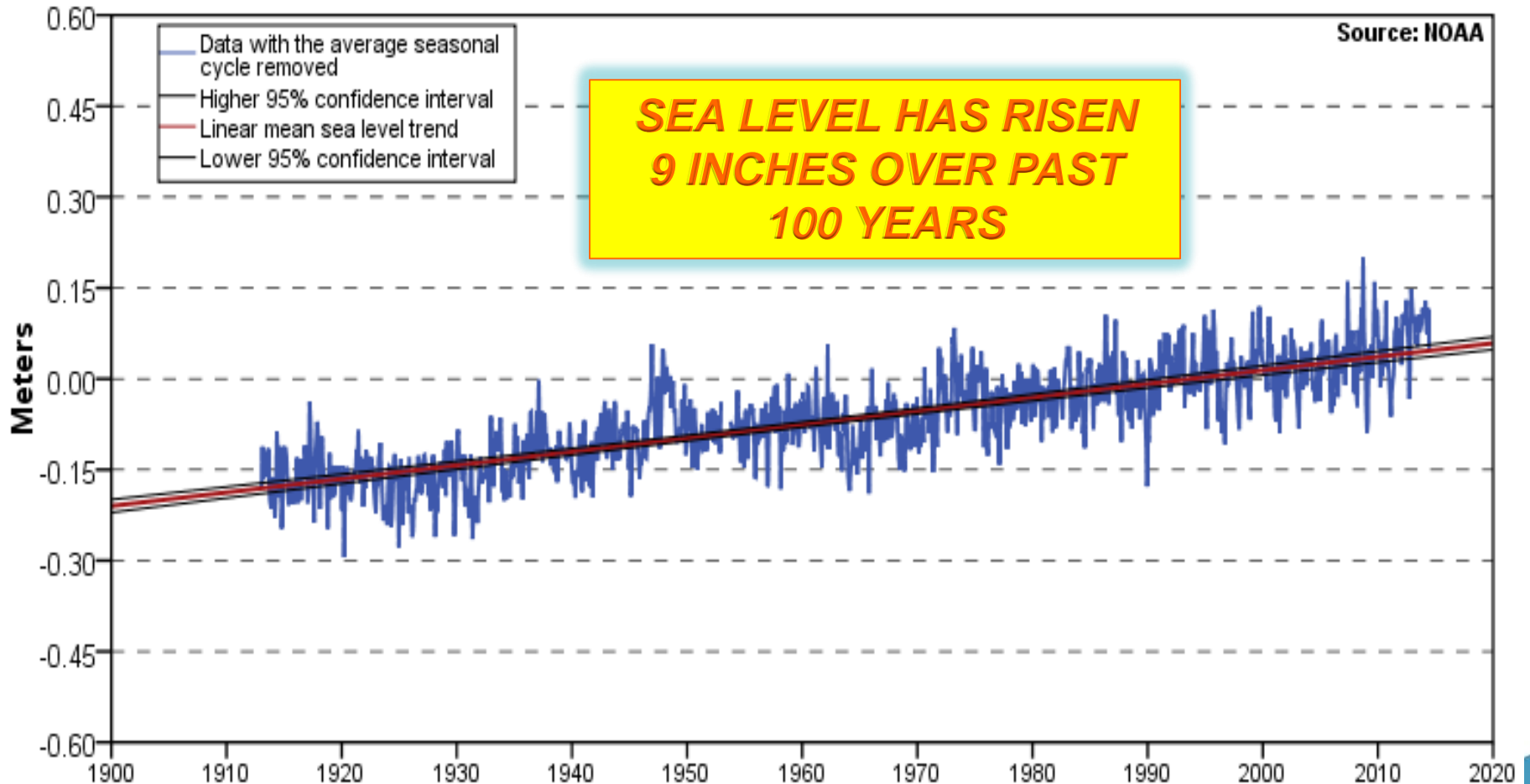
Non-Storm Related Flooding



Photo by *The New York Times*

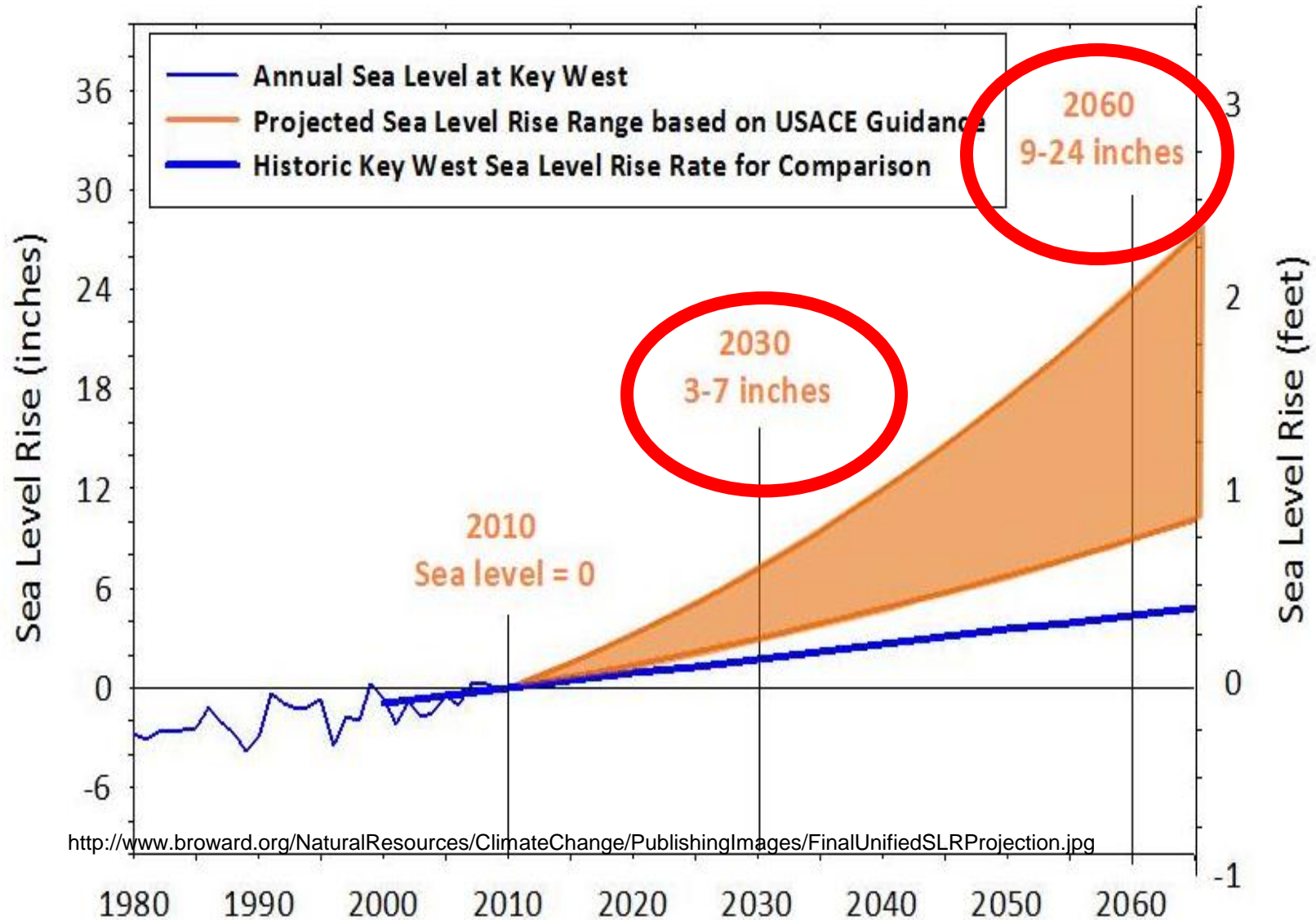
Current Sea Level Rise In Monroe County

Key West, FL 2.24 ± 0.16 mm/yr



Future Sea Level Rise

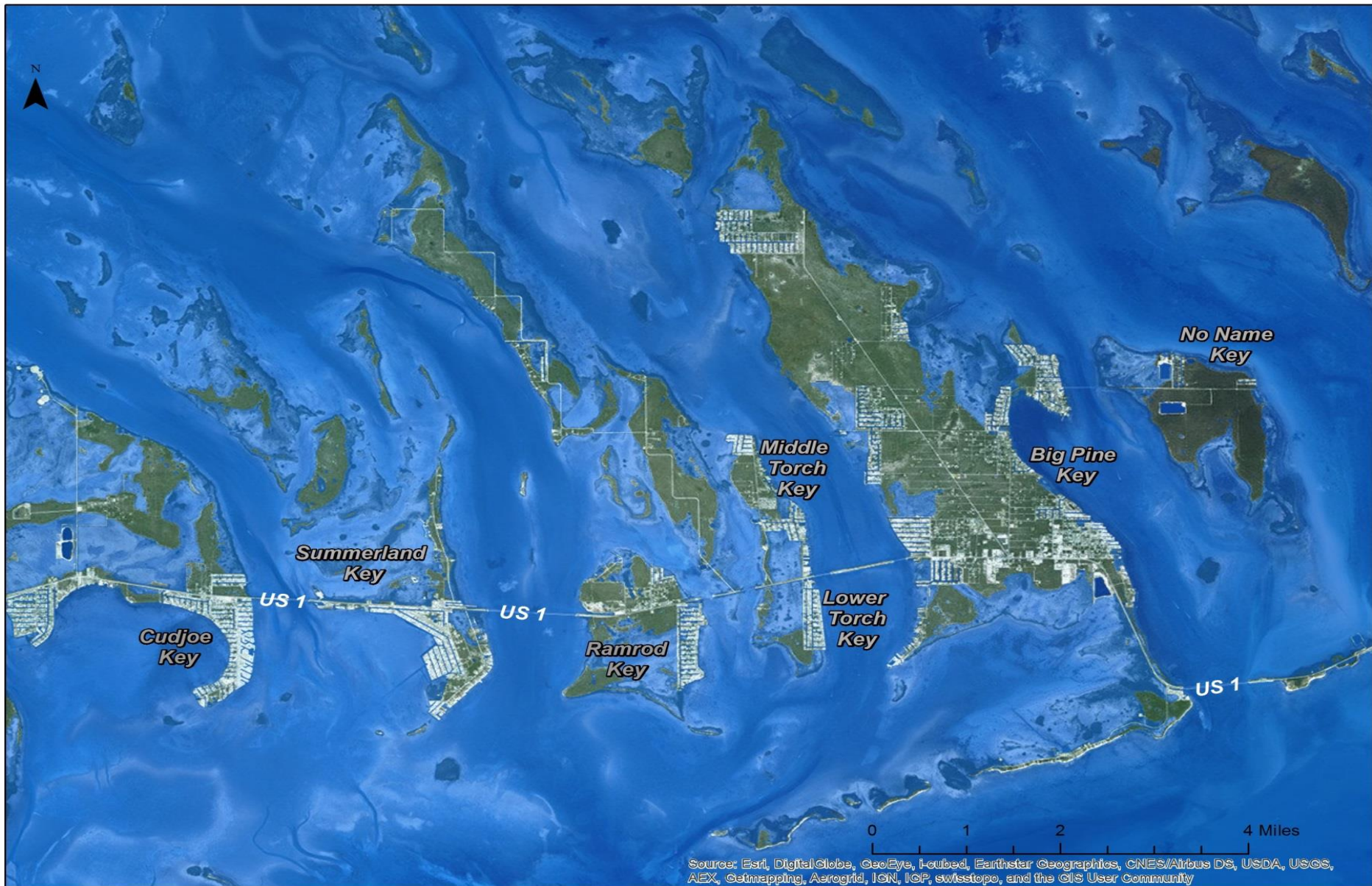
Predictions Adopted by *Southeast Florida Regional Climate Compact*



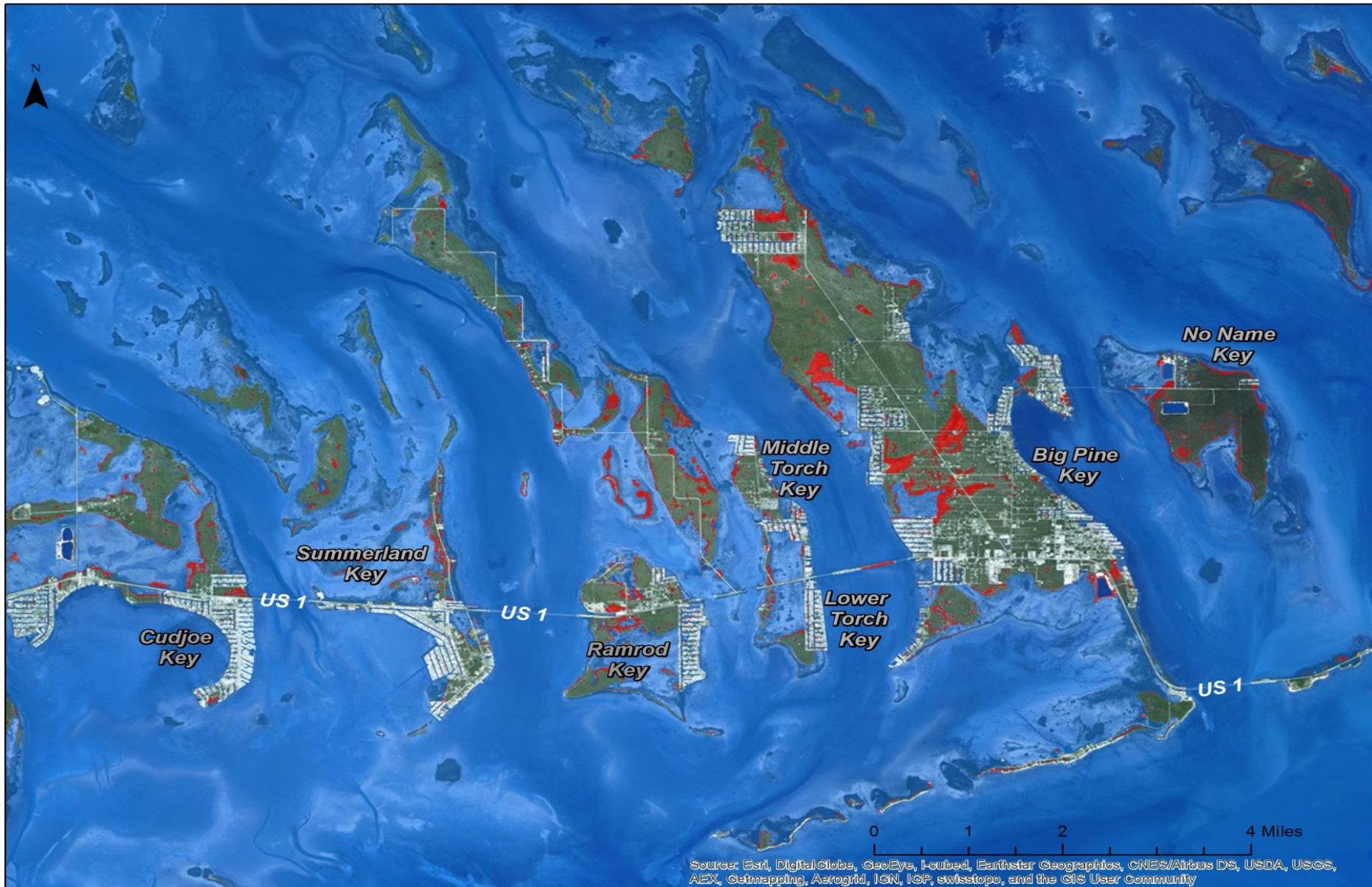
PROJECTED NEIGHBORHOOD INUNDATION LEVELS



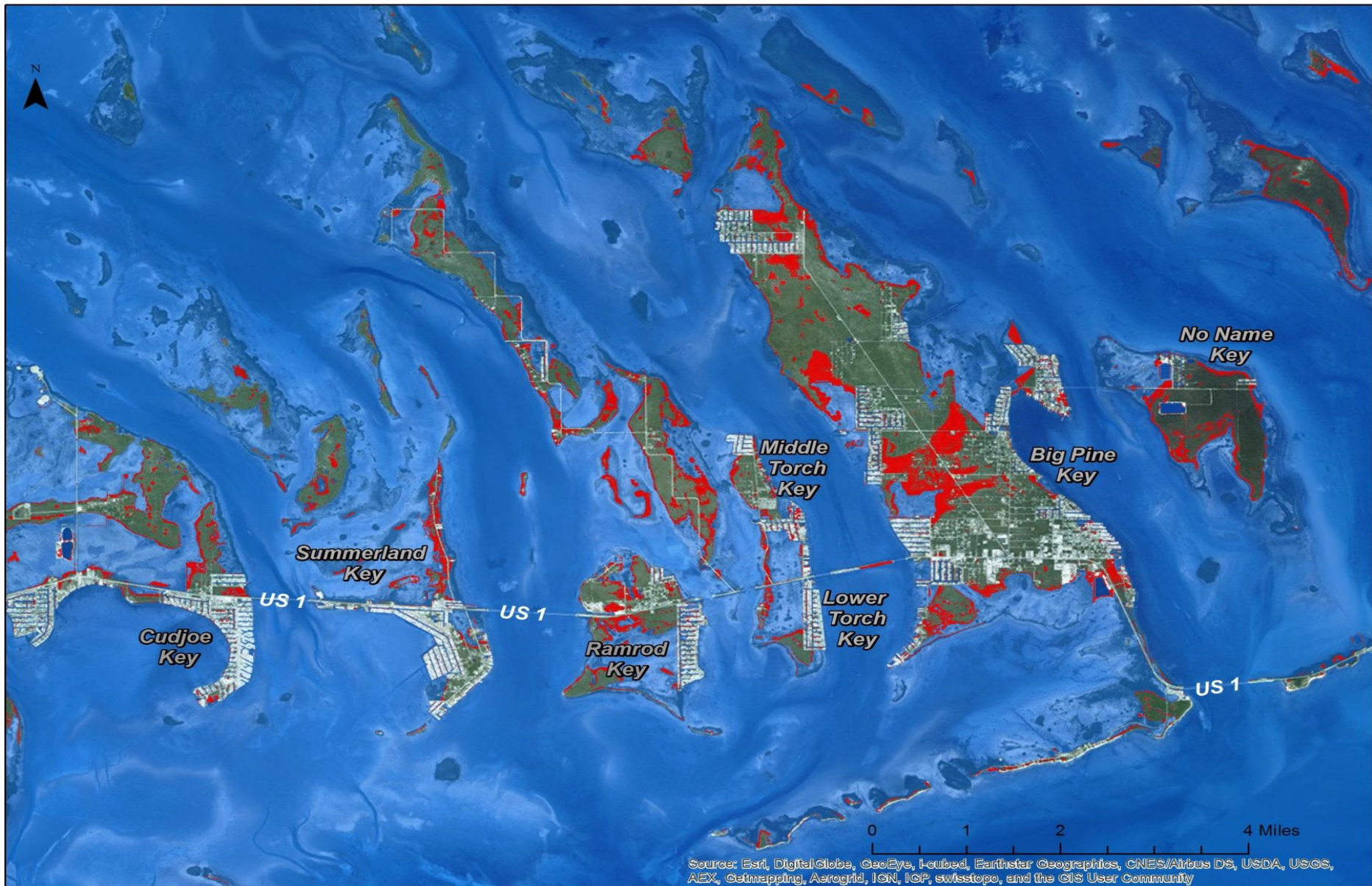
Big Pine Key to Cudjoe Key, Present Day



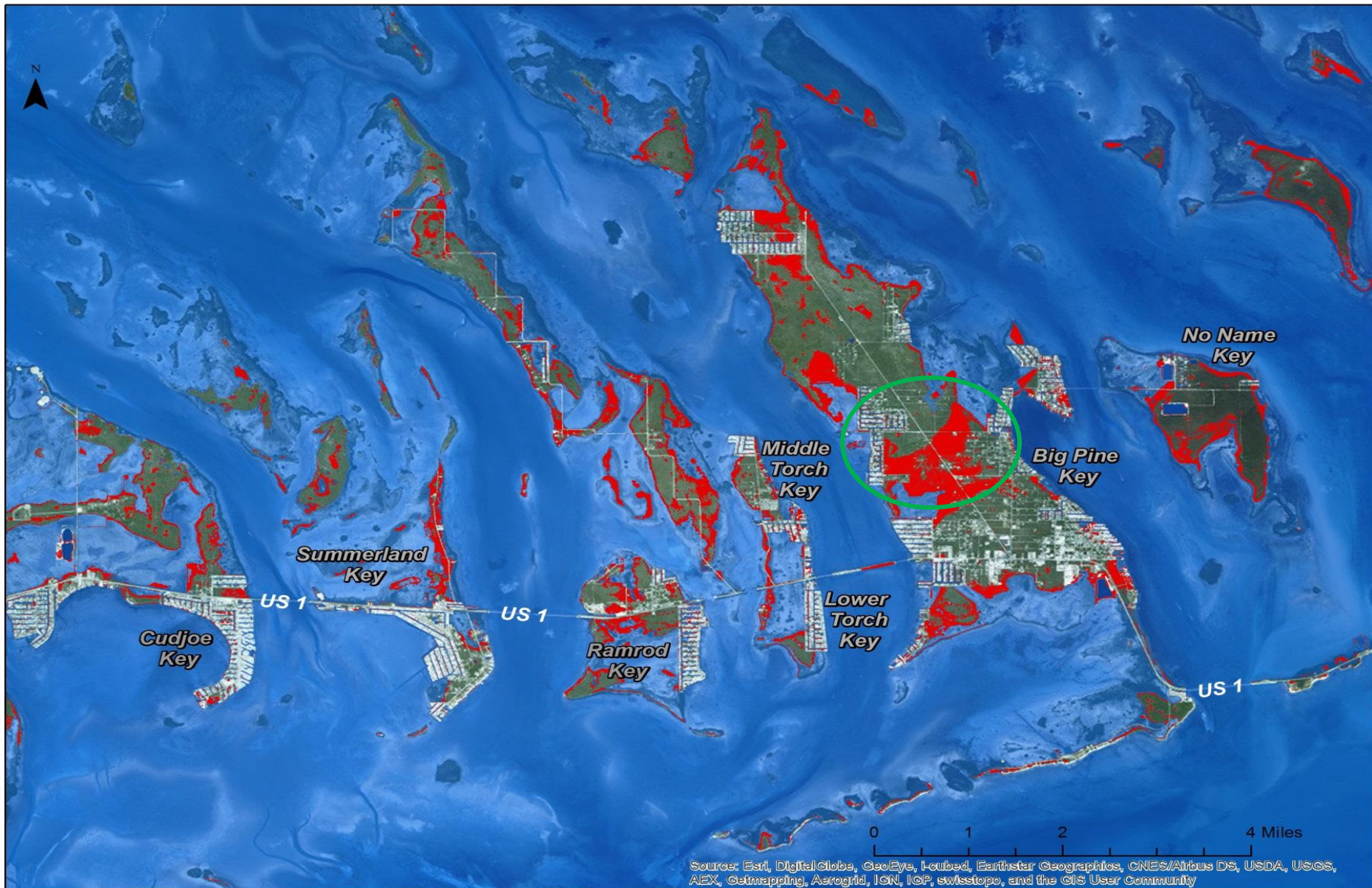
Big Pine Key to Cudjoe, **3 inches** Sea Level Rise - Low Scenario **2030**



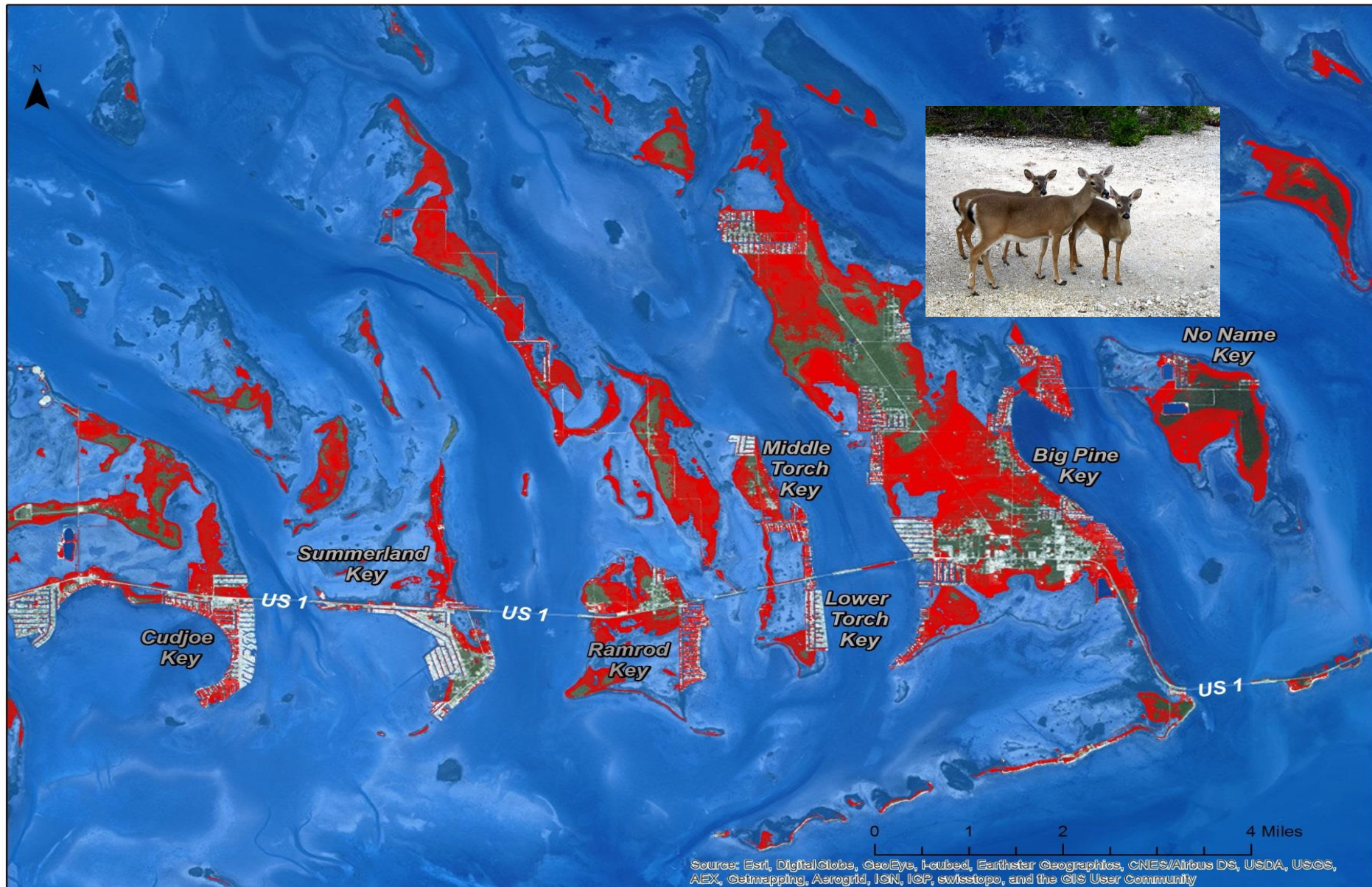
Big Pine Key to Cudjoe, **7 inches** Sea Level Rise *High Scenario 2030*



Big Pine Key to Cudjoe, **9 inches** Sea Level Rise Low Scenario **2060**



Big Pine Key to Cudjoe, **24 inches** Sea Level Rise *High Scenario 2060*



KEY WEST, PRESENT DAY



Key West, **3 inches** Sea Level Rise Low Scenario **2030**



Key West, **7 inches** Sea Level Rise High Scenario **2030**



Key West, **9 inches** Sea Level Rise Low Scenario **2060**



Key West, **24 inches** Sea Level Rise High Scenario **2060**



Effects to Habitat and Wildlife

24 inches of sea level rise (2060, High Scenario) could bring *daily* saltwater tides into **94%** of Monroe County's Freshwater Wetland Areas*



Key deer on Big Pine Key

<http://s3.amazonaws.com/trazzer-images/af/1505/00.jpg>

Effects To County Facilities

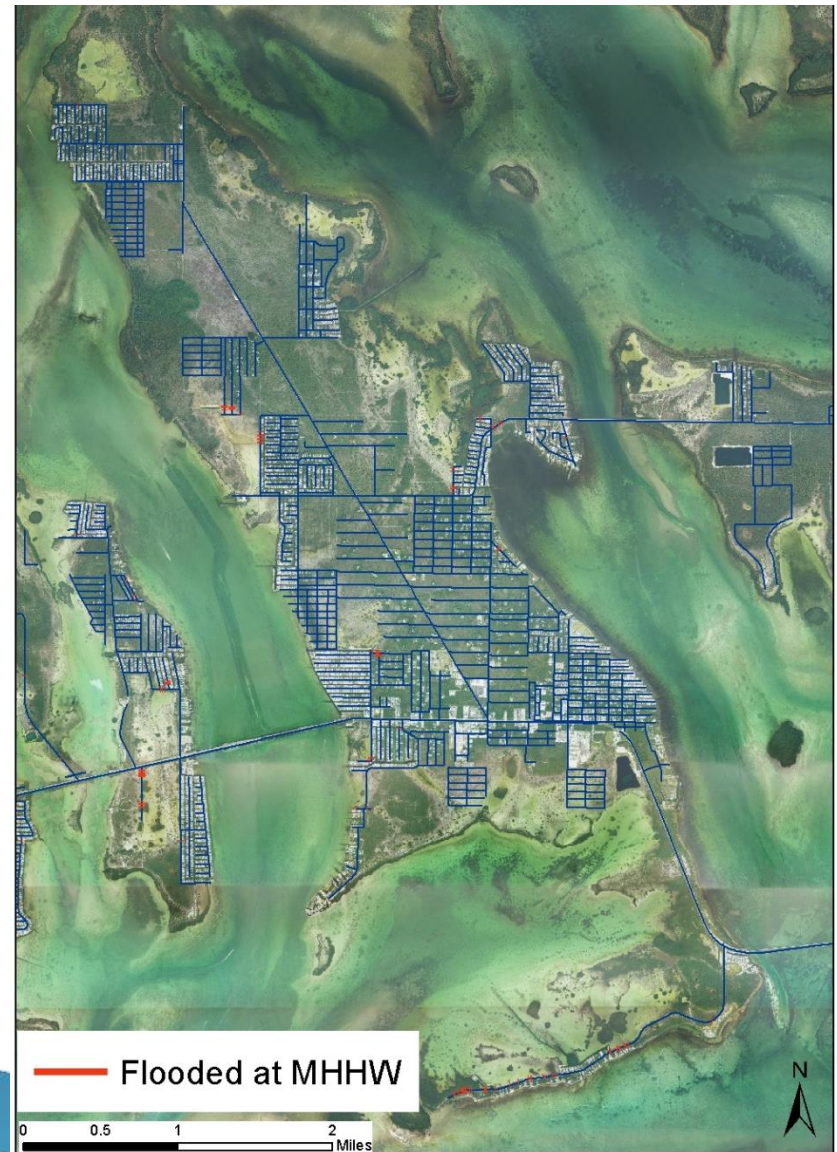
Evaluated 74 parcels with County-owned buildings and facilities

- **41%** show **flooding encroachment** at **3 inches** of sea level rise
- **53%** show flooding encroachment at **24 inches** sea level rise
- Buildings generally located on highest ground, but **access to them may be limited**



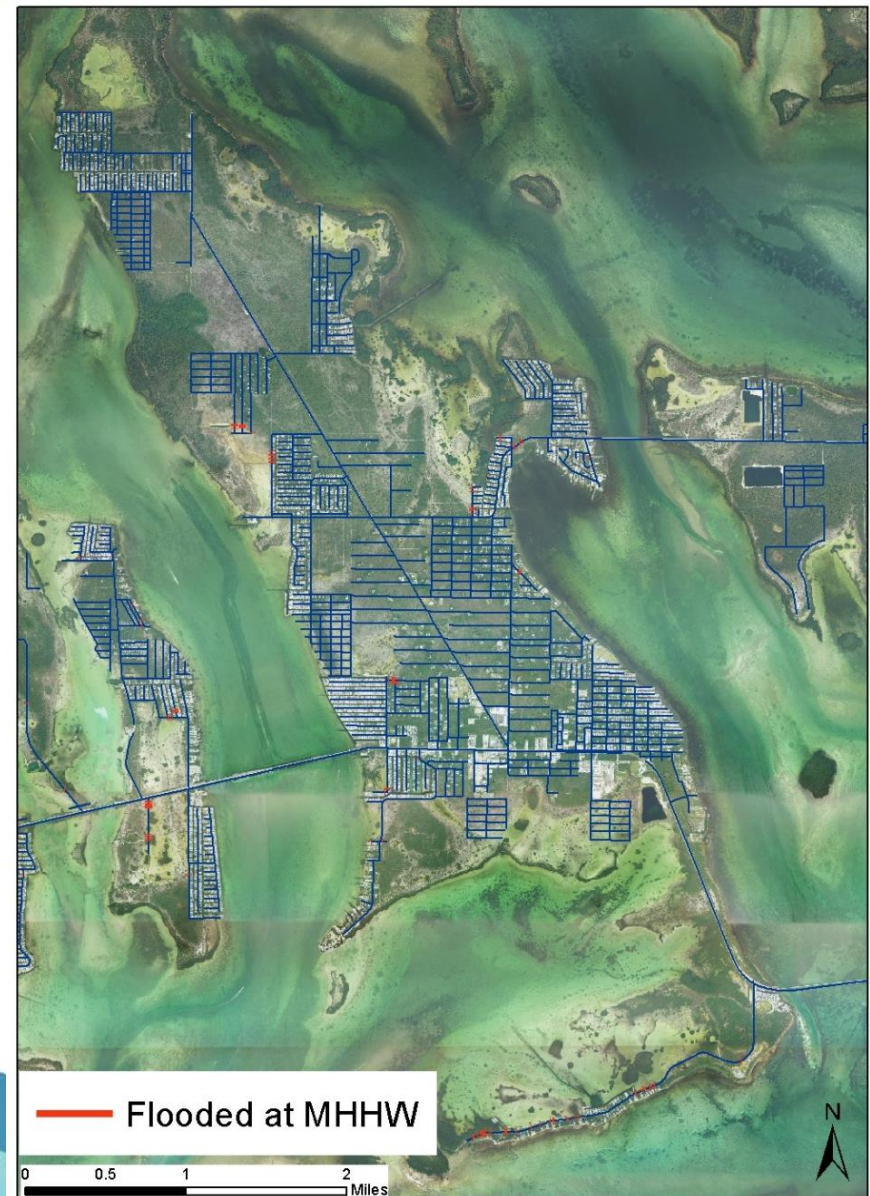
Effects to Neighborhood Roads

Big Pine Key Present Day



Big Pine Key

3 Inches
Sea Level Rise
Low Scenario 2030



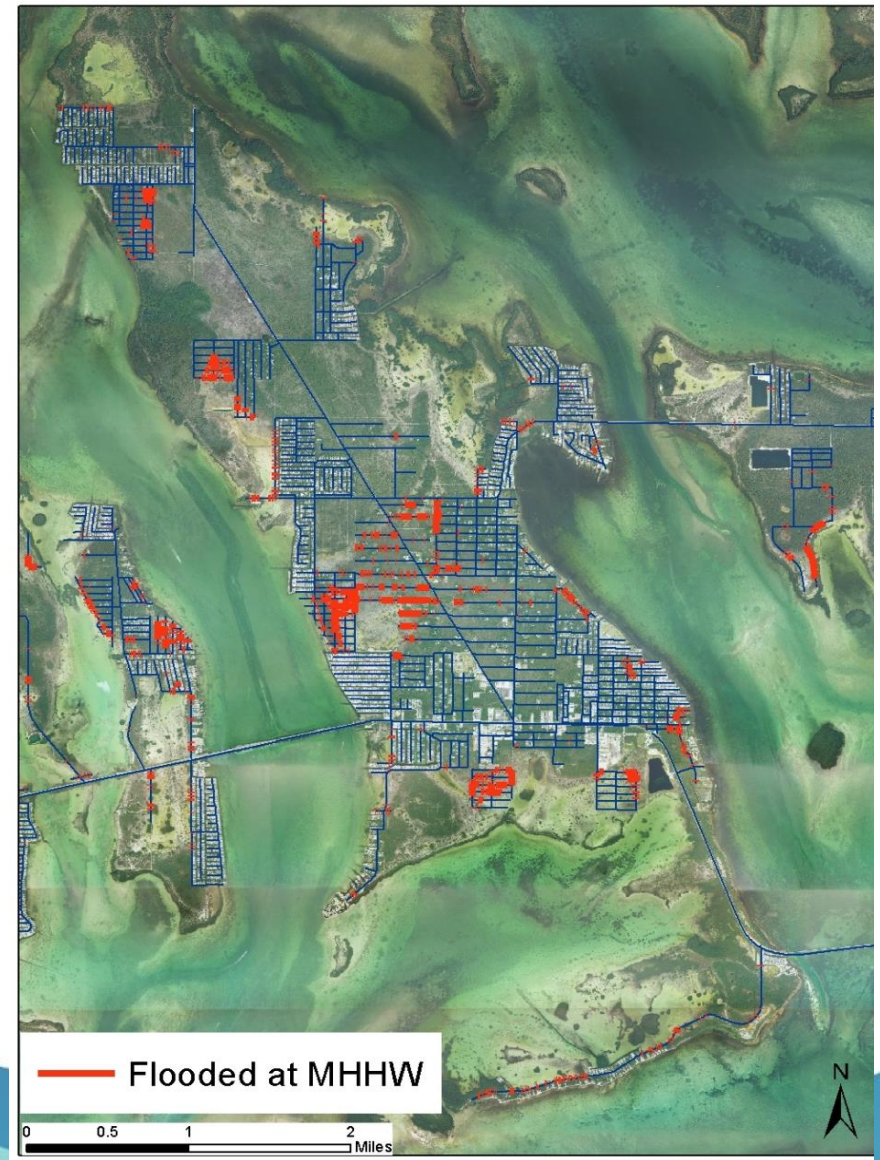
Big Pine Key

7 Inches
Sea Level Rise
High Scenario 2030



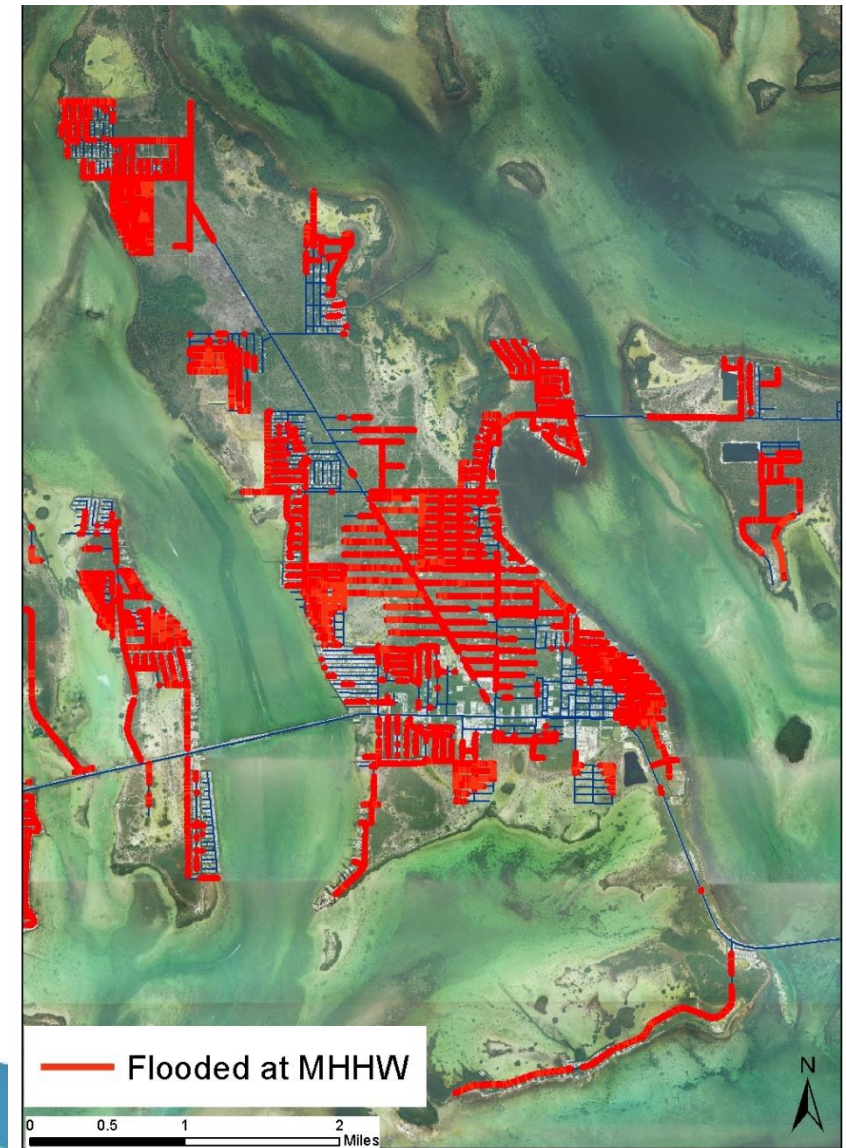
Big Pine Key

9 Inches
Sea Level Rise
Low Scenario 2060



Big Pine Key

24 Inches
Sea Level Rise
High Scenario 2060



ISLAMORADA: U.S.1

Lower Matecumbe Key – Present Day



Islamorada: U.S. 1 Lower Matecumbe Key

3 Inches Sea Level Rise **2030** Low Scenario



Islamorada: U.S. 1 Lower Matecumbe Key

7 Inches Sea Level Rise 2030 High Scenario



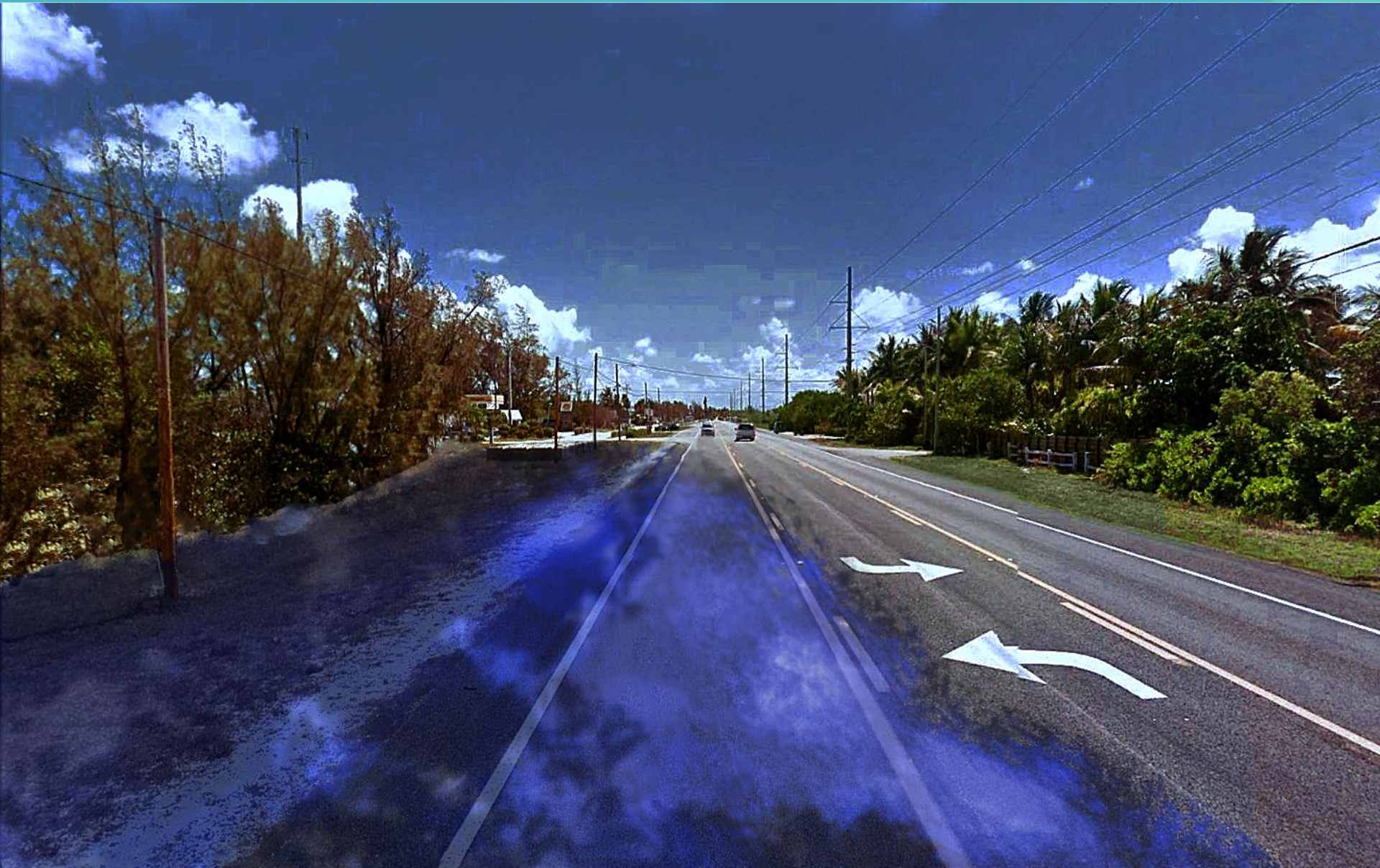
Islamorada: U.S. 1 Lower Matecumbe Key

9 inches Sea Level Rise **2060** Low Scenario

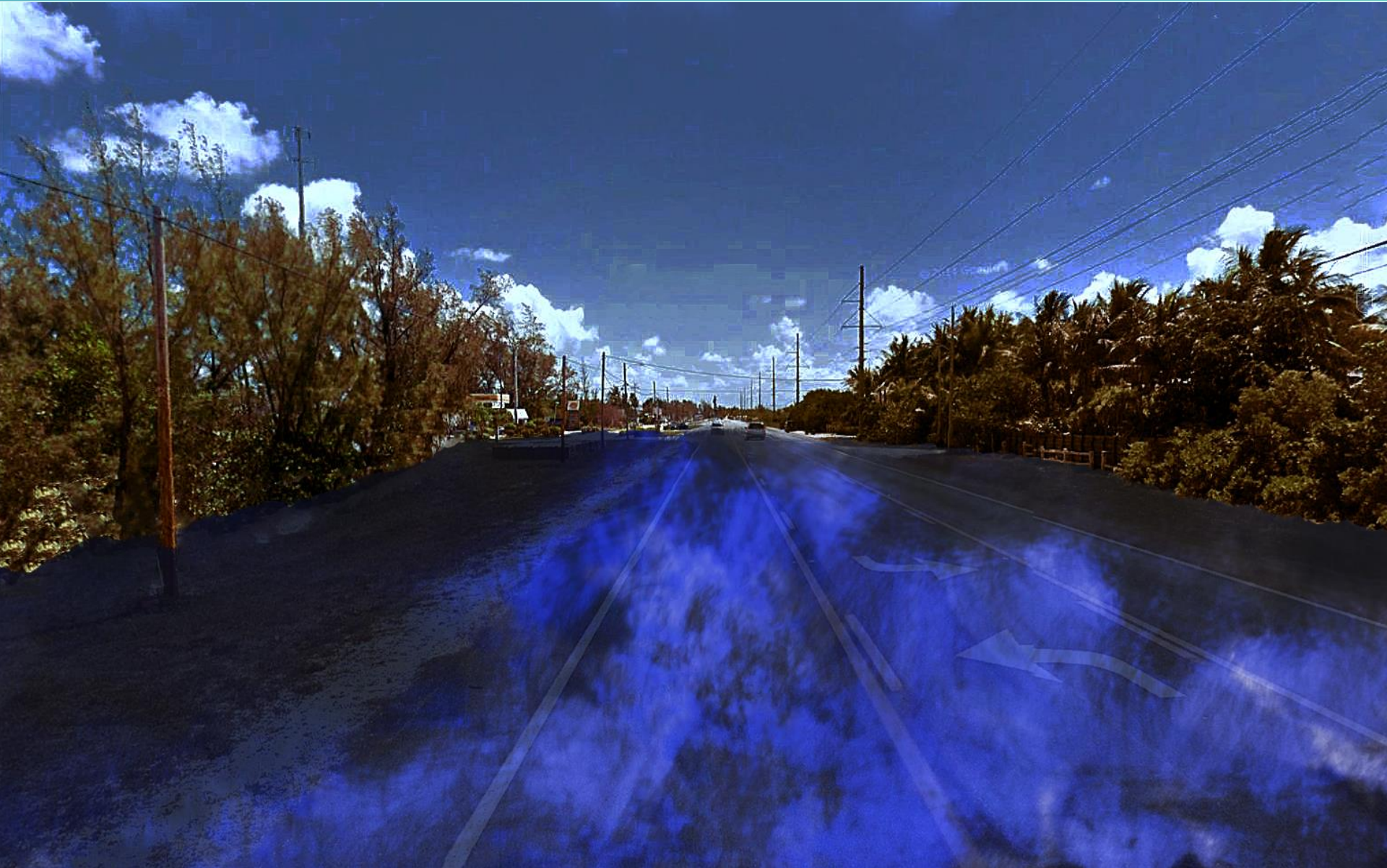


Islamorada: U.S. 1 Lower Matecumbe Key

24 inches Sea Level Rise 2060 High Scenario



ISLAMORADA: U.S.1 Lower Matecumbe Key Hurricane event (*Key West record*)



“Nuisance” Flooding – Tidal Flooding



High-tide flooded road on Big Pine Key



Tide Gauge Key West



Key Largo Campground 10/17

Defined by NOAA as *1.08 feet above Mean Higher High Water (MHHW)* at the Key West tide gauge

Nuisance Flood Vs. Hurricane Wilma At Key West



Duval Street high tide flooding

Nuisance Flooding



http://cdn1.vtourist.com/4/2436059-Pics_of_Key_West_Hurricane_Wilma_Key_West.jpg

Hurricane Flooding

Future Increase In “Nuisance Flooding” Occurrences



1980-1982
**.67 per
year**



2010-2012
**2.3 per
year**



2030 at 3”
**20 per
year**



2030 at 7”
**78 per
year**



2060 at 9”
**139 per
year**



2060 at 24”
**672 per
year**

**Flooding
More Than
1x Per Day**



Frequency Of Wilma-like Tides

With 24 inches of sea level rise, a tide as high as a Hurricane Wilma storm surge can be expected to occur at Key West twice per year.



Nuisance Flooding: King Tide Flooding in Key Largo October 2015



King Tide Flooding in Key Largo - October 2017



Monroe County, Florida

ERIN L. DEADY, P.A.



PARSONS
BRINCKERHOFF

WHAT HAS THE COUNTY DONE TO PREPARE?

Pilot Roads Elevation Project

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Monroe County, Florida

ERIN L. DEADY, P.A.



PARSONS
BRINCKERHOFF

Elevate Roads with High Levels of Tidal Flooding: Key Largo Twin Lakes Community

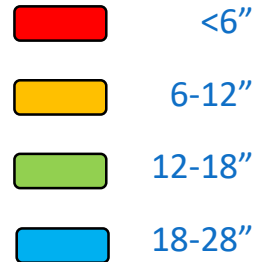


Potential Flood Water
Inundation

Vicinity of Shaw Drive

Key Largo
Monroe County, FL

Roadway Elevation
Inches NAVD88



Study
Area



Road Elevation is Expensive

	Twin Lakes – Key Largo		Sands Community – Big Pine	
Elevation	Length of Roadway Elevated	Total Roadway and <u>Drainage</u> Cost	Length of Roadway Elevated	Total Roadway and <u>Drainage</u> Cost
6"	0.25 miles	\$0.92 million	0.3 miles	\$2.22 million
12"	0.7 miles	\$4 million	0.35 miles	\$2.63 million
18"	0.8 miles	\$5.8 million	1.3 miles	\$8.9 million
28"	0.9 miles	\$7.3 million	1.5 miles	\$10.5 million

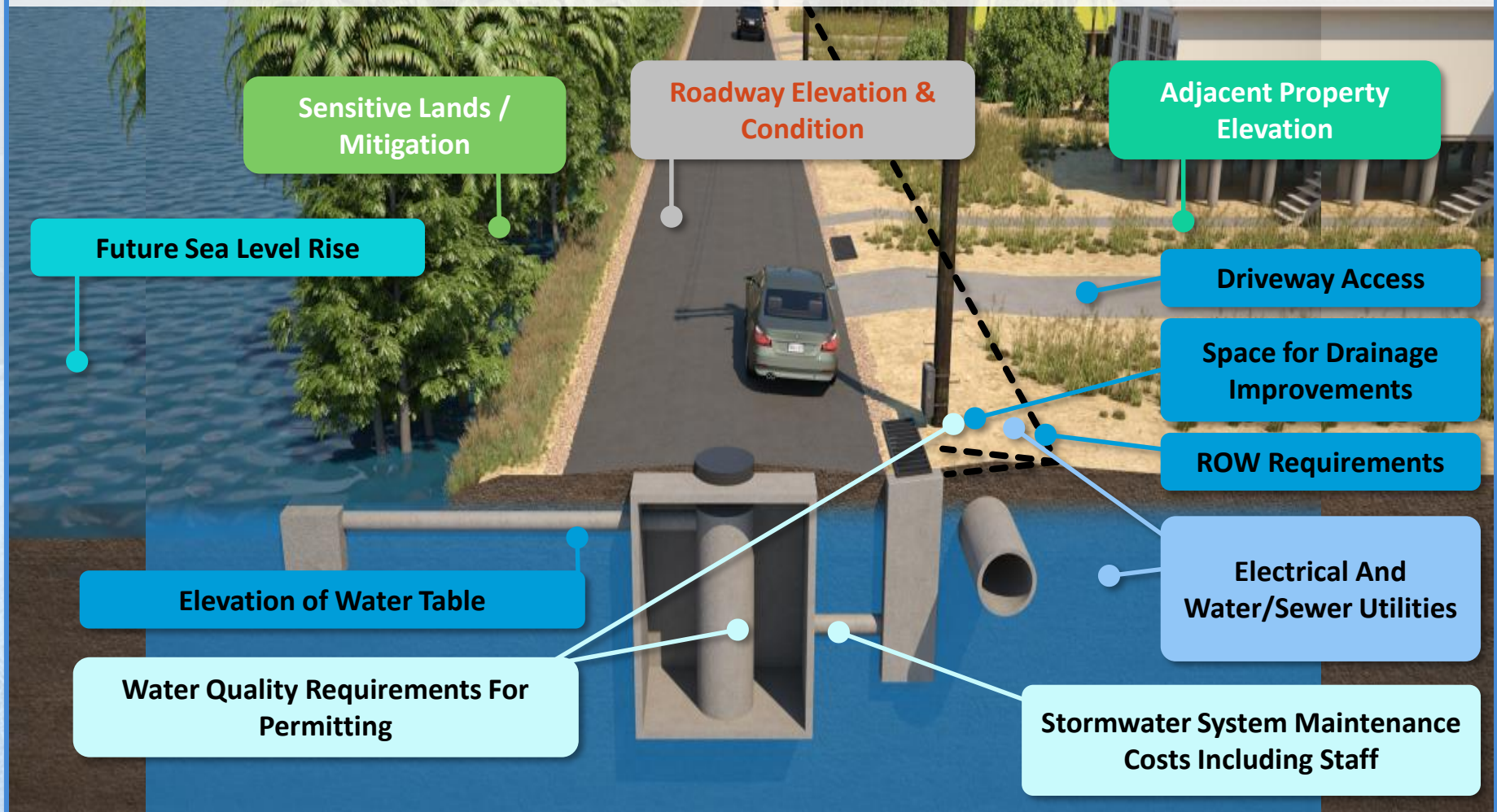
Costs factored in: Maintenance of traffic, mobilization, design, construction, 15% of costs for construction engineering and inspection, 25% contingency and stormwater features.

Costs *not* factored in: right-of-way (~12" is threshold), driveway improvements



Road Elevation Implementation Considerations

LOCAL CONDITIONS AFFECTING FINAL DESIGN RECOMMENDATIONS



Elevation Of Facilities Fire Station Near Key West

Station Floor
Located Here



Elevation
1.5 ft. above
Minimum
Required by
Code



Key West Airport

- **End-of-Runway area is designed to flood during rain events and now tidal flooding events.**



More Accurate Data

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



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COLLOBERATION AND COMMUNITY ENGAGEMENT

REGIONAL COLLABORATION

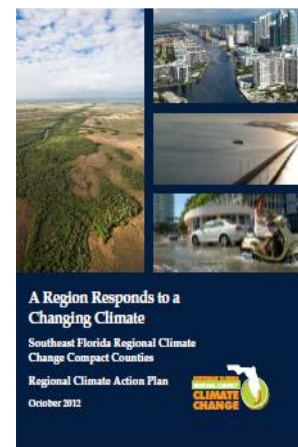


SE FLORIDA CLIMATE CHANGE COMPACT

1. **Members: 4 Counties, 4 Cities, others**
2. **Coordinate climate mitigation and adaptation activities across county lines *regardless* of parties, geographical boundaries, etc.**
3. **New form of regional climate governance**
 - Allow local governments to set the agenda for adaptation
 - Efficient means for state and federal agencies to engage with technical assistance and support.
4. **Mission:**
 - Develop annual Legislative Programs and jointly advocate
 - Dedicate staff time to create a ***Southeast Florida Regional Climate Action Plan***
 - Meet annually in ***Regional Climate Summits***



Team photo from the first Climate Summit held in 2009



SE FL Climate Change Compact

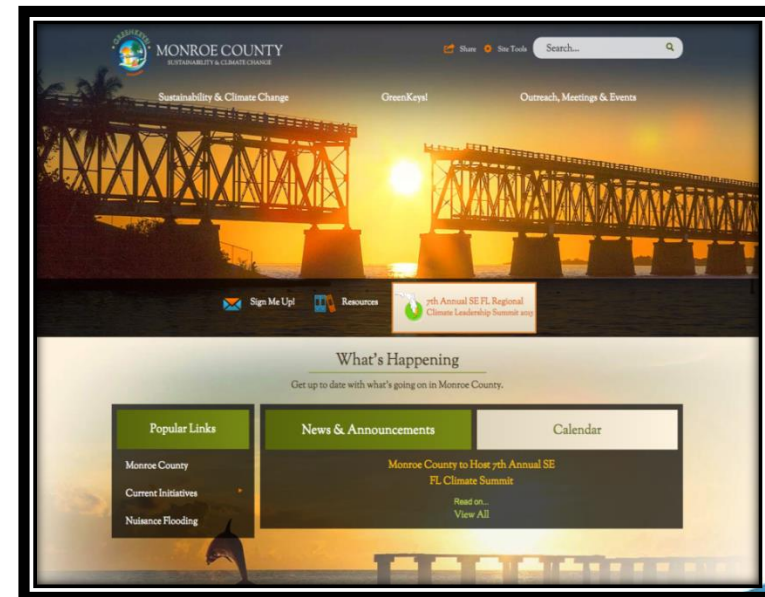
Efforts garnered attention from local, national and international sources, **very helpful to local outreach education efforts:**

1. **THE WHITE HOUSE**
2. **MEDIA:** Climate Wire, Bloomberg News, Climate Central, CNN, New York Times and Rolling Stone.
3. **ACADEMIA:** FAU, UM, FIU and other universities are working with the Compact to advance climate science and assessment tools.
4. **FEDERAL LEGISLATORS**
5. **NACO:** The NACo Achievement Award in 2010 for conducting the *Southeast Florida Regional Climate Leadership Summit*
6. **NATIONAL CLIMATE ASSESSMENT:** excellent example of regional cooperation in addressing the challenges of climate change and sea level rise.
7. **KRESGE FOUNDATION:** The Kresge Foundation awarded a three-year grant to the Compact.

LOCAL COLLABORATION

County's Sustainability and Resilience Plan:

1. Conducted **public workshops** throughout the Keys
2. Conducted **community surveys** to generate ideas for plan from residents
3. Created **community engagement website**



GreenKeys.info

COMMUNITY ENGAGEMENT

How to Involve the Community

1. Community meetings – **what** are projected levels of sea level rise, **who** will it affect and **how** will it affect them.
 - Not always popular information.
2. Seek input from residents on where **they** already see areas flood – **they become actively engaged in the process and more likely to further participate.**
3. County provides potential strategies to mitigate the impacts of rising seas
4. Residents provide input on **potential solutions**
 - No pre-judging
5. County performs a **cost benefit analysis** for all options.
 - Are residents willing to have less protection for less expenditures or more protection for more expenditures?
 - Does government fund preparation activities?



COMMUNITY ENGAGEMENT

Responding to Controversy

1. **Climate Change “Deniers” - Is climate change a political issue?**
 - How local, state and federal views vary
2. **How to temper the controversy: is climate change natural, caused by humans, or even occurring at all.**
 - Deniers attempts to interrupt public meetings and stop the planning.
 - Show documented examples of current tidal flooding and hotter temperatures in region and country
 - Don't argue the point of *why* it is happening, but show how it *IS* happening
 - Show potential effects of future flooding *to their neighborhood* and *to their insurance policies and rates*.
3. **Do people's views change in personal circumstances?**
 - Public views versus private actions



COMMUNITY ENGAGEMENT – Controversy con't.

4. What is the County's role? Preparation and protection of investments

- How planning now can save BIG \$\$ later
- Less expensive to begin elevating early, but only as needed and where needed
- Implementing projects now will allow residents to continue living in their homes and neighborhoods well into the future
- Protection of investments – County, residential and businesses



COMMUNITY ENGAGEMENT

Creating Advocates

1. Creating Community Advocates

- How residents can lead a community resiliency project.
- Include community advocate in all information, meetings, media responses and decisions.

2. Advocates Helping When Community Views Differ

- When is “Nuisance” Flooding no longer a Nuisance?
- How many days of flooding will residents tolerate?

3. Advocates Helping in Community Financial Decisions

- How much of the financial burden of preparation will residents bear?
 - Costs more to elevate roads 28” than 6”
- How much can the local government afford to spend?
- What is the long term plan for funding resiliency projects?

HURRICANE IRMA

Local Government Engaging the Community

1. Preparing for Unknown Future Effects of Climate Change

- Hurricanes *Frequency* Increasing? 2 Category 4 storms landfall in 2017
- Hurricanes *Intensity* Increasing? Super Storms and potential new Category 6 – signs of the future?



2. Community Responses before, during and after the storm: use for future planning efforts

3. Planning for Future Evacuation

- Coordination with other Counties absolutely necessary to limit road congestion



POST HURRICANE IRMA

Community Engagement & Rebuilding

1. Impacts from Hurricane Irma in Florida Keys in 2017

2. Rebuilding

- A. Work with Community on *how* to avoid the same effects to property in the future
- B. *Why* rebuilding to same standard is not always the best option or even a possible option
 - 50% Rule specifies must rebuild to new standards
- C. Local government's role in creating change in policies and standards



How County Actions Can Help Communities Avoid Making the Same Mistakes

1. Policy Implementation

- Comp Plan Changes
- Stronger Building Codes

2. Community Rating System (CRS)

- Insurance Coverage Availability and Premium affordability

3. Resilience and Emergency Management - partners in planning

4. Resilience Project Planning

- Address Priority Vulnerabilities,
- Set aside Reserves to fund

5. Land Acquisition & Management



THANK YOU!

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