

Cooperative Planning for Climate Change

UF | IFAS Extension
UNIVERSITY of FLORIDA



Alicia Betancourt- University of
Florida IFAS, Monroe County
Extension Director

Situation

- **Climate change** issues more commonplace
- Mass information is generally **global in scale**, long time frames
- Decision makers, government employees, and residents need information to address the challenges they are facing at **local level**

How to we move forward at the local level?

Assess Vulnerabilities

Develop Strategic Initiatives for Adaptation and Mitigation



- **ID key stakeholders** for engagement, science, and to implement agreements
- **Monitor and engage** in science & discussion of adapting and mitigating climate change
- Define and solidify appropriate **leadership role** of County at the county and regional level
- Determine methods for **integrating climate and resiliency** considerations into the comp plan, economic and land use/land planning decisions

Program Strategies

- Community Conversations
- Stakeholder Input and Education
- Assess Vulnerability
- Public Meetings, Media and Awareness
 - Create urgency
- Partnerships
- Working groups
- Community Engagement- Education
- Drafting Plans, Policies for Adoption
- Talking Points for Success
- Report Progress



Barriers

- Time
- Global vs. Local
- Funding
- Community Buy-in
- Politics
- Responsibility?
- Uncertainty of Impacts



Community Conversations

- Focus on “relational” impacts such as energy or flooding
- Dual benefits such as \$ savings, disaster preparedness
- Health Impacts
- Make a case for regional cooperation
- Find champions, do not engage skeptics
- Include Climate Change in the dialogue

Inundation



What is Nuisance Flooding?



High-tide flooded road on Big Pine Key



Duval Street high tide flooding

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

Nuisance vs. Wilma at Key West



Duval Street high tide flooding



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

Increase in “Nuisance Flooding”



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

3x 2010

9x 2010

34x 2010

60x 2010

Flooding more than 1x per day

Habitat Change

- 3 inches of sea level rise (2030, Low Scenario) could bring daily saltwater tides into 19% of Monroe County's freshwater wetland areas*



**Analysis based on Monroe County Habitat dataset (2009)*

Freshwater pond on Big Pine Key

<http://rcrackliffe.com/images/FloridaVacation/2004-12-28-14.jpg>

Habitat Change

- 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/trazler-images/af/1505/00.jpg>

**Analysis based on Monroe County Habitat dataset (2009)*

Habitat Change

- 3 inches of sea level rise (2030, Low Scenario) could bring daily saltwater tides into 2.3% of Monroe County's remaining tropical hardwood hammock*

**Analysis based on Monroe County Habitat dataset (2009)*



Tropical hardwood hammock
Lignumvitae State Park

<http://3.bp.blogspot.com/-I6rkce85yql/T5QYIYE2dZI/AAAAAAAAAFDk/7BHEUgYDDMY/s1600/LignumTrail.jpg>

Stakeholder Input- Feel the Temperature

- One on One meetings
- Environmental Groups
- Social and Civic Groups
- Homeowner and Business Groups
- Elected Officials

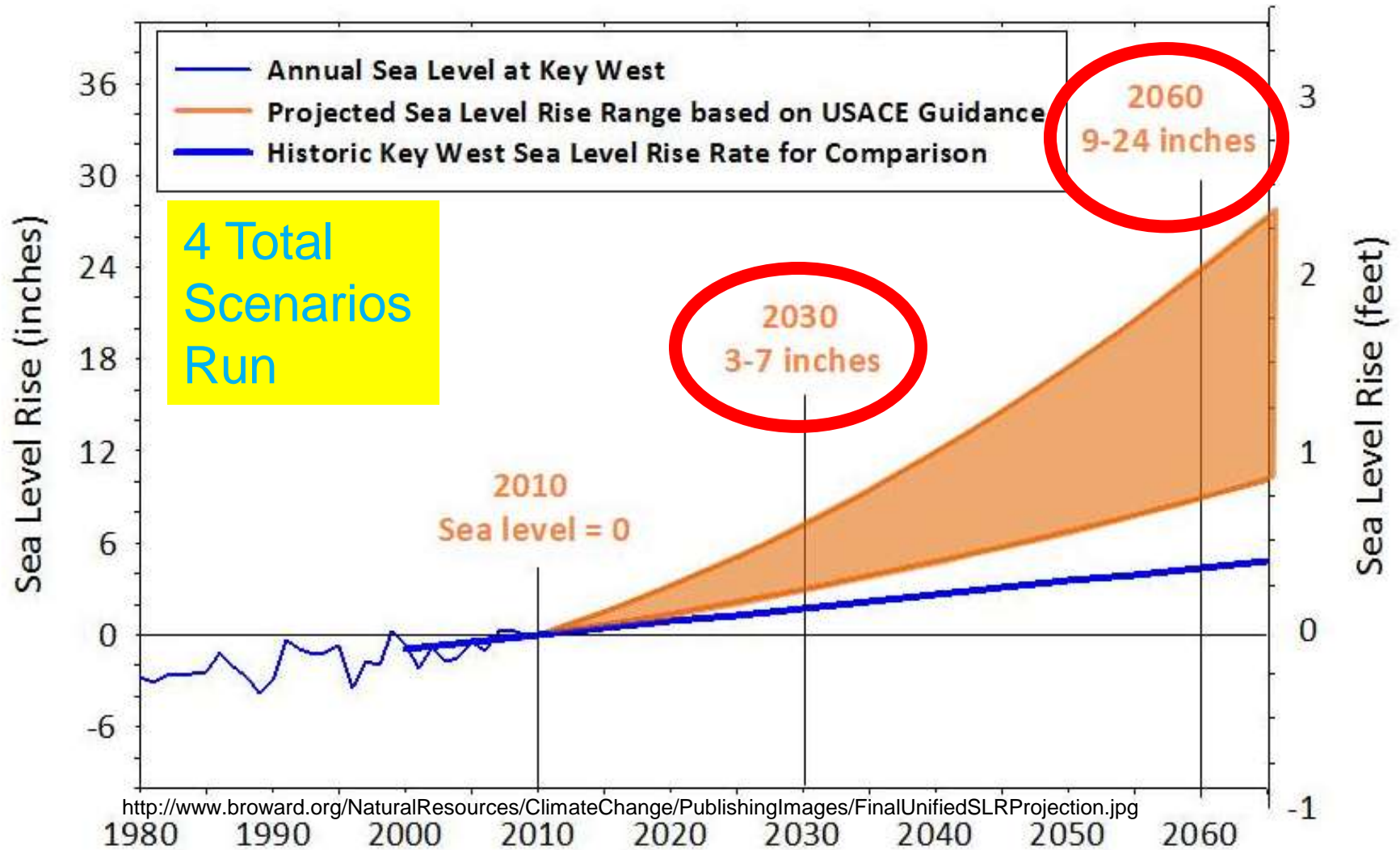
Assess Vulnerability

Monroe County Infrastructure Vulnerability for 2030 and 2060



Sea Level Rise Scenarios

Adopted by Southeast Florida Regional Climate Compact



The Burning Questions Related to Sea Level Rise

- What impacts to County assets, infrastructure and habitat will occur from sea level rise in 2030 (at 3" and 7") and in 2060 (9" and 24")?
- How can the County address those impacts?
 - Next phase of analysis



The Approach to the Analysis: What Sea Level Rise Impacts are Expected When?

Step 1

- Analyze what's been done so far & determine "Gaps"
- Determine what tool or tools will answer the question posed for individualized impacts to roads, buildings, habitat, etc.

Step 2

- **No single analytical tool can determine individualized sea level rise impacts to Monroe-County specific habitat and assets- so the Team used multiple analytical tools and approaches**

Step 3

-
- Use tools that have support of agencies/organizations
- Provide feedback and improve tools and inputs

Step 4



Sources of Data and Tools to Answer the Question: What Sea Level Rise Impacts are Expected When?

Nuisance Flooding

- NOAA Digital COAST 2030 and 2060 scenarios

Water/ Wastewater

- FKAA As Built Drawings and GIS 2030 and 2060 scenarios

Water Supply

- USGS Integrated surface - groundwater model to determine saltwater intrusion impacts for FKAA wellfields at 2030 and 2060

Roads

- FDOT Sketch Tool and County Pavement Condition Index (2014) 2030 and 2060 scenarios

Habitat

- Sea Level Affecting Marsh Model (“SLAMM”), the Florida Cooperative Land Cover Classification (“FCLCC”), the Critical Lands and Waters Identification Project (“CLIP”), Monroe County’s “Habitat” shapefile and Strategic Habitat Conservation Area (SHCA).

Electric Utility

- FKEC and Keys Energy facilities data and GIS 2030 and 2060 scenarios

County Facilities

- Point locations of county-owned buildings (2006 GIS Mapping) 2030 and 2060 scenarios

Elevation Data

- 2008 Department of Emergency Management LiDAR (Light Detection and Ranging)

County Facilities and Buildings

- **Evaluated 74 parcels with County-owned buildings and facilities**
- **26 parcels (41%) show flooding encroachment at 3 inches of sea level rise**
- **36 parcels (53%) show flooding encroachment at 24 inches sea level rise**
- **Overlays with aerial photos show buildings generally located on highest ground**

What can Monroe County do?

- 1. Understand infrastructure vulnerabilities**
- 2. Address critical near-term vulnerabilities first**
- 3. Minimize new problems through planning**

Resilience to flooding and sea level rise as a core concern in all County projects and operations

- 4. Be a global leader for reducing carbon emissions**

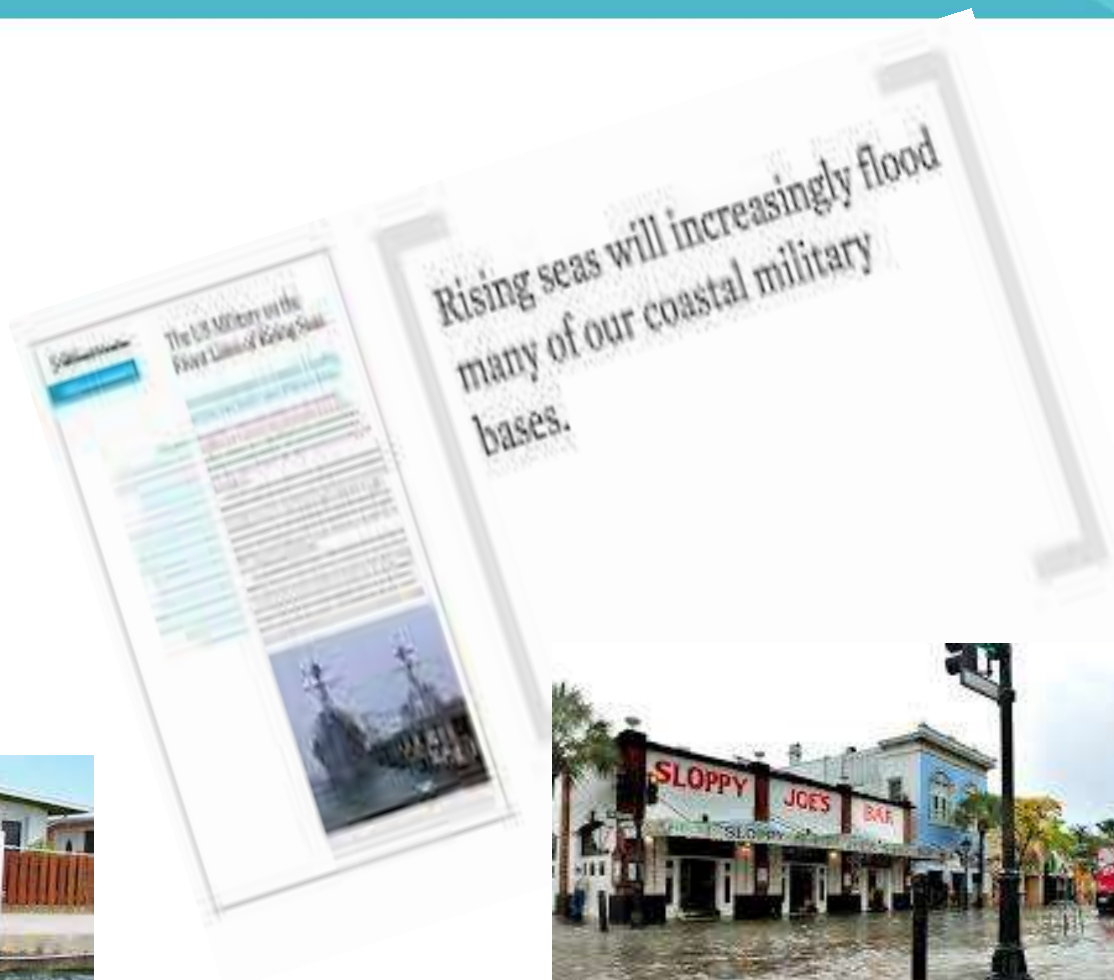
Public Meetings, Media and Urgency



RISK ● ● ● ● ●

**OVERFLOW: CLIMATE CHANGE,
HEAVY RAIN, AND SEWAGE**

Myriam Bernard / Action 21 News / James Williamson



Events



Planning and Legal Sea Level Rise Workshop,
September 12 – Marathon Government Center, 9:00 –
3:45 pm



Community Modeling

- October 9 - Community Modeling workshop #1- October 9
- November 5 - Community Modeling workshop #2- November 12
- December 9 - Community Modeling workshop #3- December 9



On the Horizon

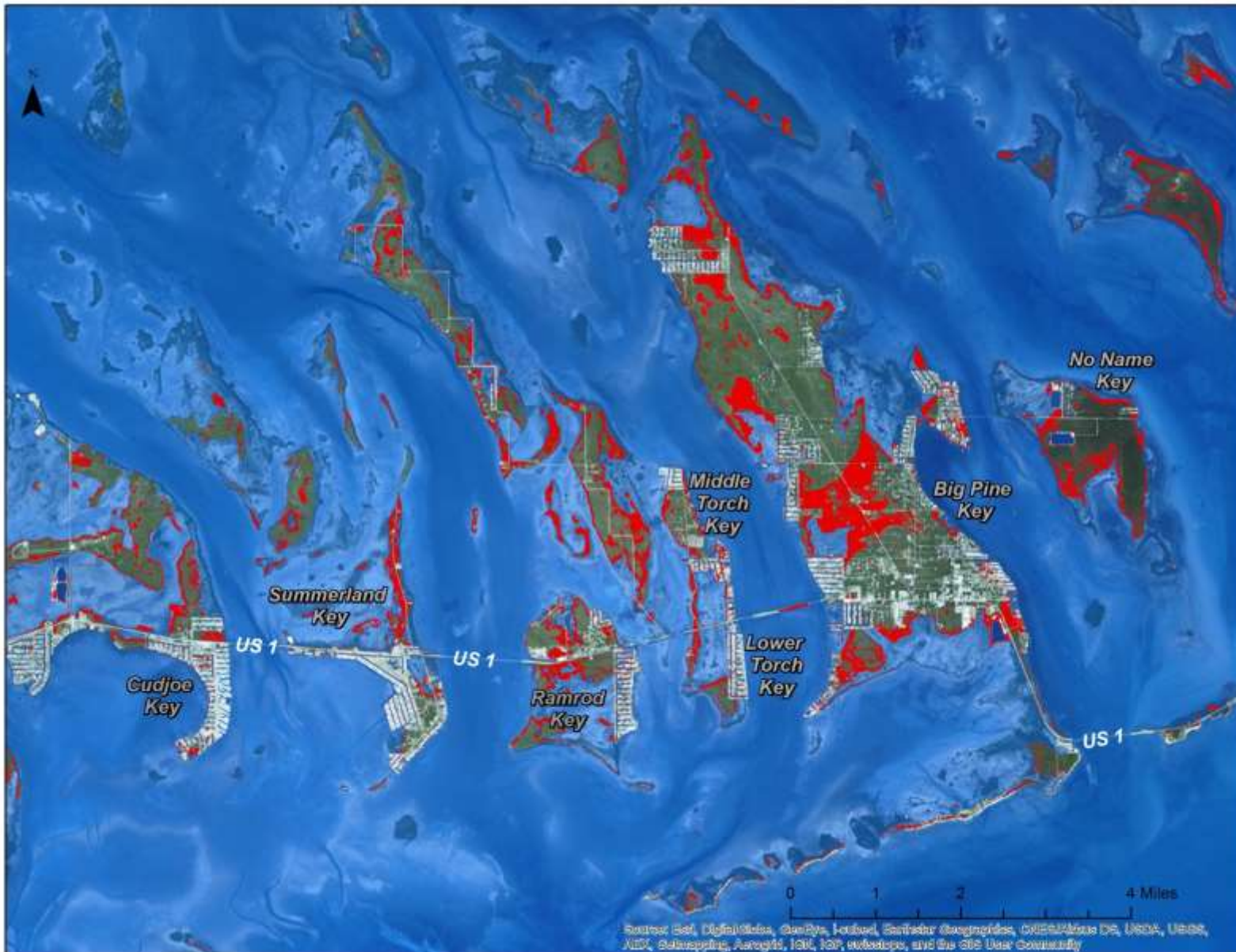
- Sustainability Goal Development Workshops Late Fall / Early Winter
- Additional Community Modeling Workshops
- Draft Plan Presentation to Public and BOCC Early Winter



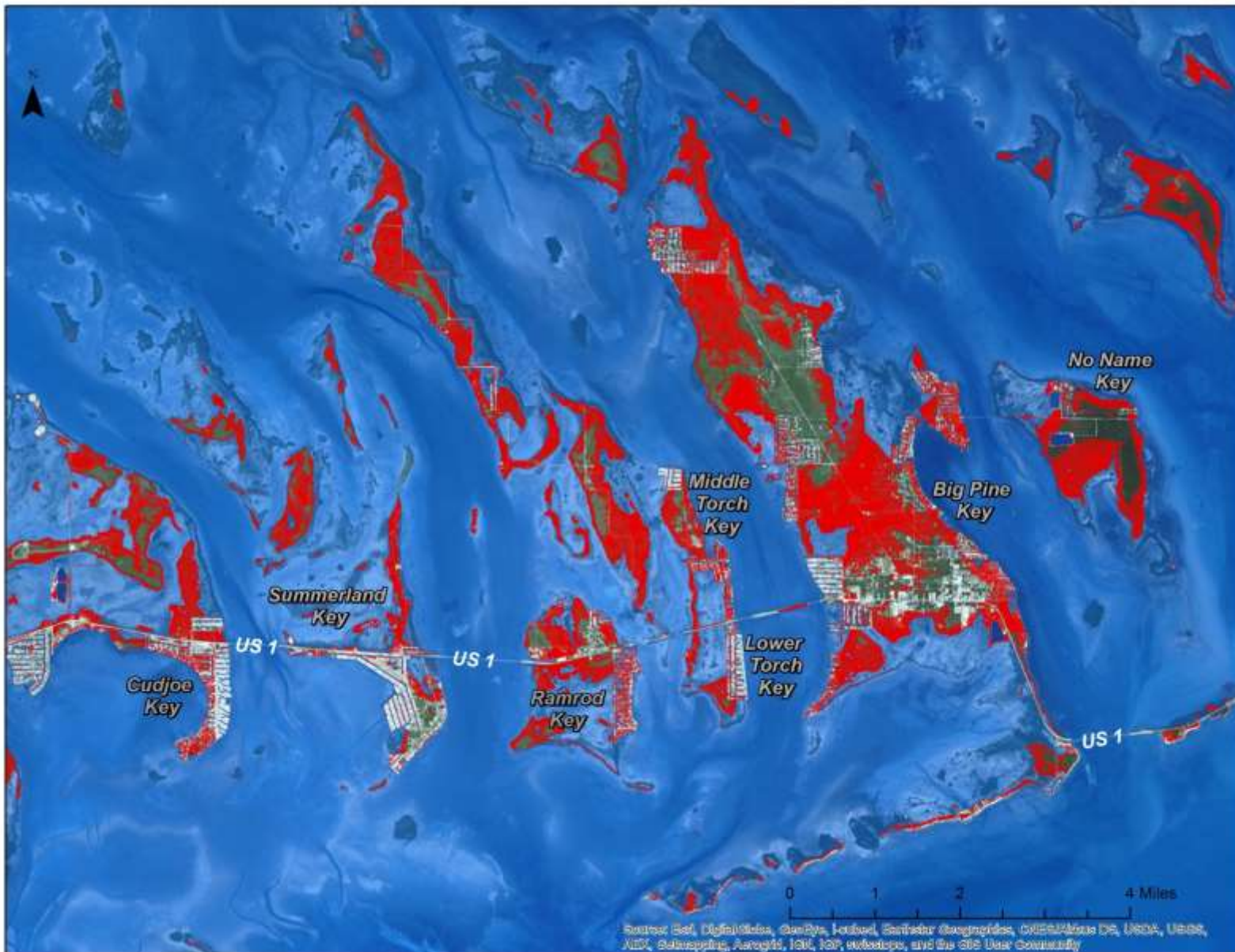
How to Engage:

- Greenkeys.info
- <http://greenkeys.mindmixer.com/>

Big Pine Key and Vicinity, 9 inches Sea Level Rise (2060, Low Scenario)



Big Pine Key and vicinity, 24 inches Sea Level Rise (2060, High Scenario)



Key West, 24 inches Sea Level Rise (2060, High Scenario)



Partnerships and Working Groups

- Academic, Science Advisory Panel
- Community, Climate Change Advisory Committee
- Environmental
 - The Nature Conservancy, Audubon
- Utilities
- Research and Data
 - Fish and Wildlife Commission

Community Engagement

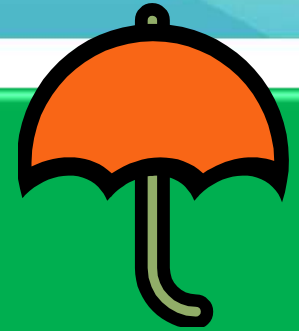
- Add climate change to existing programs
 - Health
 - Energy
 - Water quality or Natural Resources
 - Agriculture

- Events and Outreach
 - Earth day

Overview of GreenKeys! Planning Process

GreenKeys!

A Plan to Create a Sustainable Florida Keys



Climate: Forecasting Tools & Modeling

County Assets
Infrastructure
Habitat

Community Impacts

Drafting Plans and Policies

- Borrow, Adapt, Adopt
- Pervasive- Infuse in planning documents such as Comp Plan, Storm water, Roads, Purchasing, Energy ect..
- Stand Alone Plans, Climate Action Plan
- Policies and Resolutions
 - Resiliency In RFP's or Bid documents
 - Building- For the life of the structure
 - Purchasing
 - Emissions reduction

Sustainability and Climate Milestones

Year 2007-2011

- US Mayor's Climate Agreement
- Green Building/Green Initiatives Task Force
- EECB Grant/CCAC
- Sustainability Vision Statement
- GHG Inventories
- 1, 2, 3' SLR Scenarios

Year 2012

- EAR for Comprehensive Plan (Energy & Climate Element)
- Communitywide GHGs
- EECS for County GHG reductions
- Compact's Regional Climate Action Plan

Year 2013

- Monroe County Climate Action Plan
- Bid for Sustainability Action Plan

Year 2014

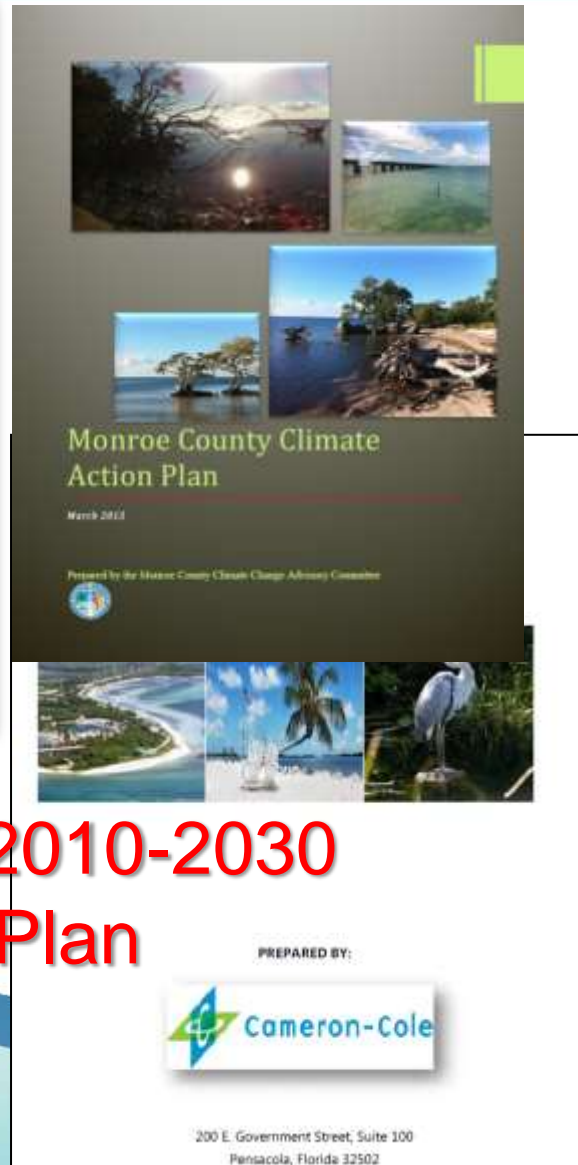
- GreenKeys! Launched
- Data collection
- SLR modeling for 2030 and 2060
- Community SLR Modeling
- Outreach
- Plan Development

Year 2015-2017

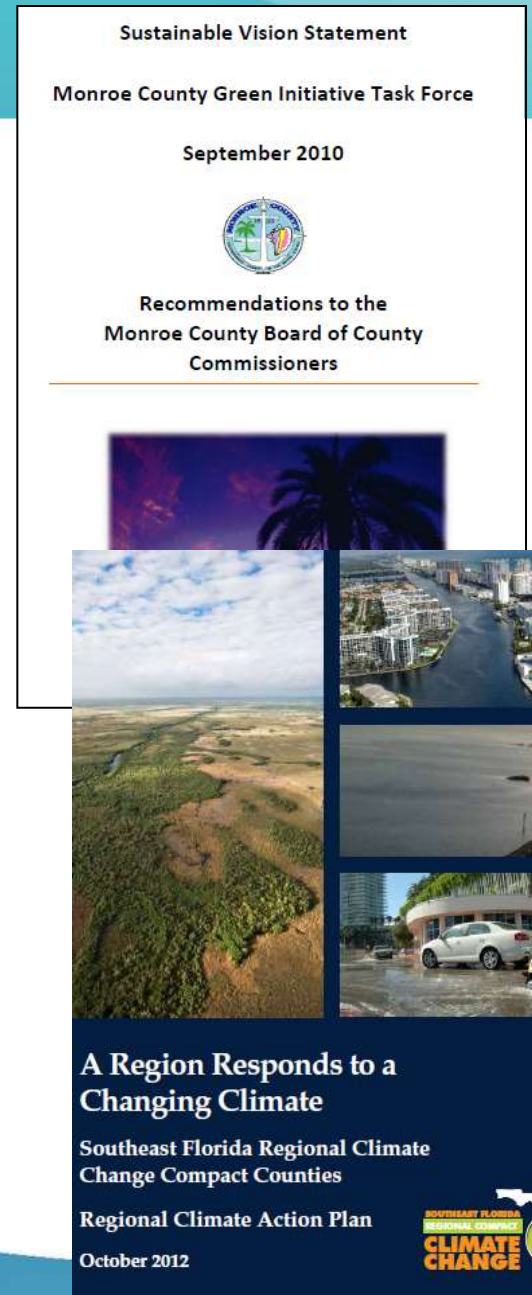
- Finalize GreenKeys! Plan
- Begin implementing recommendations



Previous Initiatives Addressing Energy and Climate



Monroe County 2010-2030 Comprehensive Plan



Roads Analysis

DEVELOPMENT OF A GEOGRAPHIC INFORMATION SYSTEM (GIS) TOOL FOR THE PRELIMINARY ASSESSMENT OF THE EFFECTS OF PREDICTED SEA LEVEL AND TIDAL CHANGE ON TRANSPORTATION INFRASTRUCTURE

Based on FDOT Sea Level Rise Sketch Tool *

Developed by University of Florida



FDOT Contract# BDK75 977-63
September 2013
Final Report



Prepared by
Alexis Thomas
Dr. Russell Watkins
The GeoPlan Center
Department of Urban & Regional Planning
University of Florida



Funded by
Florida Department of
Transportation

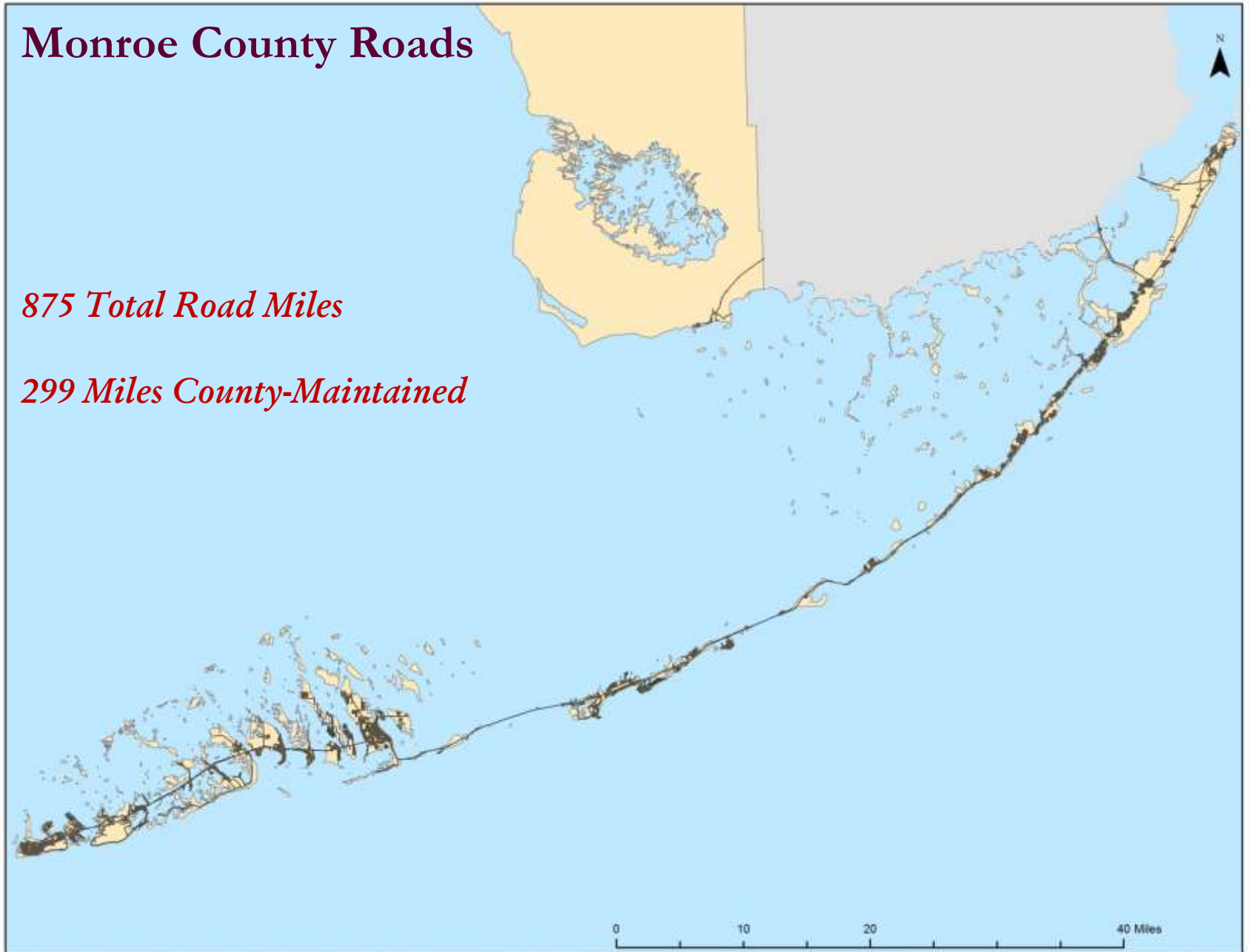
**General planning assessment tool requires additional data for use in site-level decisions*

<http://sls.geoplan.ufl.edu/documents-links/>

Monroe County Roads

875 Total Road Miles

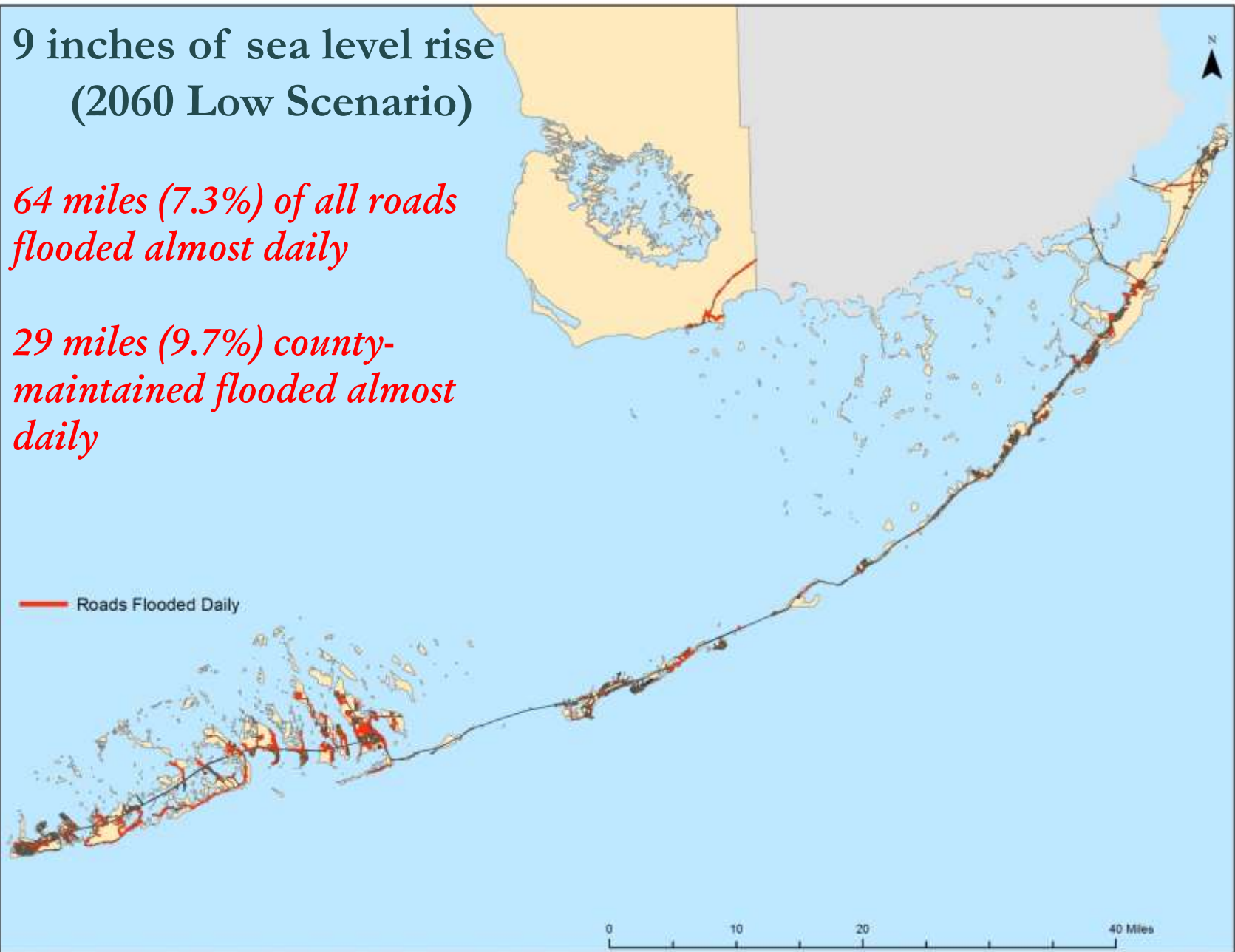
299 Miles County-Maintained



9 inches of sea level rise (2060 Low Scenario)

*64 miles (7.3%) of all roads
flooded almost daily*

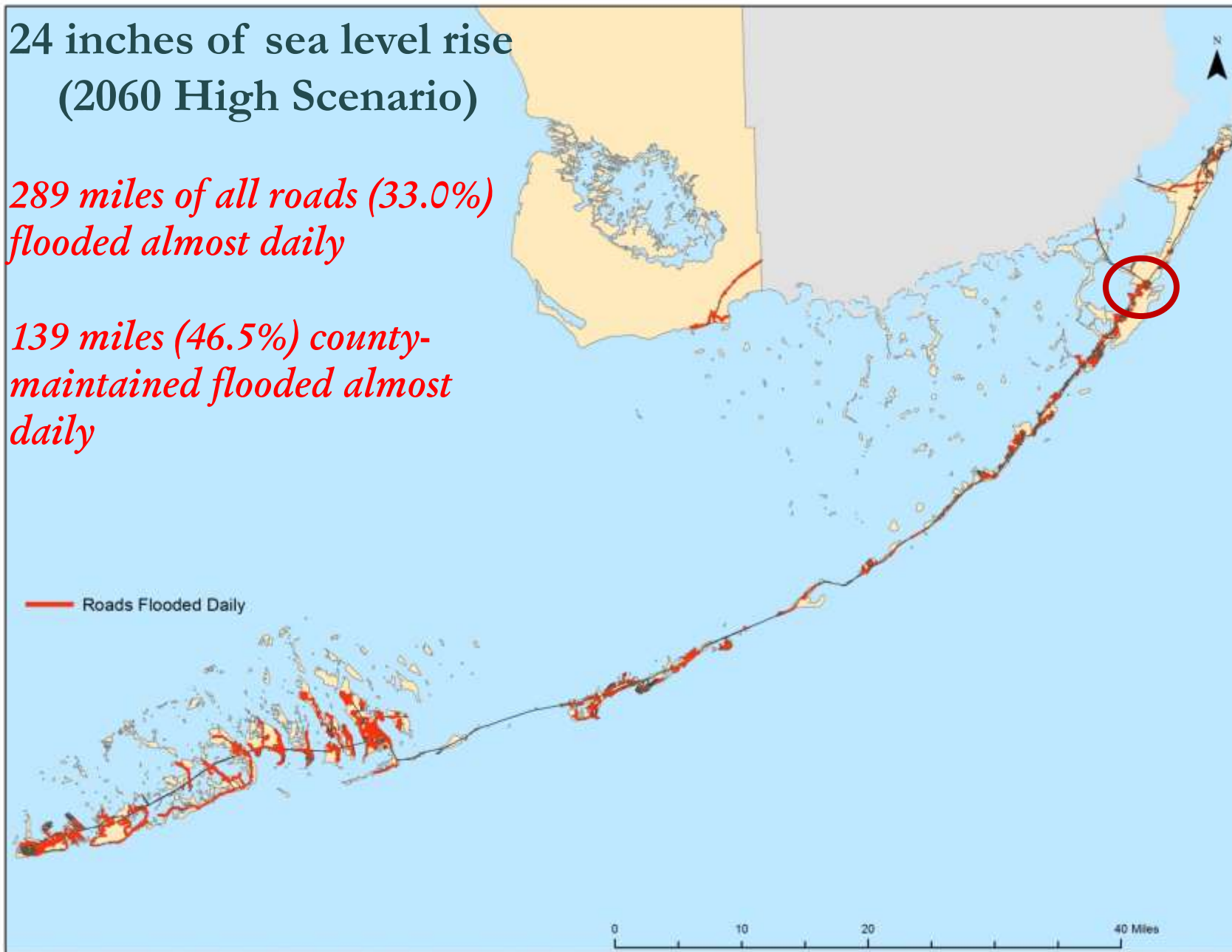
*29 miles (9.7%) county-
maintained flooded almost
daily*



24 inches of sea level rise (2060 High Scenario)

*289 miles of all roads (33.0%)
flooded almost daily*

*139 miles (46.5%) county-
maintained flooded almost
daily*



2060 High Scenario 24 inches sea level rise

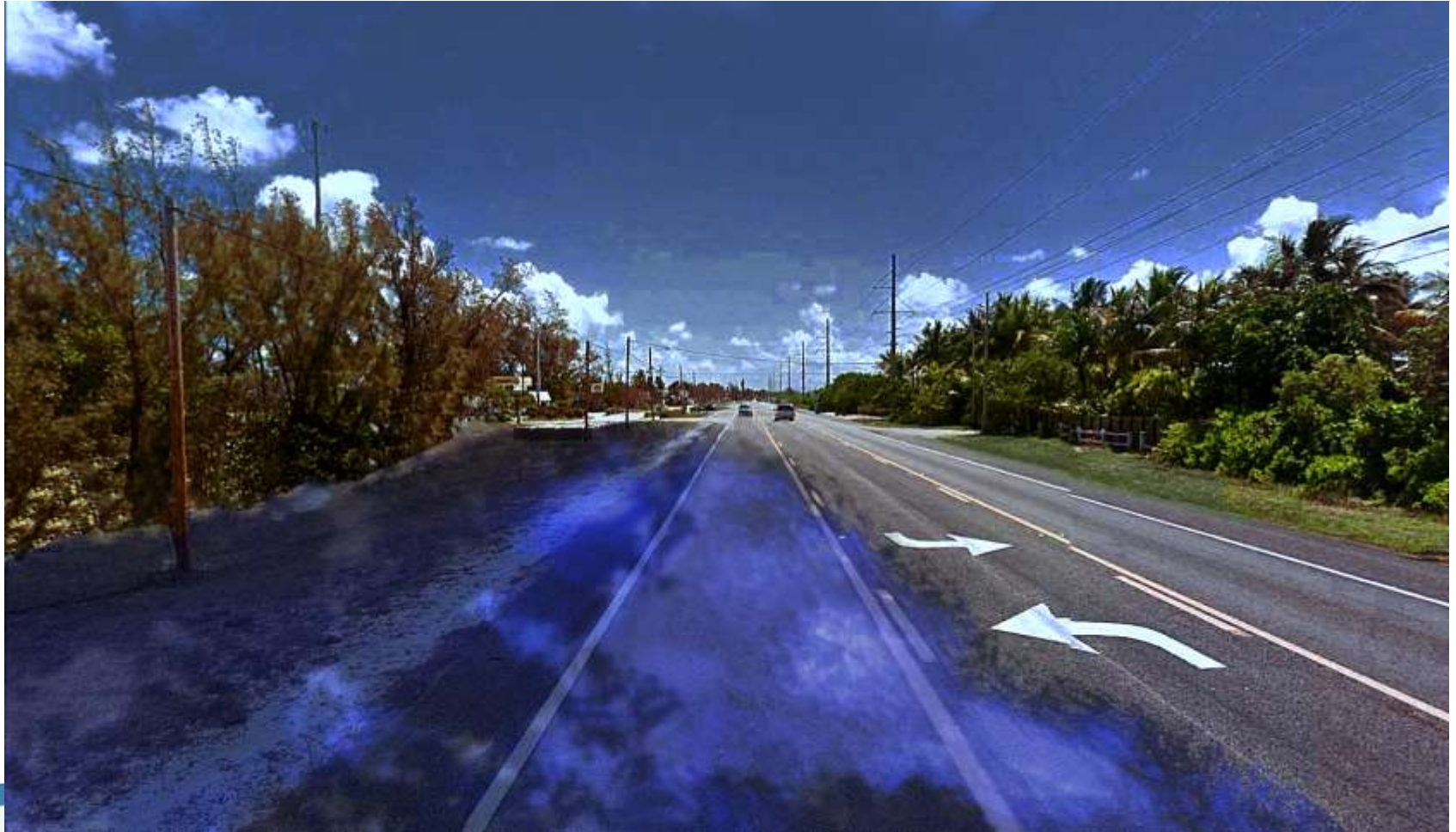
Big Pine Key



*Road centerlines and aerial imagery:
Monroe County Property Appraiser's Office*

US1 near White Marlin Blvd.
Lower Matecumbe Key

2060 High Scenario
24 inches sea level rise



Technical Recap

- The Florida Keys are clearly vulnerable to impacts from long-term sea level rise
- Roads will be the “canary in the coal mine”
- Lower and middle keys will feel earlier and more widespread effects as compared to the upper keys
- Impacts to other infrastructure will gradually increase through 2030 scenarios
- High sea level rise scenario brings a *Wilma-like event* at Key West *two times a year by 2060*
- Effective adaptation planning requires continuous development and enhancement of information

Human living areas impacted by tidal flooding 2 feet of sea level rise, 2060*

Rank	County	County population displaced
1.	Tyrell, NC	45%
2.	Hyde, NC	42%
3.	Monroe, FL	36%
4.	Dare, NC	21%
5.	Currituck, NC	20%
*	Miami-Dade, FL	3%
*	Broward, FL	1%

Land that's dry now that will go under water by 2060 in relation to the number of people living there

**National-scale analysis of over 300 coastal counties
Matthew Hauer, Applied Demography
Program, University of Georgia*

What could this mean?



*“Stiltsville”, near
Miami*

Decision Making Paradigm Shift



Land-
Acquisition/Management
Species, Habitat and Adaptation/Mitigation

Policy Implementation-
Departmental Collaboration,
Comp Plan, Code, Legal Issues



Project Planning-
Addressing Priority Vulnerabilities,
Budget Implications (New Cost Considerations),
Departmental Collaboration

Near Term Action: Enhanced Information

1. Create database for localized tide/flood events (if not centralized)
2. Digital building footprints and ground floor elevations for all structures
 - Appraiser's aerial photography
 - Elevation certificates
 - “Easy” to do, but labor and time-intensive
 - Beginning with County-owned buildings and facilities

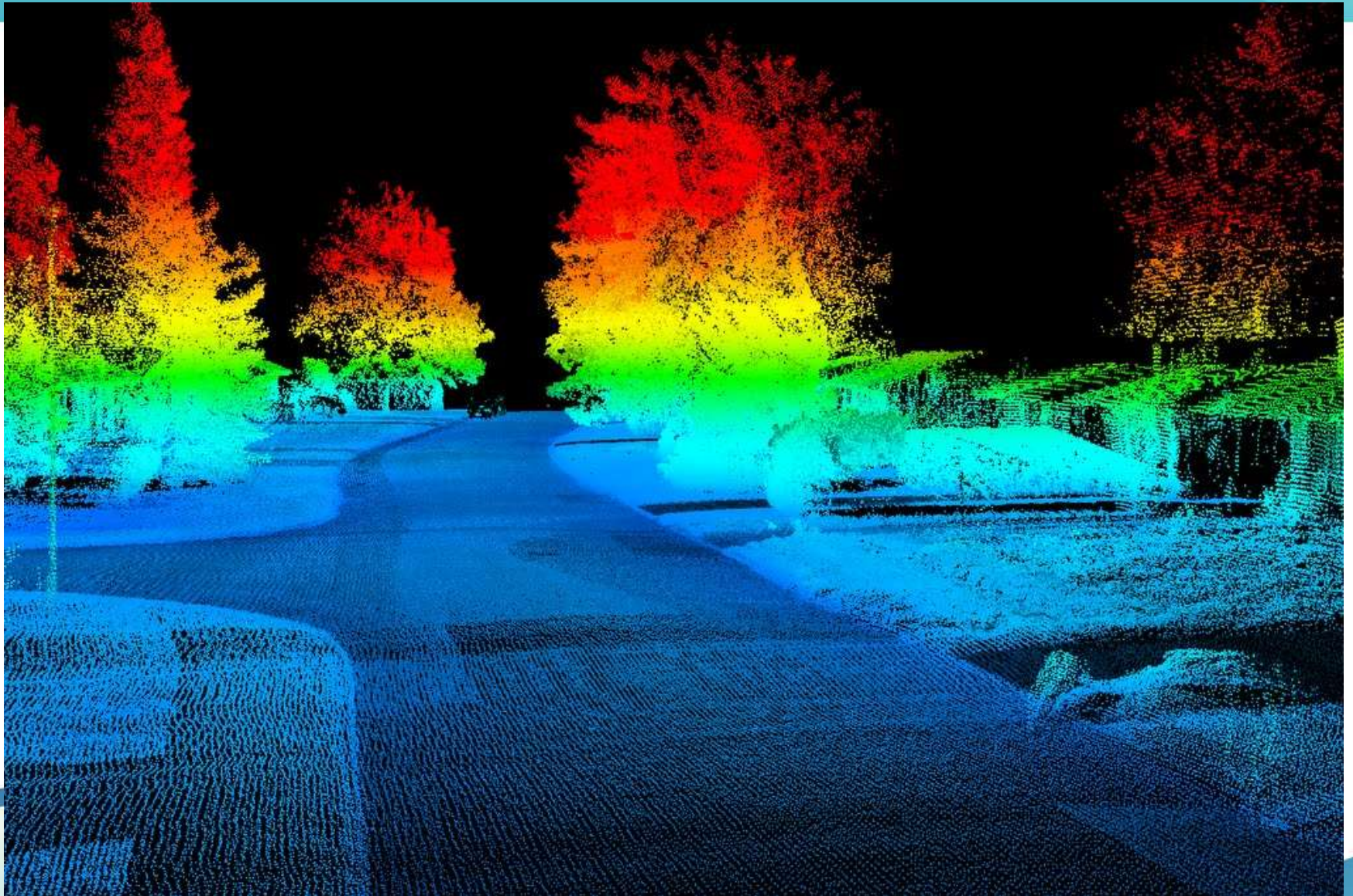
Near Term Actions: Suggestions for Enhanced Information

3. Existing aerial LiDAR from Florida Department of Emergency Management (flown in 2008)

Ground-based mobile LiDAR along roads

- Mobile LiDAR much more accurate elevation readings
- Near-term expense, but potential to save on road surveys
 - FEMA Community Rating System?
 - Better analysis at individual property level
 - More accurate elevation data for County infrastructure projects

Mobile LiDAR “point cloud”



<http://static.panoramio.com/photos/large/54282010.jpg>

Talking Points and Progress

- Celebrate Small Successes
- Build from Competition
- Credit the Stakeholders and Champions



Barriers

- Timeline of Impacts
- Global vs. Local
- Funding
- Community Buy-in
- Politics
- Responsibility?
- Uncertainty of Impacts





Questions?

Alicia Betancourt

Betancourt-alicia@monroecounty-fl.gov