



Stakeholder Values and Preferences in Adaptation Planning: Insights from the METROPOLE Coastal Vulnerability Research Initiative

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PROJECT TEAM:



FUNDERS:



FL Partners:





METROPOLE

Fundamental Objectives

- Facilitate two stakeholder engagement workshops each in three international sites **providing new future hazard/climate impact information to partners:**
 - Broward County, FL, USA (Hollywood & Dania Beach)
 - Santos, Brazil
 - Selsey, The United Kingdom
- Advance the understanding of connections between stakeholder values, beliefs, and preferences regarding risks, adaptation options and funding choices
- Understand barriers to adaptation
- Provide findings to inform regional stakeholders' priorities for adaptation strategy

Project Objectives and Design

1. Solicit data from municipal staff and regional experts
2. Plan/facilitate community workshops (~6 weeks apart) to present COAST models, benefit/costs estimates and two adaptation options
3. Conduct survey of participants at beginning of Workshop One and after Workshop Two
 - Total attendees
 - Workshop One: 50
 - Workshop Two: 45



COAST Process Overview

- CoAST (Coastal Adaptation to Sea Level Rise Tool)
 - modeled flooding damage to assets (buildings) from storm surge and sea level rise and land lost to SLR
 - generated visualizations showing **cumulative** damage of flooding to buildings in study area through 2060 from expected 10, 50 and 100-year storms
 - estimated benefit/costs of two adaptation actions based on scope that workshop participants help define
- Two stakeholder engagement workshops in each site—vulnerability and no-action damages to real estate, “parameterization” of adaptation modeling, and discussion of B/C of avoided damages and costs of adaptation options

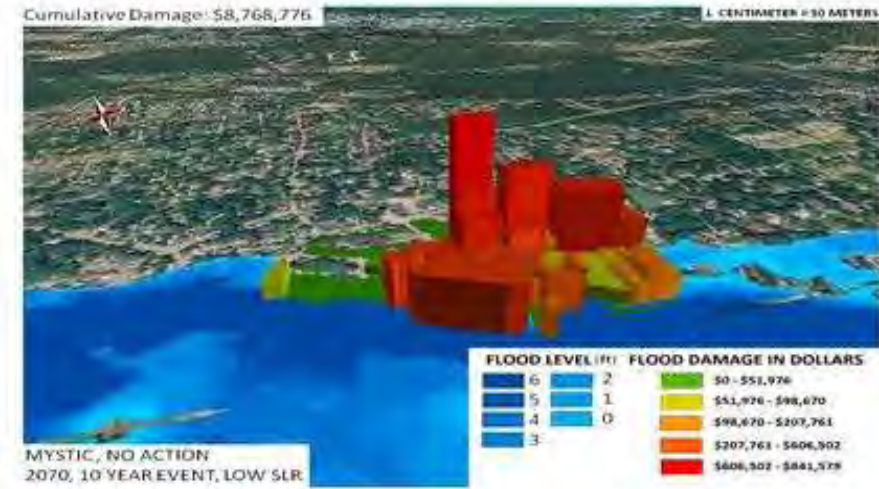
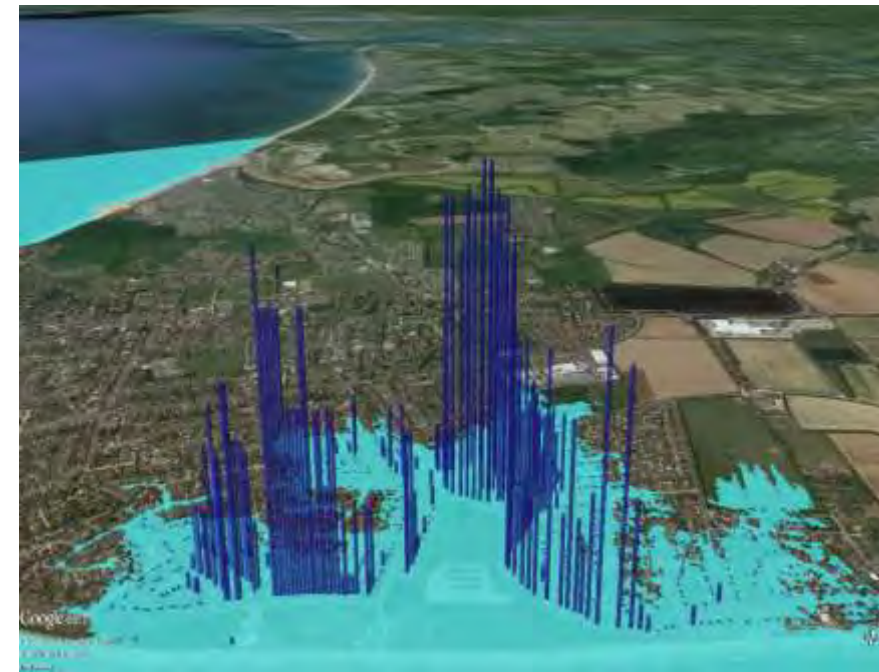


Figure 1. Example of COAST output showing a no-adaptation-action scenario for 1 meter of sea level rise and a 10-year flood event in 2070, for an area of downtown Mystic Seaport in Groton, CT.



COAST Process

Modeling Step One: Vulnerability Assessment

- if no action is taken



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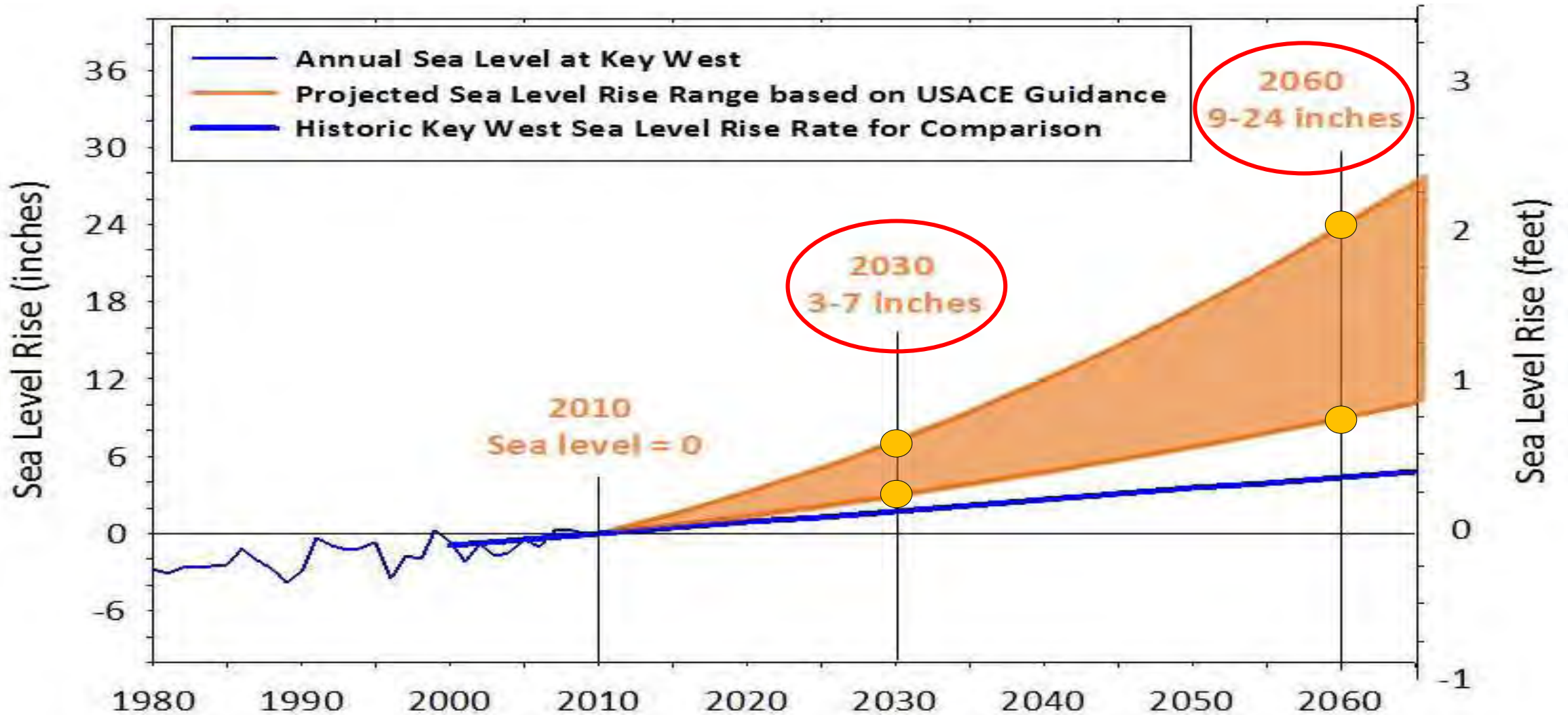
What the COAST Model Results Told Us at Meeting One:

How much building damage/land loss we might expect from:

- One-time future events (Wilma-sized storm surge);
- Cumulative damage over time, from many different sized storms; and
- How many land parcels could be lost to SLR over time

IF NO ACTION WAS TAKEN

SEA LEVEL RISE ASSUMPTIONS



Surge Heights from all storms with Sea Level Rise

- For Cumulative Damages: Used surges from the 10, 50 and 100-year storms using 2014 FEMA Flood Study and Maps, and SLOSH models from other studies
- Then ADDED SEA LEVEL RISE to these surges OVER TIME

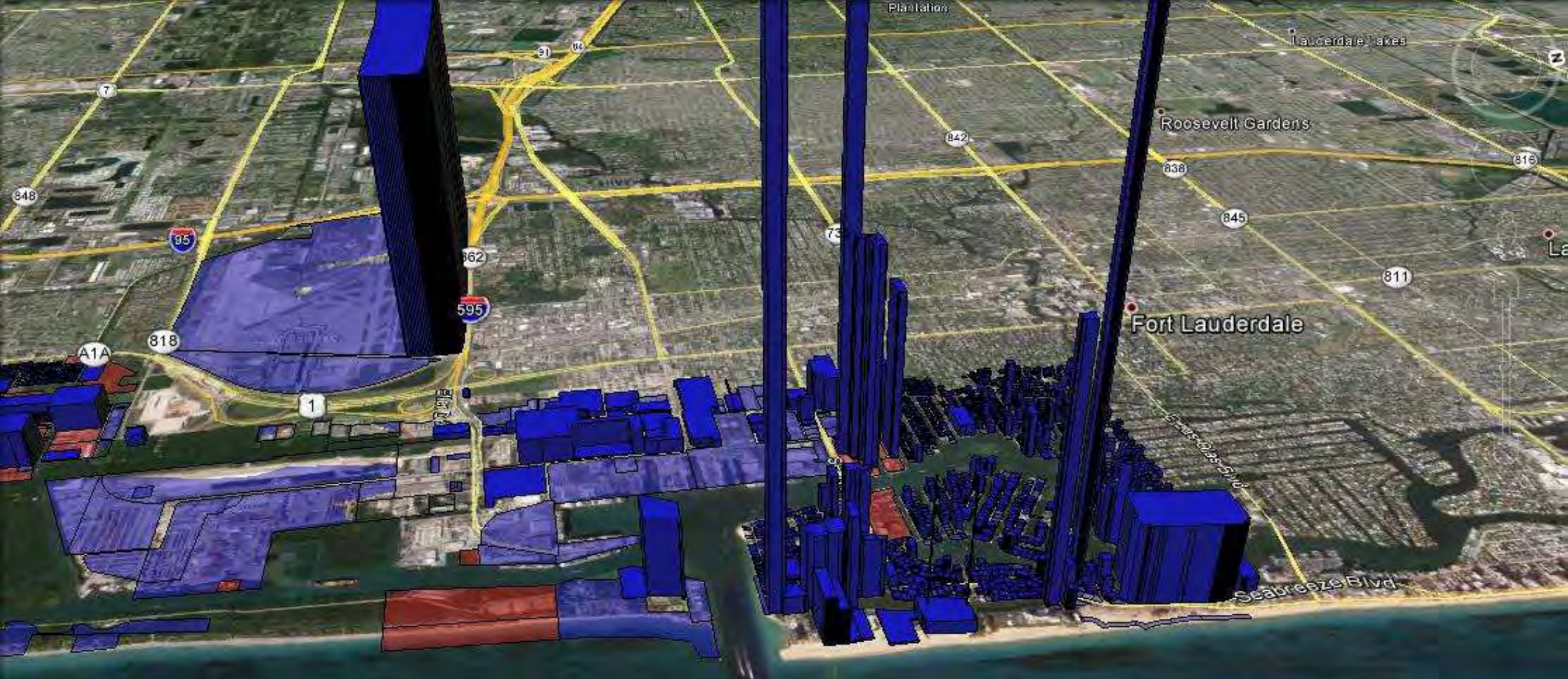


REVISED
August 18, 2014



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
12011CY000A



Total Storm Damage = \$862.7M for entire study area, not just for extent pictured here.
■ Removed from Asset Inventory Due to Permanent Inundation from Sea Level Rise (if no action taken)
■ Building Damage from Storm Surge
For General Planning Purposes Only

Example of Assessment Results: ONE-TIME DAMAGE
Wilma-sized Flood in 2060 with High SLR – Broward County Study Area

COAST results:

Estimates of Cumulative Damage

- from storm surge, for all storms and incorporating Sea Level Rise

Planning Period: 2015 - 2060

SLR Scenario	Cumulative damage to buildings by scenario date for all storms
Low – 9"	\$ 3.3 billion
High – 24"	\$ 5.3 billion

Note: All Storms = 1, 10, 50 & 100 year storm events; figures are in today's dollars

COAST results:

Buildings and land lost to Sea Level Rise

Planning Period: 2014 - 2060

SLR Scenario	Value of Buildings Lost to Sea Level Rise by Scenario Date	Value of Land Lost to Sea Level Rise by Scenario Date	No. of Parcels Lost to Sea Level Rise by Scenario Date	Total Value of Buildings and Land Lost to Sea Level Rise by Scenario Date
Low – 9”	\$ 1.1 million	\$ 312 million	53	\$ 426 million
High – 24”	\$ 2.5 million	\$ 543 million	199	\$ 791 million

Total Number of Study Area Parcels: 6,955

199 Parcels Lost by 2060 in High Scenario: 2.8% of Total Number

Value of 199 Parcels Lost by 2060: 8.4% of Total Assessed Value

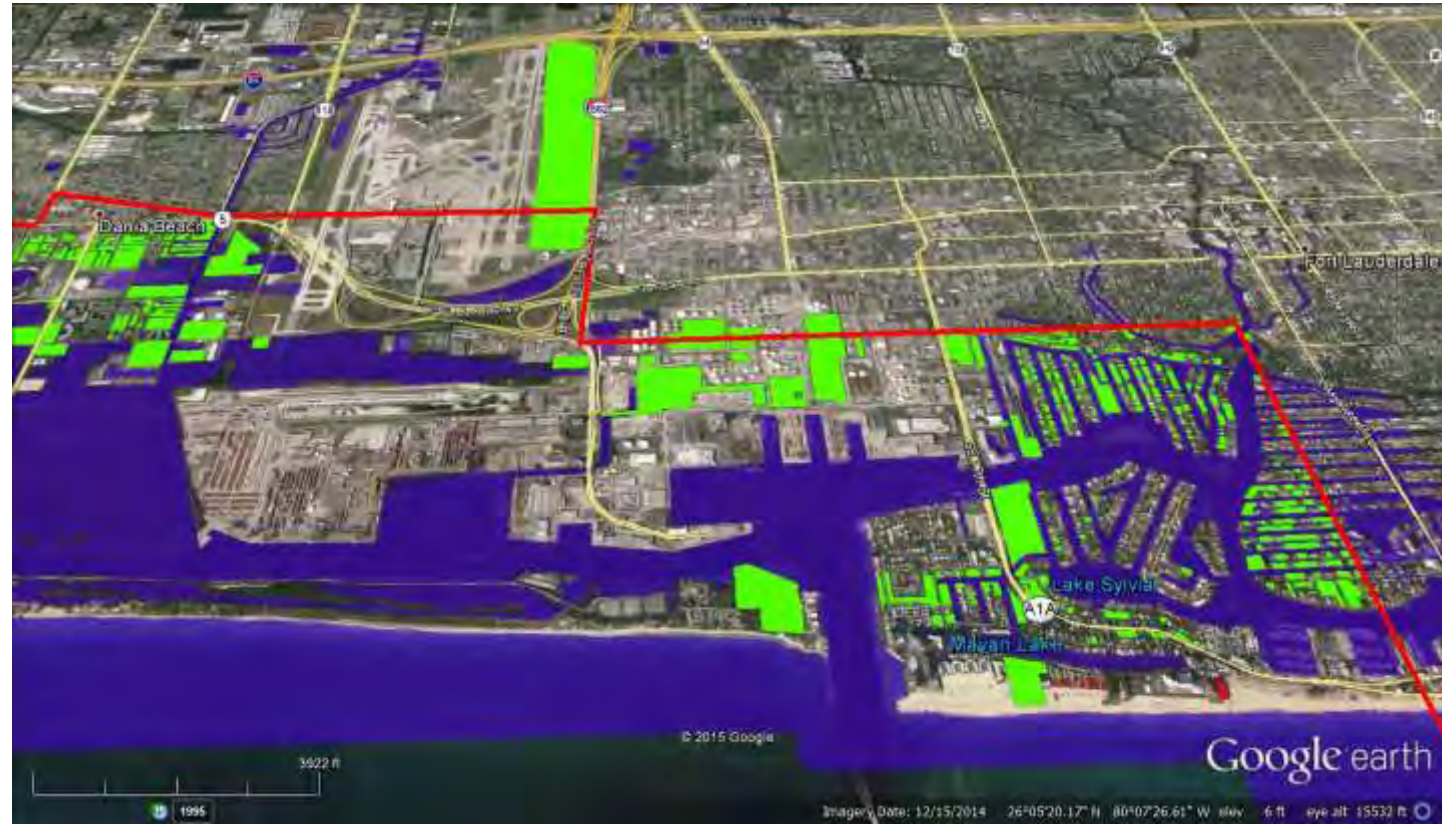
At Meeting One, We Voted to Model Two Adaptation Actions

- Elevate and Floodproof; and
- Voluntarily Relocate Properties over time

Action 1: Elevate and Floodproof

We Modeled the Benefits and Costs of:

- Elevation in V-Zones (red)
- Floodproofing in A-Zones (green)

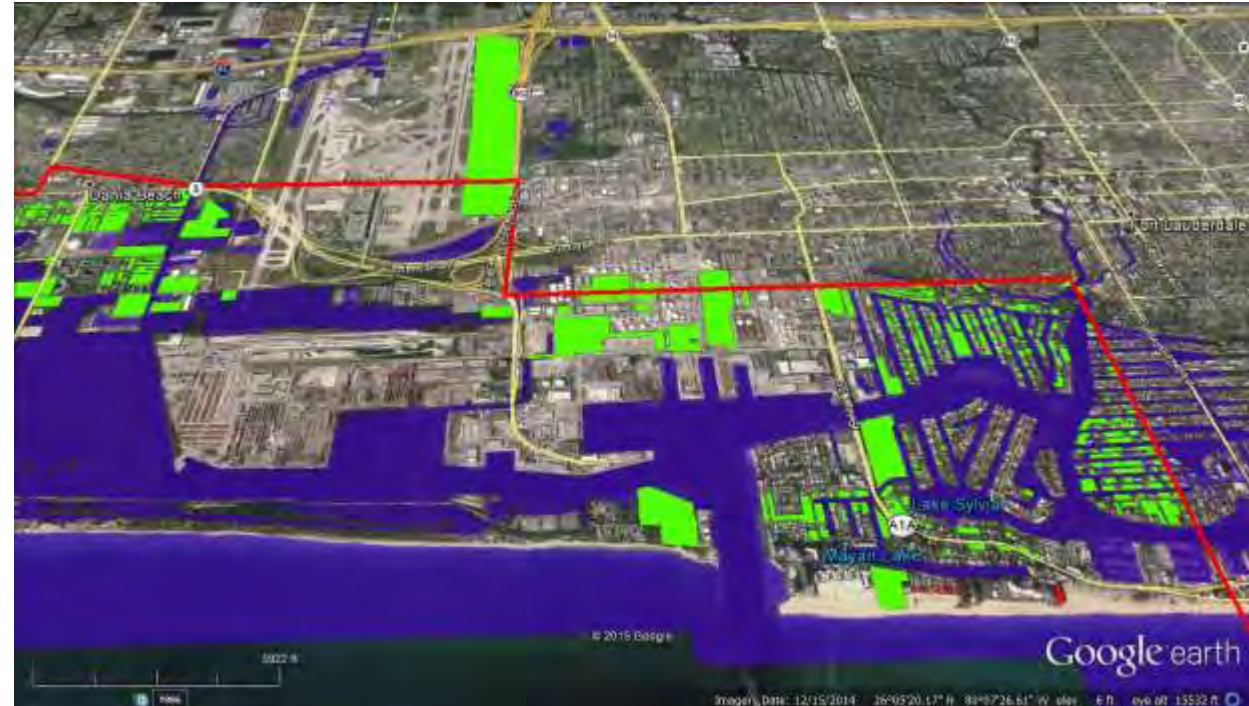
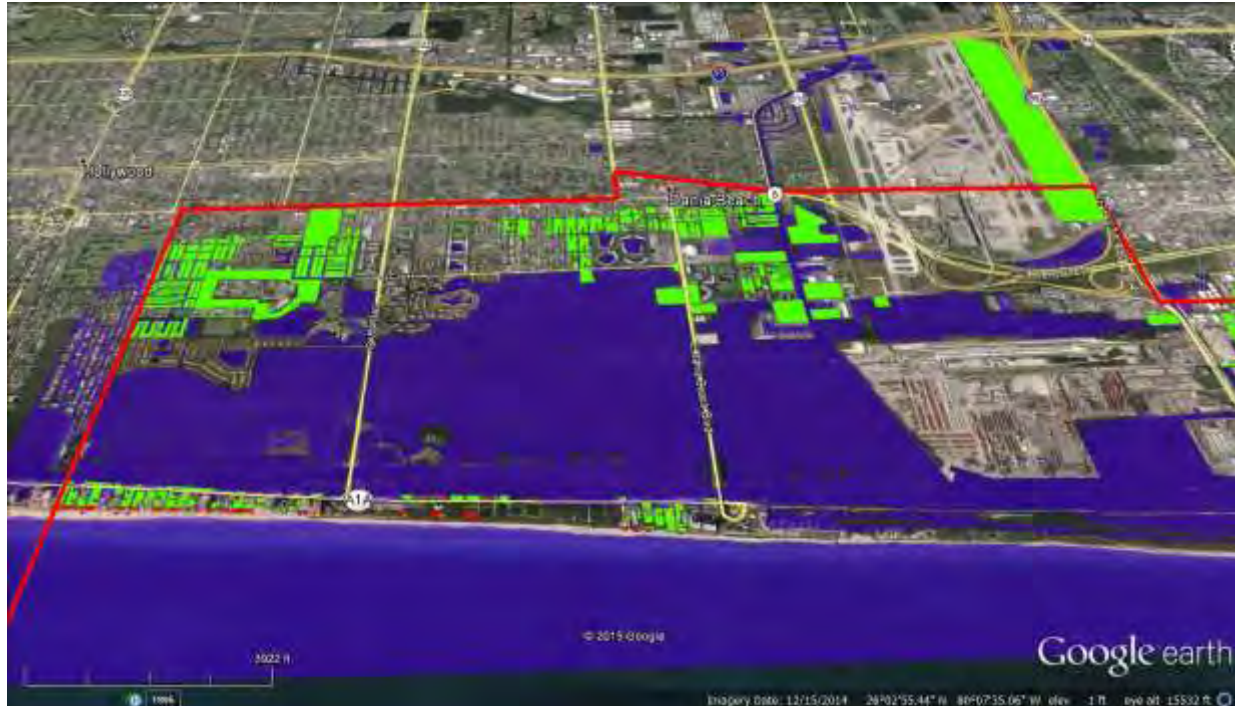


Elevate



Floodproof

Action 1: Elevate and Floodproof



Properties in red in FEMA V Zone = Modeled as Elevated (87 total)

Properties in green in FEMA A Zone = Modeled as Floodproofed (2095 total)

Action 2: Voluntarily Relocate Over Time

We modeled a form of rolling easement where:

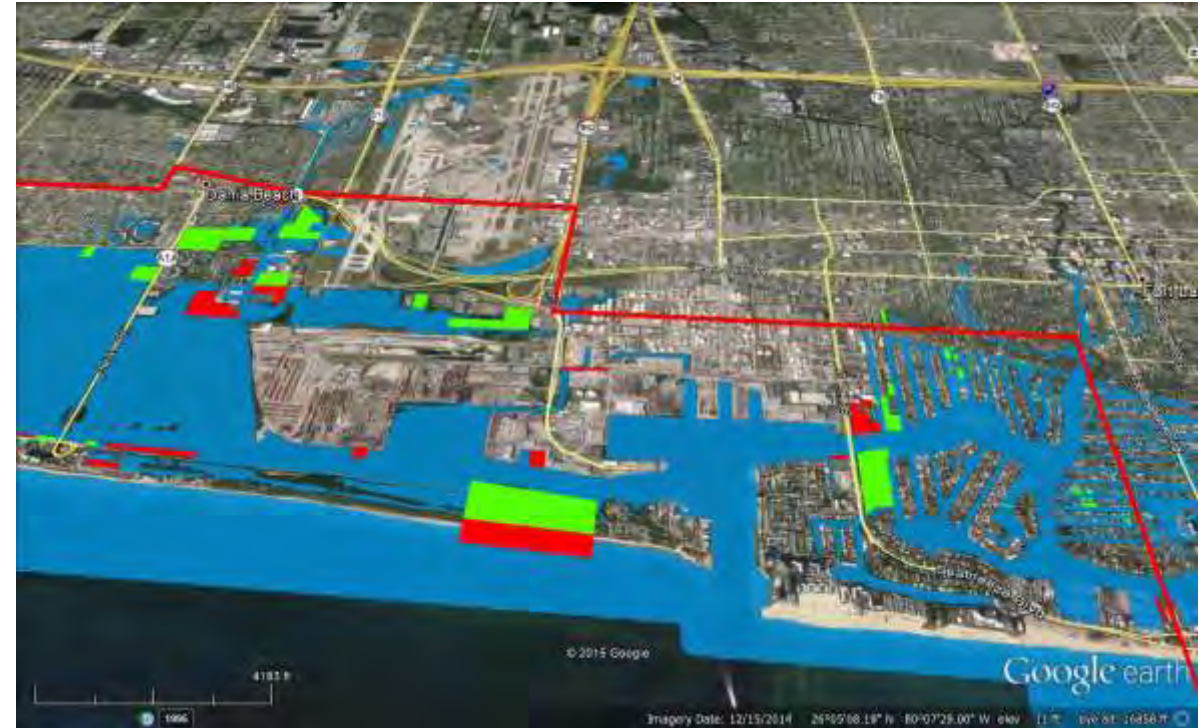
- Voluntary buyouts could be offered in two phases across Broward County
- Phase 1: for parcels expected to have high tide at their center by 2030 (red)
- Phase 2: for parcels expected to have high tide at their center by 2060 (green)

Note:

* For parcels in red – Cash payment today with title transferring in 2020

* For parcels in green – Cash payment in 2025 with title transferring in 2030

* Voluntary buyouts not offered for undeveloped land.

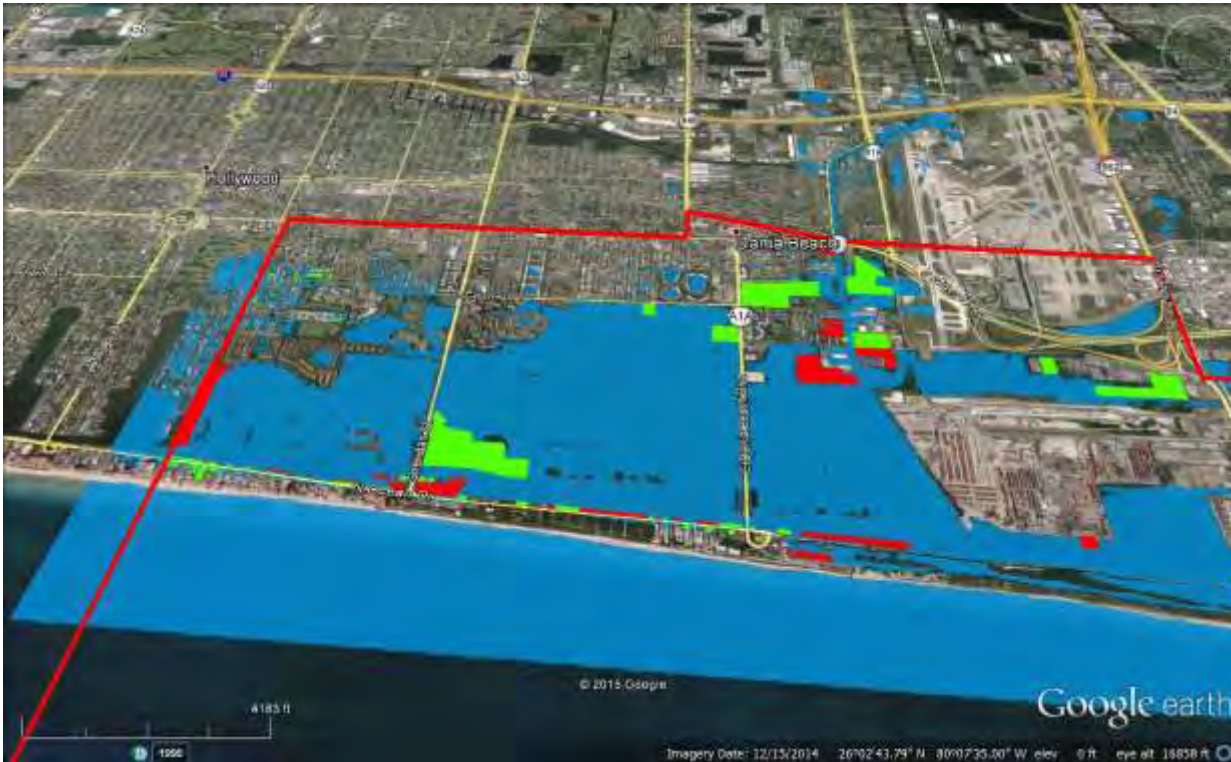


Parcels shown in red = lost to sea level rise 2010-2030.

Parcels in shown in green = lost to sea level rise 2030-2060.

Blue shade = High Tide in 2060 with 24" of sea level rise

Action 2: Voluntary Relocation with Rolling Easements



Modeled Voluntary Buyout of Properties shown in red = Lost by 2030 (44 total)

Modeled Voluntary Buyout of Properties in shown in green = Additional properties lost by 2060 (155 total)

Modeled New High Tide Shoreline in 2060 with High Sea Level Rise, shown in blue (24")

Costs and Benefits of Action

	Floodproof and Elevate		Voluntary Buyouts	
	Low SLR	High SLR	Low SLR	High SLR
Damages with No Action	\$1.677	\$2.388	\$1.677	\$2.388
Damages with Action	\$0.420*	\$0.597*	\$1.469*	\$2.210*
Avoided Damages	\$1.257*	\$1.791*	\$0.208*	\$0.178*
Cost (Low Est.)	\$0.057	\$0.057	\$0.351	\$0.351
Benefit-Cost Ratio	22	31	0.6	0.5
Cost (High Est.)	\$0.117	\$0.117	\$0.526	\$0.526
Benefit-Cost Ratio	11	15	0.4	0.3

\$ in billions, discount rate of 3.3%

Results from Fort Lauderdale, FL, 2015

***with partial participation**

What Do the Numbers Tell Us?

- Modeling shows elevating and floodproofing of buildings is cost effective!
- We modeled elevation and floodproofing to start immediately, but the modeled voluntary rolling easements were delayed, allowing owners to retain property for several years; this led to lower B/C ratios
- In a High Sea Level Rise Scenario, rolling easements allow properties to remain too long and they get damaged/inundated

Survey Research

Survey of Participant Values, Risk Experience,
Adaptation Action & Funding Preferences (or Not)



Once **BEFORE** First COAST Workshop January 2015 -- Hollywood, FL



Again **AFTER** Final COAST Workshop March 2015 -- Dania Beach, FL



Survey Content

- Individual and community experience with coastal hazards
- Preferences for 16 potential adaptation actions at various timeframes (e.g., NOW, 10, 25, 100 years, or never)
- Preferences for existing and possible public finance mechanisms for adaptation
- Perceptions about barriers to implementation

People Responding at BOTH Workshops are “Panelists”

- Some attended and responded only at 1st workshop

“Newbie” participants attended only 2nd workshop

Highlights of Results:

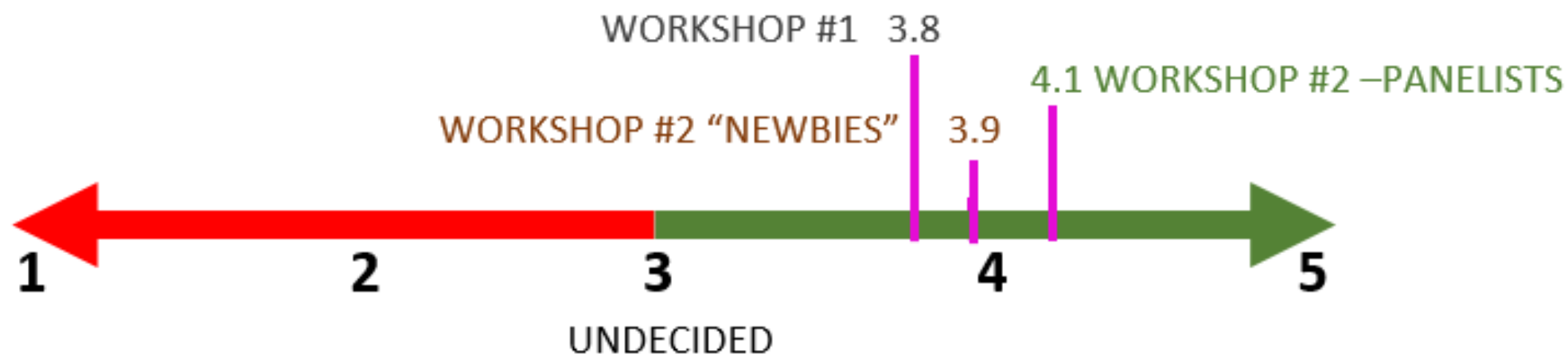
1. Participant Characteristics
2. Adaptation Priorities From Menu & Modeled Actions
3. Funding Preferences
4. Perceived Barriers to Community Action

Workshop #1—Attendee Characteristics:

- 53% Male
- 87% White 11% African American 2% Hispanic
- 94% College Degree
- 48% 55 yrs of age or older 12% < 35 yrs of age
- 88% above median HH \$\$ income
- 52% Democrat 13% Republican 35% Independent
- 43% local govt. staff 14% business owner 10% n'hood groups
18% elected and appointed officials

“NEP” Values Index (New Ecological Paradigm)

Used in 100's of studies in a dozen countries since 1979



**Nature To Be Commanded;
Nature Can Absorb Impacts**

**Nature Fragile; Human
Impacts Need Control**



ADAPTATION ACTIONS TESTED WITH PARTICIPANTS: 16 PLUS FINAL TWO ADAPTION ACTIONS MODELED

*******QUICK OVERVIEW (SEE HANDOUT)*******

CHOICES: Do NOW, 10 YRS, 25 YRS, 100 YRS, NEVER or UNSURE:

Collapsed to 3 categories here: NOW, 10 to 25 YEARS (SOON), or 100 YRS / NEVER / UNSURE

KEY PATTERNS:

1. **Growth Mgmt. = top priority** (stop new exposures)
2. **Green and Natural Infrastructure** also **highest priority**
3. Priority for ALL **Gray Infrastructure** actions **ROSE, W1→W2**
4. Mixed opinions about **Structural Solutions & Property Buyouts**
did **NOT** change much W1→W2

FINAL TWO ADAPTION ACTIONS MODELED

	<u>Panelists</u>			<u>New Attendees</u>		
	NOW	10-25 Yrs	100 Yrs/ Never/ Unsure	NOW	10-25 Yrs	100 Yrs/ Never/ Unsure
Elevation & Floodproofing as Modeled	67%	33%	0%	60%	20%	20%
Voluntary Buyouts As Modeled	42%	42%	16%	40%	20%	40%

VERY STABLE PREFERENCE ORDER FOR FUNDING ADAPTATION ACROSS WORKSHOPS & VALUES/POLITICS:

More Acceptable	Special Benefit/Assessment Districts
	Low Interest Loans for <u>Floodproofing</u>
	Bonding for Adaptation Needs (Mixed)
	Property Tax-Based Adaptation Funds
	Surcharge on Water Bills (Mixed)
Least Acceptable	Raise Sales Tax/Option Tax

“Rational Nexus” at Work!?

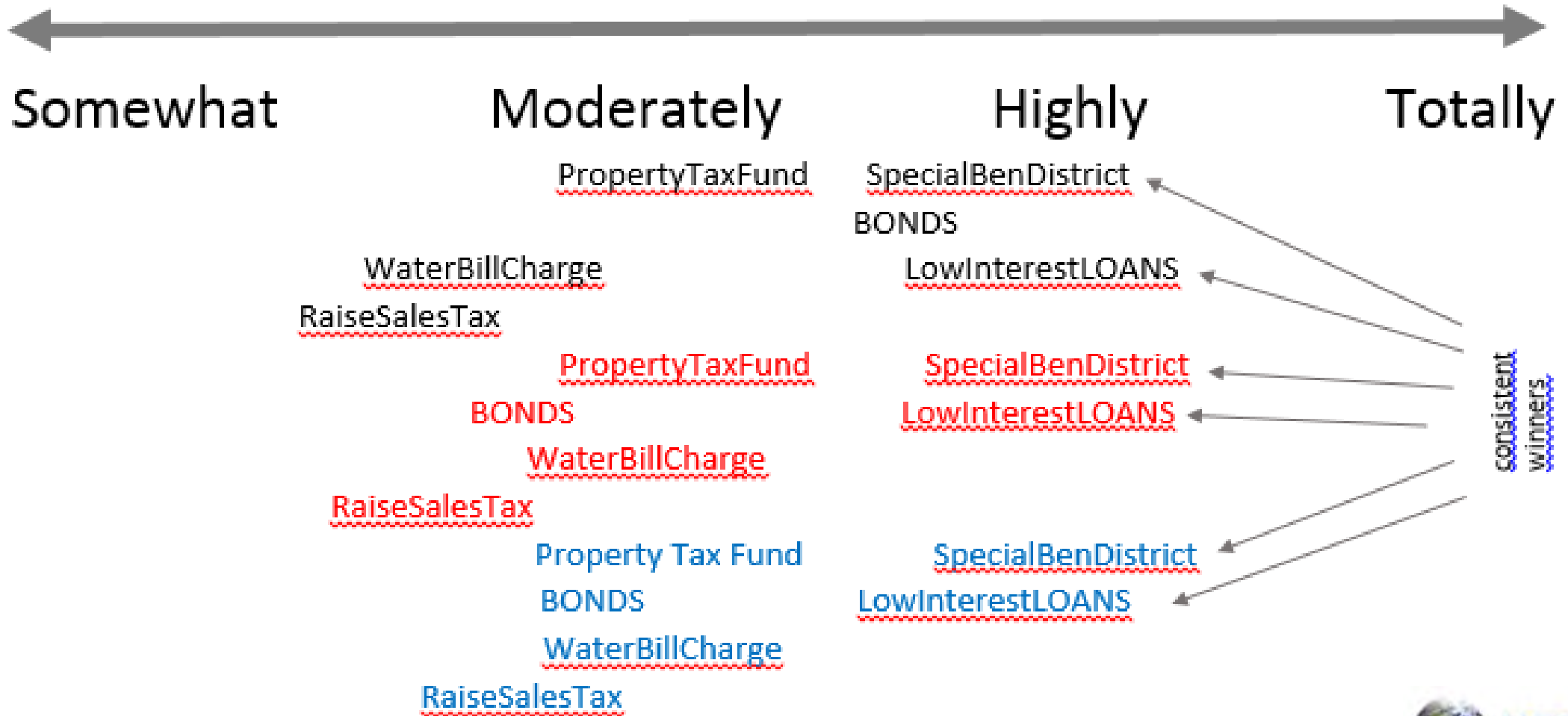
LOW NEP folks and Republicans scored acceptability lower
BUT basic ORDER same

ALL Workshop #1 People: BLACK

Workshop 1 ratings for Panelists: RED

Workshop 2 (FINAL) ratings-Panelists: BLUE

Average ACCEPTABILITY Ratings: Funding for Adaptation



Why Citizens MAY NOT Support Adaptation Actions

	BEFORE WORKSHOPS	AFTER FINAL WORKSHOP
Denial: My property won't be impacted	25%	58%
Opposed to new taxes, fees to	50%	67%
Lack of knowledge of future consequences	42%	83%
Climate change distant issue	67%	17%
Local Govt. lack expertise to act	17%	8%

NOT ISSUES: scientific uncertainty, distrust of media, concern over tourist economy, real estate economy

Qualitative Case Study Design and Findings: Barriers to Adaptation

- Data Sources
 - Field notes
 - 10 in-depth interviews, post-workshops
- Research Questions
 - What are stakeholders' values re: responding to coastal vulnerabilities?
 - What opportunities/barriers do stakeholders deliberate about re: the COAST models?
- Findings: Barriers
 - lack of leadership
 - invisibility of the (longer-term) problem
 - consistent funding needed
 - comprehensive models

Qualitative Case Study Findings: Values and Preferences for Adaptation Action

- “place” and a commitment to making the region more resilient
- “Safety and access” defined in terms of:
 - concern about damage caused by high winds and flooding to individual/community property
 - location of critical infrastructure and vulnerability/age of transportation infrastructure

Possible Take-Aways

- Giving stakeholders better information is a positive (what we planners always wish to believe) IF people can “own” the analysis process.
 - The COAST approach provides a framework for discussion of adaptation that focuses on action and benefits – not just on future damage and “climate politics”.
 - Data used in Broward County for COAST can be found throughout Florida coastal communities with similar vulnerabilities.
- **Infrastructure** is a key area where public understanding and support for action can be increased with better information—people respond to the need for future access, resiliency, safety.

Thanks to:



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