Vulnerability of Indian River County's Coast to Episodic Storm Events

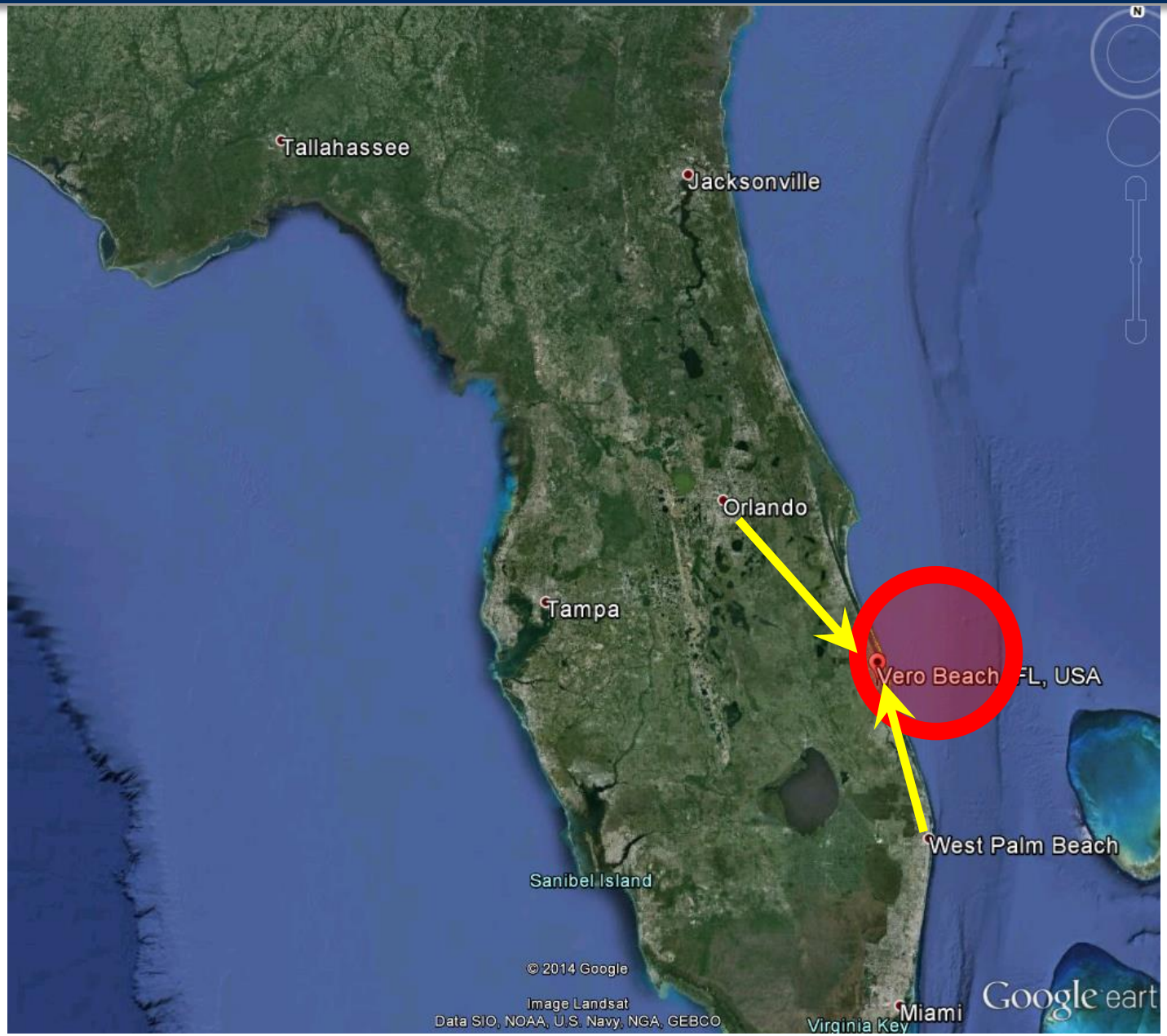
Presented by:
David Swigler (CB&I)

Special Thanks to:
James Gray (Indian River County)
Gordon Thomson (CB&I)
Julien Devisse (CB&I)

FSBPA: February 5, 2015

- **Study Location & Setting**
- Context of Study
- SBEACH
- Storm Damage
  - Vulnerability (Existing Conditions)
  - Resiliency (Beach Fill in Place)
- Action: Sector 3
- Conclusions

Study Location & Setting



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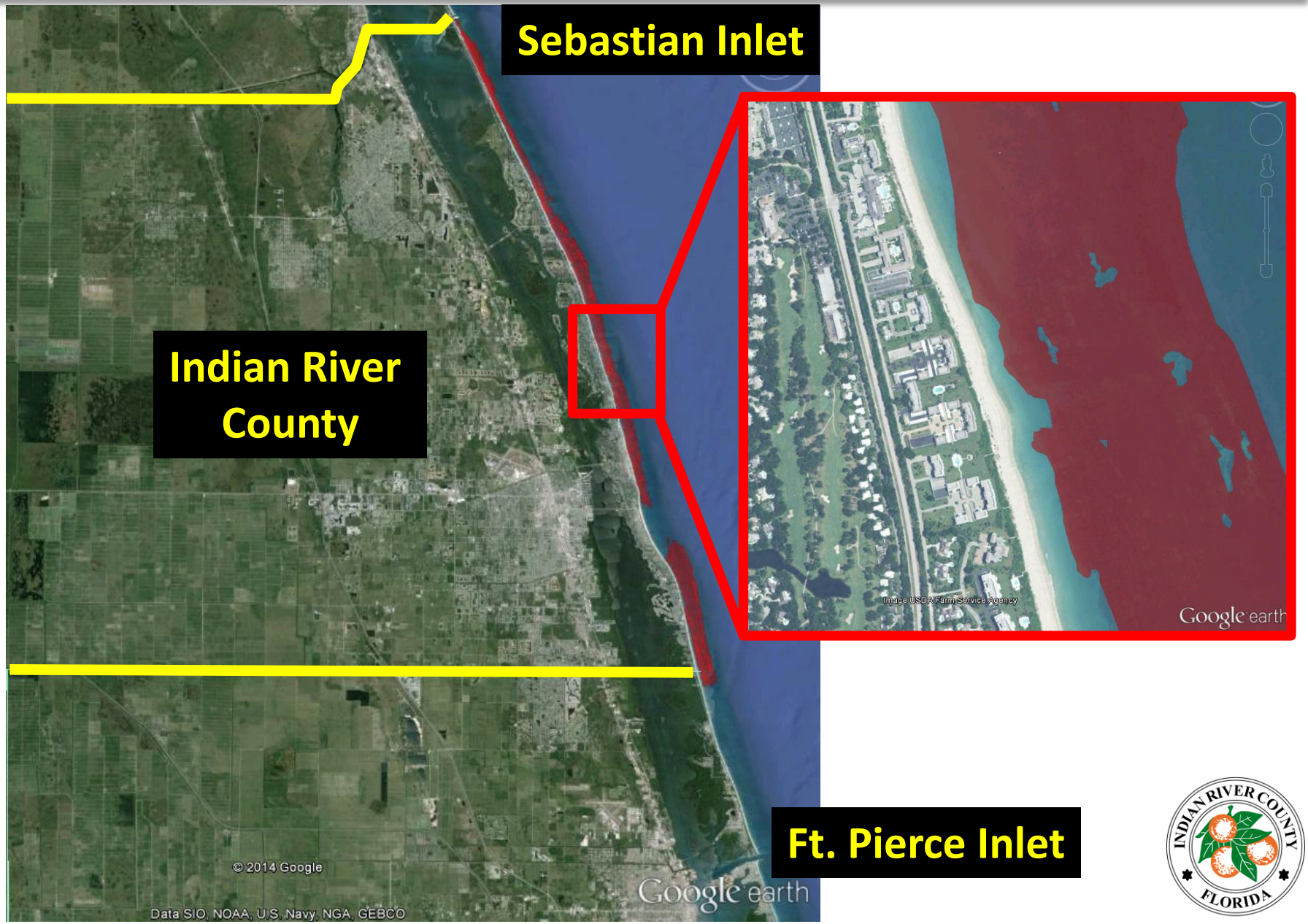

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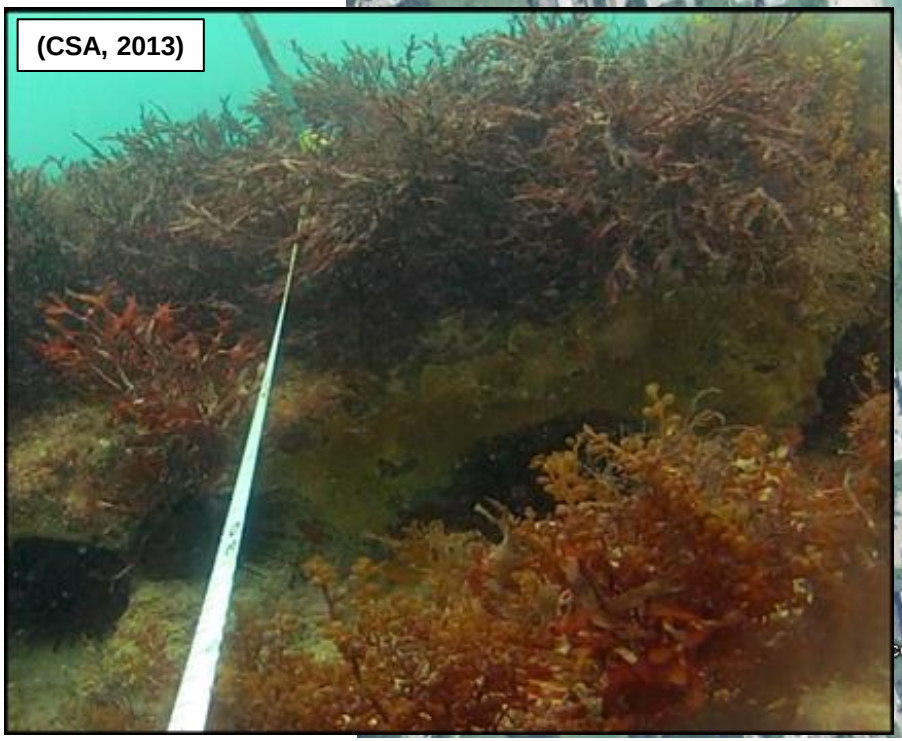

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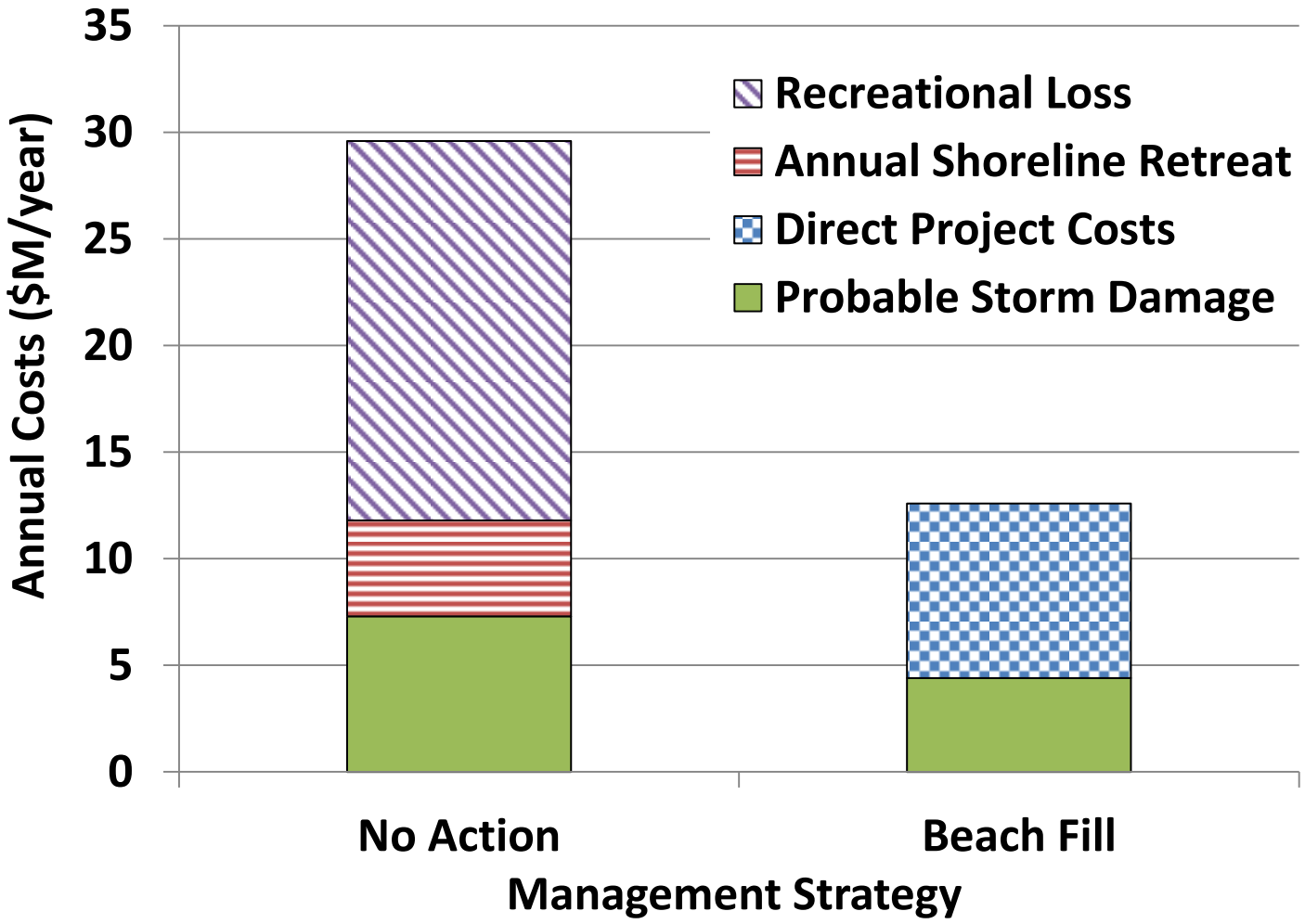
- **Florida Department of Revenue 2013**

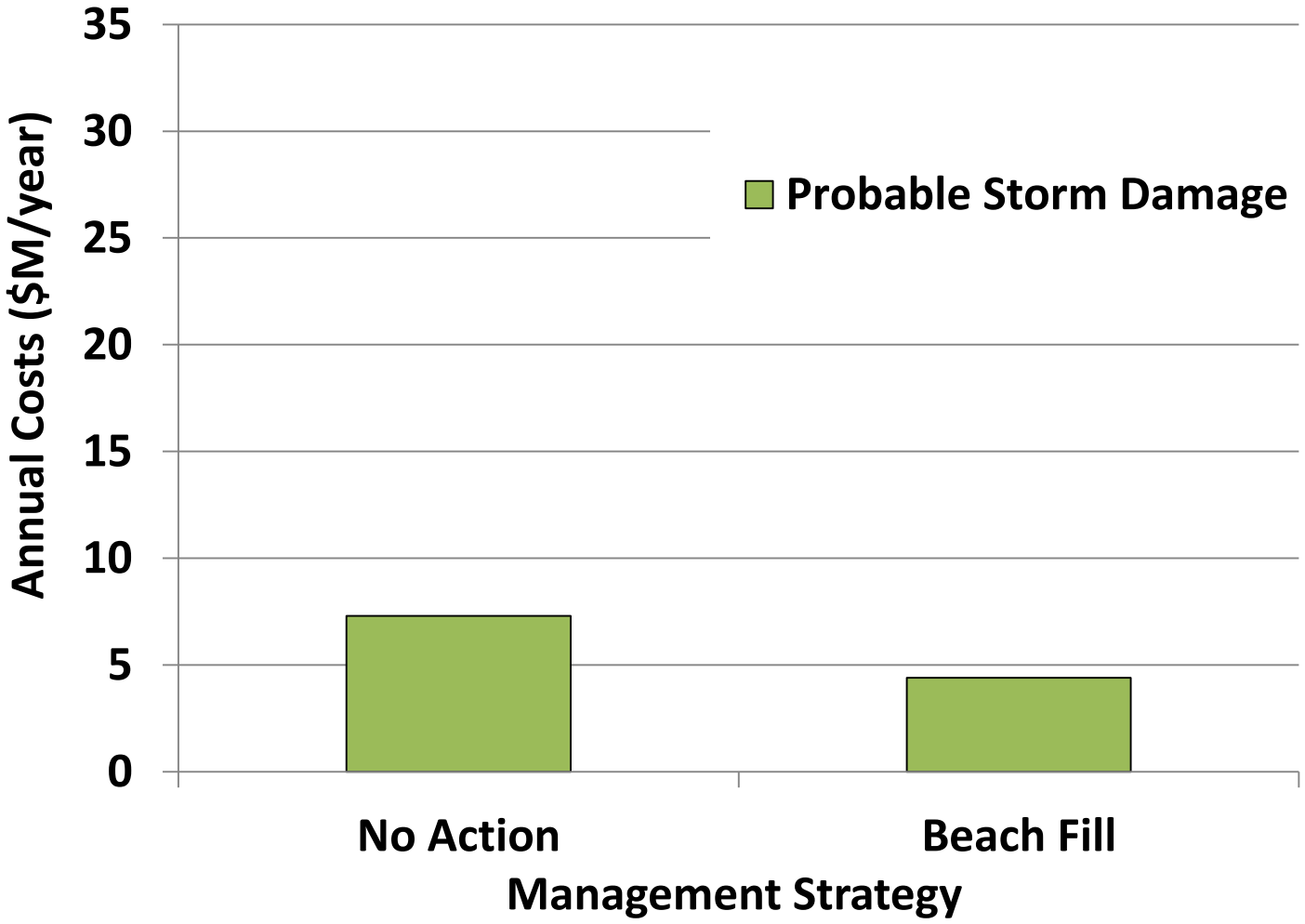
Region	Property Value ($)
County	$12,860,500,000
Beachfront	$2,138,500,000
Proportion	16.6%

  - Beachfront = property fronting the beach

- **Beach Preservation Plan**



- **Beach Preservation Plan**



Outline

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- Context of Study
- **SBEACH**
- Storm Damage
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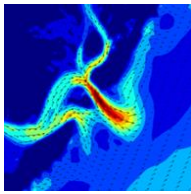
  - Resiliency (Beach Fill in Place)
- Action: Sector 3
- Conclusions





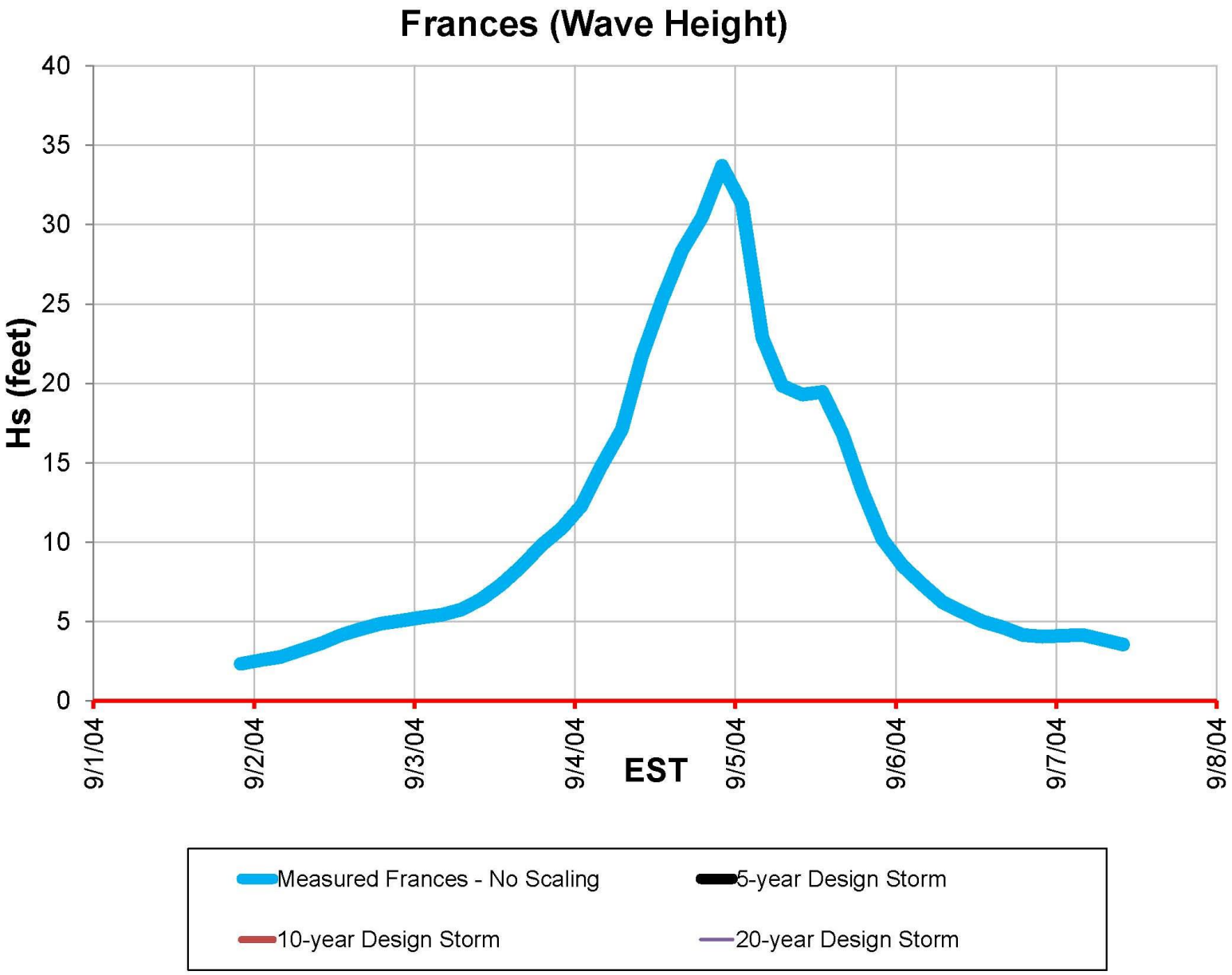
- **Advantages of Methodology**
  - Study area can broad or focused
  - Retains spatial variability of the study area
    (i.e. dune elevation, hardbottom, property)
  - Considers the range of damages for a given return period storm event

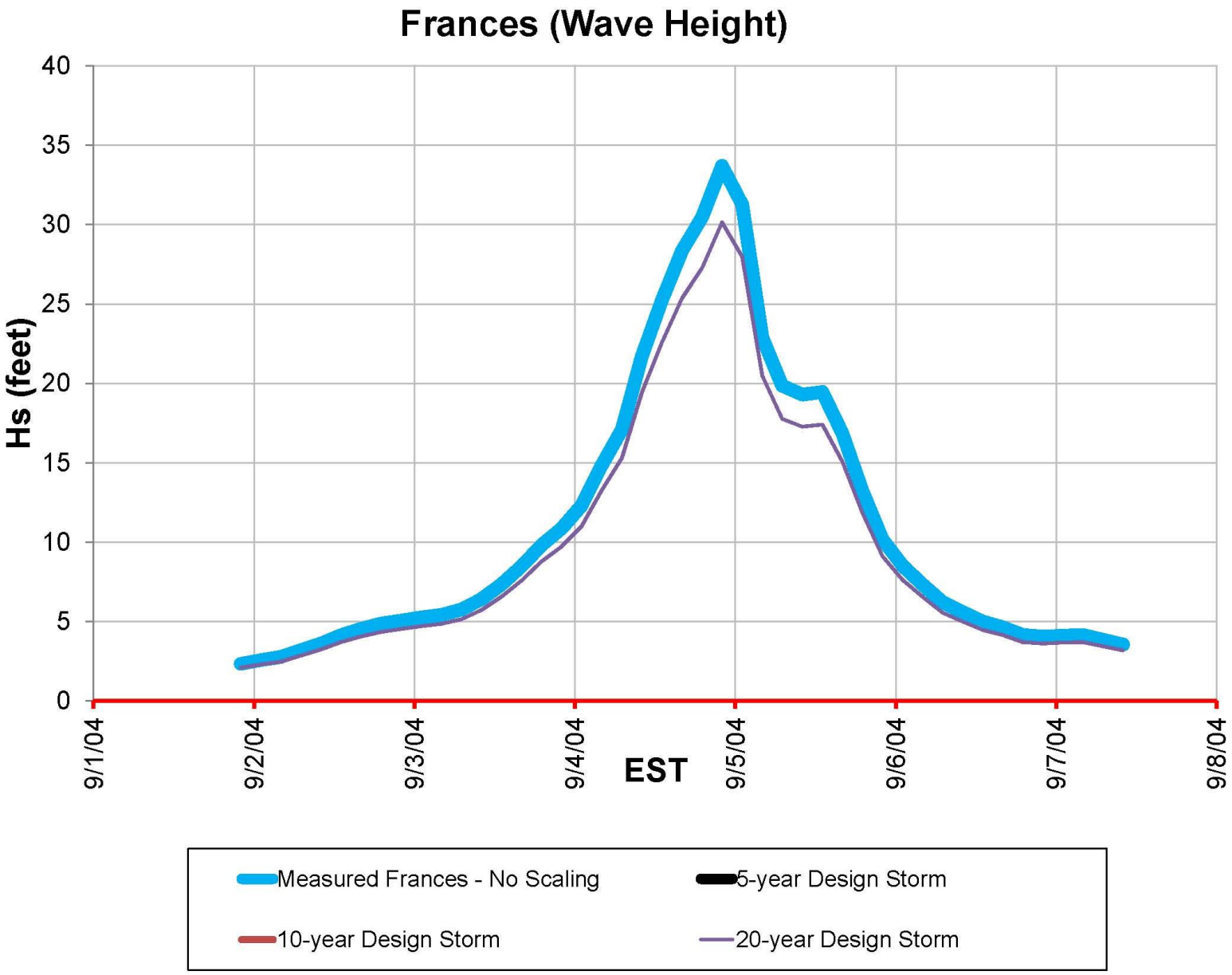
- **Storm Induced Beach Change Model (SBEACH)**
  - Cross shore model
  - Beach profile response to storm events

119 Beach Profiles
x 24 Modeled Storm Events
2,856 Simulations

- **24 Modeled Storm Events**

6 Historical Storms		4 Return Period Events
The Perfect Storm		5 Year
Hurricane Frances	X	10 Year
Hurricane Jeanne		20 Year
Subtropical Storm Andrea		30 Year
Extratropical Storm		
Hurricane Sandy		


Frances (Wave Height)
Hs (feet)
40
35
30
25
20
15
10
5
0
9/1/04
9/2/04
9/3/04
9/4/04
EST
9/5/04
9/6/04
9/7/04
9/8/04
Measured Frances - No Scaling
5-year Design Storm
10-year Design Storm
20-year Design Storm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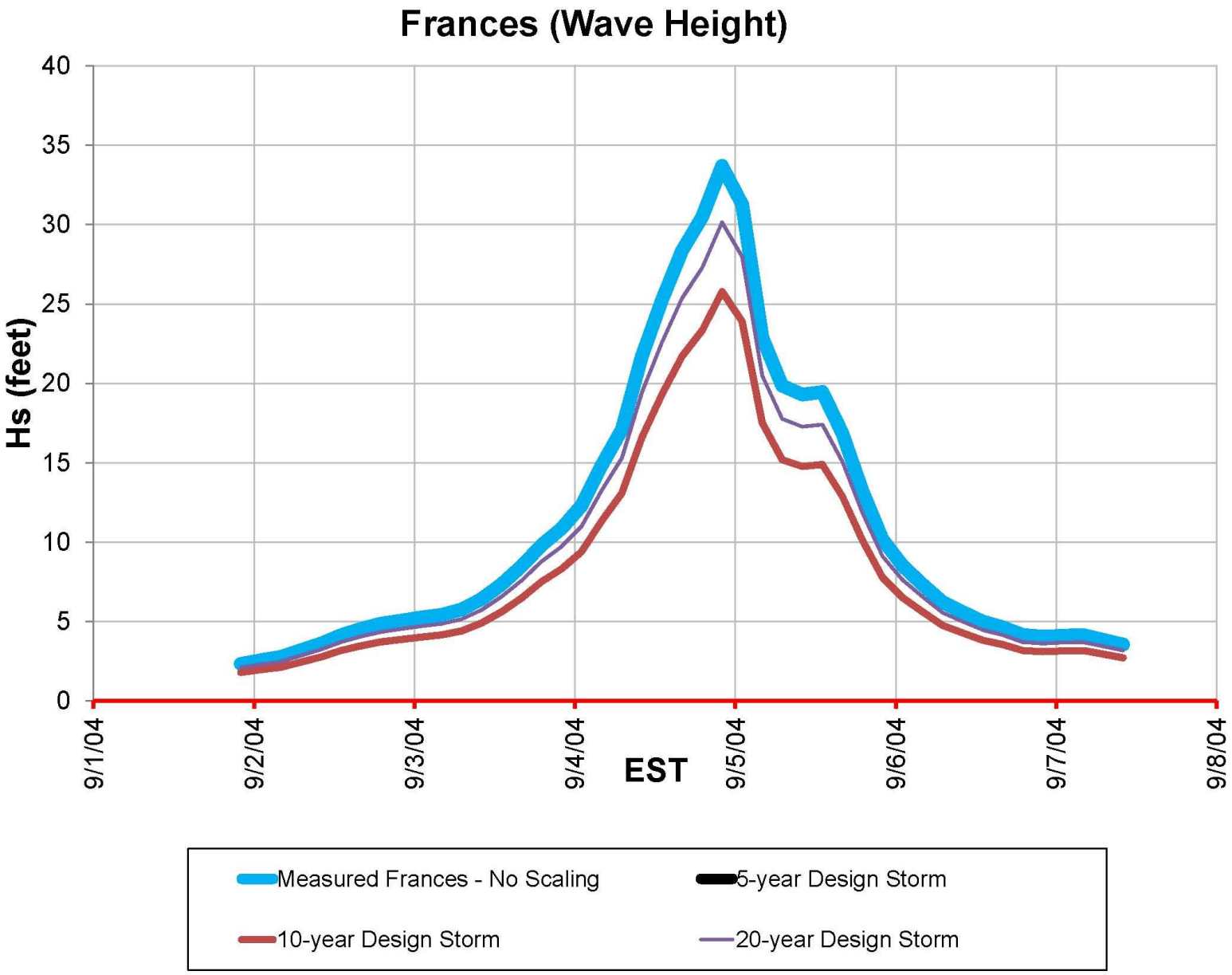
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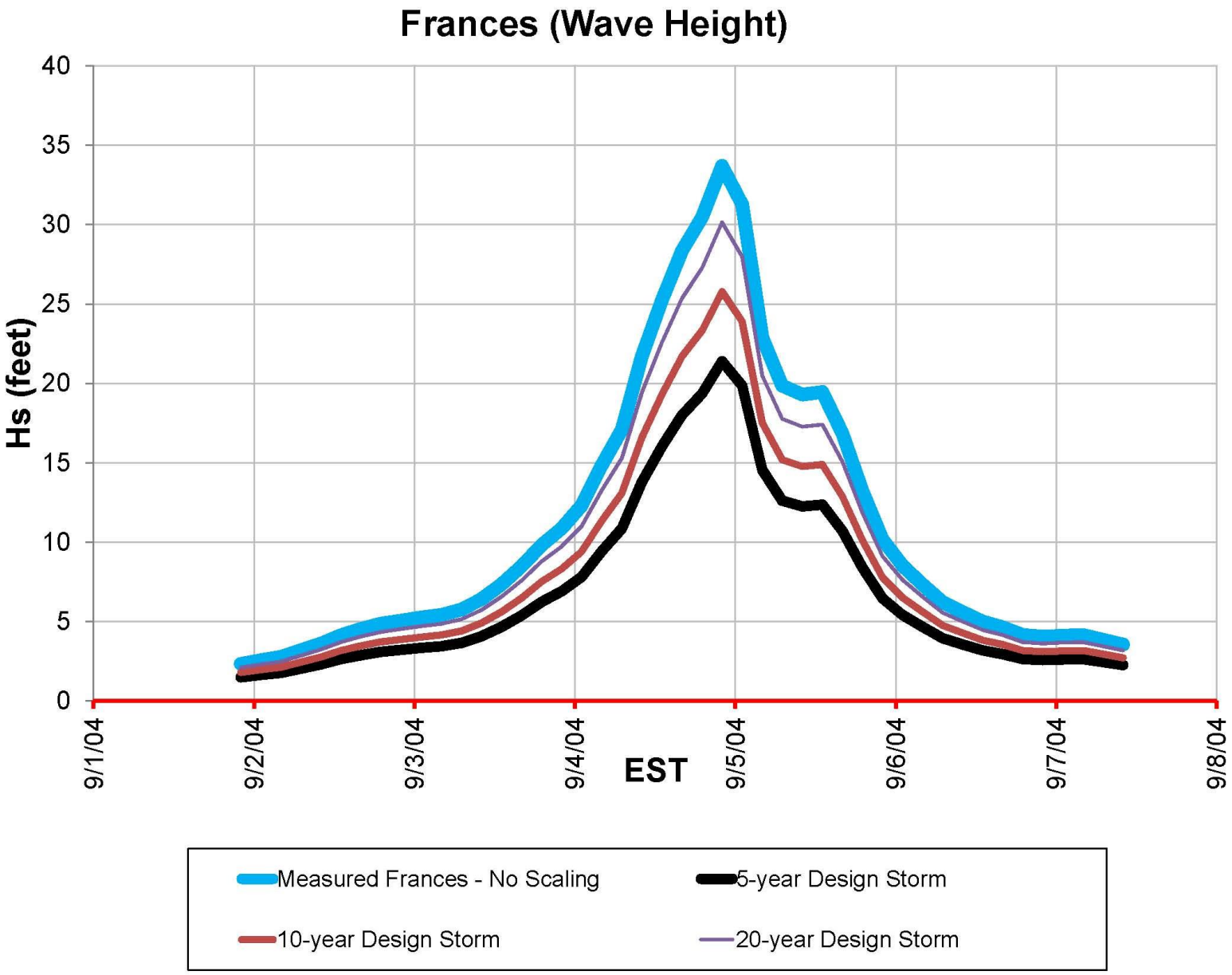
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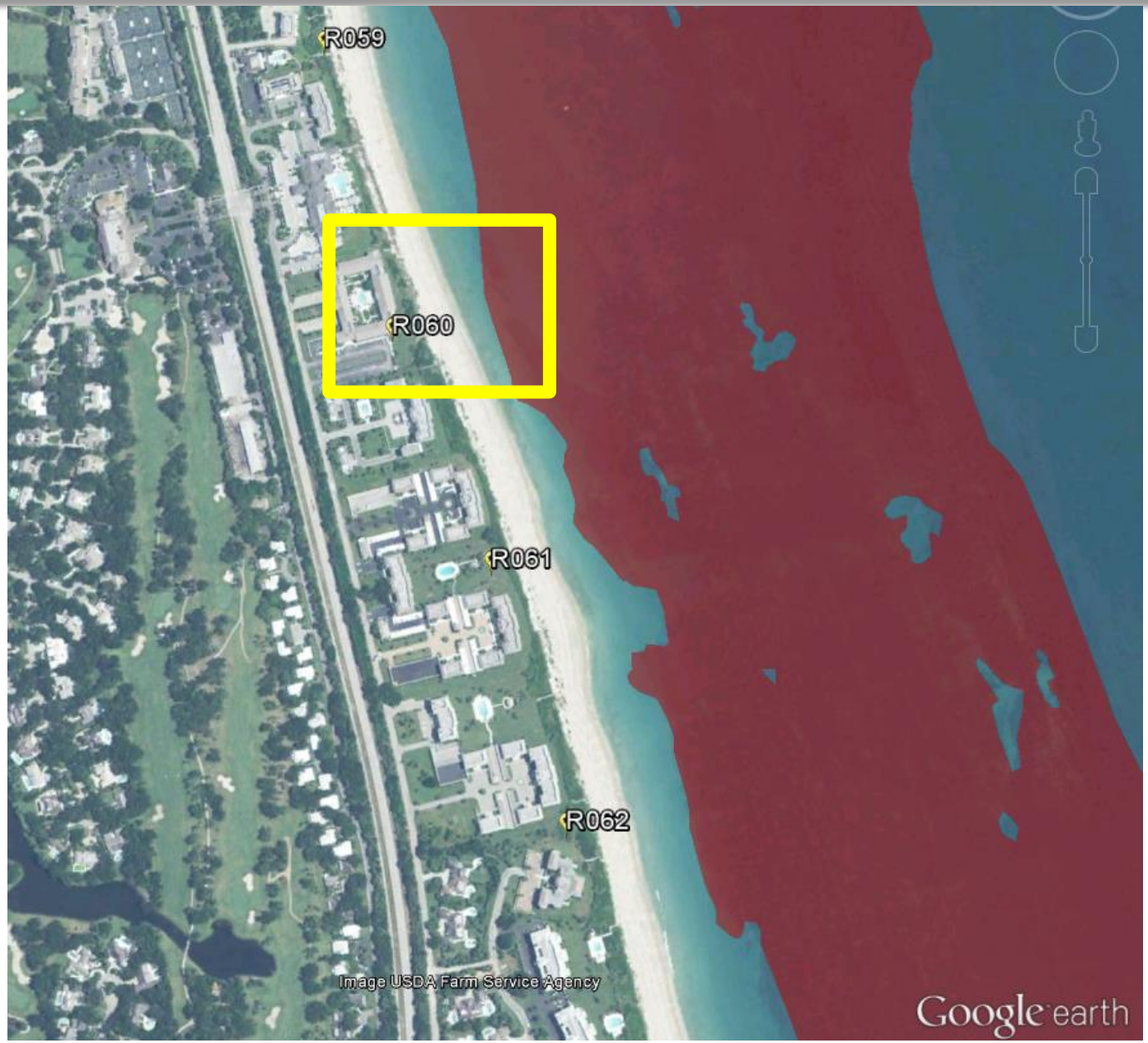
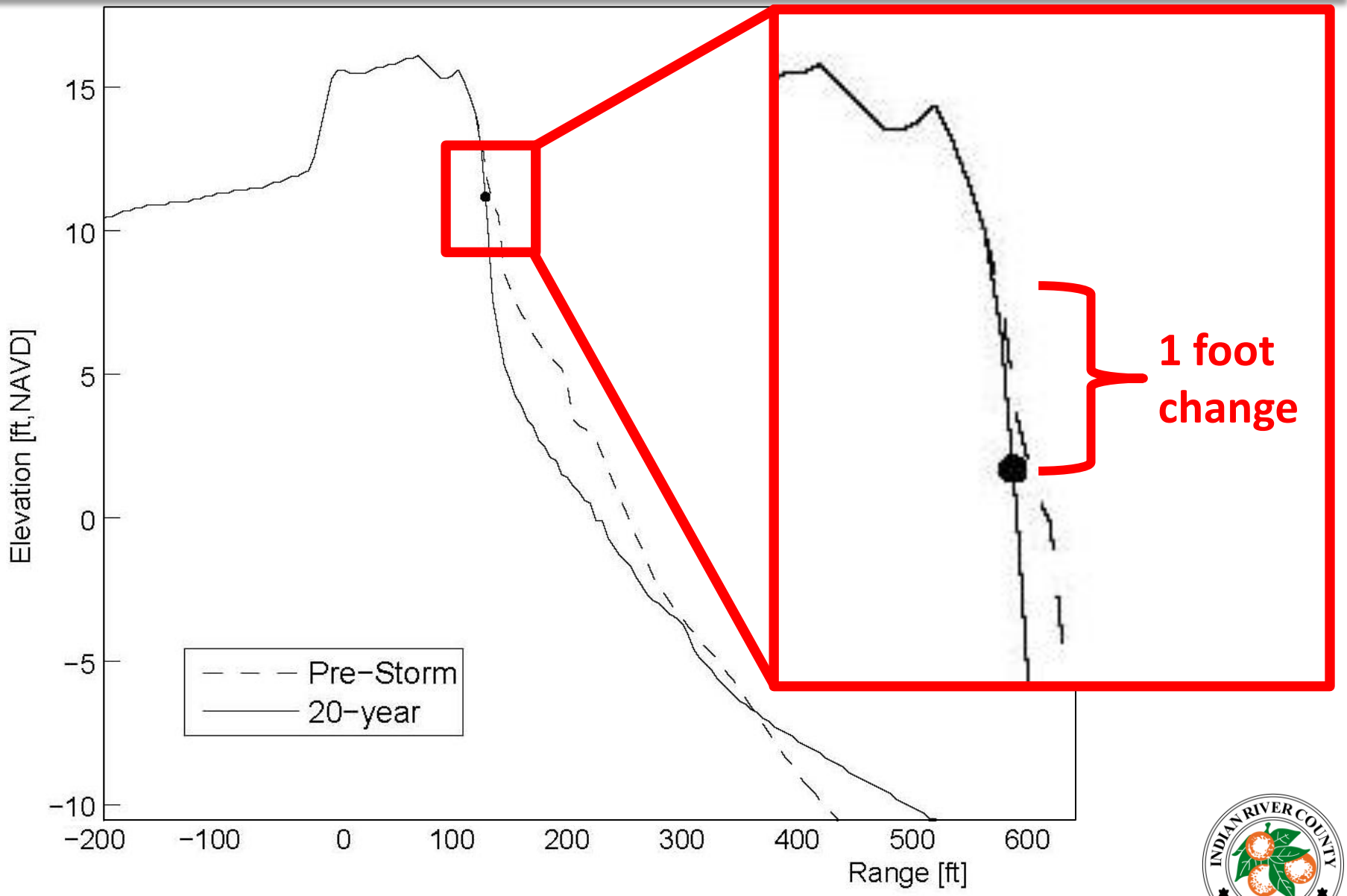
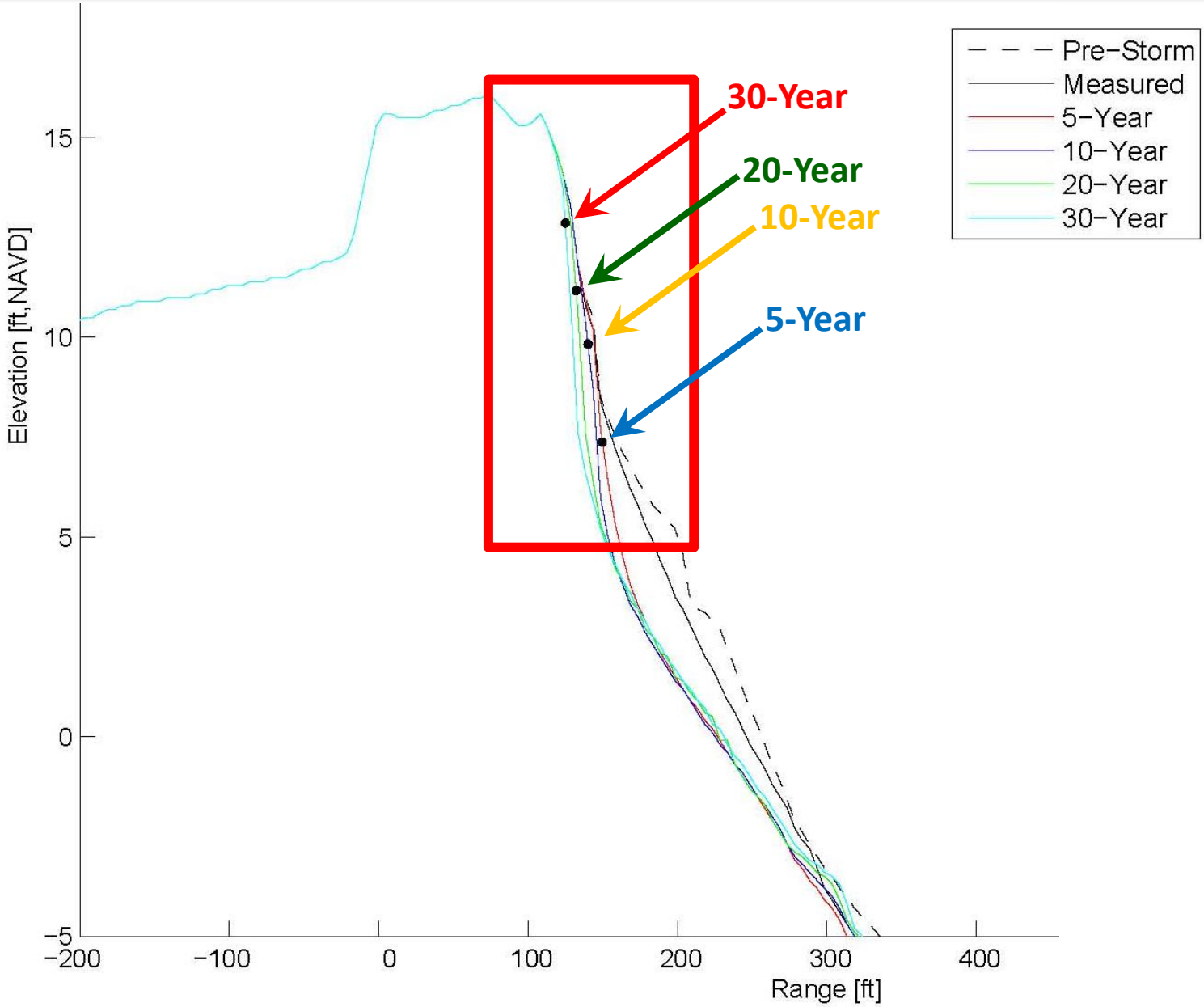

R059
R060
R061
R062
Image USDA Farm Service Agency
Google earth


Indian
River Shores
(John's Island)
R-60
A1A


15
10
5
0
−5
−10
Elevation [ft,NAVD]
−200
−100
0
100
200
300
400
500
600
Range [ft]
Pre−Storm
20−year
1 foot change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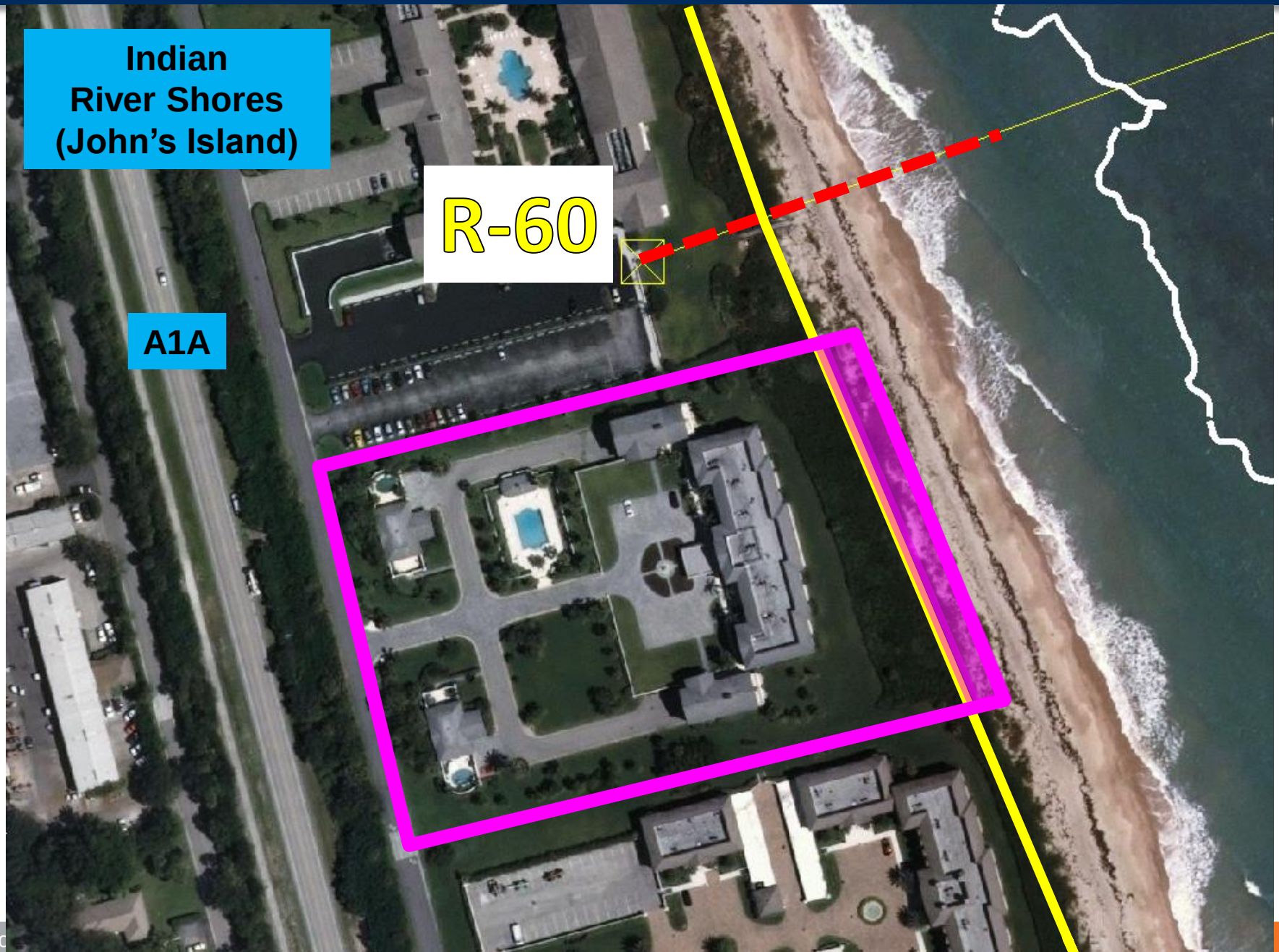
Indian
River Shores
(John's Island)
R-60
A1A

- **Property Damage Calculations**
  - Includes land loss, structural loss, and loss of taxes to County
  - No loss where seawalls or revetments in place

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- **Storm Damage**
  - Vulnerability (Existing Conditions)
  - Resiliency (Beach Fill in Place)
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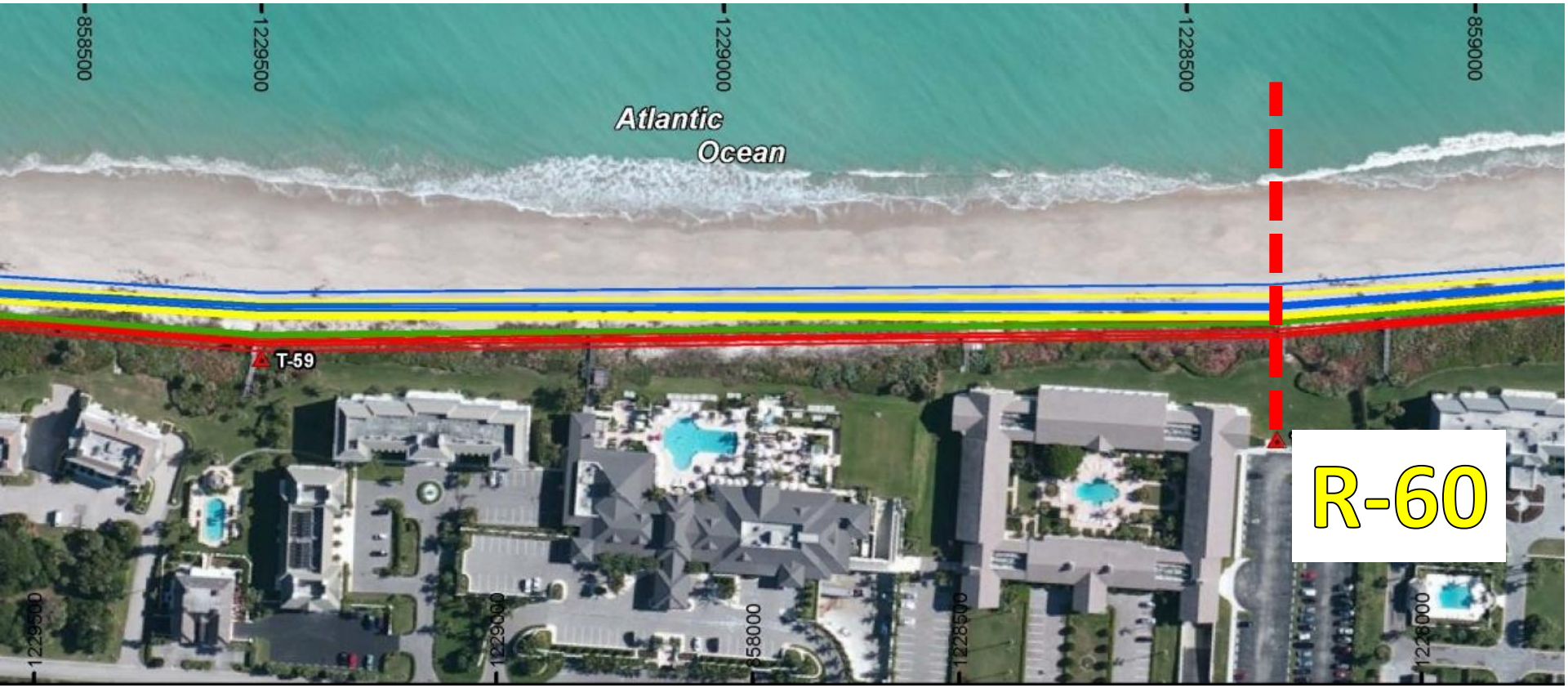
- **Vulnerability**
  - The exposure of upland property to impacts from storm events

Storm Vulnerability (Existing Conditions)



Legend:

Fill Impact Lines
- Year 5
- Year 10
- Year 20
- Year 30

FDEP Monuments

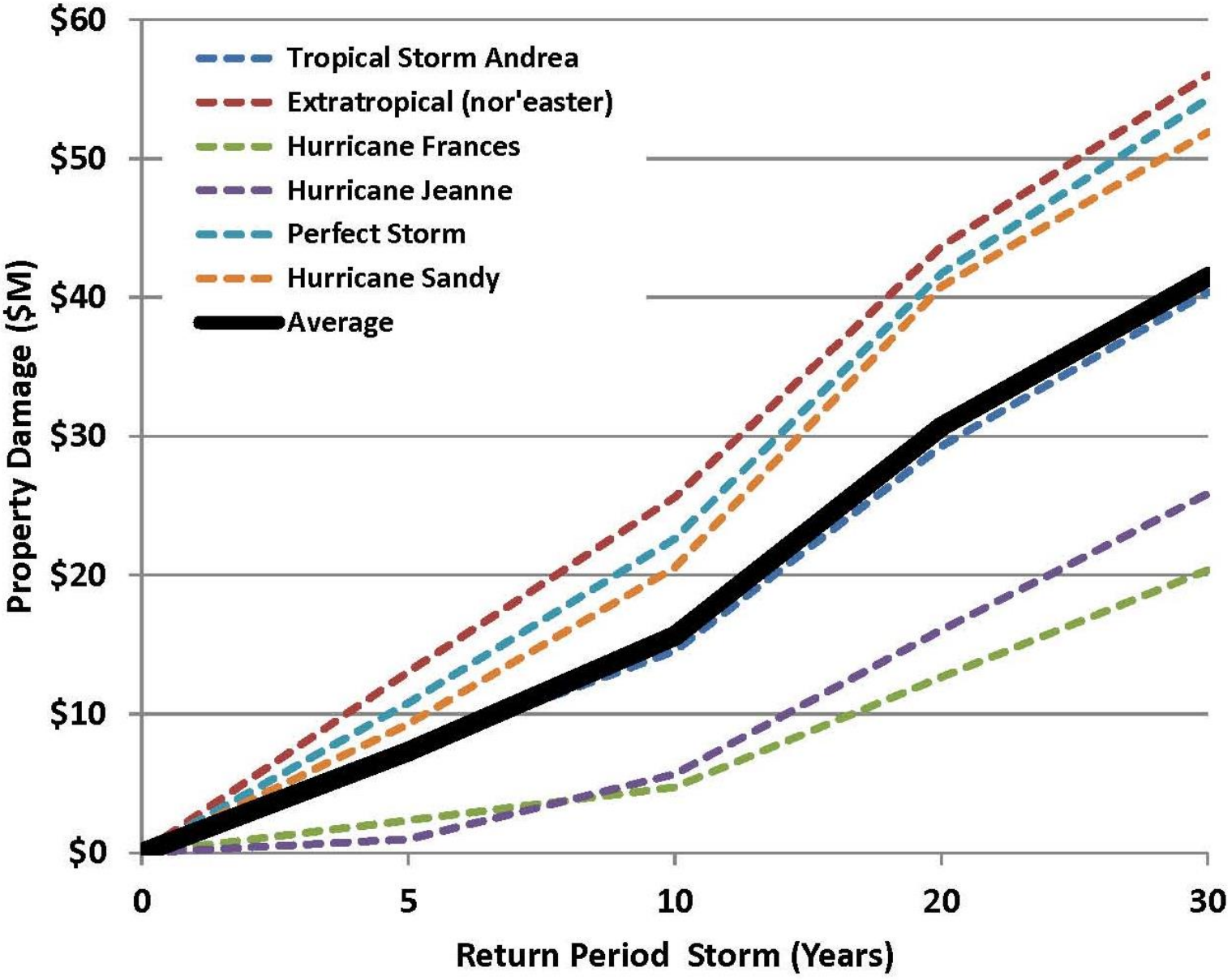
Matchline

N

0 100 200 Feet

1 inch = 200 feet

Storm Vulnerability (Existing Conditions)



Storm Vulnerability (Existing Conditions)

Return Period Storm	Average Storm Damage ($M/year)	
	Existing Conditions	Beach Fill in Place
5 Year	$7.4	
10 Year	$15.8	
20 Year	$31.1	
30 Year	$42.0	
Probable	$7.3	

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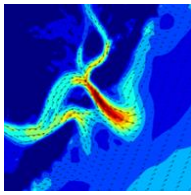
- **Resiliency**
  - The ability of the coastline to absorb the impacts from storm events reducing damage to upland properties and structures

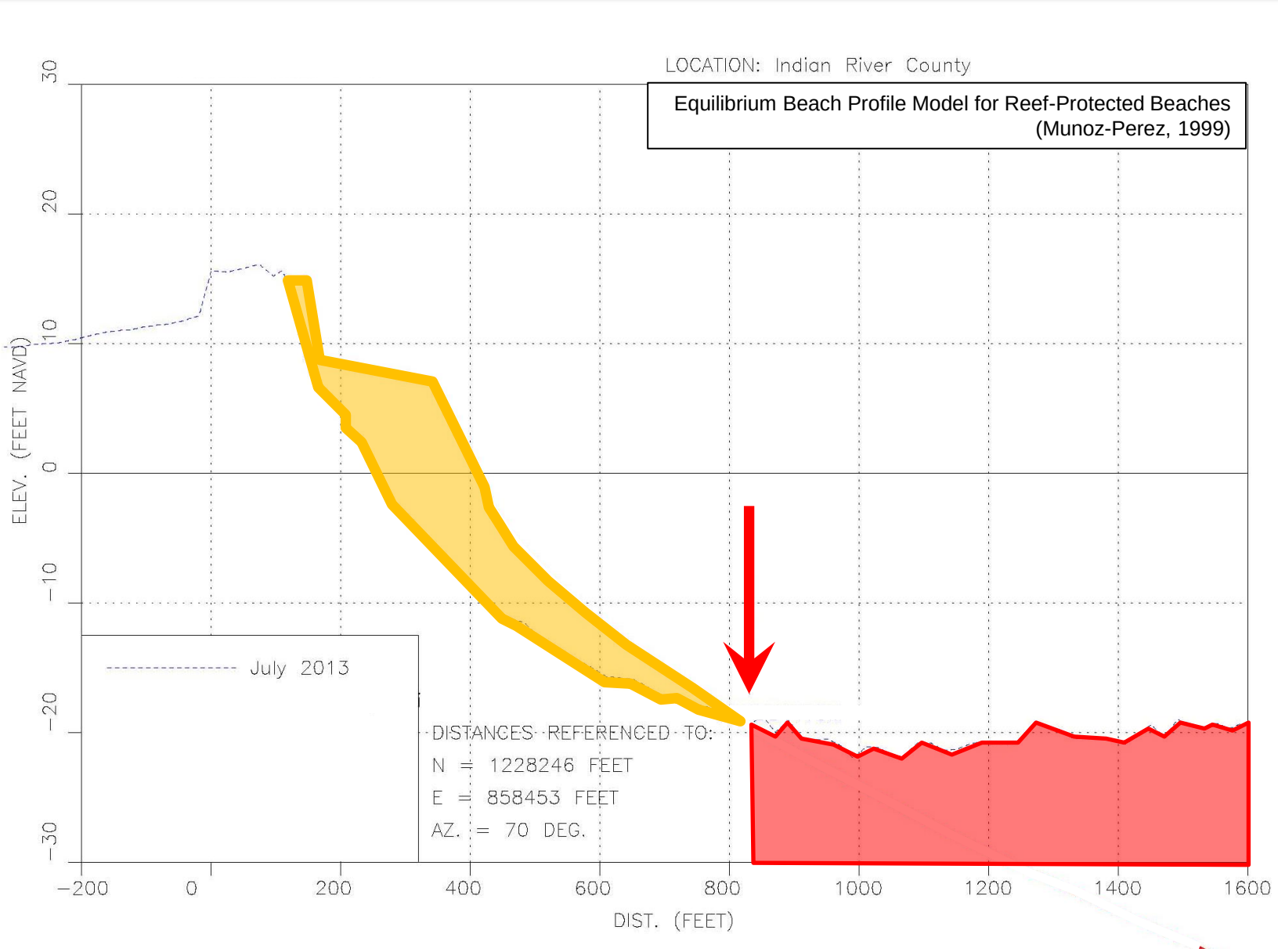
- **Beach Fill**
  - Reduce Storm Damage
  - Avoid Impacts to Hardbottom

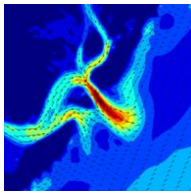




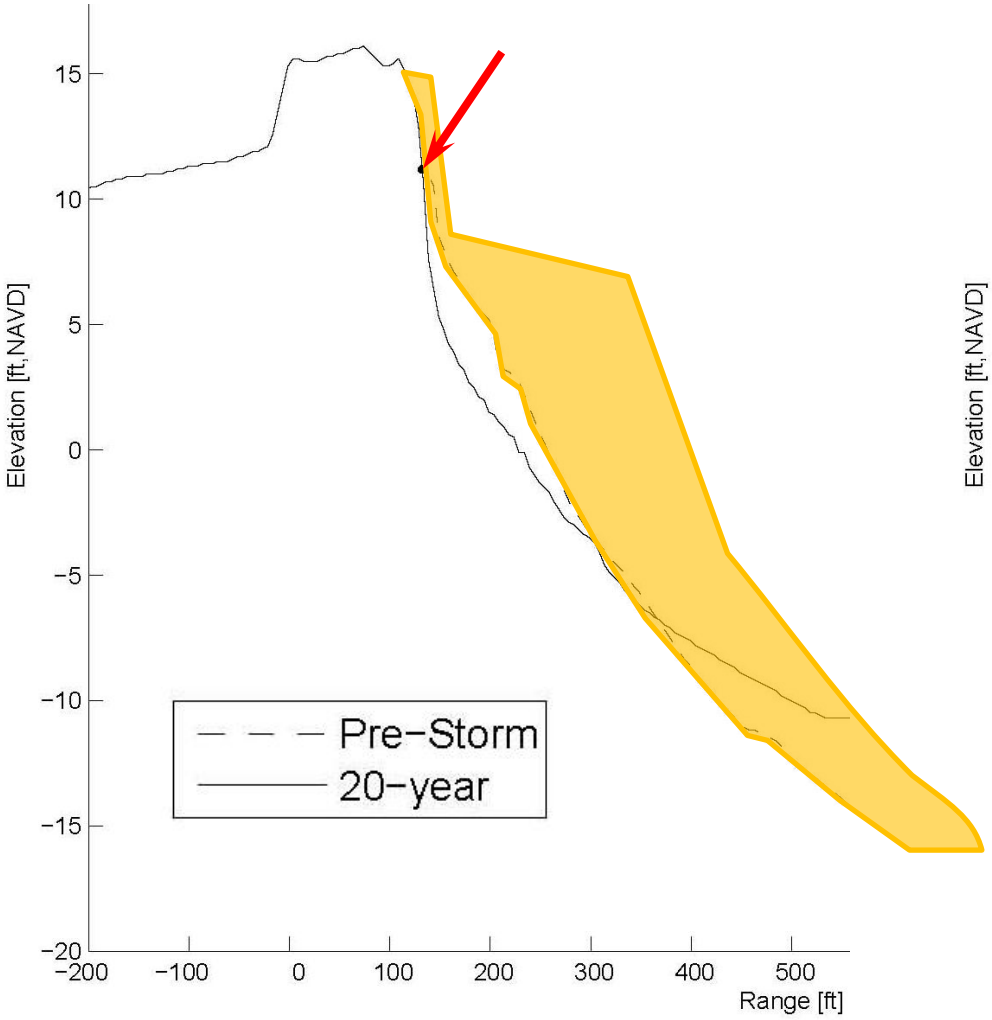



Storm Resiliency (Beach Fill in Place)

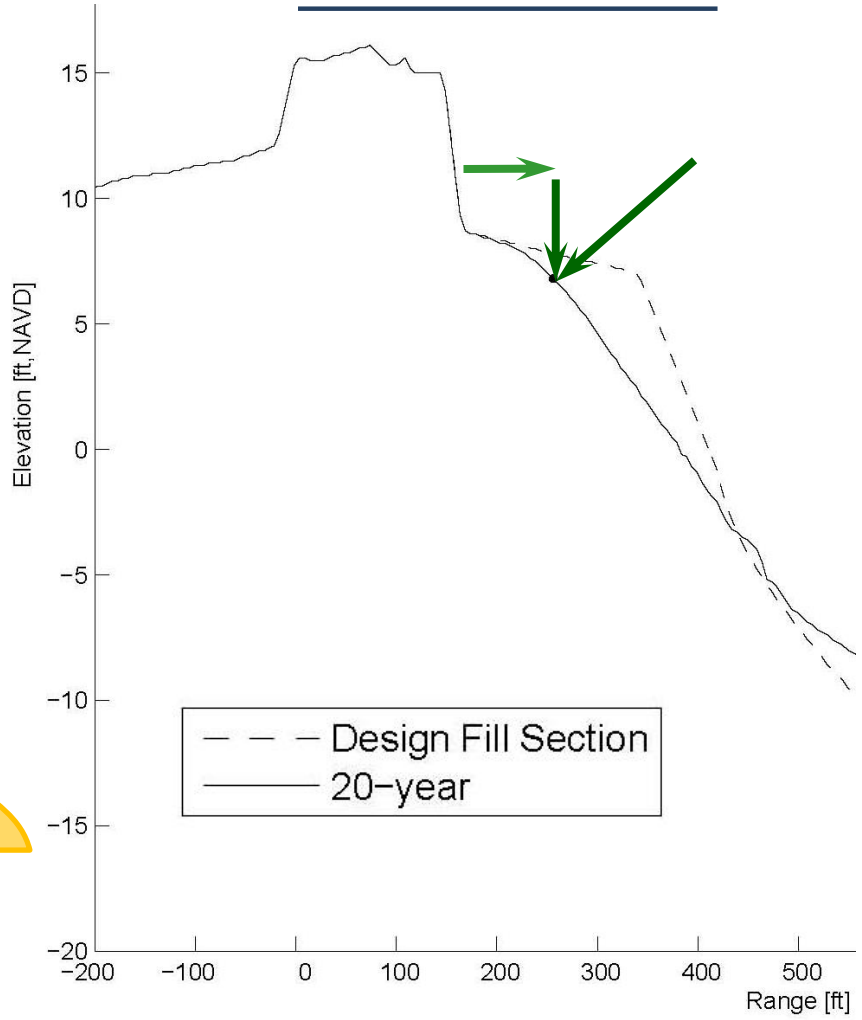


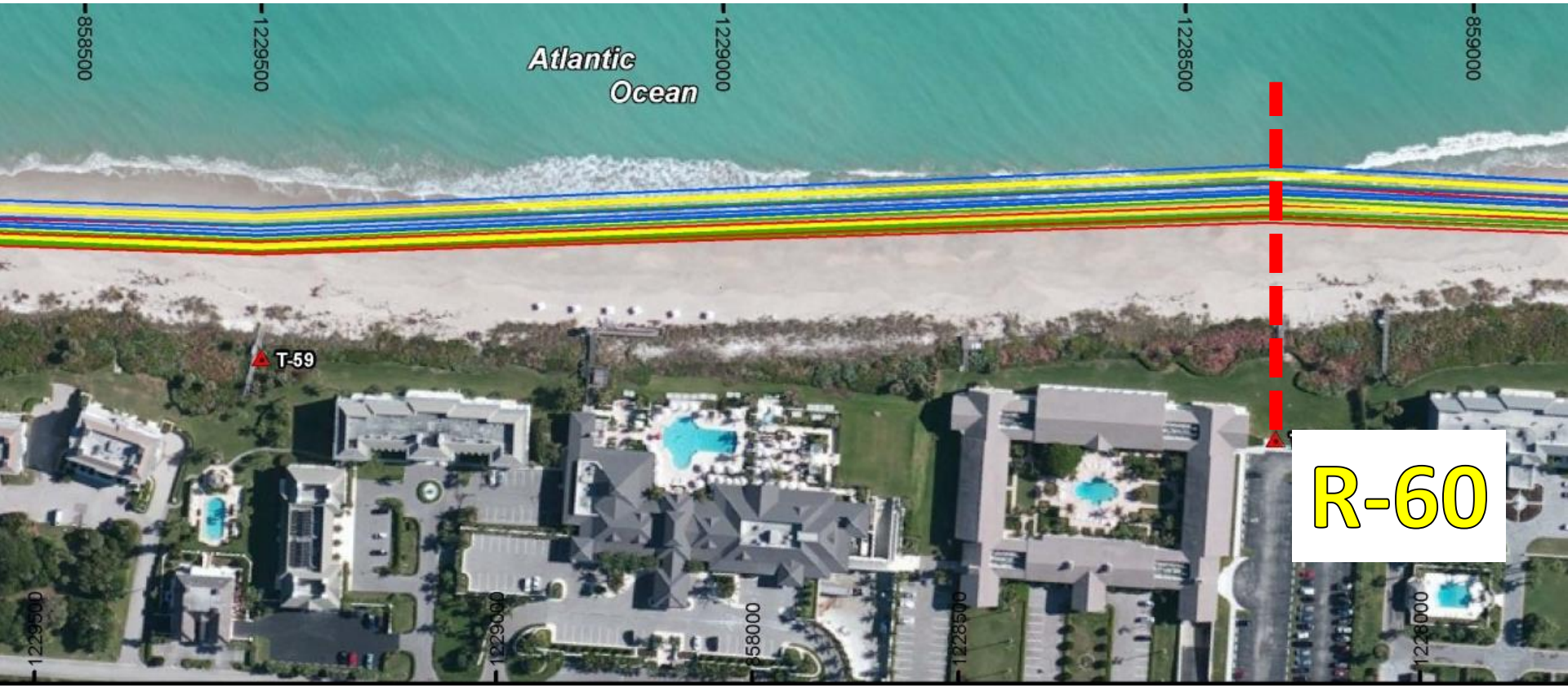


Existing Conditions



With Beach Fill





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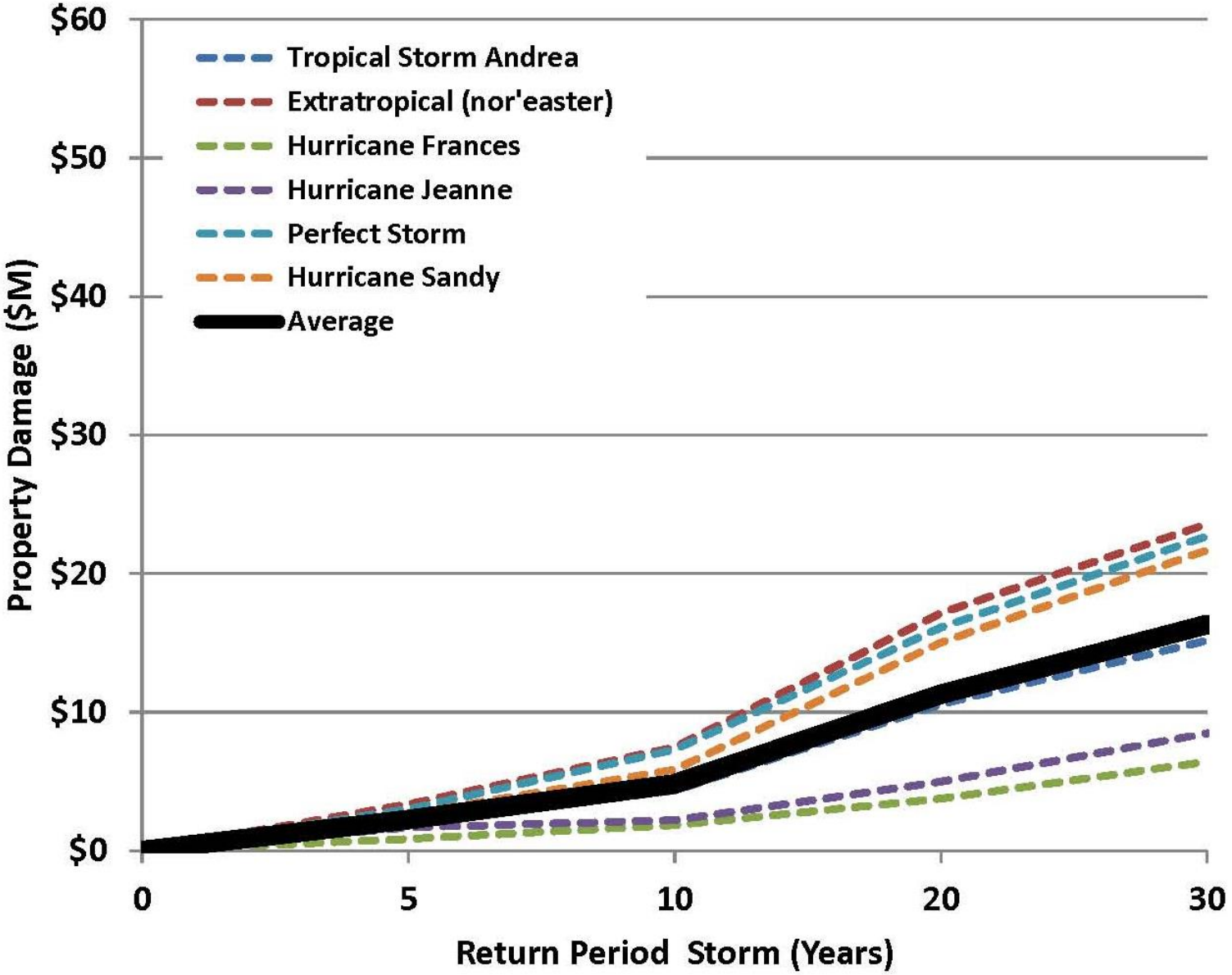

Storm Resiliency (Beach Fill in Place)

Return Period Storm	Average Storm Damage ($M/year)	
	Existing Conditions	Beach Fill in Place
5 Year	$7.4	$2.3
10 Year	$15.8	$4.9
20 Year	$31.1	$11.4
30 Year	$42.0	$16.6
Probable	$7.3	$2.5 (post-construction)
Probable	$7.3	$4.4 (renourishment interval)

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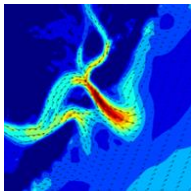
- Selection of historical storms can greatly affect results
- Retaining spatial variability of the study area is critical
- Vulnerability and resiliency are not uniform





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