

An aerial map of Watch Hill, Rhode Island, showing the coastline, roads, and the Watch Hill Historic District. A red pin marks the location of Watch Hill. The map includes labels for Foster Cove, Sequa, Squidneck Ave, Watch Hill, Westerly Rd, Bay St, Fort Rd, Watch Hill Historic District, and Lighthouse Rd.

# Watch Hill, RI Coastal Resilience

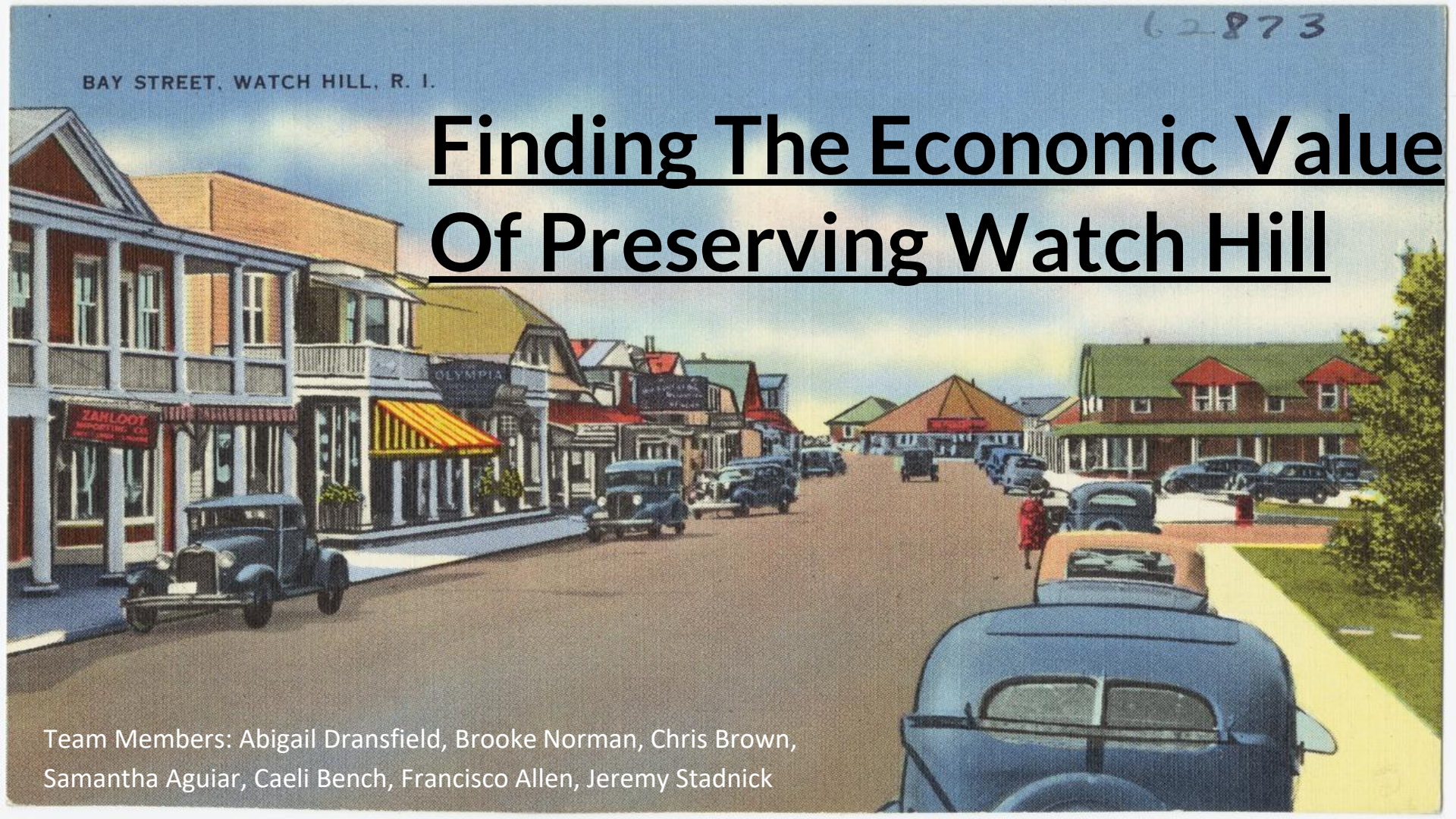
Presented by 2020 ENRE Graduates

62873

BAY STREET, WATCH HILL, R. I.

# Finding The Economic Value Of Preserving Watch Hill

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# Introduction

- Climate change has increased both storm intensity and frequency while significantly contributing to sea level rise in Watch Hill, RI
- With limited resources available, we need to explore which sites stakeholders care most about by determining how much they would be willing to pay to avoid damage from flooding and increased storms



Through our use of StormTools software we are able to see the potential threat that sea level rise and increased storm intensity poses to the Bay Street Area



# Objectives

- To understand public preferences to preserve Watch Hill's natural and historic assets by nearby residents of the community
- To determine how Watch Hill residents perceive the risk to their properties from climate change induced flooding events
- To find how much residents might be willing to pay to avoid damage to the Watch Hill District

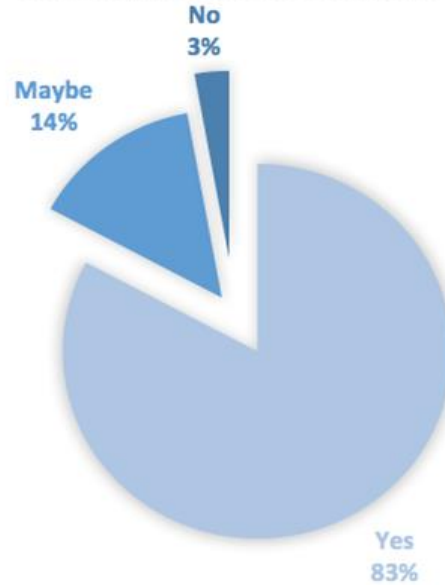


# Methodology



- Created a stated preference survey
- Programmed an online survey using Qualtrics software
- Survey was open for review from Saturday, April 18th to Wednesday, April 22th
- Administered to roughly 50 members from Watch Hill Fire District and the Watch Hill Conservancy
- Obtained 38 responses

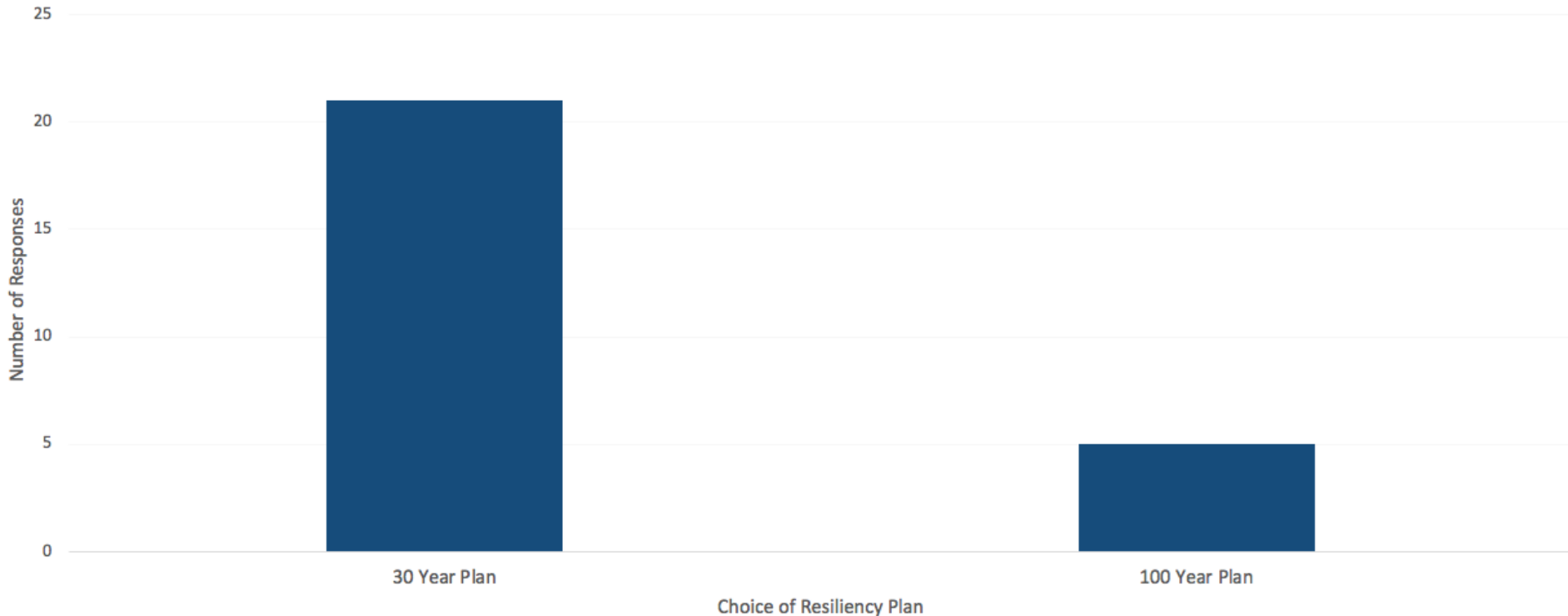
**DO YOU BELIEVE CLIMATE CHANGE WILL  
INCREASE FLOOD RISK?**



- ★ Do you believe that climate change will increase the flood risk to your home, business or others homes and businesses in the community?

★ Would you like to see the resilience plan in place for the next 30 or 100 years?

30 Year Vs. 100 Year Plan



# Project Preference Results

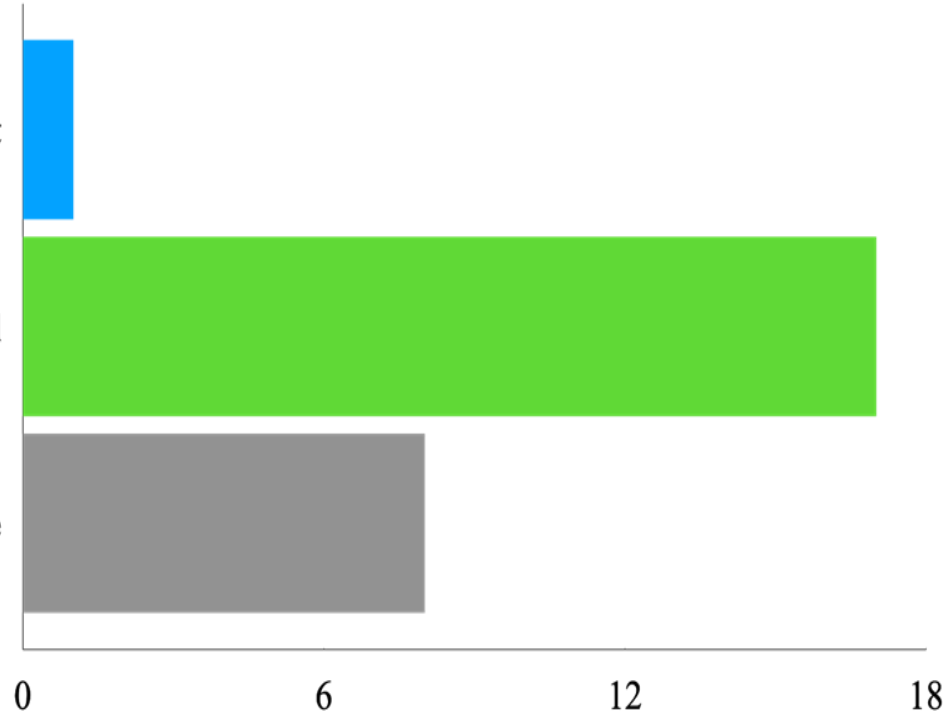
## Project Preference for 3 Foot SLR Scenario

For a 3 foot sea level rise scenario, which of these resiliency projects would you be most willing to contribute to?

**Managed Retreat**

**Reinforcing the Sea Wall**

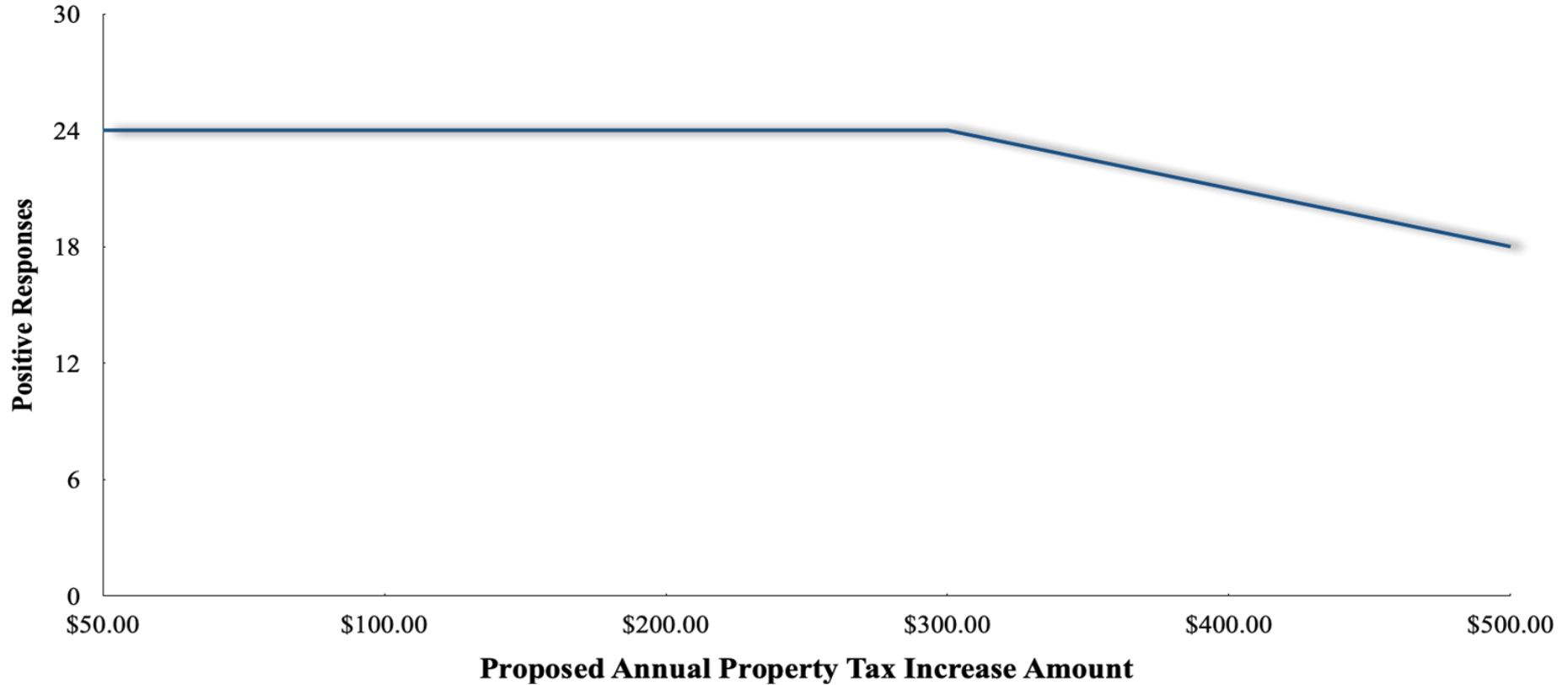
**Removal of non-permeable surfaces in favor of green landscape**



# Willingness to Pay Question

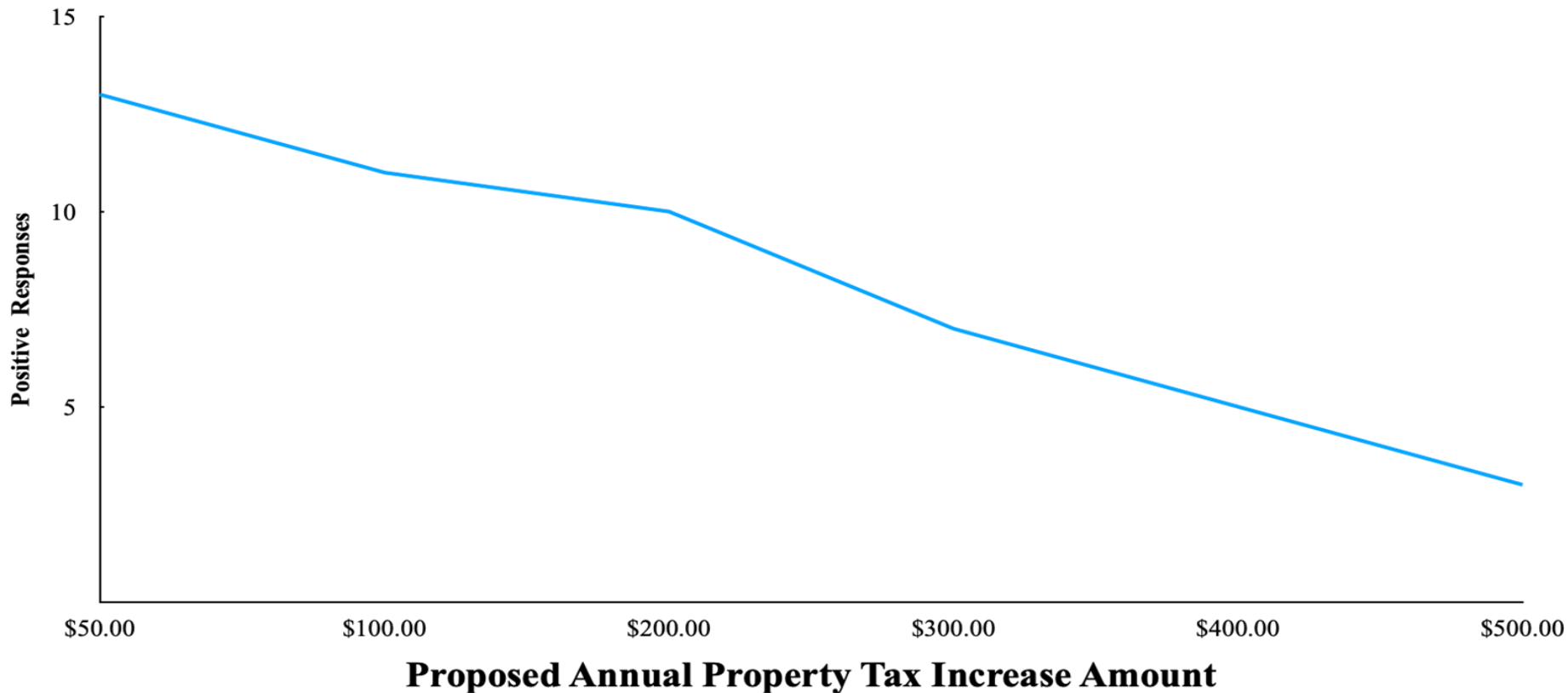
- ★ Suppose the Fire District and Watch Hill Conservancy is considering one or more of the strategies above to make the district more resilient to sea level rise and future coastal storms. Would you be willing to pay an increase in your annual property taxes to invest in these projects?
- ★ Would you be willing to pay an increase of \$50 in your annual property tax in order to avoid the effects of storm surge and sea level rise in the Watch Hill District using one or more of the strategies above?

## Willingness to Pay for Coastal Resiliency Projects within Watch Hill



Based on the responses of 23 individuals who completed this portion of the survey, the average willingness to pay is \$469.50

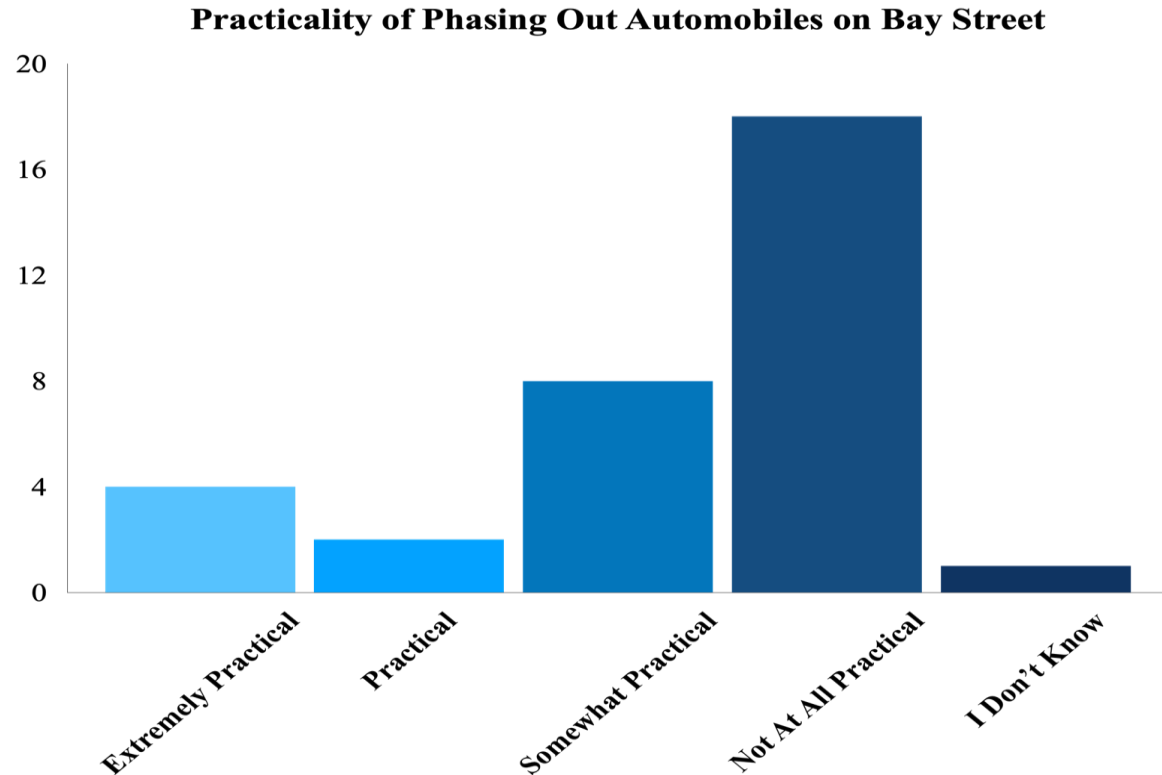
## Willingness to Pay for Flying Horse Carousel Resiliency Projects



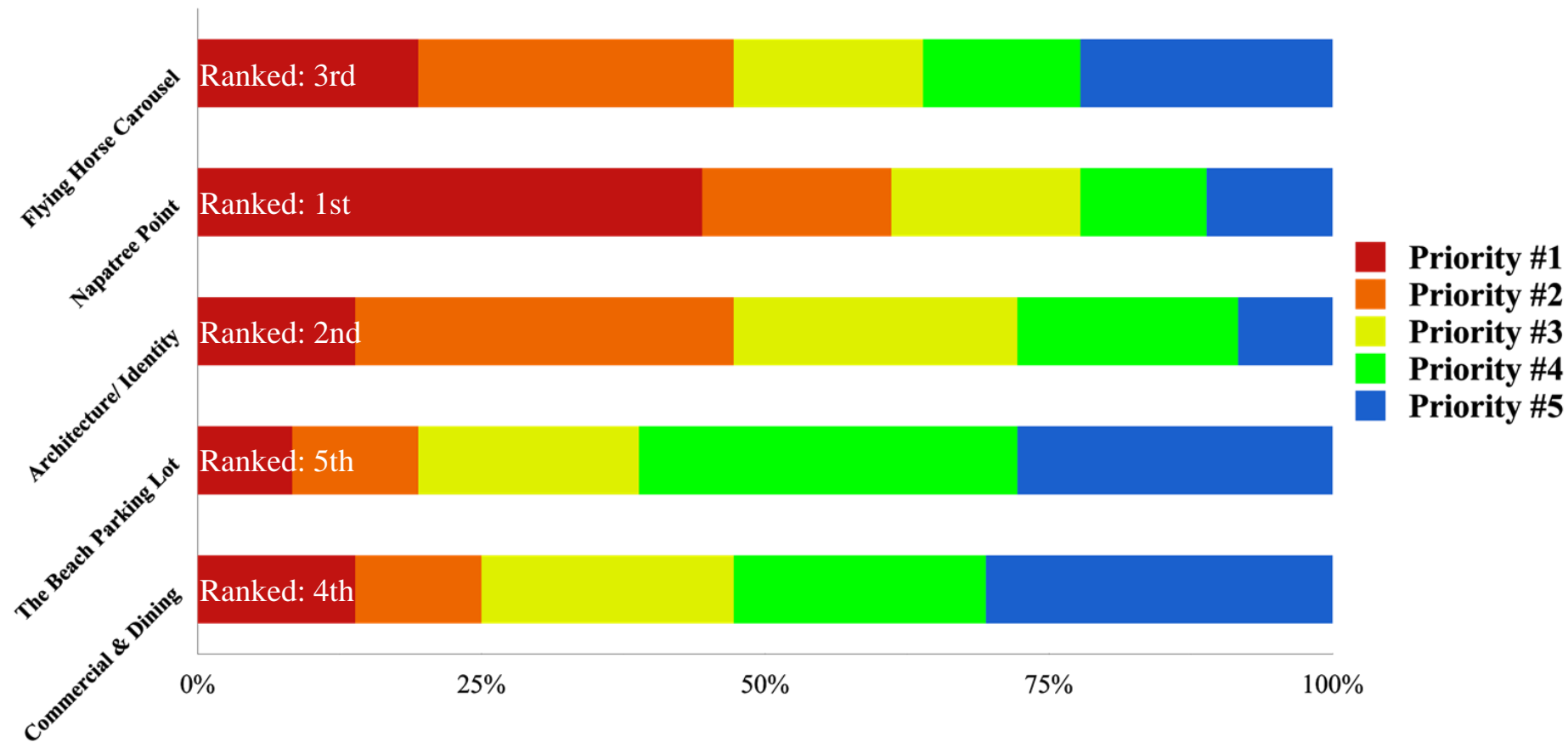
Based on the responses of 16 individuals who completed this portion of the survey the average willingness to pay is \$306.25

- ★ Do you think it would be practical to phase out automobiles on Bay Street in attempts to make the area more pedestrian friendly and to allow more room for green spaces?

The majority of visitors access Bay Street by automobile



## Which Assets Do You Feel Are More Worth Preserving?



# Conclusion

- Participants are more worried about a 100 year storm event than coastal flooding
- Napatree Point is valued as the most important historical characteristic by residents
- Participants prefer reinforcing sea wall to our other proposed resilience options
- Of the 16 individuals who were willing to pay to preserve the Flying Horse Carousel, the average willingness to pay was **\$90**
- Of the 23 individuals who were willing to pay for resiliency projects, the average willingness to pay was **\$358**
- If WTP was implemented it would result in a **0.06%** increase in residents' property taxes generating **\$225,540** annually for resiliency projects within Watch Hill.

**Thank You!**

**Any questions or comments?**



An aerial photograph of Watch Hill, Rhode Island, showing the coastline, Watch Hill Cove, and surrounding roads. The map includes labels for Foster Cove, Sequa, Squidneck Ave, Watch Hill, Westerly Rd, Watch Hill Cove, Bay St, Fort Rd, Watch Hill Historic District, and Lighthouse Rd. A red pin is located near Watch Hill.

# Economic Impacts of Coastal Hazards



## Methodology

**Study Area:** Watch Hill, Rhode Island

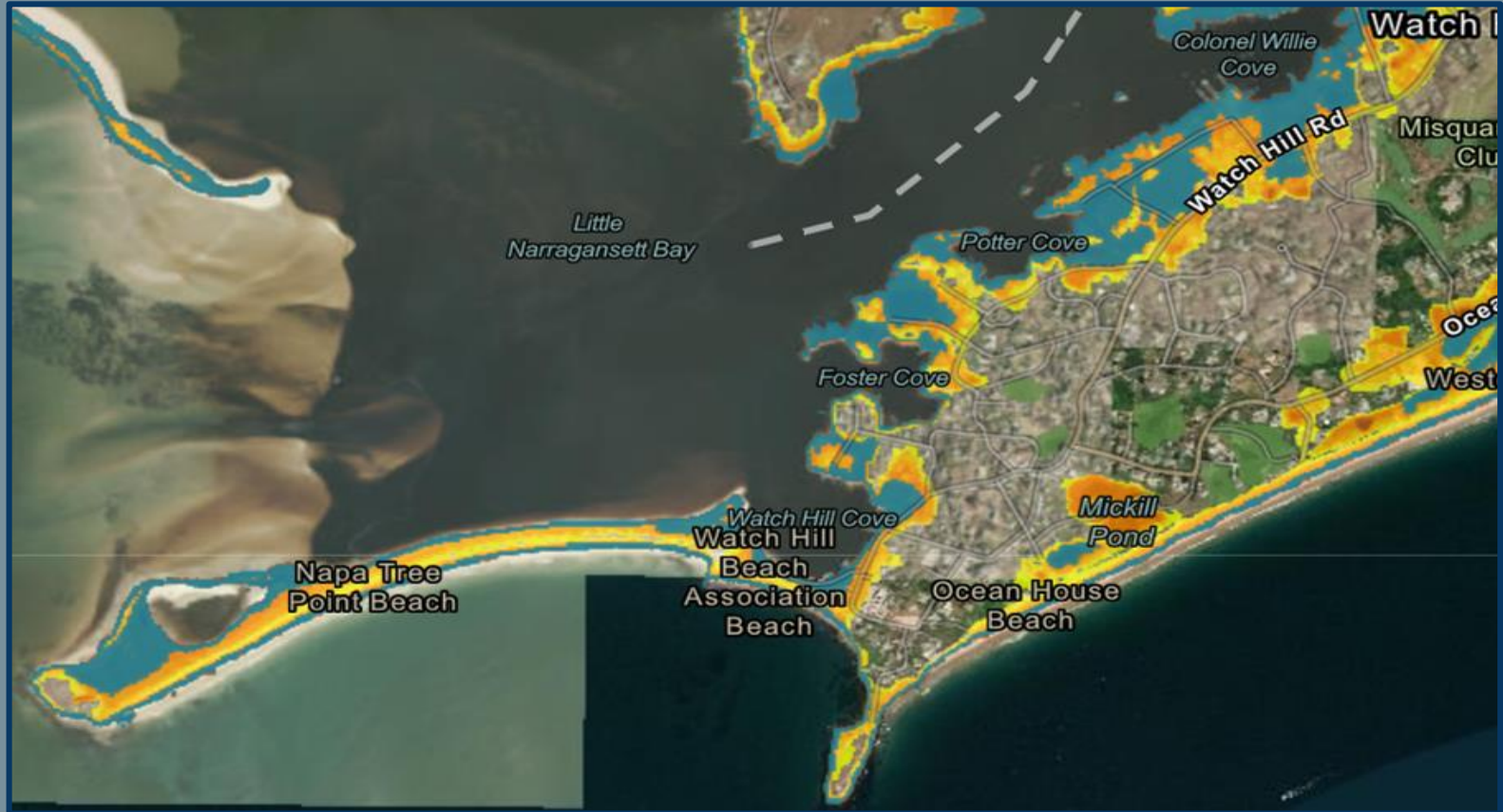
**Time Period:** May-September

**Scenarios:** 100 Yr Storm and 100 Yr Storm + 3FT SLR

**Measuring:** Revenue, Tourists, and Jobs Lost as well as Damage Costs

**Breakdown:** Historical Sites, Residential Properties, Commercial Properties (Businesses and Beaches)

# Scenario 2: 3 Ft Sea Level Rise + 100 Yr Storm





### Estimated Market Value -

\$37,000 in annual revenue

-Fee=\$2/ride

-20 Horses on Carousel

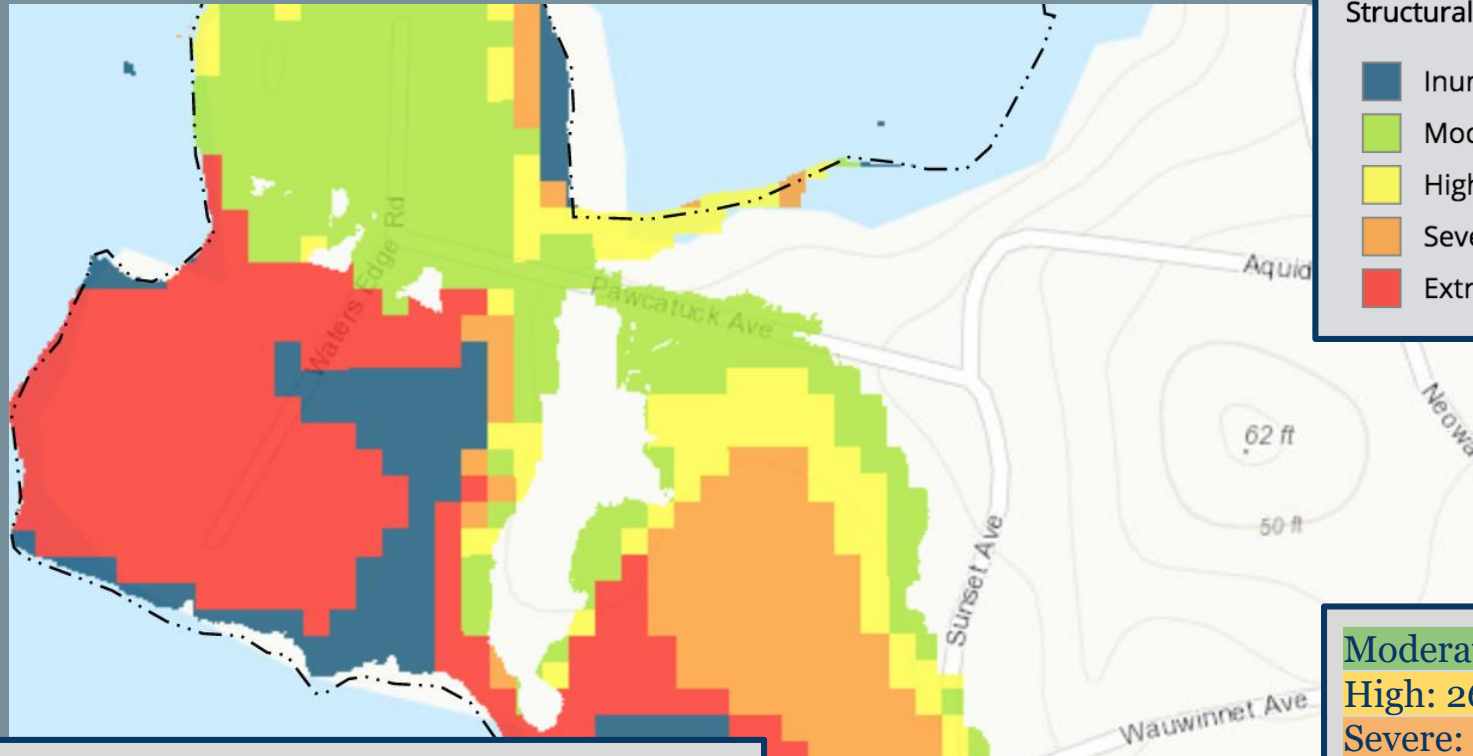
### Estimated Non-Market Value

-WTP=\$90/person

-WTP x # of Households in WH

-\$6,840

# Residential Properties: 100 Year Storm Event + 3 Ft SLR



## Structural Damage Risk

- Inundated by 2100
- Moderate
- High
- Severe
- Extreme

## Average Percentage of Damages on:

**Pawcatuck Avenue:** 19.2%

**Waters Edge Road:** 57.5%

Moderate: 1-25%

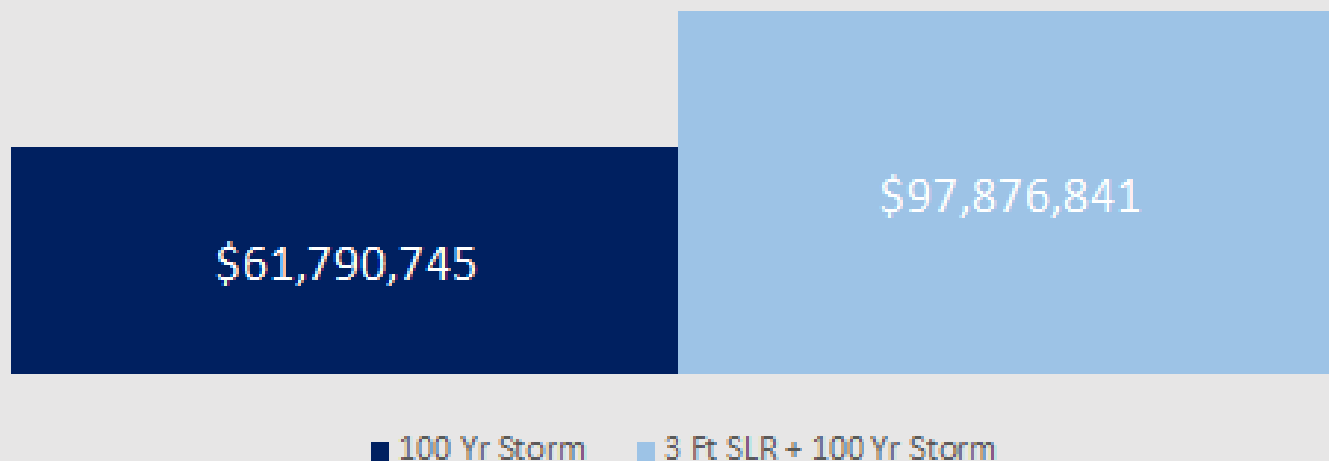
High: 26-55%

Severe: 56-75%

Extreme: 76-100%

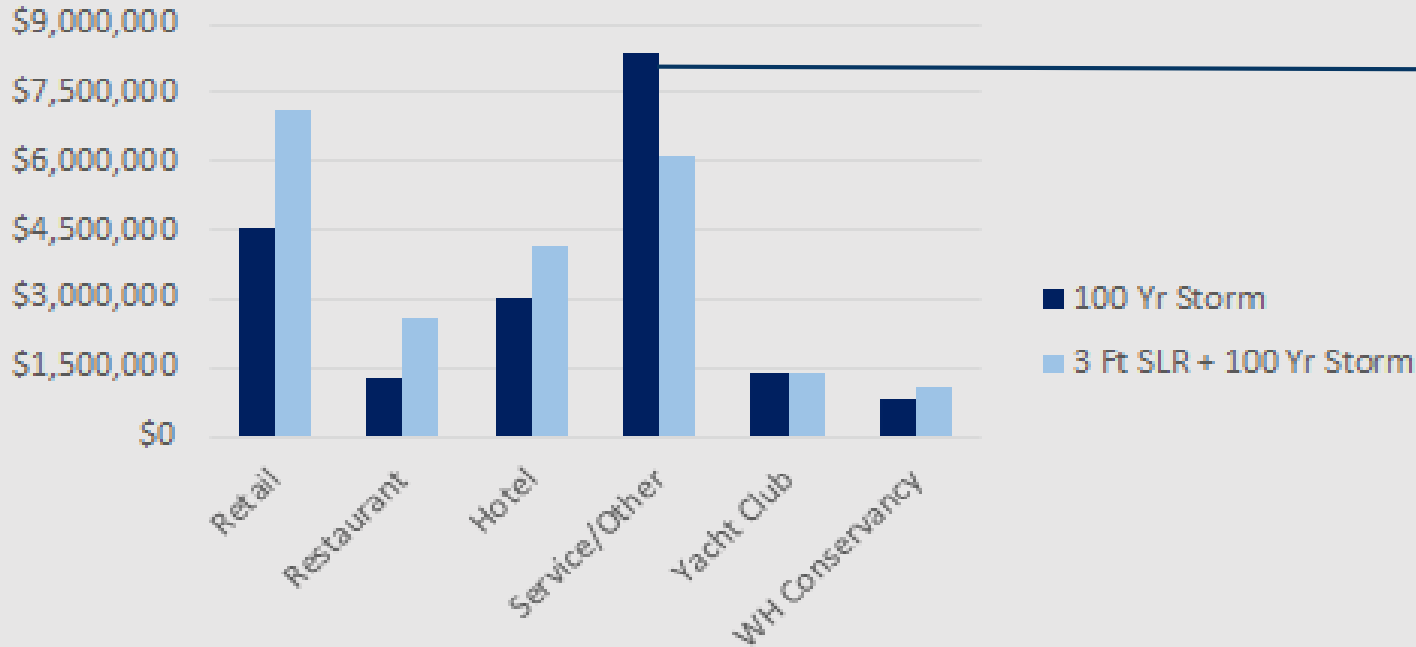
# Key Findings- Residential

## Estimated Residential Property Damage Cost



# Key Findings-Commercial Properties Damage Cost

## Estimated Commercial Property Damage Cost



Under 100 Yr Storm:  
**Service Industry**  
bears largest  
property damage  
cost

**Largest Single  
Property Damage:**  
-Watch Hill Yacht  
Club

*(100% estimated  
structure damage under  
both scenarios)*

# Finding Estimated Tourism Numbers

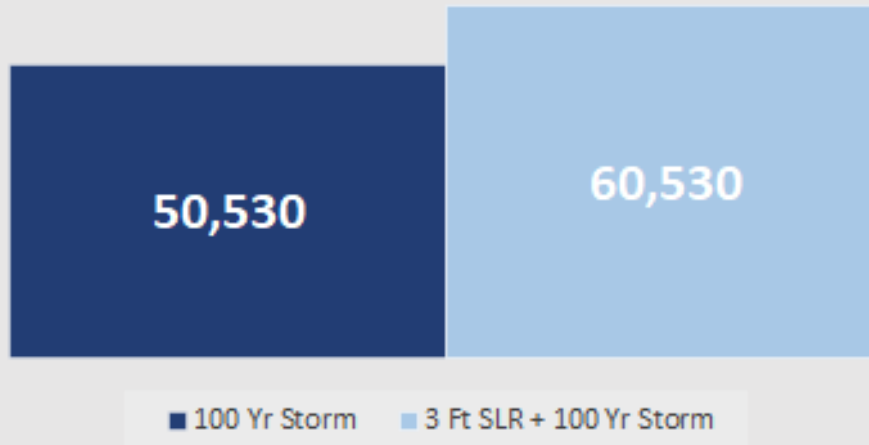
RI Visitors By Market (2017)		
	Visitors (mns)	% of total
Total by Purpose	24.8	
Leisure	22.5	90.8%
Business	1.8	7.1%
Both	0.5	2.0%

# of Tourists/# of Municipalities in RI/Months in Year = Y x Time Period of Study

22.5 Million/39/12 = 48,076 x 3.5 = **168,269** estimated tourists per season

# Key Findings- Tourism

## Estimated # of Tourists Lost Per Season



[RI Visitor Economic Impact 2017](#)

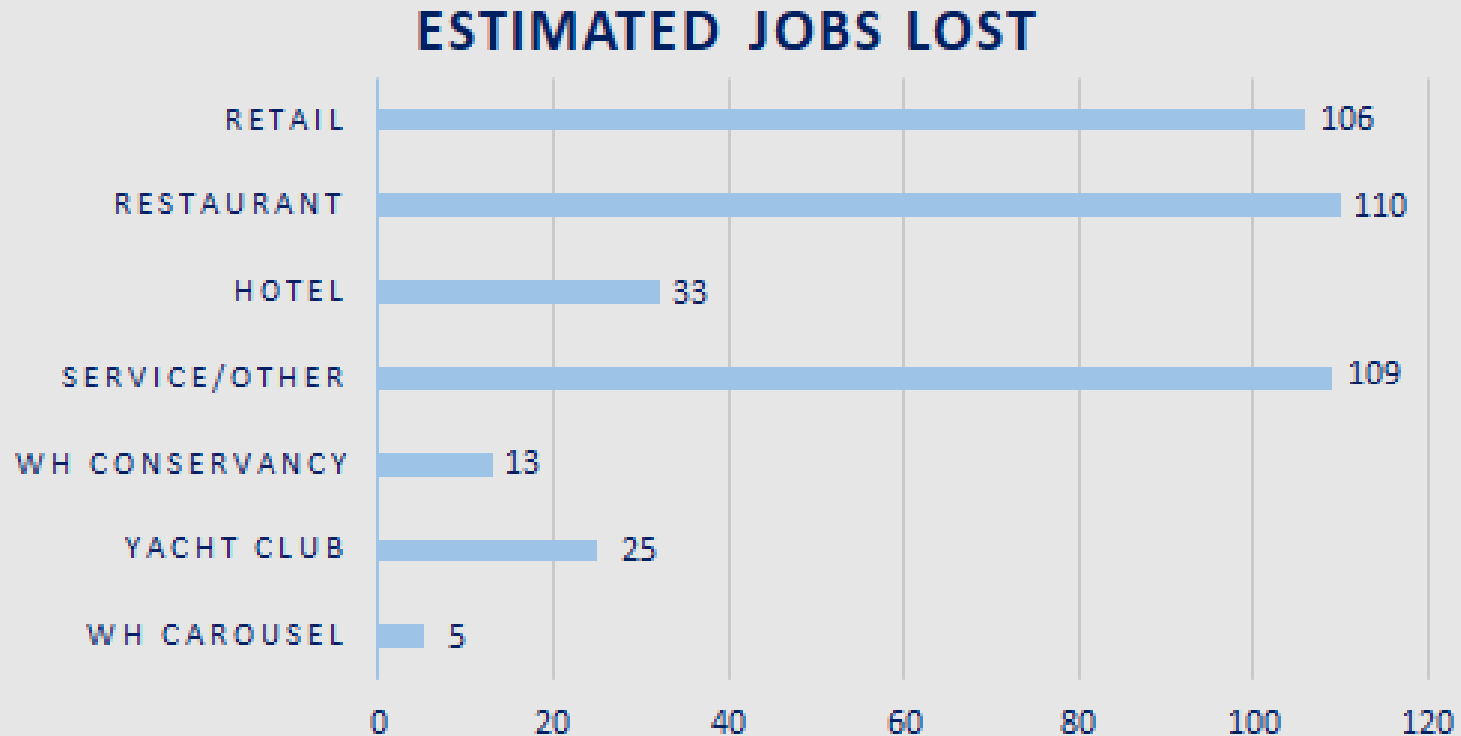
## Looked at Tourists from Key Industries:

- Beach
- Hotel
- Restaurants
- Retail

## Broke it down by:

- Beach Passes Sold
- +Amenities
- # of Hotel Rooms/Overnight Stays
- # of Tables at Restaurants
- Estimated Foot Traffic of Retail

# Key Findings- Estimated # of Jobs Lost



# Beaches:

Napatree  
Point  
Beach



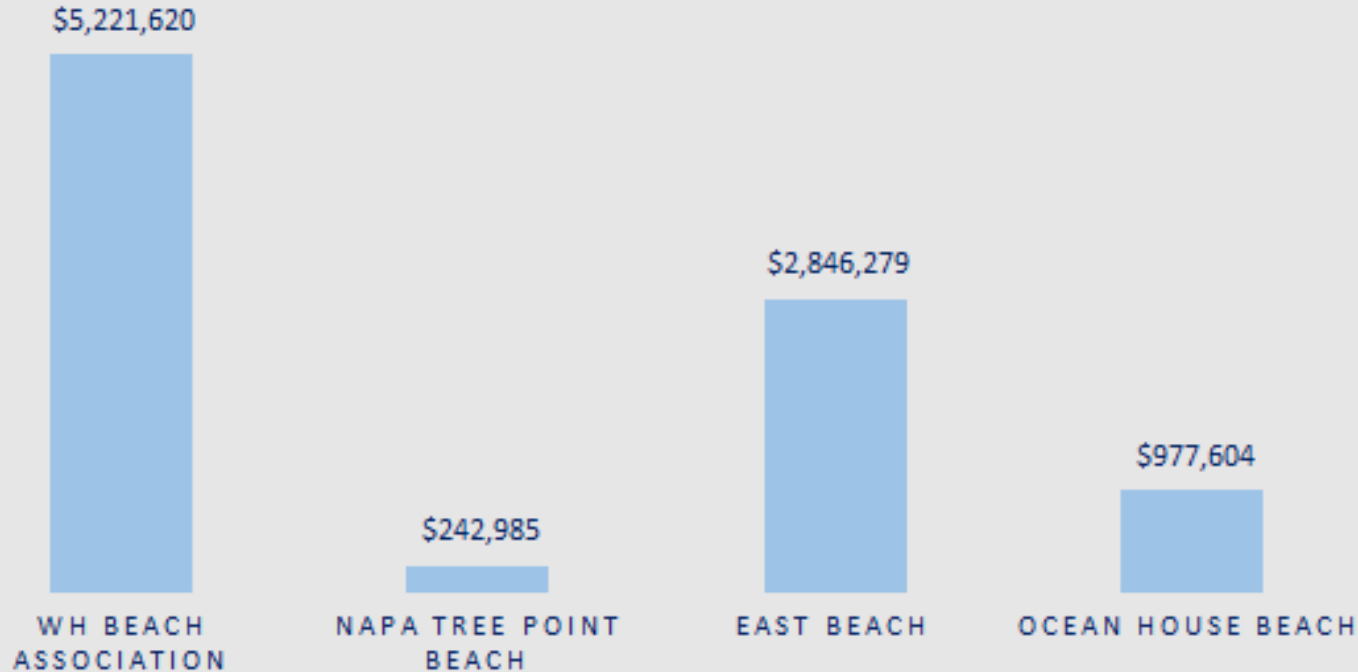
East  
Beach

Watch Hill Association  
Beach

Ocean House  
Beach

# Key Findings-Beaches

## ESTIMATED LOSS OF BEACH VALUE PER SEASON



**WTP: \$22**

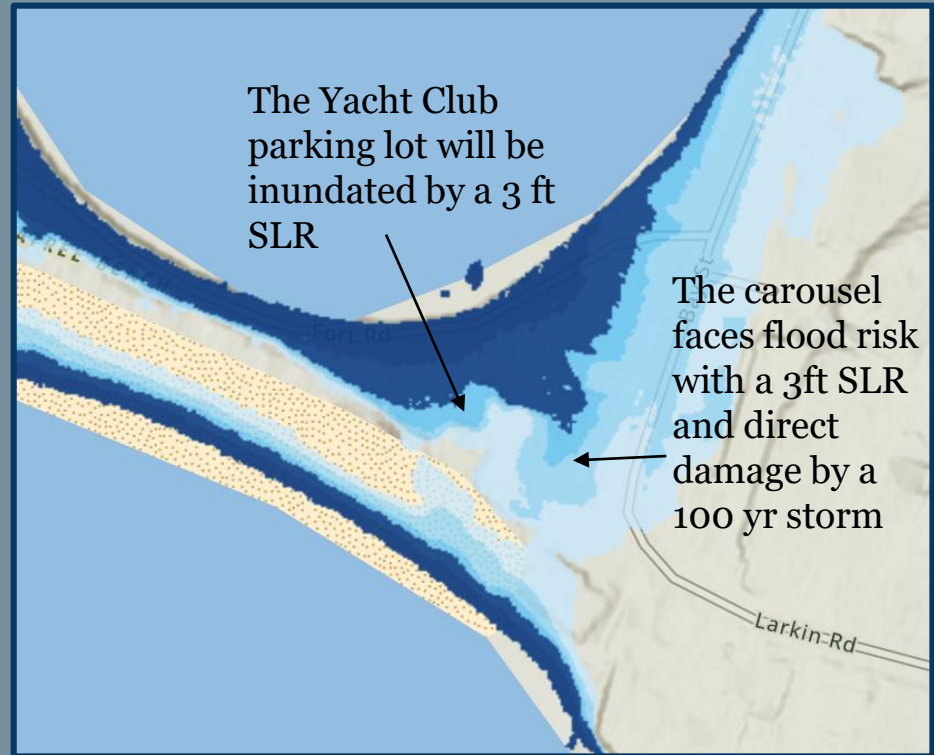
**Included:**  
-Amenities  
-# of Visitors

# Key Takeaways

Larger estimated economic impact  
under 3 Ft SLR + 100 YR Storm  
scenario

With no coastal hazard mitigation  
intervention there will be a loss in  
tourism and jobs

Revenues at risk include the beach  
cabanas and parking lot due to  
nuisance flood events



Thank you!  
Any questions?



# Cost-Benefit Analysis

# Potential Funding Mechanisms:

## Catastrophe Bonds

Insurance-linked **investment securities** that can be used to manage risks that are associated with catastrophic events.

## Resilience Bonds

Link insurance premiums to resilience projects to **monetize avoided losses** through **rebate structure**.

## Watch Hill Fire District Taxes

0.50% tax increase on property tax over 10 years

## Westerly Taxes

0.50% tax increase over the next 5 years

## Insurance and Donations

Covers the structure of homes and their contents from water damage caused by a flood.

GoFundMe pages, Save the Bay Events

# Cost-Benefit Basics:

Cost-Benefit Analysis (CBA) is an economic analysis tool that allows economists to decide which of their proposed alternatives hold the greatest economic value to them.

“Economic Value” is determined by the amount of benefits that outweigh costs of project implementation. “Net Present Value” is the value of which the benefits outweigh these costs.

With CBA, stakeholders will be able to see:



1. Which of these three strategies present the biggest ‘bang for your buck’.
2. Derivation of costs and benefits based on different project development aspects.



# Grey Infrastructure:

## Seawall Properties

1. Seawall along Watch Hill Cove near entrance to Napatree Conservation area.
2. Length= 0.34 Miles
3. Height= 9.8 ft tall, 12 in. thickness

1. Current Seawall Removal
2. Materials, Labor and Construction costs of new Seawall
3. Yearly Maintenance

1. Tourism Revenue
2. Avoided Damages from a 100- year storm event



Net Present Value in a 100-year  
Storm Scenario

\$12.9 million

Net Present Value in a 3-ft SLR  
Scenario

\$15.3 million 34

# Green Infrastructure:

This alternative consists of working with natural coastal features (i.e., dunes, seagrass, salt pools) to improve flood-risk mitigation.

1. Salt marsh Restoration
2. Seagrass Restoration
3. Dune Restoration

1. Reduced Impact of Inundation
2. Recreational Benefits (tourism revenue)
3. Existence Value of Habitat/Species
4. Carbon Offset



Net Present Value in a 100-year  
Storm Scenario

\$9.7 million

Net Present Value in a 3-ft SLR  
Scenario

\$15.1 million

# Retreat:

Structural relocation of vulnerable buildings/monuments.

1. New Site Preparation
2. New Site Utilities
3. Permitting
4. Lost Revenue Larkin Parking Lot

1. Value of saving structures
2. Value of saving businesses/coastal tourism
3. Opportunity of lower flood insurance
4. Save Ningret Statue



Net Present Value in a 100-year Storm Scenario

\$11.9 million

Net Present Value in a 3-ft SLR Scenario

\$6.4 million

# Key Takeaways:

1. Cost-Benefit Analysis has been an effective tool in showing stakeholders which resilience alternative will bring the Watch Hill community the greatest economic benefit.
2. A combination of proposed **green** and **grey** infrastructure projects can provide the Watch Hill Community with \$15 million in benefit in a 3-ft SLR scenario.
3. Benefits to the community include:
  - a. Tourism Revenue (\$0.32 million for Watch Hill Cove and \$11 million for Napatree Point annually)
  - b. Ecosystem Services (\$9.5 million)
  - c. Carbon Offset (\$57,000)
  - d. Reduced Impact of Inundation from a 100-year storm event. (\$18 million for Watch Hill Cove and \$2.5 million for Napatree Point)

An aerial photograph of Watch Hill, Rhode Island, showing the coastline, beaches, and surrounding areas. The text 'Thank You!' is overlaid in the center. Map labels include Foster Cove, Sequa, Squidneck Ave, Watch Hill, Westerly Rd, Watch Hill Cove, Bay St, Fort Rd, Watch Hill Historic District, and Lighthouse Rd.

Thank You!

## Contact Information:

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