



## 4TH ANNUAL CAPE COASTAL CONFERENCE

# THE RESILIENT CAPE COD PROJECT

Adaptation Planning, Environmental Economics and Community Engagement

**Kristy Senatori,** Cape Cod Commission

CAPE COD COMMISSION

# NOAA COASTAL RESILIENCY GRANT
## NATIONAL AWARDS

Competitive grants for projects that advance coastal resilience through:

- Land/ocean use planning
- Disaster preparedness projects
- Environmental restoration
- Hazard mitigation planning
- Other regional/state/community planning efforts

# NOAA COASTAL RESILIENCY GRANT


e Cod
mission

ersey Dept. of
Protection

States
hip Foundation

# NOAA COASTAL RESILIENCY GRANT

## NATIONAL AWARDS

SUPPORTING AGENCIES

Woods Hole Sea Grant

Provincetown Center for Coastal Studies

Massachusetts Office of Coastal Zone Management

GRANT PARTNERS

Cape Cod Commission

Seal of the Town of Barnstable, Mass. 1639. Adopted May 4, 1989

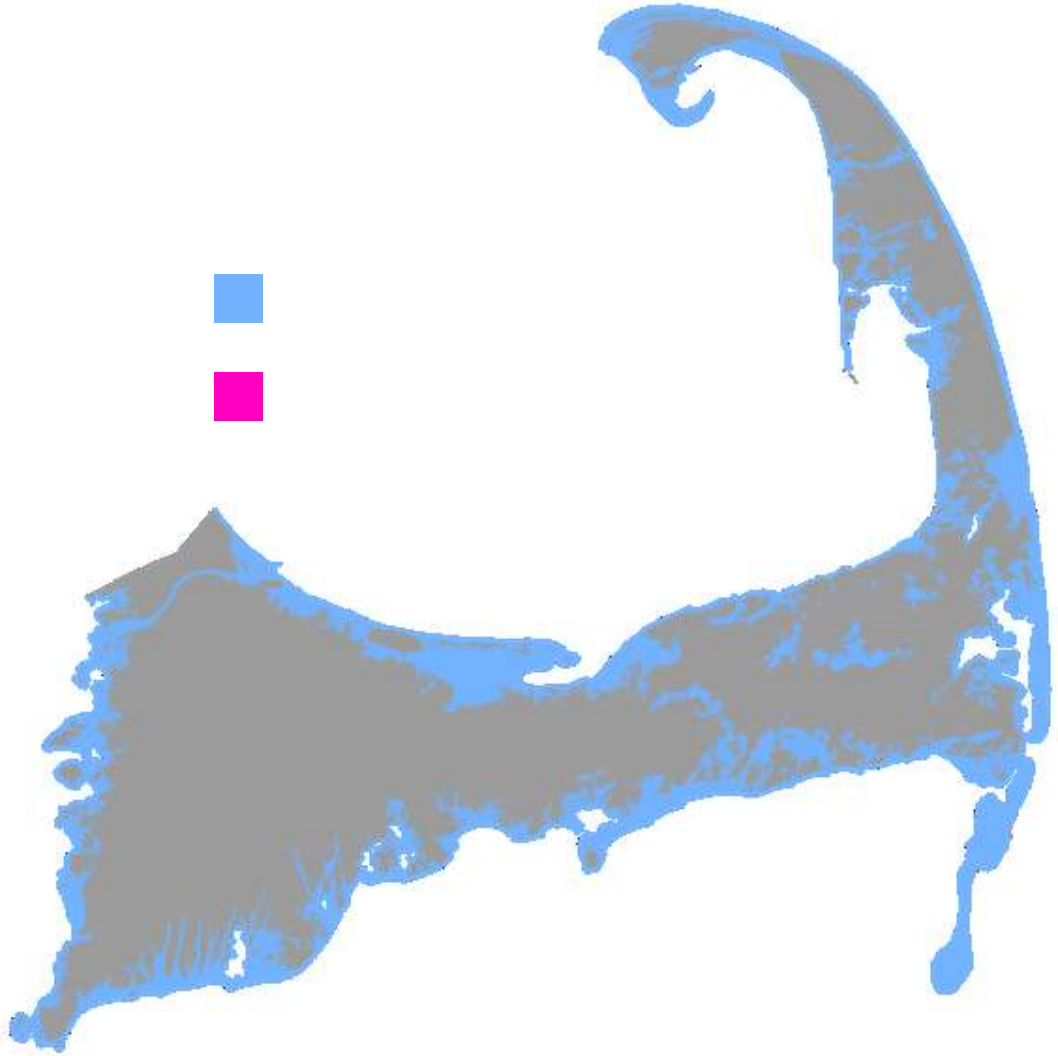
APCC Association to Preserve Cape Cod

Waquoit Bay National Estuarine Research Reserve

WE ARE
**VULNERABLE**
TO FLOODING,
COASTAL STORMS,
SEA LEVEL RISE,
AND EROSION

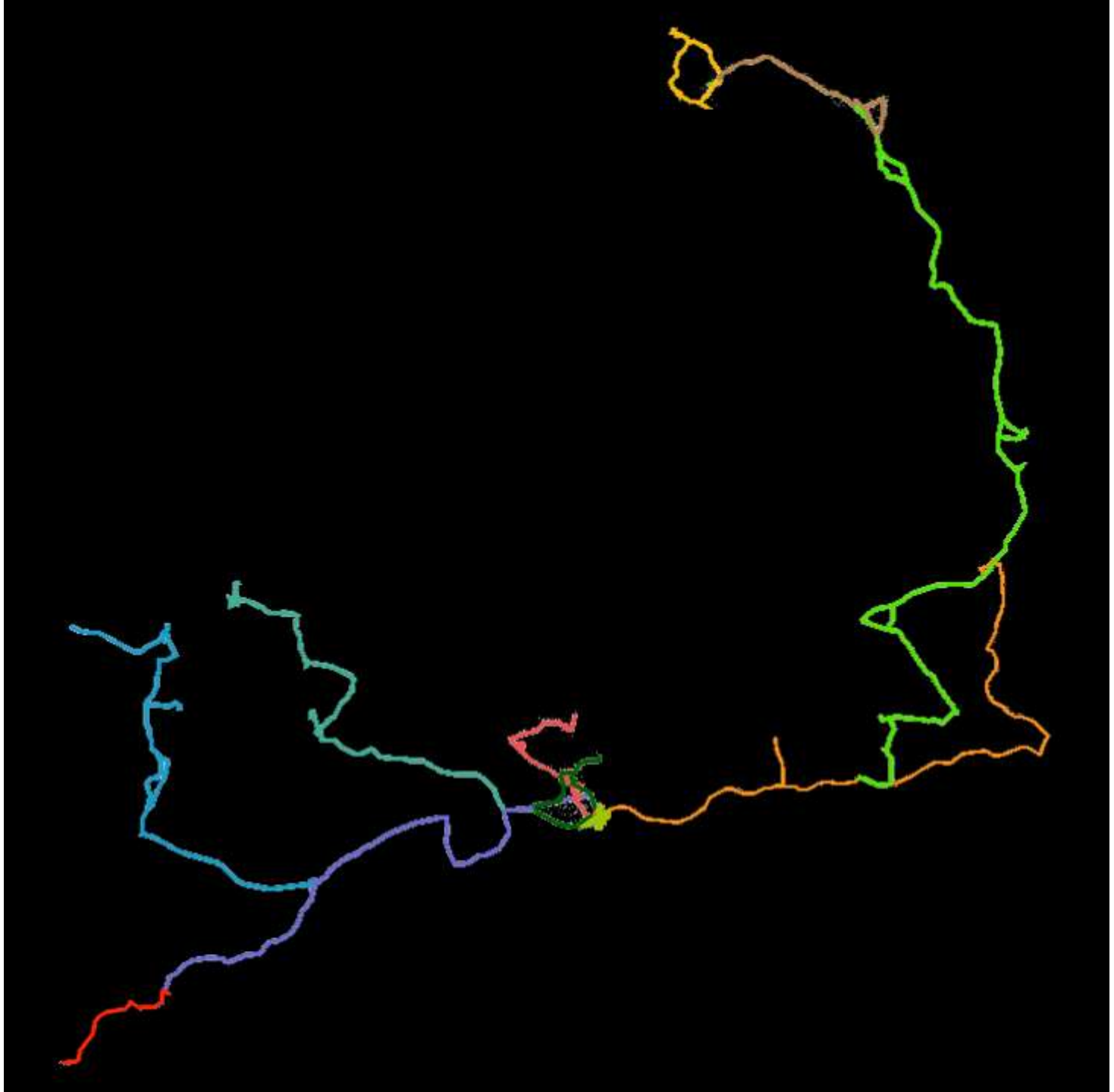
# COASTAL HOMES AT RISK

## ESTIMATED ECONOMIC LOSS



NGLE FAMILY
CIAL FLOOD
REAS (SFHA)

Y VALUE
000,000



# TATION
# UCTURE

- Pedestrial roads
- State roads
- Local roads
- Public transit
- FEMA SFHA

# WATER
# CTURE

systems

d areas

acilities

A SFHA

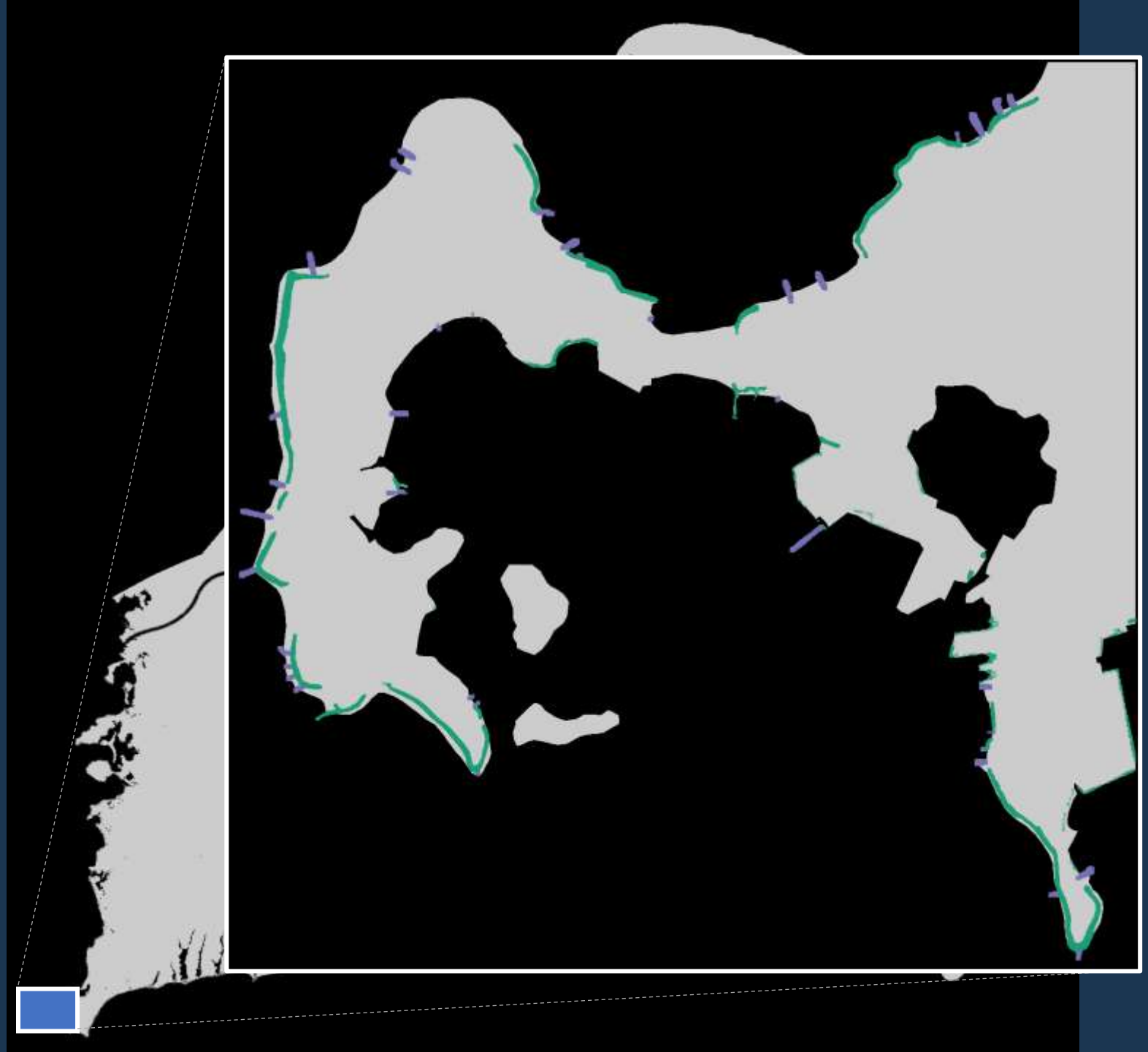
# SUPPLY
# UCTURE

ic wells

c water

AA SFHA


# COASTAL LANDFORMS AND INFRASTRUCTURE ARE ALSO **VULNERABLE**



# COASTAL INFRASTRUCTURE

## Coastal Defense Structures

- *Groin*
- *Revetment*
- *Jetty*

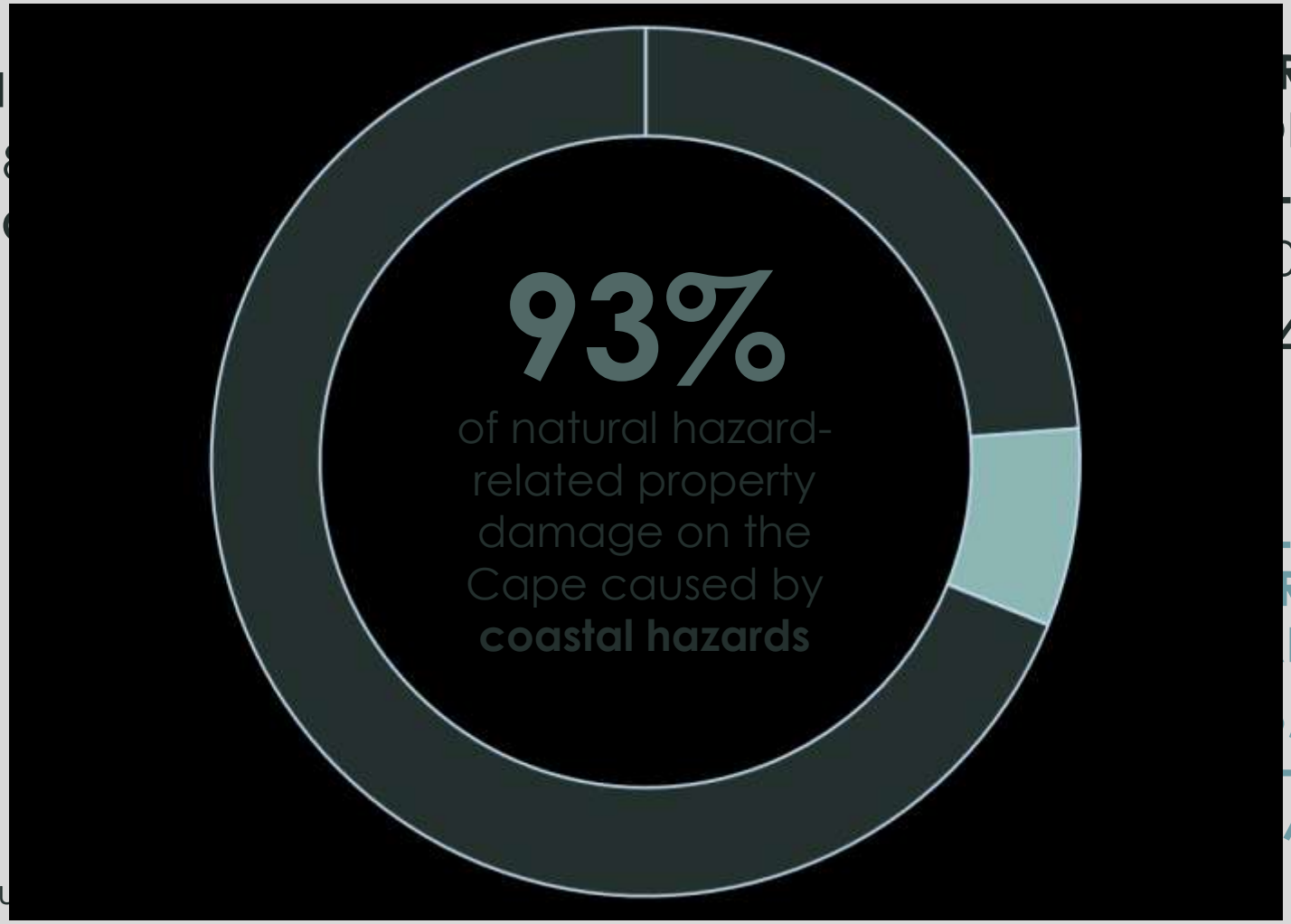
# CAPE COD HAS A HISTORY OF DAMAGE

## TOTAL PROPERTY DAMAGE 1960-2014

**HURRICAN**

$312,8

6




**RRICANE, WIND, RMS, OTHER L HAZARDS**

000,000

4%

**LIGHTNING, R WEATHER, NADOES**

,465,613

7%

Source: SHELDU

**PHASE 1**

Data Collection and Adaptation Strategies Database

**PHASE 2**

Public Engagement and Socio-Economic Analysis

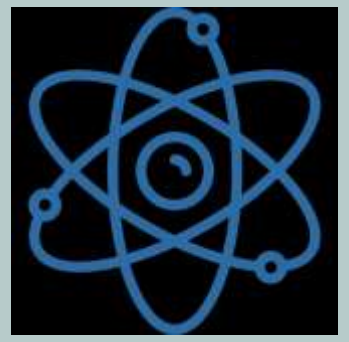
**PHASE 3**

Communication and Decision-Support Tool

# RESILIENT CAPE COD
## COMMITTEE STRUCTURE

### ADVISORY BOARD

- Provide advice on the overall approach and key decisions
- Review draft work product



### SCIENCE COMMITTEE

- Provide access to data on natural hazards
- Interpret climate, weather and coastal geology data

### ADAPTATION STRATEGIES COMMITTEE

- Review and comment of strategies database
- Advise the team on how to apply strategies across the Cape

### REGULATORY+LEGAL COMMITTEE

- Ensure the implementation of appropriate strategies across the region

PHASE 1

# Data Collection and Adaptation Strategies Database

Data Collection & Adaptation Strategies Database

# WHAT STRATEGIES INCREASE COASTAL RESILIENCY ON CAPE COD?

Data Collection & Adaptation Strategies Database

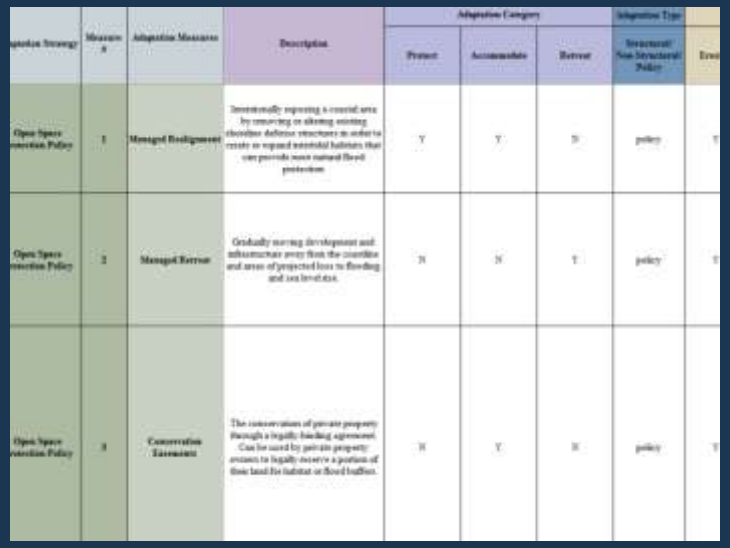
| ptation Strategy | Measure # | Adaptation Measures | Description | A |
|---|---|---|---|---|
| | | | | Protect |
| Open Space rotection Policy | 1 | Managed Realignment | Intentionally exposing a coastal area by removing or altering existing shoreline defense structures in order to create or expand intertidal habitats that can provide more natural flood protection | Y |
| Open Space rotection Policy | 2 | Managed Retreat | Gradually moving development and infrastructure away from the coastline and areas of projected loss to flooding and sea level rise. | N |
| Open Space rotection Policy | 3 | Conservation Easements | The conservation of private property through a legally-binding agreement. Can be used by private property owners to legally reserve a portion of their land for habitat or flood buffers. | N |

# COASTAL RESILIENCY DATA

Collect and organize information on the spectrum of resiliency strategies available, including where they may be used and the advantages or disadvantages of each.

- Inform on available options
- Identify benefits and costs
- Improve coastal management decision-making

## Data Collection & Adaptation Strategies Database



**Adaptation Strategies Matrix**


**Catalog of Relevant Adaptation Strategies**

**Online mapped based tool**

PHASE 2

# Public Engagement and Socio-Economic Analysis

Public Engagement and Socio-Economic Analysis

# HOW DO RESIDENTS VALUE RESILIENCY?

Public Engagement and Socio-Economic Analysis

- **Adaptation decisions are often made without the right information on  biophysical and economic tradeoffs**
- **Poorly informed adaptation can make society worse off than no action at all**

## ENVIRONMENTAL ECONOMICS

### PURPOSE OF ANALYSIS

Estimate how residents value coastal adaptation, including protecting:

- infrastructure
- personal homes
- natural systems

What policies and resiliency strategies are we willing to financially support?

Public Engagement and Socio-Economic Analysis

## CONDUCT FOCUS GROUPS

Refine the survey through a series of four meetings

## SURVEY CAPE COD RESIDENTS

Compare different resiliency scenarios to understand trade offs

## ANALYZE SURVEY RESULTS

Estimate how the community values coastal resources

## INCORPORATE DATA INTO THE TOOL

Include tradeoffs and values in the decision support tool


# WILLINGNESS TO PAY

## CHOICE EXPERIMENTS

- **Review scenarios**
- **Look at tradeoffs**

## YOU WILL BE ASKED TO VOTE

After considering the current situation and possible protection effects and methods, which do you prefer? You will be given choices and asked to vote for the option you prefer by checking the appropriate box. **Questions will look similar to the example below.**

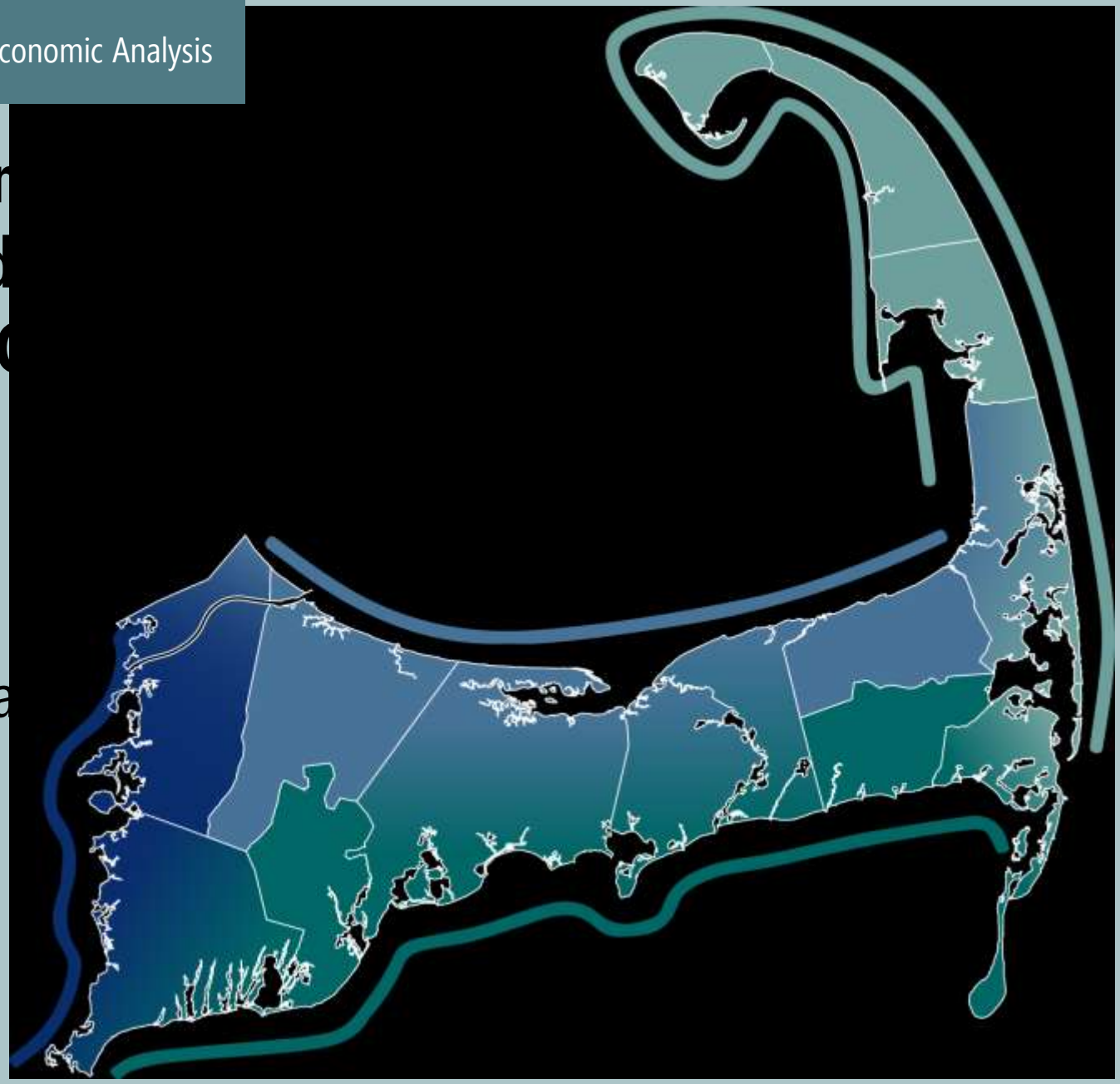
### EXAMPLE QUESTION

| Methods and Effects of Protection | Result in 2020s with NO NEW ACTION | Result in 2020s with PROTECTION OPTION A | Result in 2020s with PROTECTION OPTION B |
|---|---|---|---|
| | No Change in Existing Defenses | More Emphasis on HARD Defenses | SIMILAR Emphasis on Hard and Soft Defenses |
| Homes Flooded | 51%<br>2,585 of 5,034 homes expected to flood in a Category 3 storm | 51%<br>2,585 of 5,034 homes expected to flood in a Category 3 storm | 36%<br>1,812 of 5,034 homes expected to flood in a Category 3 storm |
| Wetlands Lost | 5%<br>25 of 497 wetland acres expected to be lost | 10%<br>50 of 497 wetland acres expected to be lost | 10%<br>50 of 497 wetland acres expected to be lost |
| Beaches and Dunes Lost | 10%<br>3 of 30 beach acres expected to be lost | 4%<br>1 of 30 beach acres expected to be lost | 16%<br>5 of 30 beach acres expected to be lost |
| Seawalls and Coastal Armoring | 24%<br>12 of 50 miles of coast armored | 24%<br>12 of 50 miles of coast armored | 24%<br>12 of 50 miles of coast armored |
| $ Cost to Your Household per Year | $0<br>Increase in annual taxes or fees | $35<br>Increase in annual taxes or fees | $35<br>Increase in annual taxes or fees |
| HOW WOULD YOU VOTE? (CHOOSE ONLY ONE) I vote for | ☑ I vote for NO NEW ACTION | ☑ I vote for PROTECTION OPTION A | ☑ I vote for PROTECTION OPTION B |
| | If you prefer No New Action check here | If you prefer Protection Option A check here | If you prefer Protection Option B check here |

Public Engagement and Socio-Economic Analysis

# ENGAGE CAPE COD BASED ON WATER

# Subregion
# Stakehold
# Working G



Outer Cape

Buzzards Ba

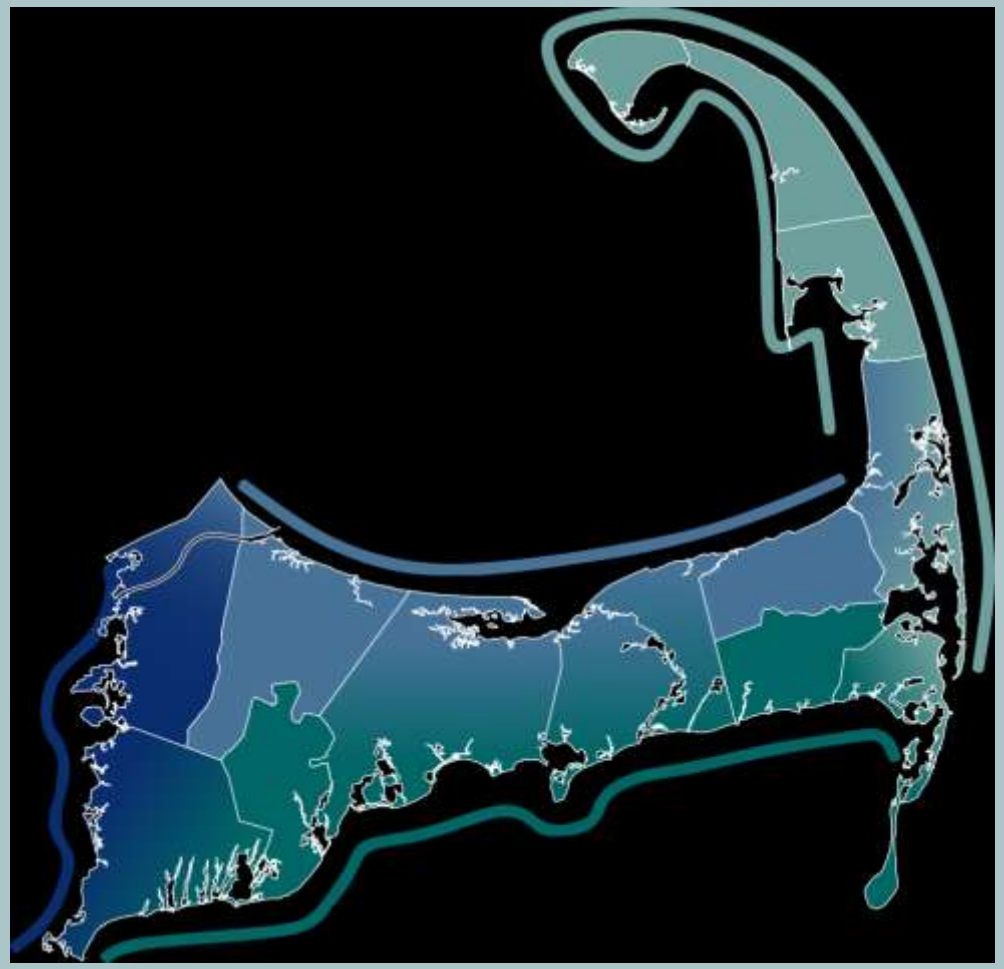
# Subregional Stakeholder Meetings

Meeting #1: Coastal Vulnerability

Meeting #2: Adaptation Strategies

Meeting #3: Specific Actions

Meeting #4: Road-Test the Tool



PHASE 3

# Communication and Decision-Support Tool


CAPE COD COMMISSION
1938
1952
1971
1984
1994
2002
2014
Clear
Statistics
Parcel Timeline: ON
1952
1890
1938
1952
1971
1984
1994
2002
2014
Clear
2002
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC...
POWERED BY esri

# Cape Cod Sea Level Rise

Tweet
Share
search for an address...
Produced by the Cape Cod Commission

6'

**Cape-wide impacts at 6ft of Sea Level Rise:**

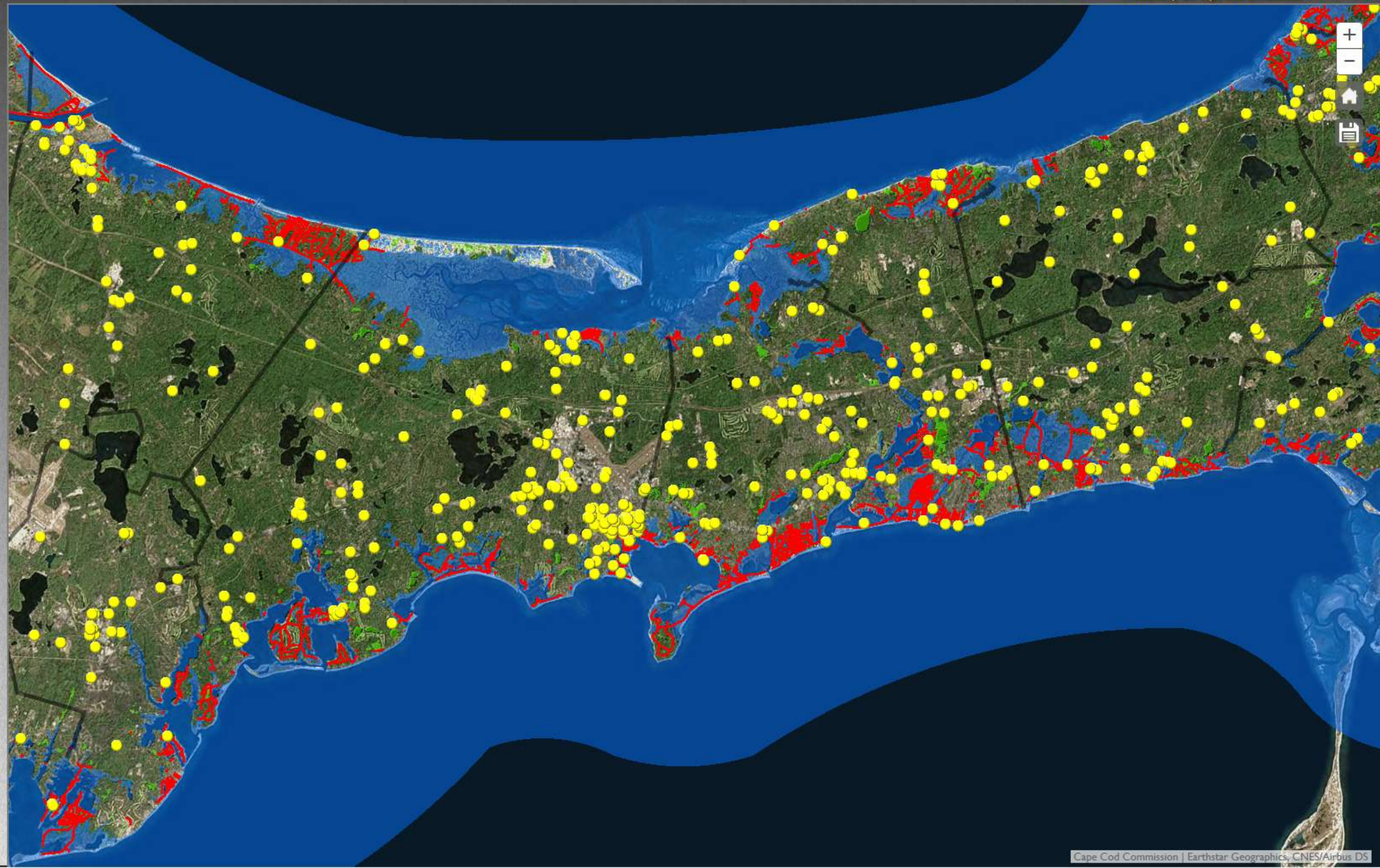
At present Cape Cod is 383 square miles with 116,031 acres of Priority Habitat. There are 728 Critical Facilities and 3,121 miles of roadway. Annual sales equal $19.7 billion and 127,412 people are employed in 14,658 businesses.

- Low-lying Areas
- Disconnected Roads
- Critical Facilities (Filter Types) ☑
  - Unaffected
  - Affected
- SLOSH Hurricane Categories ☐
  - Category 1
  - Category 2
  - Category 3
  - Category 4
- FEMA FIRM Floodzones ☐
  - Special Flood Hazard Areas
  - Coastal High Hazard Areas

More Information

**Saved Map Views:**

You have no saved map views.



Communication and Decision-Support Tool

# Develop a GIS-based, decision-support tool to **aid discussions** around **implementation** of potential adaptation strategies

# GIS-Based Decision-Support Tool Development


## PROJECT YEAR 2 + 3

**Measure impacts and engage implementation of site-specific strategies**

**GIS based map environment**

**Adaptation strategies database**

**Compare costs and benefits**

**Stakeholder feedback**

**Refine with further focus groups**

# Interested in participating as a future stakeholder?

**www.capecodcommission.org/NOAAsignup**

## THE RESILIENT CAPE COD PROJECT

CAPE COD COMMISSION

WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE

SEAL OF THE TOWN OF BARNSTABLE, MASS. 1639. ADOPTED MAY 4, 1989

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NOAA