Municipal Vulnerability Preparedness Workshop

TOWN OF HARWICH

JANUARY 31, 2020

Today's Agenda

Morning

8:30 **Introductions, Workshop Overview, and MVP Program Background** – Chloe Schaefer

9:00 **Science, Climate Projections, Resources** – Greg Berman

10:00 **Break**

10:15 **Small Team Exercise**

- **Team Orientation**
- **Discuss and Identify Priority Hazards**
- **Identify Vulnerable Features and Strengths**
- **Prepare for Report-out**

11:45 **Teams Report on Hazards, Vulnerabilities, Strengths**

12:30 **Lunch!**

Today's Agenda

Afternoon

1:00 What's Next for MVP – Shannon Hulst

1:15 Small Team Exercise

- **Discuss and Identify Actions**
- **Identify Priority and Urgency of Actions**
- **Prepare for Report Out**

2:45 Break

3:00 Small Teams Report on Top Actions

3:30 Dot Exercise

3:45 Compile Top Actions & Wrap Up

4:30 Adjourn

Project Team

MVP PROVIDER | CAPE COD COMMISSION

- Martha Hevenor - *Planner II*
- Heather McElroy - *Natural Resources Manager*
- Erin Perry - *Deputy Director*
- Anne Reynolds - *GIS Director*
- Chloe Schaefer - *Chief Planner*

MVP PROVIDER | COOPERATIVE EXTENSION

- Greg Berman - *Coastal Processes Specialist, Woods Hole Sea Grant/ Cape Cod Cooperative Extension*
- Shannon Hulst - *Deputy Director, Cape Cod Cooperative Extension and Floodplain Specialist & CRS Coordinator, Woods Hole Sea Grant/Cape Cod Cooperative Extension*

TOWN PROJECT MANAGER

- Charleen Greenhalgh - *Town Planner*

MVP Program Background

EXECUTIVE ORDER 569, 9.16.16

An Integrated Climate Change Strategy for the Commonwealth

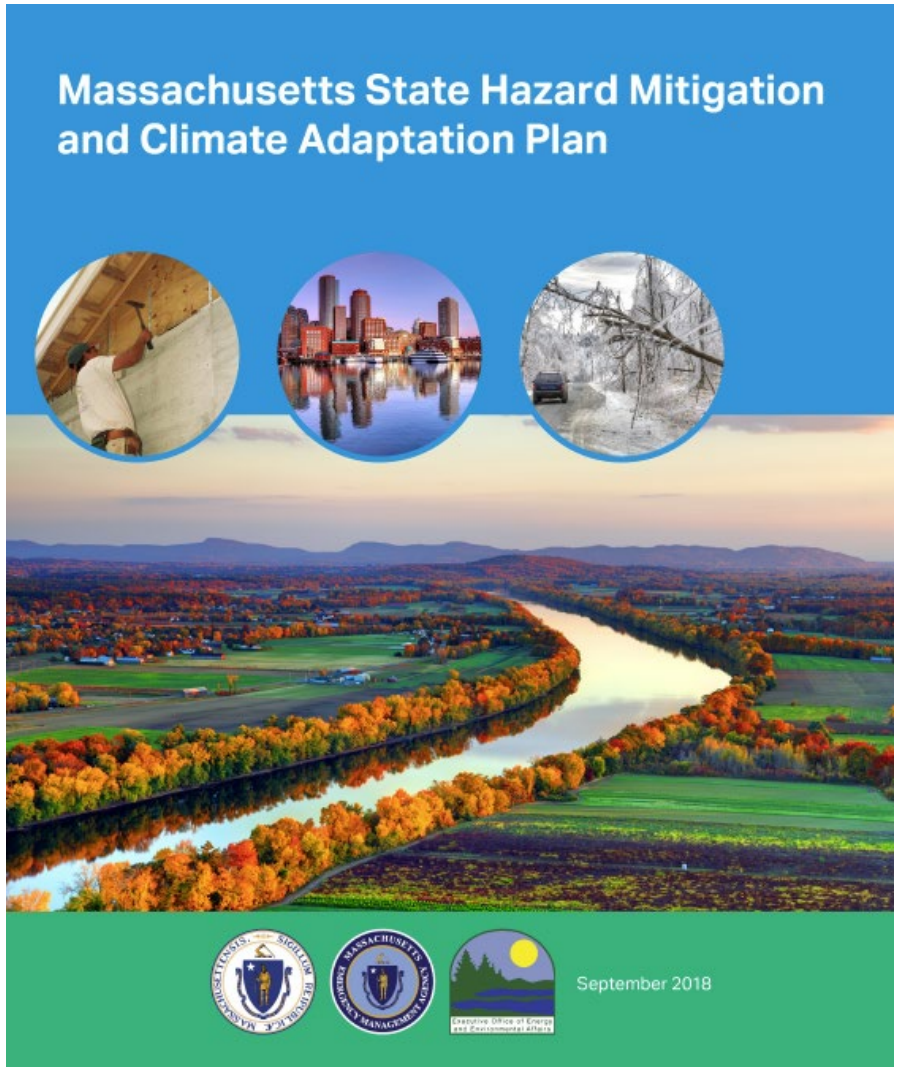
- Reducing greenhouse gas emissions to combat climate change
- Preparing for the impacts of climate change
  - State Adaptation Plan
  - Agency Vulnerability Assessments
  - Municipal Support
  - Climate Coordinators

ENVIRONMENTAL BOND BILL, 8.21.18

- $2.4 billion bond bill
- $500 million for responding to and preparing for climate impacts
- $75 million for MVP planning and action grants

MASSACHUSETTS STATE HAZARD MITIGATION AND CLIMATE ADAPTATION PLAN

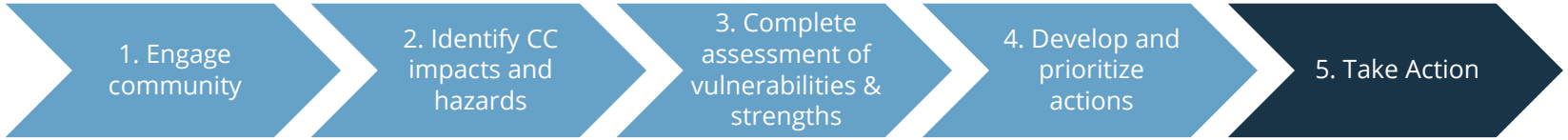
- **www.resilientma.com**
- **INTEGRATED PLAN:** First in the nation Climate Adaptation and Hazard Mitigation Plan
- **MAINSTREAMING CLIMATE CHANGE:** Incorporating climate change into current planning, budgeting, and policy frameworks



Municipal Vulnerability Preparedness (MVP) Program

- A **STATE AND LOCAL PARTNERSHIP** to build resilience to climate change by building capacity to respond to climate effects at the local level and pilot innovative adaptation practice

- Across the Commonwealth, **CITIES AND TOWNS NEED FINANCIAL AND TECHNICAL RESOURCES** to prepare their residents, businesses, and aging infrastructure



MVP PRINCIPLES

A COMMUNITY-LED, ACCESSIBLE PROCESS

- Employs **local knowledge** and buy-in
- Utilizes **partnerships** and leverages existing efforts
- Is based in **best available climate projections** and data
- Incorporates principles of **nature-based solutions**
- Demonstrates **pilot potential** and is **proactive**
- Reaches and responds to risks faced by environmental justice communities and **vulnerable populations**

Why nature-based solutions?

Cost-effective

Protects water quality and quantity

Provides food and recreation opportunities

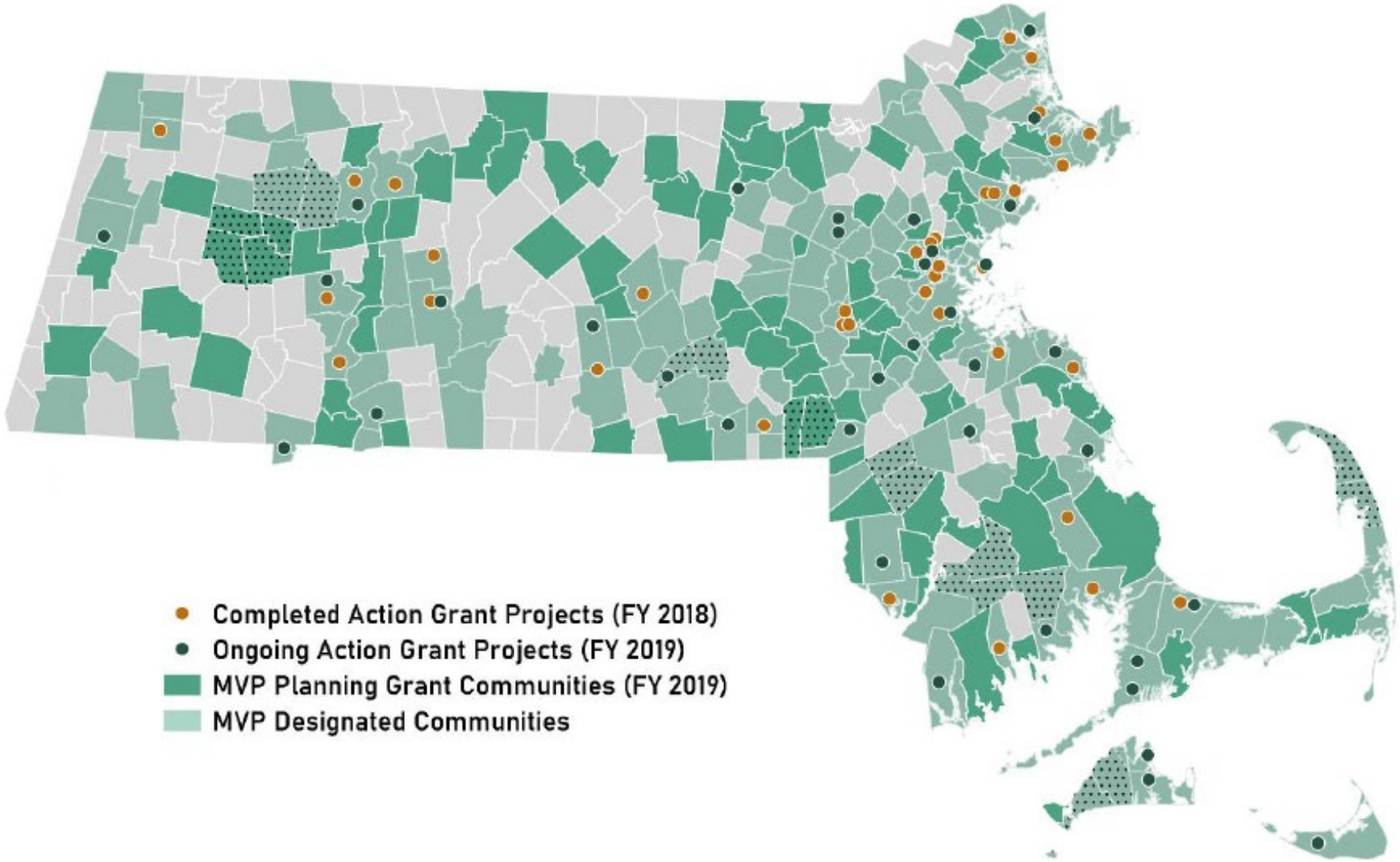
Reduces erosion

Minimizes temperature increases associated with developed areas and climate change

MVP 2017-2019

71% OF THE COMMONWEALTH/ 249 COMMUNITIES

$17+ MILLION IN PLANNING AND ACTION GRANTS



Overview of the Process

PREPARE FOR THE WORKSHOP

CHARACTERIZE HAZARDS

IDENTIFY COMMUNITY VULNERABILITIES AND STRENGTHS

IDENTIFY AND PRIORITIZE COMMUNITY ACTIONS

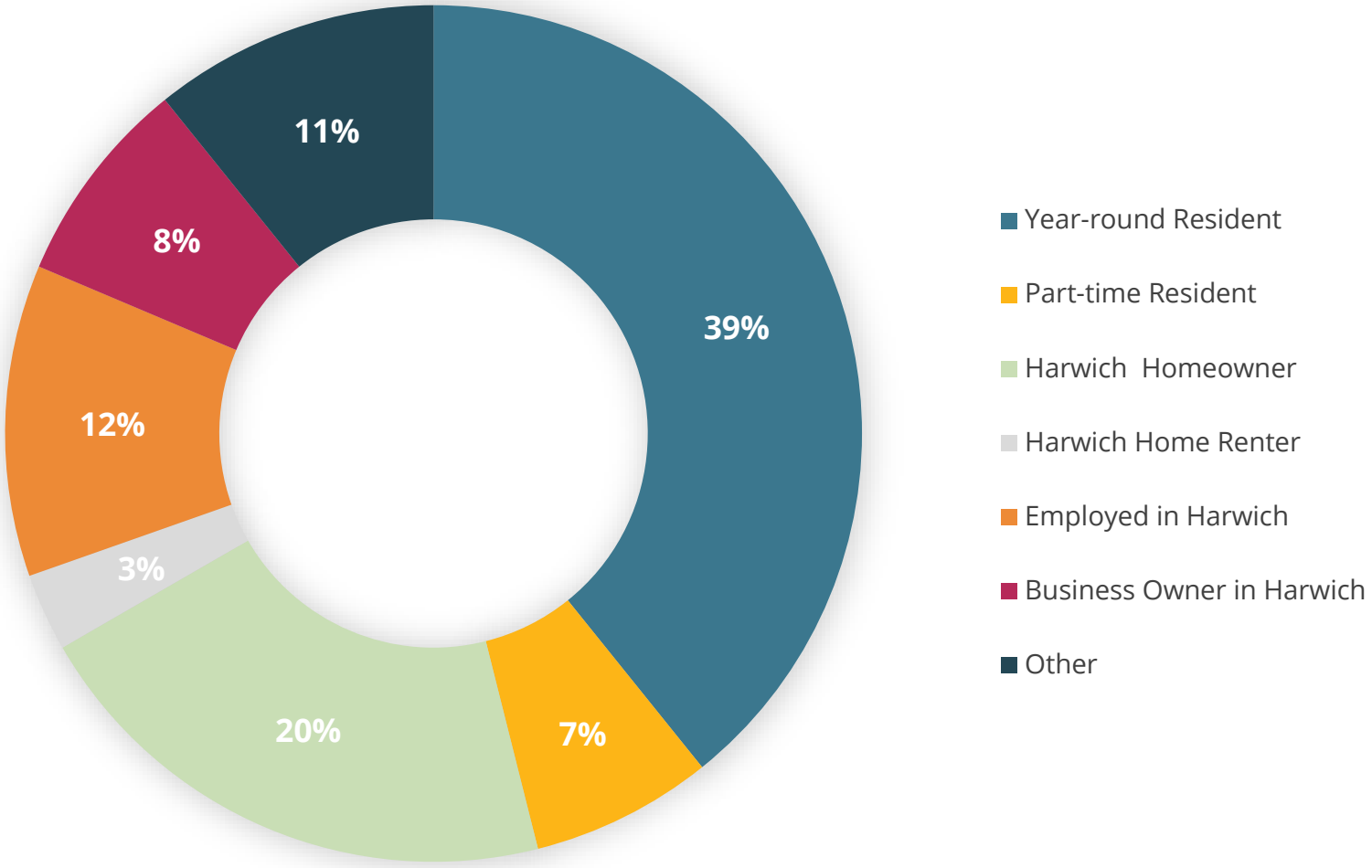
DETERMINE OVERALL PRIORITY ACTIONS

PUT IT ALL TOGETHER – FINAL REPORT

MOVE FORWARD

Respondents are...

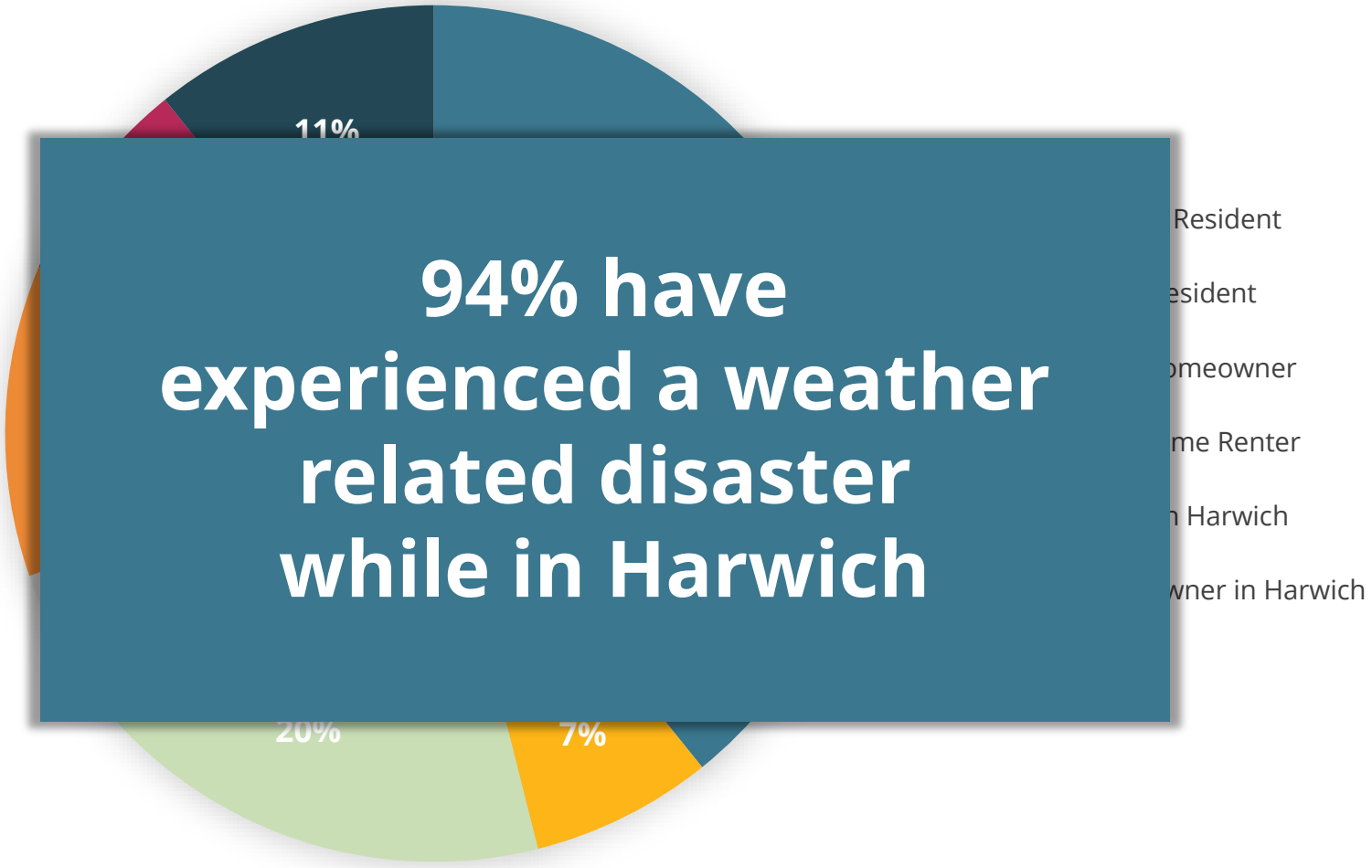
ONLINE SURVEY



Other: Retail Store Manager | CCHC | Former Town of Yarmouth Water Superintendent, retired | Town Employee (3) | Victim of July tornado | School committee member | Municipal manager | ED of The Family Pantry of Cape Cod | Facilities manager with CC5

Respondents are...

ONLINE SURVEY

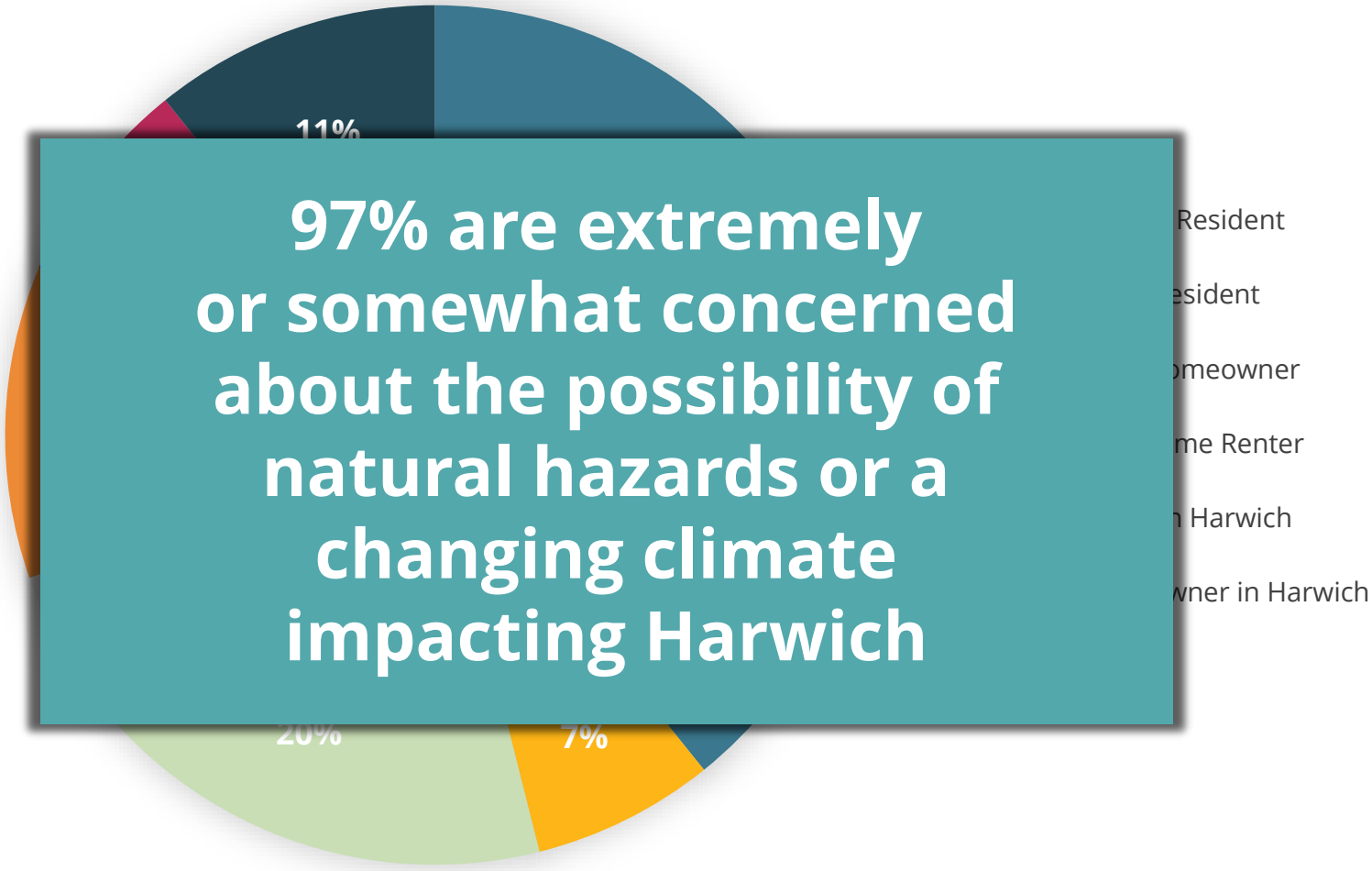


94% have experienced a weather related disaster while in Harwich

Other: Retail Store Manager | CCHC | Former Town of Yarmouth Water Superintendent, retired | Town Employee (3) | Victim of July tornado | School committee member | Municipal manager | ED of The Family Pantry of Cape Cod | Facilities manager with CC5

Respondents are...

ONLINE SURVEY

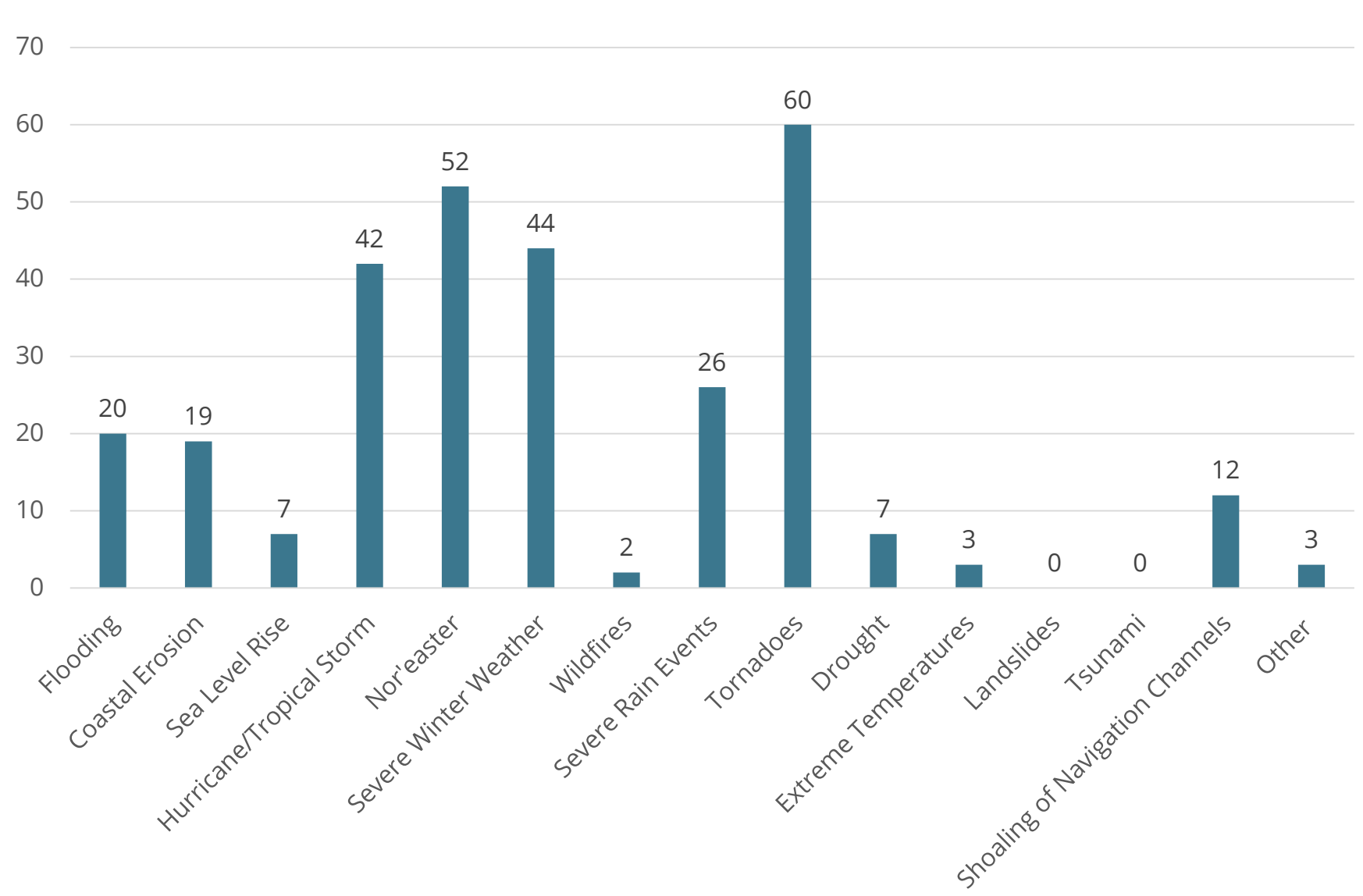


97% are extremely or somewhat concerned about the possibility of natural hazards or a changing climate impacting Harwich

Other: Retail Store Manager | CCHC | Former Town of Yarmouth Water Superintendent, retired | Town Employee (3) | Victim of July tornado | School committee member | Municipal manager | ED of The Family Pantry of Cape Cod | Facilities manager with CC5

Hazards Experienced

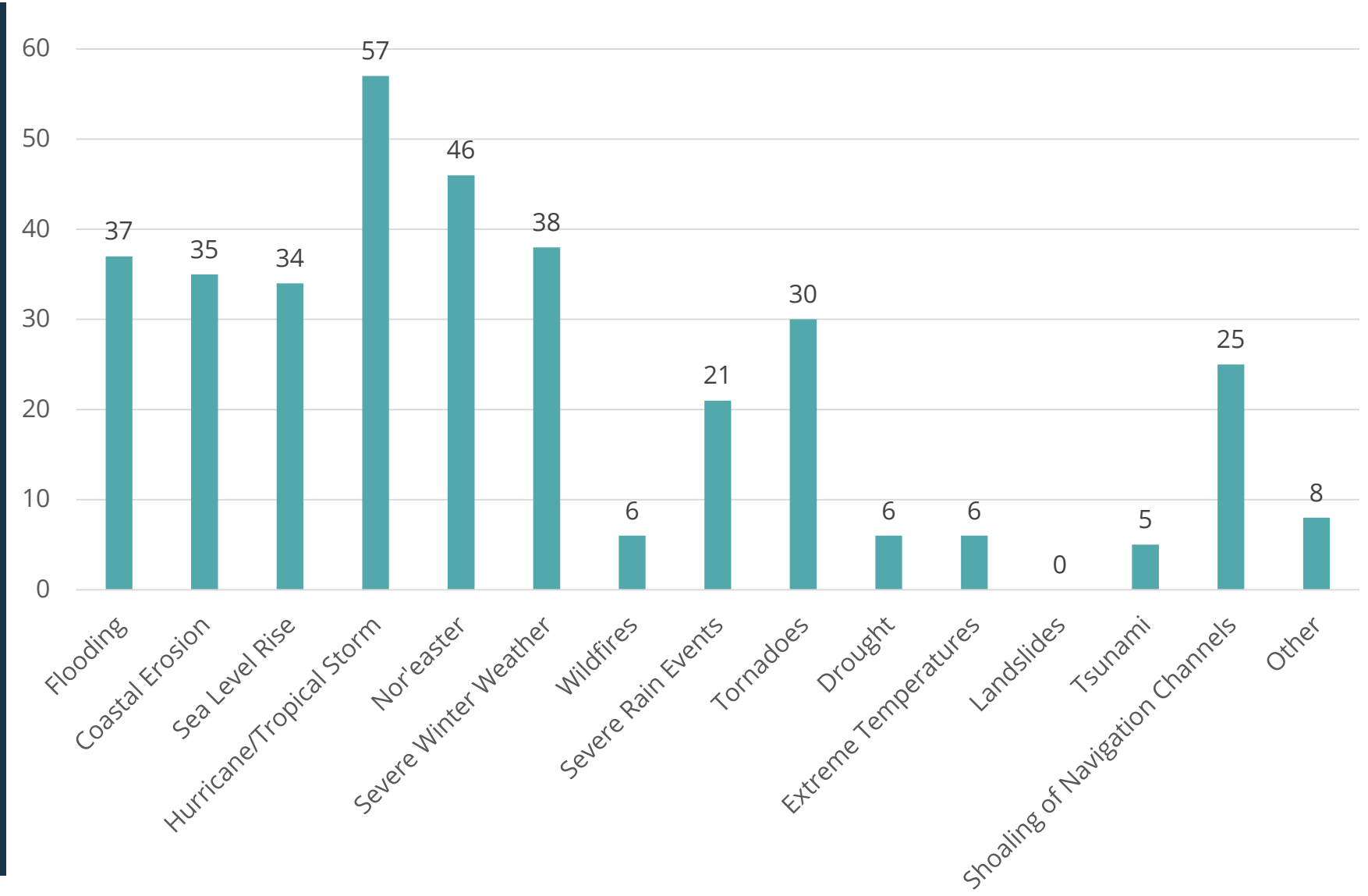
ONLINE SURVEY



Other: High winds | Impassible roadways | High groundwater level | None/does not apply (2)

Hazards of Most Concern

ONLINE SURVEY



Other: High winds (2) | Nuclear threat from Pilgrim plant | Drinking water supply and quality (2) | Pollution of water (2) | lack of pollinators | High groundwater levels | Outbreak/infectious diseases

Coastal Erosion

Dam/Culvert Failure

Drought

Earthquake

Extreme Temperatures

Fire (Urban & Wild)

Flood

High Winds

Hurricane

Landslide

Nor’easters

Sea Level Rise

Severe Winter Weather

Thunderstorms

Tornados

Tsunami

HARWICH HAZARD MITIGATION PLAN

Coastal Erosion

Dam/Culvert Failure

Drought

Earthquake

Extreme Temperatures

Fire (Urban & Wild)

Flood

High Winds

Hurricane

Landslide

Nor’easters

Sea Level Rise

Severe Winter Weather

Thunderstorms

Tornados

Tsunami

HARWICH HAZARD MITIGATION PLAN

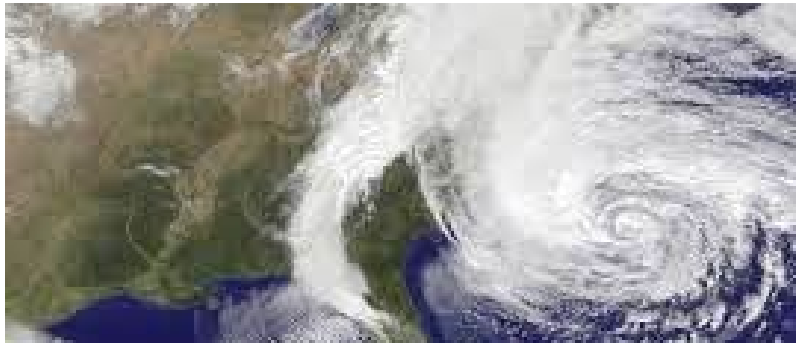
Science, Climate Projections, and Resources

Greg Berman, Coastal Processes Specialist

Woods Hole Sea Grant & Cape Cod Cooperative Extension

Examples of Vulnerability/ Hazards

FROM STATE HAZARD MITIGATION PLAN



CHANGES IN PRECIPITATION

- Inland Flooding
- Drought
- Landslide

SEA LEVEL RISE

- Coastal Flooding
- Coastal Erosion
- Tsunami

RISING TEMPERATURES

- Average/Extreme Temperature
- Wildfires
- Invasive Species

EXTREME WEATHER

- Hurricanes/Tropical Storms
- Severe Winter Storm / Nor'easter
- Tornadoes

EARTHQUAKE

HAZARD

Sea Level Rise

Nor'Easter (January 2018)

Hurricane Sandy (10/29-30/2012)
Predicted High WL = 10.3 MLLW
Actual High WL = 12.8 MLLW

Max Surge: 4.5'
High Tide Surge: 2.5'

Nor'easter Nemo (2/8-2/9/2013)
Predicted High WL = 10.0 MLLW
Actual High WL = 13.0 MLLW

Max Surge: 3.9'
High Tide Surge: 3.0'

Nor'easter Grayson (1/4-5/2018)
Predicted High WL = 12.1 MLLW
Actual WL = 15.2 MLLW

Max Surge: 3.1'
High Tide Surge: 3.1'

SL has risen ~4.5" in the 40 years since 1978....so SLR is the reason the record was broken!!!

In Boston, a storm tide of 15.16' was recorded which beat the record set by the Blizzard of 1978 (15.0')

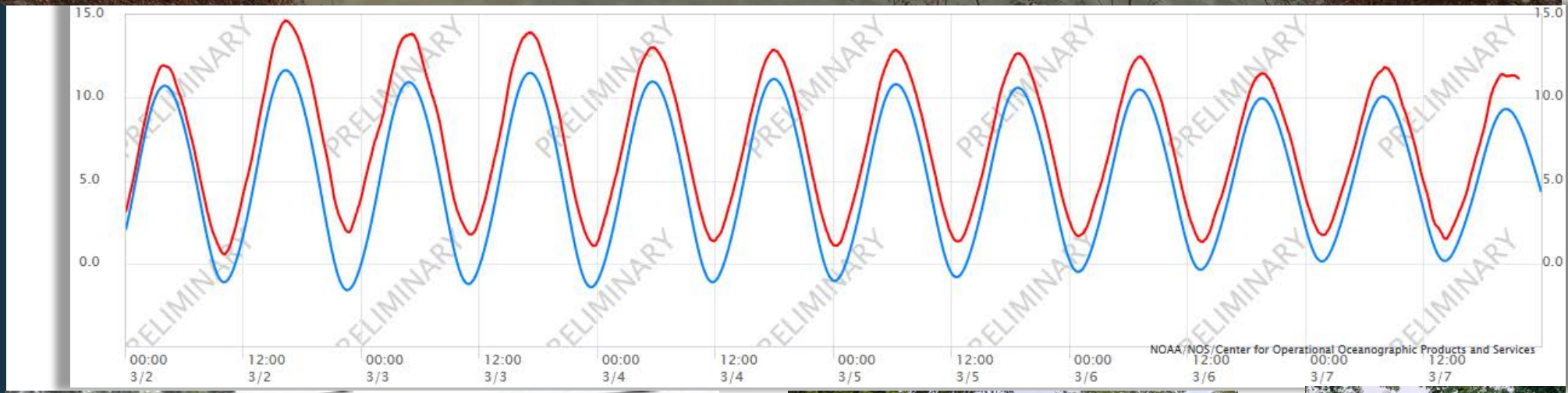
~2"

Woods Hole Sea Grant

County of Barnstable Massachusetts

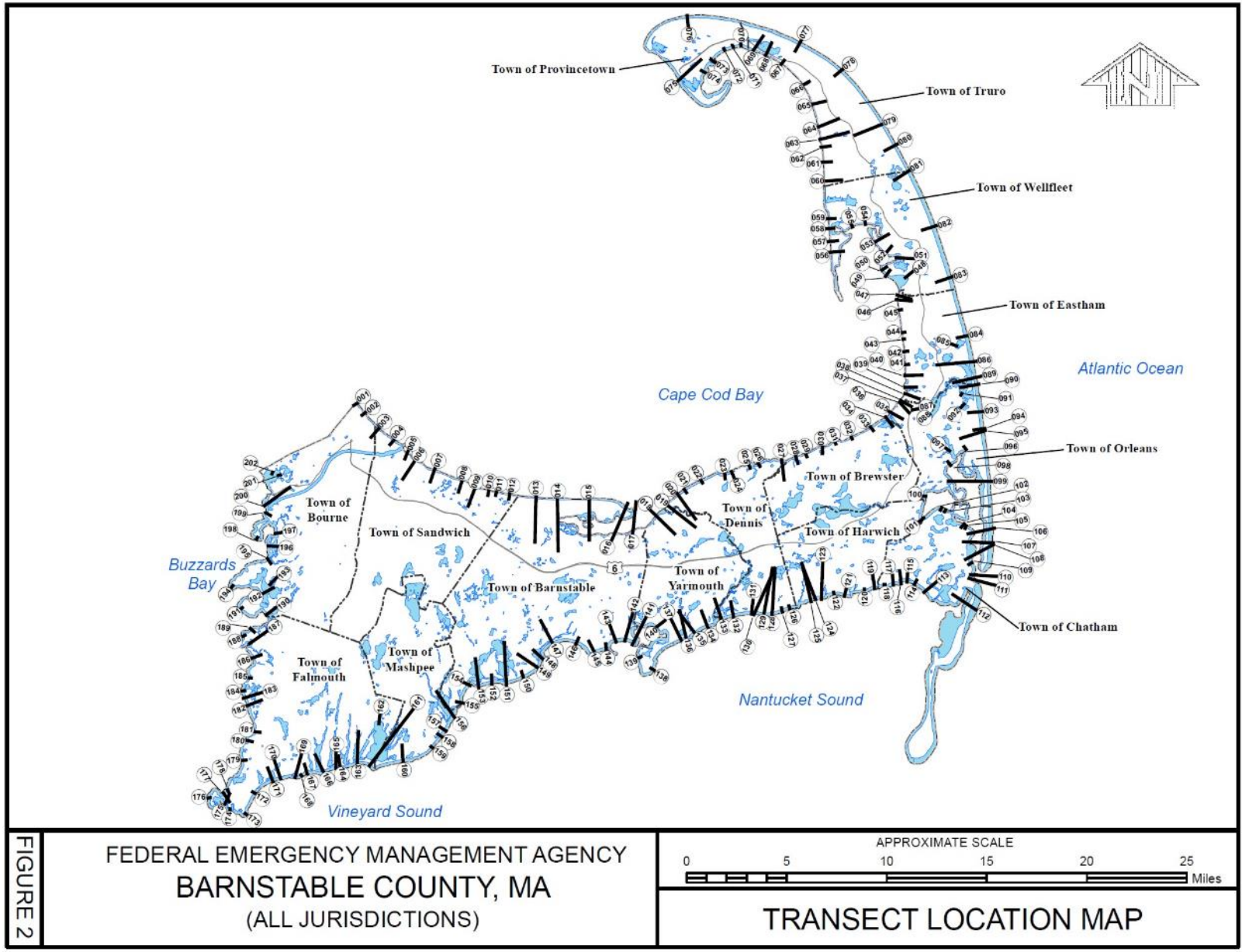
HAZARD

Storms



HAZARD

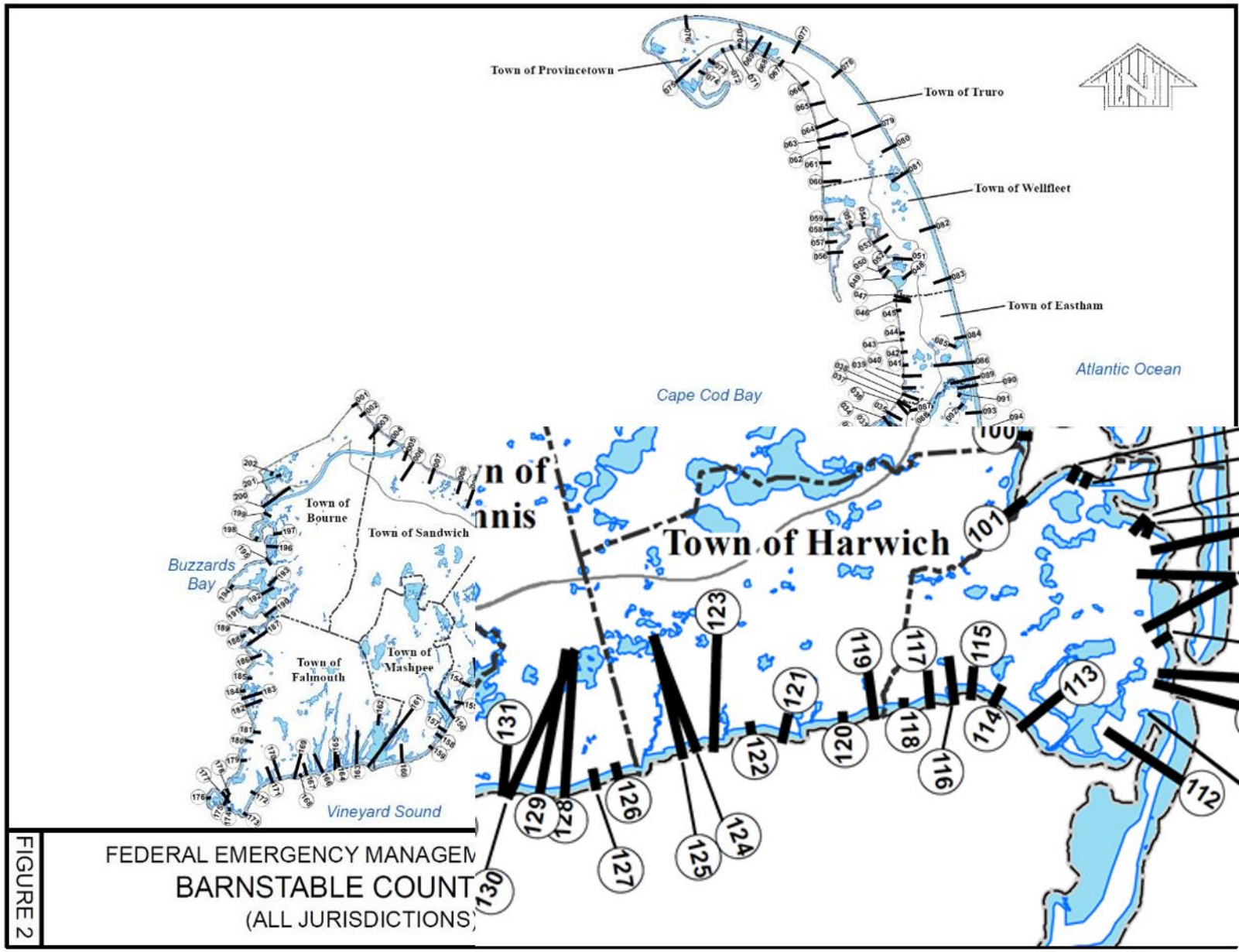
SLR & Storms



Changing the return period of flooding

HAZARD

SLR & Storms

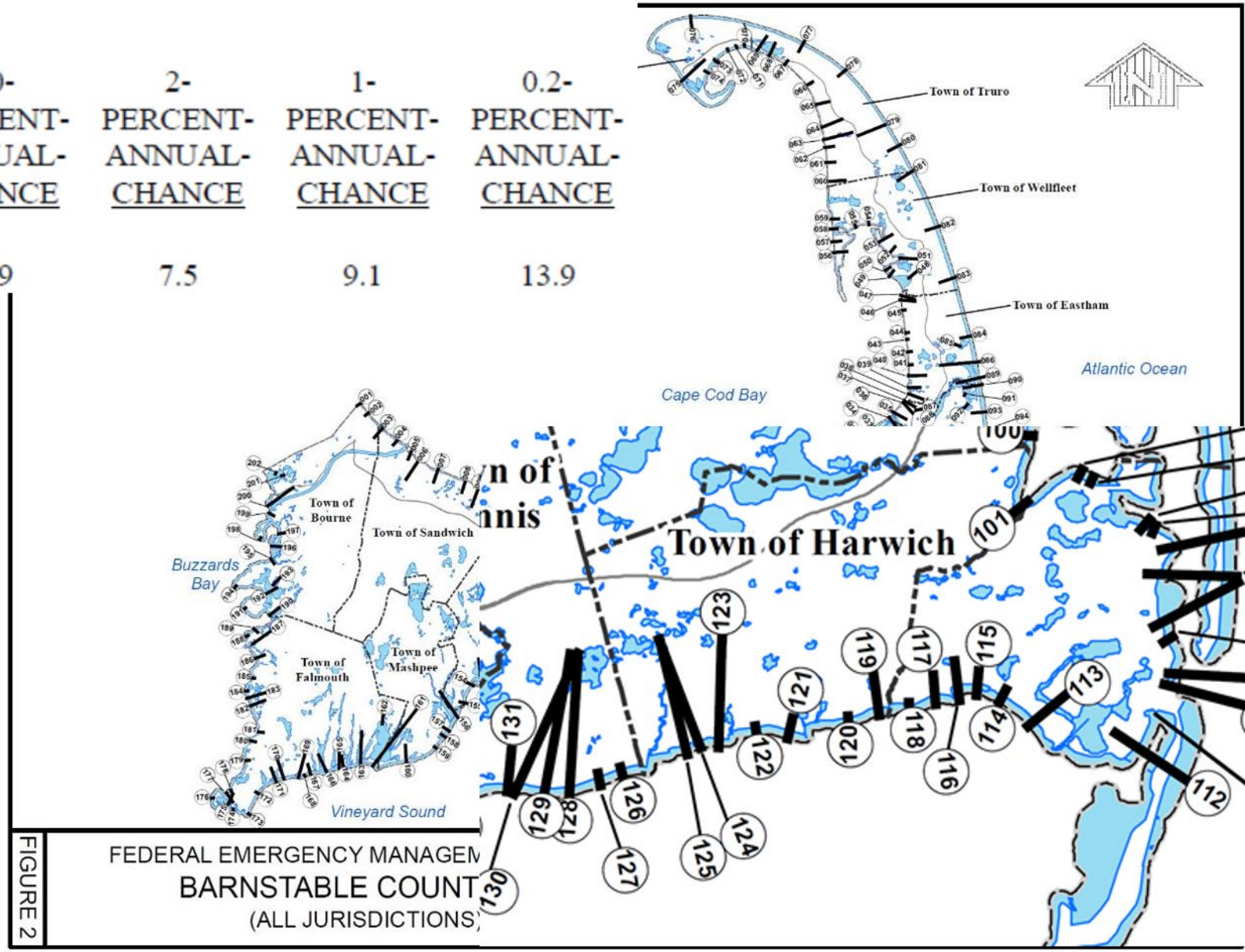


Changing the return period of flooding

HAZARD

SLR & Storms

TRANSECT	10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
114	4.9	7.5	9.1	13.9



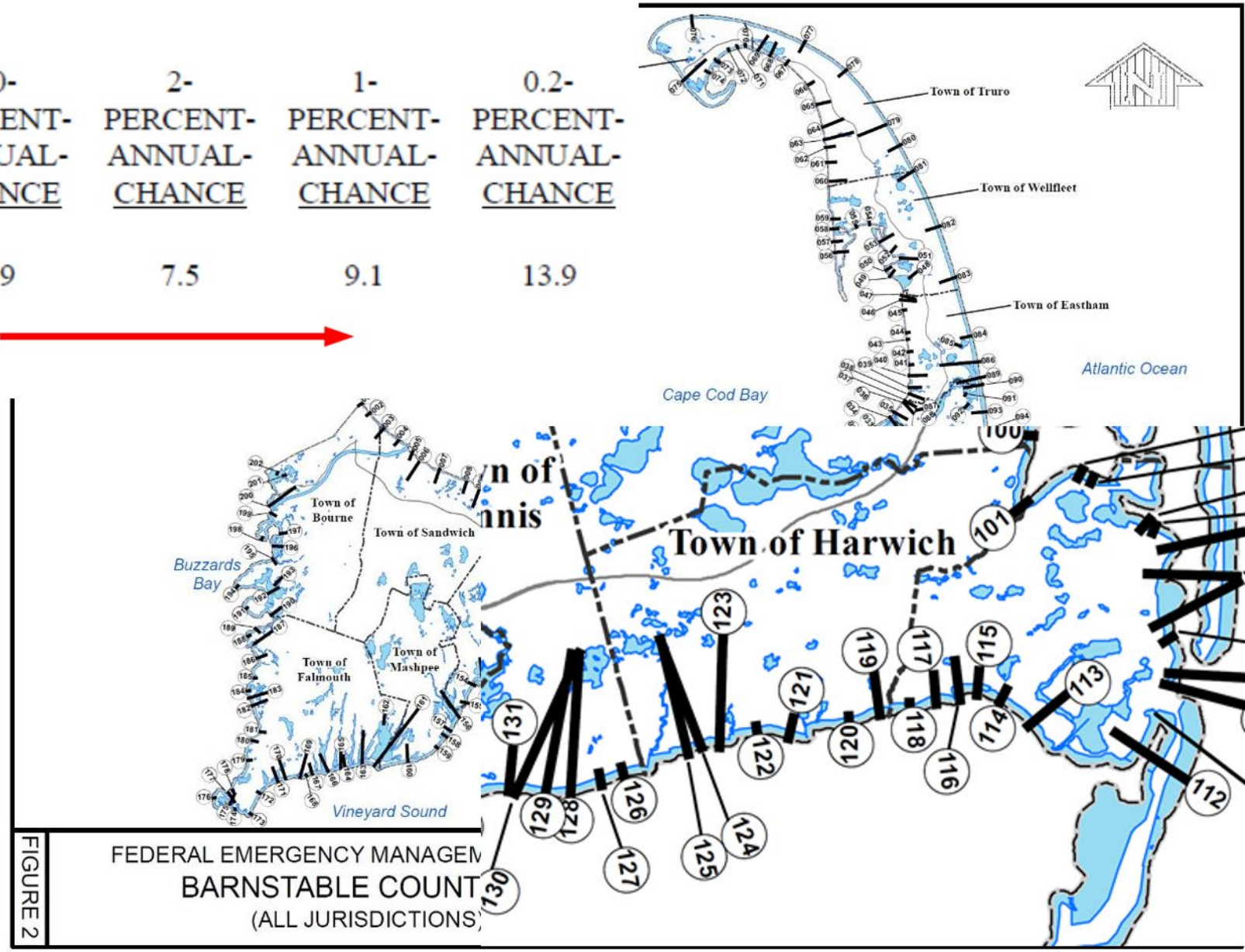
Changing the return period of flooding

HAZARD

SLR & Storms

TRANSECT	10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
114	4.9	7.5	9.1	13.9

4’



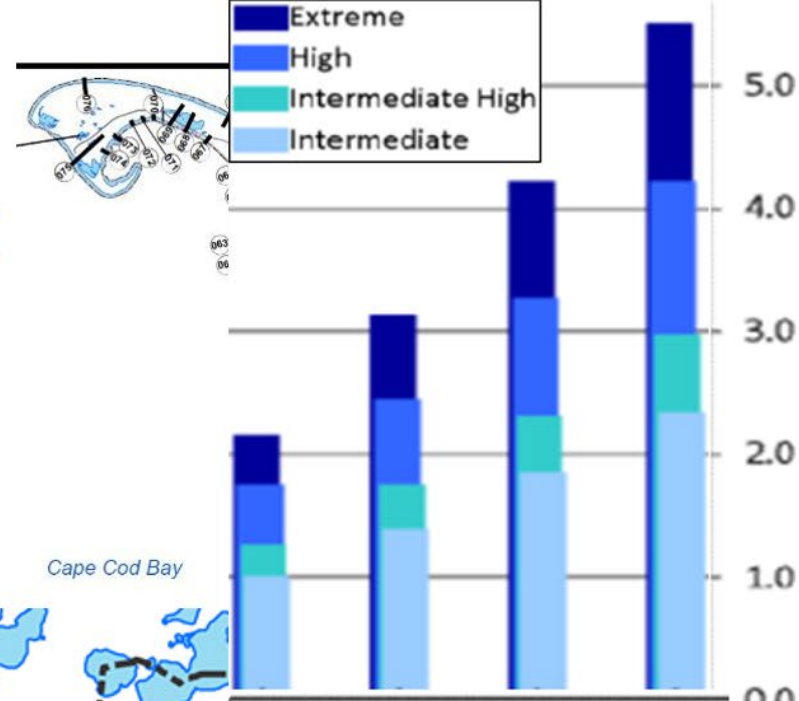
Changing the return period of flooding

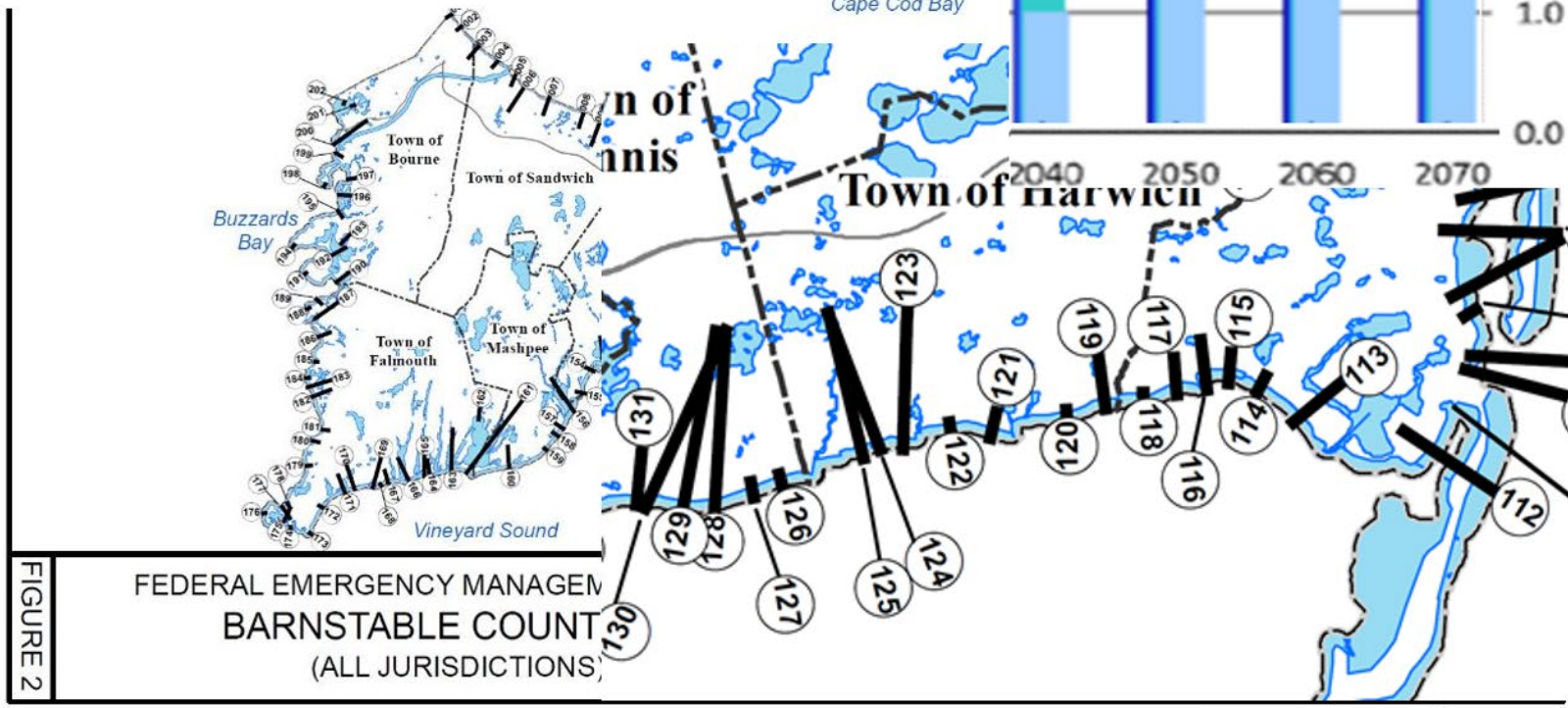
HAZARD

SLR & Storms

TRANSECT	10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
114	4.9	7.5	9.1	13.9

4’

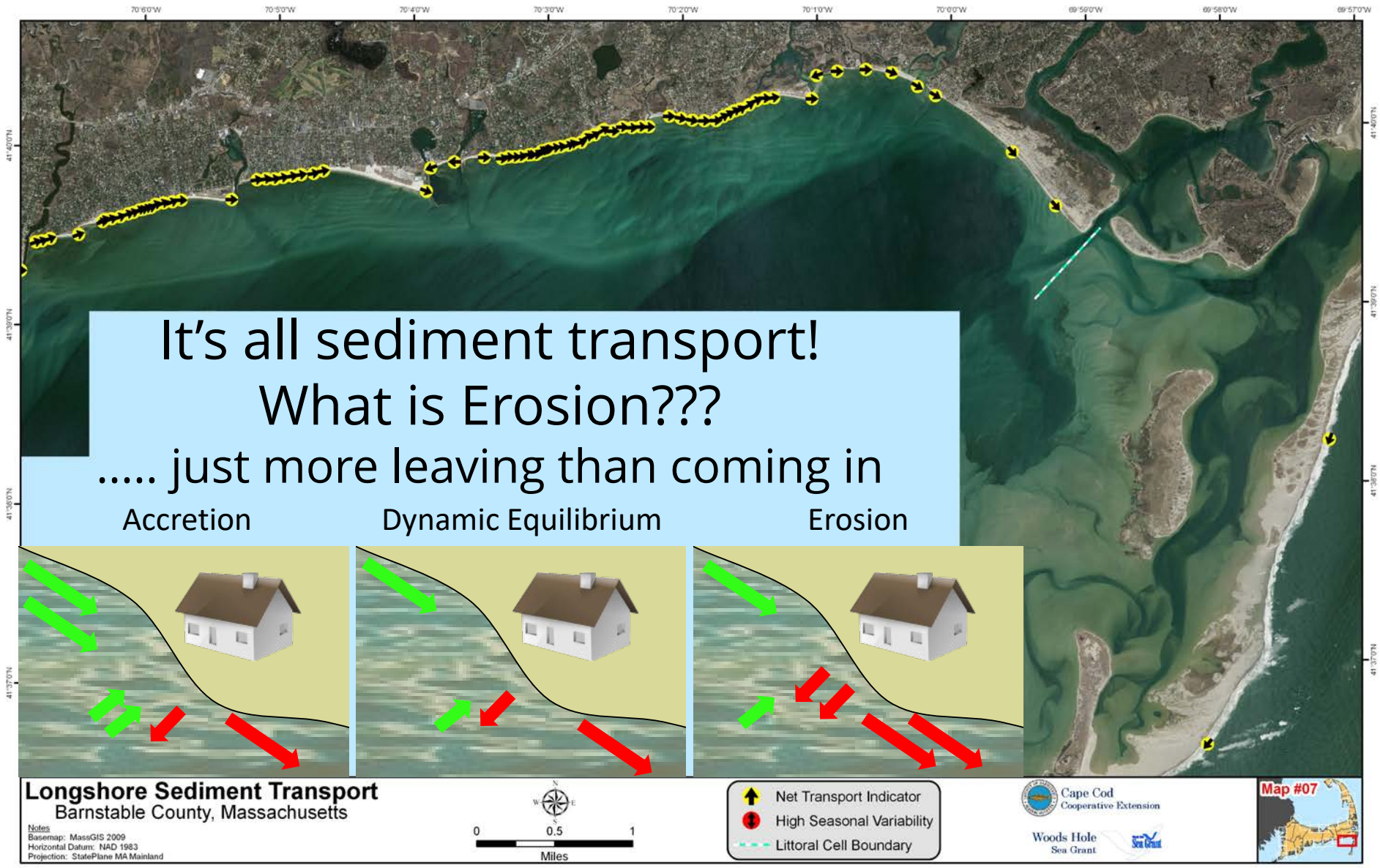




Changing the return period of flooding

HAZARD

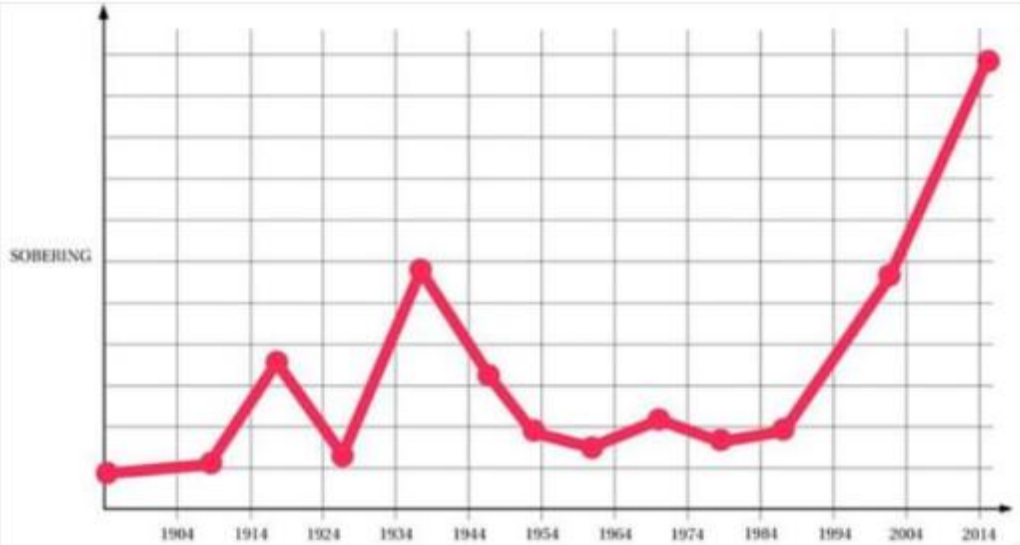
Erosion



Overview of Data and Maps

The Onion
19 mins ·

"As recently as 15 years ago, there were relatively few statistics that were concerning, let alone troubling, but our research found that the vast majority of current statistical figures are unsettling, alarming, or even, in some cases, chilling."



THEONION.COM
Study Finds 79% Of Statistics Now Sobering
CAMBRIDGE, MA—Noting a sharp increase over rec...

CAPE COD BASIN

MUNICIPALITIES WITHIN CAPE COD BASIN:

Barnstable, Bourne, Brewster, Chatham, Dennis, Eastham, Falmouth, Harwich, Mashpee, Orleans, Provincetown, Sandwich, Truro, Wellfleet, Yarmouth

Many municipalities fall within more than one basin, so it is advised to use the climate

CAPE COD BASIN

MUNICIPALITIES WITHIN CAPE COD BASIN:

Barnstable, Bourne, Brewster, Chatham, Dennis, Eastham, Falmouth, Harwich, Mashpee, Orleans, Provincetown, Sandwich, Truro, Wellfleet, Yarmouth

resilient MA

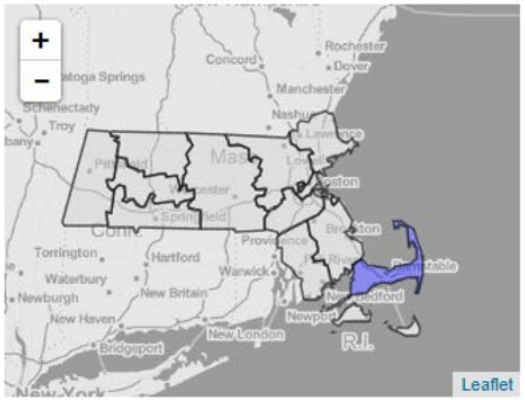
Climate Change Clearinghouse for the Commonwealth

County: Barnstable County, MA

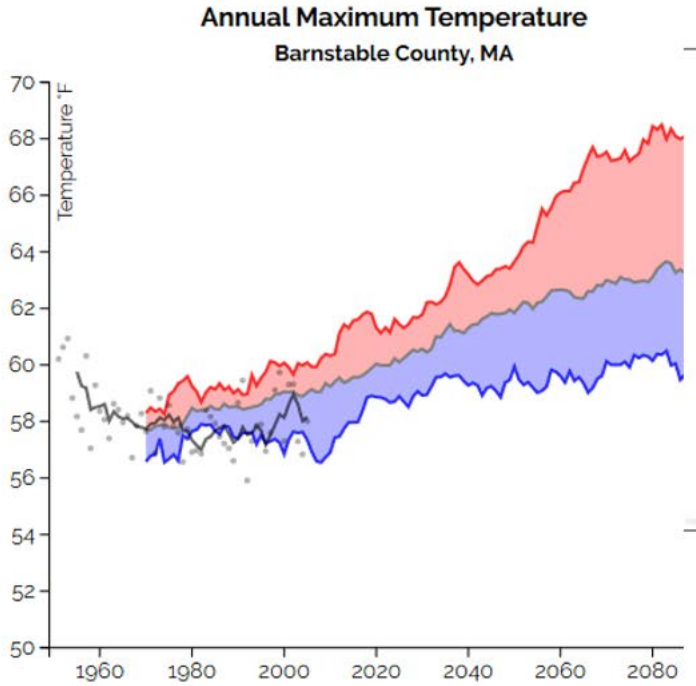
Calculated Variable:

Maximum Temperature

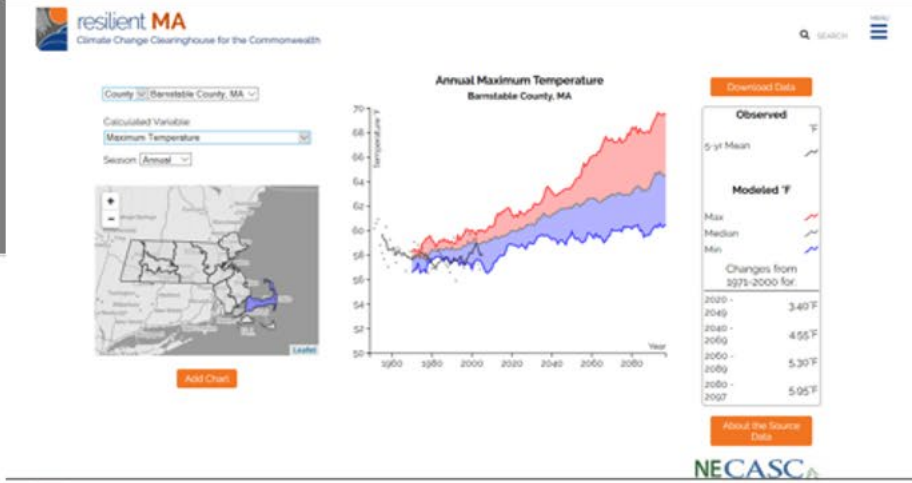
Season: Annual

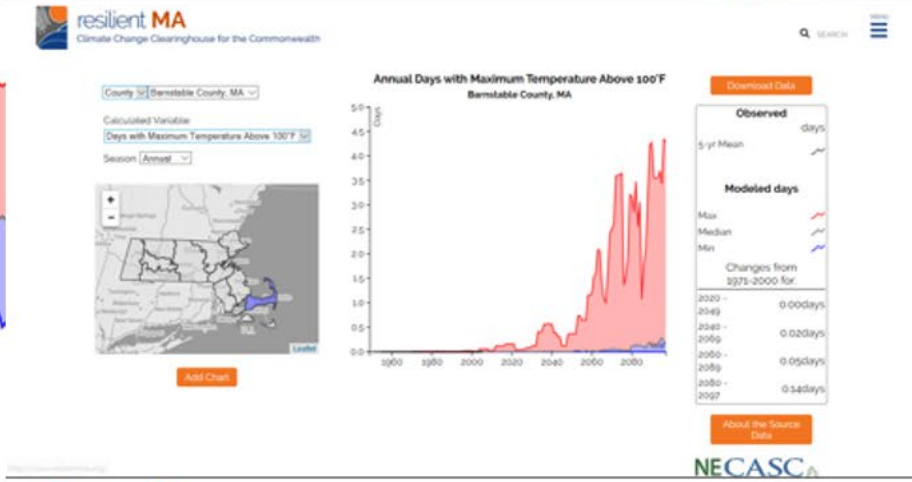


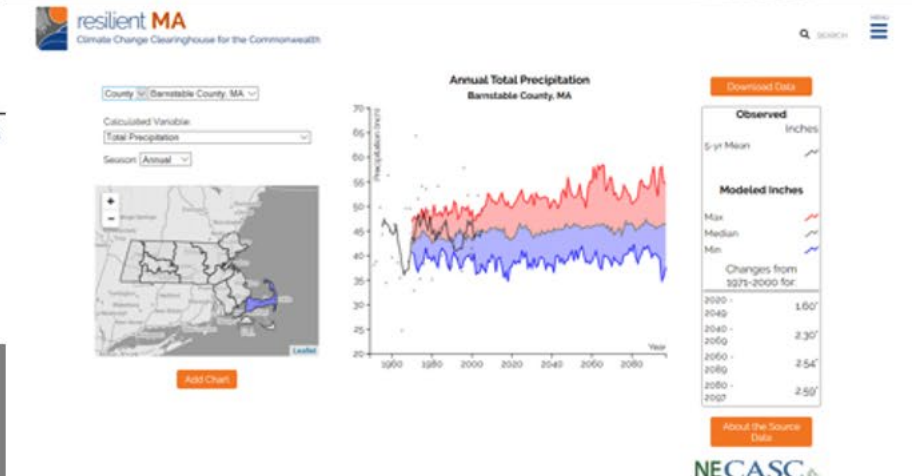
Add Chart



Many municipalities fall within more than one basin, so it is advised to use the climate



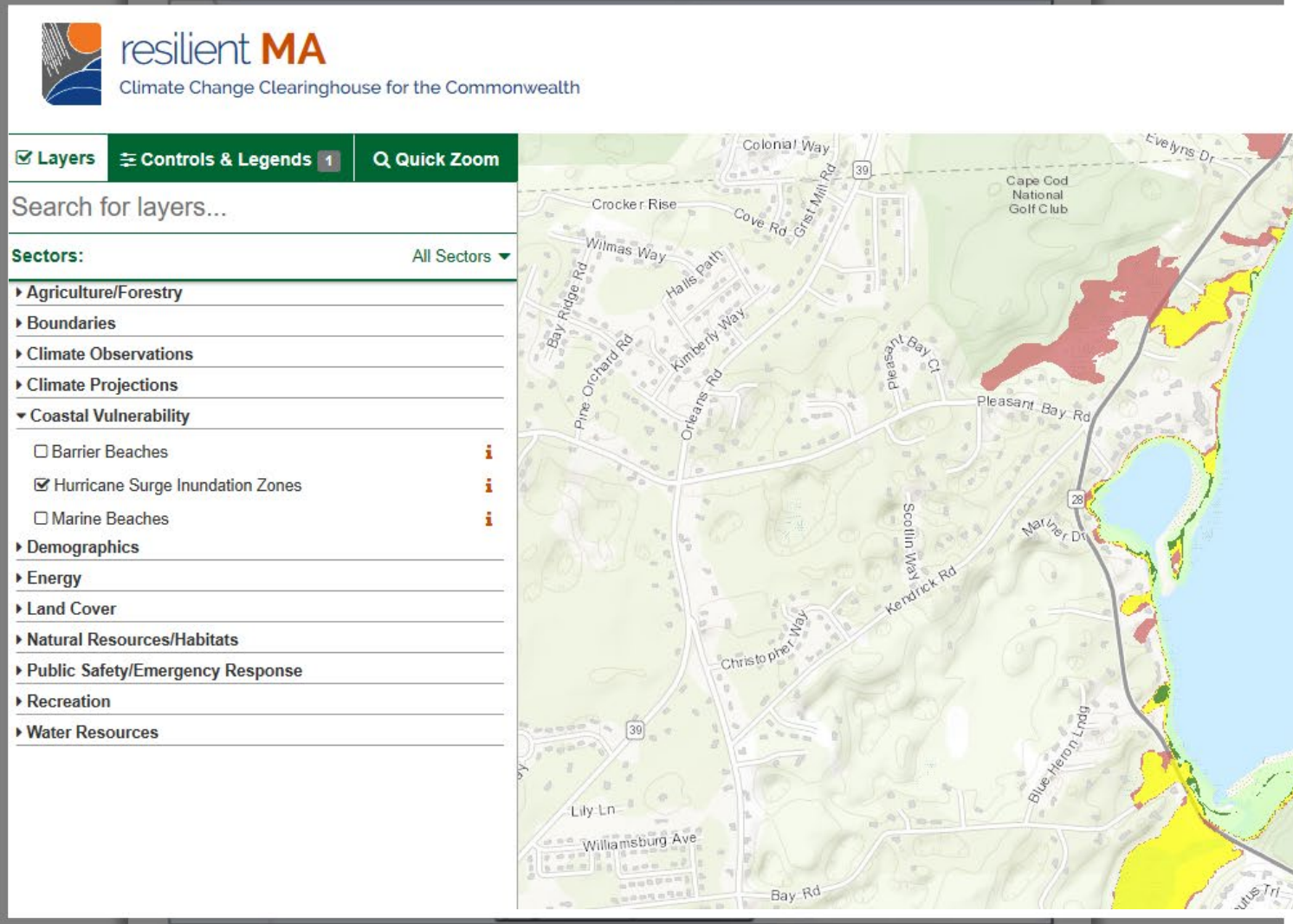


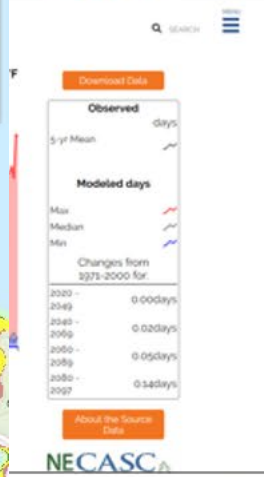


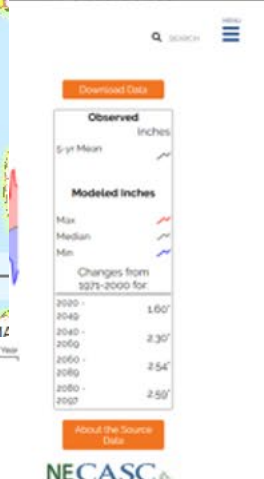
CAPE COD BASIN

MUNICIPALITIES WITHIN CAPE COD BASIN:

Barnstable, Bourne, Brewster, Chatham, Dennis, Eastham, Falmouth, Harwich, Mashpee, Orleans, Provincetown, Sandwich, Truro, Wellfleet, Yarmouth





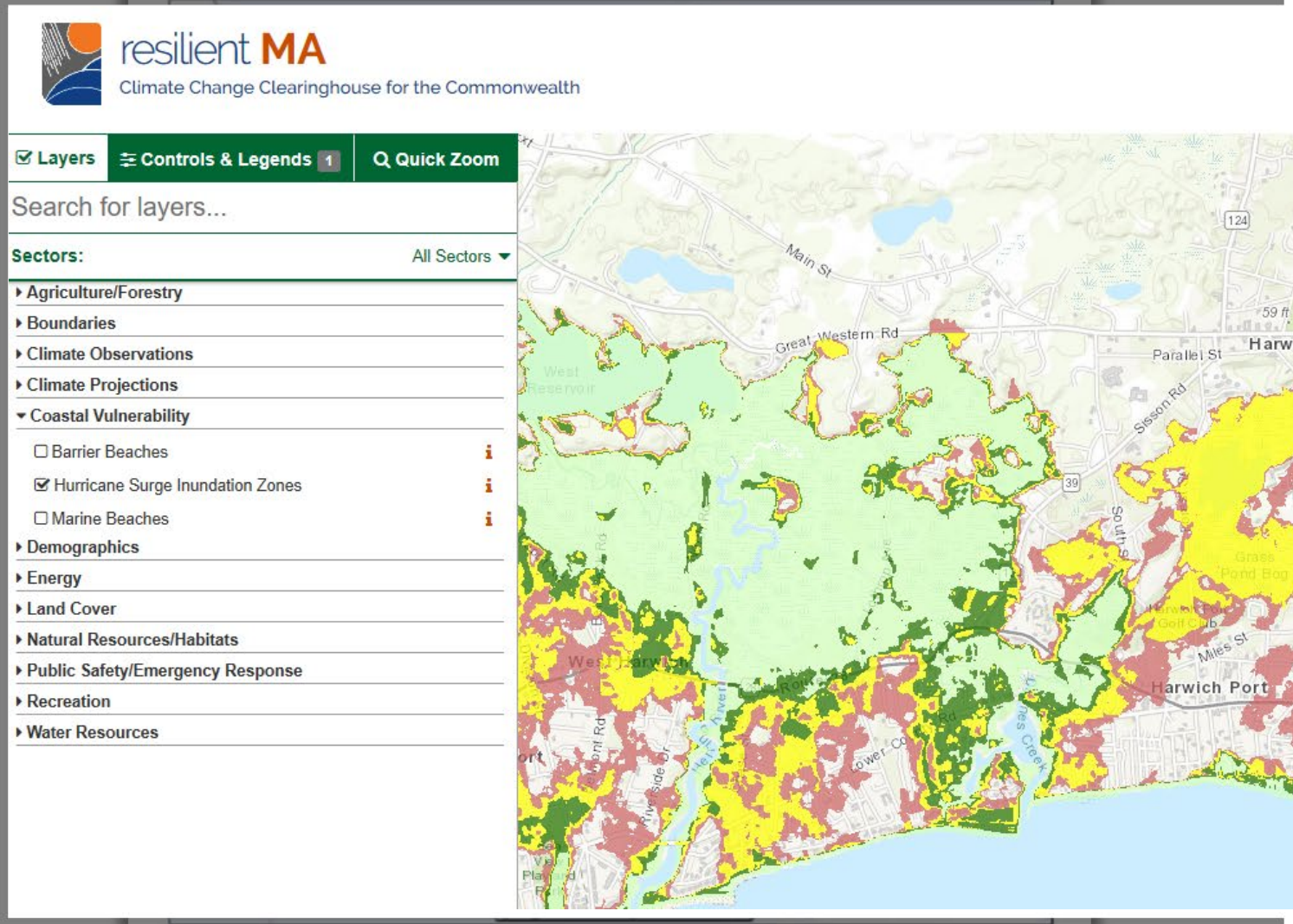


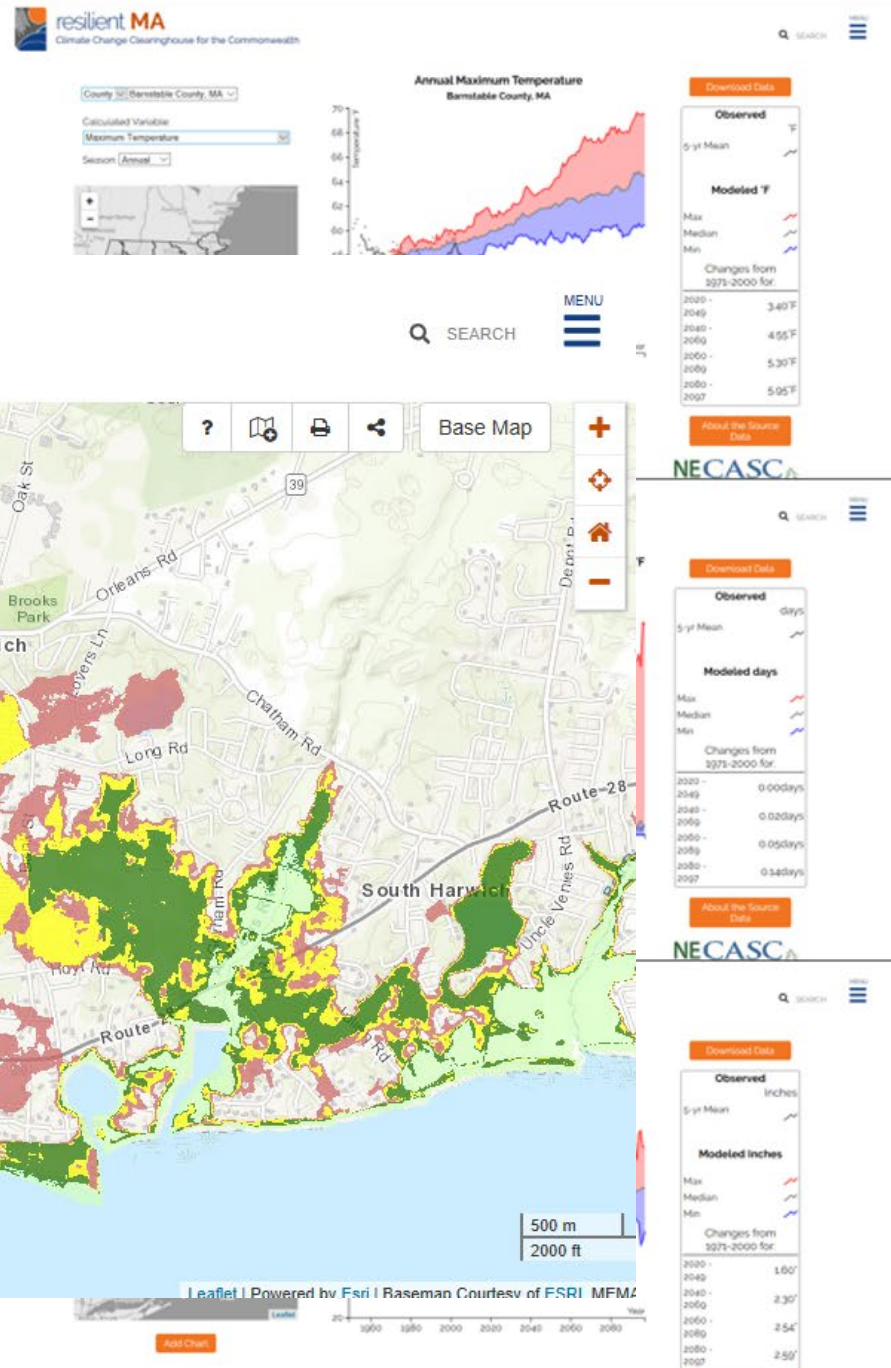
Many municipalities fall within more than one basin, so it is advised to use the climate

CAPE COD BASIN

MUNICIPALITIES WITHIN CAPE COD BASIN:

Barnstable, Bourne, Brewster, Chatham, Dennis, Eastham, Falmouth, Harwich, Mashpee, Orleans, Provincetown, Sandwich, Truro, Wellfleet, Yarmouth

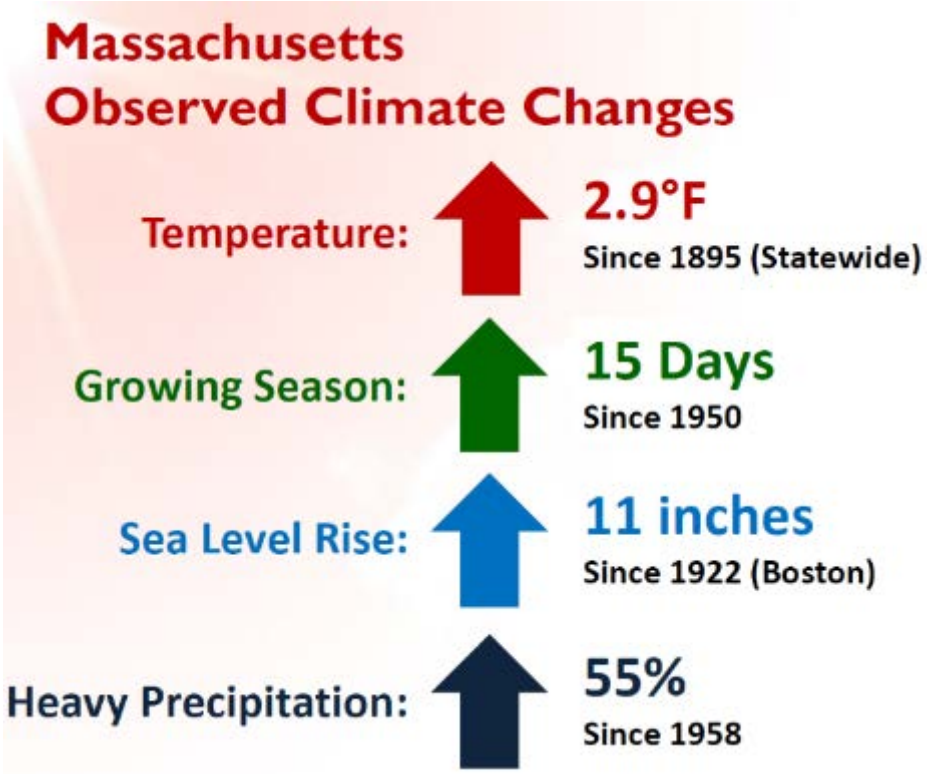




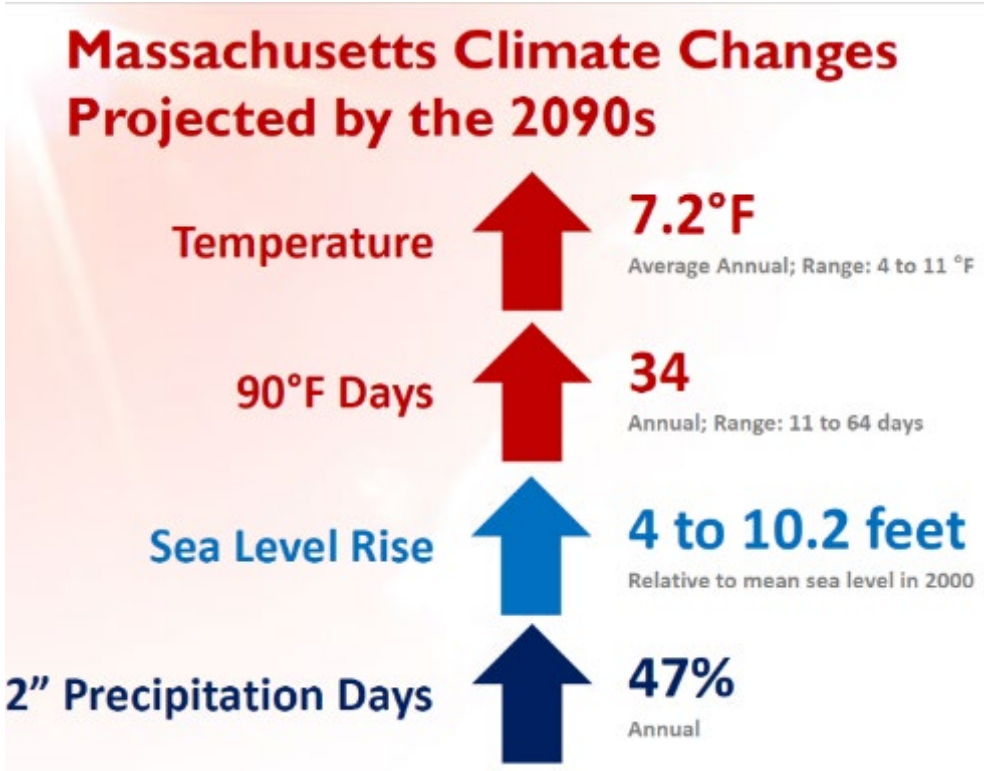
Many municipalities fall within more than one basin, so it is advised to use the climate

Massachusetts Climate Change Projections

MARCH 2018



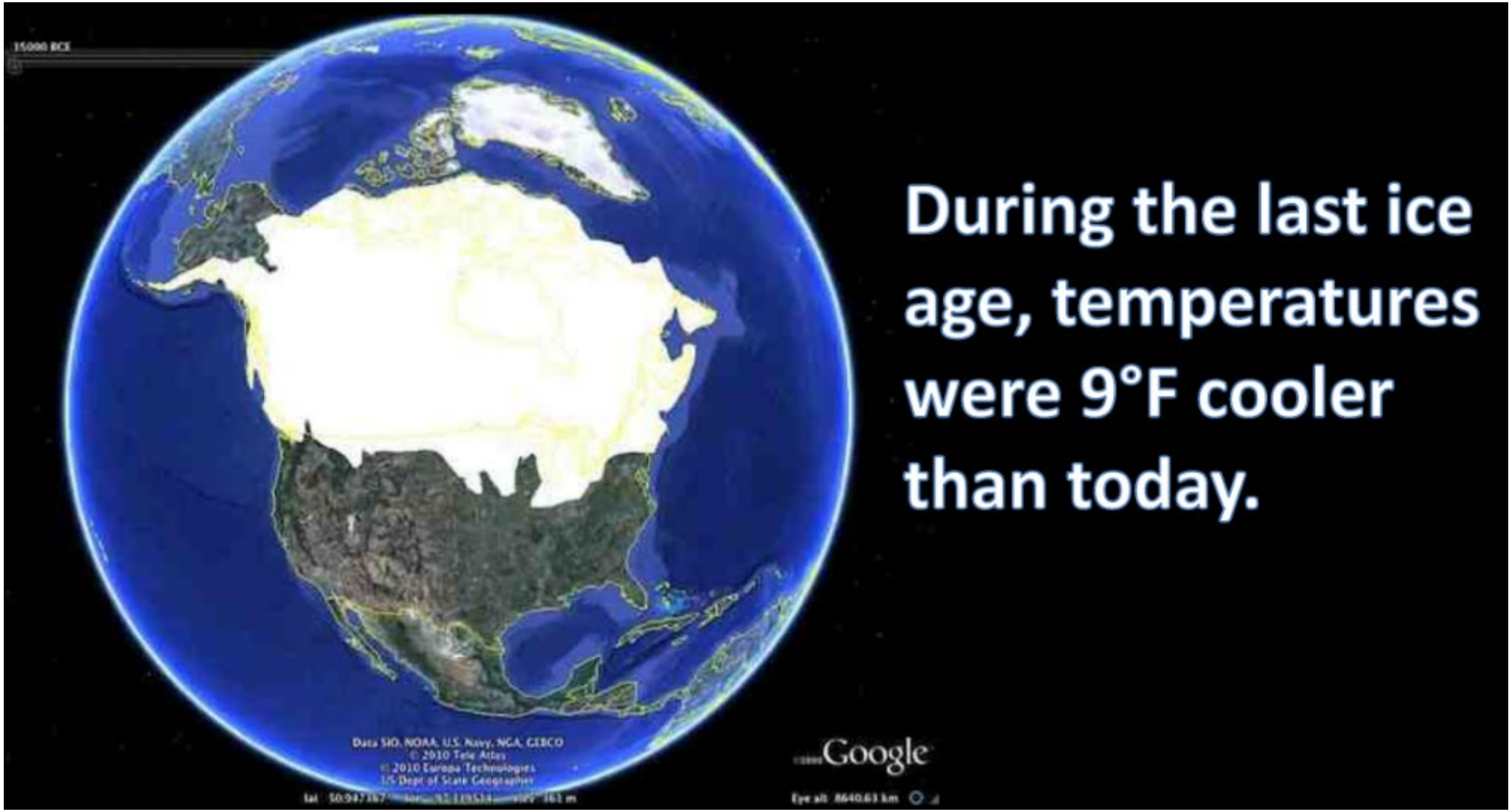
Source: Climate Science Special Report, 2017; NOAA NCEI nClimDiv; NOAA Ocean Service



Source: Northeast Climate Adaptation Science Center

Massachusetts Climate Changes Projected by the 2090s | **Temperature**

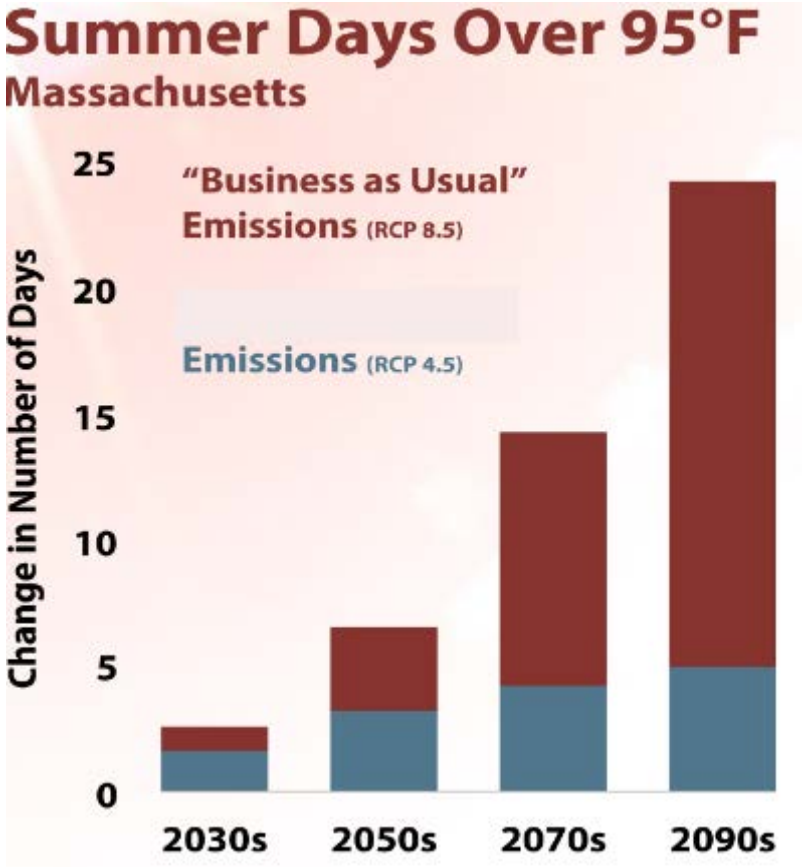
7.2° F
Average Annual



Massachusetts Climate Changes Projected by the 2090s | **Temperature**

7.2° F Average Annual

34 Annual



Data courtesy A. Karmalkar, Northeast Climate Adaptation Science Center. Figure by D. Brown

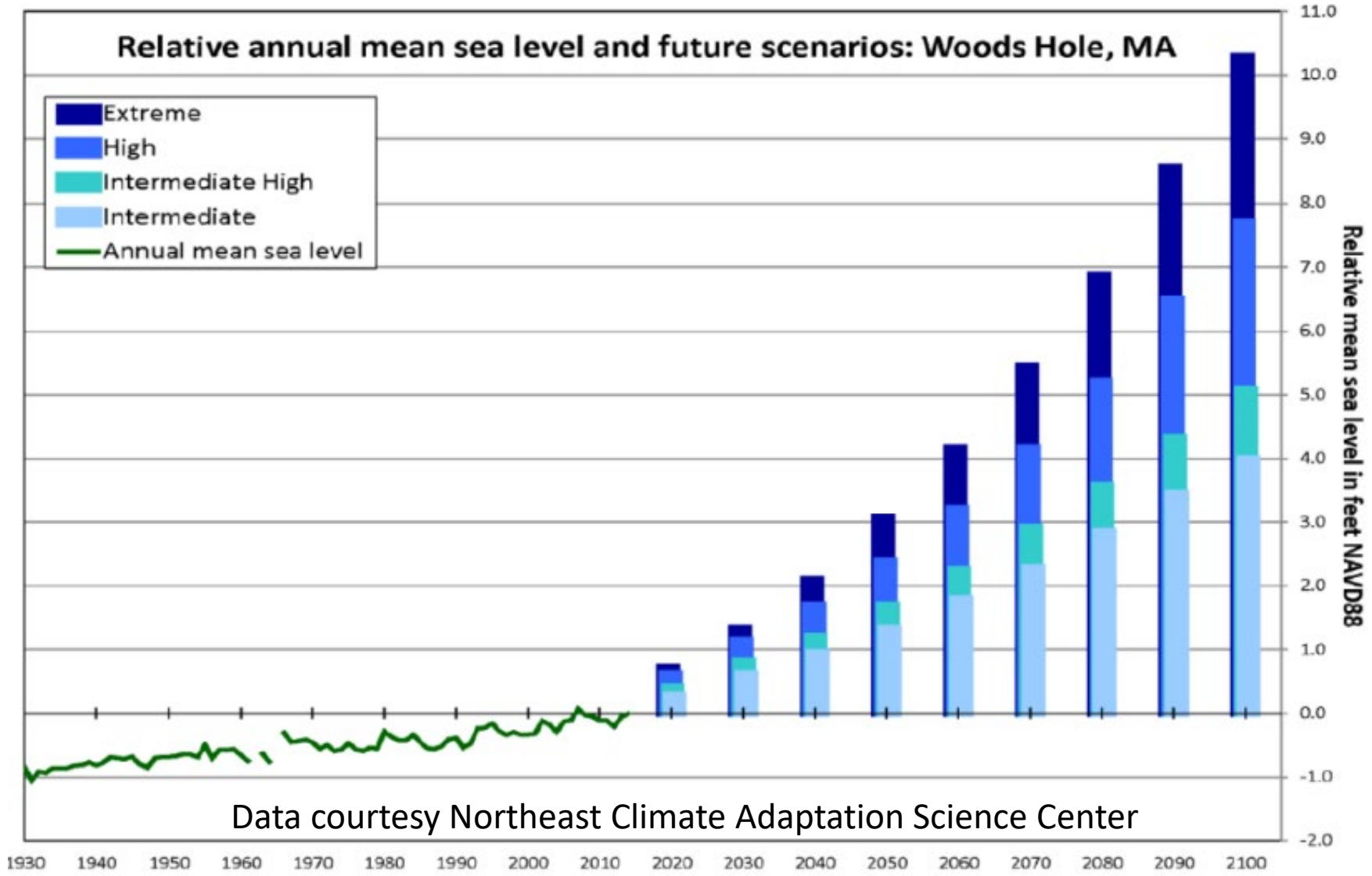
More Warm Winter Days, Less Heating Demand

More Warm Summer Days, More Cooling Demand

Source: Northeast Climate Adaptation Science Center, ResilientMA.org, accessed 2018.

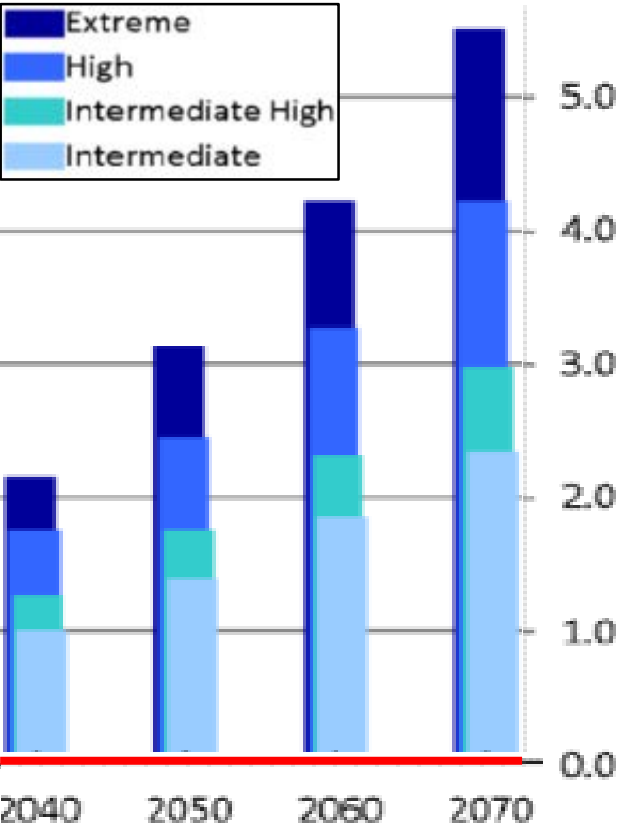
Massachusetts Climate Changes Projected by the 2090s | **SLR**

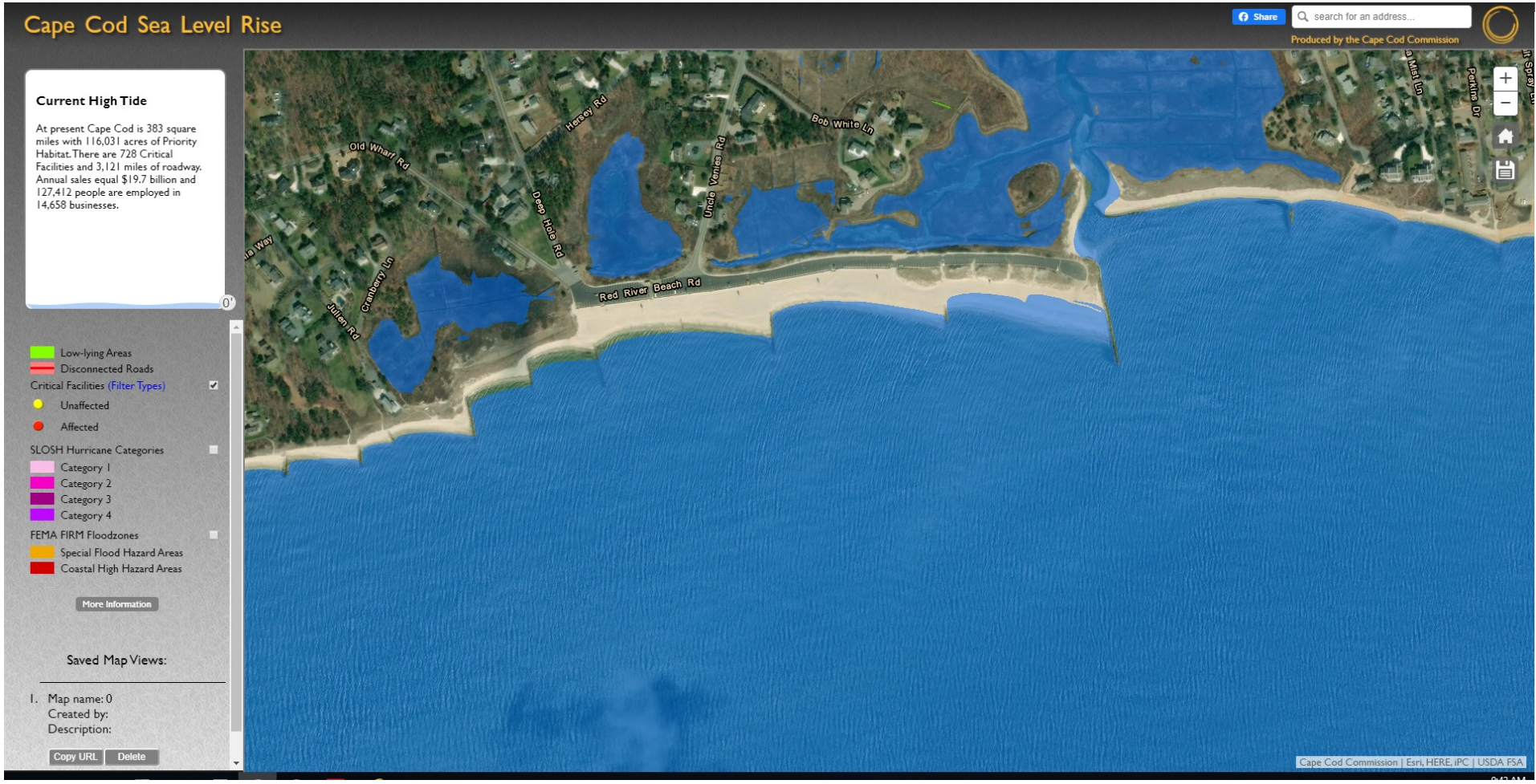
4 to 10.2 feet
Relative to mean sea level in 2000



Massachusetts Climate Changes Projected by the 2090s | **SLR**

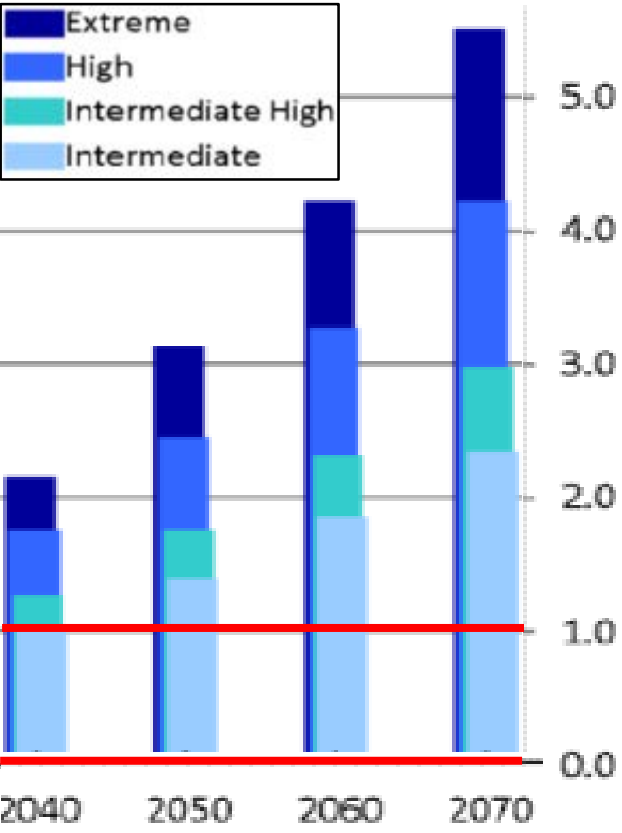
4 to 10.2 feet
Relative to mean sea level in 2000

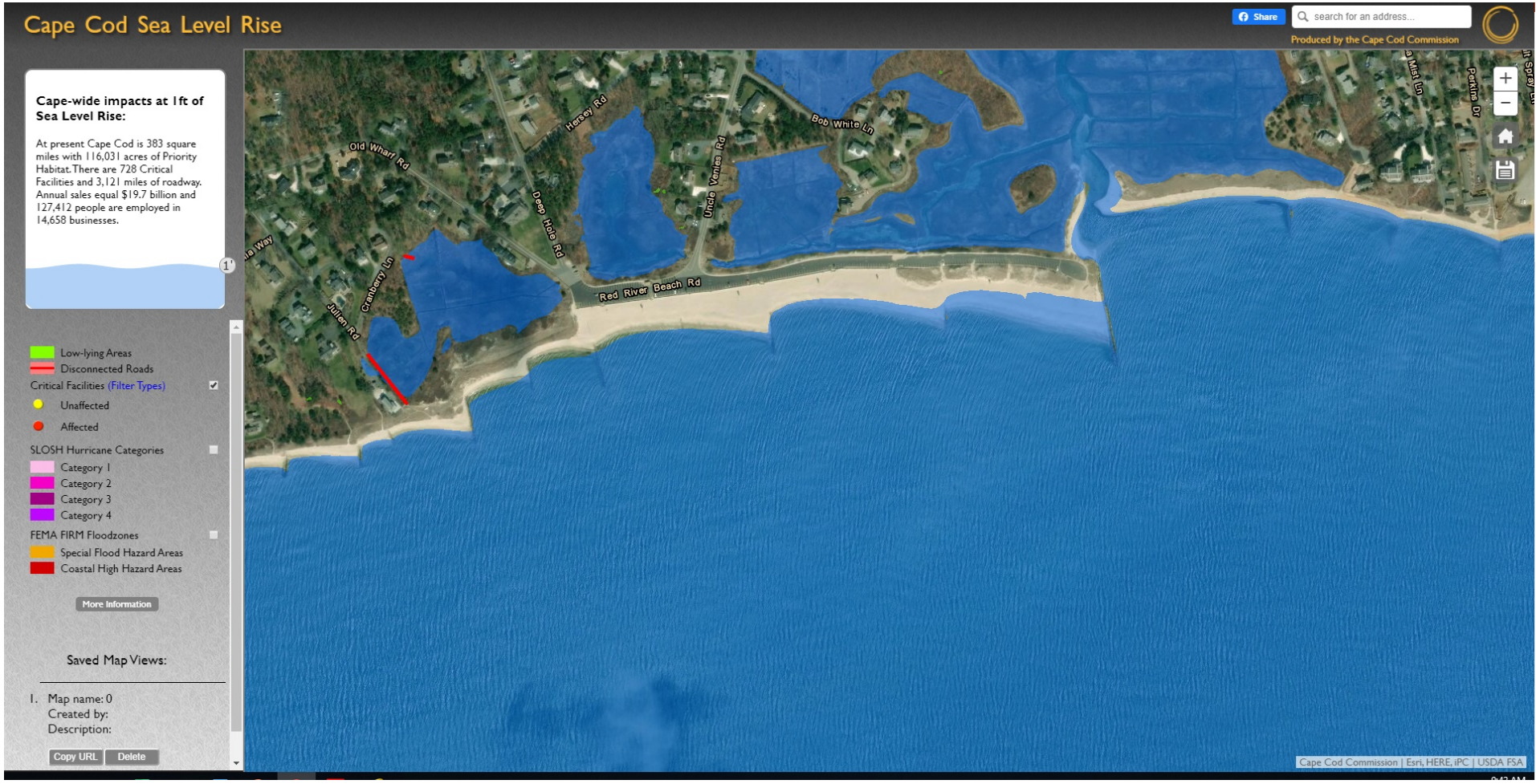




Massachusetts Climate Changes Projected by the 2090s | **SLR**

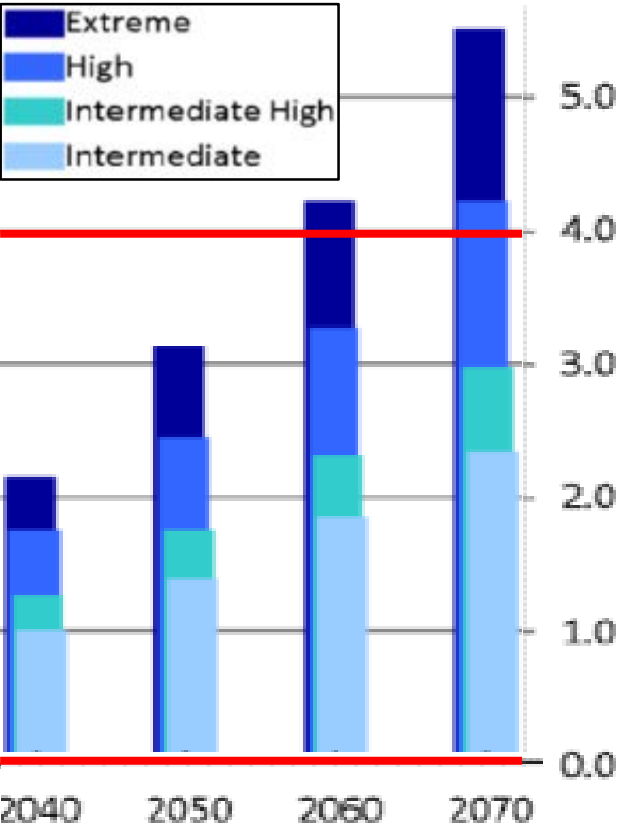
4 to 10.2 feet
Relative to mean sea level in 2000

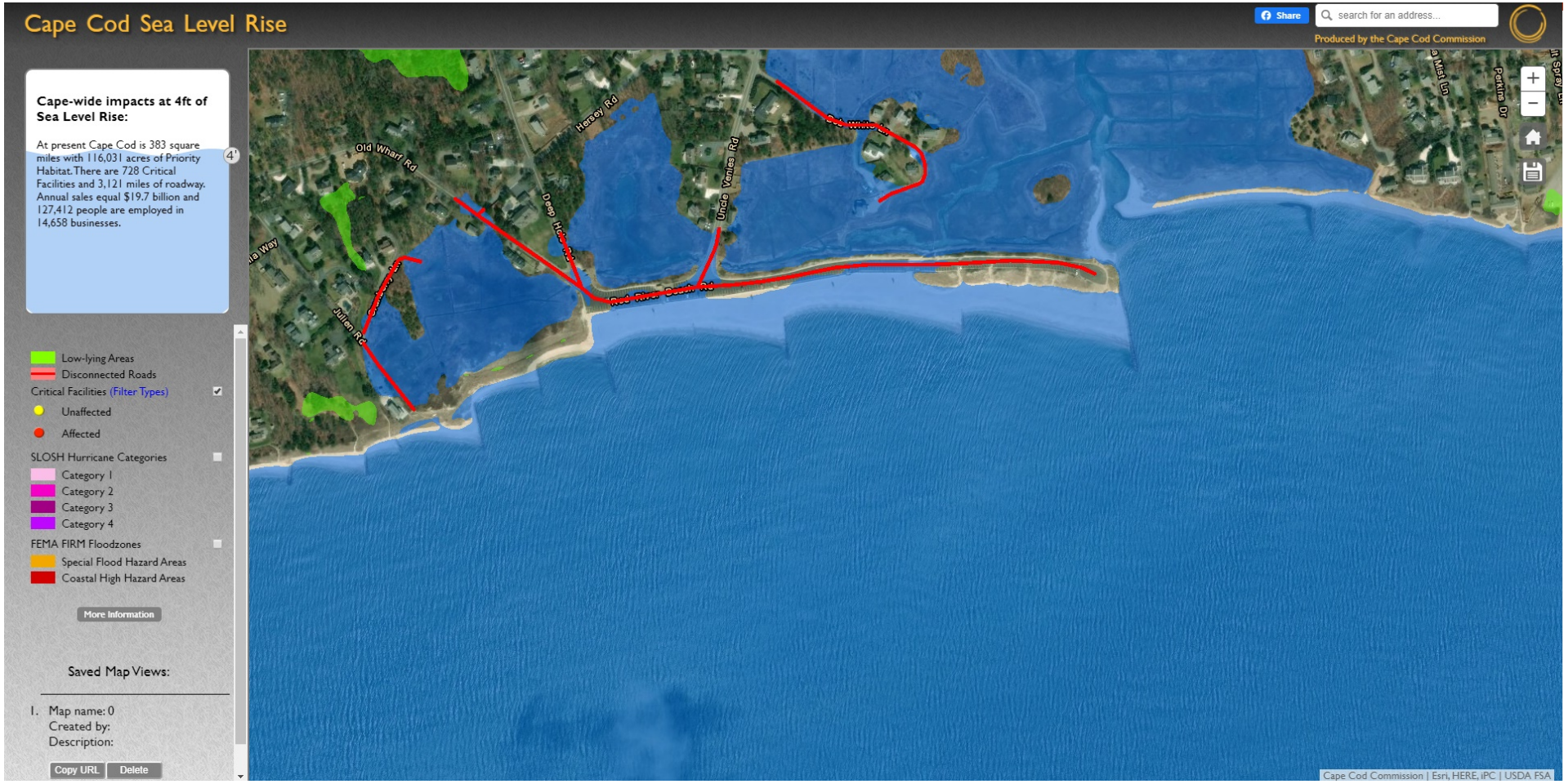




Massachusetts Climate Changes Projected by the 2090s | **SLR**

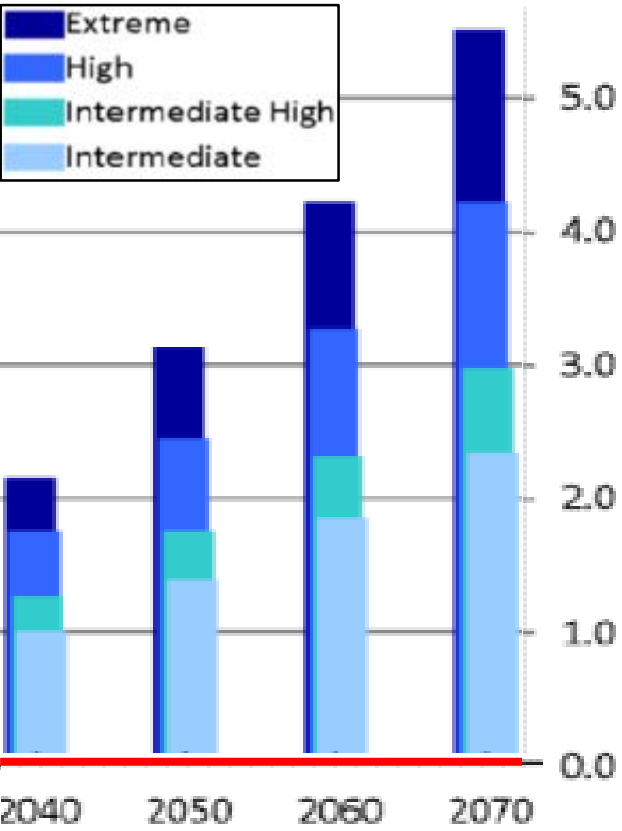
4 to 10.2 feet
Relative to mean sea level in 2000

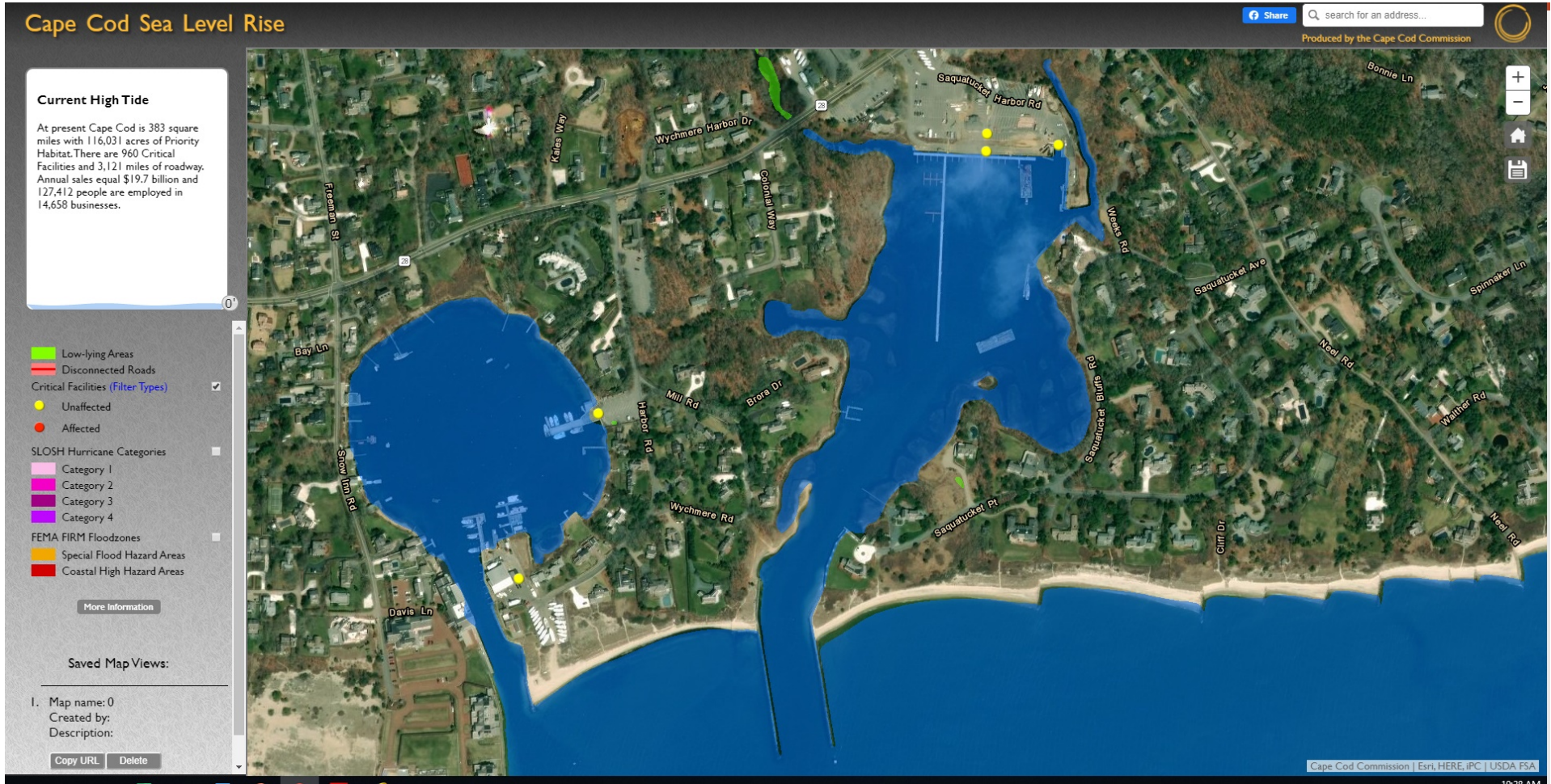




Massachusetts Climate Changes Projected by the 2090s | **SLR**

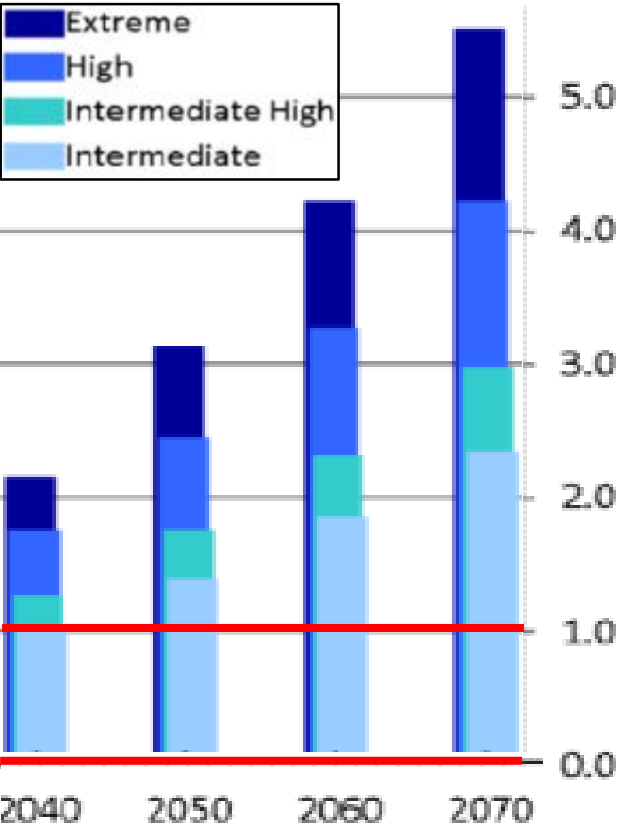
4 to 10.2 feet
Relative to mean sea level in 2000

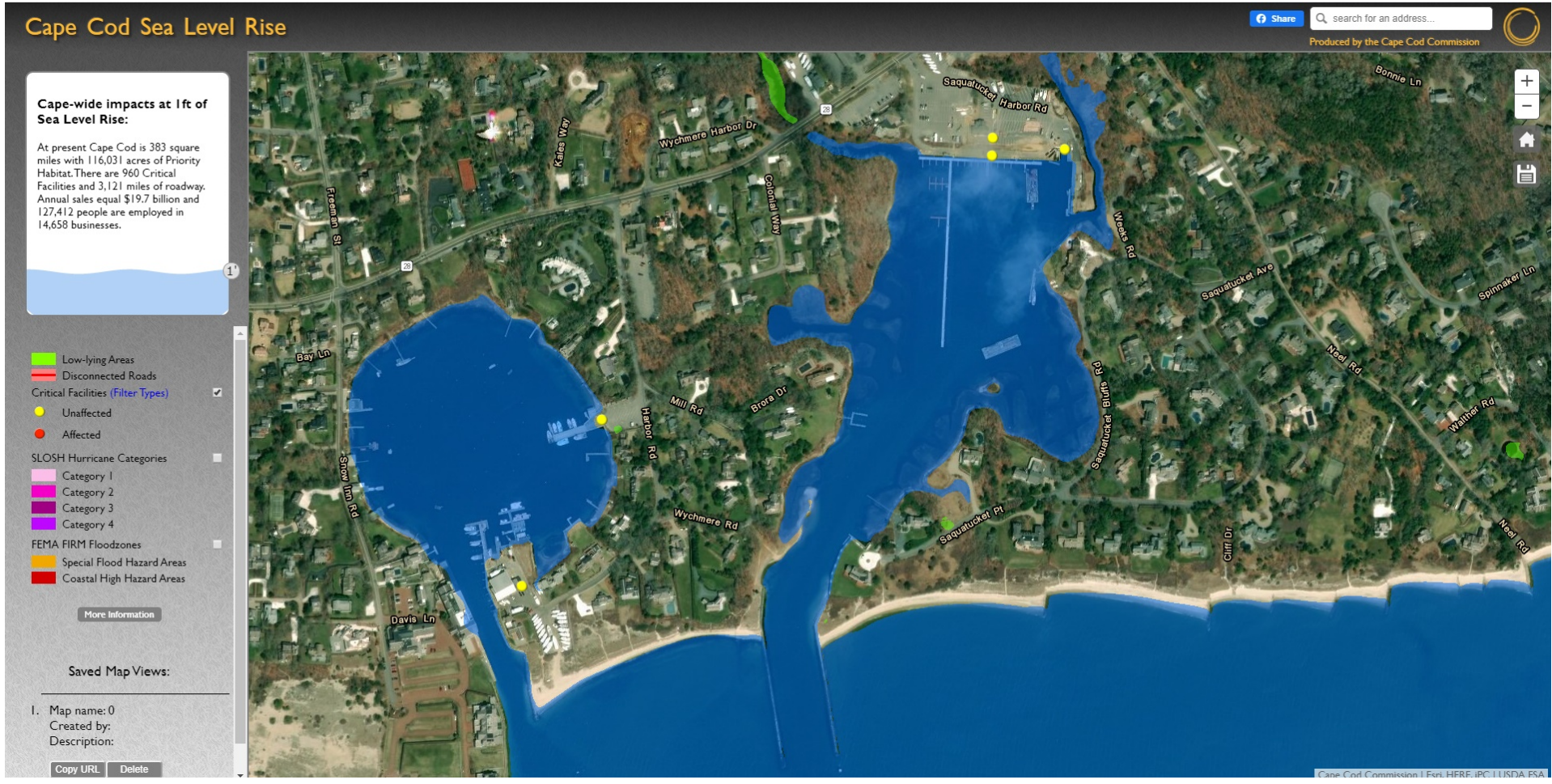




Massachusetts Climate Changes Projected by the 2090s | **SLR**

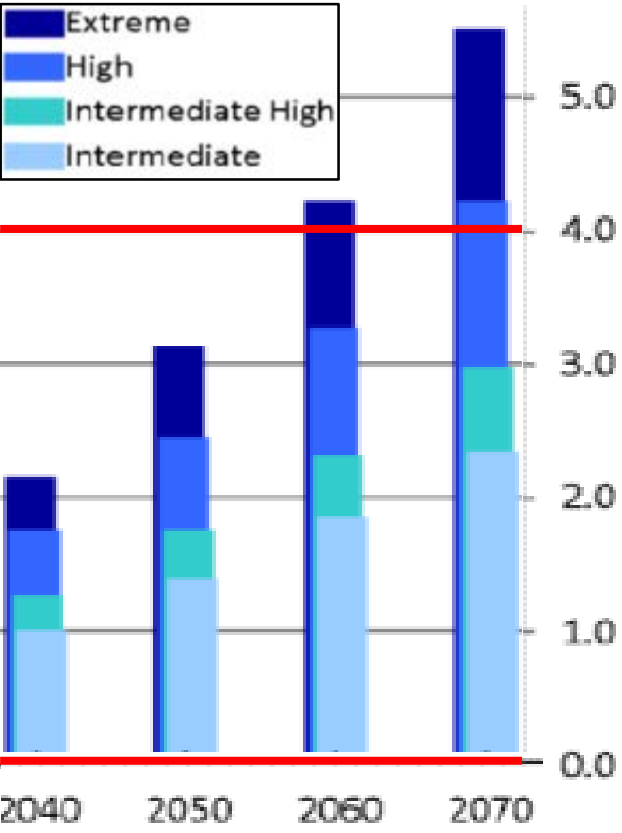
4 to 10.2 feet
Relative to mean sea level in 2000

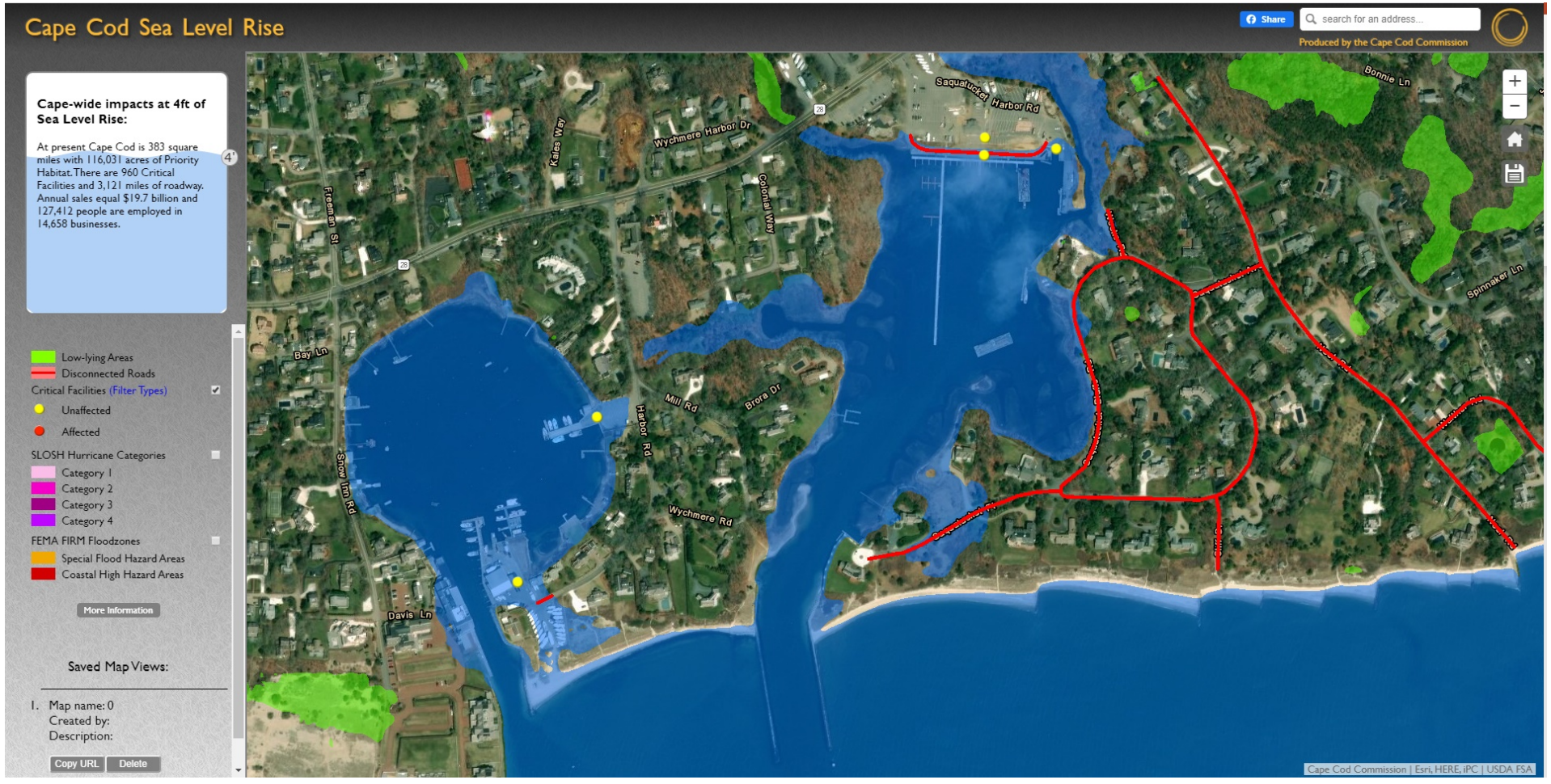




Massachusetts Climate Changes Projected by the 2090s | **SLR**

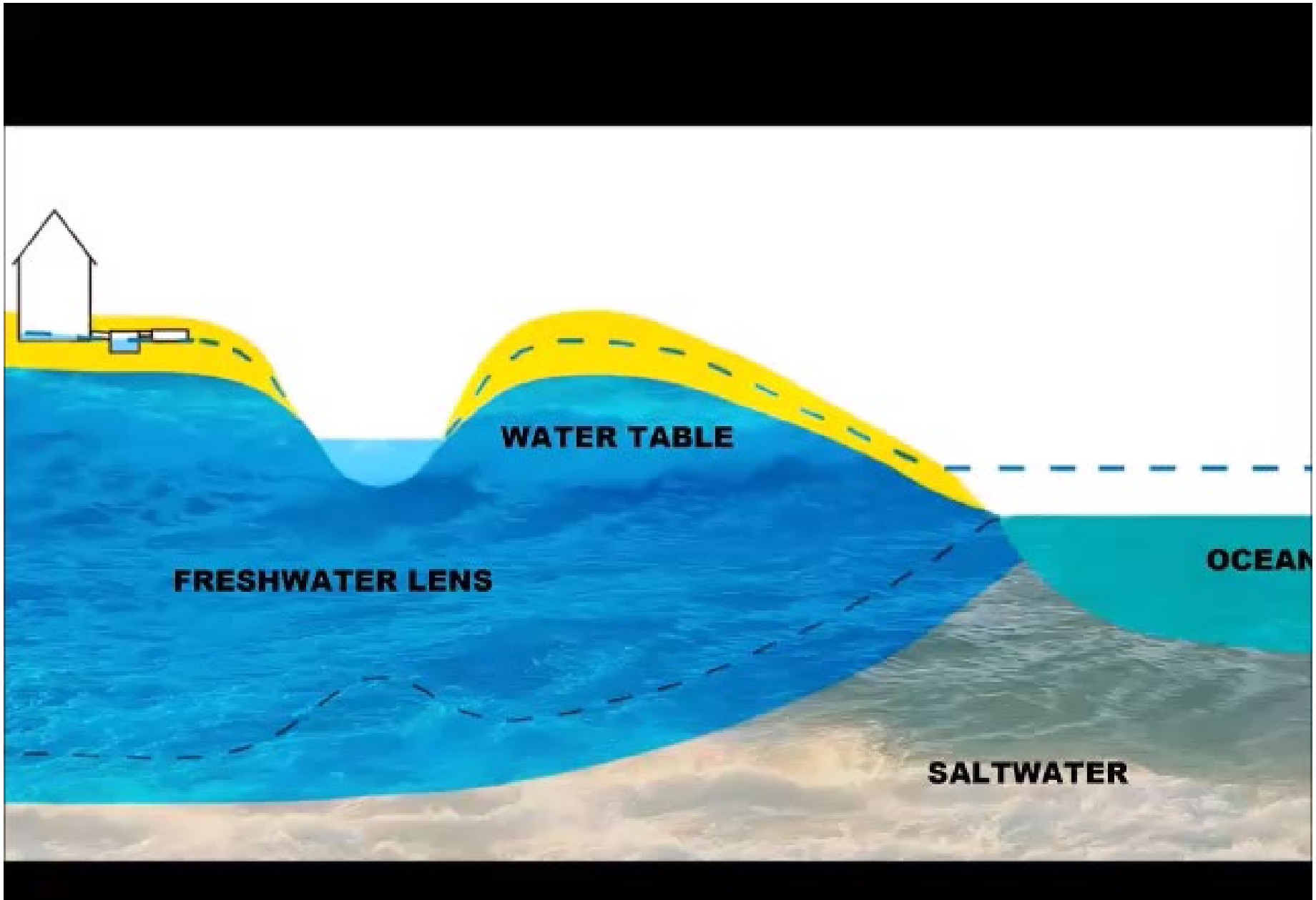
4 to 10.2 feet
Relative to mean sea level in 2000



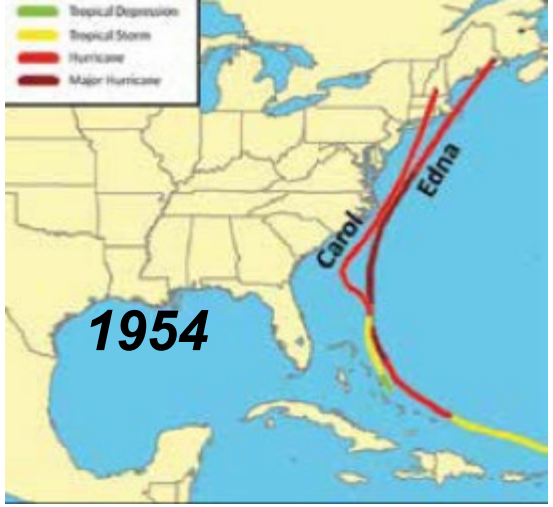


Massachusetts Climate Changes Projected by the 2090s | **SLR**

4 to 10.2 feet
Relative to mean sea level in 2000



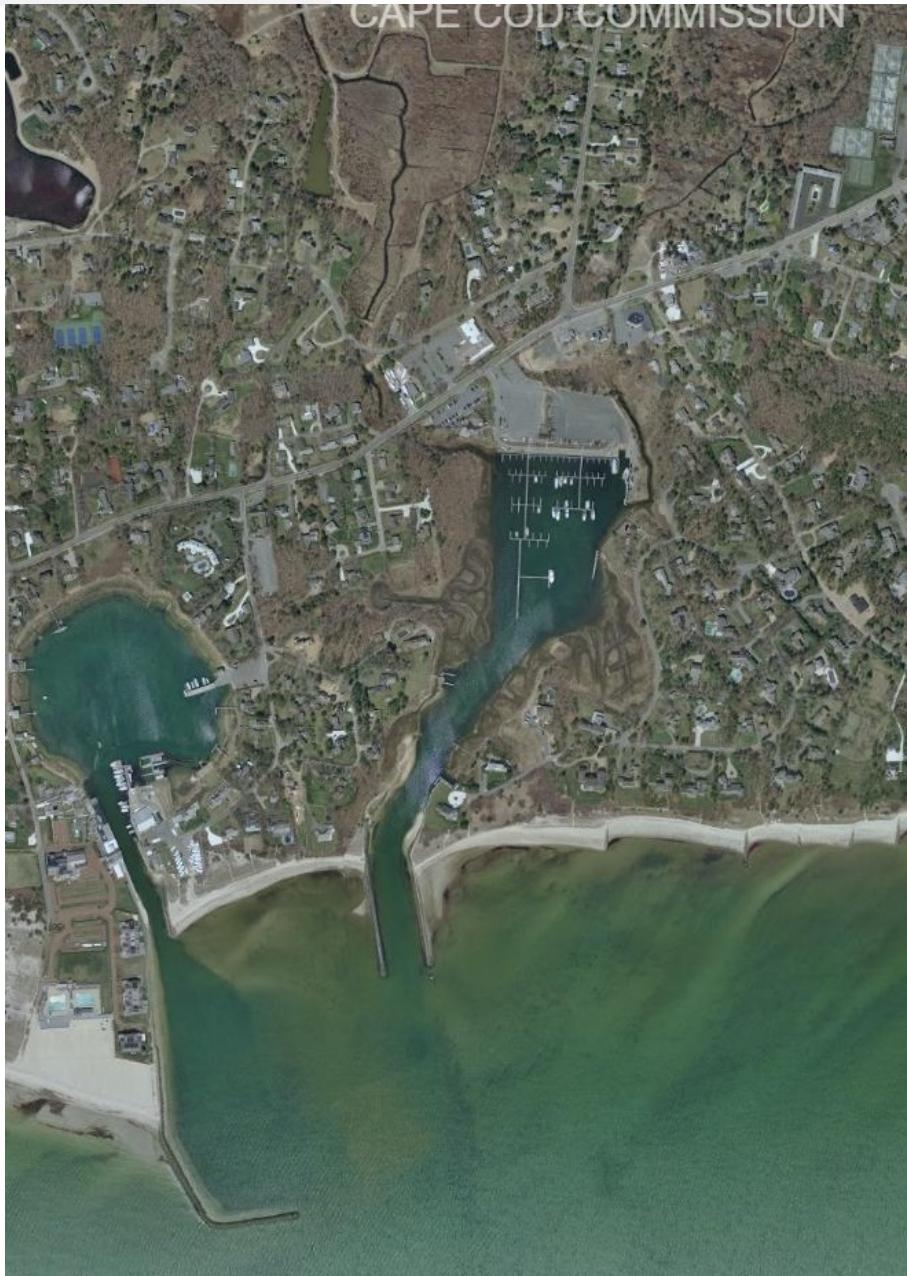
Video from https://www.apcc.org/videos/index.html , **Video 3: Sea Level Rise: Changing Cape Cod's Groundwater**

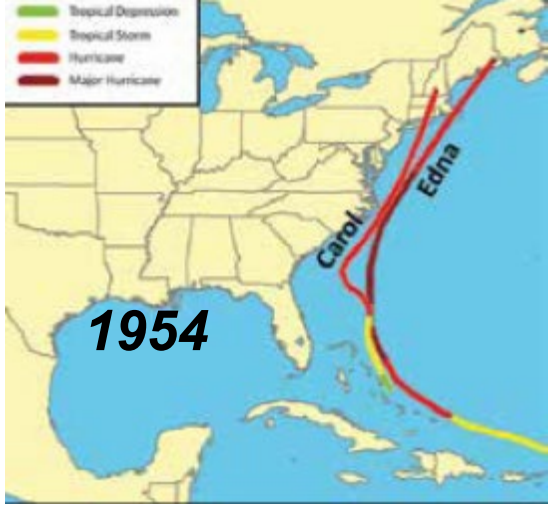


CAROL: 65 deaths, $15 million in crop damage ($461 million total), 10,000 houses damaged

Land-use Change | **Population**

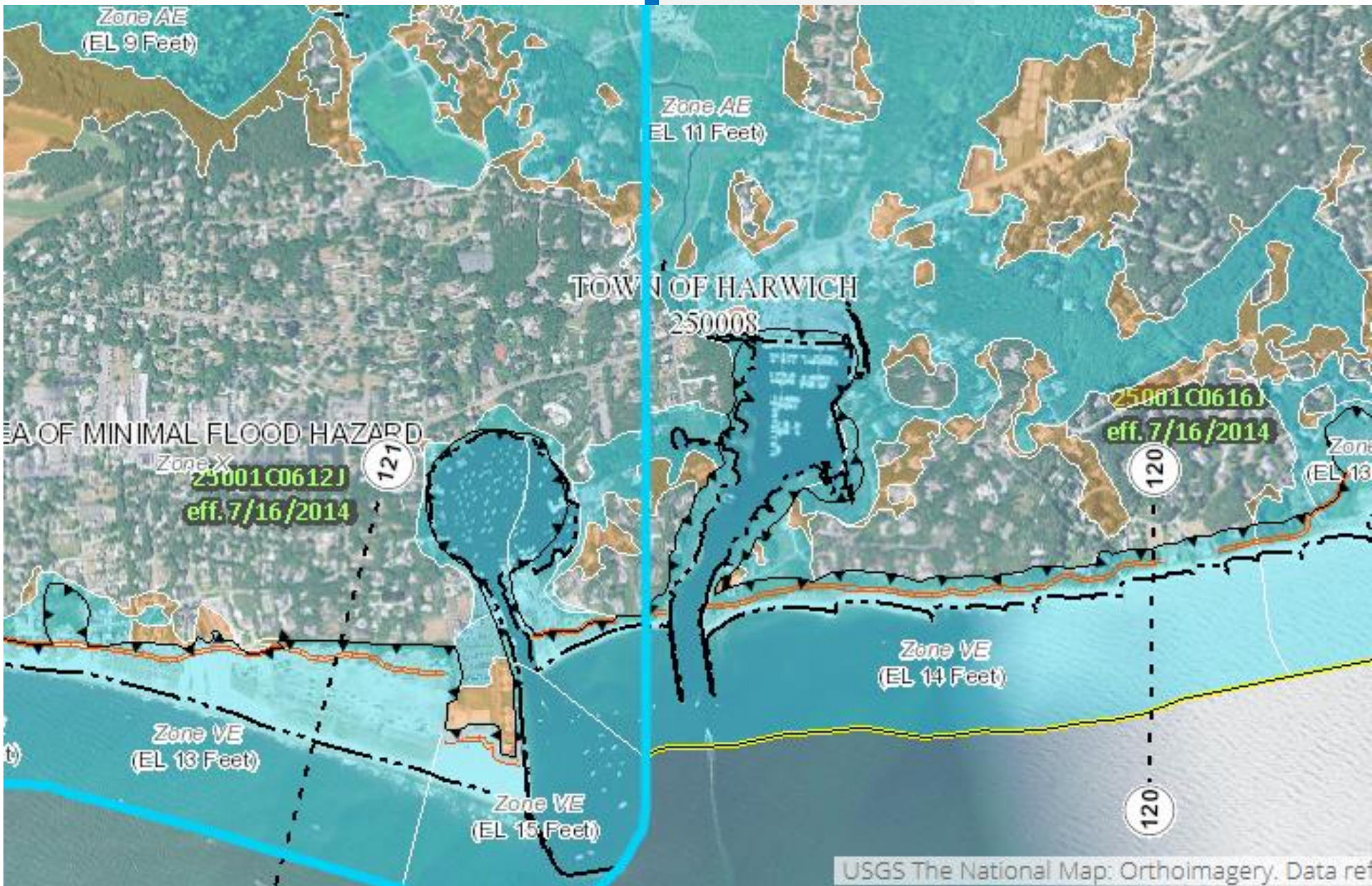
4.75x 1950s



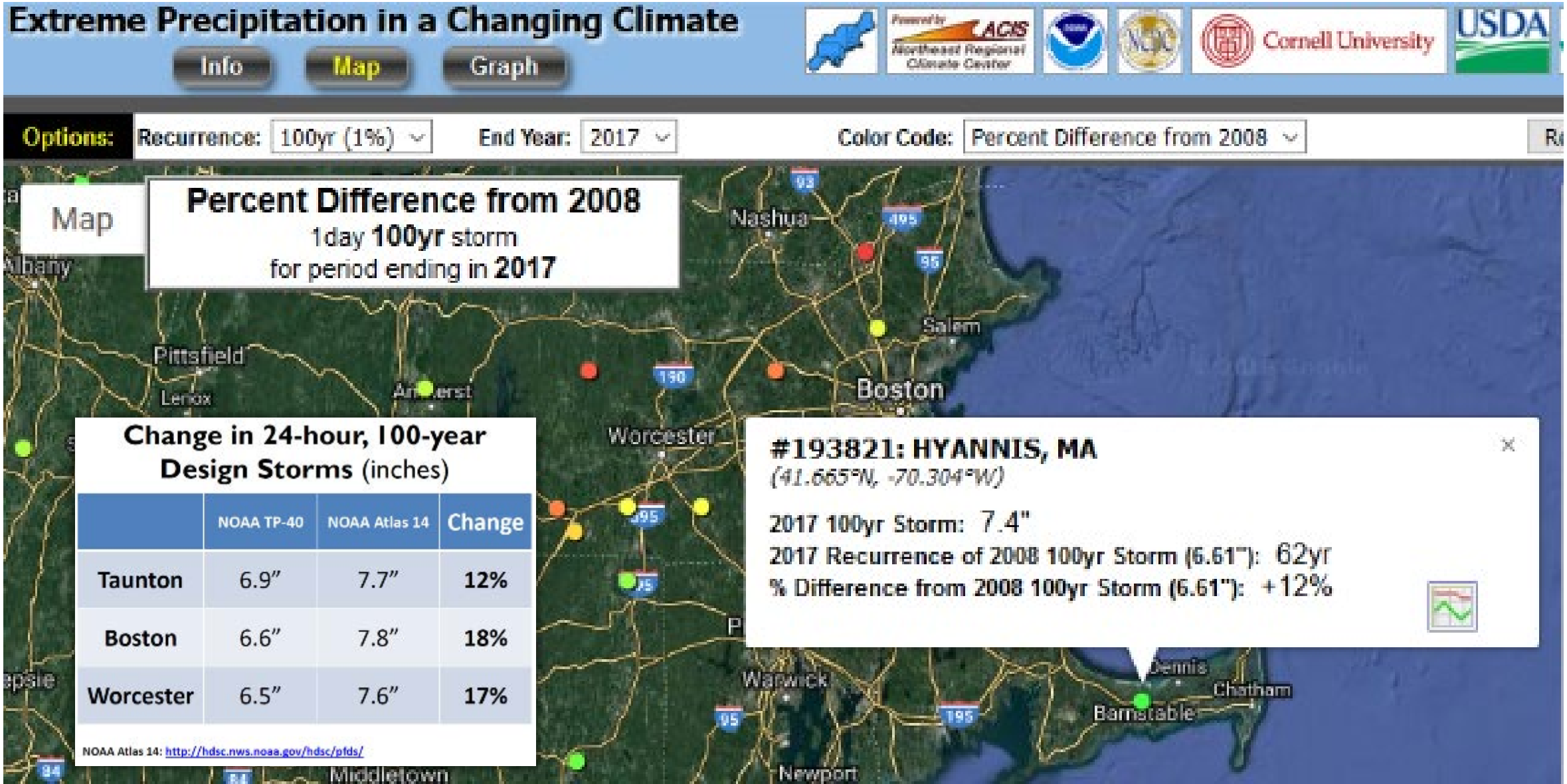


Land-use Change | **Population** ↑ **4.75x 1950s**

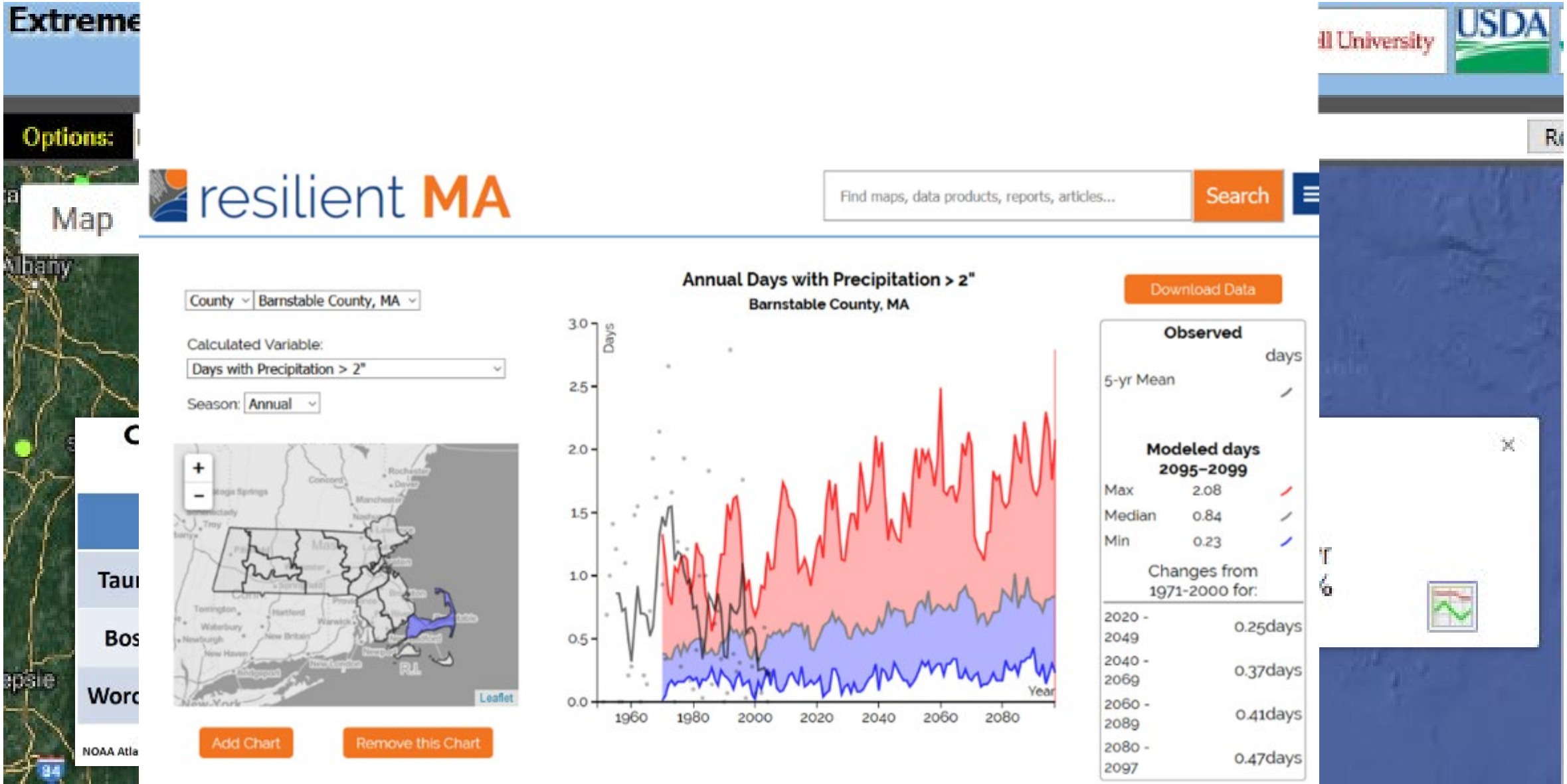
CAROL: 65 deaths, $15 million in crop damage ($461 million total), 10,000 houses damaged



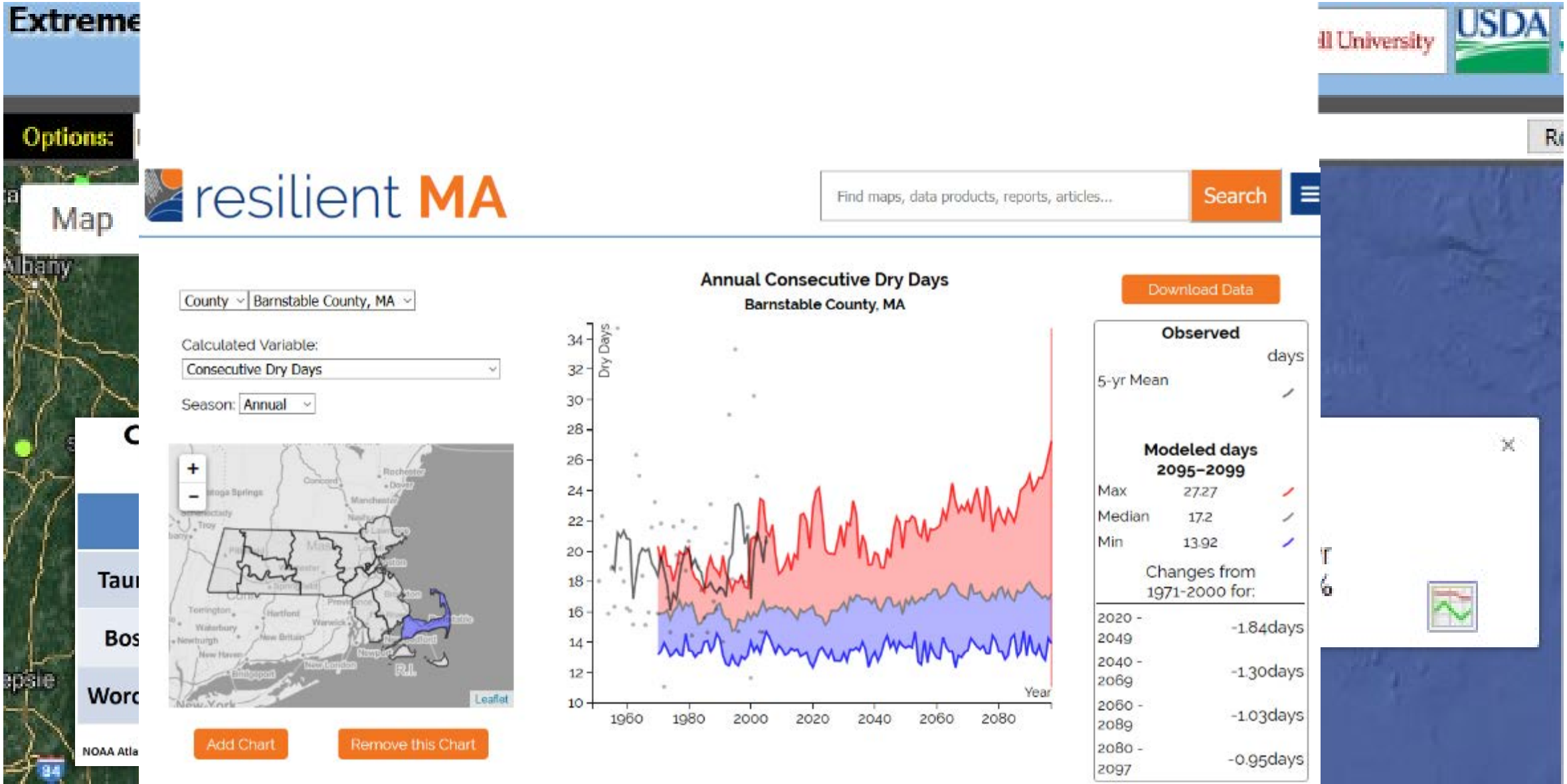
Massachusetts Climate Changes Projected by the 2090s | **Increased dry days**



Massachusetts Climate Changes Projected by the 2090s | **Increased dry days**



Massachusetts Climate Changes Projected by the 2090s | **Increased dry days**



Massachusetts Climate Changes Projected by the 2090s | **Increased dry days**

What is Phragmites ?

Phragmites australis is a perennial grass that grows in dense stands up to 12 feet in height. Also known as Common Reed, this plant can be found worldwide. It is an aggressive invader of wetland areas particularly where the soil has been disturbed or exposed. Dense stands of phragmites crowd out native wetland plants and provide little or no value to wildlife.

Why is Phragmites a Threat?

Thick stands of phragmites also pose a significant wildfire threat to surrounding communities. Because the stands contain a lot of standing dead material, they will carry fire readily even in summer when the current year's growth is still green. Fire danger is increased in the fall after the current growth is killed by frost and remains high until spring greenup.

For more information, please contact the Virginia Department of Forestry or your local fire department.

*Thank you to **Poquoson Fire Department** for your interest in educating the public.*

Virginia
Department of Forestry
Central Office
900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903
Visit us on the Web: www.dof.state.va.us
Phone: (434) 977-6555 ; V/TDD (434) 977-6555
Fax: (434) 296-2369

VDOF P00109; 11/2002

Virginia Department of Forestry

Phragmites and Fire

REDUCE THE RISK TO YOUR HOME !

Virginia Department of Forestry

HAZARD

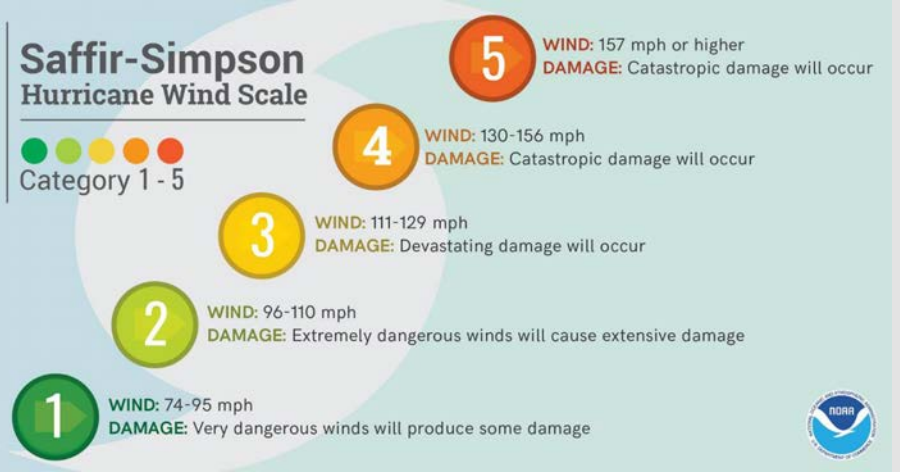
High Winds

Image from BostonGlobe

Tornado

ENHANCED FUJITA SCALE	DAMAGE
EF-0 (65-85 MPH)	LIGHT
EF-1 (86-110 MPH)	MODERATE
EF-2 (111-135 MPH)	CONSIDERABLE
EF-3 (136-165 MPH)	SEVERE
EF-4 (166-200 MPH)	DEVASTATING
EF-5 (200+ MPH)	INCREDIBLE

Hurricane

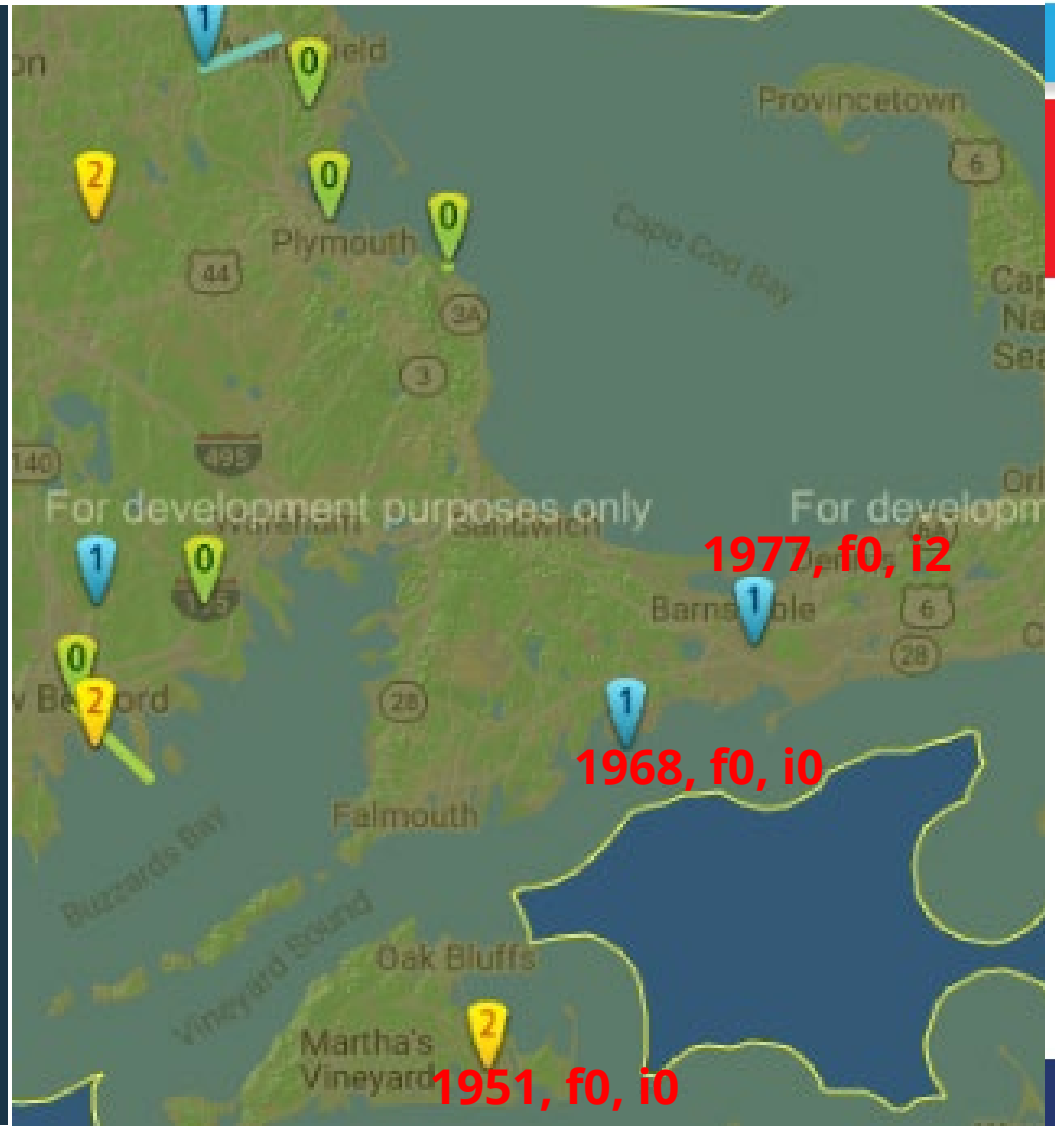


Nor'Easter
70-100 mph for max typical

http://www.tornadohistoryproject.com/tornado/Massachusetts/map

HAZARD

High Winds



National Weather Service

TORNADO SAFETY
FOR YOU AND YOUR FAMILY

BEFORE

- **BE WEATHER-READY:** Check the forecast often to see if a tornado is coming. Listen to local news or a NOAA Weather Radio to stay informed about tornado watches and warnings.
- **SIGN UP FOR NOTIFICATIONS:** Know how to get warnings. Media broadcasts and smart phones can alert residents of severe storms capable of producing tornadoes.
- **CREATE A PLAN:** Have a family plan that includes an emergency meeting place and shelter spaces. Pick a safe room in your home, such as a basement, storm cellar or an interior room on the lowest floor with no windows.
- **PRACTICE YOUR PLAN:** Conduct a drill regularly so everyone knows what to do if a tornado is approaching. Make sure all family members know where to go when a tornado warning is issued. Don't forget pets if time allows.
- **PREPARE YOUR HOME:** Consider having your safe room reinforced. You can find plans for reinforcing an interior room to provide better protection at **fema.gov/safe-room-resources**
- **HELP YOUR NEIGHBOR:** Encourage your loved ones to prepare for the possibility of tornadoes. Take CPR training so you can help if someone is hurt.

DURING

- **STAY WEATHER-READY:** Continue to listen to local news or a NOAA Weather Radio to stay updated about tornado watches and warnings.
- **AT YOUR HOUSE:** If you are in a tornado warning area, go to your basement, safe room or an interior room away from windows. Don't forget pets if time allows.
- **AT YOUR WORKPLACE OR SCHOOL:** Follow your tornado drill and proceed to your tornado shelter quickly and calmly. Stay away from windows and do not go to large open rooms such as cafeterias, gymnasiums or auditoriums.
- **OUTSIDE:** Seek shelter inside a sturdy building immediately if a tornado is approaching. Sheds and storage facilities are NOT safe.
- **IN A VEHICLE:** Being in a vehicle during a tornado is NOT safe. The best course of action is to drive to the closest shelter. If you are unable to make it to a safe shelter, either get down in your car and cover your head, or abandon your car and seek shelter in a low lying area such as a ditch or ravine.

If you don't have a tornado shelter, stay in an inside room or hallway and cover your head. Photo: NOAA

AFTER

- **STAY INFORMED:** Keep listening to local news or NOAA Weather Radio for updates about more tornado watches and warnings that may be coming. The next round of thunderstorms may bring more tornadoes.
- **CONTACT YOUR FAMILY AND LOVED ONES:** Let your family and close friends know you are okay so they can help spread the word. Send text messages or posts updates on social media. These posts are more reliable forms of communication than phone calls.
- **ASSESS THE DAMAGE:** After the tornado threat has ended, check for property damage. When walking through storm damage, wear long pants, a long-sleeved shirt and sturdy shoes. Contact utilities if you see power lines down and stay away from them. Stay out of damaged buildings. Be aware of insurance scammers.
- **HELP YOUR NEIGHBOR:** If you see someone injured, call 911. Then, if you are trained, provide first aid until emergency responders arrive.

After a tornado, watch out dangerous debris such as sharp metal, glass or downed power lines. Photo: NOAA

For more information, visit **weather.gov/safety/tornado**

Woods Hole Sea Grant

County of Barnstable Massachusetts

Small Team Exercise

Small Team Exercise

GETTING STARTED

- Introductions
- Identify Small Team Spokesperson
- Clarifying Questions

EXERCISE

1. Identify Top Community Hazards
2. Identify Community Features and Categorize as Vulnerability or Strength
   - Infrastructure
   - Societal
   - Environmental
3. Identify Location and Ownership on Map/Matrix


Coastal Erosion


Flood


Severe Winter Weather


Dam/

nderstorms

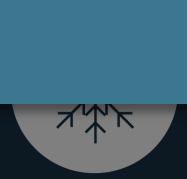

Droug

nados


Earth

nami


Extren



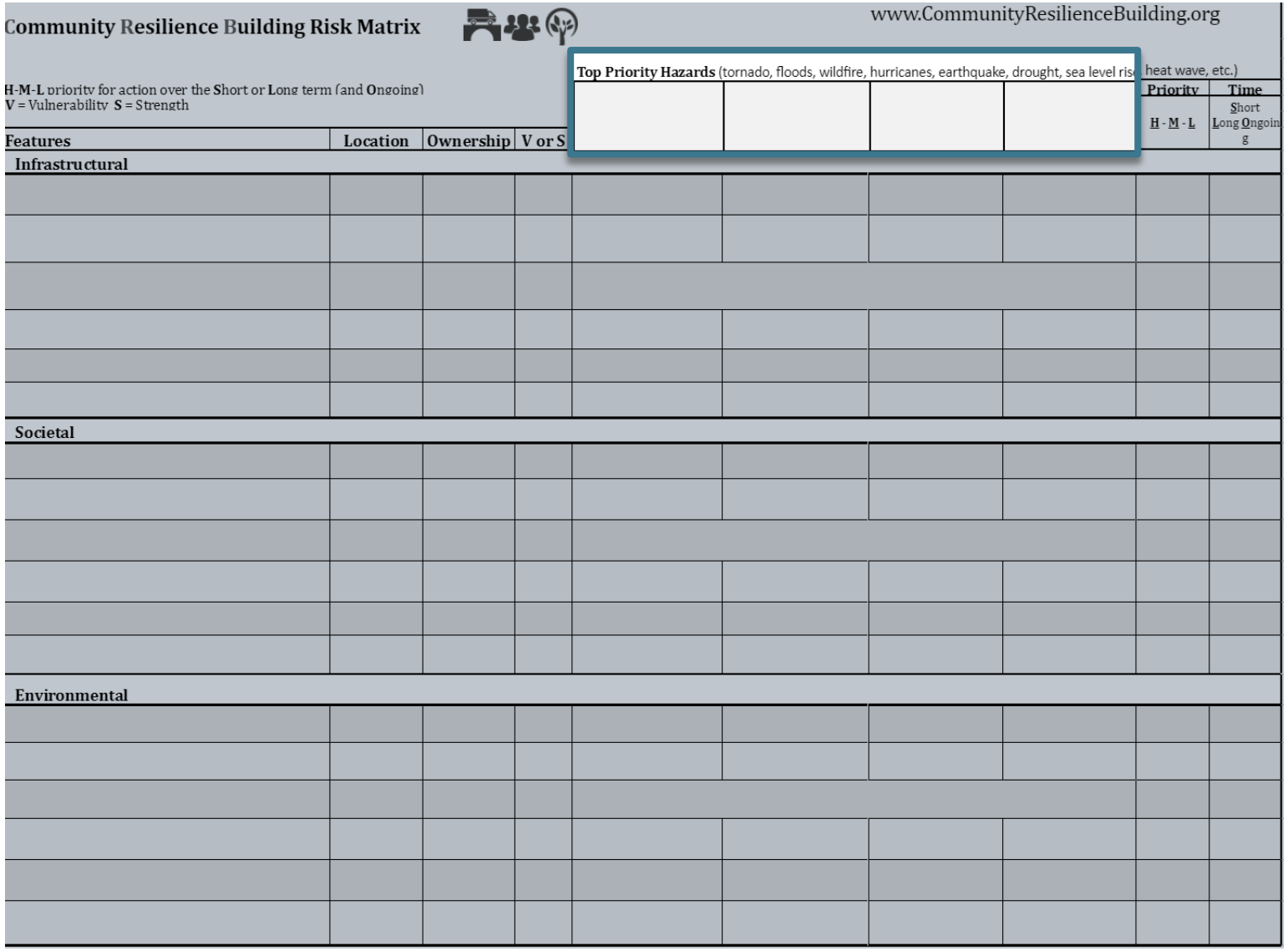

Fire (Urban & Wild)


Sea Level Rise

HARWICH HAZARD MITIGATION PLAN

1. Identify Top Community Hazards

1. Top Community Hazards



Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level ris heat wave, etc.)

								Priority	Time
H-M-L priority for action over the **S**hort or **L**ong term (and **O**ngoing) **V** = Vulnerability **S** = Strength								H - M - L	Short Long Ongoing
Features	**Location**	**Ownership**	**V or S**						
Infrastructural									
Societal									
Environmental									

2. Identify Community Features and Categorize as Vulnerability or Strength

2.

Community Features

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-M-L priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S					Priority H - M - L	Time S Short L Long O Ongoing
Infrastructural									
Societal									
Environmental									

3. Identify Location and Ownership of Community Features on Map/Matrix

Municipal Vulnerability Program

Coastal Erosion

Dam/Culvert Failure

Drought

Earthquake

Extreme Temperatures

Fire (Urban & Wild)

Flood

High Winds

Hurricane

Landslide

Nor’easters

Sea Level Rise

Severe Winter Weather

Thunderstorms

Tornados

Tsunami

HARWICH HAZARD MITIGATION PLAN

Small Teams Report Out

Lunch!

Today's Agenda

Afternoon

1:00 What's Next for MVP – Shannon Hulst

1:15 Small Team Exercise

- **Discuss and Identify Actions**
- **Identify Priority and Urgency of Actions**
- **Prepare for Report Out**

2:45 Break

3:00 Small Teams Report on Top Actions

3:30 Dot Exercise

3:45 Compile Top Actions & Wrap Up

4:30 Adjourn

What's Next for MVP?

Shannon Hulst, Floodplain Specialist & CRS Coordinator,
Woods Hole Sea Grant/Cape Cod Cooperative Extension
Deputy Director, *Cape Cod Cooperative Extension*

Sources of Available Grants

- Municipal Vulnerability Preparedness (MVP) Program
- Coastal Zone Management (CZM) Program's Coastal Resilience Grant Program
- FEMA's Hazard Mitigation Grant Program
- Others

MV
Gr

- Detailed Vulnerability and Risks Assessment Further Planning
- Community outreach and education
- Local Bylaws, Ordinances, Plans, and Other Management Measures
- Redesigns and Retrofits

INELIGIBLE PROJECTS: Ineligible projects under the MVP Action Grant include acquisition of diesel generators, and projects that seek to repair to previous conditions without consideration of climate change projections or more resilient alternatives. Other project types not meeting the goals of this BID may be deemed ineligible at the discretion of the Secretary.

- Impacts
- Acquisition of land to achieve a resiliency objective
- Ecological Restoration and Habitat Management to Increase Resiliency
- Subsidized Low Income Housing Resilience Strategies
- Mosquito Control Districts

MVP Action Grants

Consider the timeframe of the grant !!!

PROPOSALS SHOULD ADDRESS STAGES

- Planning, feasibility assessment, and siting
- Design
- Permitting
- Construction, installation, and monitoring

MVP Action Grant Details

- One-year timeframe
- $25,000 - $2,000,000 for single towns
- Up to $5,000,000 for regional projects
- Must be used to advance priority adaptation actions identified in MVP reports
- 25% match

MVP Action Grant Examples

- **Adams** - **Assessment** and Conceptual Design for Adaptation and Resiliency
- **Arlington** – Mill Brook Corridor Flood Management Demonstration Project
- **Belchertown** - Town-Wide Road Stream Crossing Assessment and Climate Change Adaptation
- **Boston** - Climate Ready Zoning and Design Guidelines
- **Charlton & Spencer** - Integrated Water Infrastructure Vulnerability Assessment and Resiliency
- **Deerfield** - Culvert Redesign and Retrofit and Bylaw Update
- **Essex** - Living Shoreline Feasibility Study for Essex Bay
- **Gloucester** - Watershed and Water Supply Vulnerability, Risk Assessment and Management
- **Holden** - Water-Sewer Infrastructure Green Emergency Power Study
- **Medford** - Drainage Model and Conceptual Strategies to Reduce Future Flooding
- **Medford** - Open Space Plan Update
- **Mendon** - Integration of Low Impact Development Standards into Local Bylaws **Regulations**
- **Montague** - City Road Flooding Protection Project- **Design and Permitting**
- **Natick** - Tree Planting Plan to Mitigate Heat Islands and Reduce Runoff
- **Newbury** - Assessing Storm Energy Reduction by the Vegetated Salt Marsh Platform
- **Newburyport** - Wastewater Treatment Plant Climate Resilience
- **Northampton** - **Nature-Based Flood Protection** to Reduce Vulnerabilities
- **Salem** - Sanitary Sewer Trunk Line Relocation Assessment
- **Sandwich** - Climate Change Vulnerability Assessment-Adaptation Planning
- **Weymouth** - Fort Point Road Coastal Infrastructure Resilience Project
- **Winthrop** - Ingleside Park **Feasibility Study** and Permitting

Woods Hole Sea Grant

County of Barnstable Massachusetts

CZM's Coastal Resilience Grant Program

- Vulnerability and Risk Assessment
- Public Education and Communication
- Local Bylaws, Adaptation Plans, and Other Management Measures
- Redesigns and Retrofits
- Natural Storm-Damage Protection Techniques

MVP vs CZM

MVP

- All climate-related issues
- Multiple opportunities throughout the year
- $25K - $2 million
- 25% match
- If it fits CZM, apply to both programs

CZM

- Coastal only
- Opens once a year (Spring)
- Up to $750,000
- 25% match
- If it fits MVP, apply to both programs

FEMA's Hazard Mitigation Grant Program

Hazard Mitigation Grant Program (HMGP)*

Pre-Disaster Mitigation Grant (PDM)

Flood Mitigation Assistance Grant (FMA)

**Available only After Federally Declared Disaster*
"...not intended to fund repair, replacement, or deferred maintenance activities."

- Storm-water upgrades
- Drainage and culvert improvements
- Property acquisition
- Slope stabilization
- Infrastructure protection
- Structure elevations
- Hazard Planning

Small Team Exercise

Small Team Exercise

GETTING STARTED

- Identify Small Team Spokesperson
- Clarifying questions

EXERCISE

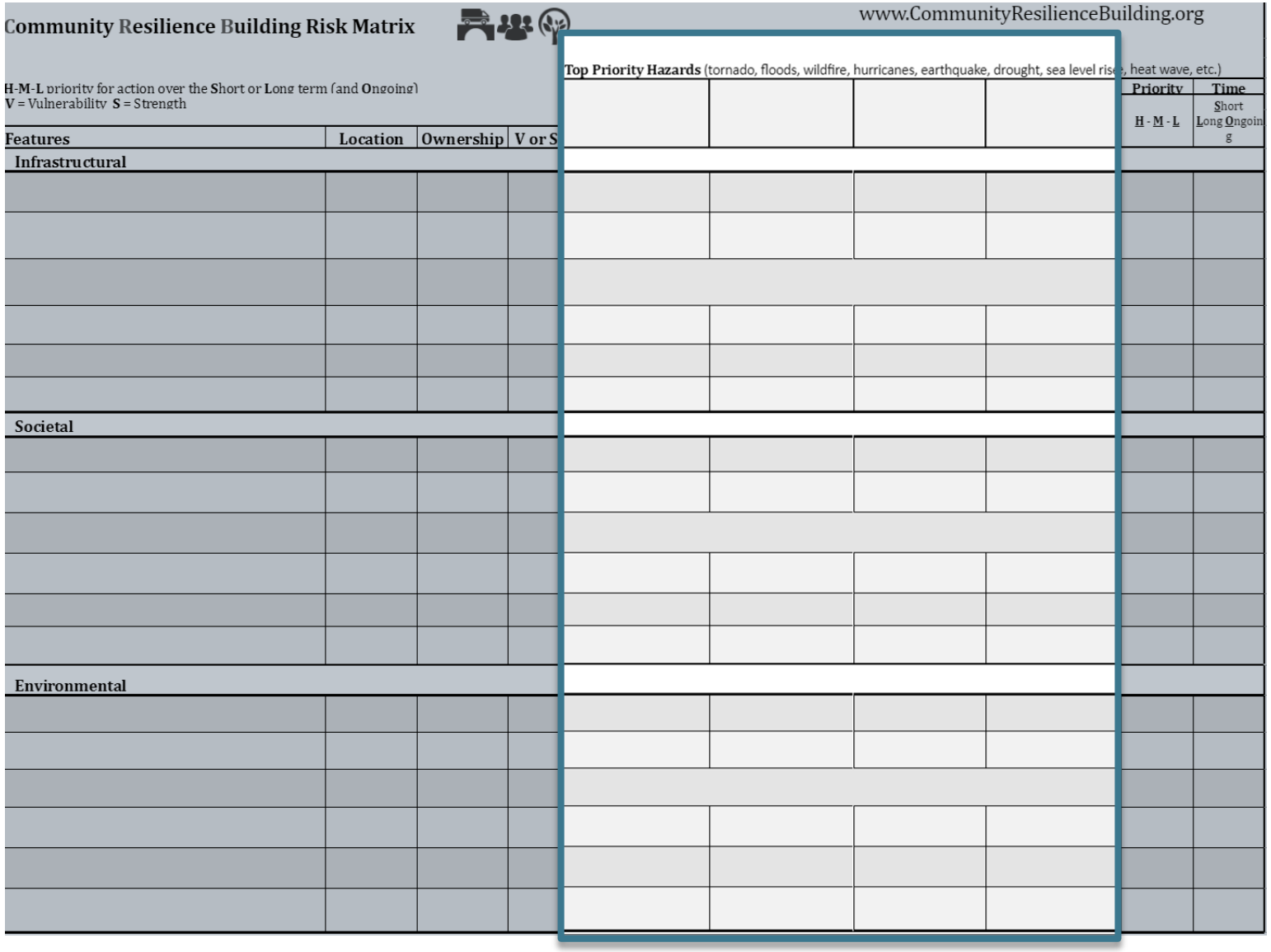
1. Identify Actions to Reduce Vulnerability or Reinforce Strengths

2. Assign Priority and Urgency of Each Action
   - Infrastructure
   - Societal
   - Environmental

3. Identify Top 5 Priority Actions

1.

Identify Actions



Community Resilience Building Risk Matrix

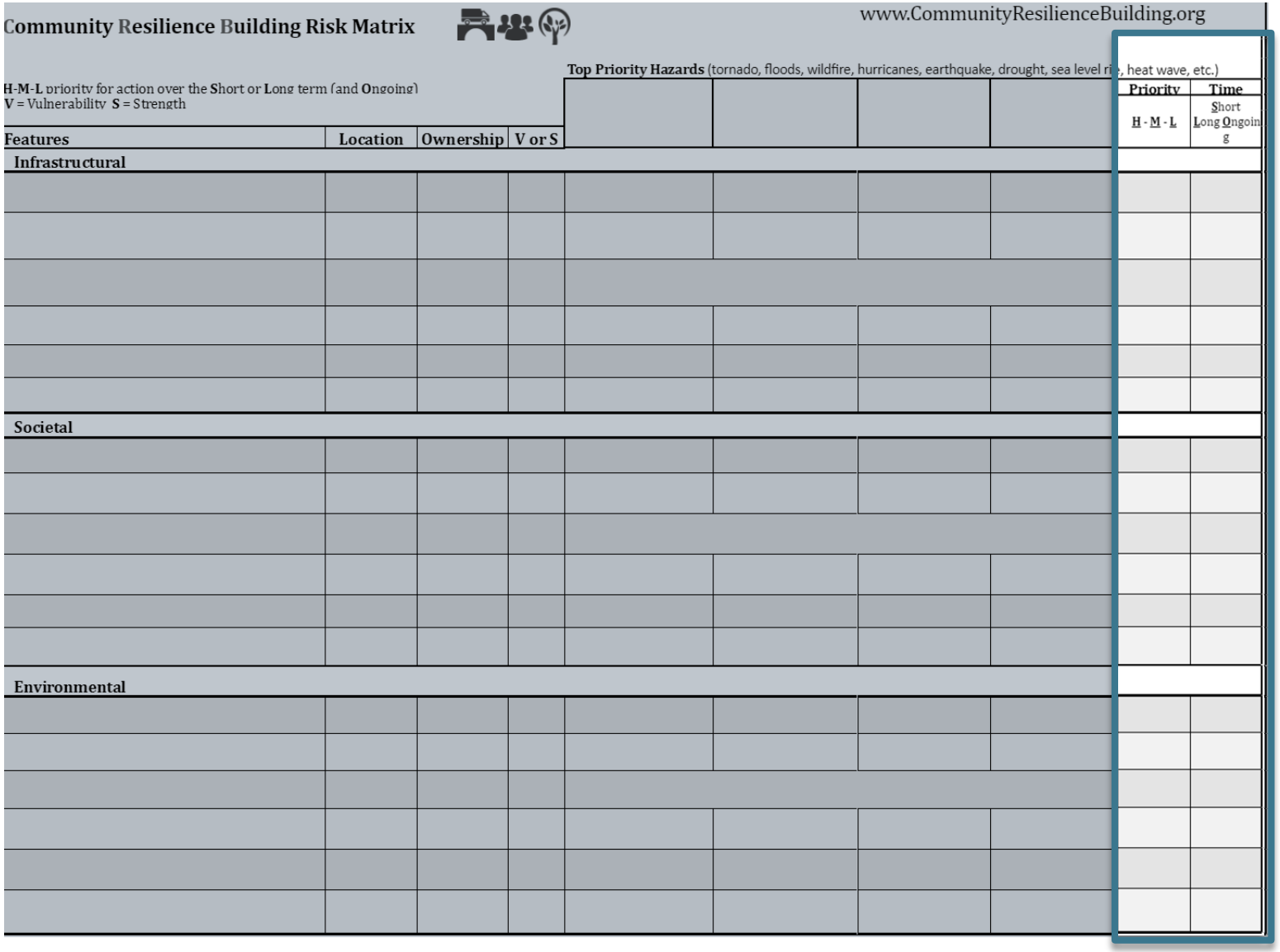
www.CommunityResilienceBuilding.org

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Features	Location	Ownership	V or S	Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)				Priority	Time
								H - M - L	Short Long Ongoing
Infrastructural									
Societal									
Environmental									

2.

Assign Priority and Urgency



Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level ri , heat wave, etc.)

Features	Location	Ownership	V or S					Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Societal									
Environmental									

3.

Identify Top Priority Actions

Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.org

H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Features	Location	Ownership	V or S	Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)				Priority H - M - L	Time Short Long Ongoing	
Infrastructural										
										*
										*
										*
Societal										
										*
Environmental										
										*

Small Team Exercise

GETTING STARTED

- Identify Small Team Spokesperson
- Clarifying questions

EXERCISE

1. Identify Actions to Reduce Vulnerability or Reinforce Strengths

2. Assign Priority and Urgency of Each Action
   - Infrastructure
   - Societal
   - Environmental

3. Identify Top 5 Priority Actions

Break

Small Teams Report Out

Top Priority Actions

Selecting Priorities: Dot Exercise

Compile Top Actions & Wrap Up

Municipal Vulnerability Preparedness Workshop

TOWN OF HARWICH

JANUARY 31, 2020