



Local Natural Hazards Mitigation Plan Overview

April 25, 2018

Why a Local Hazard Mitigation Plan?

- The **Federal Disaster Mitigation Act of 2000** requires municipalities to adopt a Hazard Mitigation Plan to be eligible for FEMA mitigation grants.
- Plans must be updated every 5 years to maintain FEMA grant eligibility
- The Plan will meet FEMA's requirement and help the Town make good use of its resources.



Plan for Mitigating Damages from Natural Hazards

- Flooding
- High winds, hurricanes, tornadoes
- Coastal erosion & damage
- Winter storms, snow and ice
- Brush fires
- Earthquakes, landslides
- Extreme temperatures
- Drought

“Pre-Disaster” Plan, not an Emer



What is Hazard Mitigation?



To permanently reduce or prevent losses of life, injuries and property damage by using long-term strategies to reduce vulnerability and increase resilience

- ❖ What preventive actions are being taken **NOW** to reduce future risks and damages?
- ❖ What additional actions can be taken in the **FUTURE?**

Breaking the Cycle of Disaster & Rebuilding





1. Prevention
2. Property Protection
3. Public Education
4. Natural Resources Protection
5. Structural Projects
6. Emergency Services Protection

Six Tools & Techniques for Hazard Mitigation



- Planning & Zoning
- Floodplain regulations
- Wetlands bylaws
- Open Space preservation
- Stormwater management
- Open Space preservation

1 Prevention of Damages

(Non-Structural / Policy & Regulatory)



- Building elevation
- Flood proofing
- Elevating utilities
- Sewer backup protection
- Storm shutters
- Hurricane/roof straps
- Relocation/acquisition

2 Property Protection



- Flood and hurricane awareness websites
- Hazard Information at libraries and public buildings
- Information brochures mailed to residents
- Public outreach at community events

3 Public Education and Awareness



- Wetlands & Watersheds
- Floodplains
- Erosion and sediment control
- Best Management Practices

4 Natural Resource Protection



- Prevent floodwaters from reaching properties and infrastructure
- Man-made structures to control water flows
- Culverts, dams, levees, pumping facilities, and coastal protection structures

5 Structural Projects



- Protection of critical facilities like fire stations and shelters
- Protection of critical infrastructure such as roadways used as evacuation routes

6 Emergency Services Protection

How the Plan Update Is Developed

- MAPC provides technical assistance to the community for plan development under a FEMA grant.
- The Town coordinates the plan update through its Local Hazard Mitigation Team.
- Stakeholder engagement: residents, businesses, institutions, community organizations.
- Two public meetings, during plan development and review of the draft plan.

Local Hazard Mitigation Team

Typically designated by the Town Manager or EM Director:

- **Local Emergency Manager/LEPC**
- **Fire and Police Departments**
- **Public Works Department**
- **Town Engineer**
- **Planning Director**
- **Conservation Agent**
- **Public Health Agent**
- **Building Inspector/Zoning Officer**
- **Municipal Light & Power**
- **Other: Community Development; School Dept; Parks**

Plan Development Steps

1. Hazard Identification
and Mapping

2. Map Critical
Facilities

3. Assess Risks &
Vulnerabilities

4. Review Existing
Mitigation

5. Identify & Prioritize
Mitigation Strategies

6. Plan Approval
(MEMA/FEMA)

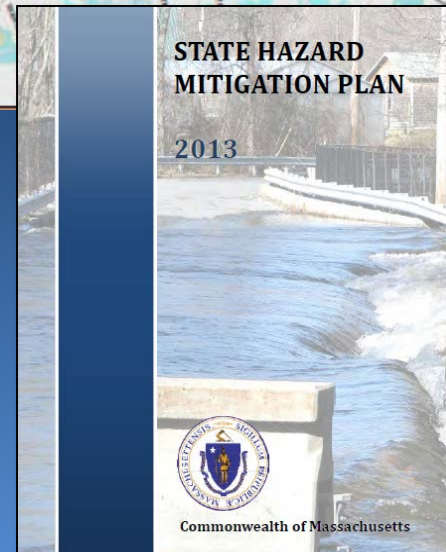
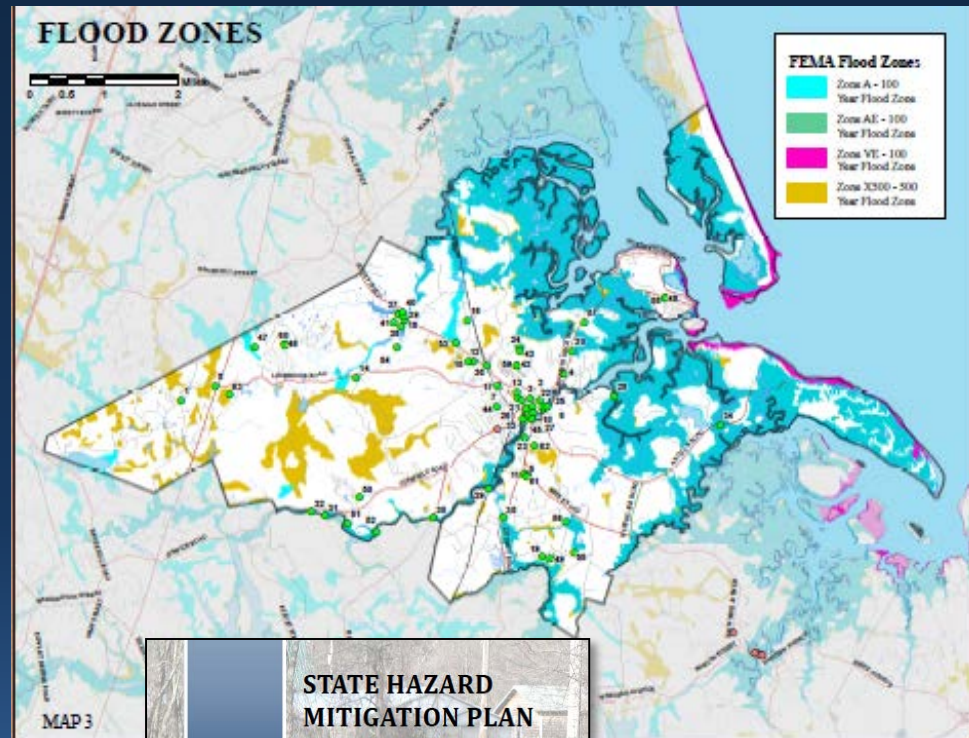
7. Adoption of Plan
by the Town/City

8. Implement Plan
Update in 5 years



1: Hazard Identification & Mapping

- State & Federal data on floodplains, snowfall, wind speeds, hurricanes, coastal erosion, earthquake risk, etc.
- Review Mass. State Hazard Mitigation Plan
- Coordinate with Local Team to get local information on hazard areas and potential future developments



1: Locally-Identified Hazard Areas



Example: Ipswich

Flooding Areas – mainly due to:

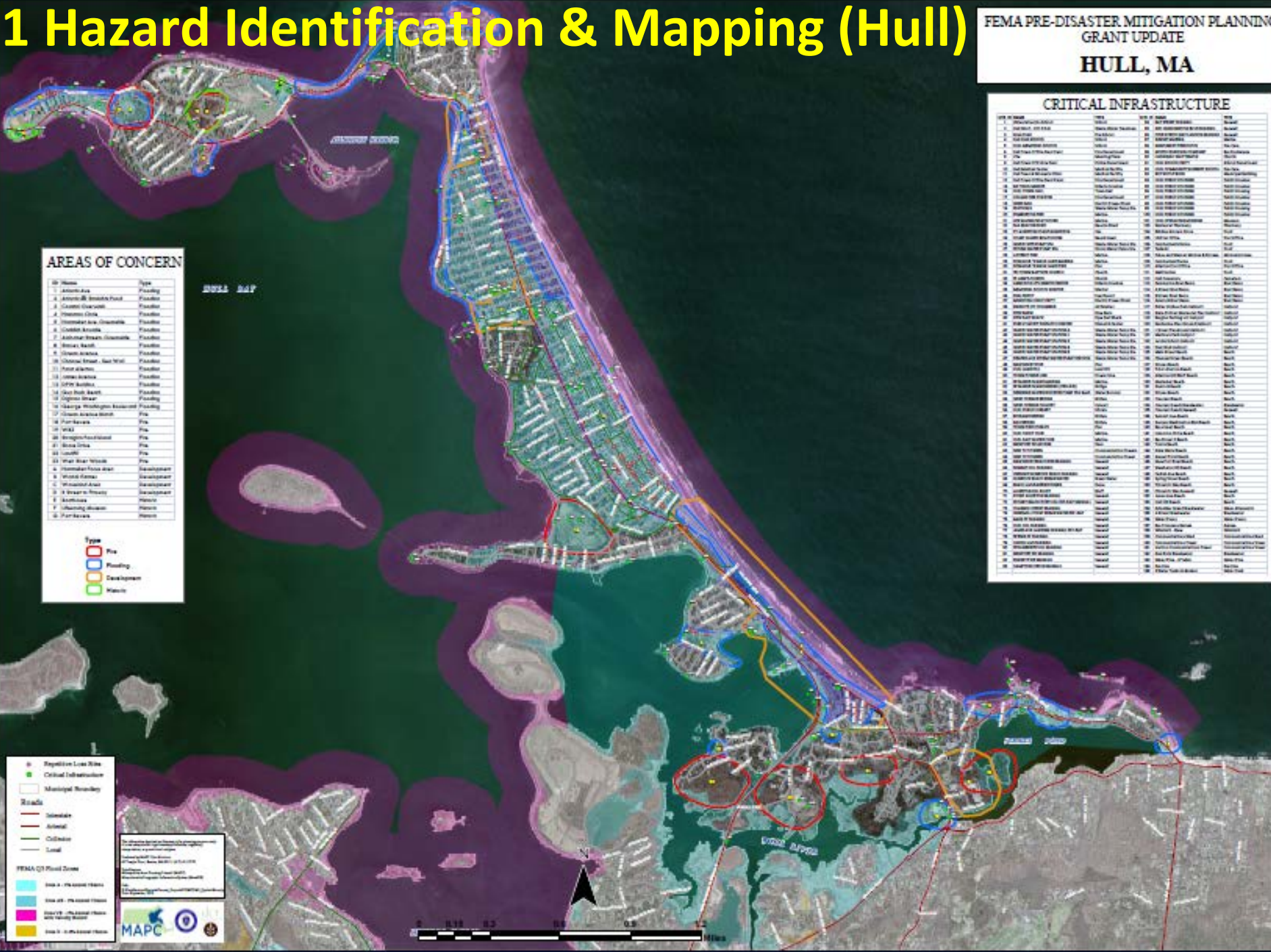
- Proximity to floodplain/coast
- Drainage Infrastructure
- Beaver activity

Locations-examples:

- County Road
- Bull Brook Culverts
- Heartbreak Road
- Jeffrey's Neck Road

**Potentially hazard prone areas
identified for flooding and brushfires**

1 Hazard Identification & Mapping (Hull)



AREAS OF CONCERN

ID	Name	Type
1	Amesbury Point	Flooding
2	Amesbury Point	Flooding
3	Amesbury Point	Flooding
4	Amesbury Point	Flooding
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CRITICAL INFRASTRUCTURE

ID	Name	Type	ID	Name	Type
1	Amesbury Point	Flooding	51	Amesbury Point	Flooding
2	Amesbury Point	Flooding	52	Amesbury Point	Flooding
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Regulatory Line Style

Critical Infrastructure

Municipal Boundary

Roads

Interstate

Arterial

Collector

Local

FEMA Q1 Flood Zones

Zone A - 1% Annual Chance Flood

Zone B - 1% Annual Chance Flood

Zone C - 1% Annual Chance Flood

Zone D - 1% Annual Chance Flood

Zone E - 1% Annual Chance Flood

Zone F - 1% Annual Chance Flood

Zone G - 1% Annual Chance Flood

Zone H - 1% Annual Chance Flood

Zone I - 1% Annual Chance Flood

Zone J - 1% Annual Chance Flood

Zone K - 1% Annual Chance Flood

Zone L - 1% Annual Chance Flood

Zone M - 1% Annual Chance Flood

Zone N - 1% Annual Chance Flood

Zone O - 1% Annual Chance Flood

Zone P - 1% Annual Chance Flood

Zone Q - 1% Annual Chance Flood

Zone R - 1% Annual Chance Flood

Zone S - 1% Annual Chance Flood

Zone T - 1% Annual Chance Flood

Zone U - 1% Annual Chance Flood

Zone V - 1% Annual Chance Flood

Zone W - 1% Annual Chance Flood

Zone X - 1% Annual Chance Flood

Zone Y - 1% Annual Chance Flood

Zone Z - 1% Annual Chance Flood

MAPC

Seal of the Commonwealth of Massachusetts

Seal of the City of Hull

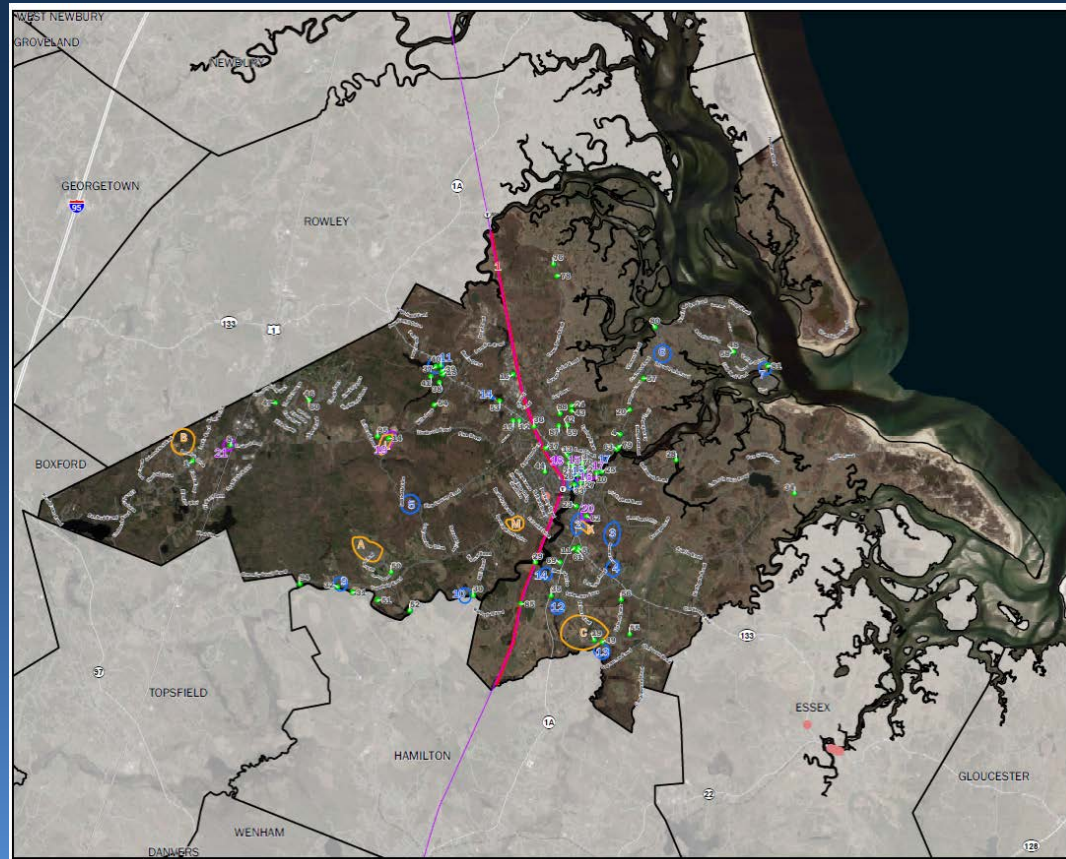
1: Hazard Identification & Mapping (Weymouth)

2: Critical Facilities

Database & GIS maps of critical facilities

62 sites identified including:

- Disaster response sites such as fire and police stations
- Sites requiring assistance such as elderly housing
- Places of assembly
- Critical infrastructure (Dams, pump stations, communications)
- Shellfish resources



2: Critical Resources: Ipswich Clam Flats



2016 Landings
930,500 lbs.

Economic Value
\$1,775,000

3: Vulnerability Analysis: Ipswich Example

FLOODING Estimated damages

Low estimate property damage: \$ 1,265,563

High estimate property damage \$ 6,282,818

HURRICANE Estimated Damages (HAZUS)

Category 2 property damage: \$ 180,000

Category 3 property damage: \$ 1,027,260

EARTHQUAKE Estimated Damages (HAZUS)

Magnitude 5 total property damage: \$ 55,790,000

Magnitude 7 total property damage: \$ 634,860,000

What about Climate Change?

FEMA plan guidelines do NOT require climate change to be considered, but they allow for it...

Climate Change

The planning team may decide to include a discussion of the impacts of climate change in the risk assessment. This is not required by Federal mitigation planning regulation, but can provide a better understanding of how risk may change in the future. Climate change in and of itself may not be a hazard, but it may change the characteristics of the hazards that currently affect the planning area. The planning team can include climate change as a separate section in the plan or within the descriptions of the existing hazards, such as severe storms, flooding, wildfire, and drought. Climate adaptation strategies, which are adjustments in natural or human systems to mitigate the impacts of a changing environment, may complement other hazard mitigation strategies. For an overview of potential changes in your region, consider reviewing the [United States Global Change Research Program's Regional Climate Change Impacts](#) reports.⁴

Climate Change and Climate Adaptation

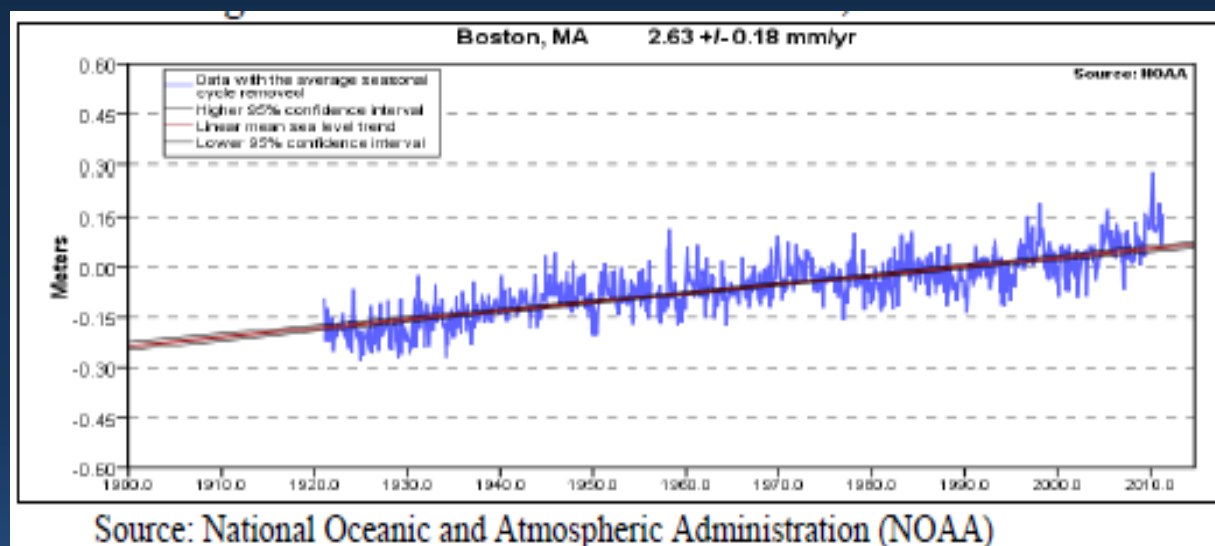
Climate Change: A statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Climate Change Adaptation: The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects.

Source: Intergovernmental Panel on Climate Change (IPCC), <http://www.ipcc.ch/index.htm>.

Impacts of Climate Change – Sea Level Rise

Boston Harbor Tide Gage Trends 1920-2011



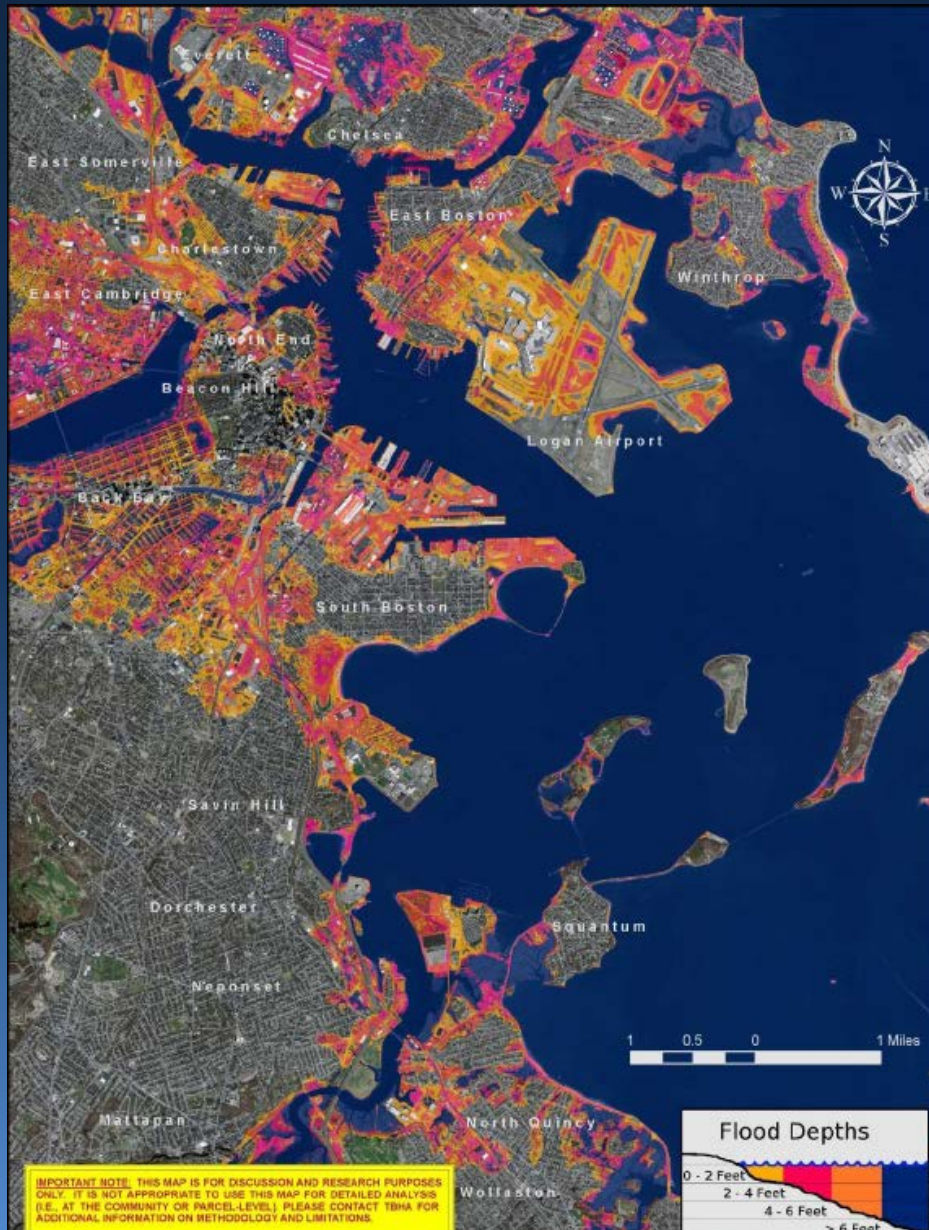
Boston Harbor Sea Level Projections to 2100

Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

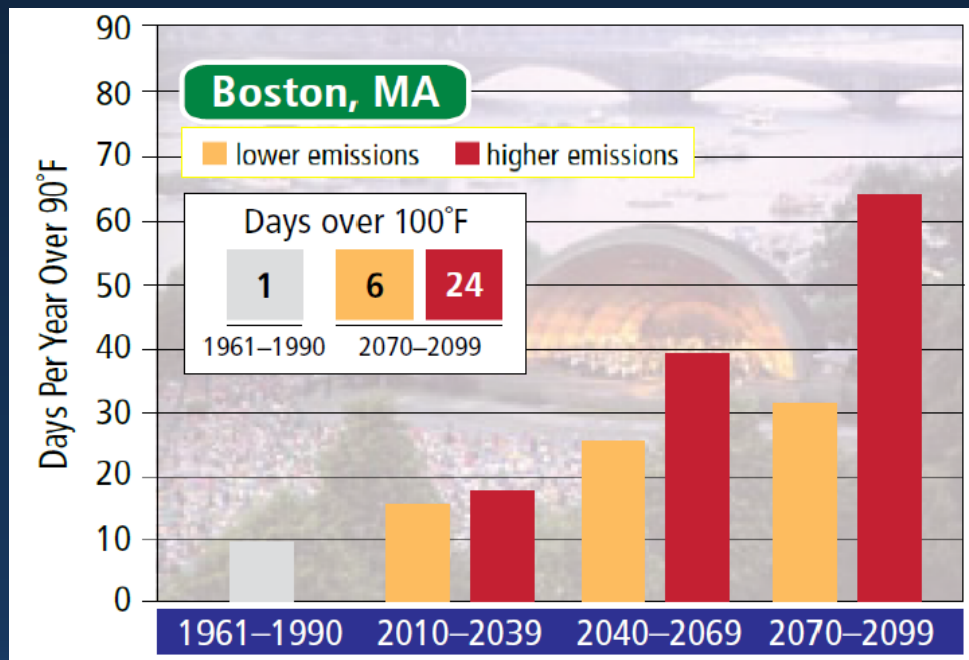
* Using mean sea level in 1992 as a starting point.

Projected Sea Level Rise – Boston Harbor

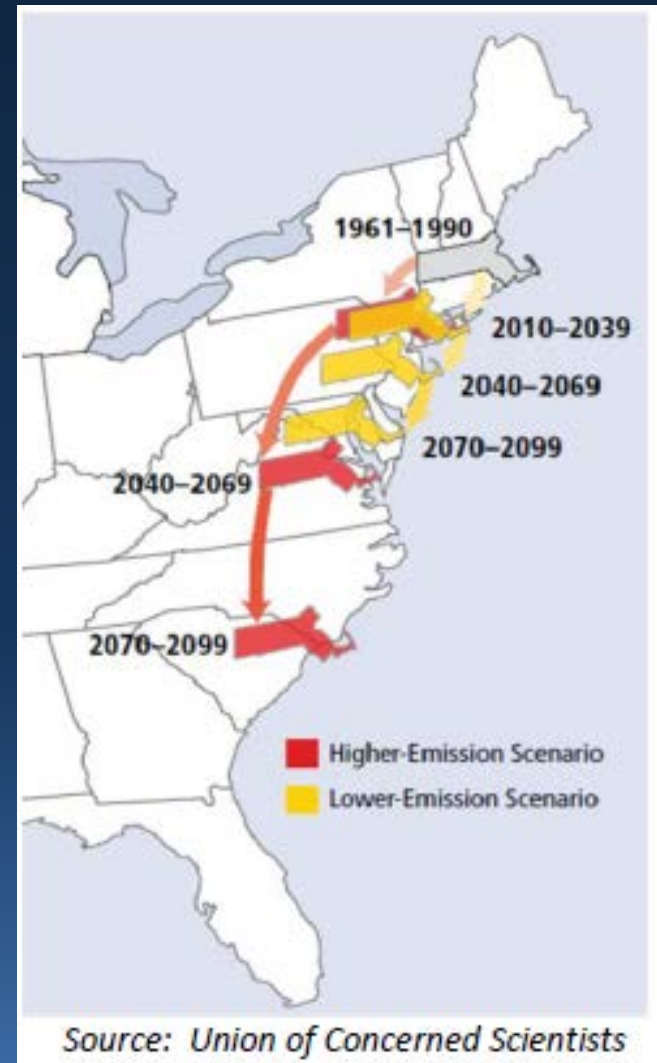
Water 7.5 feet above
mean high tide



Chris Watson and Ellen Douglas, U. Mass Boston
Paul Kirshen, Battelle Laboratories

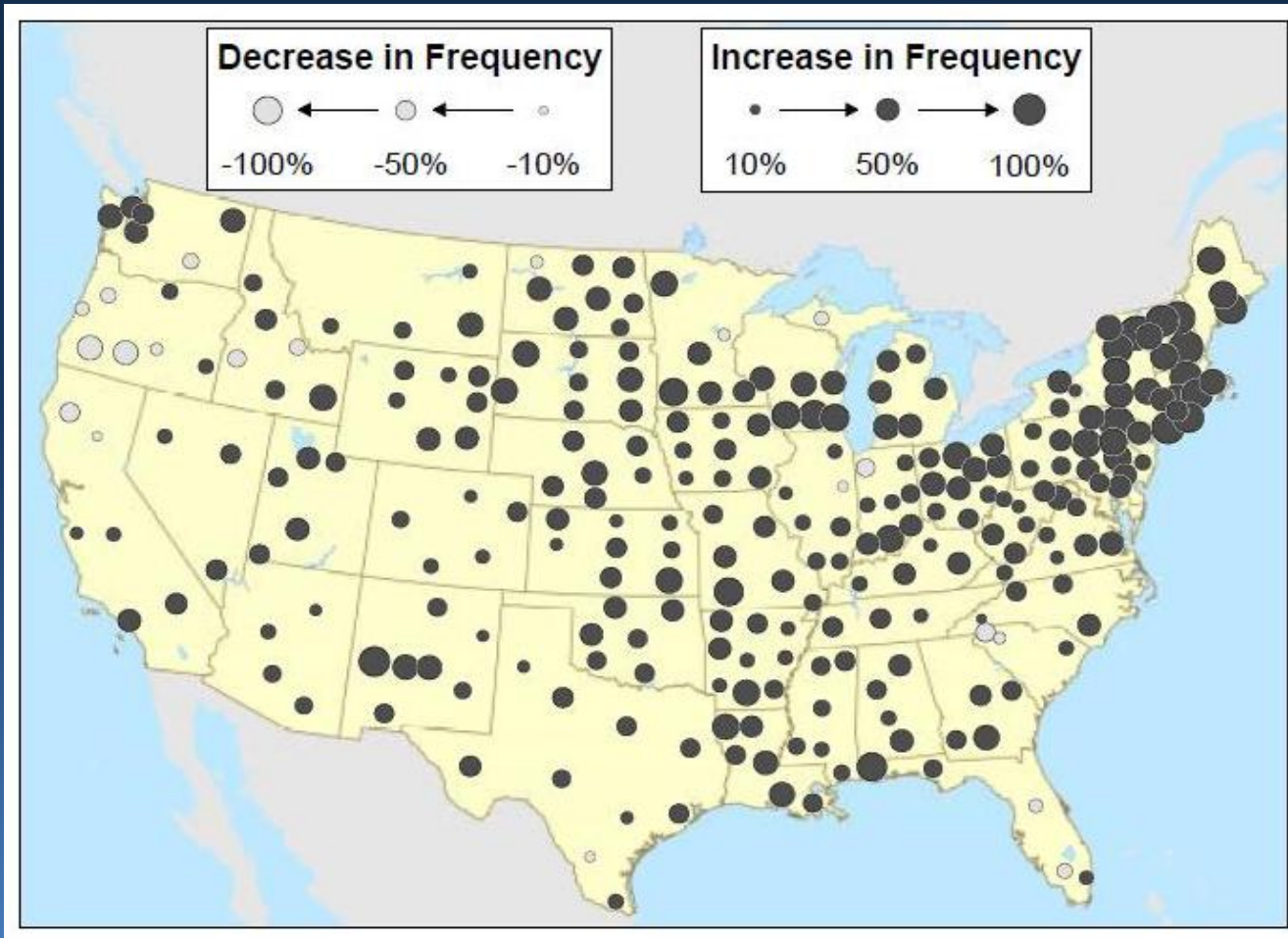


Climate Change Scenarios



Climate Change Impacts: Extreme Heat

Climate Change Impacts: Change in Extreme Precipitation 1948-2011



Source: *When It Rains It Pours – Global Warming and the Increase in Extreme Precipitation*, Environment America Research and Policy Center, July 2012

4: Review Existing Mitigation Measures

MULTI-HAZARD

- Massachusetts State Building Code
- Multi-Department Review of Development

FLOOD RELATED HAZARDS

- National Flood Insurance Program (NFIP)
- Street Sweeping & Catch basin cleaning
- Roadway treatments
- Zoning regulations
- Subdivision Rules and Regulations

WIND-RELATED HAZARDS

- Tree trimming program
- Massachusetts State Building Code

DAM FAILURES

- DCR Dam Safety regulations
- Permits required for construction

WINTER-RELATED HAZARDS

- Snow removal operations
- Sand/salt roadway application

GEOLOGIC HAZARDS

- Massachusetts State Building Code

BRUSH FIRE RELATED HAZARDS

- Permits for outdoor burning
- Subdivision Review

5: Identify & Prioritize Mitigation Strategies

What Is Already Being Done?



- ❖ Identify local protection and mitigation steps being taken
- ❖ Structural & Non-Structural
- ❖ Identify state & federal protection/mitigation

Where Are the Gaps?

- ❖ Review effectiveness of existing mitigation
- ❖ Identify unprotected areas and unresolved issues
- ❖ Consider regional issues

5: Identify & Prioritize Mitigation Strategies

Example: Ipswich Recommendations

Hazard Area	Mitigation Measure	Priority	Implementation Responsibility	Time Frame	Estimated Cost	Potential Funding Sources
High Priority						
Flooding/Dams						
<i>Jeffrey's Neck Road</i>	A) Elevate the two low-lying sections of the road that flood during coastal storm surge events and isolates 1200 (winter) residents in about 600 homes.	High	DPW/Conservation Commission	2011 -2013	\$1 million	Ipswich/FEMA
<i>Labor in Vain Road</i>	B) Replace existing stone, 4 x 4 culvert with larger pre-cast concrete culvert.	High	DPW/Conservation Commission	2011 -2013	\$400,000 - \$500,000	Ipswich/FEMA
<i>Flooding at 110 -112 County Road/Route 1A, 12-14 Heartbreak Road and southern end of Heartbreak Road</i>	C) Drainage study of affected areas.	High & NFIP	DPW /MA DOT	2011 - 2013	\$150,000	Ipswich/MA DOT/FEMA
<i>Pine Swamp Road culverts</i>	D) Replace existing 18-inch corrugated culverts with 30-40-inch precast concrete culverts and elevate low section in road.	High	DPW	2011 – 2014	\$30,000 culvert \$15,000 road	Ipswich/FEMA

6 & 7: Plan Approval and Adoption

- Draft plan reviewed by MEMA & FEMA
- FEMA “Approval Pending Adoption”
- The Town Adopts the plan
- FEMA issues formal Plan Approval
- The Town is eligible for FEMA mitigation grants for the next 5 years





Questions

