

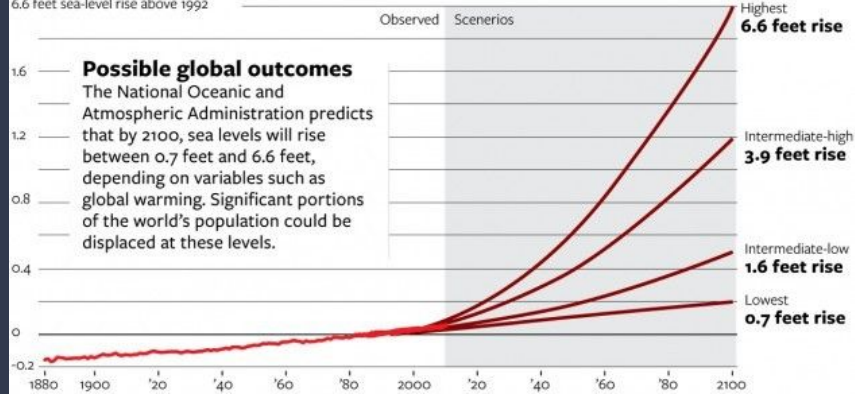
Addressing Municipality Climate Preparedness in the Commonwealth of Massachusetts

Tara Srinivasan and Jonathan Sun

December 10, 2019

Sea-Level Rise

6.6 feet sea-level rise above 1992



Scenarios from NOAA for 2013 are calculated using tidegauge observations from 1983-2001, taking the midway point (1992) as the starting point.

Low-lying land in the U.S.

The areas that would be most affected by sea rise in the Mid-Atlantic and Southeastern regions.

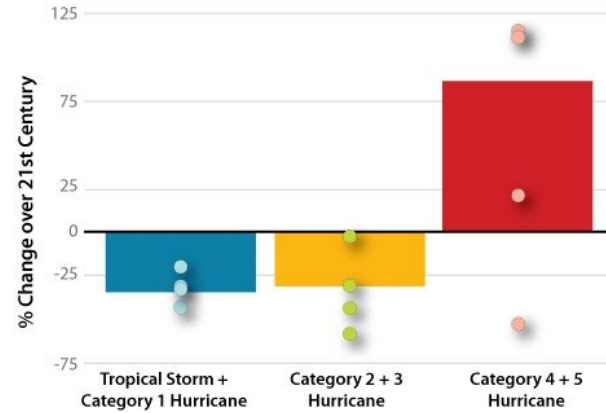
Dry land area less than 3.3 feet above high tide



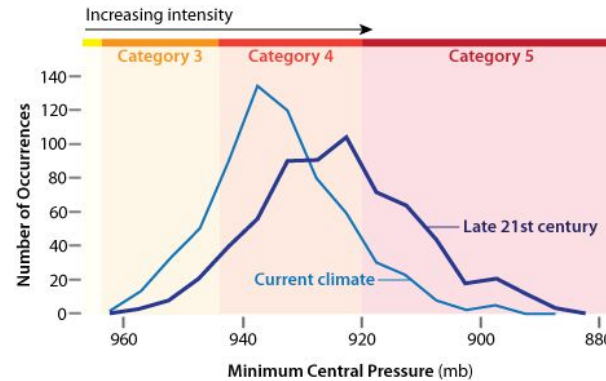
Five most-vulnerable states



Source: National Oceanic and Atmospheric Administration



Graph courtesy of Gabriel Vecchi, NOAA GFDL



Graph courtesy of Tom Knutson, NOAA GFDL.


< Previous Next >

San Francisco

San Francisco's New Hazards and Climate Resilience Plan

12:30 p.m. | Thursday, November 14, 2019

MENU CITY of **BOSTON** | Mayor Martin J. Walsh

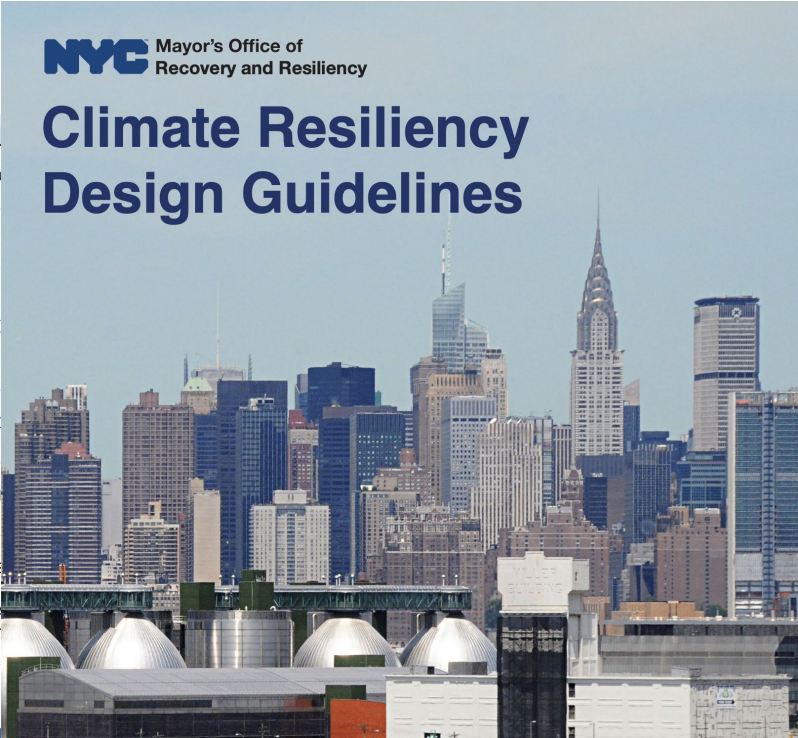


PAY AND APPLY

HOME > DEPARTMENTS > ENVIRONMENT > CLIMATE READY BOSTON MAP EXPLORER

CLIMATE READY BOSTON MAP EXPLORER

This tool allows you to explore the spatial data used in Climate Ready Boston. You can also learn more about climate preparedness projects across the City.



NYC Mayor's Office of Recovery and Resiliency

Climate Resiliency Design Guidelines

Still have questions? CONTACT US

ENVIRONMENT

617-635-3850

ENVIRONMENT

1 CITY HALL ST
ROOM 709
BOSTON, MA
UNITED STATES

READY TO EXPLORE?

LAUNCH THE EXPLORER

A detailed map of the Boston area, including parts of Cambridge, Somerville, and Chelsea. The map displays a dense network of streets, major highways (Interstates 90, 93, 28, 2A, 3, 3A, 27, 26, 24, 23, 22, 21, 20, 1A), and water bodies like the Charles River and Boston Harbor. A semi-transparent FEMA National Flood Hazard Layer is overlaid on the map, showing various flood zones. The text 'FEMA National Flood Hazard Layer' and 'MassGIS's Online OLIVER Mapping Tool' is centered over the map. A scale bar in the bottom right corner shows 500 meters and 1000 feet, along with a north arrow.

FEMA National Flood Hazard Layer
MassGIS's Online OLIVER Mapping Tool

500 m
1000 ft

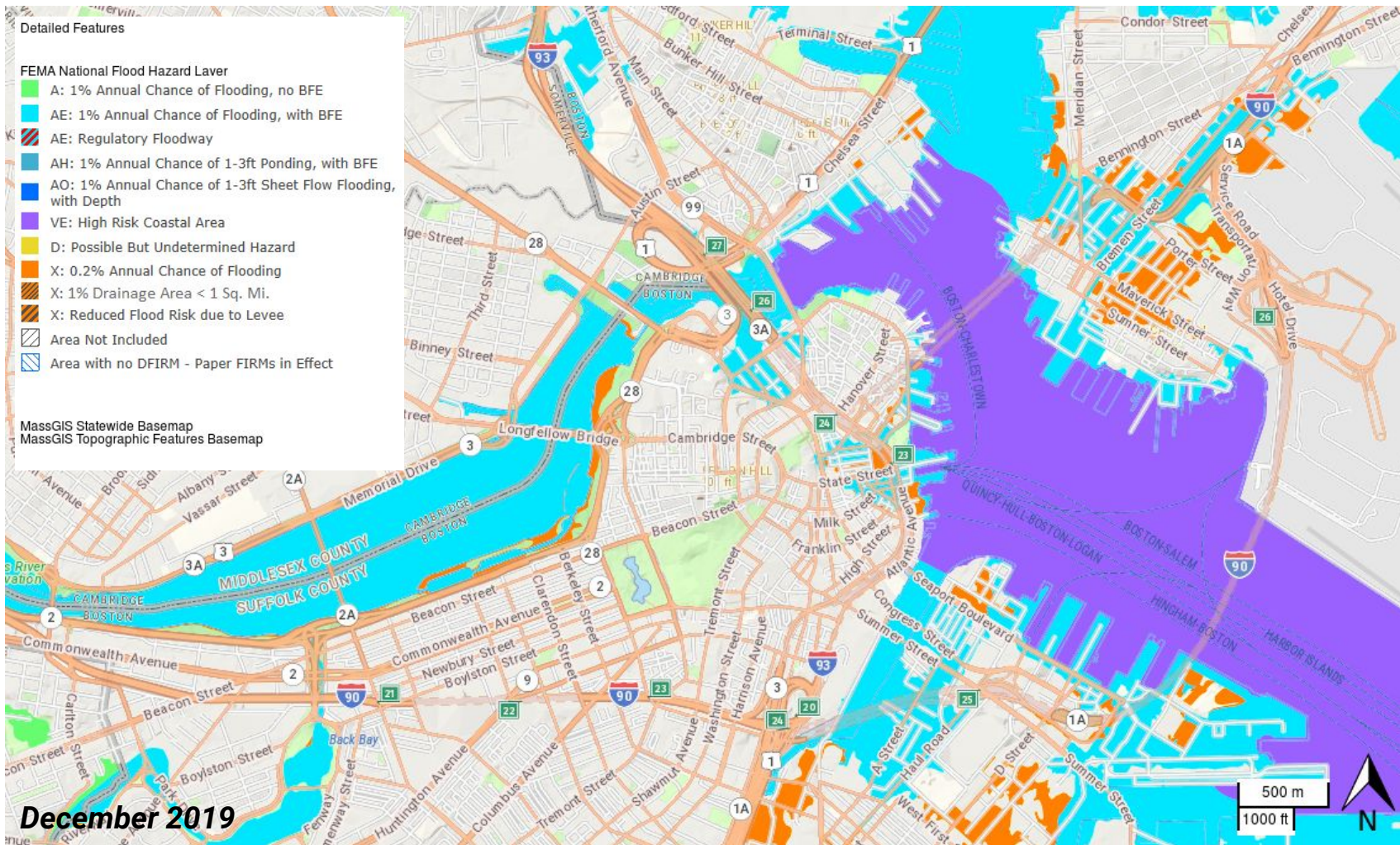


Detailed Features

FEMA National Flood Hazard Layer

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- AH: 1% Annual Chance of 1-3ft Ponding, with BFE
- AO: 1% Annual Chance of 1-3ft Sheet Flow Flooding, with Depth
- VE: High Risk Coastal Area
- D: Possible But Undetermined Hazard
- X: 0.2% Annual Chance of Flooding
- X: 1% Drainage Area < 1 Sq. Mi.
- X: Reduced Flood Risk due to Levee
- Area Not Included
- Area with no DFIRM - Paper FIRMs in Effect

MassGIS Statewide Basemap
MassGIS Topographic Features Basemap



December 2019



EEA

*Municipal Vulnerability Preparedness
(MVP) Program*

Planning Grant

Action Grant

Certified Providers



FEMA

National Flood Insurance Program (NFIP)

*Flood Mitigation Assistance (FMA)
Grant Program*

Community Rating System (CRS)

*Pre-Disaster Mitigation (PDM)
Grant Program*

Hazard Mitigation Grant Program (HMGP)

Vulnerable Populations

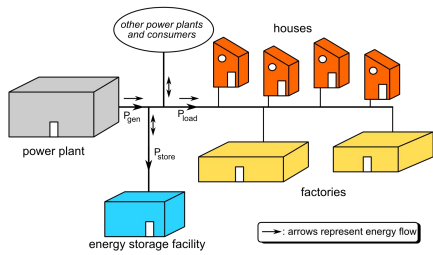


Chemical Storage



Comprehensive Community Preparedness

Power Outages



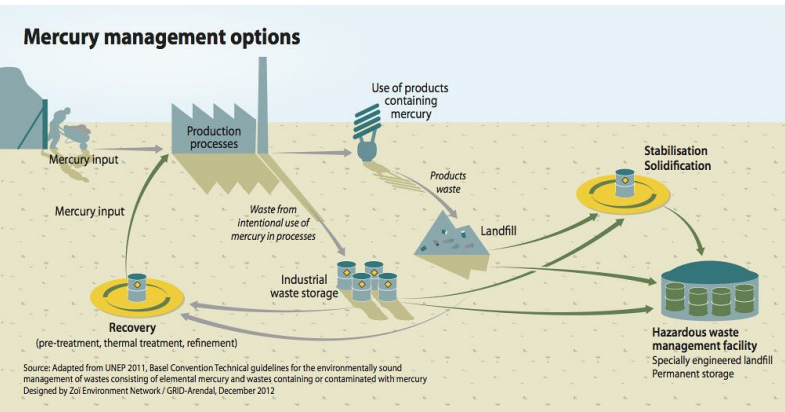
Home Resilience



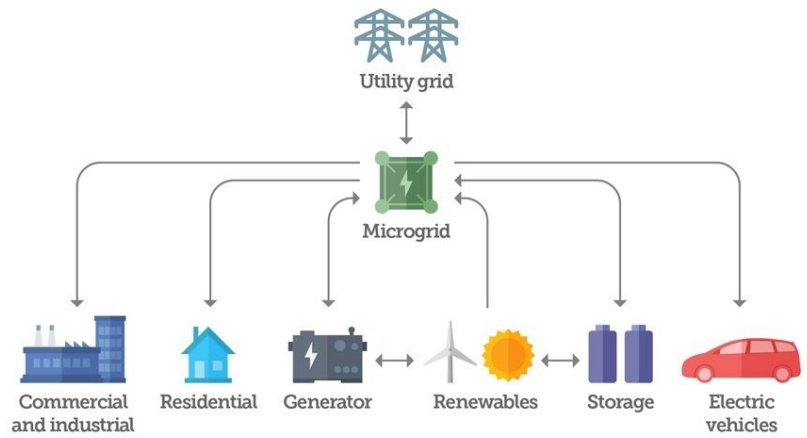
Vulnerable Populations: The Young, Elderly, and the Disabled



Chemical Storage and Contaminated Waste Sites: Superfunds, landfills and Hazardous Waste



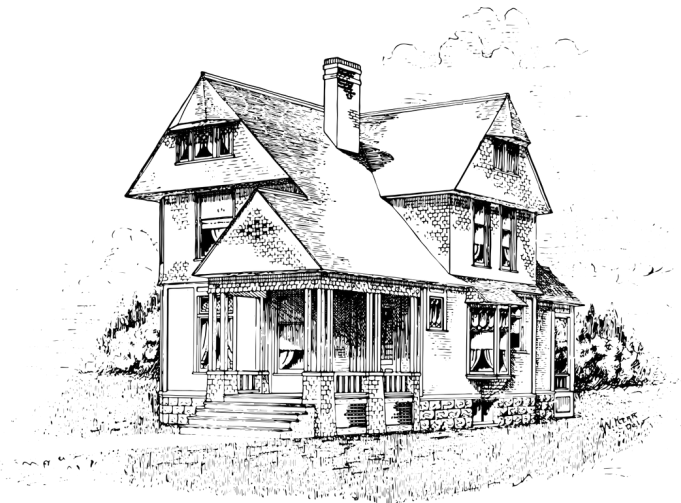
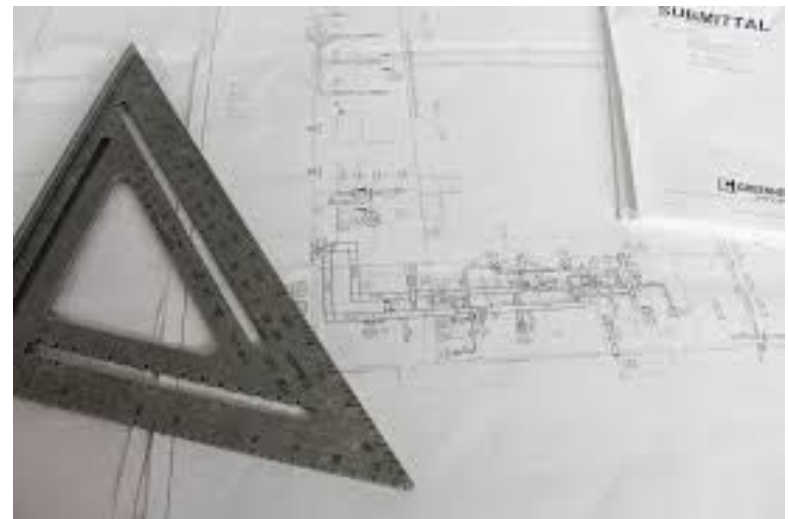
Power Outages: Battery Systems, Microgrids, Emergency Generators and Alternative Renewable Energy



Source: LG CNS
© 2016 The Pew Charitable Trusts

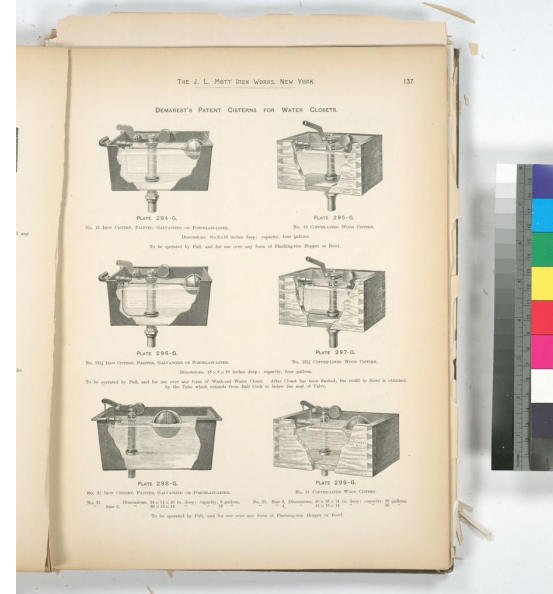
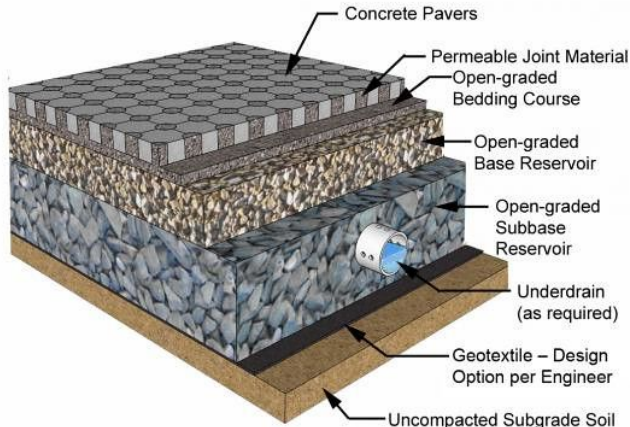


Home Resilience: Waterproofing, Drainage, Engineering Dilemmas



Stormwater Management in Communities

- Green Roofs
- Rain Barrels & CISTERNS
- Permeable Pavements
- Bioretention Areas
- Constructed Wetlands/Underground Reservoir System



Underground Reservoir System: Chicago

McCook Reservoir

- **Deep Tunnel system**
Drains water from overloaded sewer systems during storms
- **Reservoir**
Holds water to be sent to treatment plant
- **Treatment plant**
- **Sewage release point**
During some heavy rains



Out of the 351 total municipalities in Massachusetts

252 are affiliated with the MVP (as of September 2019, but inclusive of Lowell).

158 of these are designated MVP communities.

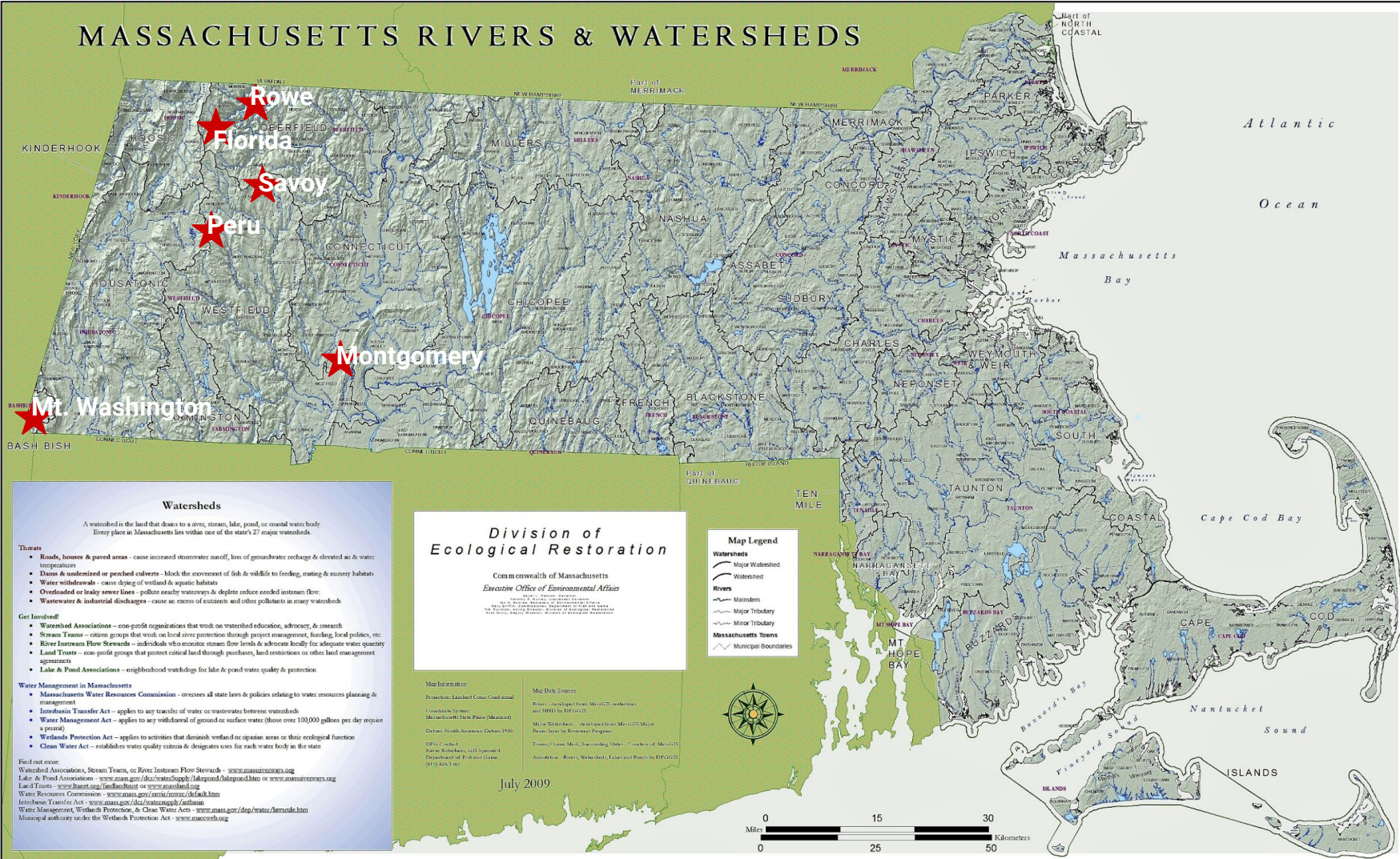
93 of these are known to be currently applying for the MVP planning grant.

341 are in the NFIP.

21 of these have CRS status.

There is an overlap of 6 communities not known to be affiliated with either the NFIP or the MVP; all are in areas not considered urgently at risk of flooding, but have hazards identified according to FEMA Flood Hazard Mapping (except Mount Washington, which has not yet been mapped for hazards).

MASSACHUSETTS RIVERS & WATERSHEDS



Watersheds

A watershed is the land that drains to a river, stream, lake, pond, or coastal water body. Every place in Massachusetts lies within one of the state's 27 major watersheds.

Threats

- Roads, houses & paved areas - cause increased stormwater runoff, loss of groundwater recharge & elevated air & water temperatures
- Dams & unmodernized or perched culverts - block the movement of fish & wildlife to feeding, mating & nursery habitats
- Water withdrawal - causes drying of wetland & aquatic habitats
- Overloaded or leaky sewer lines - pollute nearby waterways & deplete reduce needed stream flow
- Wastewater & industrial discharges - cause an excess of nutrients and other pollutants in many watersheds

Get Involved!

- Watershed Associations - non-profit organizations that work on watershed education, advocacy, & research
- Stream Teams - citizen groups that work on local river protection through project management, funding, local politics, etc.
- River Instream Flow Stewards - individuals who monitor stream flow levels & advocate locally for adequate water quantity
- Land Trusts - non-profit groups that protect critical land through purchases, land restrictions or other land management agreements
- Lake & Pond Associations - neighborhood watchdogs for lake & pond water quality & protection

Water Management in Massachusetts

- Massachusetts Water Resources Commission - oversees all state laws & policies relating to water resources planning & management
- Interstate Transfer Act - applies to any transfer of water or wastewater between watersheds
- Water Management Act - applies to any withdrawal of ground or surface water (those over 100,000 gallons per day require a permit)
- Wetlands Protection Act - applies to activities that diminish wetland or riparian areas or their ecological function
- Clean Water Act - establishes water quality criteria & designates uses for each water body in the state

Find out more:

Watershed Association, Stream Team, or River Instream Flow Stewards - www.masswatersheds.org
 Lake & Pond Association - www.mass.gov/dep/water/quality/lakepond/laikpond.htm
 Land Trusts - www.landtrust.org or www.mass.gov/dep/water/quality/landtrust.htm
 Water Resources Commission - www.mass.gov/dep/water/water/water.htm
 Interstream Transfer Act - www.mass.gov/dep/water/interstream.htm
 Wetlands Management, Wetlands Protection, & Clean Water Act - www.mass.gov/dep/water/act/water/act/water.htm
 Municipal authority under the Wetlands Protection Act - www.mass.gov/dep/water/act/water/act/water.htm

Division of Ecological Restoration

Commonwealth of Massachusetts
 Executive Office of Environmental Affairs

100 State Street, 10th Floor, Boston, MA 02109
 Telephone: 617-725-2000
 Fax: 617-725-2001
 E-mail: ecological@ecr.state.ma.us

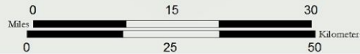
Map Information

Projections: Lambert Conformal
 Coordinate System:
 Massachusetts State Plane (Maschob)
 Datum: North American Datum 1983
 EPG Code:
 3146
 Federal Information Processing Standard 10
 Department of Fish and Game
 (01/20/04)

Map Data Sources

Rivers: Adapted from MA GIS website
 with NHD to EPG files
 Major Watersheds: Adapted from MA GIS Major
 Watersheds by Resource Program
 Towns, Cities, and Villages: Courtesy of MA GIS
 Association: River Watersheds, Lakes and Ponds by EPGGIS

Map Legend	
	Major Watershed
	Watershed
	Rivers
	Mainstem
	Major Tributary
	Minor Tributary
	Massachusetts Towns
	Municipal Boundaries



July 2009

Lowell

- Riverine
- Merrimack River floodplain
- NFIP ✓
- Updating 2015 Regional Hazard Mitigation Plan
- Applying for MVP Planning Grant

Westfield

- Riverine
- Westfield River floodplain (flows into Connecticut River)
- NFIP ✓
- Identifies city dams in need of support
- Hydraulics study on flood levee capacity
- Considering MVP application

Barnstable County

- Coastal
- Cape Cod
- NFIP ✓
- MVP ✓
- 9 CRS Recipients

Pelham

- Highland
- MVP ✓
- Not interested in NFIP

Mount Washington

- Highland
- Unmapped
- No Community ID in FEMA records

Reasons in favor

- Pre-disaster preparation is a good practice.
- Being in a policy pre-disaster can result in more payout.

Reasons against

- Low-risk location
- Already feel prepared
- Limitations of programs
- **Bandwidth**
- Outdated reference material

Conclusions

What is a well-prepared community?

- Updated Hazard Mitigation Plan
- Recent mapped records of hazard potential
- MVP program affiliation
- Enrolled in some flood insurance program
- Considering/applying for fringe benefits

Further Steps

- Solution to bandwidth issue
- Continuing to contact communities
- Deeper program integration
- Additional resources for communities outside of MVP and NFIP

Acknowledgements

Richard Reibstein

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