Stantec

Weymouth
Municipal Vulnerability Preparedness

Community Resilience Building Workshop

Welcome Address

Mayor Hedlund

Time	Activity	Who
8:30 AM	Breakfast, registration	
9:00 AM	Welcome address	Mayor Hedlund
9:15 AM	Presentation (MVP, workshop process, top hazards), Q&A	Stantec's Urban Places
10:30 AM	Identify municipal vulnerabilities and strengths	Table groups
11:30 AM	Hazards, vulnerabilities, strengths recap and next steps	Large group discussion
12:00 PM	Lunch	
1:00 PM	Identify and prioritize municipal actions	Table groups
2:30 PM	Identify top 5 actions and write on post-its	Table groups
2:45 PM	Short break	
3:00 PM	Report back per table, organize into themes, and priority exercise	Large group discussion
4:00 PM	Further define urgency and timing	Large group discussion
4:30 PM	Closing remarks	Core project team
5:00 PM	Workshop adjourned	

Presentation agenda

1. Your team
2. About MVP
3. Today's goals & process
4. Top natural hazards
5. Start small group discussions

Your MVP Team

MVP Project Managers

Frank Singleton
Bob Luongo
Mary Ellen Schloss

MVP Working Group

You, the participants

Stantec Consulting

Larissa Brown
Nels Nelson

Municipal Vulnerability Preparedness (MVP)

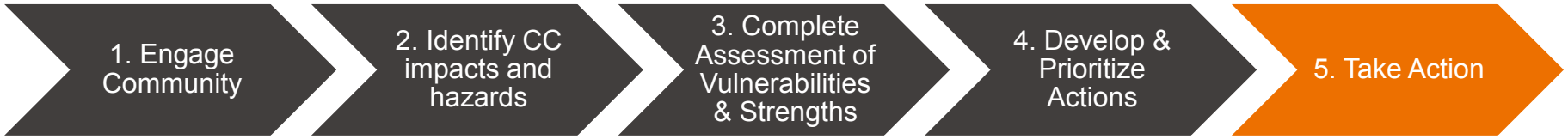


State and local partnership to build resiliency to climate change

1. Engage Community
2. Identify CC impacts and hazards
3. Complete assessment of vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action

Empowering Communities & Informing Statewide Action

- **Community-led process**
- **Partnerships** and leveraging existing efforts
- **Communities** as local innovators
- **Frame** coordinated statewide efforts.



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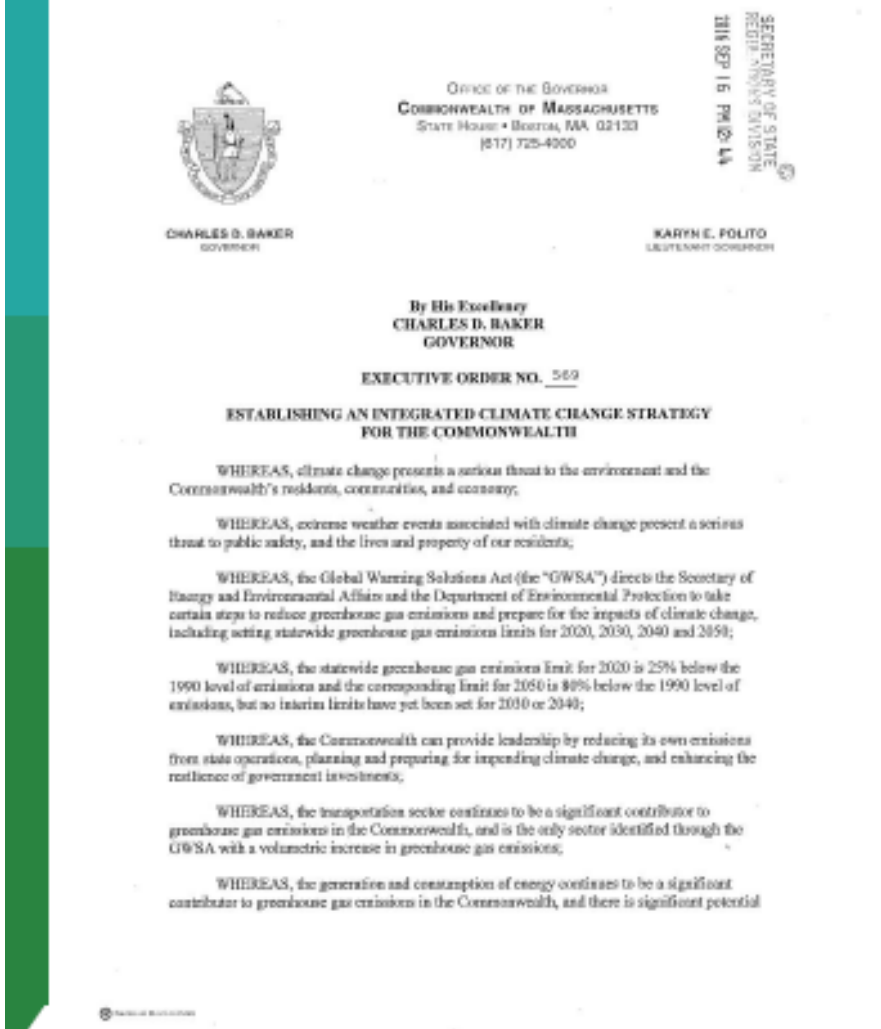
The MVP Process



OFFICE OF THE GOVERNOR
COMMONWEALTH OF MASSACHUSETTS
STATE HOUSE • BOSTON, MA 02133
(617) 725-4000

2015 SEP 16 PM 2:44
SECRETARY OF STATE
PUBLICATIONS DIVISION

CHARLES D. BAKER
GOVERNOR

KARYN E. POLITO
LIEUTENANT GOVERNOR

By His Excellency
CHARLES D. BAKER
GOVERNOR

EXECUTIVE ORDER NO. 569

ESTABLISHING AN INTEGRATED CLIMATE CHANGE STRATEGY
FOR THE COMMONWEALTH

WHEREAS, climate change presents a serious threat to the environment and the Commonwealth's residents, communities, and economy;

WHEREAS, extreme weather events associated with climate change present a serious threat to public safety, and the lives and property of our residents;

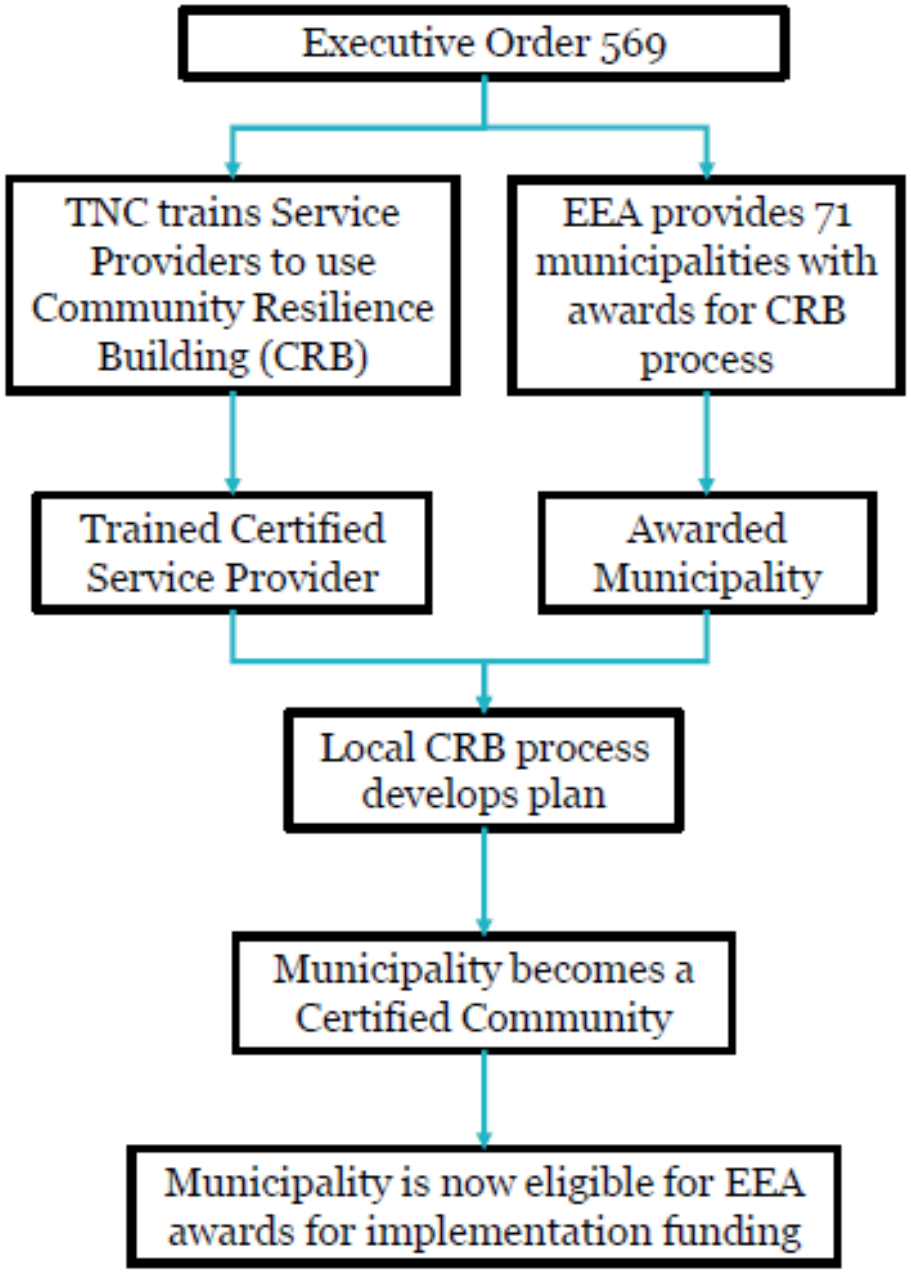
WHEREAS, the Global Warming Solutions Act (the "GWSA") directs the Secretary of Energy and Environmental Affairs and the Department of Environmental Protection to take certain steps to reduce greenhouse gas emissions and prepare for the impacts of climate change, including setting statewide greenhouse gas emissions limits for 2020, 2030, 2040 and 2050;

WHEREAS, the statewide greenhouse gas emissions limit for 2020 is 25% below the 1990 level of emissions and the corresponding limit for 2050 is 80% below the 1990 level of emissions, but no interim limits have yet been set for 2030 or 2040;

WHEREAS, the Commonwealth can provide leadership by reducing its own emissions from state operations, planning and preparing for impending climate change, and enhancing the resilience of government investments;

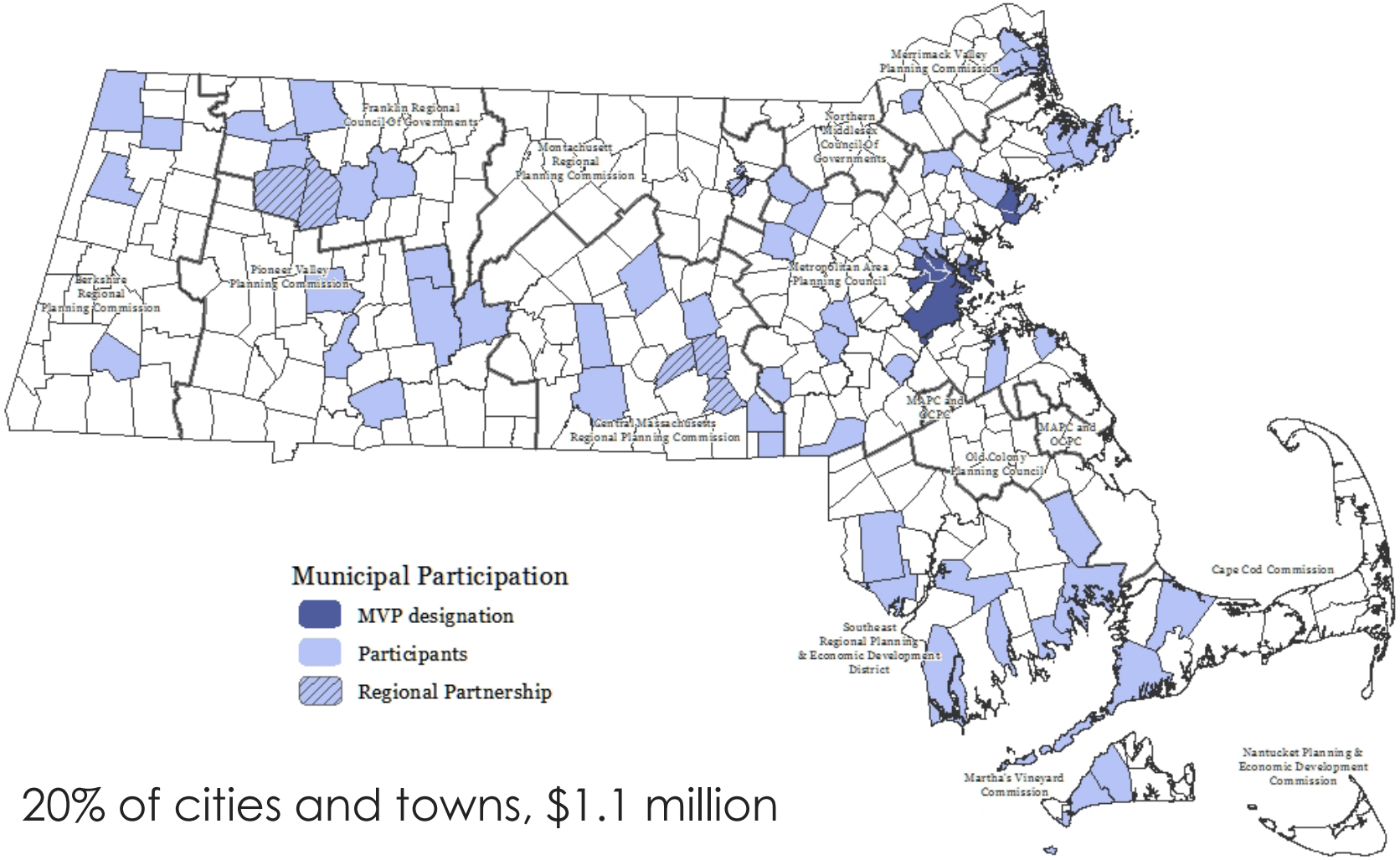
WHEREAS, the transportation sector continues to be a significant contributor to greenhouse gas emissions in the Commonwealth, and is the only sector identified through the GWSA with a volumetric increase in greenhouse gas emissions;

WHEREAS, the generation and consumption of energy continues to be a significant contributor to greenhouse gas emissions in the Commonwealth, and there is significant potential



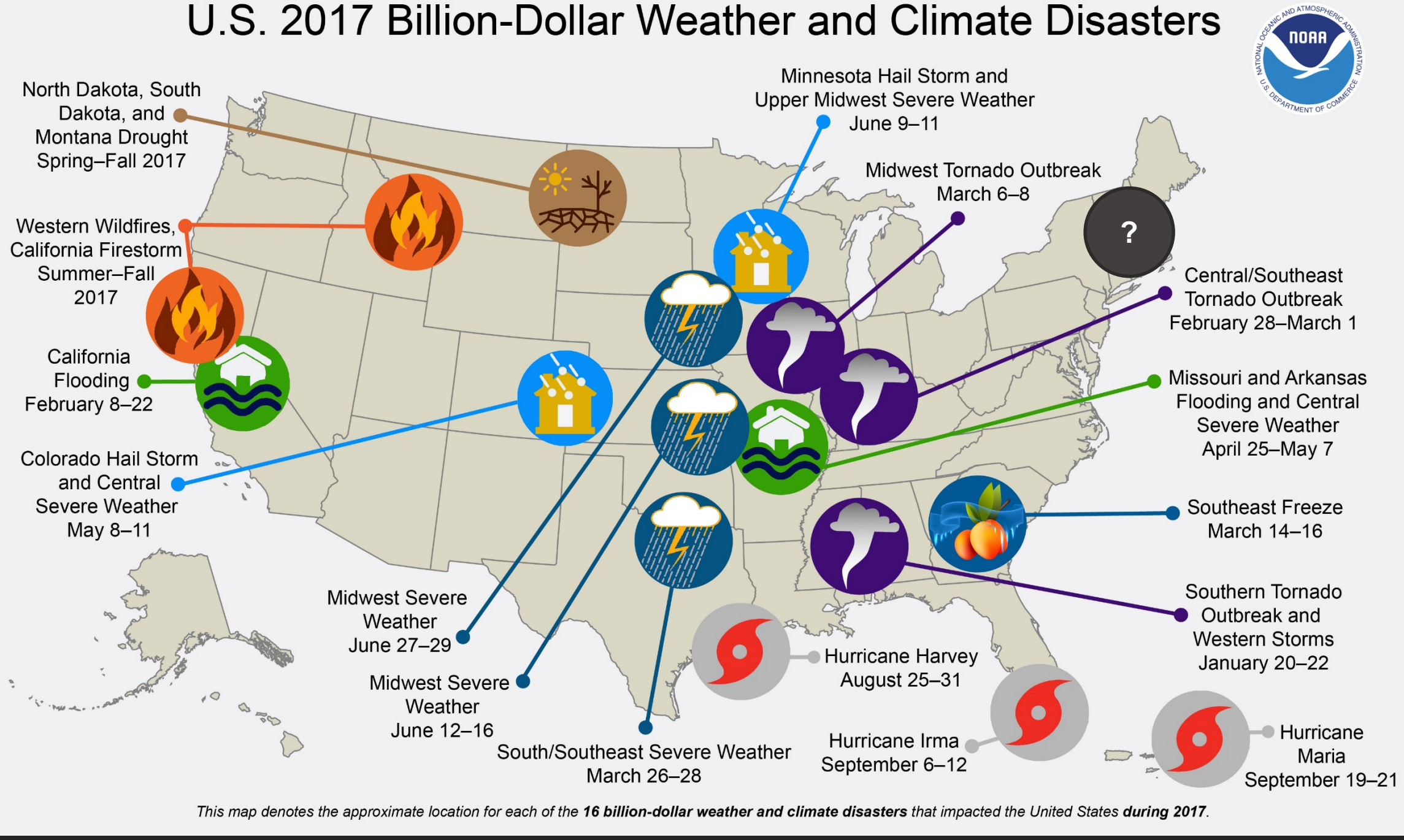
Municipal Vulnerability Preparedness (MVP) Program 2017-2018

IV. MVP Program



20% of cities and towns, $1.1 million

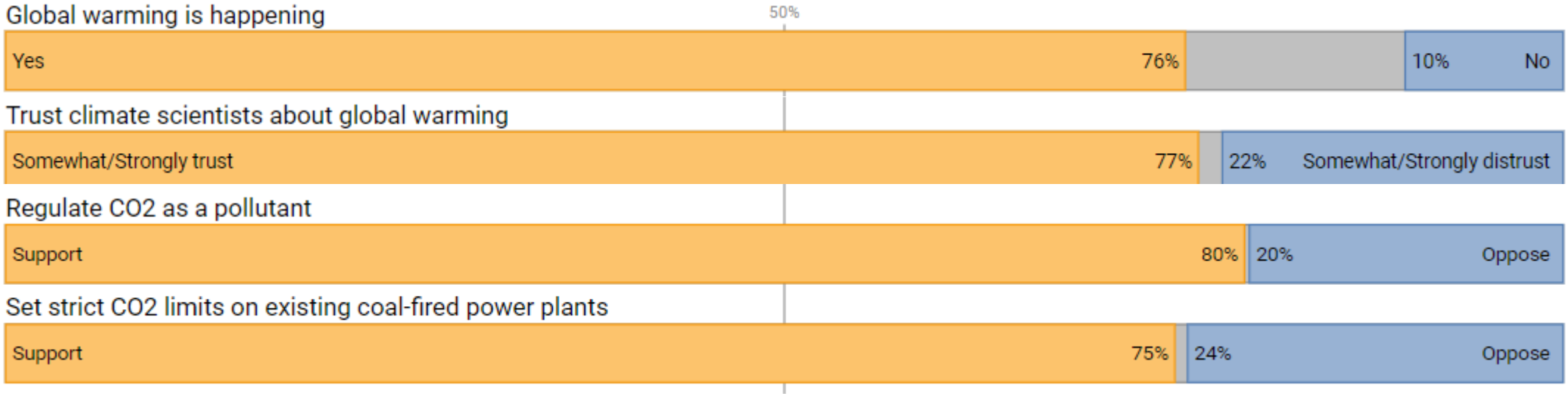
U.S. 2017 Billion-Dollar Weather and Climate Disasters

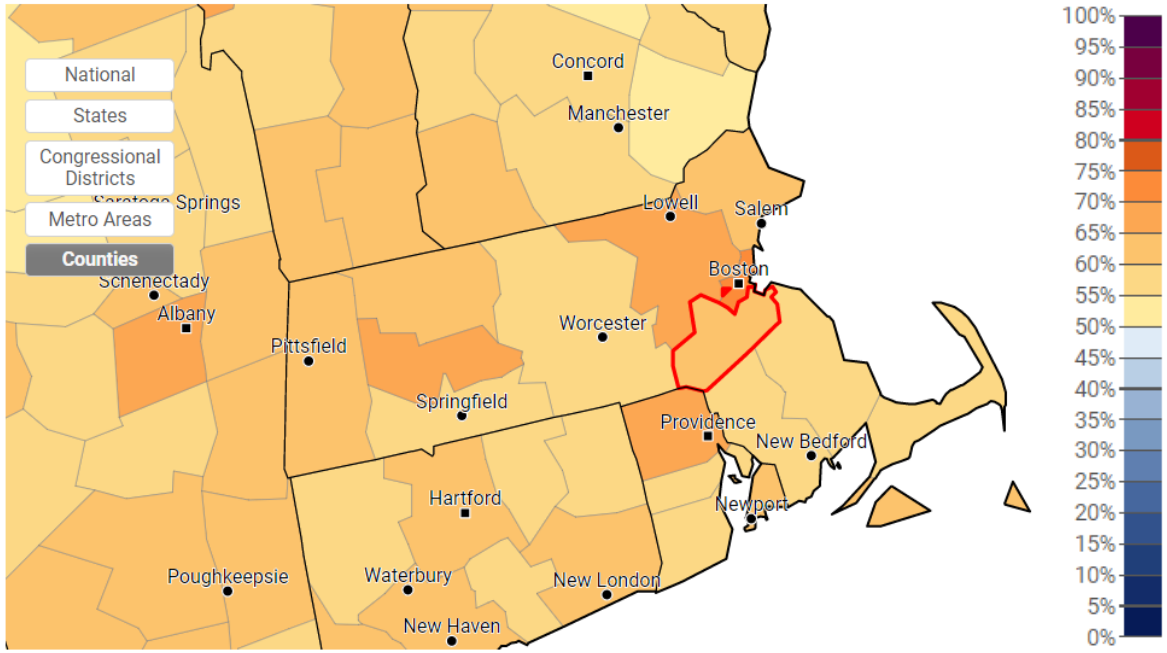


*This map denotes the approximate location for each of the **16 billion-dollar weather and climate disasters** that impacted the United States **during 2017**.*

https://www.washingtonpost.com/news/energy-environment/wp/2018/01/08/hurricanes-wildfires-made-2017-the-most-costly-u-s-disaster-year-on-record

Public Opinion Estimates, Norfolk County, Massachusetts, 2016



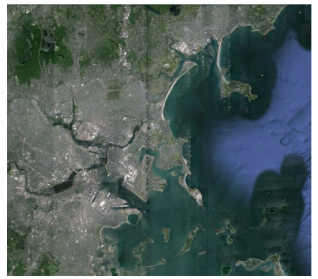


Estimated % of adults who are worried about global warming, 2016

http://environment.yale.edu/ycom/factsheets/MapPage/2017Rev/?est=worried&type=value&geo=county&id=25021

WOODS HOLE GROUP

Evaluation of June 9, 2014 Federal Emergency Management Agency Flood Insurance Study for Town of Weymouth, Norfolk, Co, MA

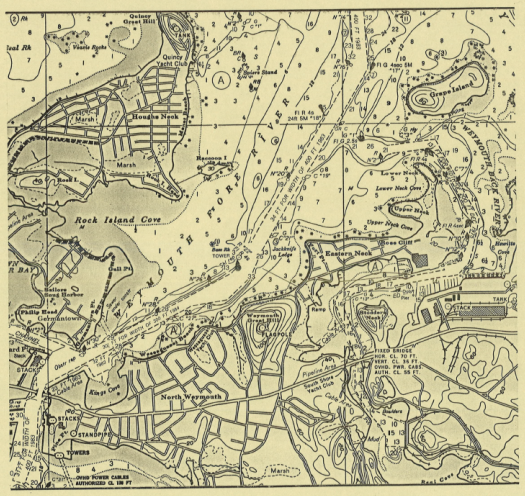


Prepared For:
Woodard & Curran
95 Cedar Street, Suite 100
Providence, RI 02903

Prepared By:
Woods Hole Group, Inc.
81 Technology Park Drive
East Falmouth, MA 02536

August 2015

WEYMOUTH WATERFRONT PLAN



AUGUST, 1988

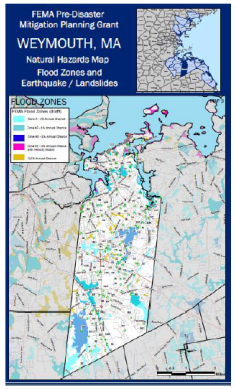
PREPARED BY HENDERSON GROUP

Weymouth Regulatory Assessment for Healthy Community Design

Prepared by Pioneer Valley Planning Commission, 2015
With funding support from the
Massachusetts Department of Public Health

pvpc

TOWN OF WEYMOUTH
HAZARD MITIGATION PLAN
2014 UPDATE



MAPC

Revised Draft Plan Update for MEMA and FEMA Review
May 15, 2015

TOWN OF WEYMOUTH
OPEN SPACE AND RECREATION PLAN

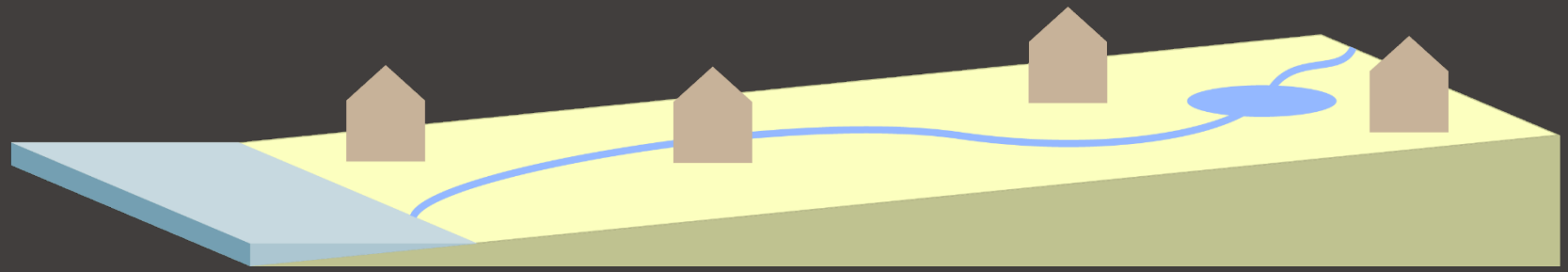
TABLE OF CONTENTS

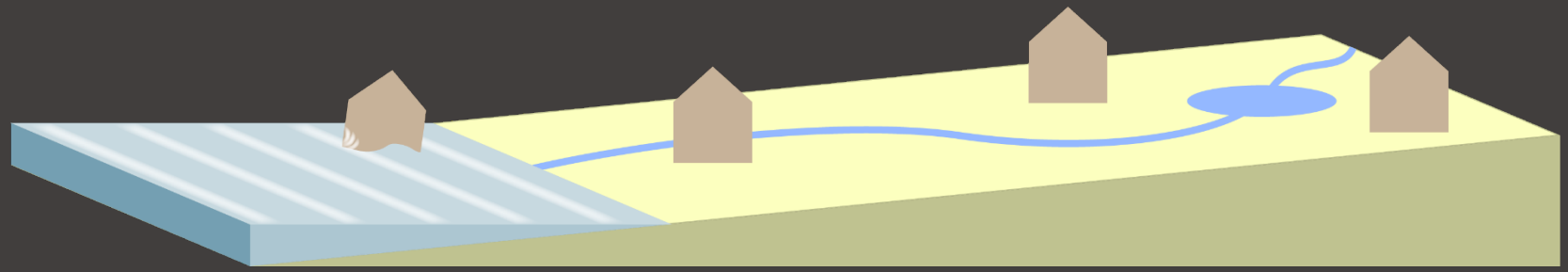
FIRM Analysis for Weymouth, Massachusetts

WESSAGUSSET - 1622 · LABORARE SIT VINCERE · MASSACHUSETTS · WEYMOUTH-1635

June 16, 2015
7:00pm
Woodard & Curran
Woods Hole Group

What are the top four natural hazards for Weymouth?

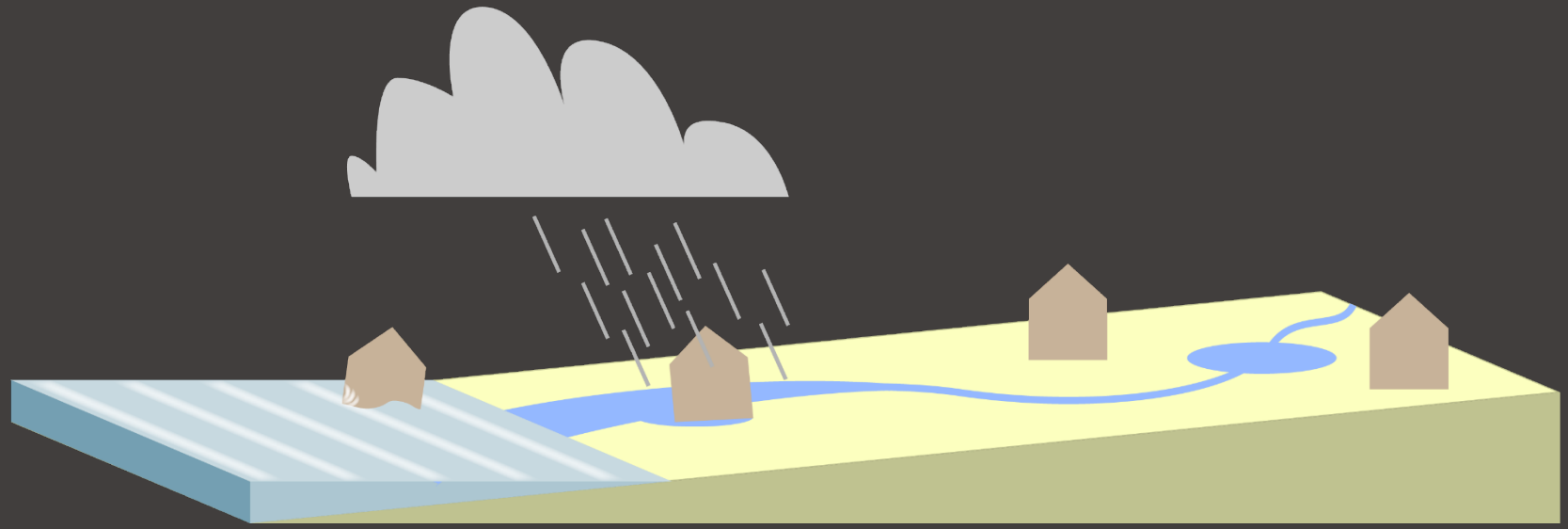




1 Coastal flooding and sea level rise

3 feet of sea level rise by 2100

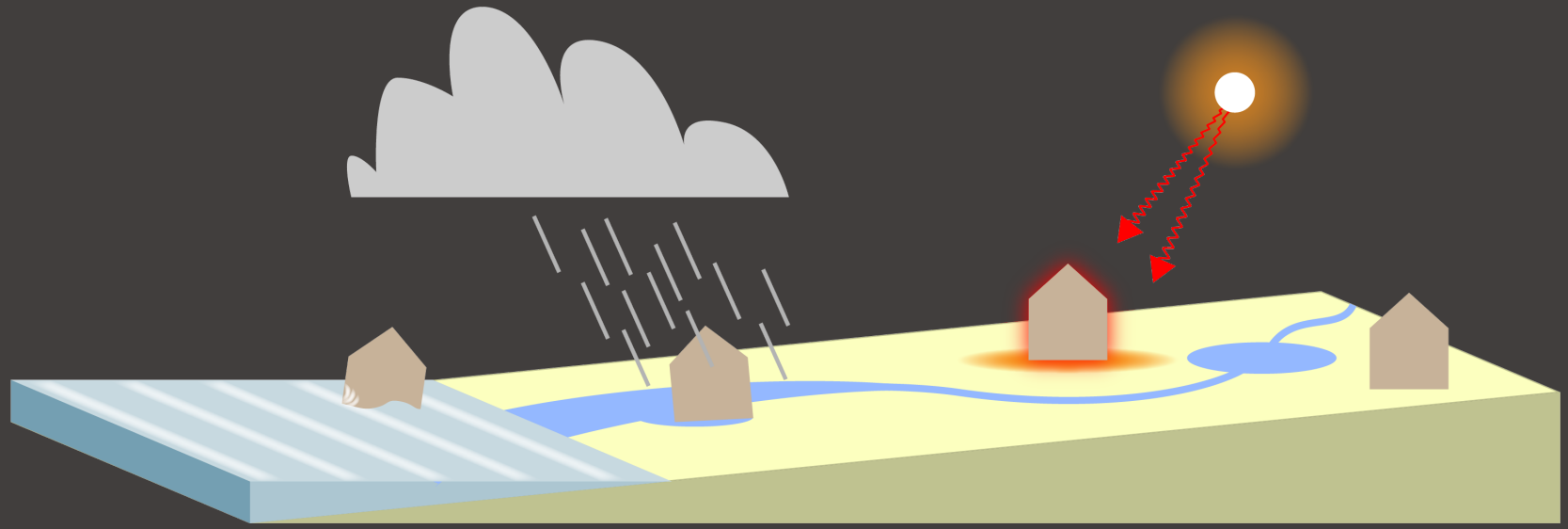
2 **Extreme storms**
More days with over 1 inch of precipitation



1 **Coastal flooding and sea level rise**
3 feet of sea level rise by 2100

2 **Extreme storms**
More days with over 1 inch of precipitation

3 **Extreme temperatures**
More days with over 90 °F
(and fewer under 32 °F)



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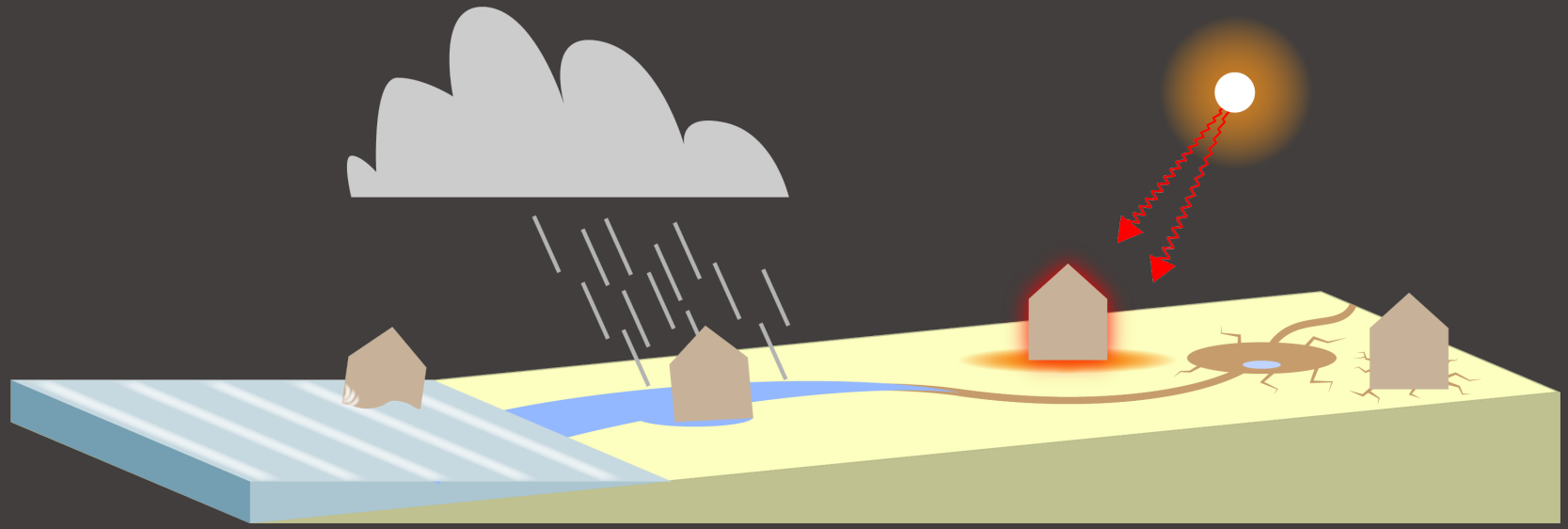
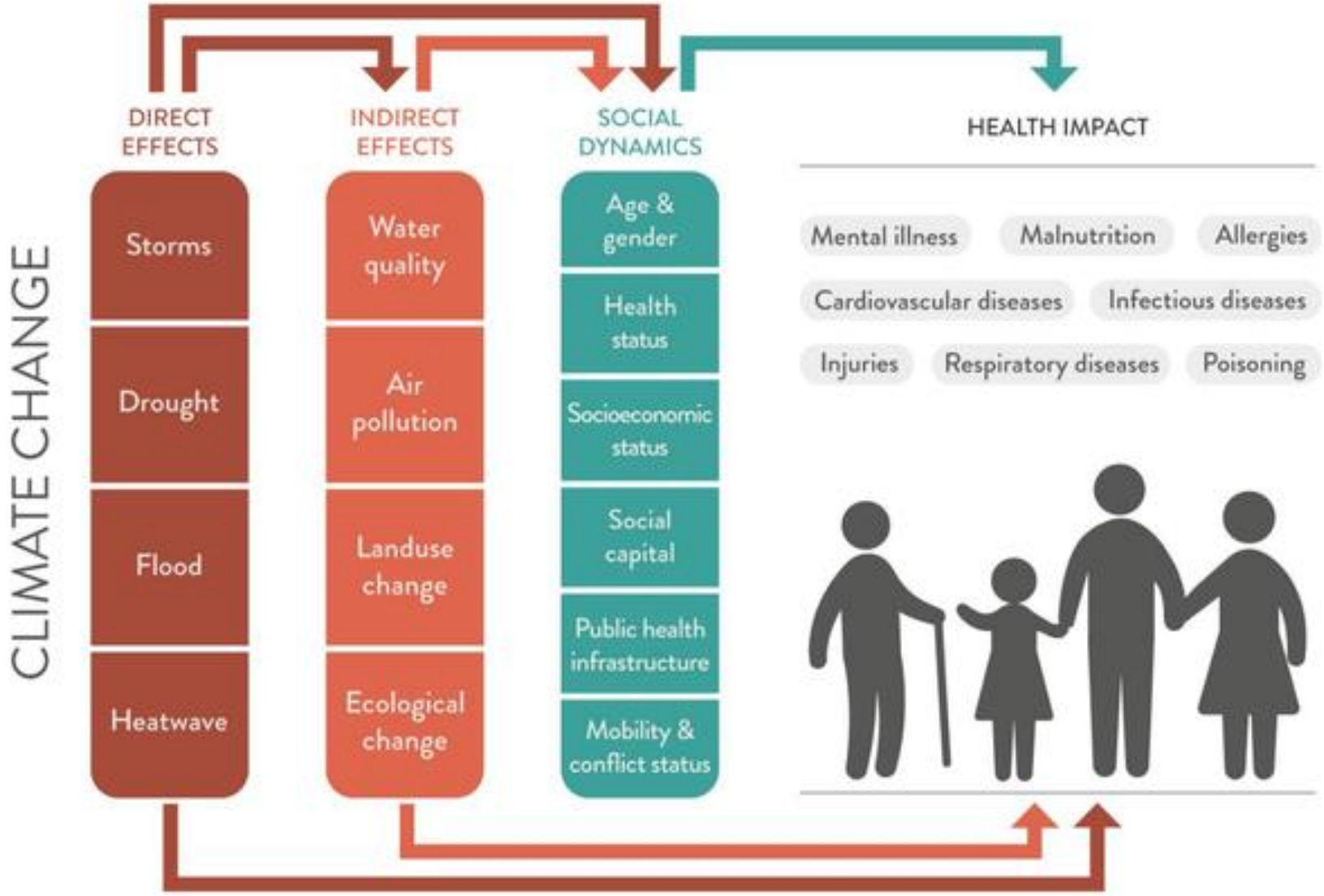


1 **Coastal flooding and sea level rise**
3 feet of sea level rise by 2100

4 **Drought**
More consecutive dry days in the fall

What are the risks to Weymouth's infrastructure, society, and environment?



Societal Features

- Availability of services
- Vulnerable populations, elderly, disabled, low income, etc.
- Response personnel
- Community networks
- Civic groups

Infrastructural Features

- Housing
- Schools
- Roads
- Bridges
- Utilities
- Shoreline protection
- Docks

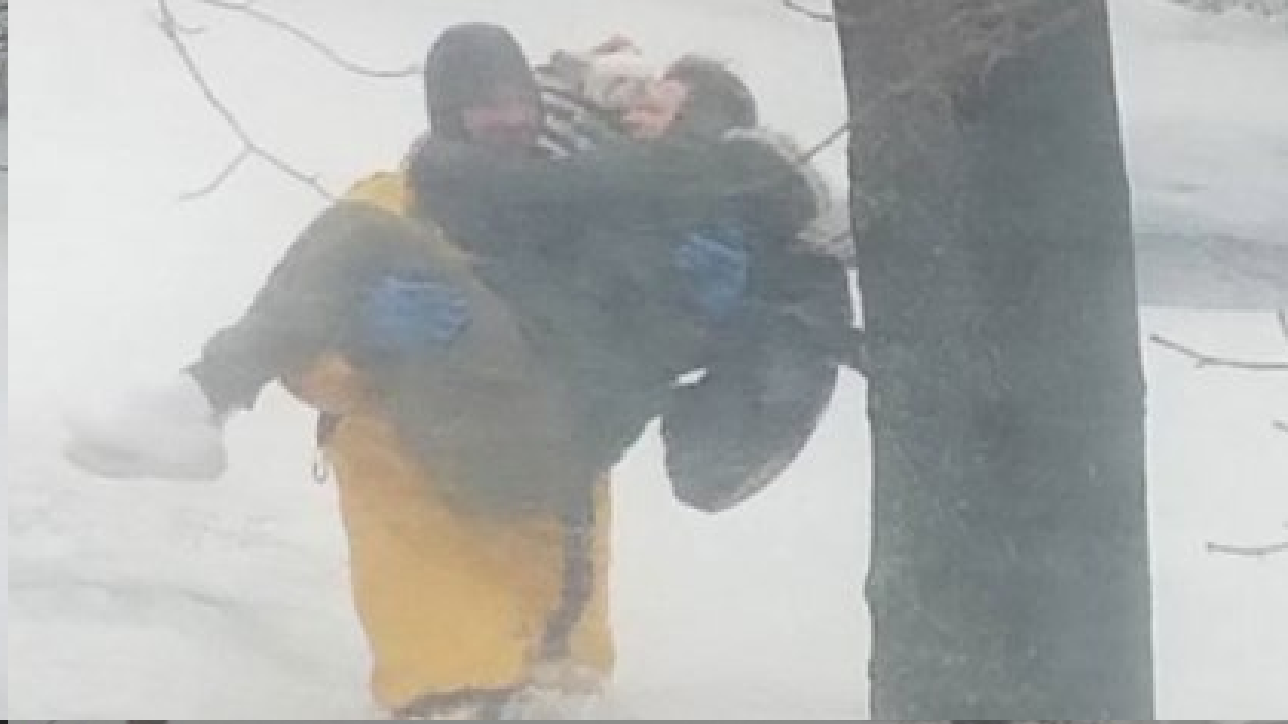
Environmental Features

- Wetlands
- Reservoirs
- Rivers
- Salt marshes
- Fish runs
- Aquifers
- Conservation areas
- Dunes

Standardized State Climate Projections

Researchers from the Northeast Climate Science Center at the UMass Amherst developed projections for changes in temperature, precipitation, and sea level rise for each basin in the state.

1. Coastal flooding and sea level rise

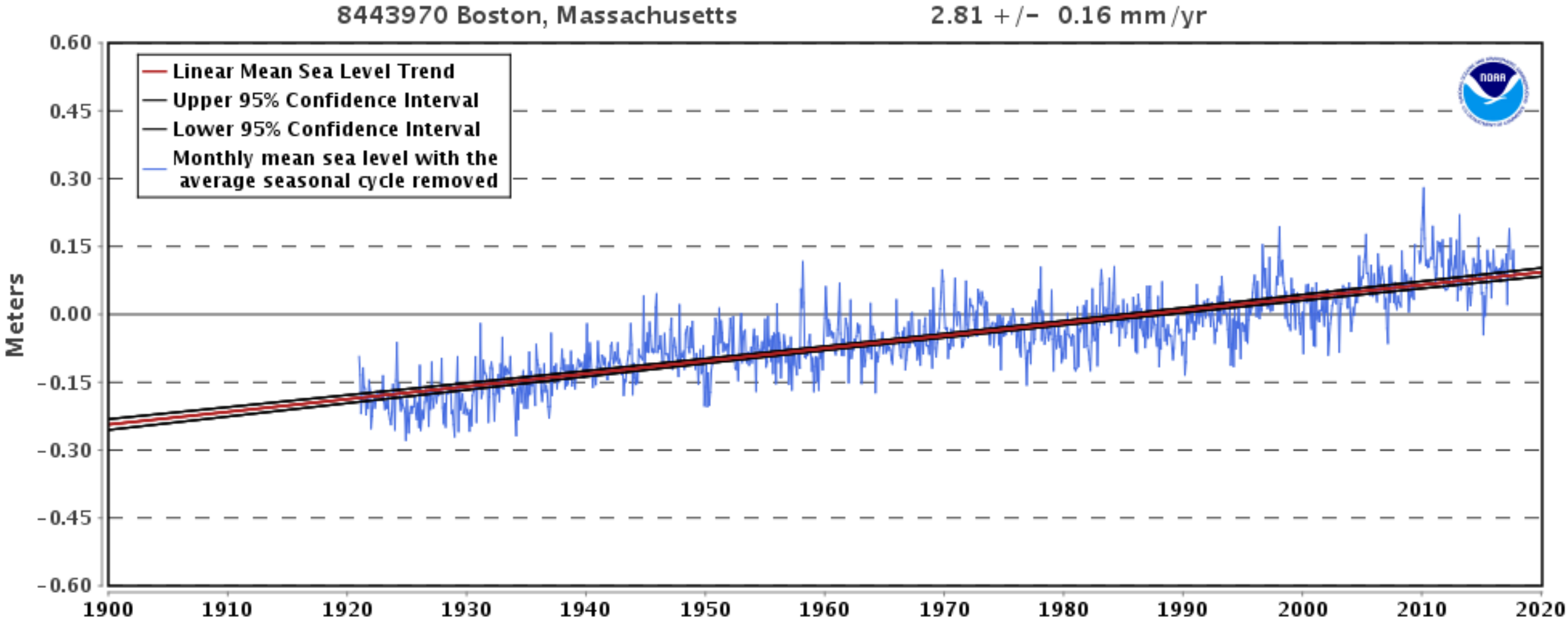


☝ Residents being carried by firefighters through icy flood waters to safety in Weymouth during the height of January 4's storm

Waves crashing over Fort Point Road ☞

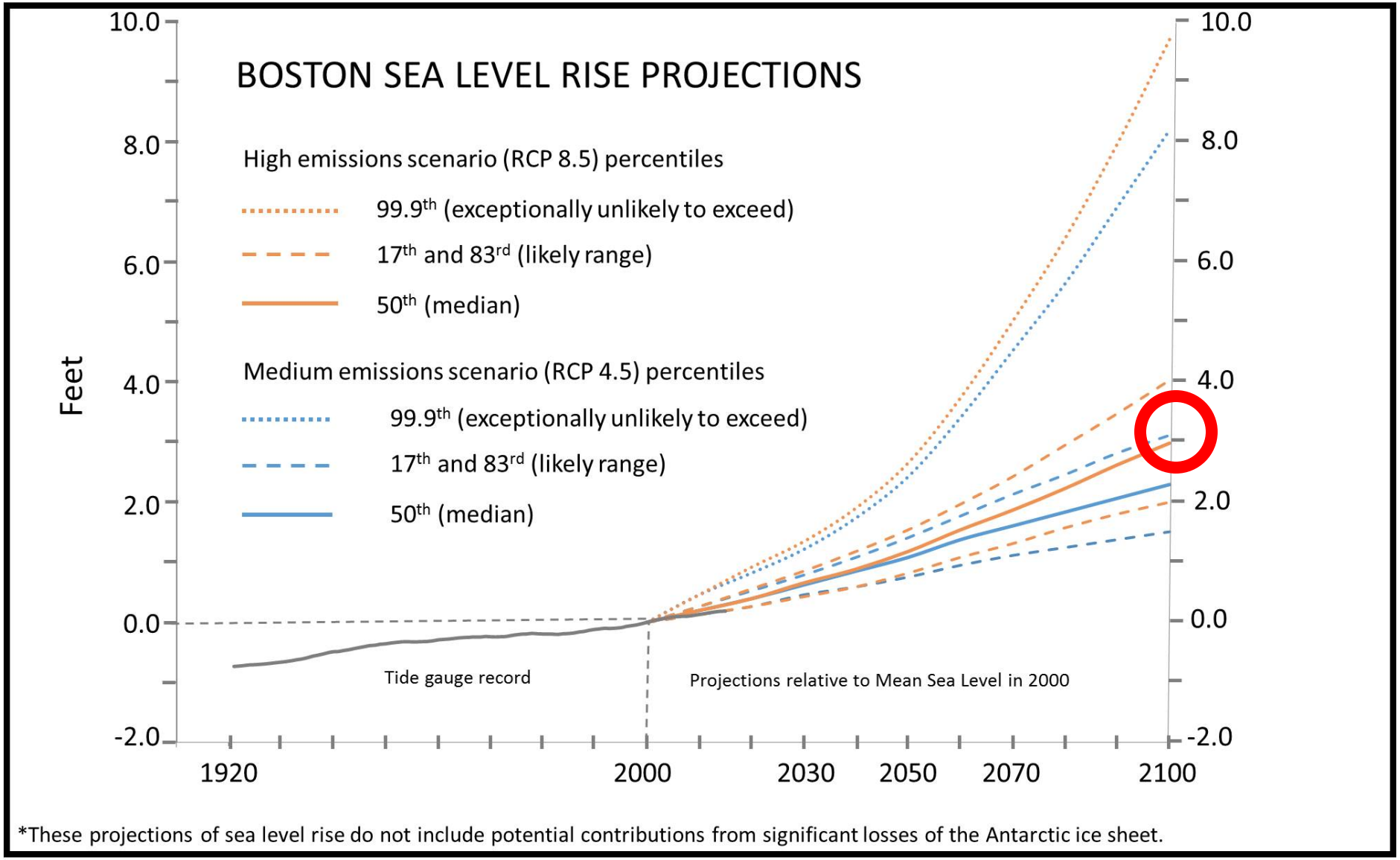
http://boston.cbslocal.com/2018/01/04/weymouth-flood-rescue-blizzard-2018-firefighters-wessagusset-beach/
http://weymouth.wickedlocal.com/news/20180105/flooding-leaves-its-mark-in-north-weymouth-neighborhood

Average sea level rise in Boston for the last century



https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8443970

State's estimate of likely SLR between 2000 and 2100 is 3 feet

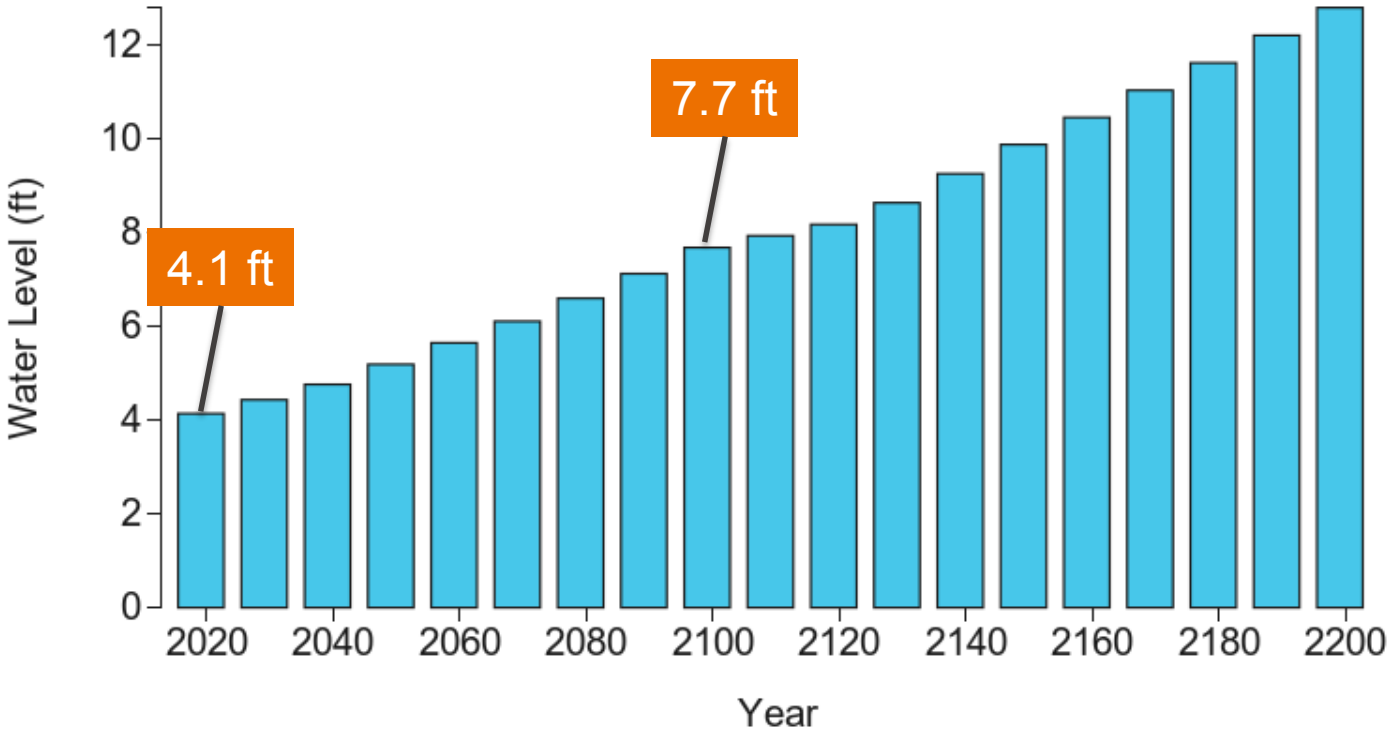


On the 1-yard line in Super Bowl XLIX with a game-clinching interception by then-rookie cornerback Malcolm Butler with 26 seconds remaining in the game.

WEYMOUTH TOWN AREA*

Projected sea level rise + moderate flood level

A “moderate flood” has a roughly 10% chance per year

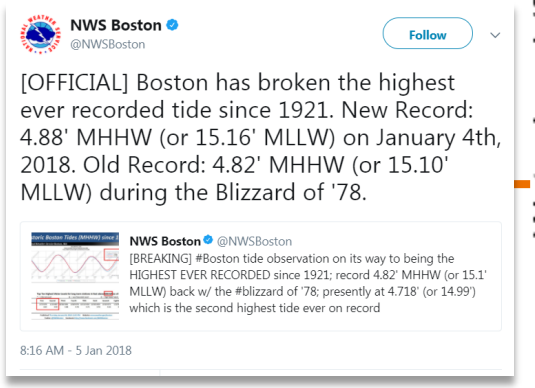


A 4.1’ moderate flood today becomes a 7.7’ flood in 2100 with sea level rise

**At Boston water level station, 12 miles from Weymouth Town*

Analysis uses median local sea level projections based on the intermediate scenario from NOAA Technical Report NOS CO-OPS 083 (2017), intended for the 2018 U.S. National Climate Assessment. Source: Climate Central Risk Finder, 2018. http://www.riskfinder.org/

Sea level rise is relative to a 1992 baseline. A “moderate flood” is locally defined as 3.4 ft above the high tide line in the year it occurs.



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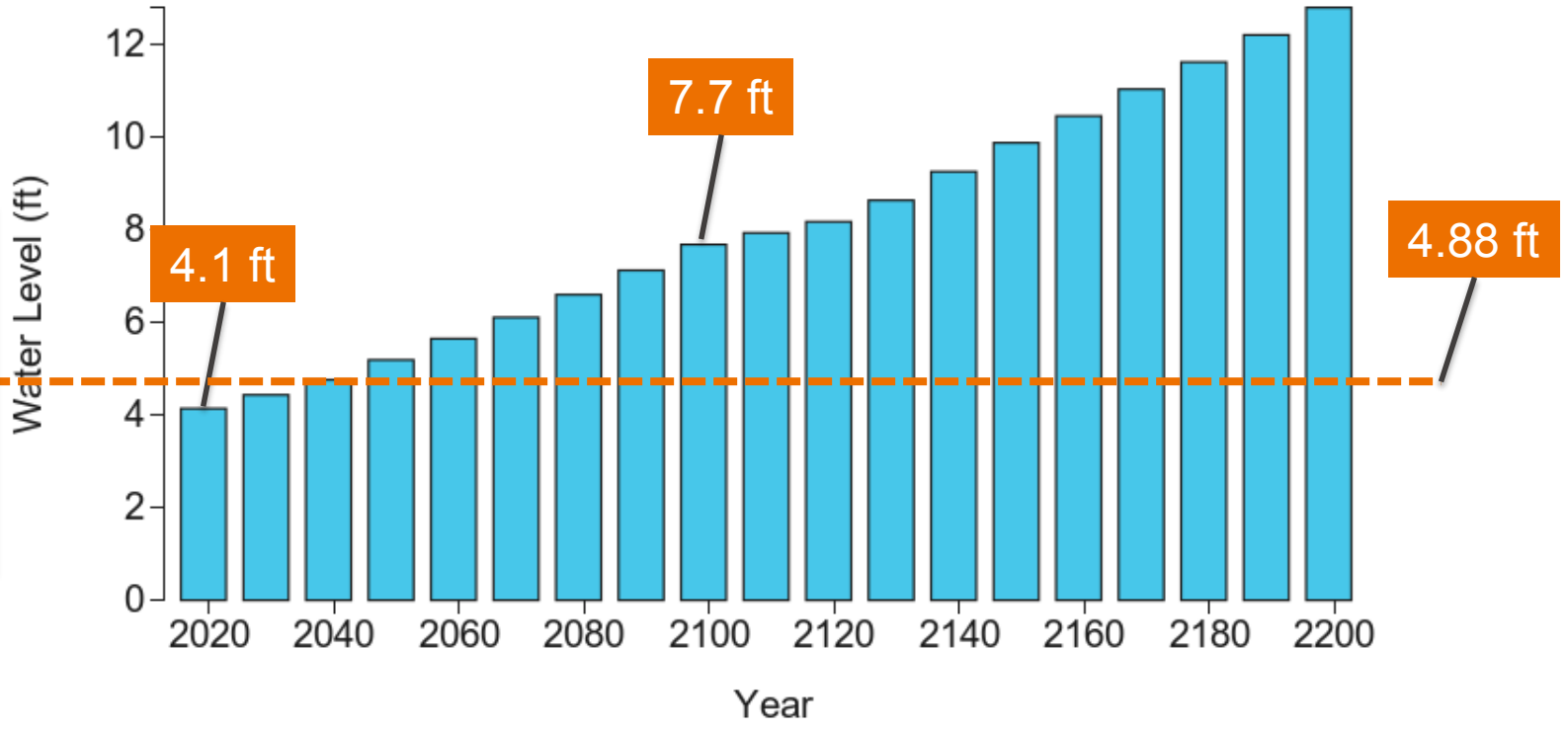

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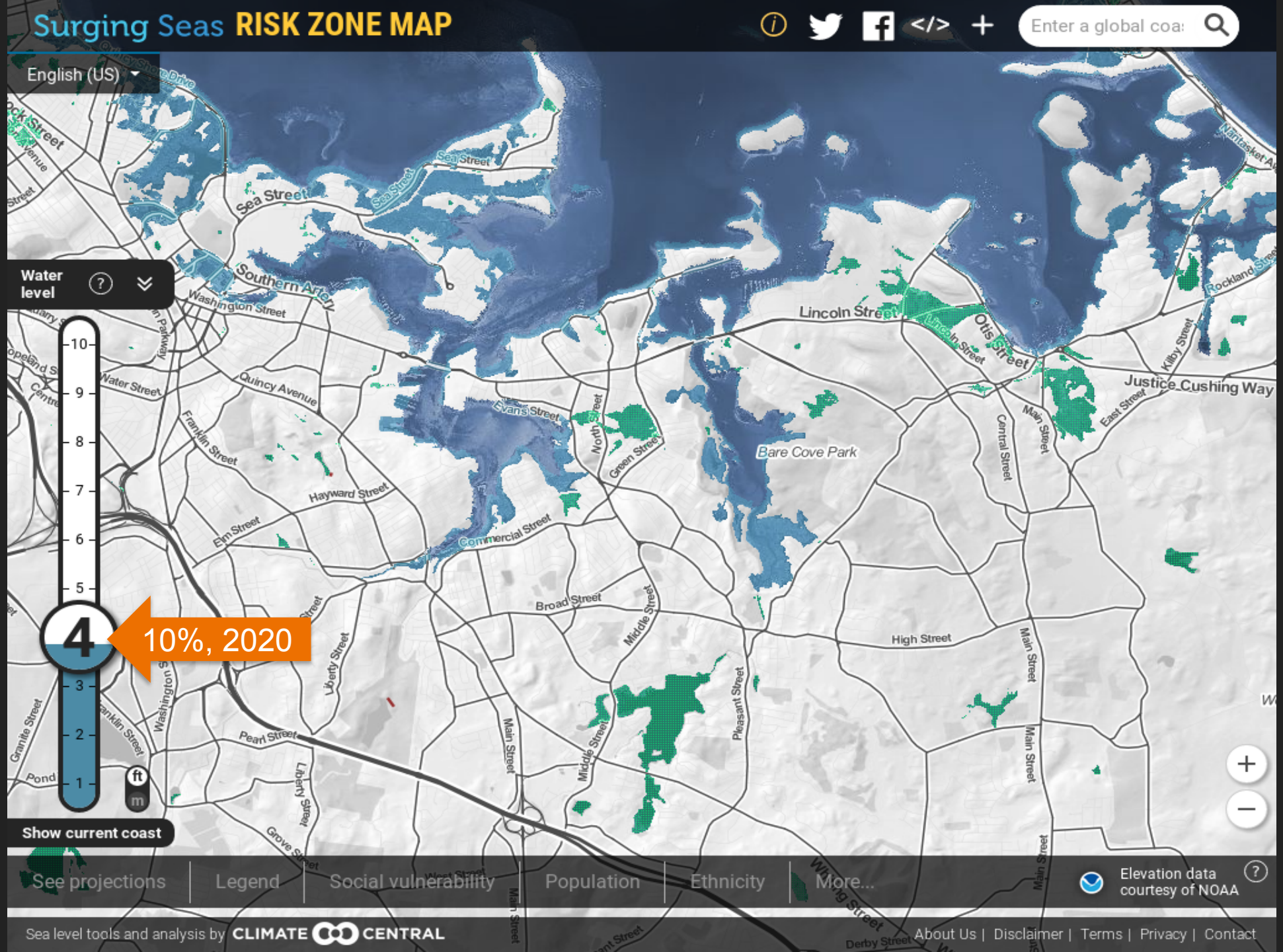
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Bare Cove Park
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High Street
Liberty Street
Middle Street
Pearl Street
Main Street
Pleasant Street
Granite Street
Pond
Grove Street
Central Street
East Street
Kilby Street
Rockland Street
See projections
Legend
Social vulnerability
Population
Ethnicity
More...
Elevation data courtesy of NOAA
Sea level tools and analysis by CLIMATE CENTRAL
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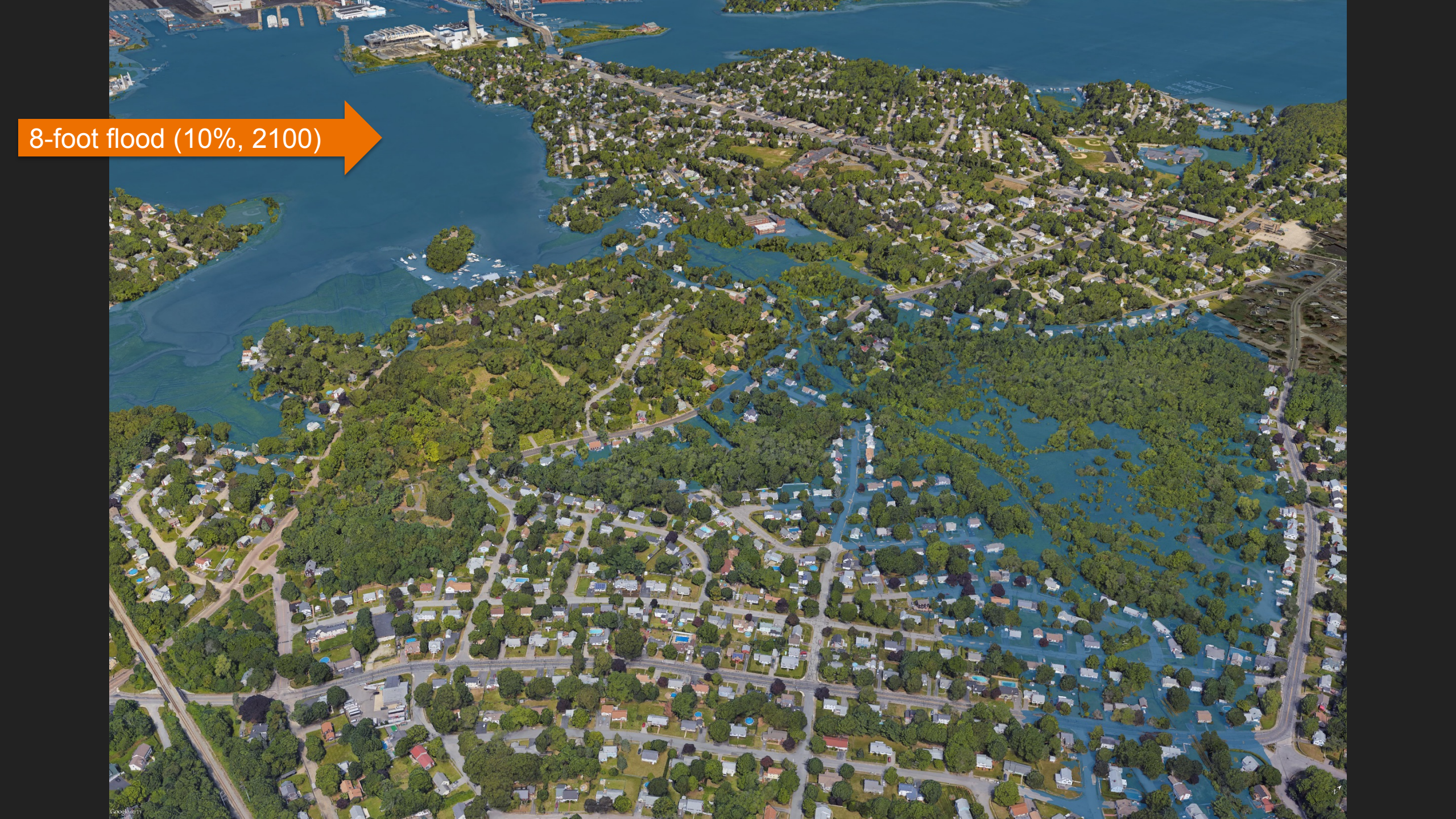
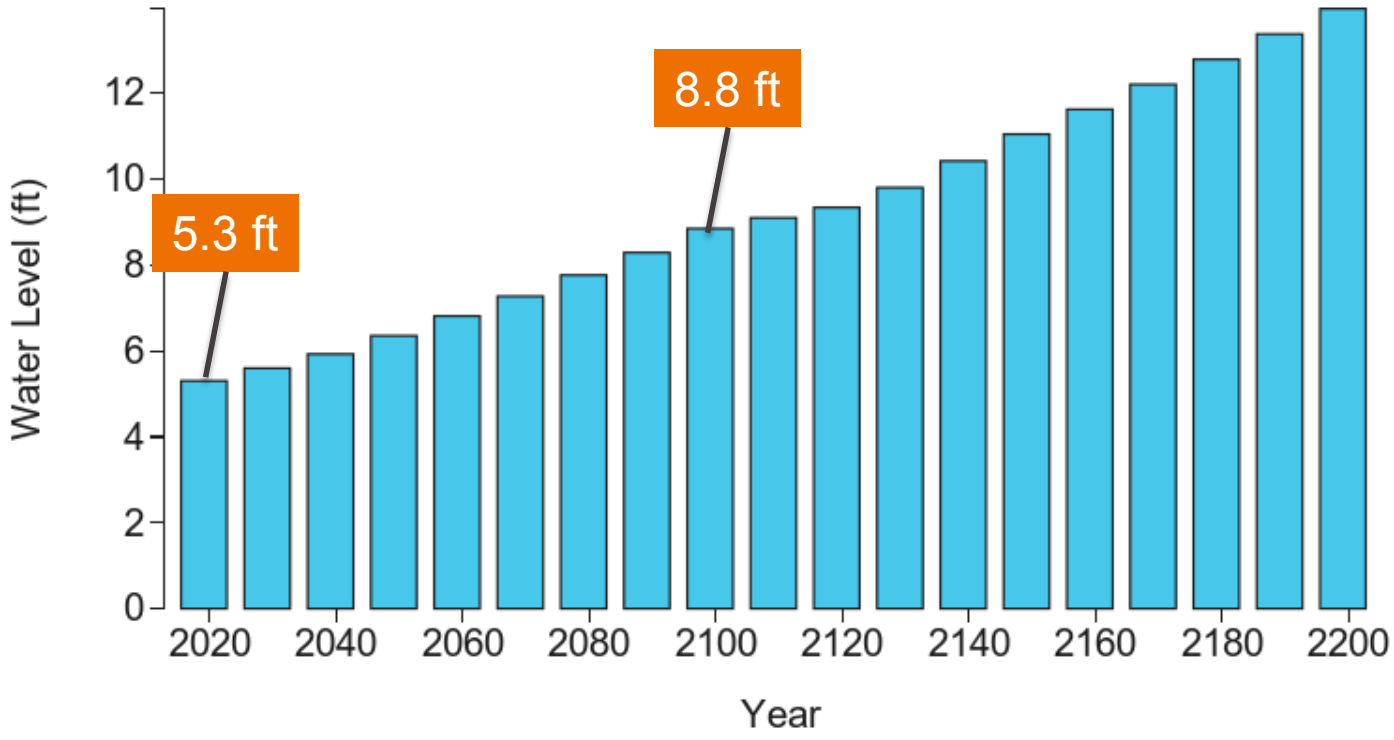

8-foot flood (10%, 2100)

WEYMOUTH TOWN AREA*

Projected sea level rise + major flood level

A “major flood” has a roughly 1% chance per year



A 5.3’ extreme flood today becomes an 8.8’ flood in 2100 with sea level rise

**At Boston water level station, 12 miles from Weymouth Town*

Analysis uses median local sea level projections based on the intermediate scenario from NOAA Technical Report NOS CO-OPS 083 (2017), intended for the 2018 U.S. National Climate Assessment. Source: Climate Central Risk Finder, 2018. http://www.riskfinder.org/

Sea level rise is relative to a 1992 baseline. A “major flood” is locally defined as 4.5 ft above the high tide line in the year it occurs.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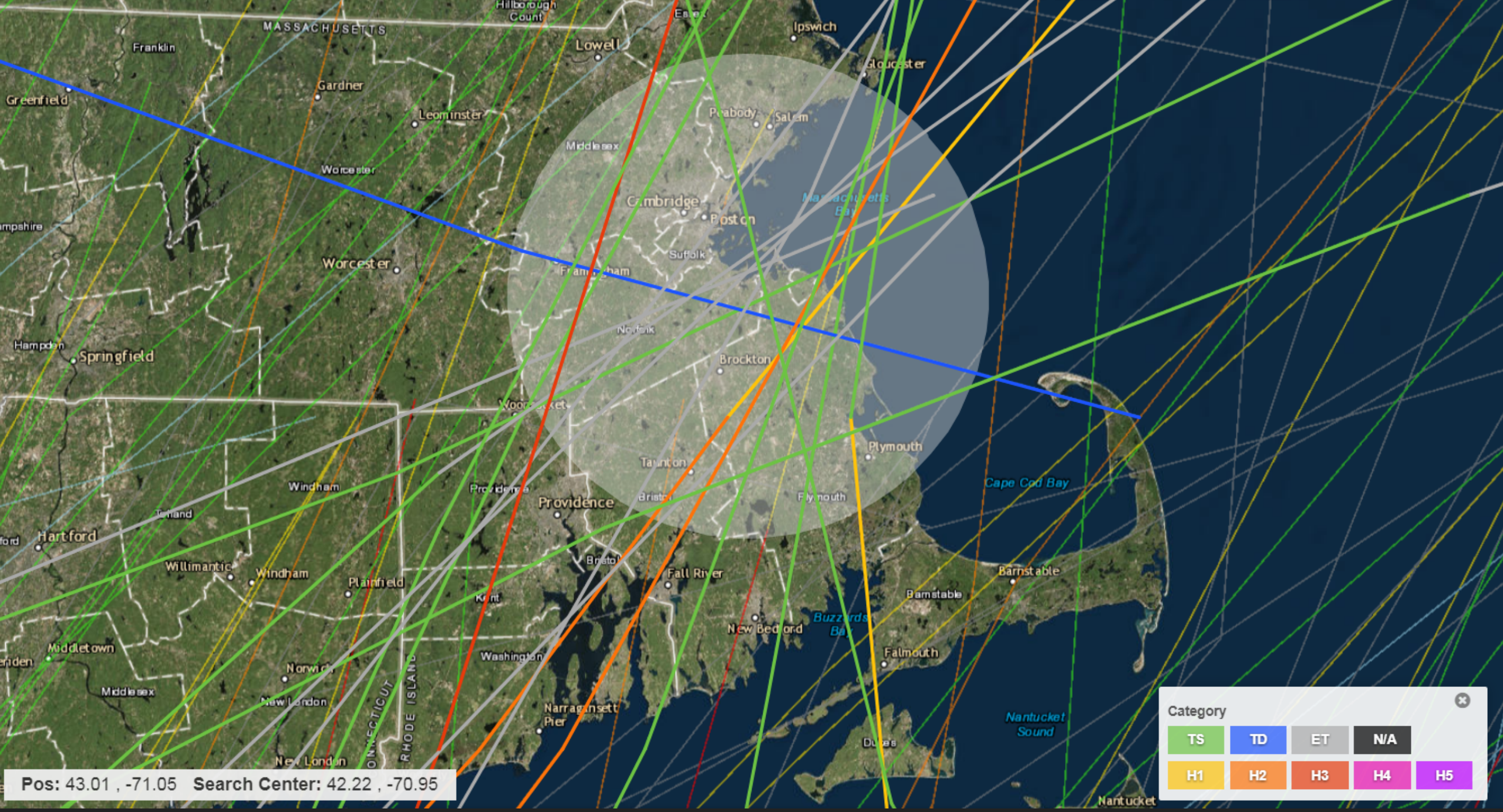
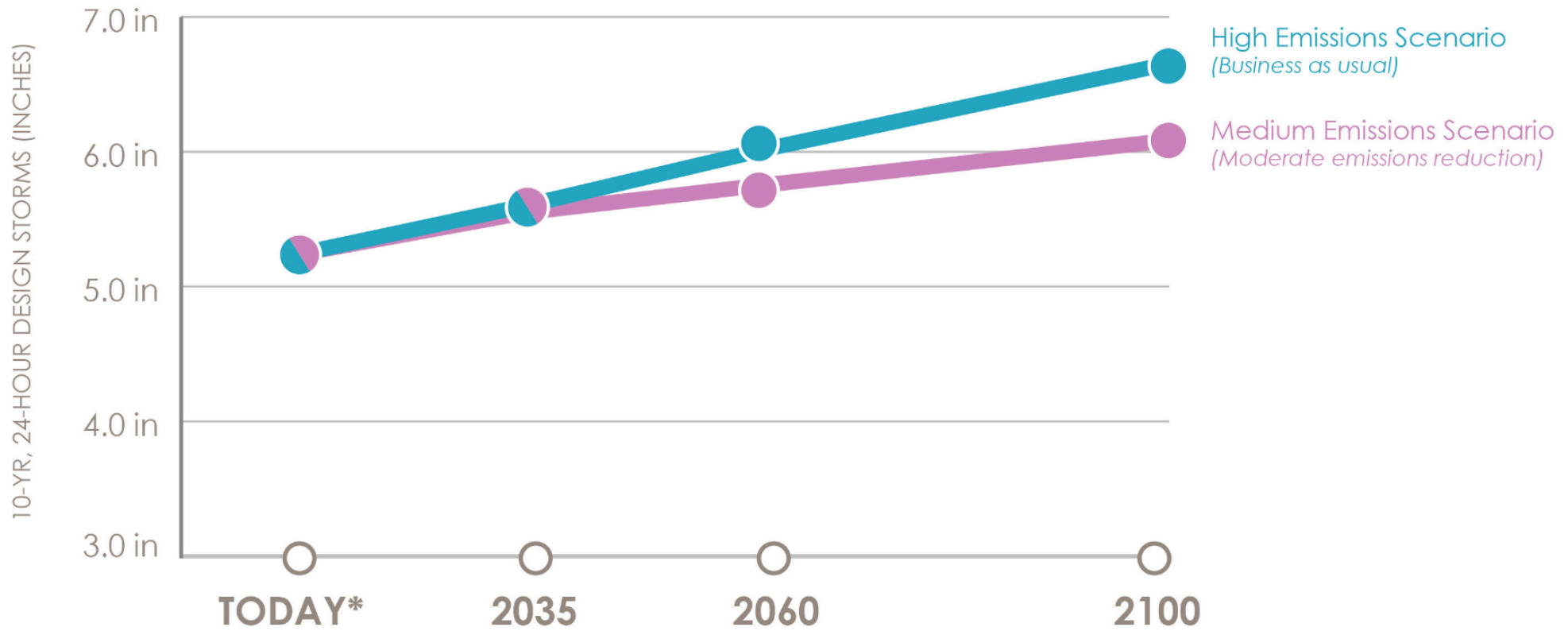
2. Extreme storms



https://coast.noaa.gov/hurricanes/

Andrea 2013, Hanna 2008, Barry 2007, Hermine 2004, Bob 1991

RAINFALL FROM STORMS WILL INCREASE



* "Today" baseline represents historical average from 1948-2012
Confidence intervals are not available for these projections but are likely large, so these numbers should be considered as the middle of a large range

Data Source:
Boston Water & Sewer Commission

https://keepcool.mapc.org/info/why-is-it-so-hot

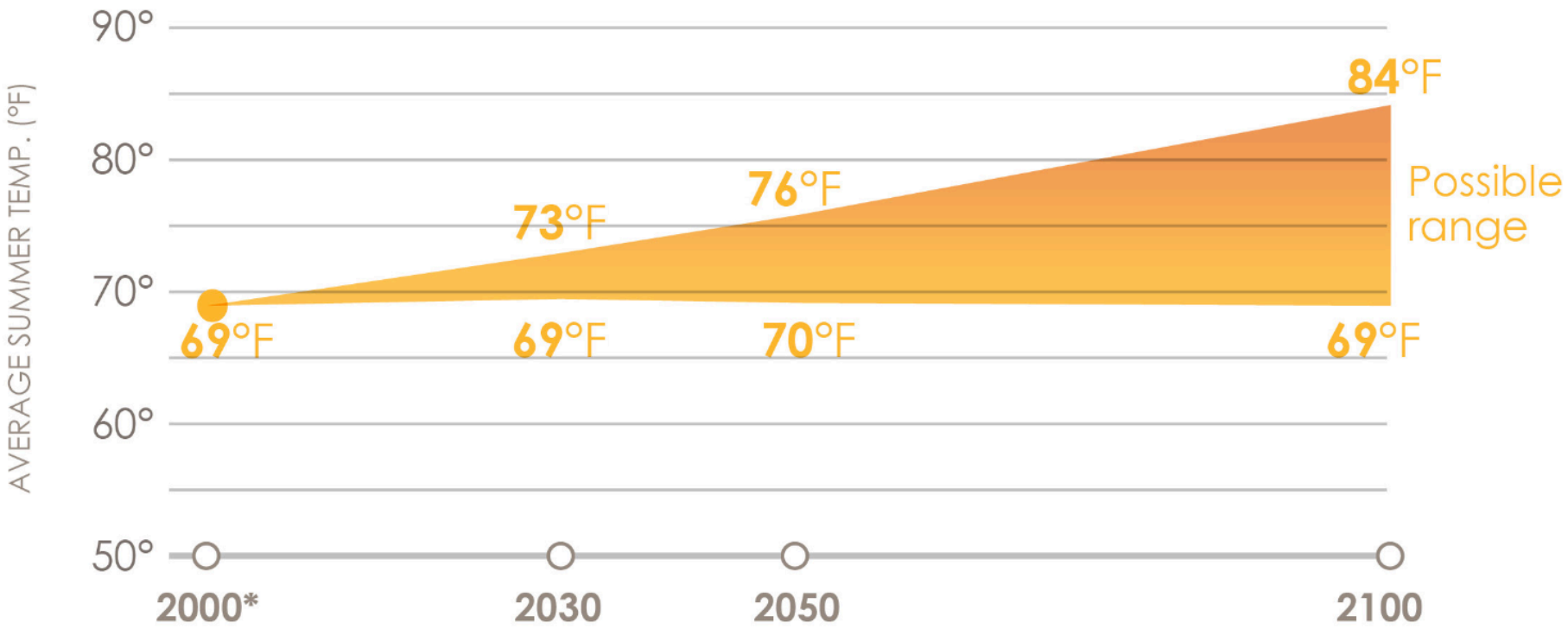

3.46 inches of rain fell in Dorchester, August 2, 2017

Rainy Days in Boston Harbor Basin		Observed Baseline 1971-2000 (Days)	End of Century (Range of Change in Days)
Days with Precipitation Over 1”	Annual	9.06	+1.28 to 4.43
	Winter	2.4	+0.41 to 2.20
	Spring	2.04	+0.23 to 1.33
	Summer	1.96	-0.17 to +0.61
	Fall	2.64	-0.33 to +1.01
Days with Precipitation Over 2”	Annual	1.27	+0.27 to 1.19
	Winter	0.2	+0.02 to 0.34
	Spring	0.21	+0.01 to 0.36
	Summer	0.41	-0.07 to +0.13
	Fall	0.44	-0.08 to +0.45
Days with Precipitation Over 4”	Annual	0.08	-0.03 to +0.20
	Winter	0.00	0.00 to 0.00
	Spring	0.00	-0.00 to +0.06
	Summer	0.03	-0.02 to +0.10
	Fall	0.05	-0.02 to +0.12

Rain in Boston Harbor Basin		Observed Baseline 1971-2000 (Inches)	End of Century (Range of Change in Inches)
Total Precipitation	Annual	46.07	+1.09 to 9.03
	Winter	11.82	+0.37 to 4.07
	Spring	11.59	+0.30 to 2.83
	Summer	10.51	-1.66 to +2.23
	Fall	12.18	-1.64 to +1.78

3. Extreme heat

AVERAGE SUMMER TEMPERATURE WILL INCREASE

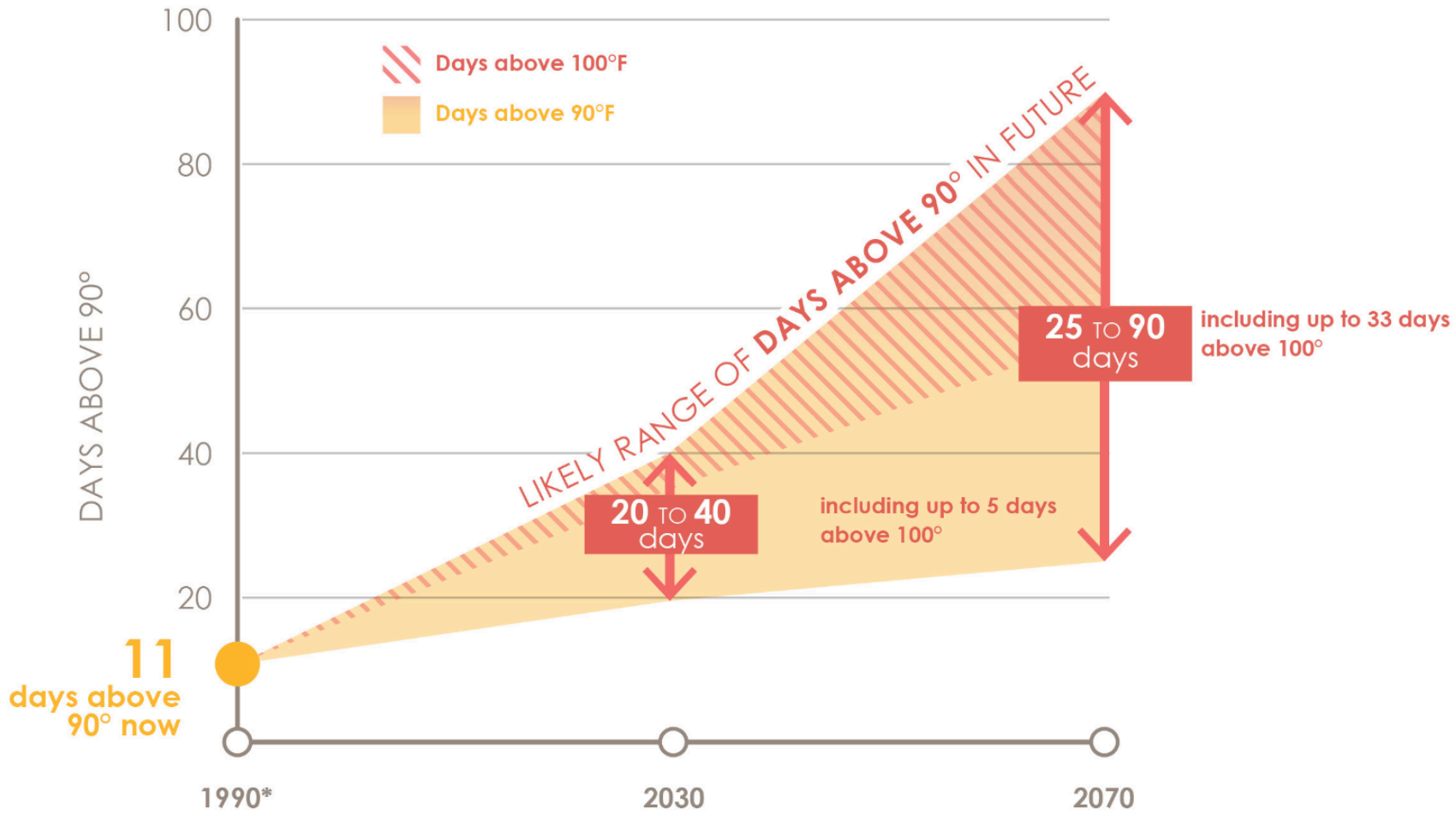


* Baseline represents historical average from 1981-2010
Upper values from high emissions scenario. Lower values from low emissions scenario.

Data source: Houser et al 2015

https://keepcool.mapc.org/info/why-is-it-so-hot

THE NUMBER OF VERY HOT DAYS WILL INCREASE

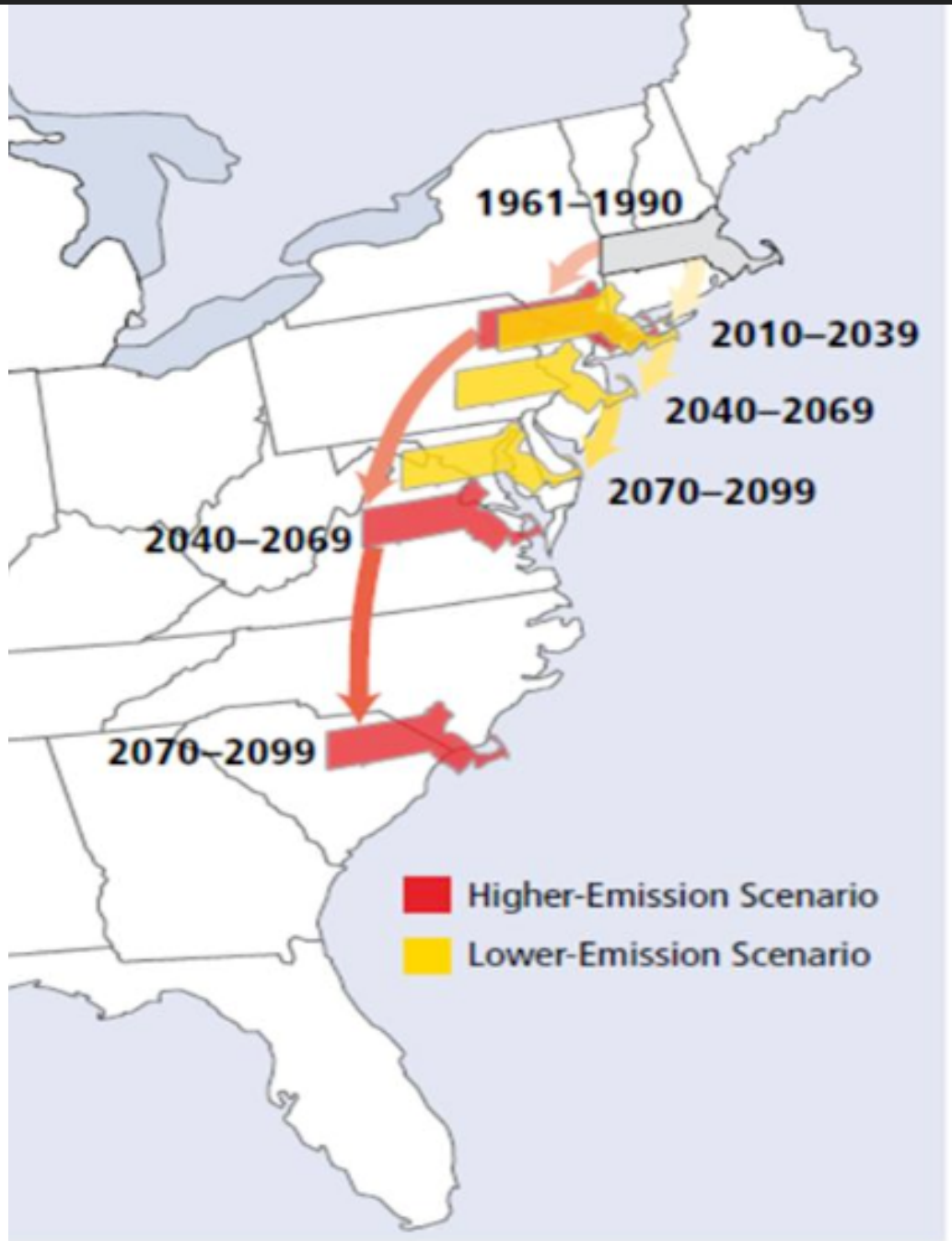


* Baseline represents historical average from 1971-2000
Upper values from high emissions scenario. Lower values from low emissions scenario.

Data source: Rossi et al. 2015

https://keepcool.mapc.org/info/why-is-it-so-hot

What will it feel like in the future?



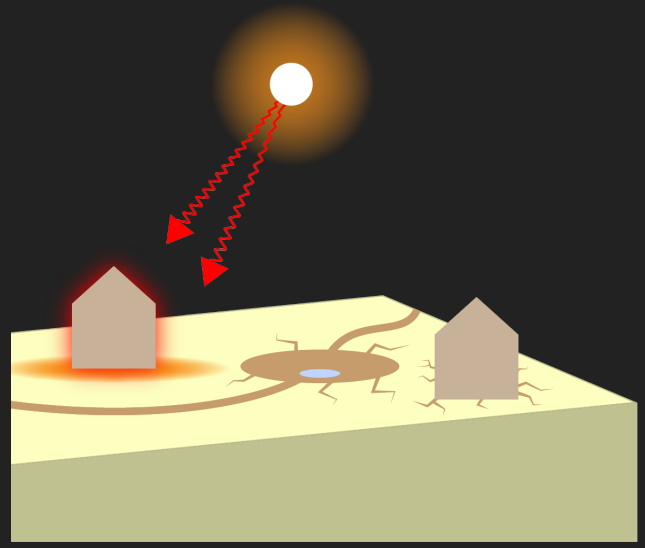
https://keepcool.mapc.org/info/why-is-it-so-hot

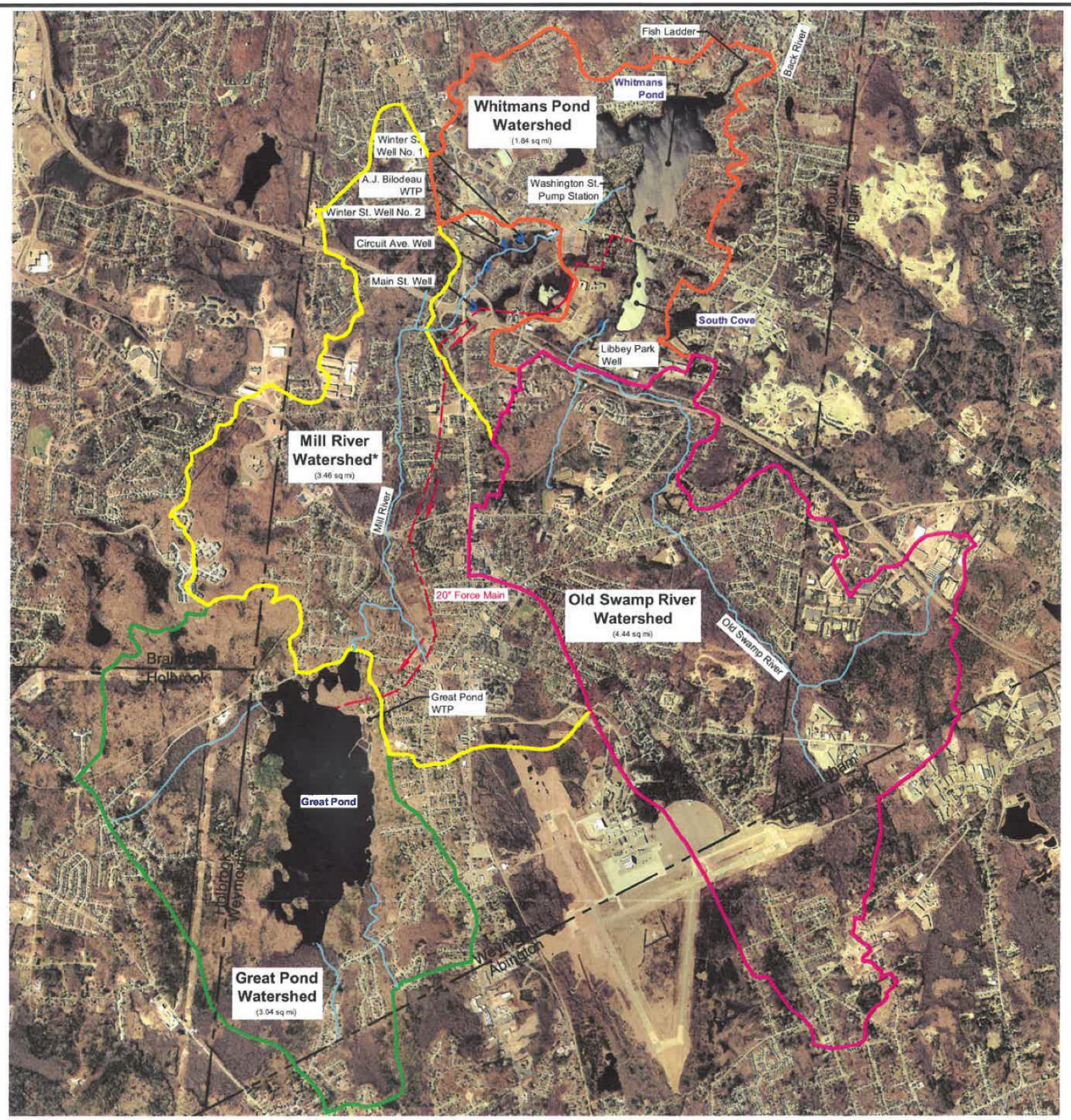
Highs and Lows in Boston Harbor Basin		Observed Baseline 1971-2000 (°F)	End of Century (Range of Change in °F)
Average Temperature	Annual	50.13	+3.46 to 10.84
	Winter	29.84	+3.87 to 10.34
	Spring	47.65	+3.13 to 9.79
	Summer	70.07	+3.39 to 12.11
	Fall	52.58	+3.78 to 11.60
Maximum Temperature	Annual	59.55	+3.19 to 10.74
	Winter	38.38	+3.42 to 9.56
	Spring	57.46	+3.08 to 9.66
	Summer	80.04	+3.22 to 12.21
	Fall	61.93	+3.63 to 11.78
Minimum Temperature	Annual	40.7	+3.75 to 10.95
	Winter	21.31	+4.33 to 10.91
	Spring	37.84	+3.25 to 9.76
	Summer	60.11	+3.56 to 12.02
	Fall	43.22	+3.92 to 11.41

Hot Days in Boston Harbor Basin		Observed Baseline 1971-2000 (Days)	End of Century (Range of Change in Days)
Days with Maximum Temperature Over 90°F	Annual	7.85	+11.54 to 66.93
	Winter	0.00	0.00 to 0.00
	Spring	0.5	+0.29 to 3.97
	Summer	7.04	+10.28 to 51.95
	Fall	0.31	+1.19 to 10.97
Days with Maximum Temperature Over 95°F	Annual	1.08	+4.55 to 40.58
	Winter	0.00	0.00 to 0.00
	Spring	0.01	+0.03 to 1.51
	Summer	1.05	+4.34 to 35.56
	Fall	0.02	+0.26 to 4.83
Days with Maximum Temperature Over 100°F	Annual	0.05	+0.55 to 15.67
	Winter	0.00	0.00 to 0.00
	Spring	0.00	0.00 to +0.36
	Summer	0.05	+0.52 to 14.23
	Fall	0.00	+0.01 to 1.21

Cold Days in Boston Harbor Basin		Observed Baseline 1971-2000 (Days)	End of Century (Range of Change in Days)
Days with Minimum Temperature Below 0°F	Annual	2.58	-0.92 to -2.1
	Winter	2.57	-0.91 to -2.06
	Spring	0.01	-0.11 to -0.00
	Summer	0.00	0.00
	Fall	0.00	0.00
Days with Minimum Temperature Below 32°F	Annual	119.21	-22.54 to -65.69
	Winter	76.48	-8.93 to -34.12
	Spring	26.51	-7.95 to -19.54
	Summer	0.00	-0.03 to -0.00
	Fall	16.19	-5.80 to -14.06

4. Drought





LEGEND

- TOWN LINE
- WATERSHED BOUNDRY
- GROUNDWATER SUPPLY WELL
- 20" RAW WATER TRANSMISSION MAIN
- RIVER / TRIBUTARY

*MILL RIVER WATERSHED NOT INCLUDED IN THE MODELED WHITMANS POND WATERSHED AREA.

N

August 2008

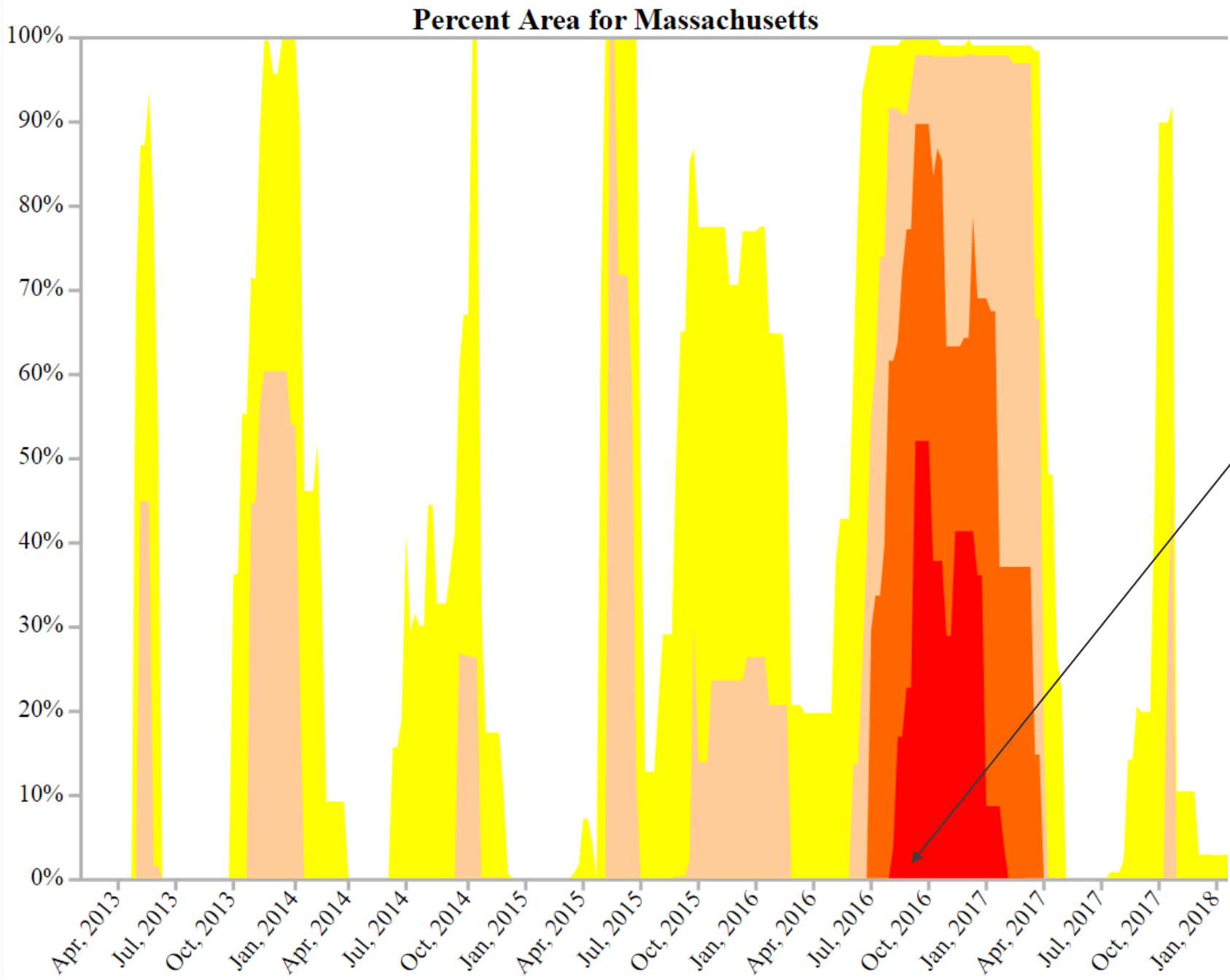
0 3,000 6,000 9,000

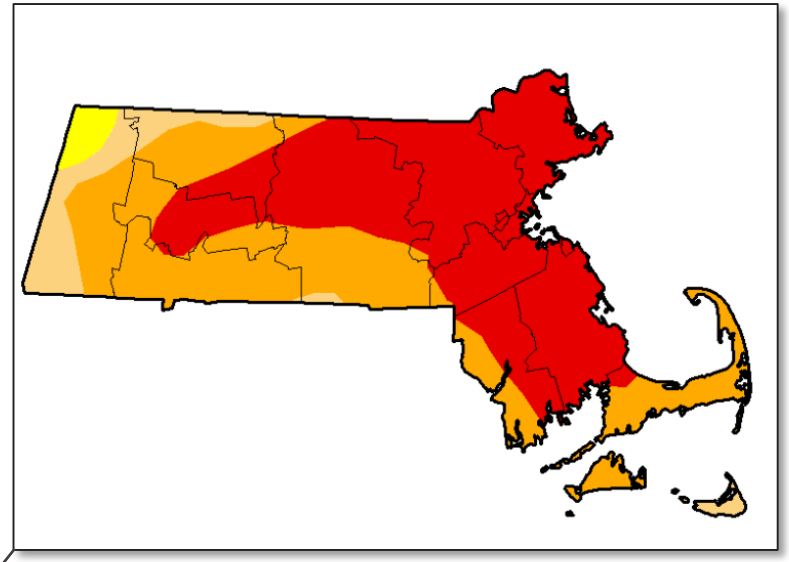
SCALE IN FEET
SCALE: 1" = 3,000'

Figure 2 - Weymouth Water Supply System

Great Pond and Whitmans Pond
Weymouth, Massachusetts

Environmental Partners GROUP
A partnership for engineering solutions.





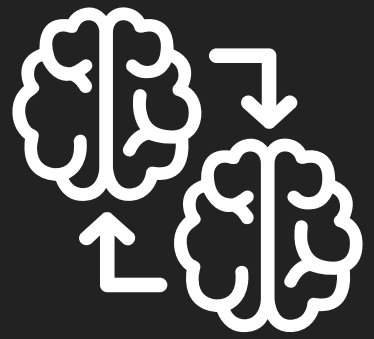
Jul 29, 2016: The Weymouth Department of Public Works asks residents to limit outdoor water use due to a drought watch. Great Pond falls within 1 foot of a water ban.

None | D0 (Abnormally Dry) | D1 (Moderate Drought) | D2 (Severe Drought) | D3 (Extreme Drought) | D4 (Exceptional Drought)

Dry Days in Boston Harbor Basin		Observed Baseline 1971-2000 (Days)	End of Century (Range of Change in Days)
Consecutive Dry Days	Annual	17.46	-0.59 to +3.64
	Winter	11.09	-1.00 to +2.01
	Spring	11.37	-1.31 to +1.27
	Summer	12.58	-1.44 to +2.41
	Fall	12.78	-0.45 to +3.00

Today's goals

Identify Community Strengths & Vulnerabilities



Develop Community Actions

Identify Highest Priority Actions

Overview of the Process (Steps & Tasks)

DURING WORKSHOP

A Prepare for the Workshop
1. Establish a core team with goals.
2. Engage stakeholders.
3. Prepare materials for workshop.
4. Decide on participant arrangements.

B Characterize Hazards
1. Identify past, current, and future impacts.
2. Determine the highest-priority hazards.

C Identify Community Vulnerabilities and Strengths
1. Identify infrastructural vulnerabilities and strengths.
2. Identify societal vulnerabilities and strengths.
3. Identify environmental vulnerabilities and strengths.

D Identify and Prioritize Community Actions
1. Identify and prioritize infrastructural actions.
2. Identify and prioritize societal actions.
3. Identify and prioritize environmental actions.

E Determine the Overall Priority Actions
1. Identify highest-priority actions.
2. Further define urgency and timing.

F Put It All Together
1. Generate final workshop products.

G Move Forward
1. Continue community outreach and engagement.
2. Secure additional data and information.
3. Inform existing planning and project activities.

Community Components

Infrastructural

Societal

Environmental

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

Features	Location	Ownership	V or S	Top Priority Hazards: Coastal flooding and sea level rise	Extrem	B(✓)	Drought	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Societal									
C									
						D			
Environmental									

Questions?

Time	Activity	Who
8:30 AM	Breakfast, registration	
9:00 AM	Welcome address	Mayor Hedlund
9:15 AM	Presentation (MVP, workshop process, top hazards), Q&A	Stantec's Urban Places
10:30 AM	Identify municipal vulnerabilities and strengths	Table groups
11:30 AM	Hazards, vulnerabilities, strengths recap and next steps	Large group discussion
12:00 PM	Lunch	
1:00 PM	Identify and prioritize municipal actions	Table groups
2:30 PM	Identify top 5 actions and write on post-its	Table groups
2:45 PM	Short break	
3:00 PM	Report back per table, organize into themes, and priority exercise	Large group discussion
4:00 PM	Further define urgency and timing	Large group discussion
4:30 PM	Closing remarks	Core project team
5:00 PM	Workshop adjourned	

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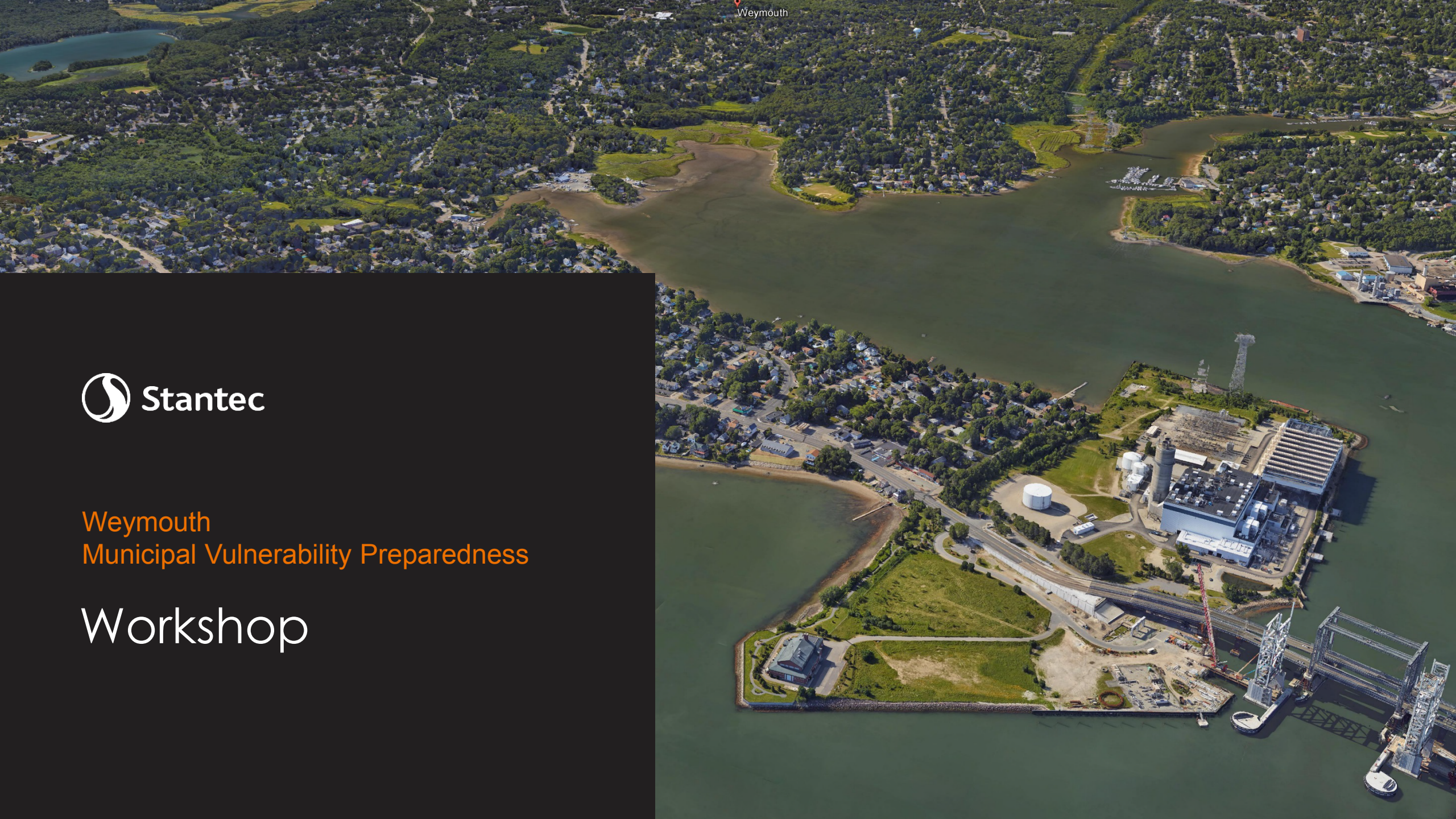
Next Steps

- Report with community actions matrix
- Public listening session



Stantec

Weymouth
Municipal Vulnerability Preparedness

Workshop