Climate Change Education Using Role-Play Simulations

The New England Climate Adaptation Project

• • •

Jennifer West

Narragansett Bay Research Reserve
Coastal Training Program

New England
Climate Adaptation PROJECT

http://necap.mit.edu/

MIT Science Impact Collaborative

Harmonizing Science, Politics and Policy

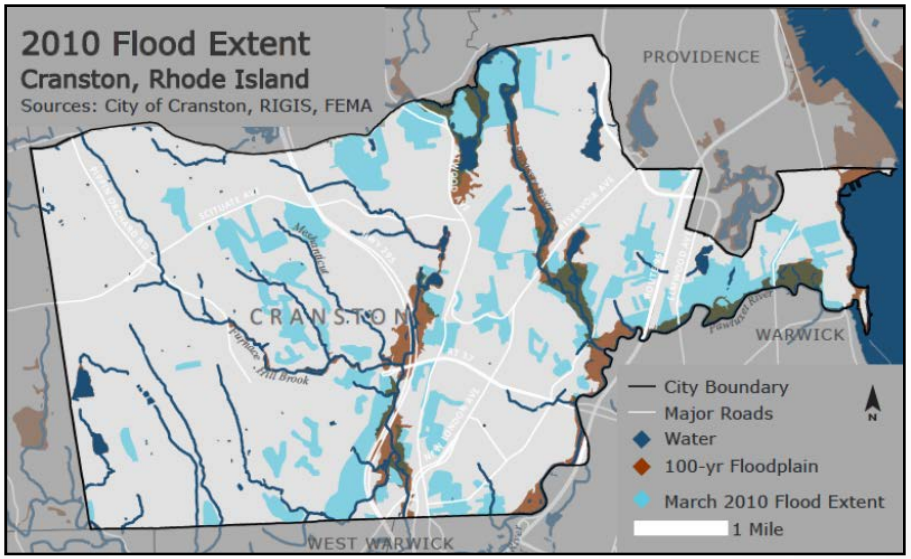
cbi
Consensus Building Institute

NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

Funded by the NERRS Science Collaborative

Project Goals

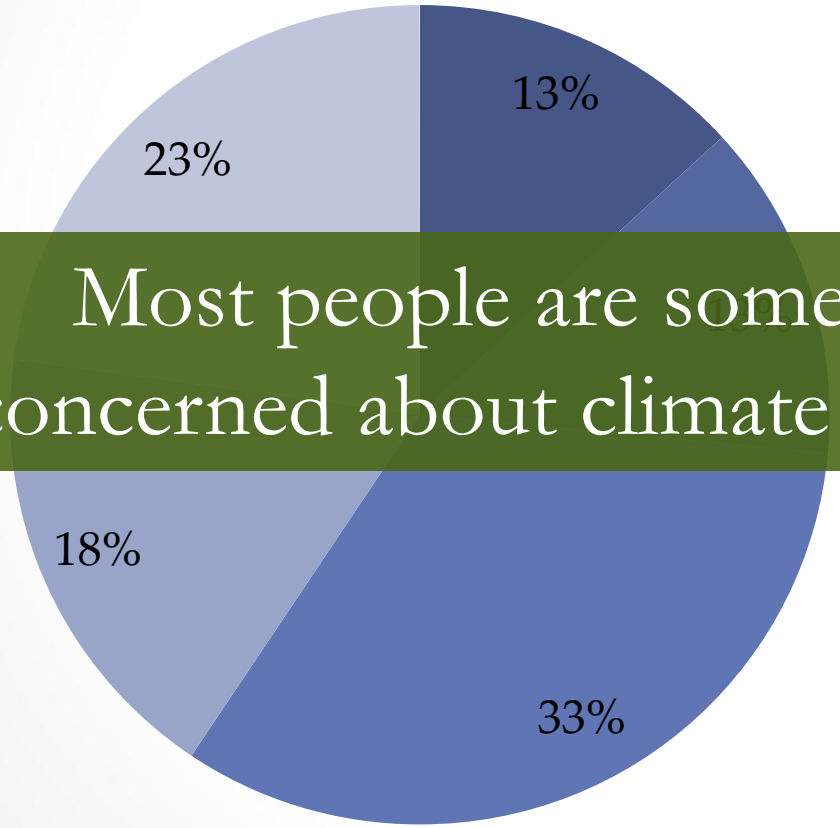
- Assess local climate change risks
- Identify key challenges and opportunities for adaptation
- Test the use of role-play simulations as a tool for educating the public about climate change threats and helping communities explore ways of enhancing their preparedness



Project Outputs

- Public opinion poll
- Risk Assessment
- Stakeholder Assessment
- Tailored, science-based role-play simulation
- Case study

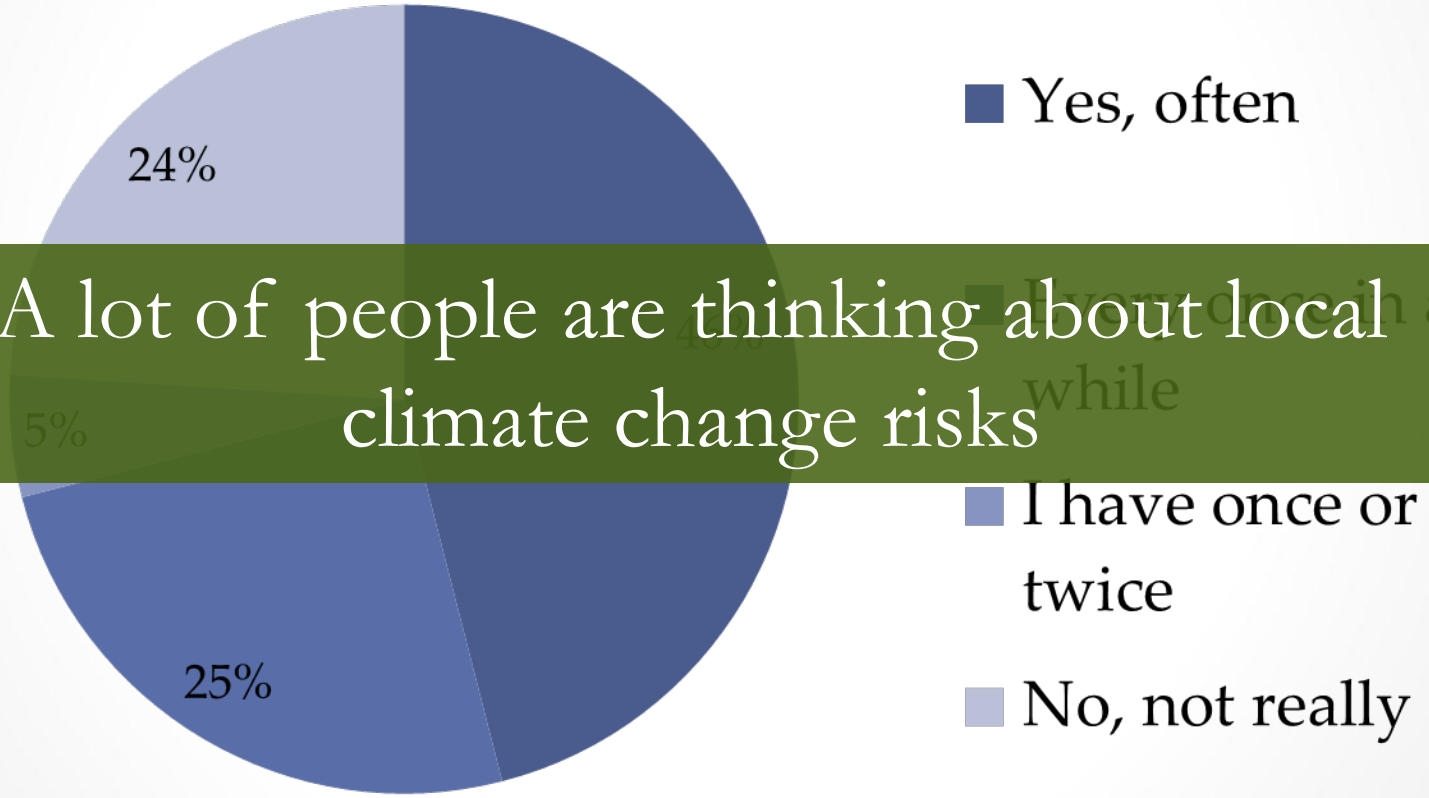
How concerned are you about the possible impacts a changing climate might have on your town?



- 1 - Not at all concerned
- 2
- 3 - Somewhat concerned
- 4
- 5 - Very concerned

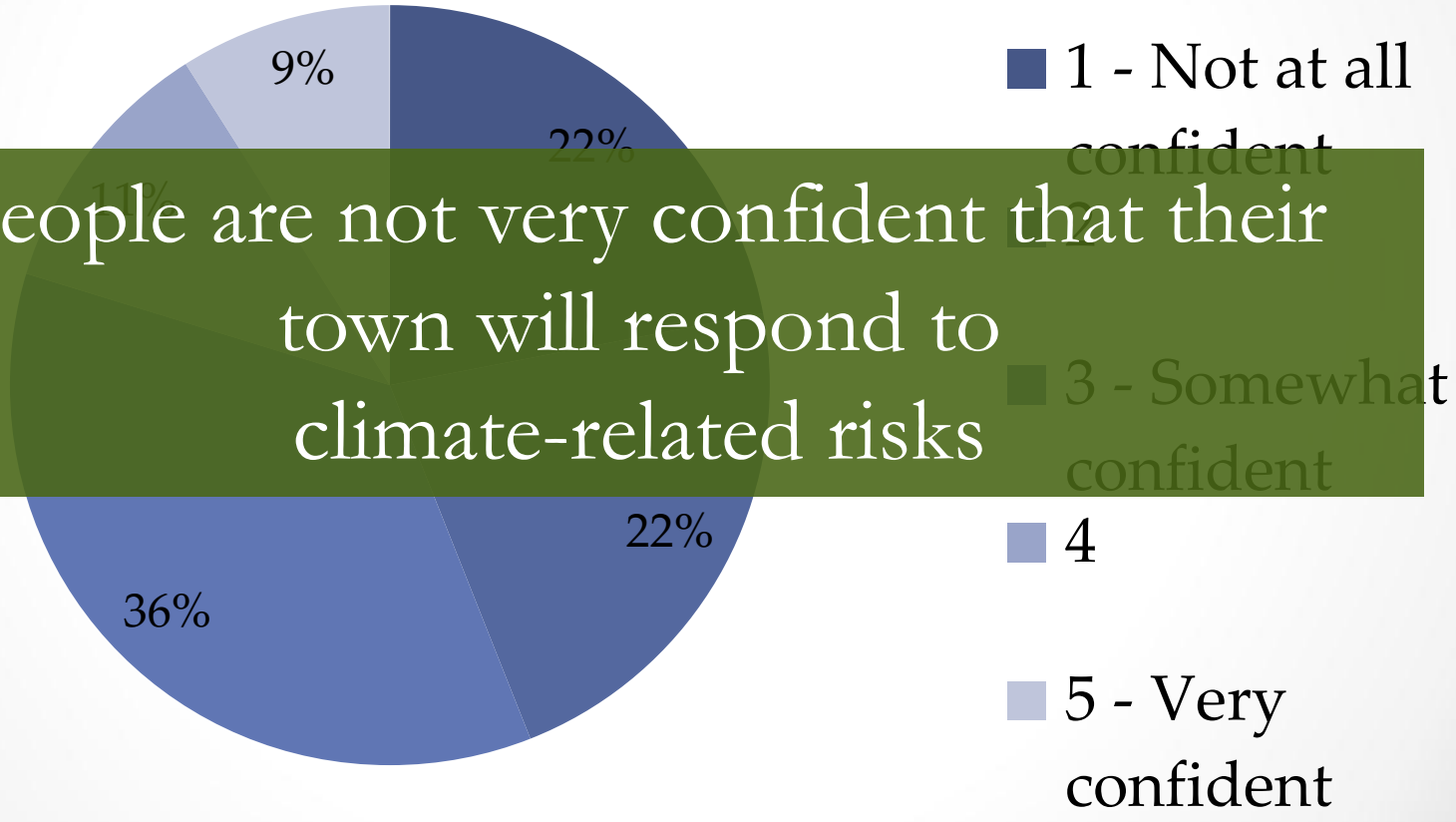
Most people are somewhat to very concerned about climate change impacts

Do you ever think about whether a change in the climate could affect your community?



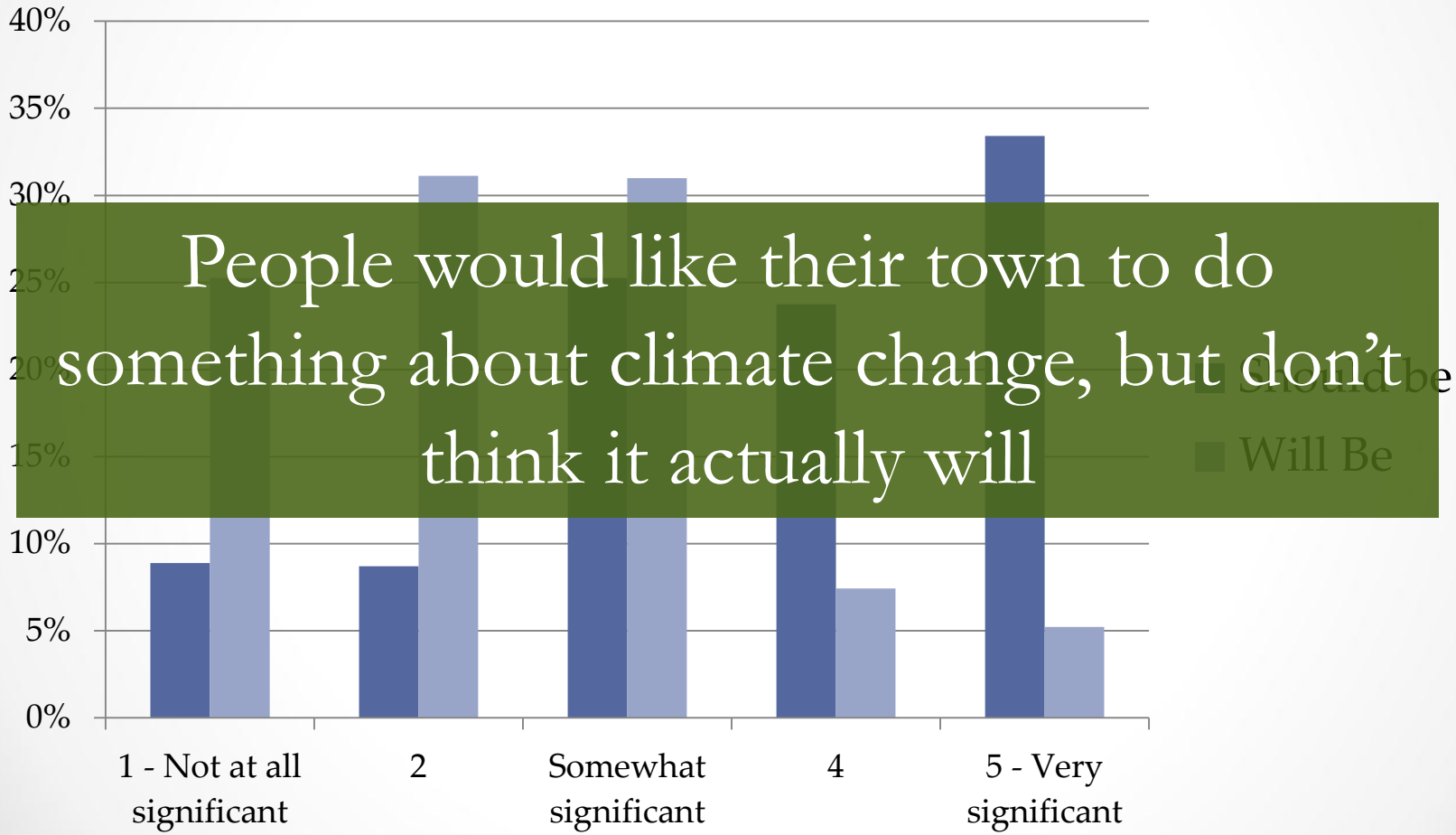
A lot of people are thinking about local climate change risks

How confident are you that your town will be able to effectively respond to climate-related risks despite uncertainty about what the future climate will be like?



People are not very confident that their town will respond to climate-related risks

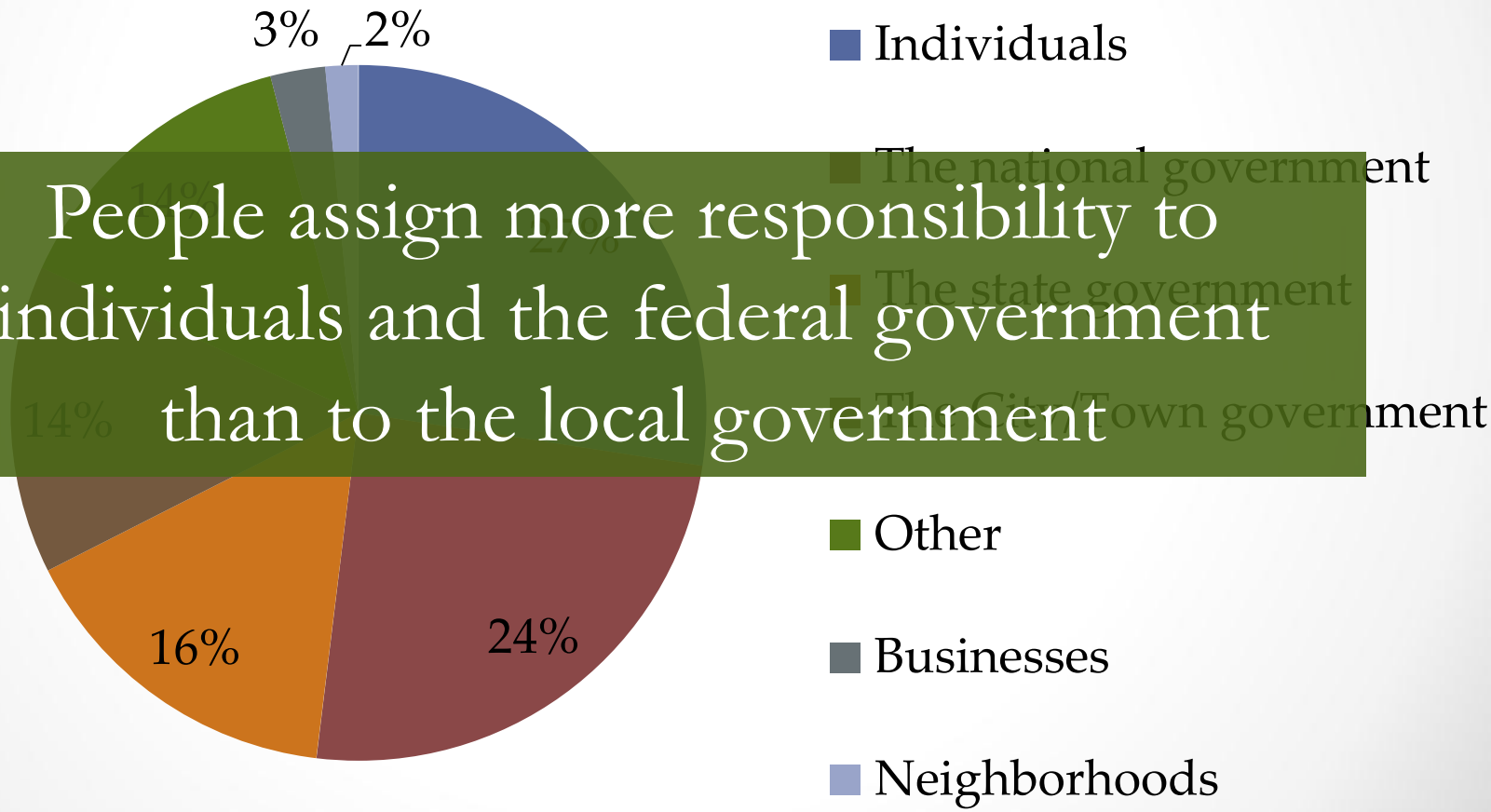
How significant do you think climate change <u>should/will</u> be in your town's planning and decision making over the next ten years?



People would like their town to do something about climate change, but don't think it actually will

If the climate is changing, who do you think should be responsible for preparing for the possible impacts on your community?

Please select up to 3 options (first response shown below)

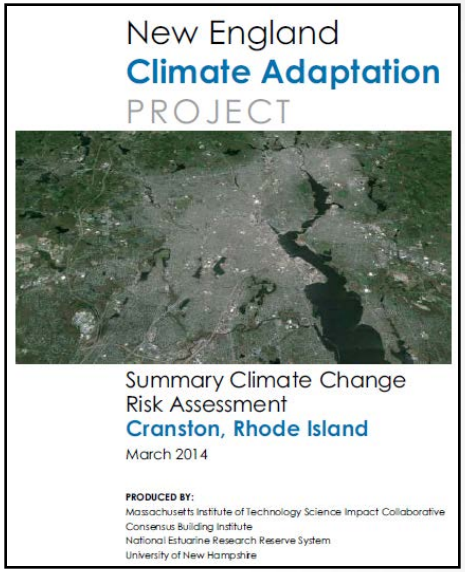


People assign more responsibility to individuals and the federal government than to the local government

Risk Assessment

"Downscaled" climate projections produced for:

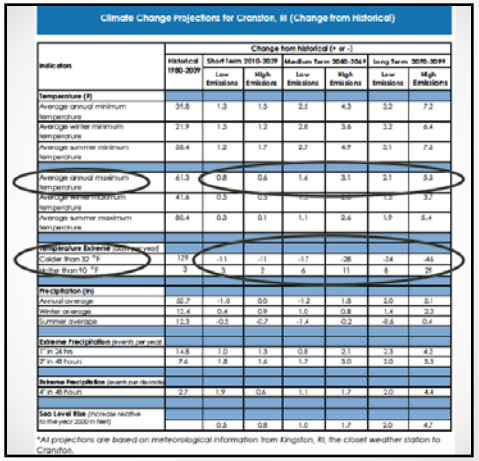
- A range of climate indicators
  - temperature, precipitation, sea level rise, etc.
- Three time frames
  - Short term (2010 -2039)
  - Medium term (2040 -2069)
  - Long term (2070 -2099)
- "Better case" (low emissions) and "worse case" (high emissions) climate change scenarios



New England
Climate Adaptation
PROJECT

Summary Climate Change Risk Assessment
Cranston, Rhode Island
March 2014

PRODUCED BY:
Massachusetts Institute of Technology Science Impact Collaborative
Consensus Building Institute
National Estuarine Research Reserve System
University of New Hampshire



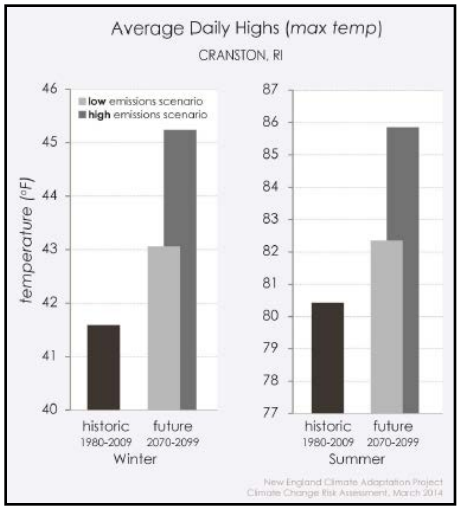
Climate Change Projections for Cranston, RI (Change from Historical)

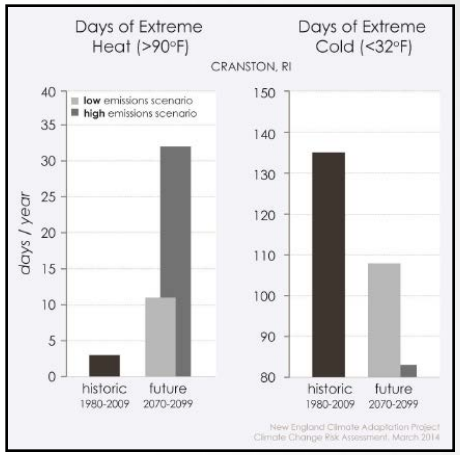
Indicators	Historical 1980-2009	Short Term 2010-2039		Medium Term 2040-2069		Long Term 2070-2099	
		Change from historical (+ or -)					
		Low Emissions	High Emissions	Low Emissions	High Emissions	Low Emissions	High Emissions
Temperature (F)							
Average annual minimum temperature	39.8	1.3	1.5	2.5	4.3	3.2	7.2
Average winter minimum temperature	21.9	1.3	1.2	2.8	3.6	3.2	6.4
Average summer minimum temperature	66.4	1.2	1.7	2.7	4.7	3.1	7.2
Average annual maximum temperature	61.3	0.8	0.6	1.6	3.1	2.1	5.3
Average winter maximum temperature	41.6	0.3	0.3	[illegible]	[illegible]	1.5	3.7
Average summer maximum temperature	86.4	0.3	0.1	1.1	2.6	1.9	5.4
Temperature Extreme (days per year)							
Colder than 32 °F	129	-11	-11	-17	-28	-34	-46
Hotter than 90 °F	3	3	3	6	11	8	29
Precipitation (in)							
Annual average	52.7	-1.0	0.0	-1.2	1.8	2.0	5.1
Winter average	12.4	0.4	0.9	1.0	0.8	1.4	2.2
Summer average	12.3	-0.5	-0.7	-1.4	-0.2	-0.6	0.4
Extreme Precipitation (events per year)							
1" in 24 hrs	14.8	1.0	1.3	0.8	2.1	2.3	4.2
2" in 48 hours	7.6	1.8	1.6	1.7	3.0	3.0	5.3
Extreme Precipitation (events per decade)							
4" in 48 hours	2.7	1.9	0.6	1.1	1.7	2.0	4.8
Sea Level Rise (increase relative to the year 2000 in feet)		0.5	0.8	1.0	1.7	2.0	4.2

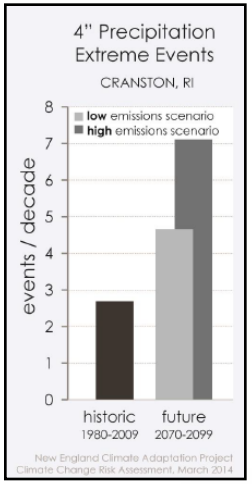
*All projections are based on meteorological information from Kingston, RI, the closest weather station to Cranston.

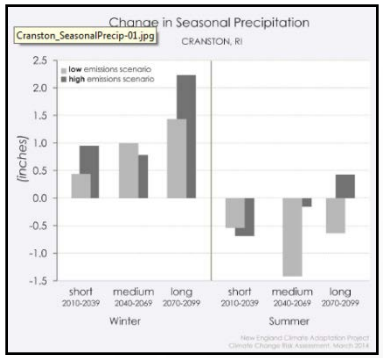
Key Findings

- Higher average temperatures
- More extreme heat events, fewer extreme cold events
- More extreme precipitation events
- Wetter winters, drier summers
- Significant sea level rise





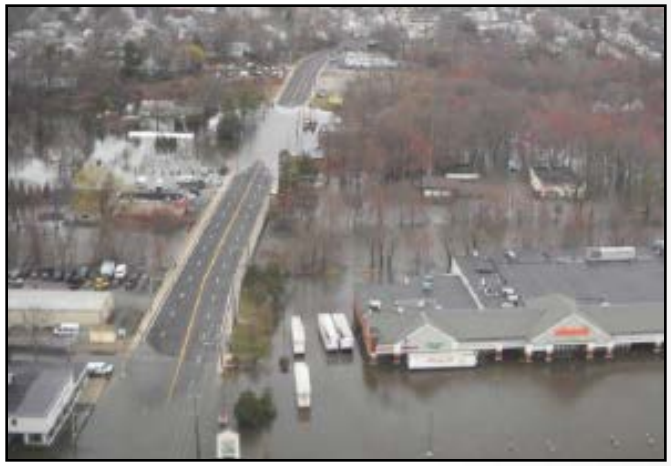


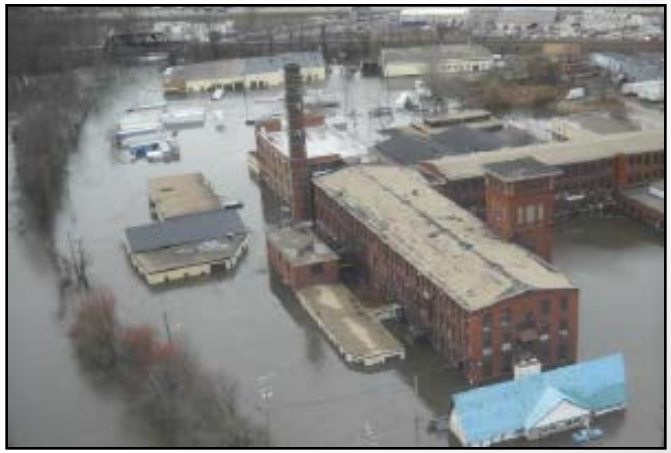


What does this mean?

- ⬆ Risk of riverine flooding
- ⬆ Risk of coastal flooding and storm surges
- ⬆ Risk of heat waves
- ⬆ Risk of drought

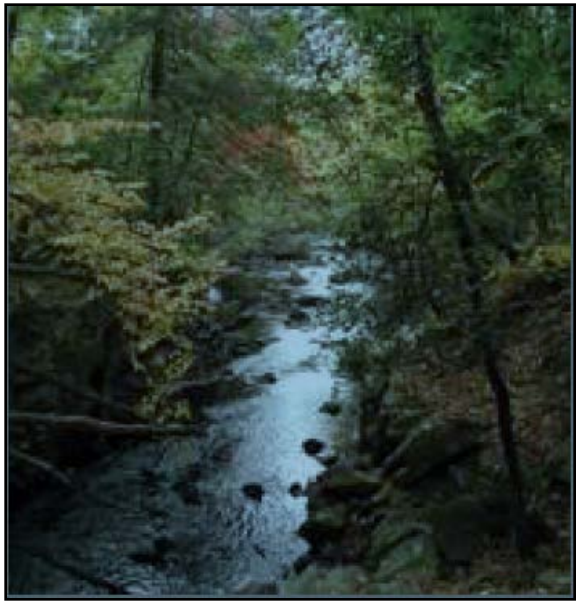
Threats to community residents, infrastructure, and ecosystem health





Adaptation Options

Flood resilient building design



Wetland Restoration

Low impact development

Stakeholder Assessment

Identified:

- Key threats
  - Variability in precipitation
  - Sea level rise
  - Beach erosion
- Impacts
  - Damage to homes, businesses, and infrastructure
  - Declining water quality
  - Increased level of disease
  - Harm to local ecosystems

Stakeholder Group	Number of Interviews
Local government – Elected and Appointed Officials	2
Local government – Civil Service Officials	5
State government	2
Federal government	1
Business – Environmental Services	2
Business – All Other	3
Environmental Organization	3
Social services/Public health	1
Total Interviews	*19*

Stakeholder Assessment, con't.

Identified:

- Adaptation options
  - Increase stakeholder engagement
  - Reinforce bridges and riverbanks
  - Acquire at-risk properties and restore floodplains
- Obstacles to adaptation
  - Lack of knowledge of risks and adaptation options
  - Financial constraints
  - Regulatory challenges

Role-Play Simulation

Role-Play Simulation, con't.

Issue 1: Managing Flood Risks in Lower Granite River Area

Option	*Estimated Costs*	*Potential Financing Strategy*
1.1 Do nothing	$0 now, but $15-20 million in recovery after each large storm	N/A
1.2 Floodwalls	$10 - $18 million ($2,000 per linear foot)	Grants, bonds financed with tax revenue
1.3 Flood-proofing buildings	$10 – $100K per building	Property owner pays, but city may offer property tax rebate
1.4 Flood-proofing infrastructure	1.8 million ($600K per pump station)	Grants, water fees
1.5 Buy-back program for properties in the floodplain	$500,000 - $1.5M per property; Total cost depends on popularity of program.	Property sale tax of 1-3% of sale price

Issue 2: Managing Growth in Northern Milton

Option	*Estimated Costs*	*Potential Financing Strategy*
2.1 Do nothing	$0 now, but flooding may become more severe downstream	N/A
2.2 Incorporate low impact development into city planning regulations	Minimal cost to city May increase cost of construction	N/A
2.3. Purchase of development rights program	Depends on scale of program, but $5 million minimum	Grants, taxes, fees

- Planning Director
- Public Works Director
- Executive Director of a non-profit social service organization
- President of the Chamber of Commerce
- Chairperson of a neighborhood association
- Executive Director of an environmental advocacy group

Role-Play Simulation Outcomes

- ⬆ Concern about local climate change risks
- ⬆ Sense of local responsibility for preparing for and managing climate change risks
- ⬆ Confidence in ability of local government to take adaptation action
- ⬆ Understanding of other perspectives & appreciation for the need for stakeholder engagement

Cranston HERALD

6/4/14 SHARE

RATE THIS

Climate change project points to city's risks, seeks ways to adapt

Daniel Kittredge

Outcomes

- Mainstreaming risks into community plans
- Hazard mitigation planning
- Political traction
- Catalyst for funding

Acknowledgements

- NERRS Science Collaborative
- All project partners, affiliates, and research staff