Harvard Municipal Vulnerability Preparedness

Agricultural Workshop 1

February 2, 2019

HARRIMAN

Workshop Agenda

9:00 Welcome and Introductions

9:05 MVP Overview, Agricultural Workshop Process

9:20 Overview of Climate Change, Agriculture and Harvard

9:50 Questions and Answers

10:00 Small Group Exercise Introduction

10:10 Small Group Discussions

- Introductions within the team, identify person for report out
- Characterize the hazards
- Identify Harvard's vulnerabilities and strengths

10:45 Break

11:00 Continue Small Group Discussion

12:00 Small Group: Report Outs

12:20 Wrap up and Introduce Workshop #2

Introductions

- MVP Core Group
  - Christopher Ryan, Director of Community and Economic Development
  - Liz Allard, Land Use Administrator/Conservation Agent
  - Eric Broadbent, Energy Advisory Committee
  - Justin Brown, Planning Board
  - Kerri Green, Agricultural Advisory Commission
  - Sharon McCarthy, Board of Health
  - Kara Minar, Select Board

- Harriman
  - Emily Keys Innes, Associate and Senior Urban Planner
  - Katie Moore, Urban Planner

- University of Massachusetts-Amherst
  - Professor Dan Cooley

Municipal Vulnerability Preparedness (MVP) Program Overview

What is the MVP Program?

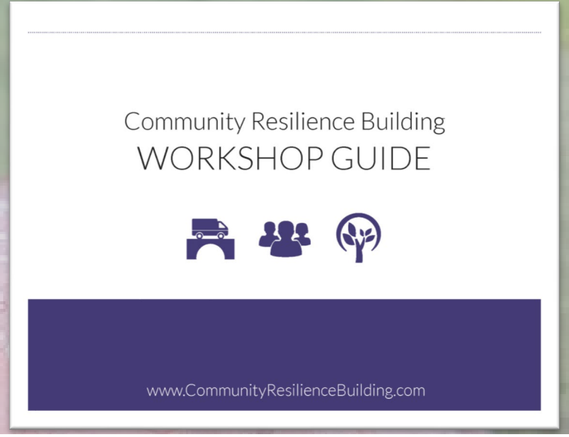
- A component of MA Executive Order 569 (2016)
- Grant funding for technical support to
  - Complete vulnerability assessments
  - Develop action-oriented resiliency plans

Why is the Town Participating?

- Increasingly more unpredictable and severe weather is occurring
- Agriculture is a significant part of the town's composition and identity
  - Dedicated MVP component focusing on agriculture
- Completion qualifies Harvard for access to further grant funding

Workshop Process

A. Prepare for the Workshop
B. Characterize Hazards
C. Identify Community Vulnerabilities and Strengths
D. Identify and Prioritize Community Actions
E. Determine the Overall Priority Actions
F. Put it All Together
G. Move Forward



Community Resilience Building Risk Matrix www.CommunityResilienceBuilding.com

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									

Overview of Climate Change

- Climate change
  - A change in the state of the climate … whether due to natural variability or as a result of human activity
- Natural hazard
  - Natural events that threaten lives, property, and other assets
  - Often can be predicted; they tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area
- Risk
  - The potential for an unwanted outcome resulting from a hazard event
- Vulnerability
  - The propensity or predisposition to be adversely affected
  - A function of exposure, sensitivity, and adaptive capacity

A *hazard* is the sun.

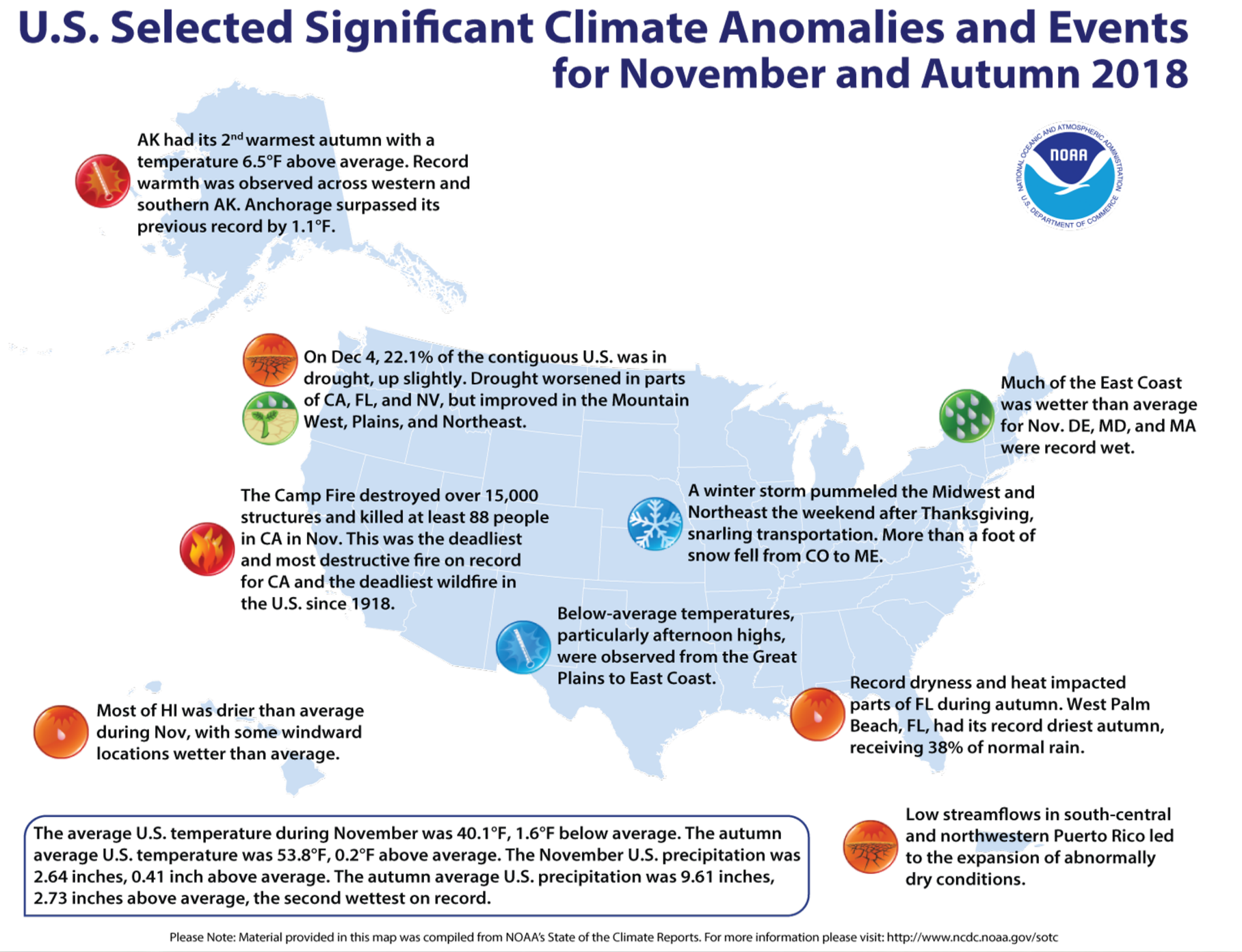
The *risk* is sunburn.

The *vulnerability* includes the length of *exposure* to the sun, how *sensitive* the skin is to it.

Definitions from the *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, 2018

Overview of Climate Change - US

November 2018 was the 407th consecutive month with global temperatures above the 20th century average



Overview of Climate Change - MA

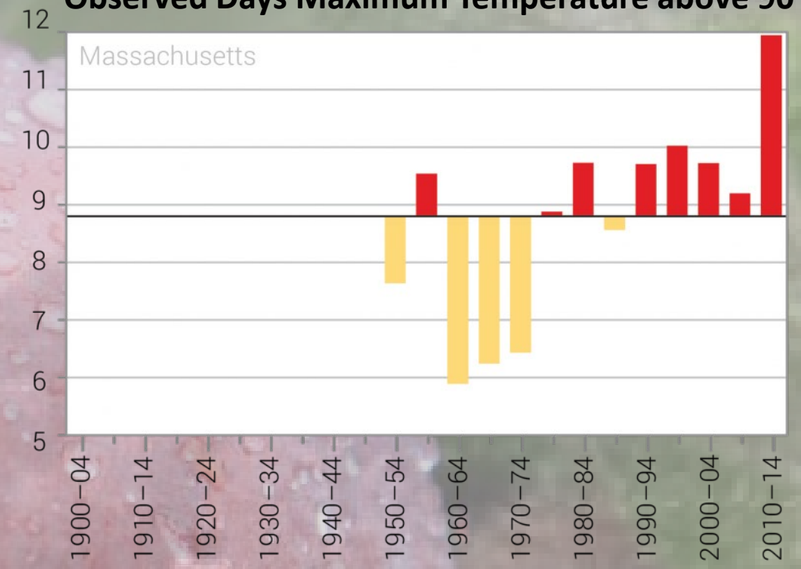
- Average annual temperatures increased almost 3°F between 1900-2014

- Number of days maximum temperature was above 90°F has been consistently above average since the 1990s

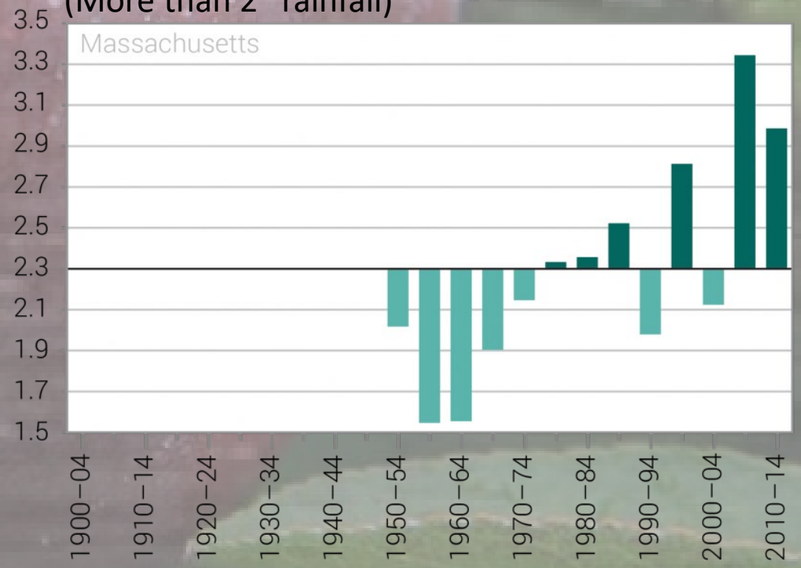
- All precipitation metrics have been highest during the most recent decade of data (2005–2014)

Source: *NOAA Technical Report NESDIS 149-MA*, 2017

Observed Days Maximum Temperature above 90°F



Observed Extreme Precipitation Events
(More than 2" rainfall)

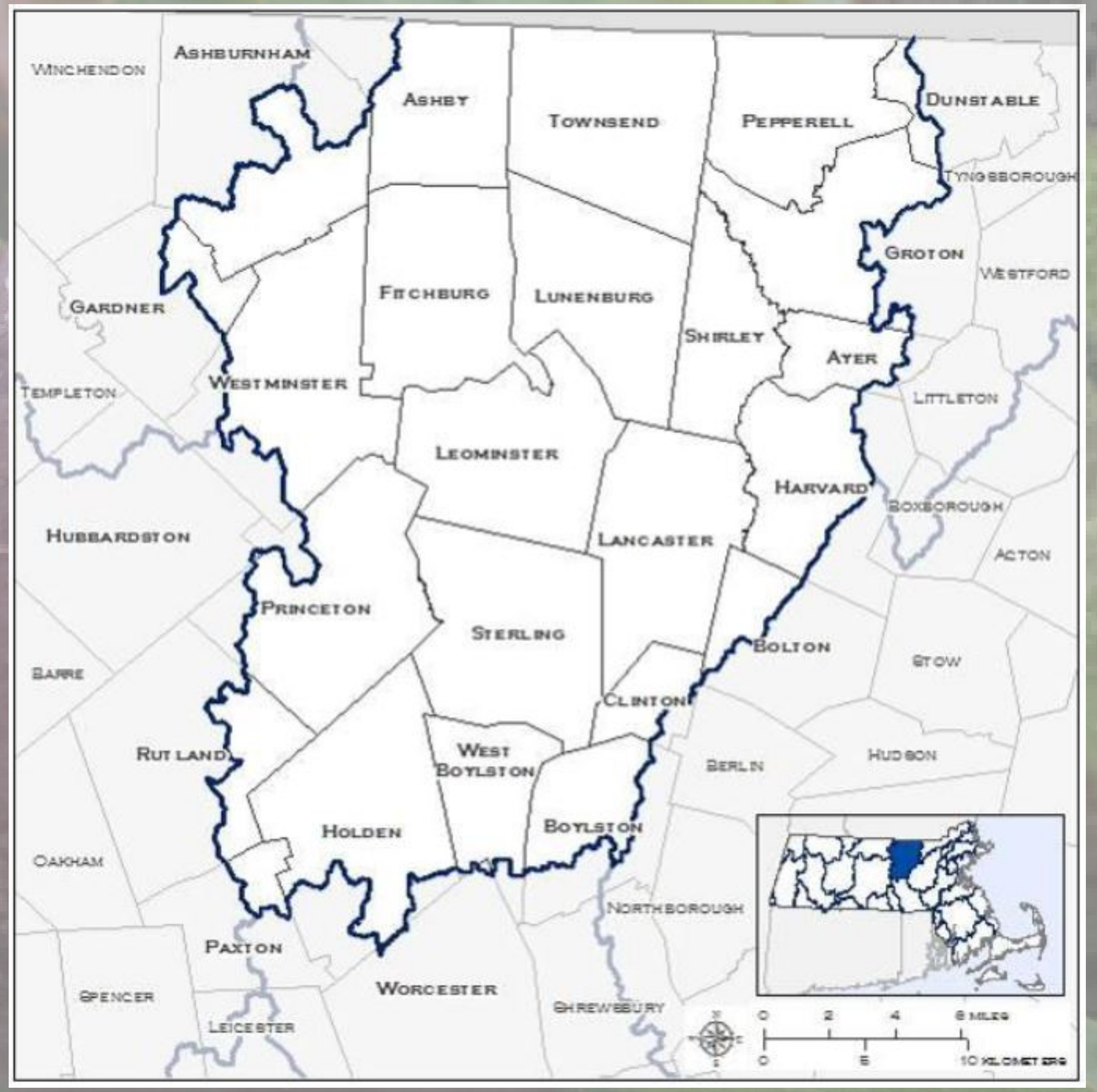


Overview of Climate Change - MA

- MA Executive Office of Energy and Environmental Affairs created a clearinghouse of climate science maps, data, documents (resilientMA.org)

- Projections from Northeast Climate Adaptation Science Center (e.g., temperature, precipitation)
  - "Downscaled" to major watershed basin (Harvard is in the Merrimack, Nashua, and Sudbury-Assabet-Concord (SuAsCo) Basins)
  - Temperature projections are more certain than precipitation

Overview of Climate Change – Nashua Basin



Overview of Climate Change – Nashua Basin

- Increased average, maximum, and minimum temperatures
  - Increased seasonal temperatures; winter is expected to see greater increases
- More days with extreme heat (daily maximum temperatures over 90°F)
- Fewer days with daily minimum temperatures below 32°F

	Baseline (1971-2000)	Mid-century (2050s)	End of Century (2090s)
Average annual temperature (°F)	46.8°F	+ 3.0 to 6.4°F	+ 3.9 to 11.0°F
Annual days max temperature >90°F	4 days	9 to 30 more days	13 to 70 more days
Annual days min temperature <32°F	156 days	19 to 38 fewer days	23 to 64 fewer days

Source: resilient MA, 2018

Overview of Climate Change – Nashua Basin

- Number of days receiving over 1” precipitation are variable; winter is expected to see the highest increase

- Winter is expected to see the greatest change in precipitation (increase 2-22% by 2050s, increase 6-39% by 2090s)

- Fall and summer are expected to continue to have the most consecutive dry days

Agriculture and Harvard

Small Groups

1. Team introductions: Name, organization/department

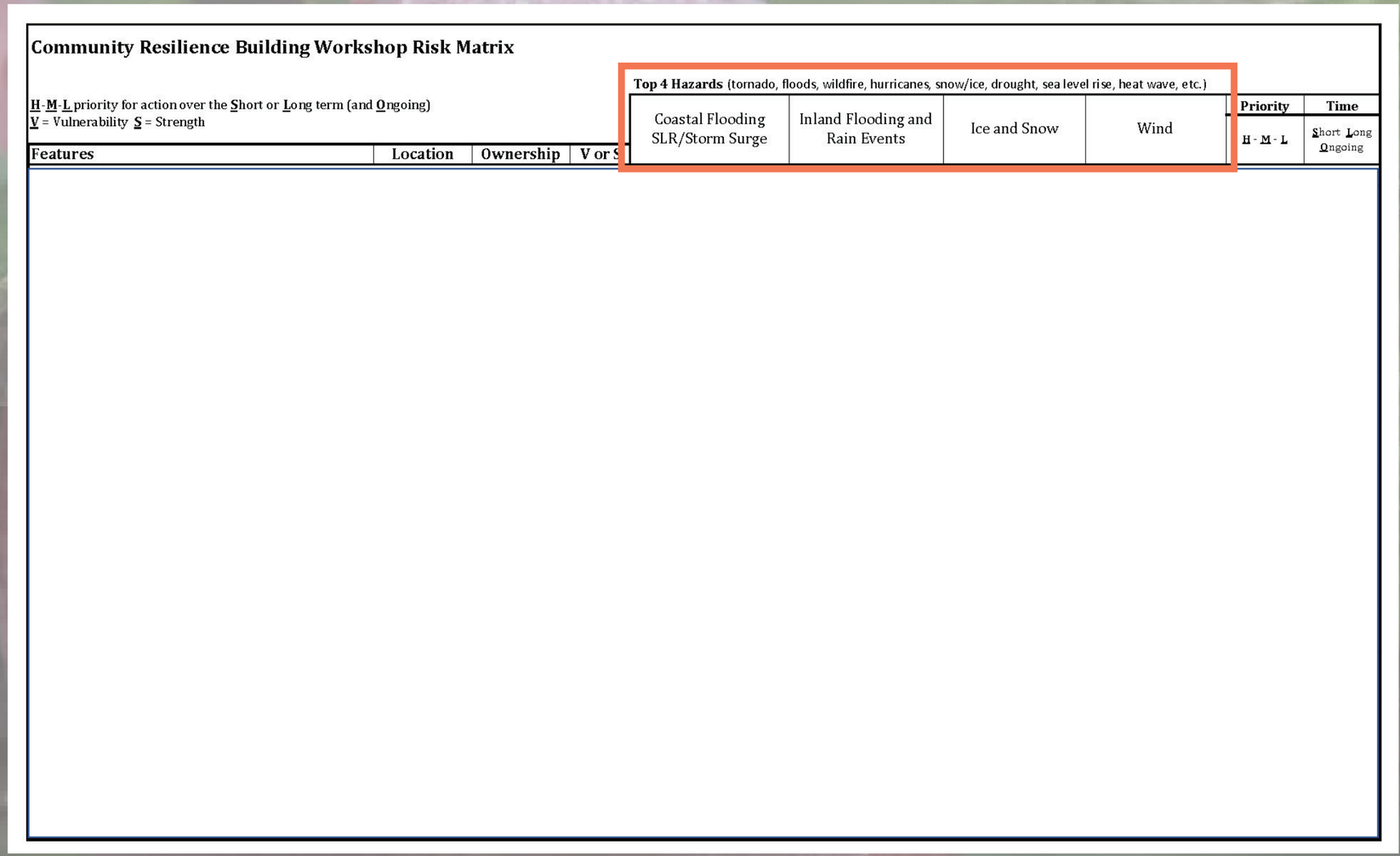
2. Identify a spokesperson (not the facilitator)

3. Characterize the ***top 4 priority hazards*** for agriculture in Harvard

4. Identify ***community vulnerabilities and strengths***
   - "Features" in each category of infrastructure, society, and environment.
     - List of key assets and infrastructure applicable to each category
     - Describe location for each asset and infrastructure
     - Identify ownership
   - Identify each "Feature" as a vulnerability or strength.

Characterize Hazards

- Identify past, current, and future hazards (large group)
- Determine top-priority hazards (small group)



Community Resilience Building Workshop Risk Matrix

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

Top 4 Hazards (tornado, floods, wildfire, hurricanes, snow/ice, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing

Identify Community Vulnerability and Strengths

- Infrastructural
- Societal
- Environmental

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Features	Location	Ownership	V or S	Coastal Flooding SLR/Storm Surge	Inland Flooding and Rain Events	Ice and Snow	Wind	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Town Campus	Specific	Town	V						
Evacuation Routes - Roads	Town-wide	Town/State	V						
Nursing Homes/Elderly Care Facilities	Multiple	Private	V						
Homeowners Associations/Neighborhoods	Town-wide	Town/Private	V						
Electrical Distribution System	Multiple	CL&P/Town	V						
Dams (inland and coastal)	Multiple	Private	V						
Railway and State Bridges	Multiple	Amtrak/State	V						
Septic Systems	Town-wide	Private	V						
State Roads/Intersections	Town-wide	State/Town	V						
Wharves and Shore Infrastructure	Shore	Town-State-Private	V						
Waste Water Treatment Facility	Specific	Town	V						
New Ambulance Center	Specific	Town	S						
Zoning Regulations (maintain large lot size)	Multiple	Town	S						
Business District (power generators)	Specific	Town/Private	S						

Report Out from Small Teams

Next Steps

Workshop #2

March 2, 9:00am-12:45pm

- Review related experiences of agriculture in other areas
- Develop actions that further reduce the impact of hazards and increase resilience across and within Harvard
- Prioritize the actions