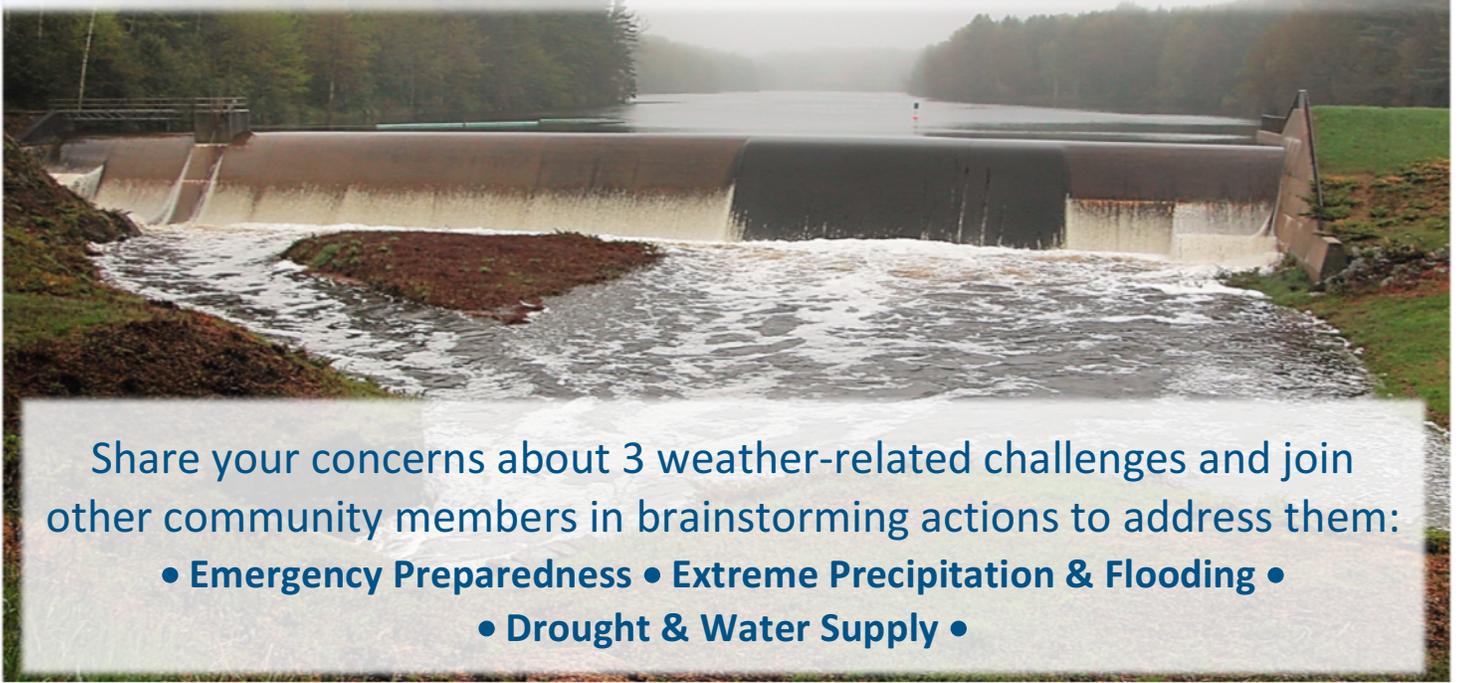


Madbury Prepares for Extreme Weather



Share your concerns about 3 weather-related challenges and join other community members in brainstorming actions to address them:

- Emergency Preparedness • Extreme Precipitation & Flooding •
- Drought & Water Supply •



Join the conversation

Wednesday
SEPTEMBER 27
6:30 to 9:00pm
Madbury Town Hall

Details:

- Ice cream sundaes will be served
- Pre-registration for this event is requested:
<http://tinyurl.com/Madburyworkshop>

What to expect:

- Learn about the current and projected impacts of climate change on Madbury
- Break out into small groups to discuss concerns about the three focal topics
- Identify actions the Town and residents can take to address these impacts

Questions?

Contact Lisa Graichen:

Lisa.Graichen@unh.edu | (603) 862-2356

These workshops are hosted and facilitated by:



Extension



This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

MADBURY PREPARES FOR EXTREME WEATHER

- Emergency Preparedness • Extreme Precipitation & Flooding •
- Drought & Water Supply •

What are the issues?

! EMERGENCY PREPAREDNESS

Storms – rain, snow, wind, and ice – already pose challenges to residents and municipalities. Storm events are projected to increase in frequency and intensity in the future, so the need to prepare will become even more important.

In addition, extreme heat days are expected to become more frequent during the summer, requiring a different type of emergency preparedness. Communities need to be able to take care of all residents, especially those most vulnerable to these impacts.

☁ EXTREME PRECIPITATION & FLOODING

Heavy precipitation is expected to increase in frequency and intensity, causing more problems with flooding and putting people and infrastructure at risk.

💧 DROUGHT & WATER SUPPLY

As temperatures rise, so does the likelihood of drought, which will influence drinking water supplies, water-based recreation, agriculture, and wildlife.



What does this mean for Madbury?

Madbury is not especially vulnerable to flooding from sea-level rise and coastal storm surge, but the expected increase in heavy precipitation events will cause local issues. Even though the Town of Madbury itself may not be as vulnerable to certain impacts as some of its neighbors, the vulnerabilities of those neighboring communities may affect Madbury's capacity and options for emergency response and evacuation.

Water supply is another concern as Madbury and its neighboring communities see increasing demand for water as populations grow, in conjunction with hotter, dryer summers, less precipitation during the winter, and less infiltration due to the intensity of rainfall and expansion of impervious surfaces.

Madbury's natural resources will be impacted by some of these same issues. These resources, such as forests and wetlands, can provide protection for Madbury's residents and infrastructure (in addition to their benefits for wildlife). For example, forests provide locally cooler temperatures, and wetlands and their surrounding buffers help mitigate flooding and protect water resources in the case of wetlands. But as climate change adds stress to ecosystems, they may not be able to provide those benefits as effectively in the future.

BY THE NUMBERS:

What we can expect in NH by 2100

- **22-48** fewer days per year below 32°F (from the historical average of 154)¹
- **21-57** more days per year above 90°F (from the historical average of 10)¹
- **4 TO 9°F** increase in our annual average temperature by 2100¹
- An additional **1.6 TO 6.6 FEET** of sea-level rise²
- **AS MUCH AS 20%** more annual precipitation, and more frequent extreme precipitation events²

¹Climate Solutions New England 2014; values for Durham, NH, where available; compared to historical averages from 1980-2009

²STAP Report 2014; compared to mean sea level in 1992 as a reference; compared to average annual rainfall from 1970-1999

10 IDEAS FOR ACTION

to prepare for extreme weather

Emergency Preparedness	<ul style="list-style-type: none"> <input type="checkbox"/> Provide information about potential flood hazards to residents and businesses and implement an early warning system for storms <input type="checkbox"/> Make sure evacuation plans are up-to-date, routes are well marked, and residents have instructions on what to do in evacuation and isolation (shelter-in-place) situations <input type="checkbox"/> Encourage neighborhood-wide communication and preparation during storms
Extreme Precipitation & Flooding	<ul style="list-style-type: none"> <input type="checkbox"/> Regulate future development in the 100-year floodplain and encourage protective measures for existing development in the floodplain <input type="checkbox"/> Conserve land in areas that are vulnerable to flooding <input type="checkbox"/> Implement buffers between wetlands and development <input type="checkbox"/> Ensure that culverts are sized to deal with growing rates of precipitation
Drought & Water Supply	<ul style="list-style-type: none"> <input type="checkbox"/> Raise awareness about the town's drinking water sources <input type="checkbox"/> Encourage water conservation actions, such as reducing use and implementing rain gardens and rain barrels <input type="checkbox"/> Conserve land around water resources to protect quality and quantity

Resources

NH Coastal Adaptation Workgroup:

- Visit our website: www.nhcaw.org
- Sign up for our newsletter: <http://tinyurl.com/NHCAWnews>
- Follow us on social media (Facebook and Instagram: @nhcoastaladaptation / Twitter: @nhcaw)
- Madbury Climate Risk in the Seacoast (C-RiSe) report (<http://tinyurl.com/crise-Madbury>) and maps (<http://www.strafford.org/services/climatechange.php>)
- NH Coastal Risk and Hazards Commission (CRHC) Report, 2016: www.nhcrhc.org
- NH CRHC Science and Technical Advisory Panel Report, 2014: <http://www.nhcrhc.org/stap-report/>
- NH Setting SAIL Project: <http://www.nhcrhc.org/setting-sail/>
- NH Coastal Viewer: www.nhcoastalviewer.org
- Climate Solutions New England. 2014. *Climate Change in Southern New Hampshire: Past, Present, and Future*. <http://tinyurl.com/southernNHclimate>
- ReadyNH.gov: www.ReadyNH.gov

For more information, contact:

Lisa Graichen, Climate Adaptation Program Coordinator,
 UNH Cooperative Extension and NH Sea Grant,
Lisa.Graichen@unh.edu, (603) 862-2356



This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the NH Department of Environmental Services Coastal Program.

September 2017

Madbury Workshop

Community input on addressing the impacts of
3 weather-related challenges

Wednesday, September 27, 2017



Extension





CAW

New Hampshire
Coastal Adaptation
Workgroup

RESOURCEFUL • READY • RESILIENT

Visit our website:

www.nhcaw.org

Sign up for our newsletter:

<http://tinyurl.com/NHCAWnews>

Follow us on social media:

 @nhcoastaladaptation

 @nhcoastaladaptation

 @nhcaw

Climate Risk in the Seacoast (C-RiSe) project



Credit: Eric Fiegenbaum



TOWN OF MADBURY, NEW HAMPSHIRE Vulnerability Assessment of projected impacts from sea-level rise and coastal storm surge flooding



Prepared by the
Strafford Regional Planning Commission

February 2017

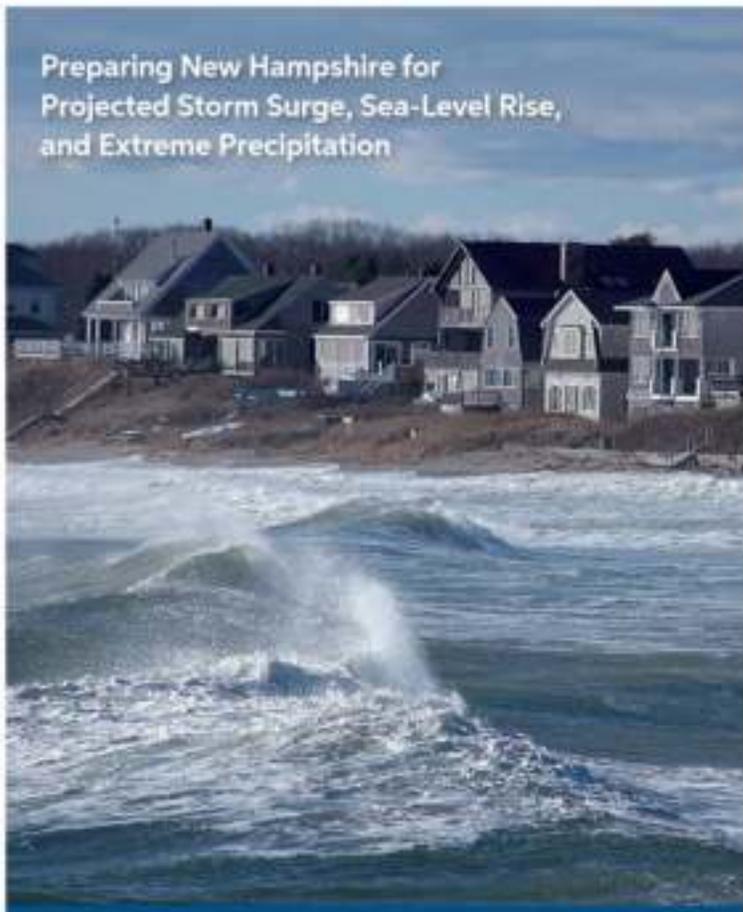
This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the New Hampshire Department of Environmental Services Coastal Program.



NH Coastal Risk and Hazards Commission

NEW HAMPSHIRE COASTAL RISK AND HAZARDS COMMISSION

Preparing New Hampshire for
Projected Storm Surge, Sea-Level Rise,
and Extreme Precipitation



Final Report and Recommendations

November 2016



What We Are Facing



Our Risks & Vulnerabilities



What We Need To Do



Our Goals & Recommendations

www.NHCRHC.org



New Hampshire Setting SAIL

Acting on the Coastal Risk and Hazards Commission Science, Assessment, Implementation, and Legislation Recommendations

Dover • Durham • Exeter • Greenland • Hampton • Hampton Falls • Madbury • New Castle • Newfields
Newington • Newmarket • North Hampton • Portsmouth • Rollinsford • Rye • Seabrook • Stratham

Science, Assessment, Implementation, Legislation

Goal: Support state and municipal implementation of the CRHC report through outreach and technical assistance

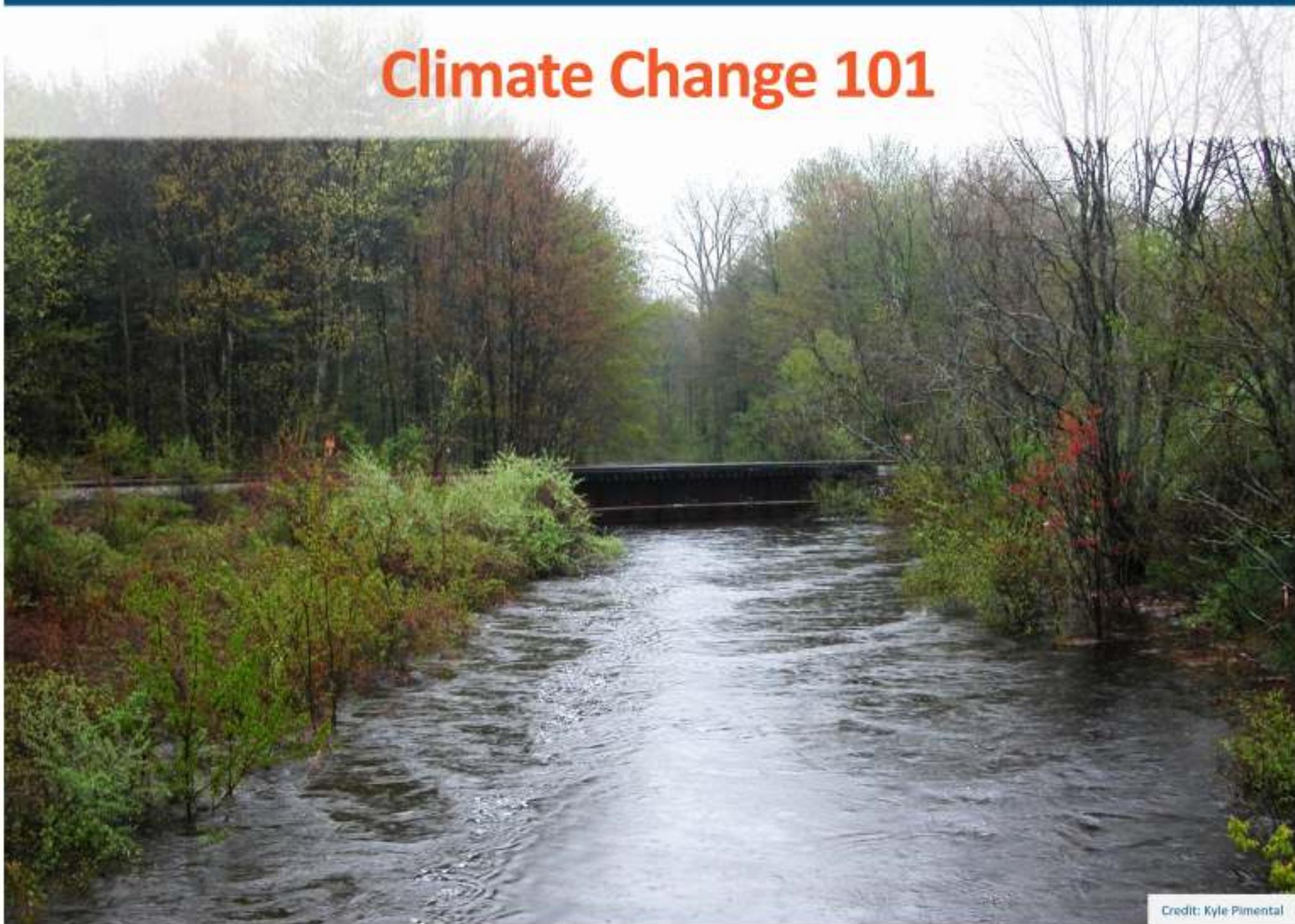


GREAT BAY
NATIONAL
ESTUARINE
RESEARCH
RESERVE

ROCKINGHAM
PLANNING
COMMISSION



Climate Change 101



Weather and Climate

Since 1970:

↑ Annual +2.3F

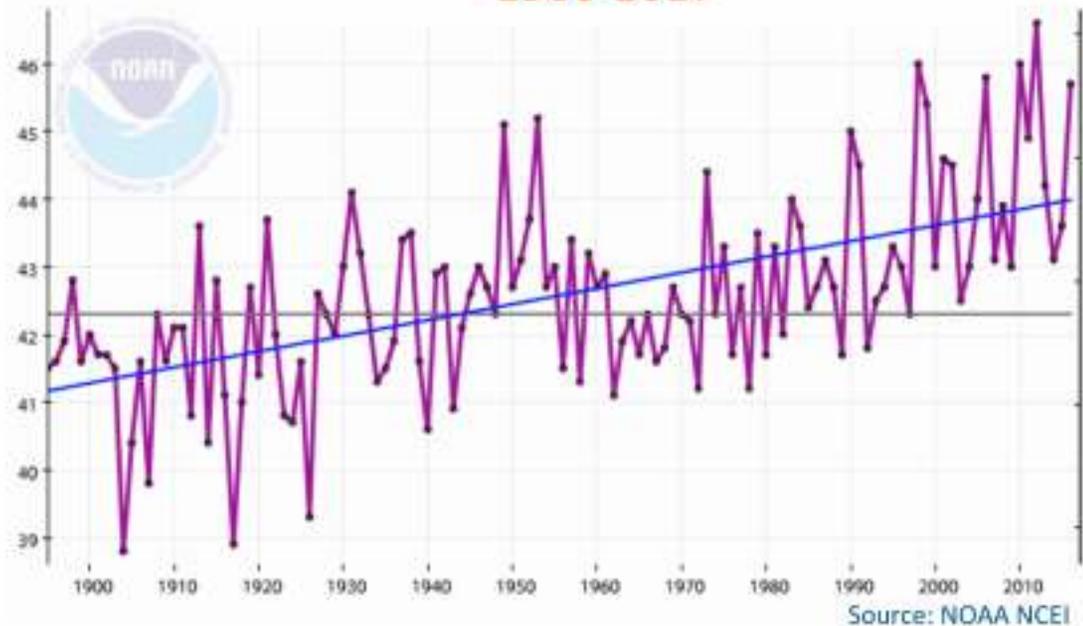
↑ Winters +3.36F

Source: Climate Solutions New England, 2014



Weather

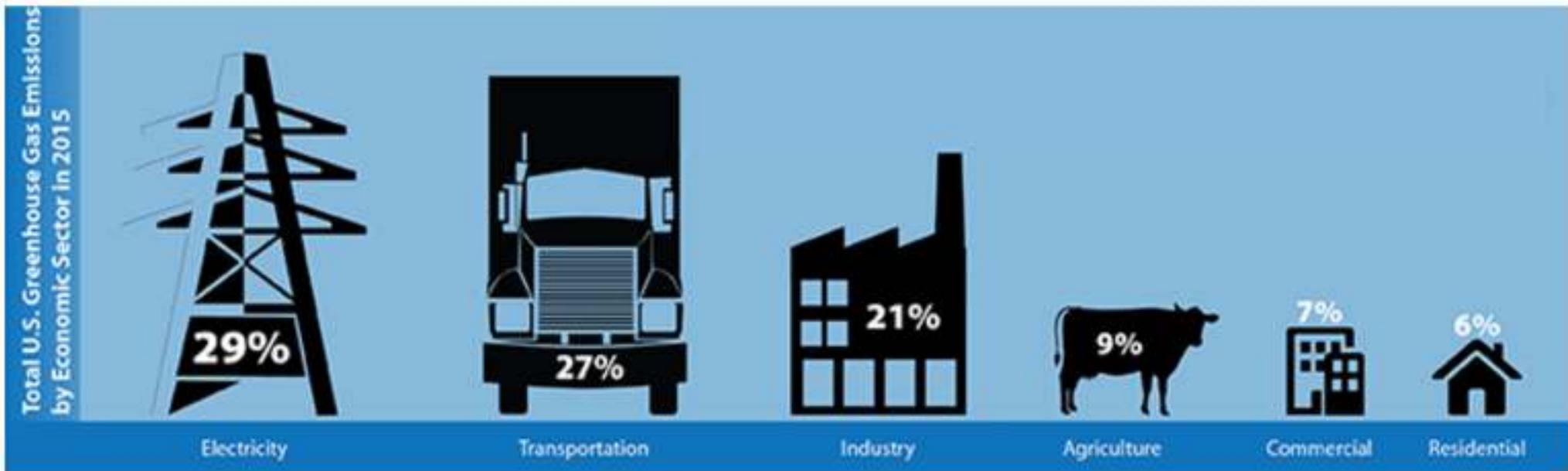
NH – Average Annual Temperatures, 1900-2017



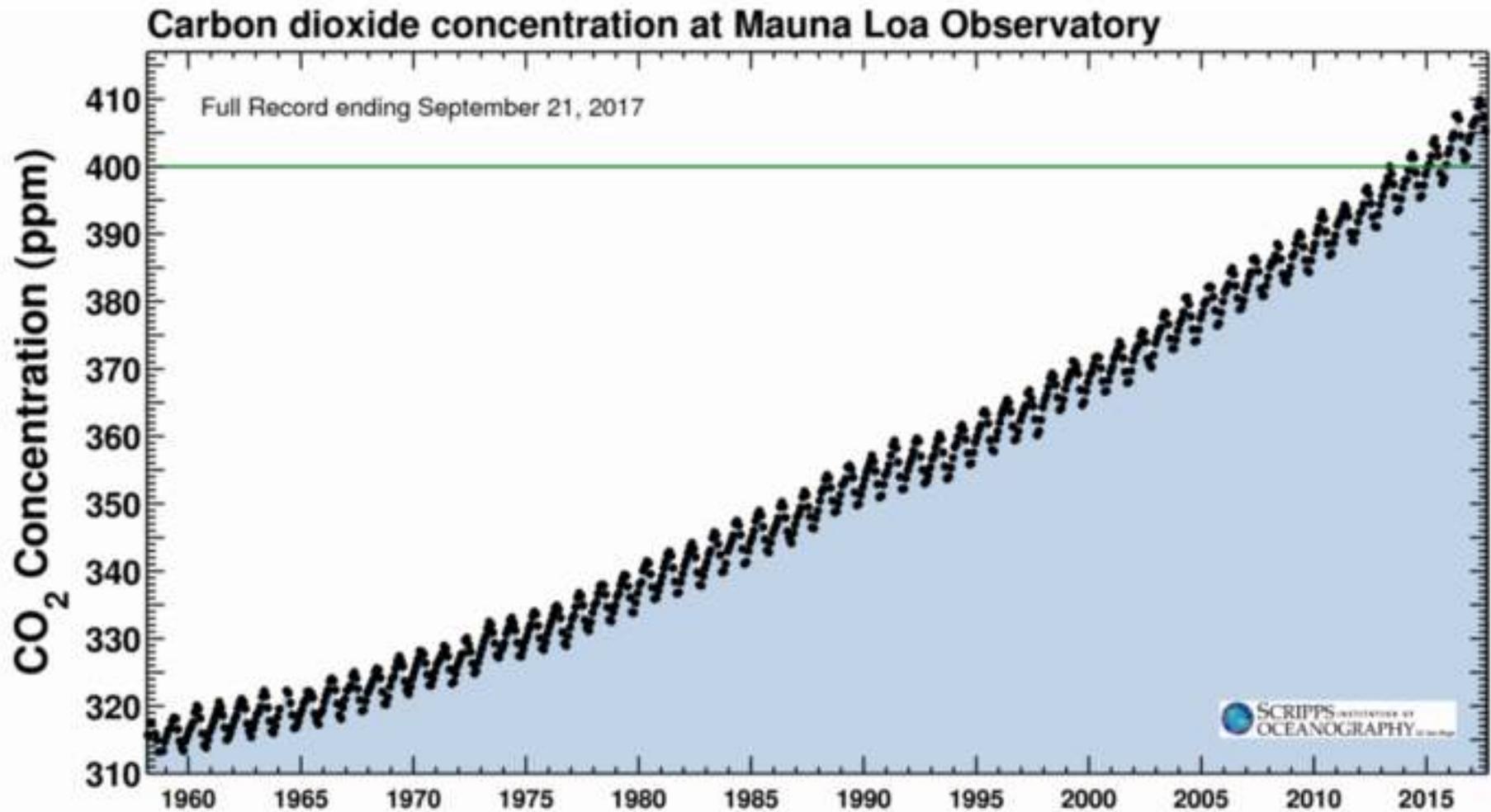
Climate

Global warming causes the climate to change

Sources of greenhouse gases emissions (U.S., 2015)



How do we know the climate is changing?



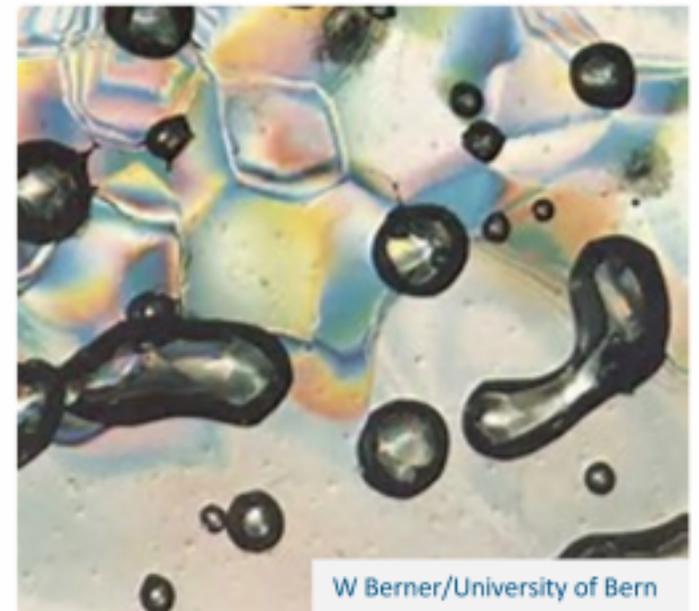
How do we know the climate is changing?



Cameron Wake



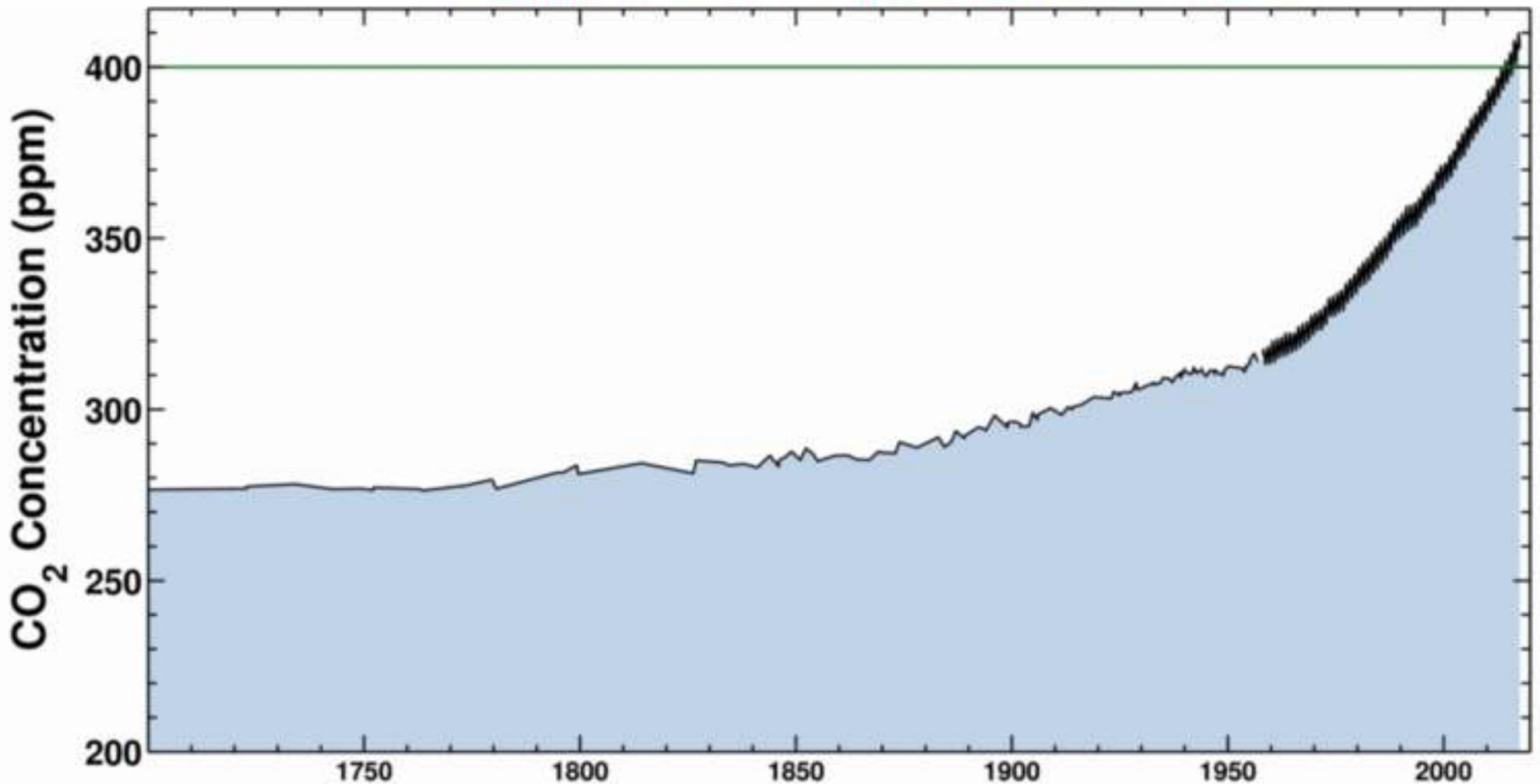
Mike Waszkiewicz.



W Berner/University of Bern

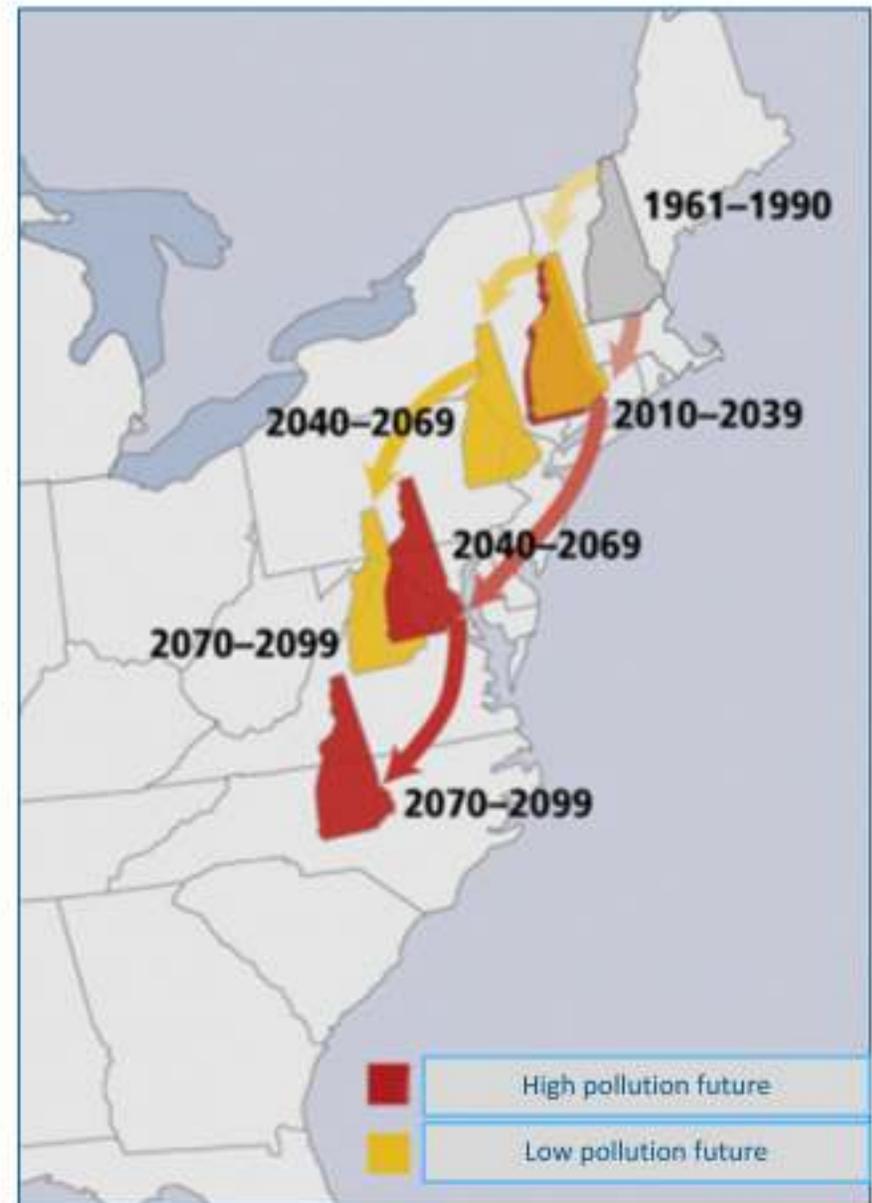
Carbon dioxide trends

Ice core data before 1958, Mauna Loa data after 1958



What does climate change look like?

- Changing seasons
- Increases in temperature
- More frequent/intense drought
- Increases in precipitation
- Sea-level rise
- Increase in extreme weather

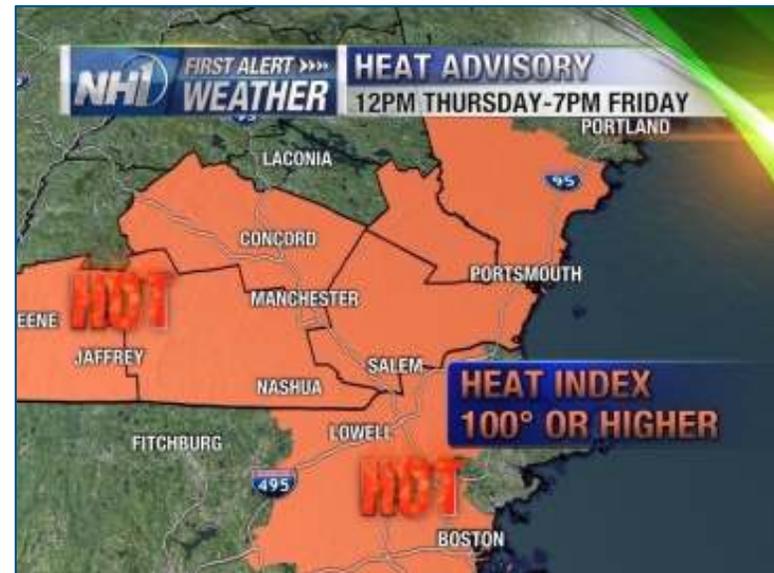


Changing Seasonality



Source: Climate Solutions New England, 2014

Increasing Temperature



Drought



Known Water Use Restrictions and Bans

Last Update: October 13, 2016

Legend

County Boundary

Town Boundary

Municipality or Water System Status

● Outdoor Use Ban

● Restriction

● Voluntary Restriction or Ban

Drought Condition

Abnormally Dry

Moderate Drought

Severe Drought

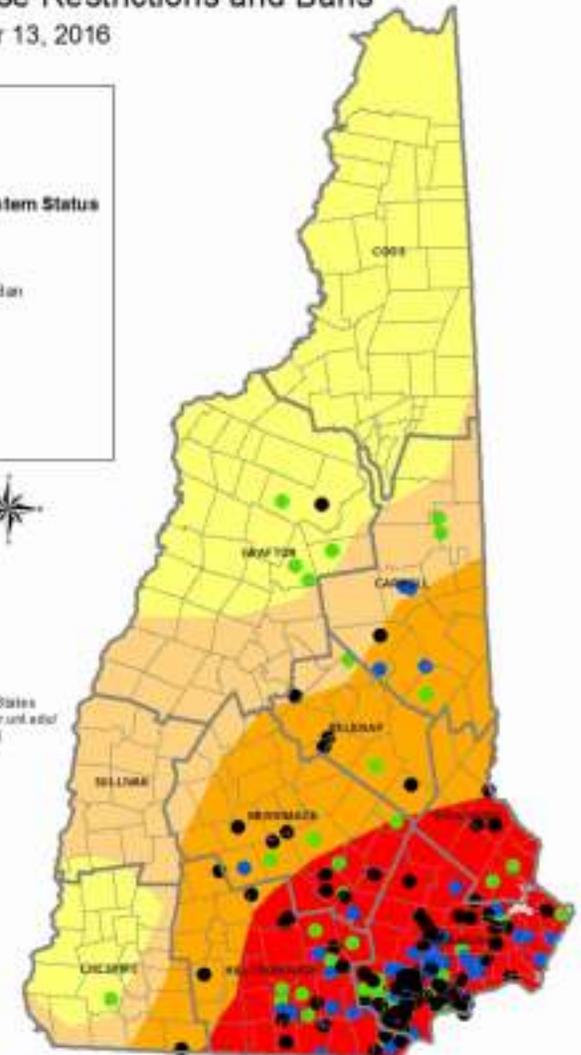
Extreme Drought

0 5 10 20 Miles

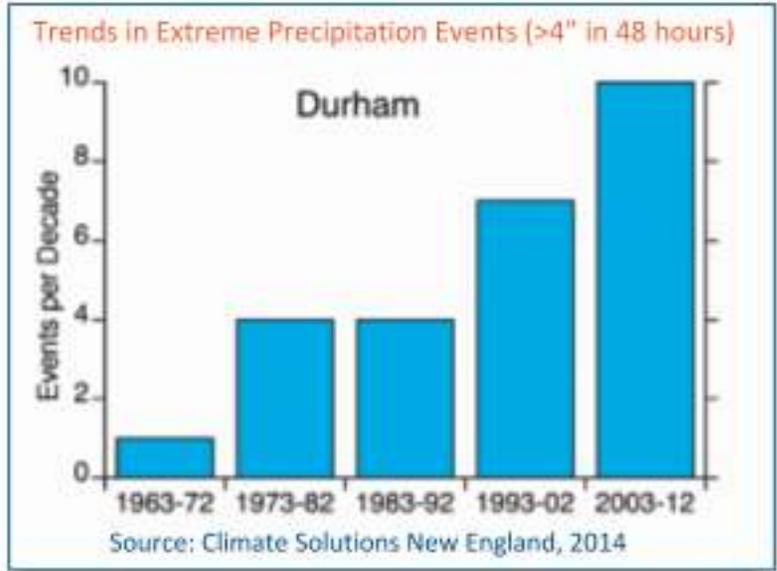
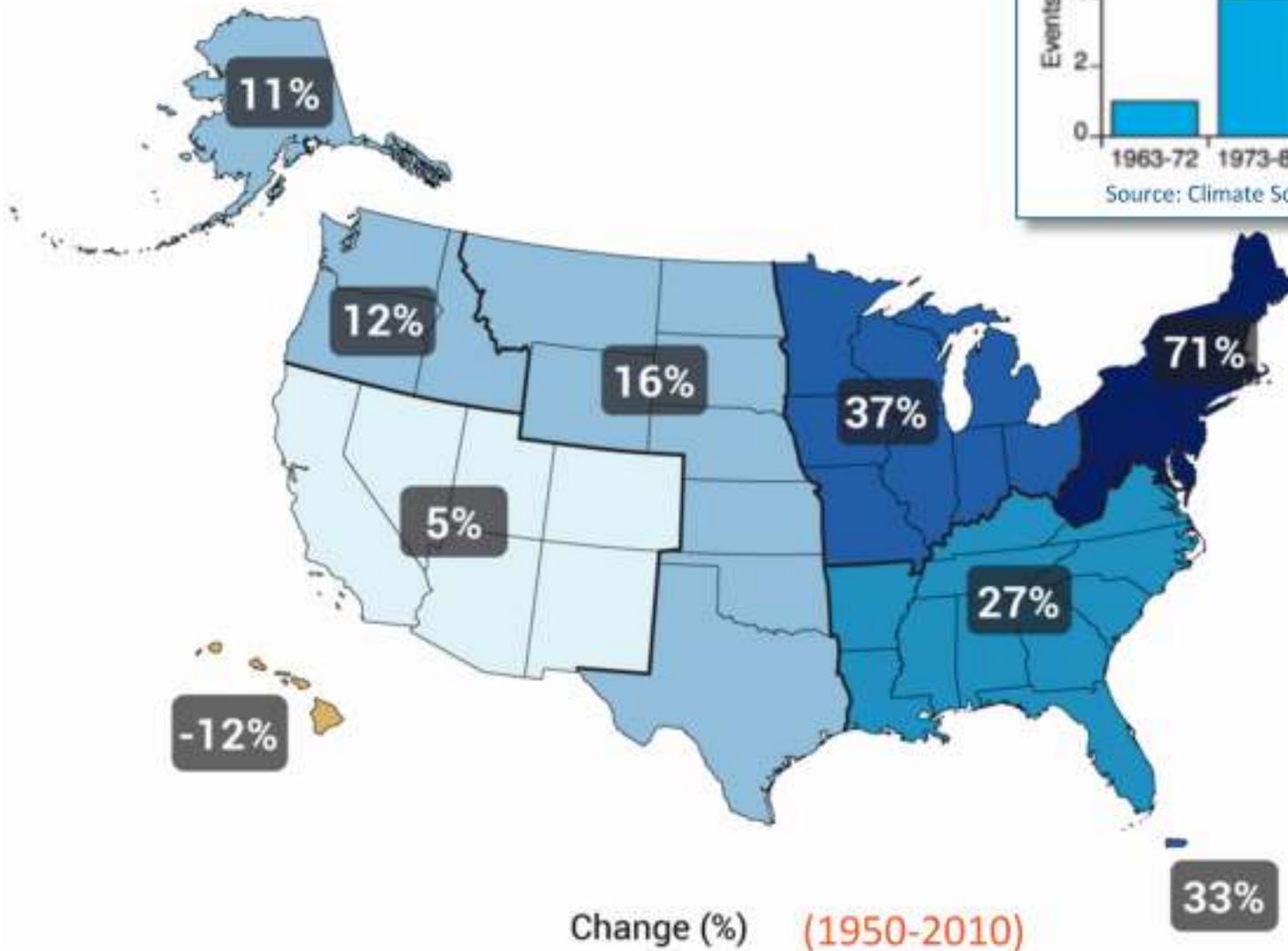


Drought Conditions based on United States Drought Monitor (<http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?NH>)

Disclaimer: The status of water use restrictions and bans is based on information submitted to the New Hampshire Department of Environmental Services and may not be comprehensive.



Increase in extreme precipitation



Source: National Climate Assessment 2014

The same extra heat that evaporates more water from the ocean, causing bigger downpours and floods...

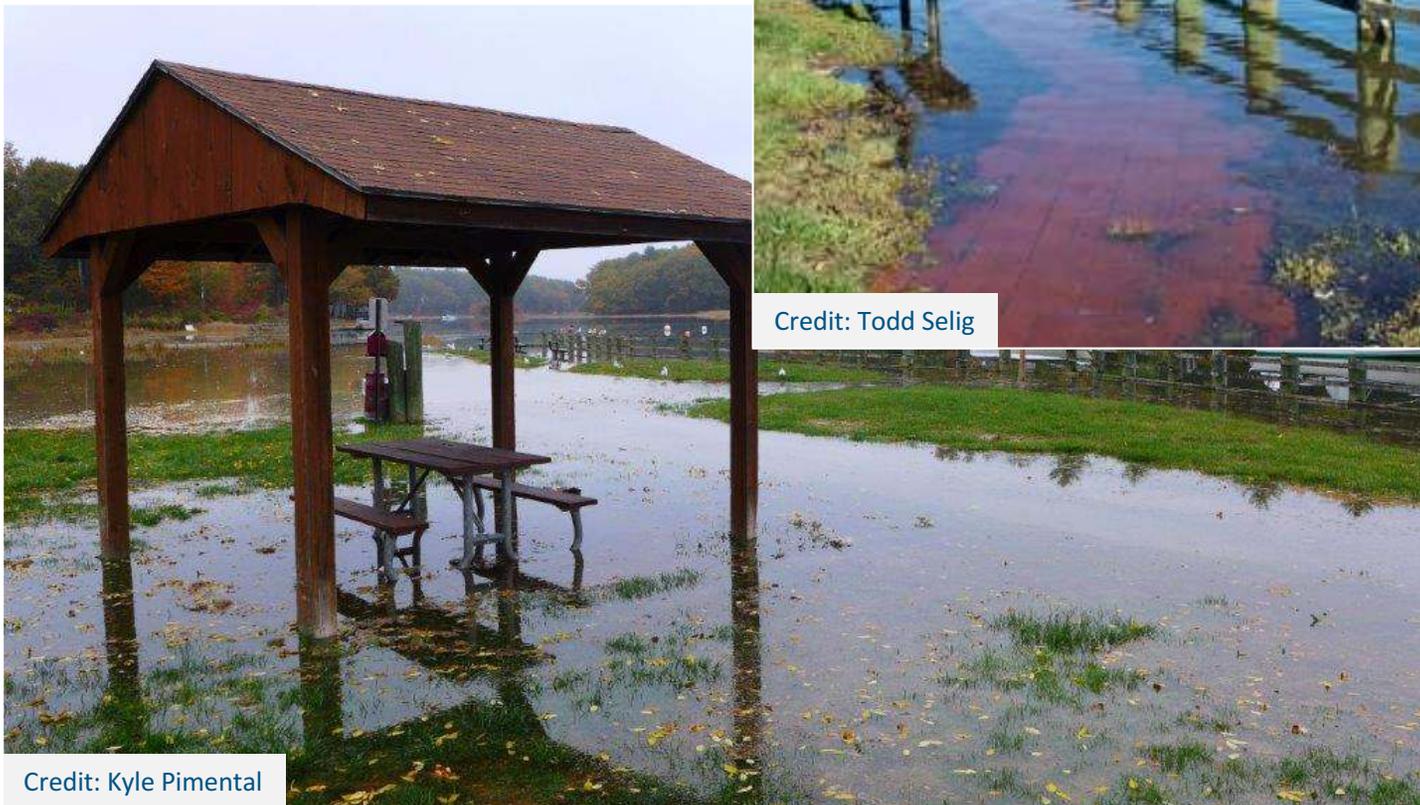
Rising seas

↑ 0.6 – 2.0 ft. by 2050

↑ 1.6 – 6.6 ft. by 2100



Credit: Todd Selig



Credit: Kyle Pimental

King Tide
in Durham, NH

Increase in extreme weather



MARCUS YAM/LOS ANGELES TIMES/GETTY IMAGES

Presidentially declared storm-related disasters in NH

- 1951-2000 (**50 years**) – **14** Declared Disasters
- 2001-2015 (**15 years**) – **18** Declared Disasters

Source: FEMA.gov

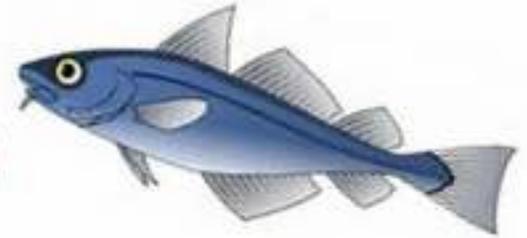


Madbury
Credit: Eric Fliegenbaum



Newmarket
Credit: Aaron Leclerc, 2007

Ecological (& Economic) Impacts



What does Climate Change mean for Madbury?

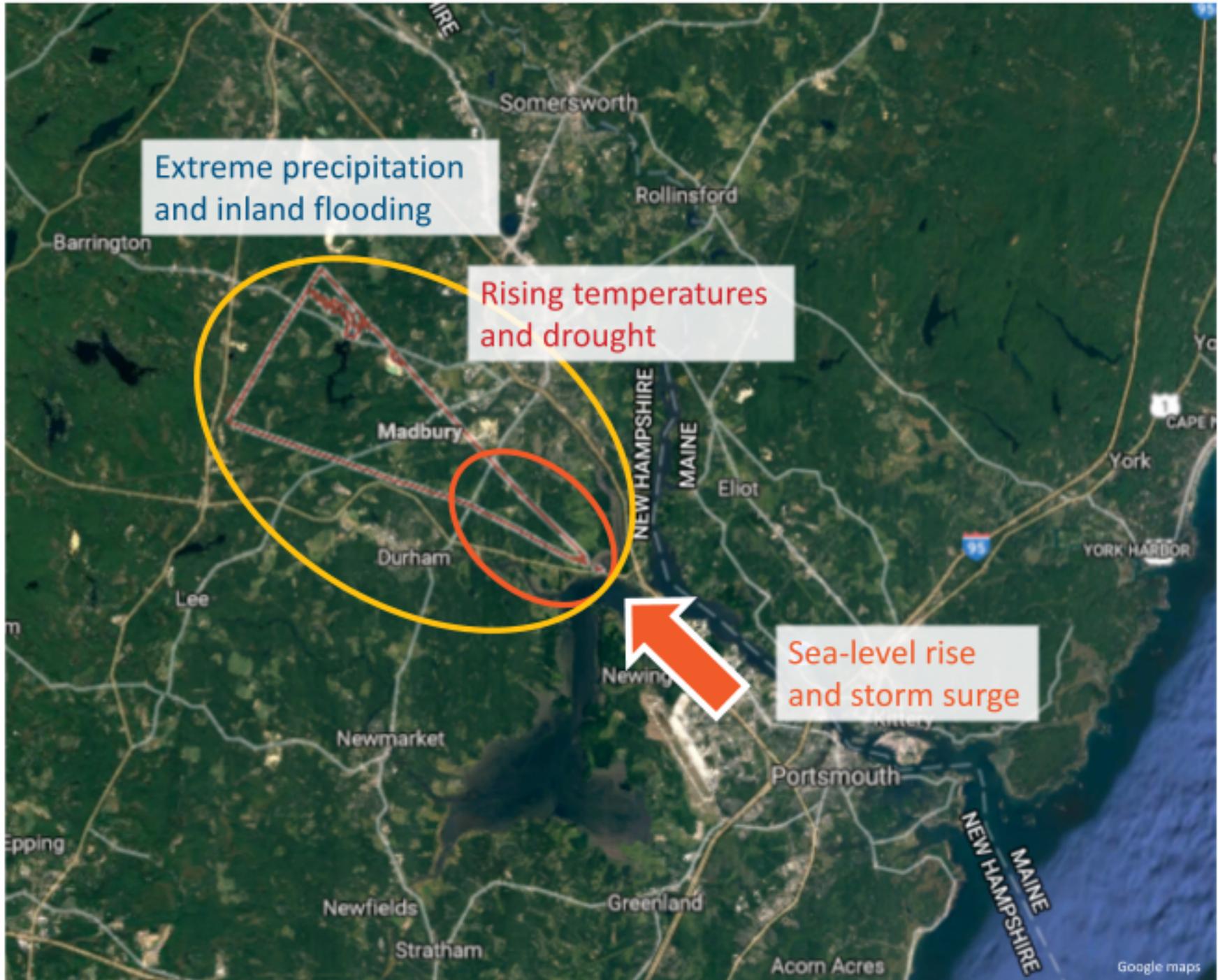


From Eric Fiegenbaum

Extreme precipitation
and inland flooding

Rising temperatures
and drought

Sea-level rise
and storm surge

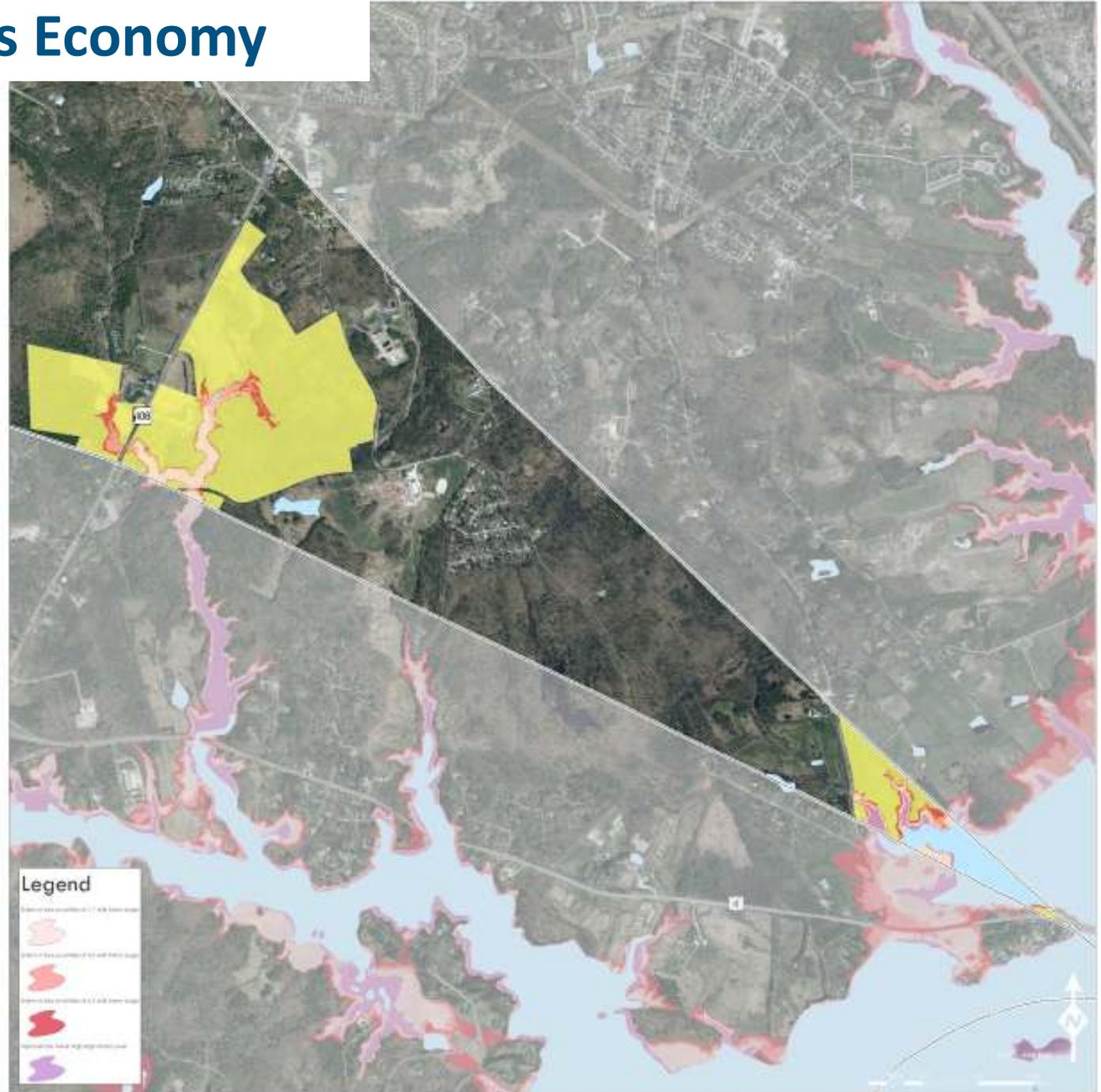




Madbury's Economy

Estimated 19 parcels with total value of approximately \$2.1 million under the “worst case scenario”

[6.3ft of SLR with a storm surge]



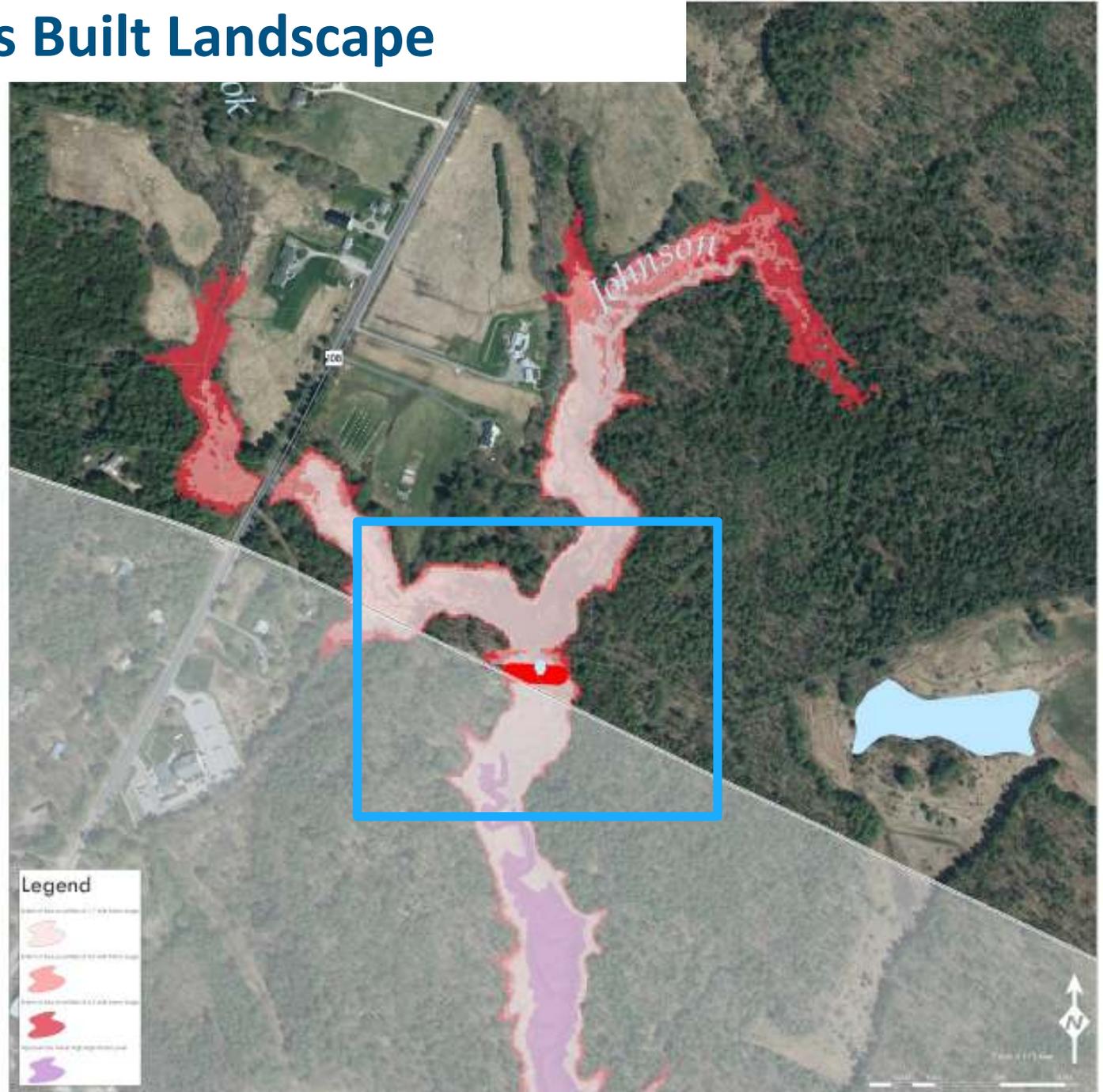


Madbury's Built Landscape

No infrastructure impacts.

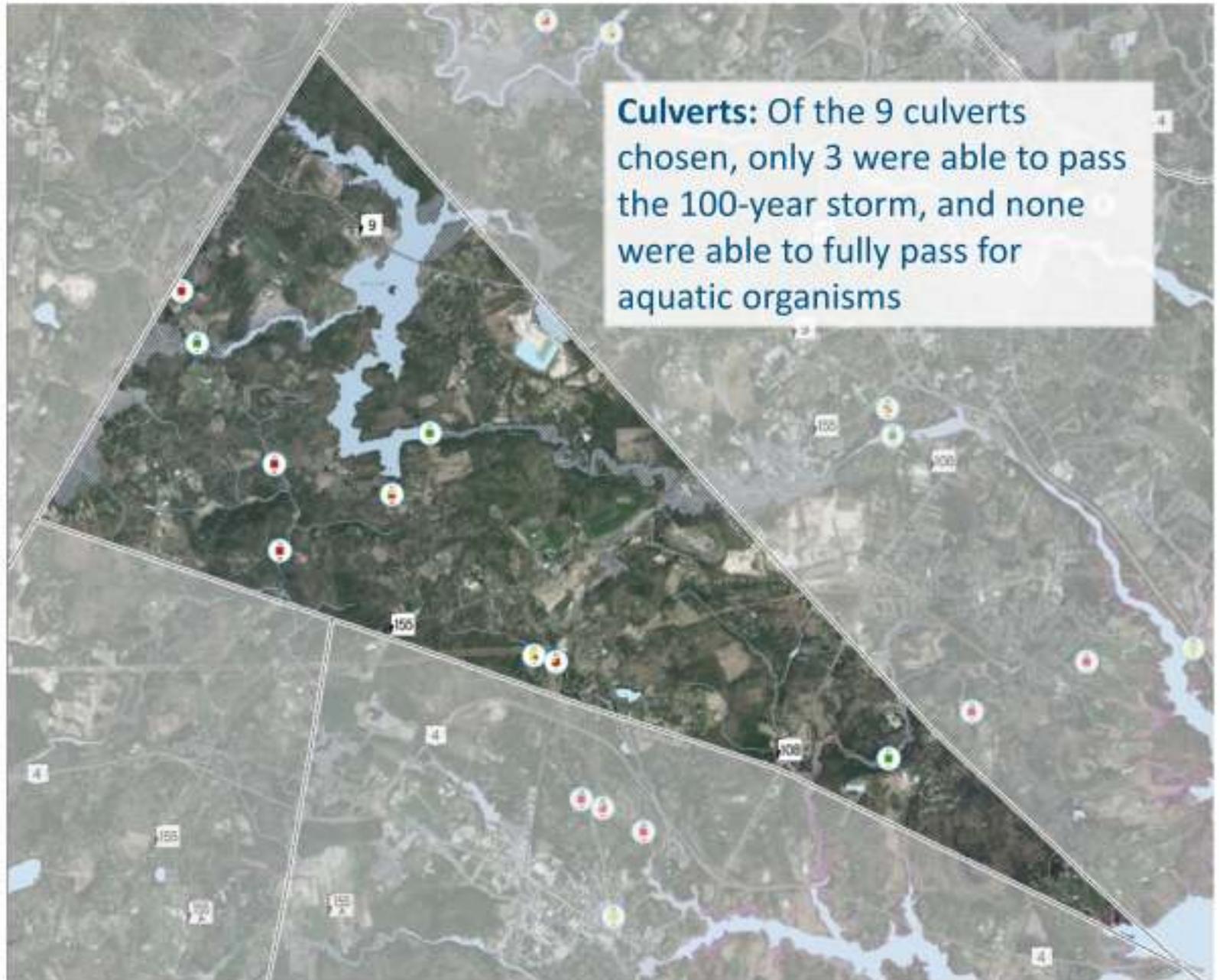
No critical facility impacts.

Only 1 “not maintained” roadway impacted [Creek Road] over Johnson Creek





Madbury's Built Landscape

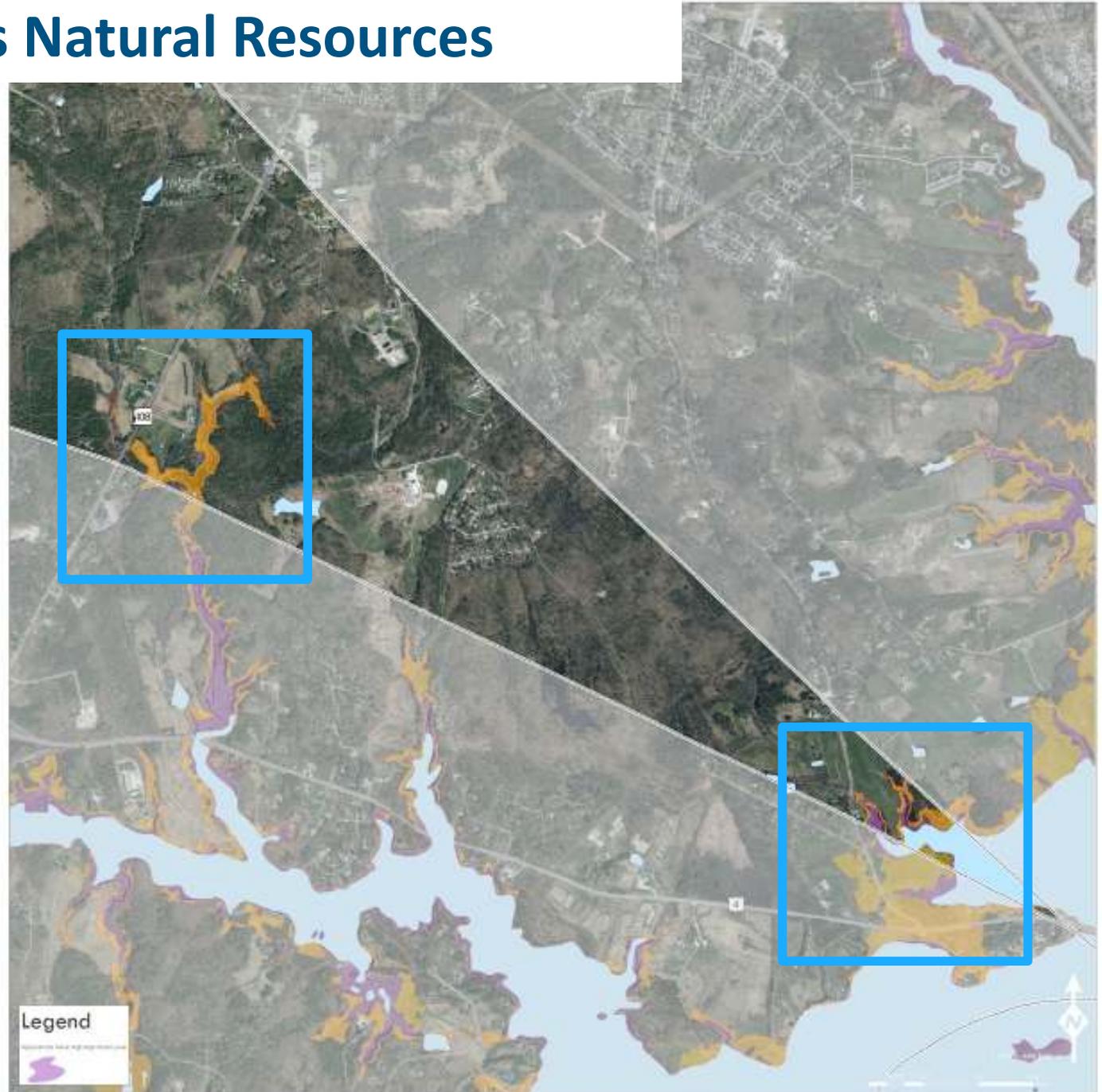




Madbury's Natural Resources

Land Resources:

- Conservation: 1.5 acres
- Wildlife Action Plan: 23.8 acres
- Focus Areas: 26.4 acres
- Uplands: 24.9 acres



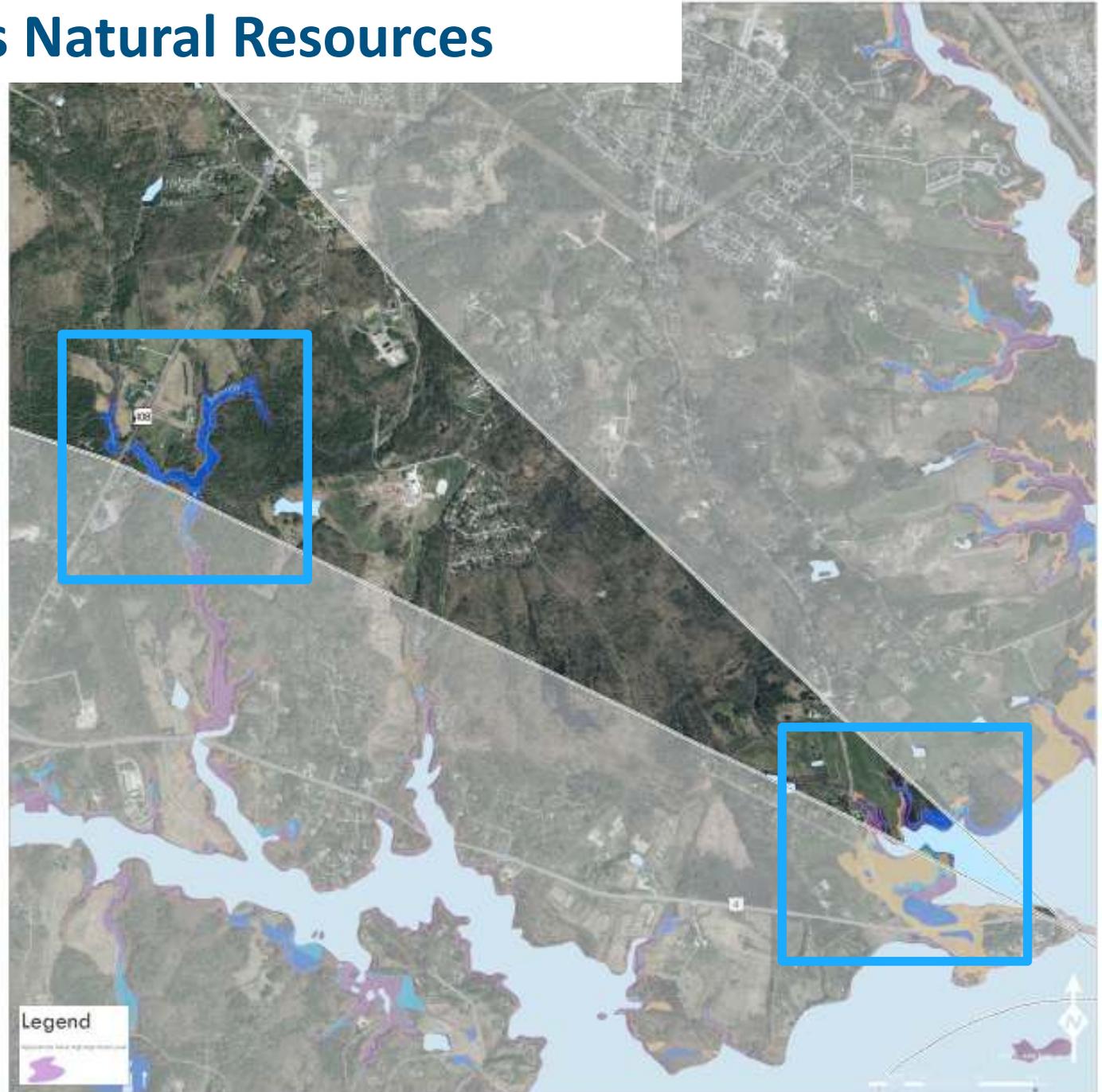


Madbury's Natural Resources

Water Resources:

- Tidal Wetlands: 1.3 acres
- Freshwater Wetlands: 20.5 acres
- Existing Aquifers: 7.7 acres

65.5% of flooding due to highest SLR scenario is captured within existing 100-year floodplain

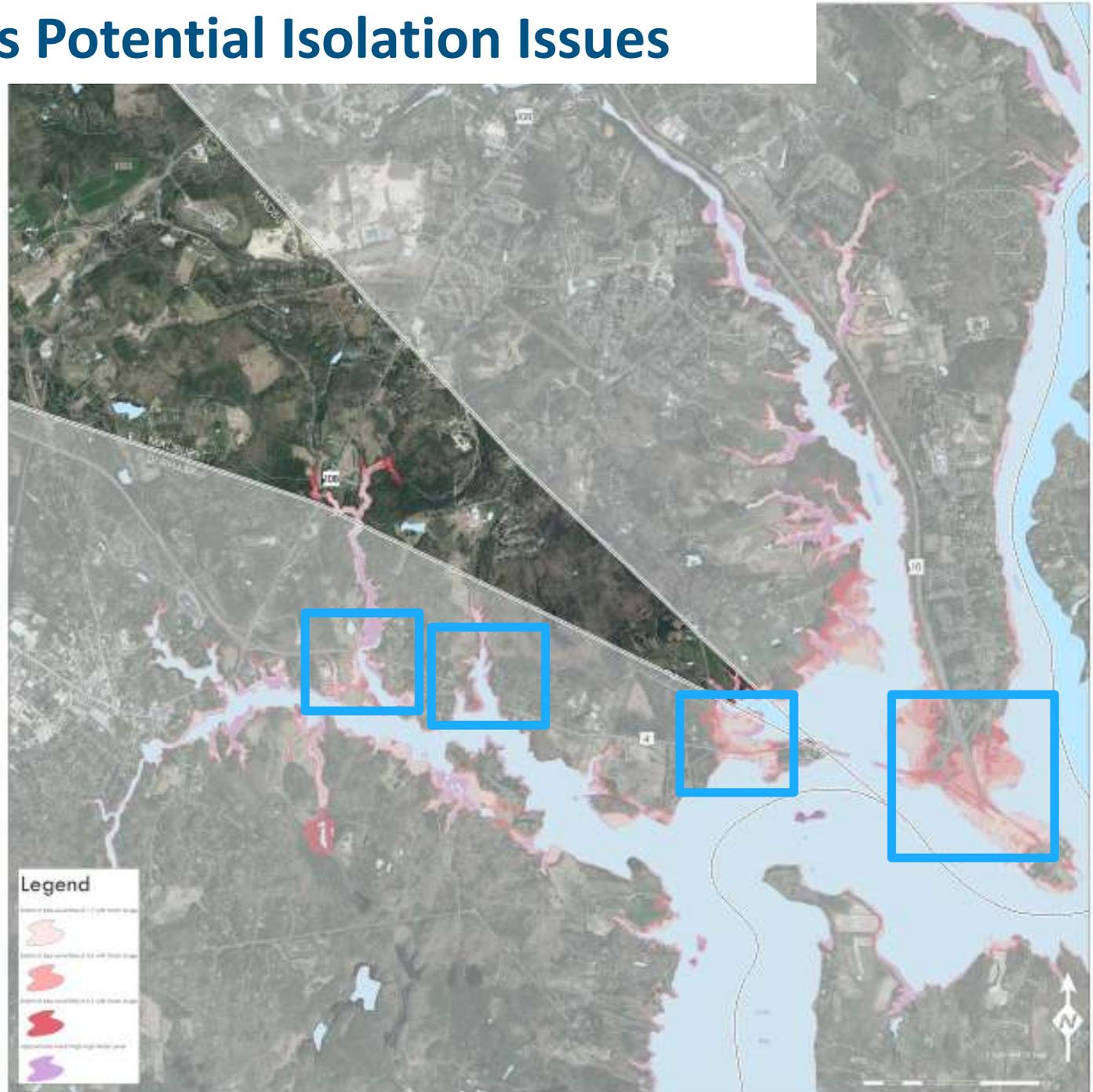




Madbury's Potential Isolation Issues

Impacts on Route 4 in Durham (Johnson and Bunker Creeks, and Back River Road)

Impacts to Route 16 connecting Dover and Portsmouth



What can we do?

MITIGATION

Reducing greenhouse gases



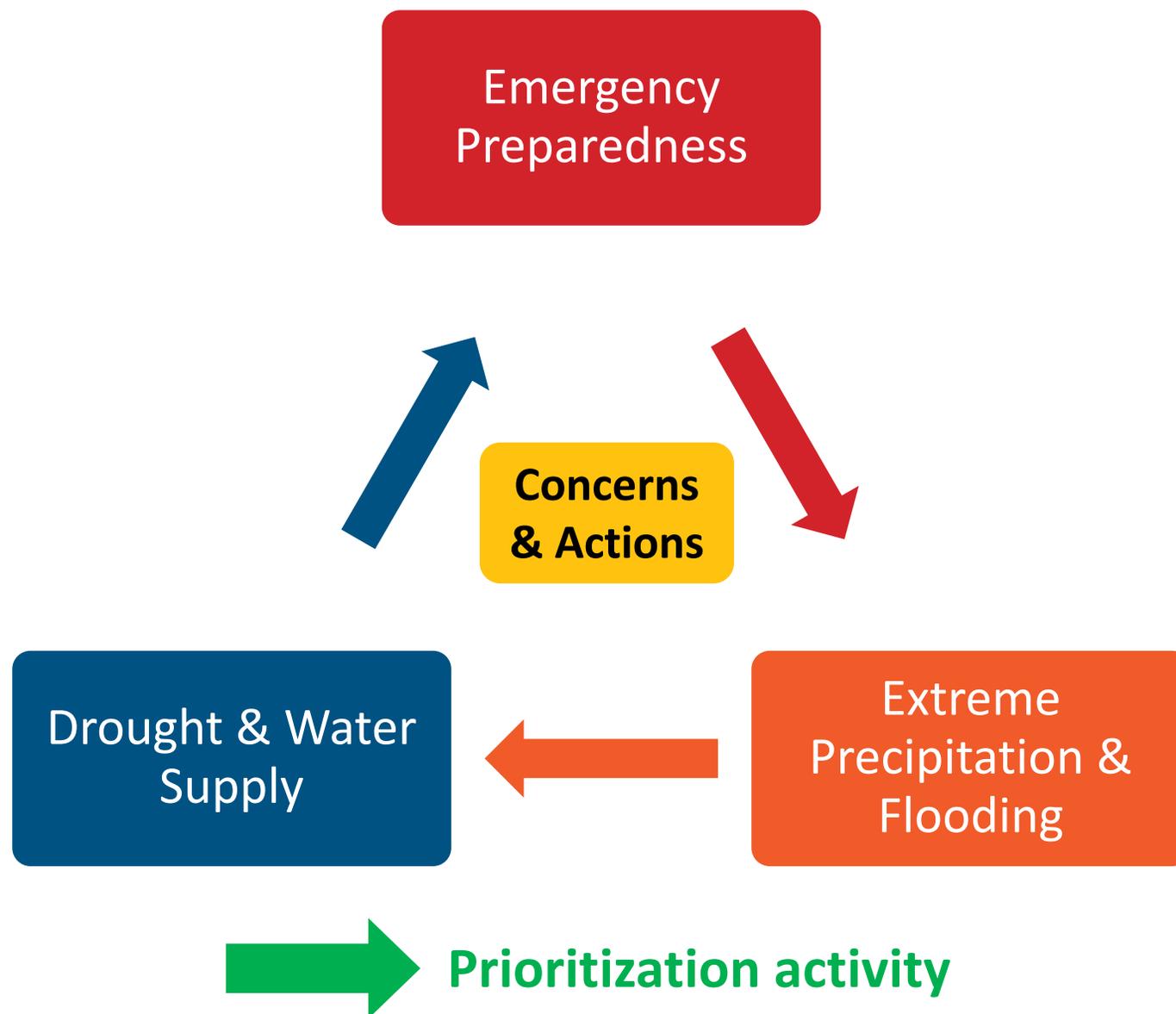
What can we do?

ADAPTATION

Adapting to the impacts of climate change



Breakout Groups



Discussion Ground Rules

- Be respectful and polite
- Listen to others
- One speaker at a time – don't interrupt
- All ideas are valid
- Be concise
- Stay focused and on task
- Challenge problems, not people
- Share the floor – give other participants equal opportunity to share their views

Next Steps

- Please fill out the workshop evaluation form!
- Develop a summary of the concerns and actions
- Meet with Madbury Planning Board members and others to discuss next steps
- Follow up with tonight's participants

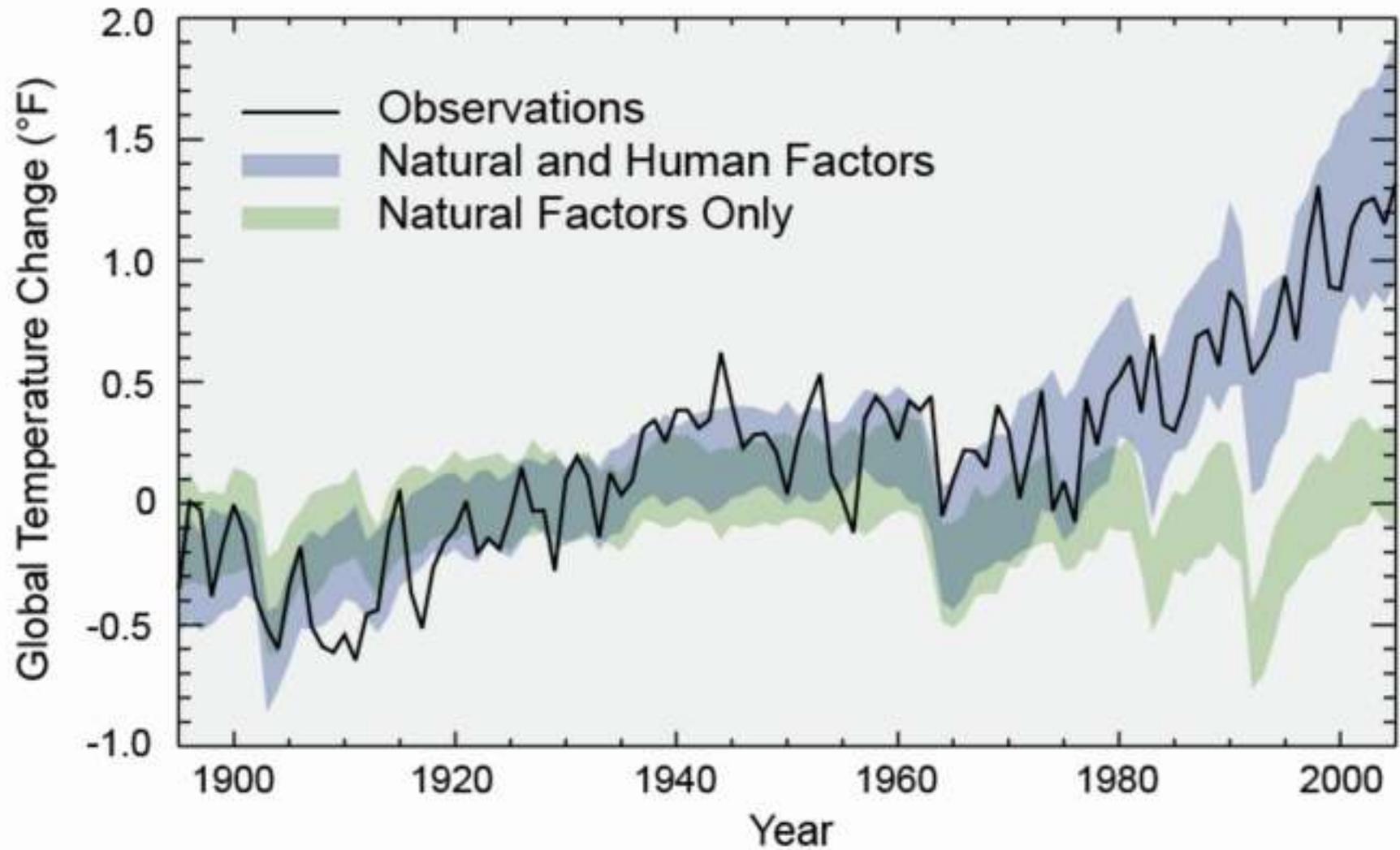
For more information:

- Check out www.nhcaw.org
- Sign up for CAW's newsletter
- Contact Lisa Graichen: (603) 862-2356, lisa.graichen@unh.edu



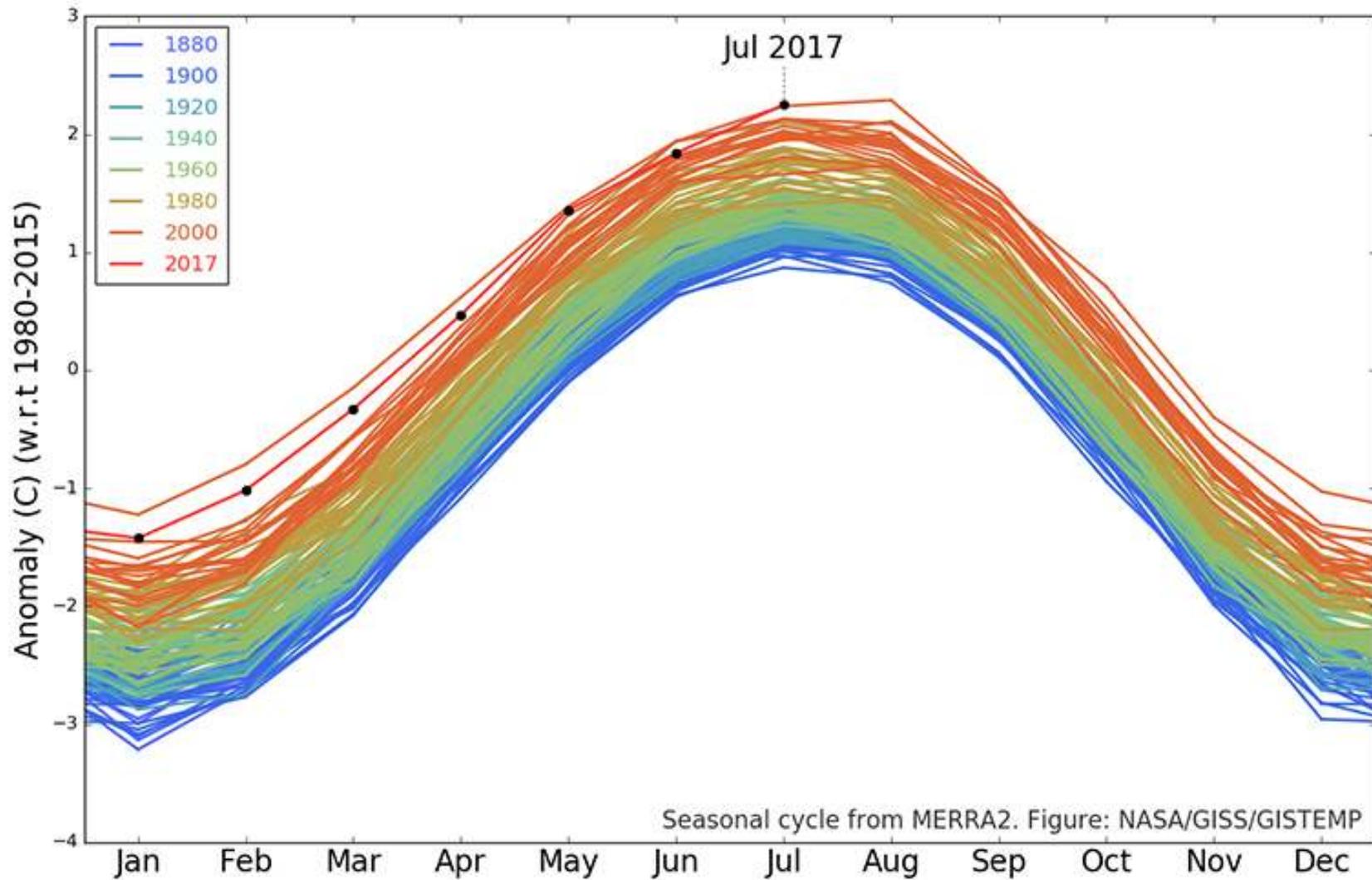
Thank you for joining us

Separating Human and Natural Influences on Climate

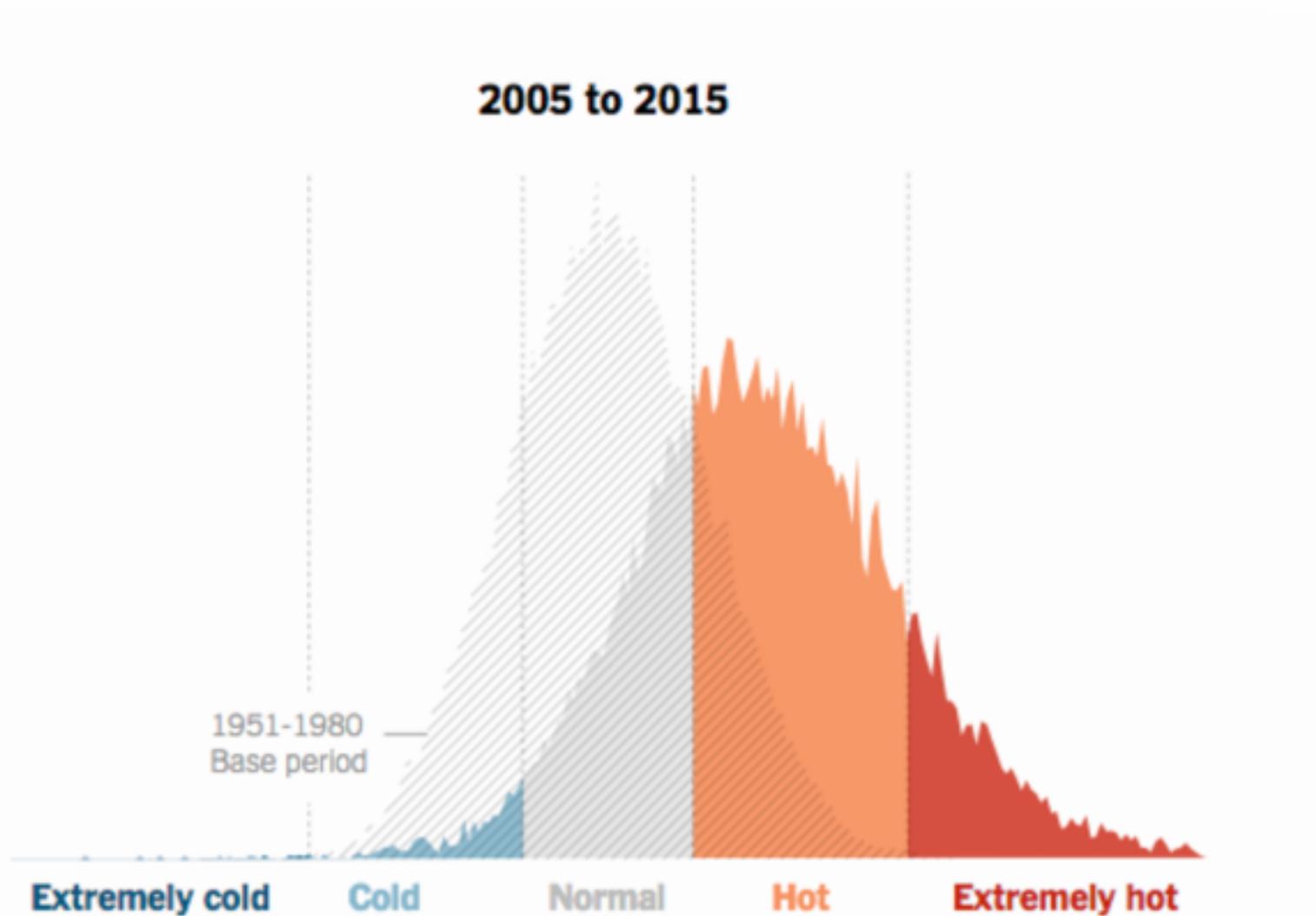


Warming Trends

GISTEMP Seasonal Cycle since 1880



Weather and Climate



Carbon dioxide trends

Ice core data before 1958, Mauna Loa data after 1958

