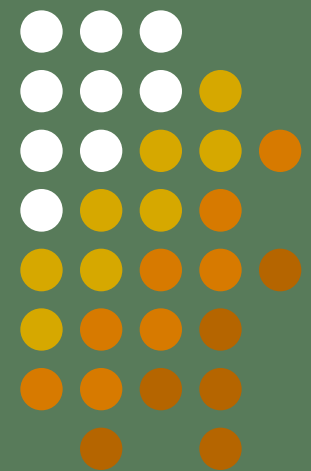


# A North Carolina Perspective on Climate Change

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Climate Ready NC  
SE Climate & Health Workshop  
February 13, 2012



# At a glance

- Geographic diversity
- N.C. experiences every major type of weather except monsoons<sup>1</sup>
- N.C. projected to have some of the largest numbers of older Americans by 2030<sup>10</sup>
- Significant population growth in recent history
- Extensive health surveillance system
- Numerous research projects on climate change
- Strong public health & emergency response<sup>2</sup>



<sup>1</sup>NC State Climate Office

<sup>2</sup>NC Climate & Health Workshop Summary

<sup>10</sup>Administration of Aging 2011

Image from duke.edu



# Heat-related Illness & Death

- From 1980 to 2009, 275 deaths caused by heat -- 10 North Carolinians a year<sup>8</sup>
- Of 68 heat-related deaths among U.S. crop workers 1992-2006, 13 occurred in N.C.<sup>3</sup>
- From 1977-2001, 40 percent of occupational heat-related fatalities in NC were among farm workers, many of whom died unnoticed & without medical attention<sup>4</sup>
- 2008-2011 heat-related ED visits:
  - Large spike in June
  - Highest incidence among 19-44 year old males<sup>5,6,7</sup>

<sup>3</sup>MMWR – June 20, 2008

<sup>4</sup>Mirabelli and Richardson, AJPH, 2005

<sup>5</sup>NC DETECT, Heat Surveillance Group at NC DPH

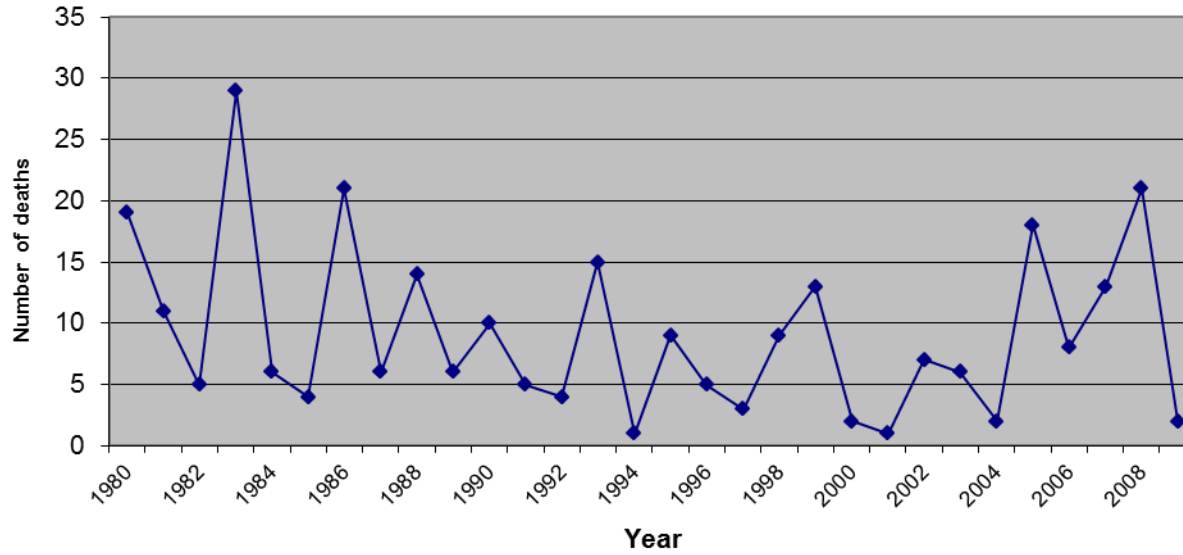
<sup>6</sup>Rhea, J Community Health, 2011

<sup>7</sup>Lippmann and Fuhrmann, manuscript under review, 2012

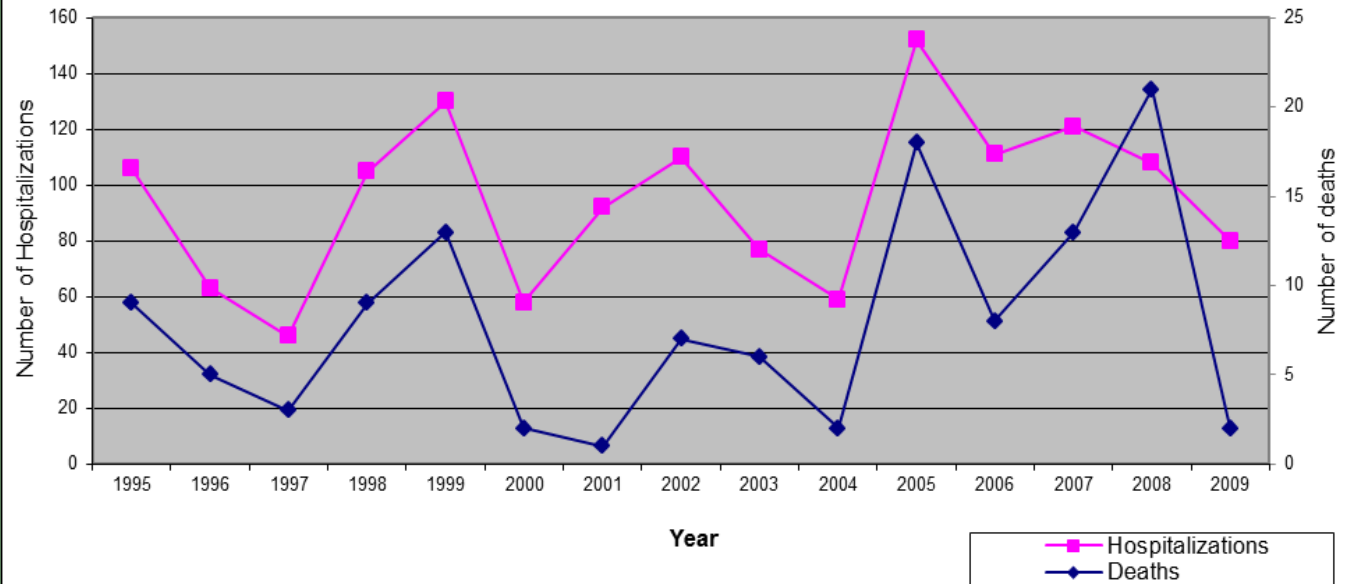
<sup>8</sup>NC Office of Medical Examiner



North Carolina heat-related mortality during May-September, 1980-2009



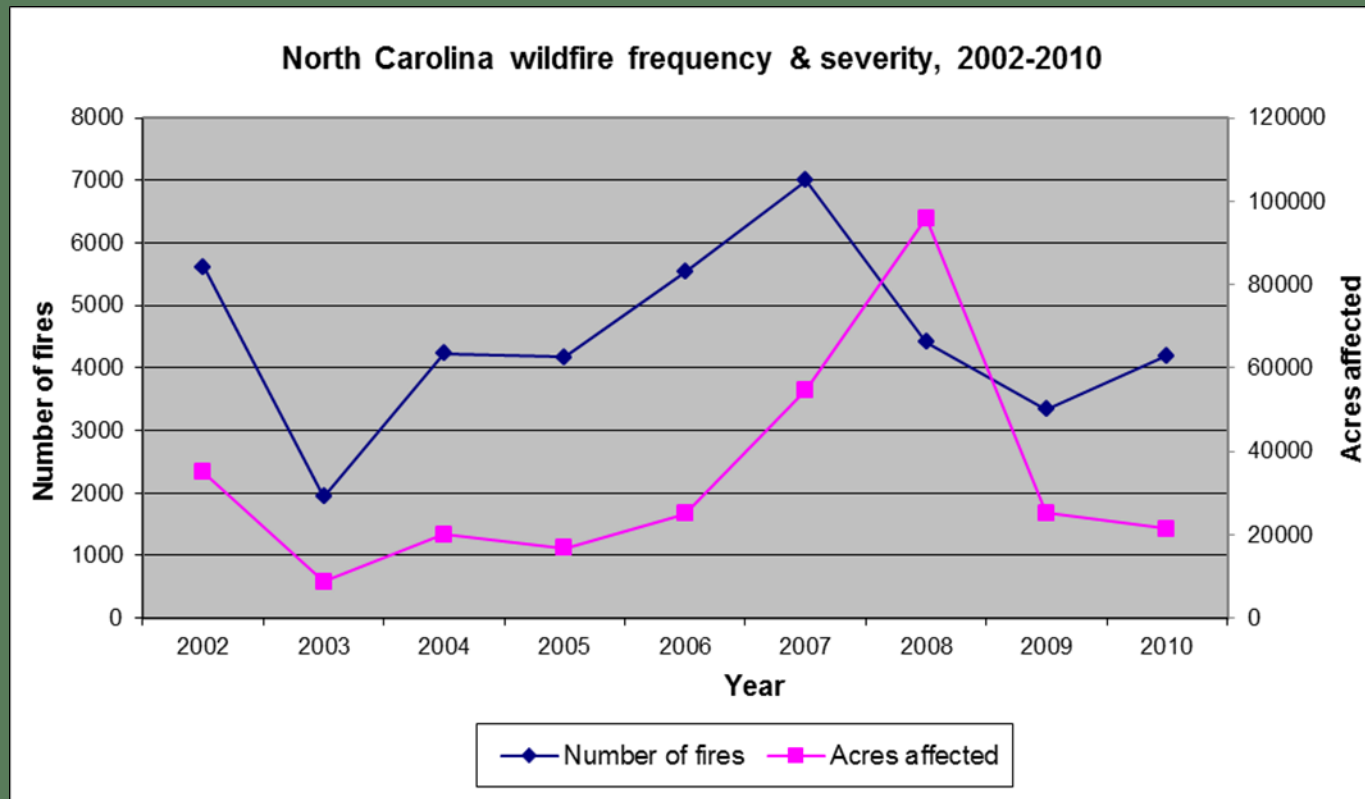
North Carolina heat-related morbidity & mortality during May-September, 1995-2009





# Air Pollution

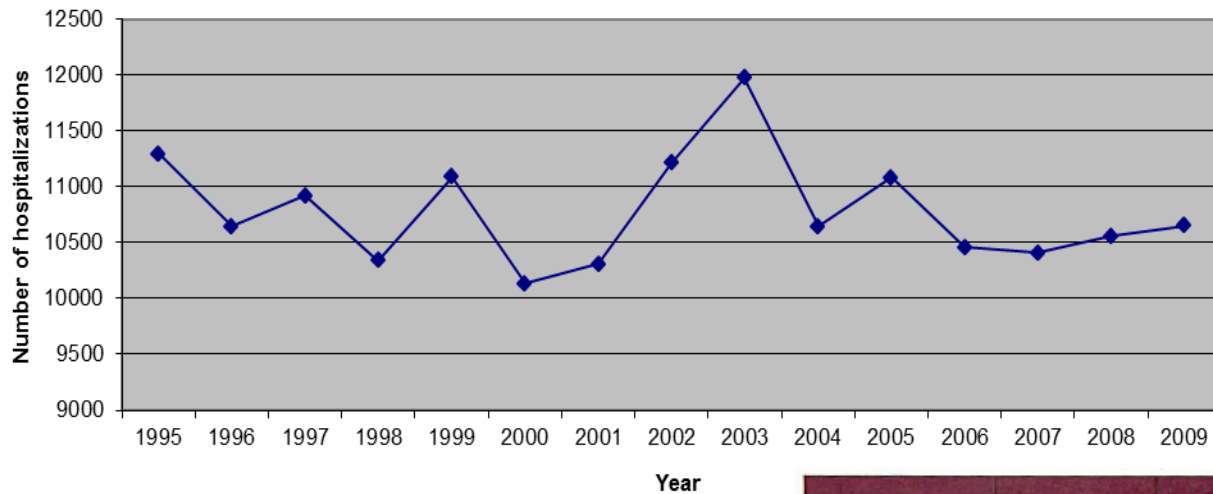
- Peat bog fires – even brief exposure associated with negative respiratory & cardiovascular outcomes<sup>9</sup>



<sup>9</sup>Rappold et al. 2011



North Carolina hospitalizations due to allergic disease, 1995-2009



| State          | Population | Occurrences of Acute Respiratory Symptoms (Rank) | Health Care Costs (Rank)          |
|----------------|------------|--|-----------------------------------|
| California     | 42,206,743 | 225,210–659,680 (1)                              | \$122,327,850–\$1,833,793,410 (1) |
| Texas          | 28,634,896 | 147,140–431,000 (2)                              | \$79,533,660–\$1,168,692,990 (2)  |
| New York       | 19,576,920 | 108,150–316,790 (3)                              | \$64,435,580–\$989,410,430 (3)    |
| Illinois       | 13,236,720 | 73,110–214,160 (4)                               | \$43,131,710–\$688,944,830 (5)    |
| Pennsylvania   | 12,787,354 | 67,660–198,190 (5)                               | \$51,854,220–\$849,044,420 (4)    |
| Ohio           | 11,644,058 | 62,530–183,150 (6)                               | \$44,397,880–\$688,928,900 (6)    |
| Michigan       | 10,695,993 | 56,470–165,420 (7)                               | \$37,111,390–\$584,559,100 (7)    |
| North Carolina | 10,709,289 | 52,350–153,360 (8)                               | \$33,827,120–\$528,660,190 (8)    |
| New Jersey     | 9,461,635  | 51,030–149,480 (9)                               | \$32,958,790–\$515,592,450 (9)    |
| Virginia       | 8,917,395  | 47,250–138,420 (10)                              | \$29,436,950–\$449,390,850 (10)   |

Illness occurrence and health care cost figures represent the low and high range of estimates under a 2 ppb increase in ground-level ozone in 2020; population projections are courtesy of U.S. Census 2010.



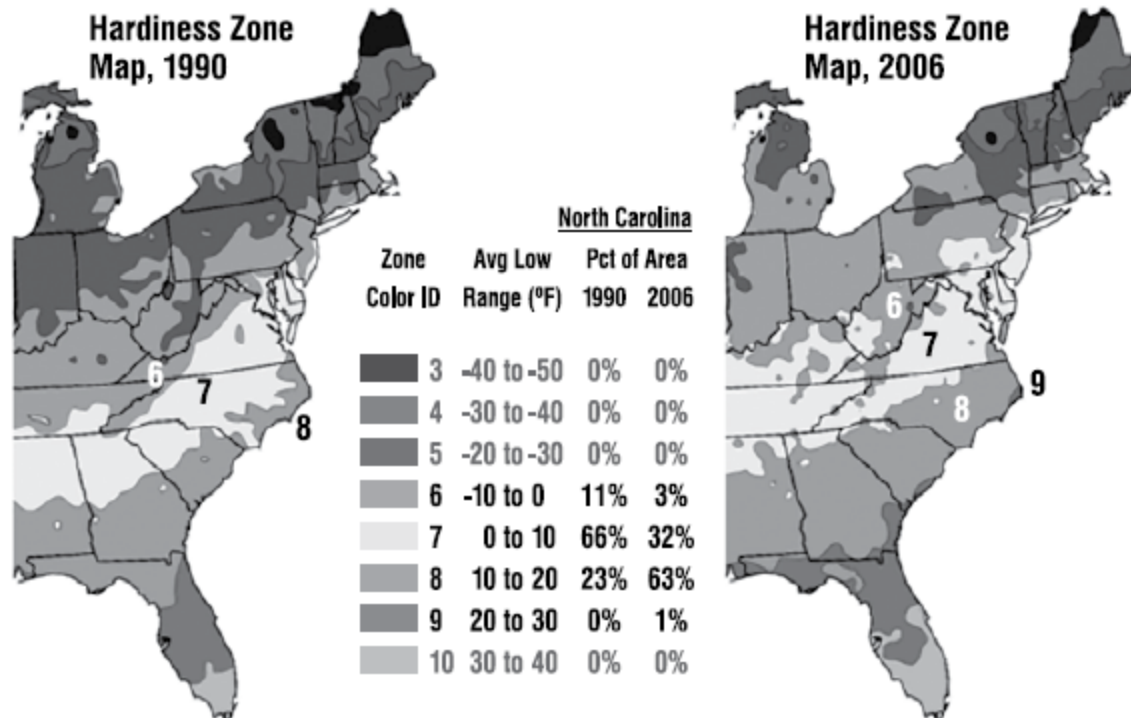
# Water-borne Disease

- Evaluating public health infrastructure at-risk to SLR inundation:
  - Wastewater treatment plants
  - Water treatment plants
  - EPA-recognized chemical sites
  - The rate of MSL observed at 2-4 mm/yr<sup>12</sup>



# Changing Agriculture – One Health

**Figure 1.**  
**Comparison of US Department of Agriculture Plant Hardiness Zones for the Eastern United States, 1990 and 2006**

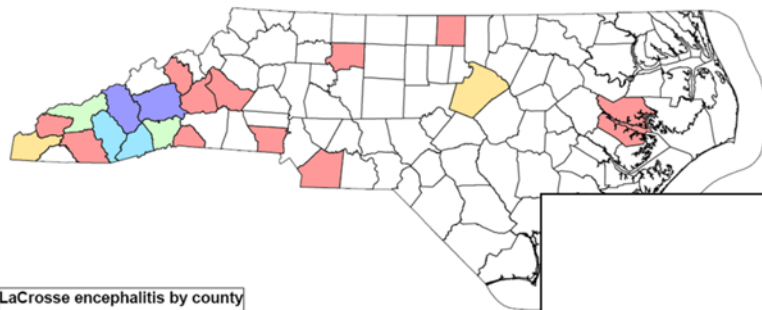




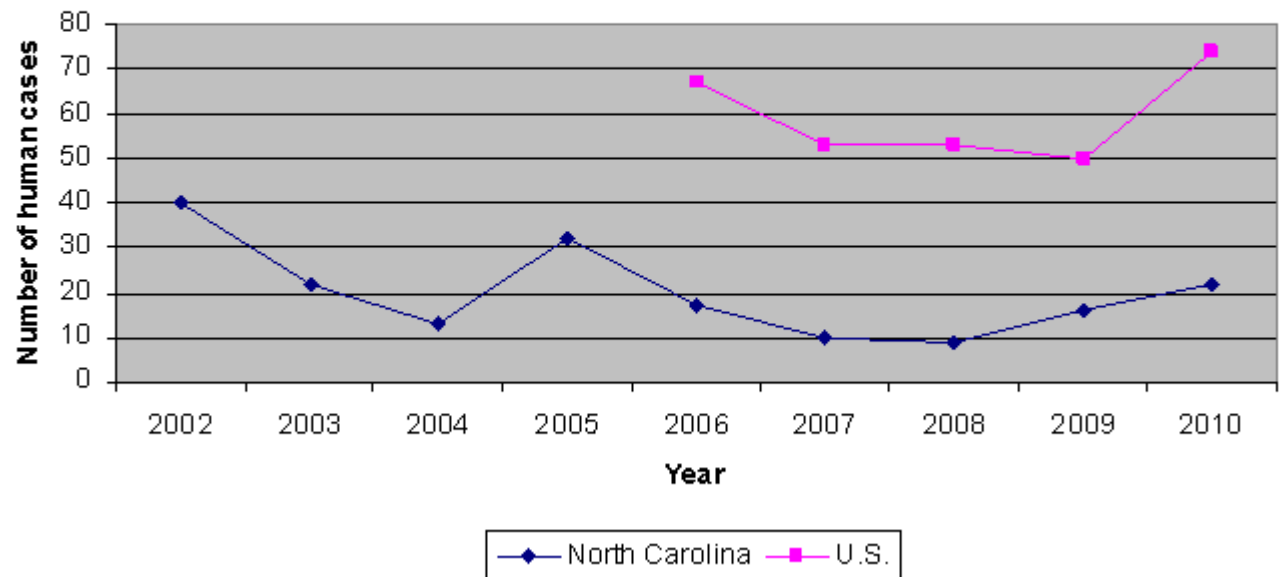
# Vector-borne Disease



Human cases of LaCrosse encephalitis in NC, 2002-2010

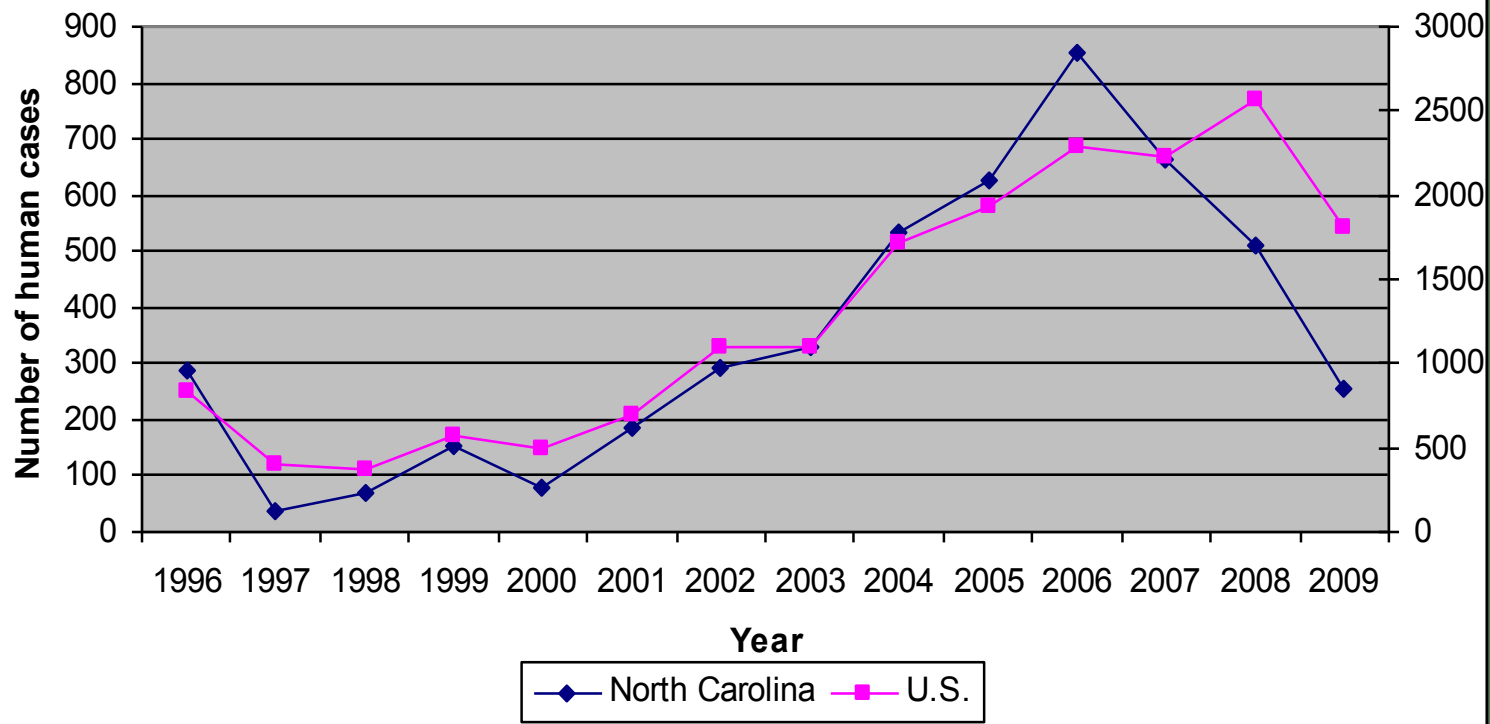


North Carolina and U.S. Annual Incidence of LaCrosse Encephalitis, 2002-2009





### North Carolina and U.S. Annual Incidence of Rocky Mountain Spotted Fever, 1996-2009



# Assessment & Adaptation



- N.C. Climate & Health Workshop held 8/19/11 hosted by SE Regional Climate Office, N.C. LHD Association Environmental Health Committee, N.C. DPH.
- Draft of N.C. Interagency Climate Change Adaptation Plan – DENR, DOI, DOT, EPA, WRC, DHHS, NCEM.
- Assessment for strategic plan to address health impacts.
- EPA-FEMA Sustainable Communities work funds climate change adaptation projects in New Bern & Wilmington.

# Adaptation cont...



- Draft of new heat response plan from NCEM following data sharing.
- Local elected official support:
  - 30 percent of N.C.'s population governed by a mayor that has signed U.S. Conference of Mayors Climate Protection Agreement
  - 20 percent of population governed by a local official participating in ICLEI



# Next Steps

- Important to consider whether local gov' ts or other entities should become more proactive in conveying info on natural disasters & their risks.
- Vulnerability to heat-related illness is not just tied to heat waves; improving education & communication may be accomplished through collaboration between local meteorologists & public health<sup>2</sup>.

# Questions?



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- Thanks!
  - CDC Climate Ready Cities & States Initiative
  - Lauren Thie, MSPH
  - Melissa Tinling, BSPH
  - Dr. Rick Langley
  - Climate-related Health Working Group
  - N.C. State Center for Health Statistics
  - N.C. DETECT