Climate Change, Farming, and Energy Considerations in Vermont

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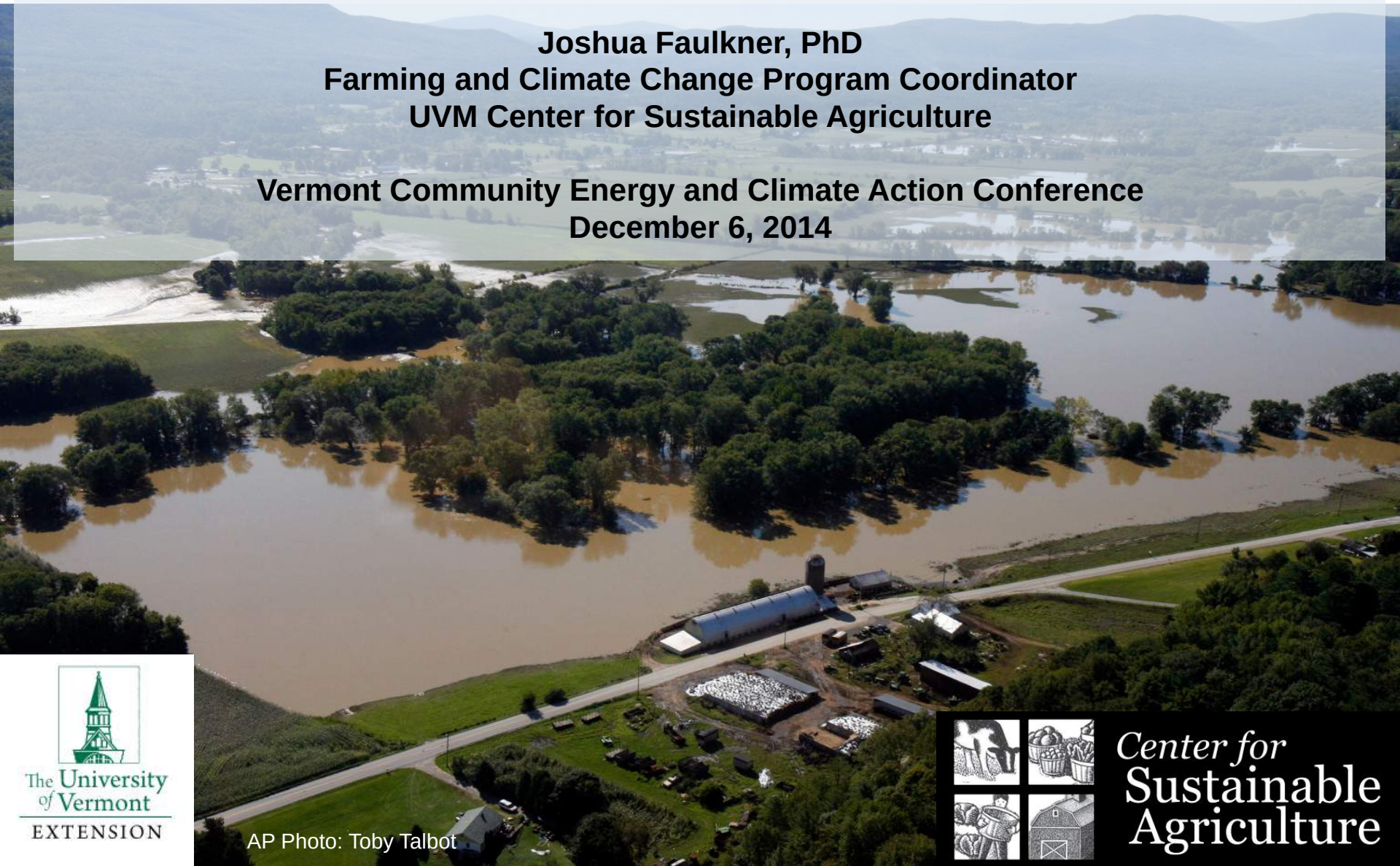
Vermont Community Energy and Climate Action Conference
December 6, 2014



AP Photo: Toby Talbot

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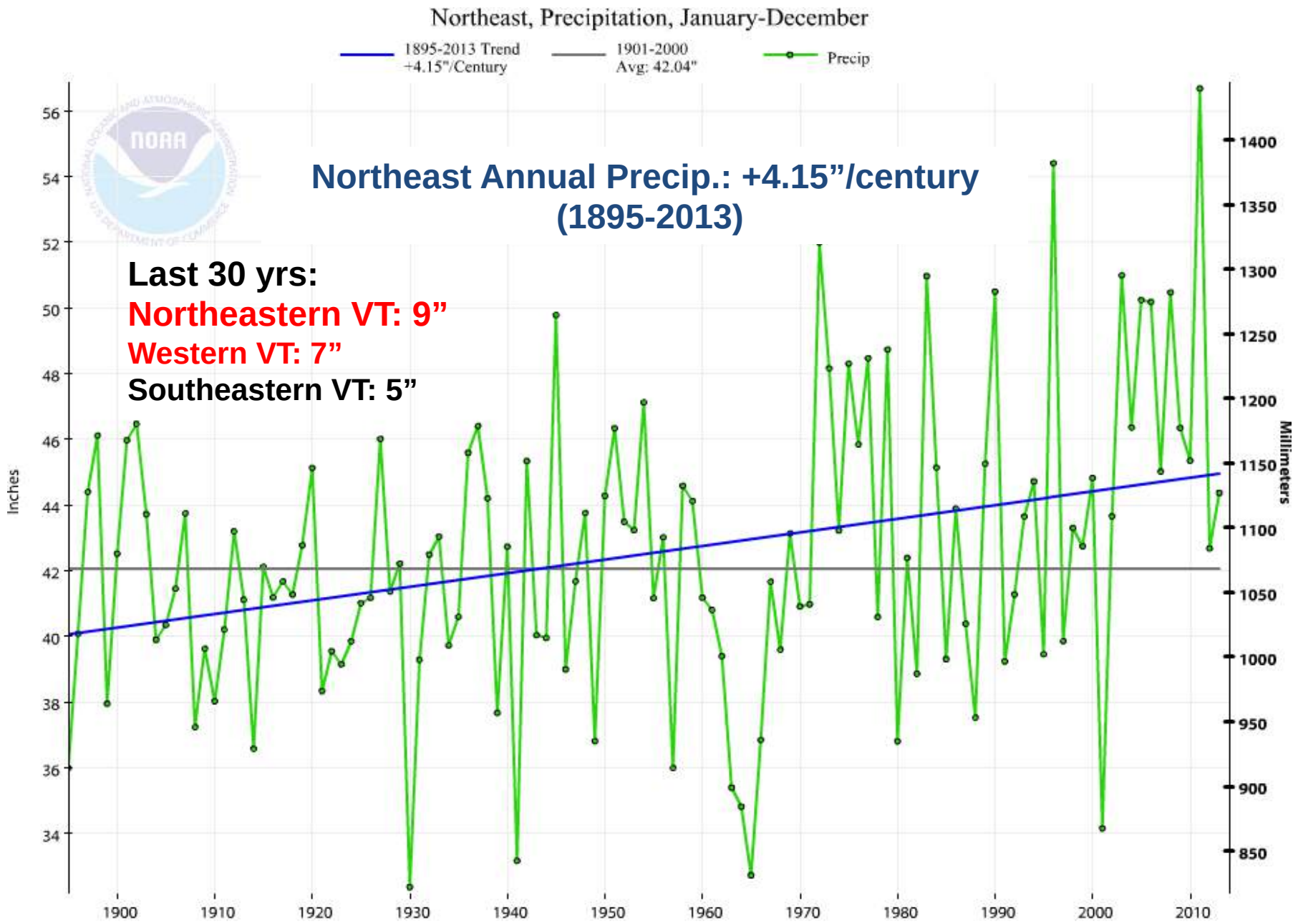
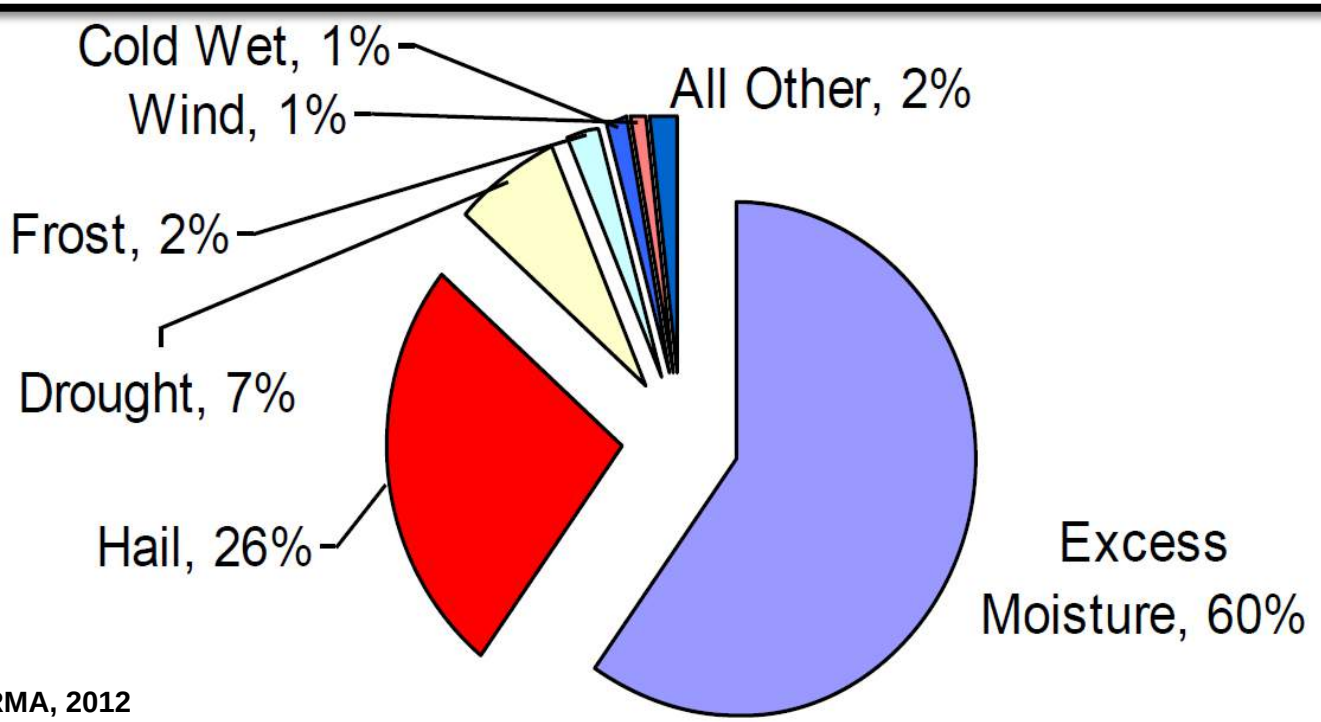
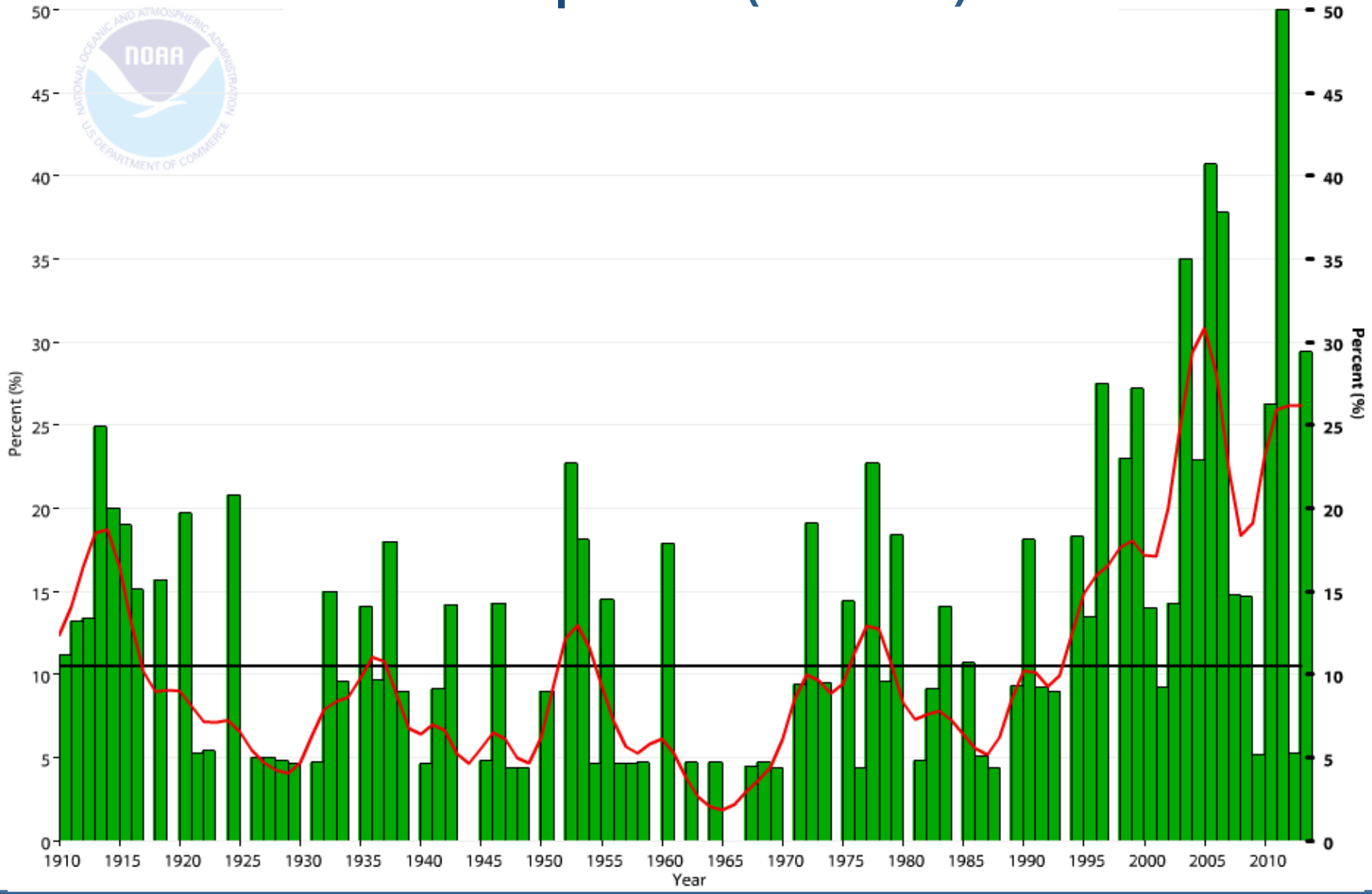

Northeast, Precipitation, January-December
1895-2013 Trend
+4.15"/Century
1901-2000
Avg: 42.04"
Precip
Northeast Annual Precip.: +4.15”/century
(1895-2013)
Last 30 yrs:
Northeastern VT: 9”
Western VT: 7”
Southeastern VT: 5”
Inches
Millimeters
56
54
52
50
48
46
44
42
40
38
36
34
1400
1350
1300
1250
1200
1150
1100
1050
1000
950
900
850
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

Why Vermont Crops Fail (2001-10)

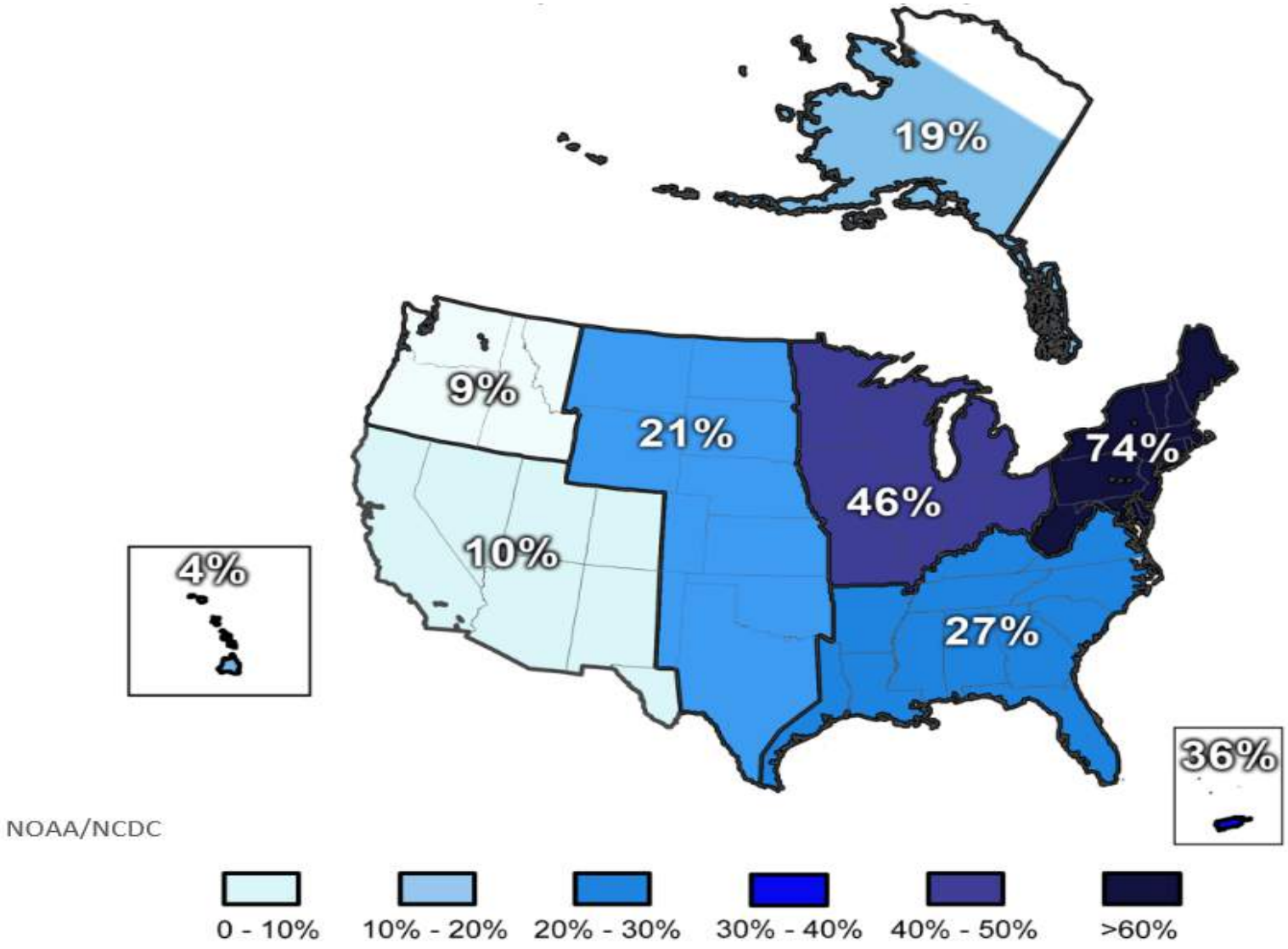


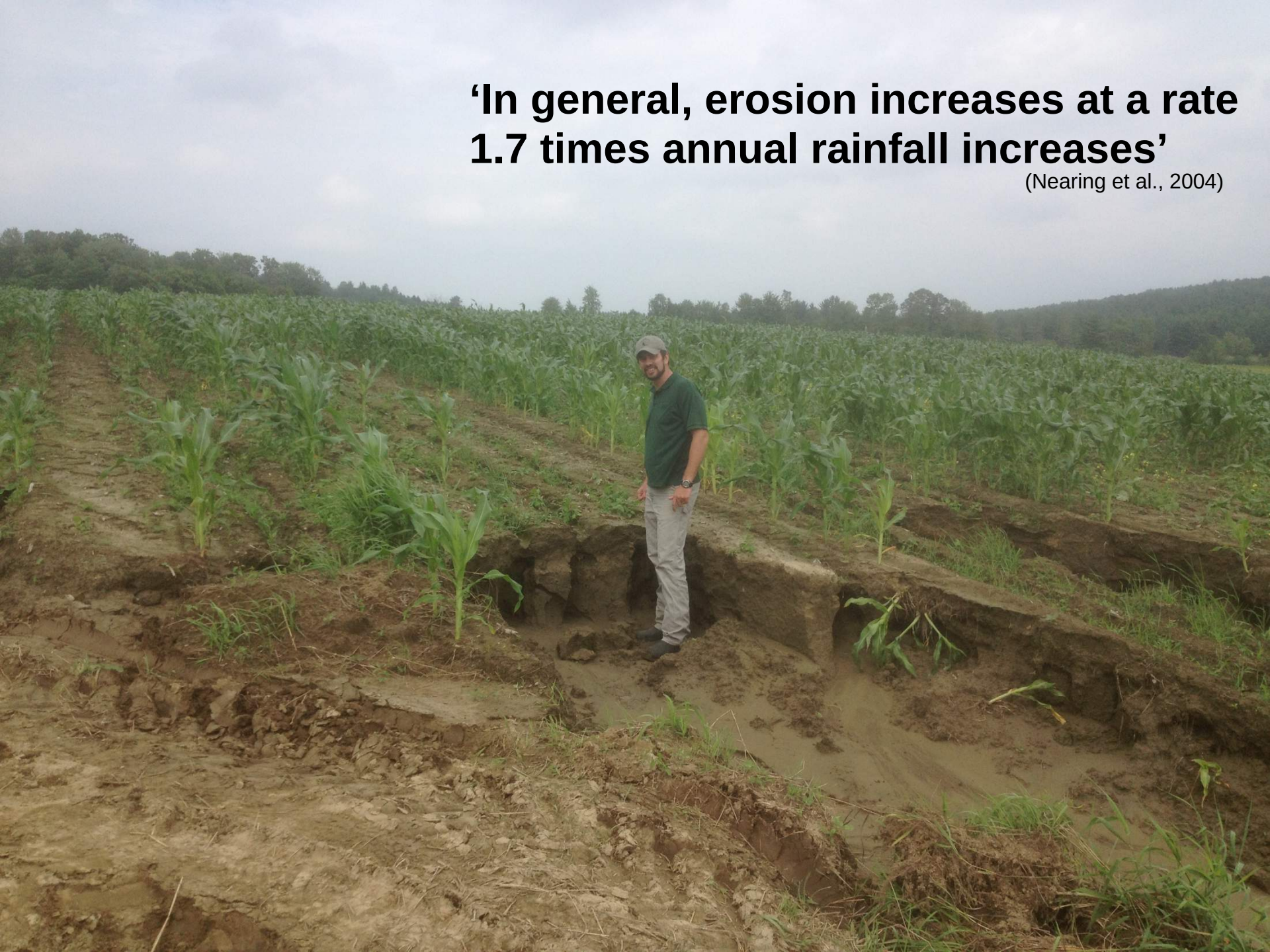
RMA, 2012

Northeast Extremes in 1-Day Precipitation (1910-2013)

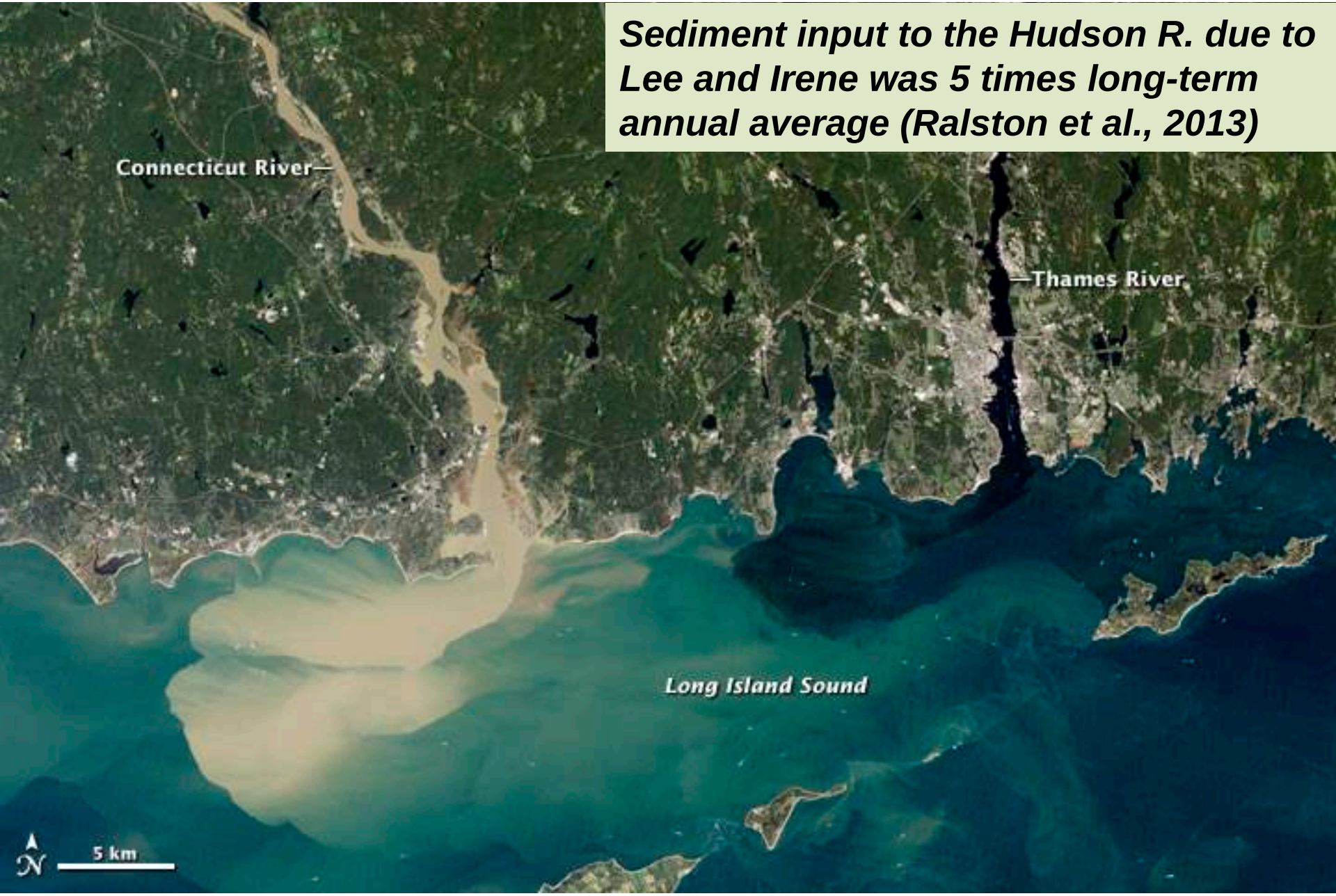


Trend in 1-day Very Heavy Precipitation
(1958-2010)



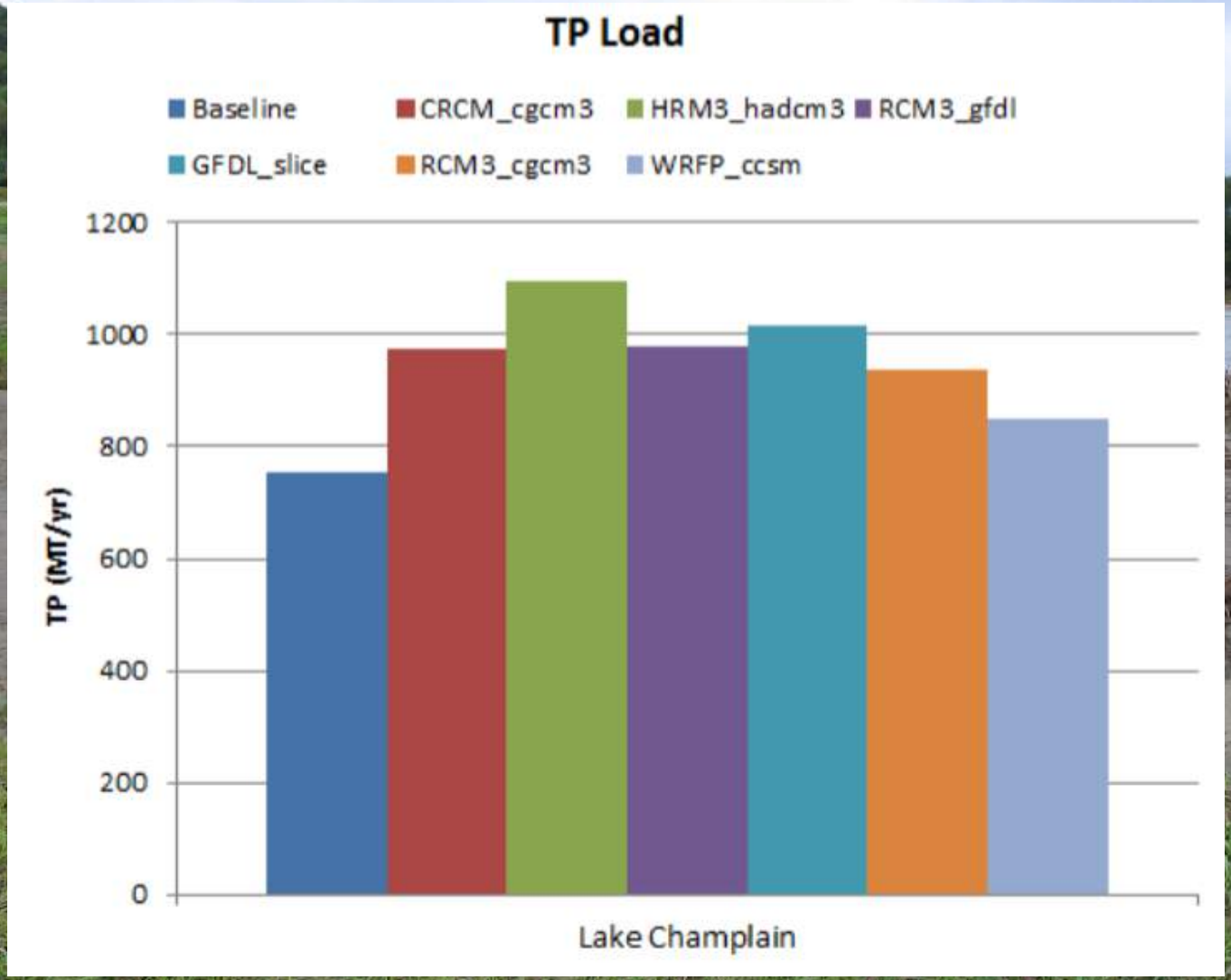

‘In general, erosion increases at a rate 1.7 times annual rainfall increases’
(Nearing et al., 2004)

Sediment input to the Hudson R. due to Lee and Irene was 5 times long-term annual average (Ralston et al., 2013)



(Source: earthobservatory.nasa.gov))

Modeled Total P: Six Climate Scenarios



(Tetra Tech, 2013)

Climate Adaptation for Resilient Soils and Systems

Three principles of resilient soils:

1. Soil cover
2. Building soil carbon/organic matter
3. Reduced disturbance/soil structure

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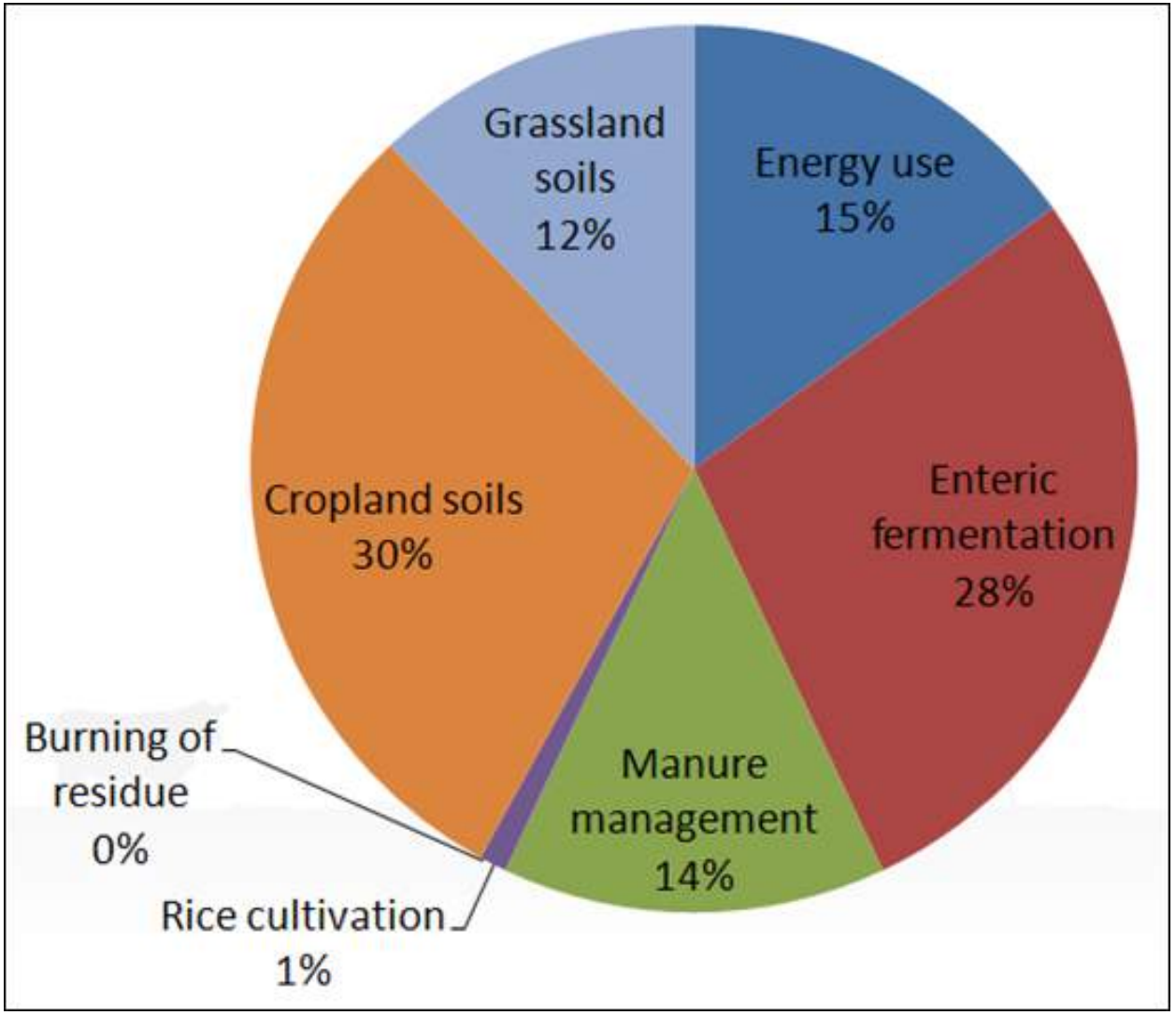
www.nrcs.usda.gov

How does agriculture impact climate change? (US)

8% of Total GHG Emissions



U.S. agricultural greenhouse gas sources (Adapted from Archibeque et al., 2012)

Climate Considerations Moving Forward

What crops to grow for energy AND climate resilience??

- Perennials
- Annual crops that lend themselves to the ‘Big Three’
- Diversified systems (i.e., plants and animals)
  - OM
  - Limited synthetic N
- Leguminous crops
  - Reduced nitrous oxide emissions
  - Limiting synthetic N

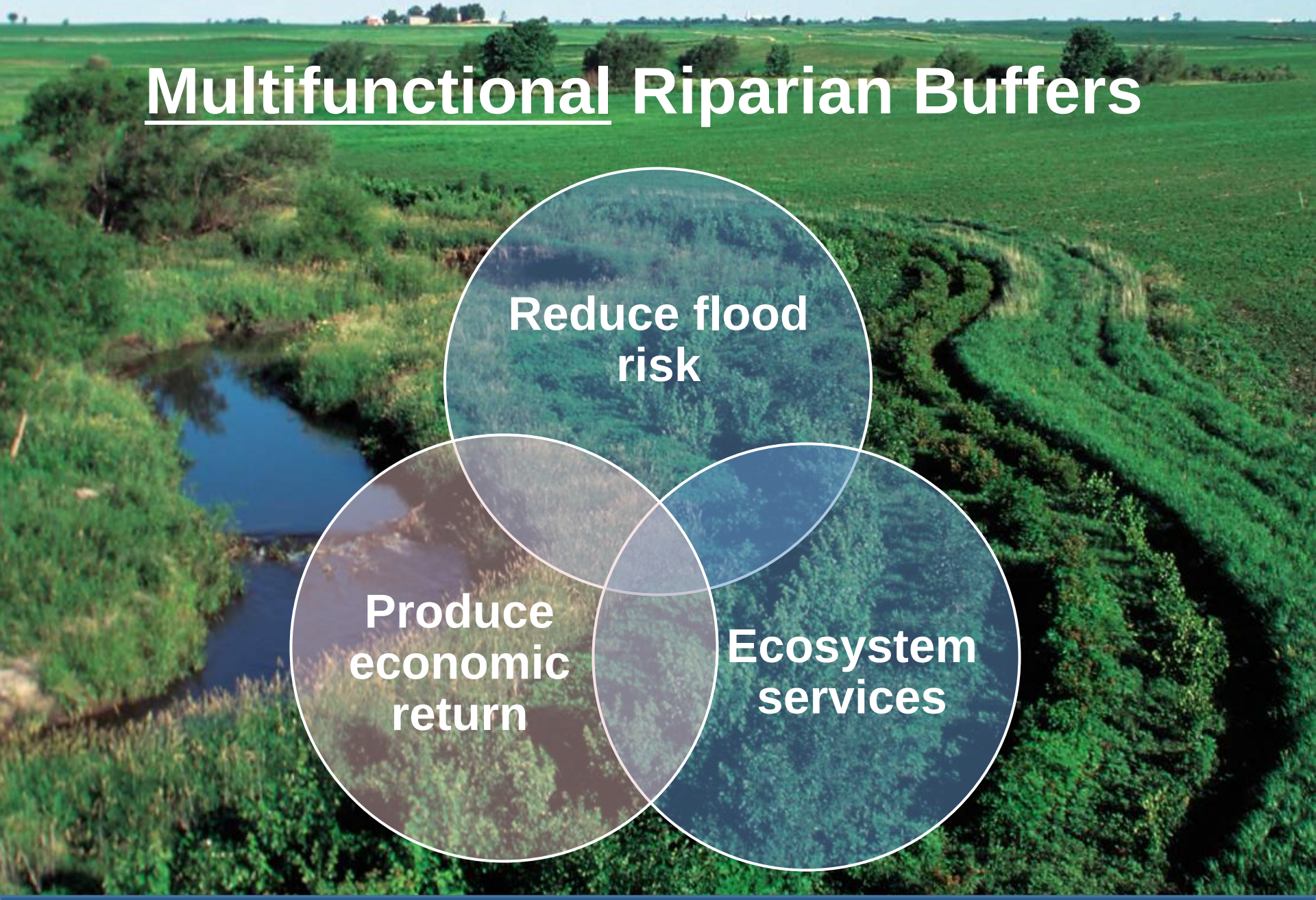
(Photo: Vermont Sustainable Jobs Fund)

Climate Considerations Moving Forward


(Photo: VTD, Eric Blokland)

Estimated that to meet 50% of New England's diet by 2060, four million more acres will need to transition into agricultural use…

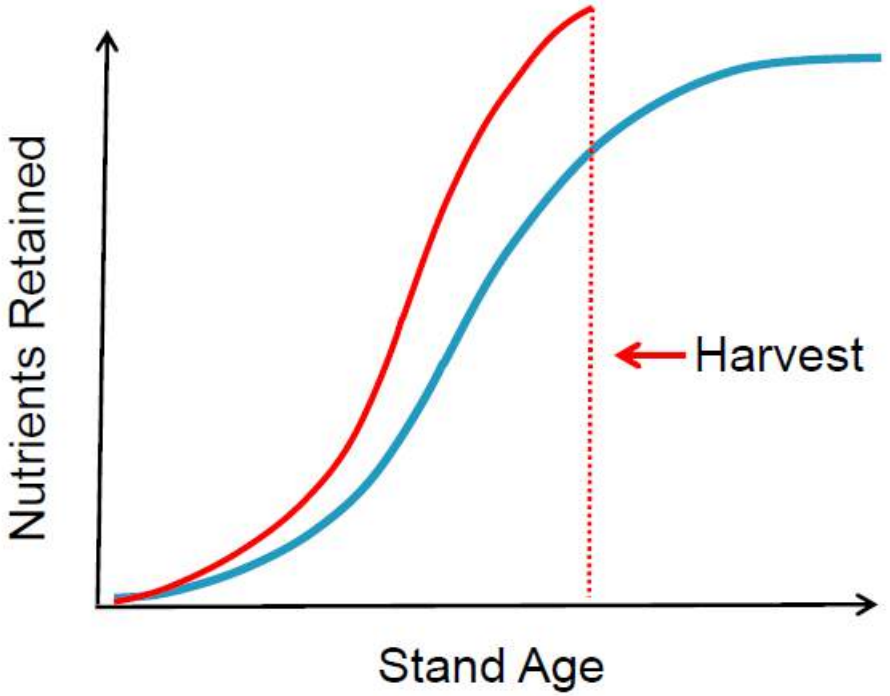
Multifunctional Riparian Buffers



(Photo: NRCS)

Multifunctional Riparian Buffers

Harvest removes nutrients from the system



Thank You


http://flavormagazinevirginia.com/got-dairy-farmers/


http://www.greenlandbluewaters.org/covercrops.html


http://www.annmeekins.com/pages.asp?pg=northernneck_tour

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Additional Resources:
http://www.uvm.edu/~susagctr/

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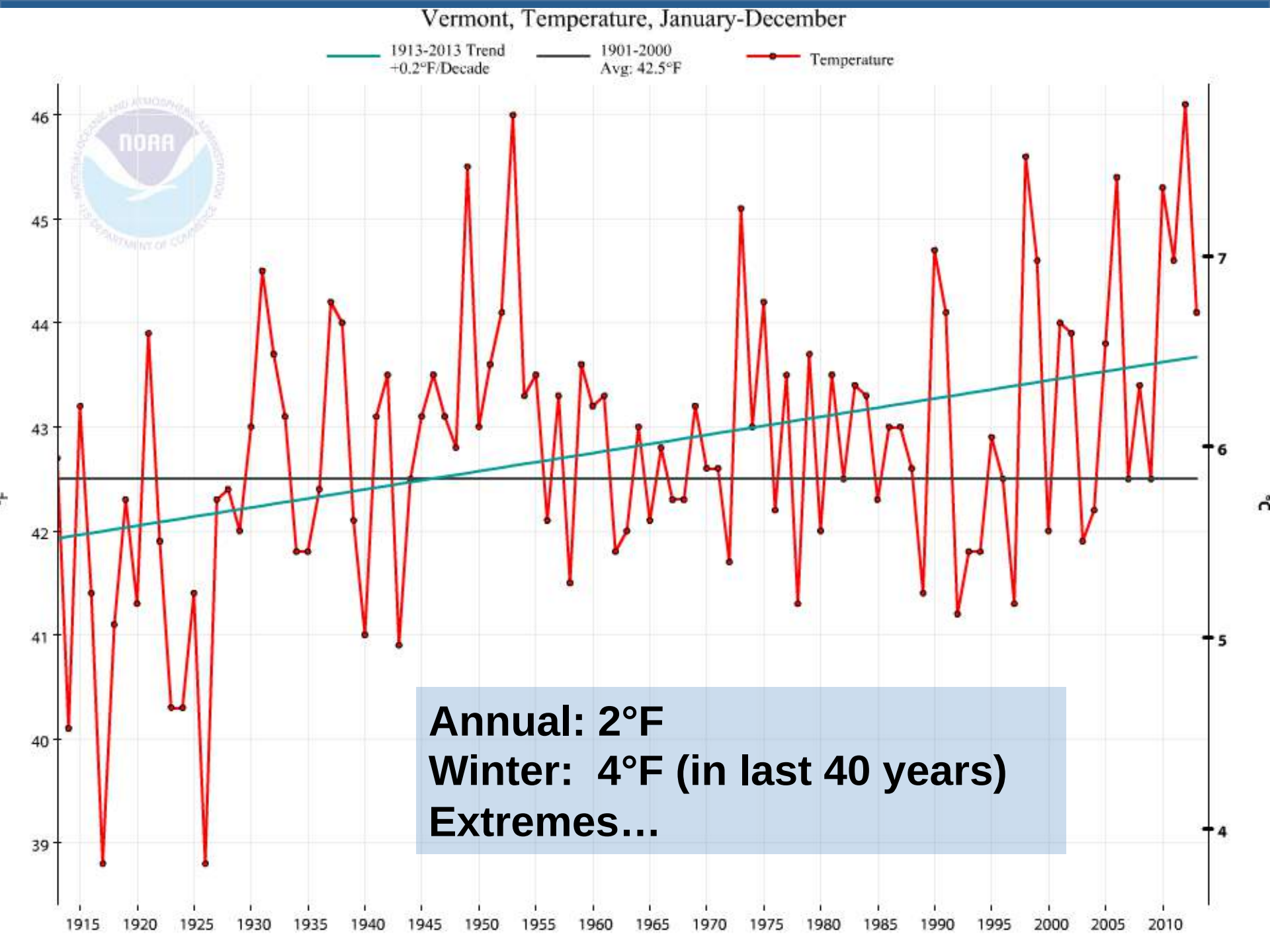
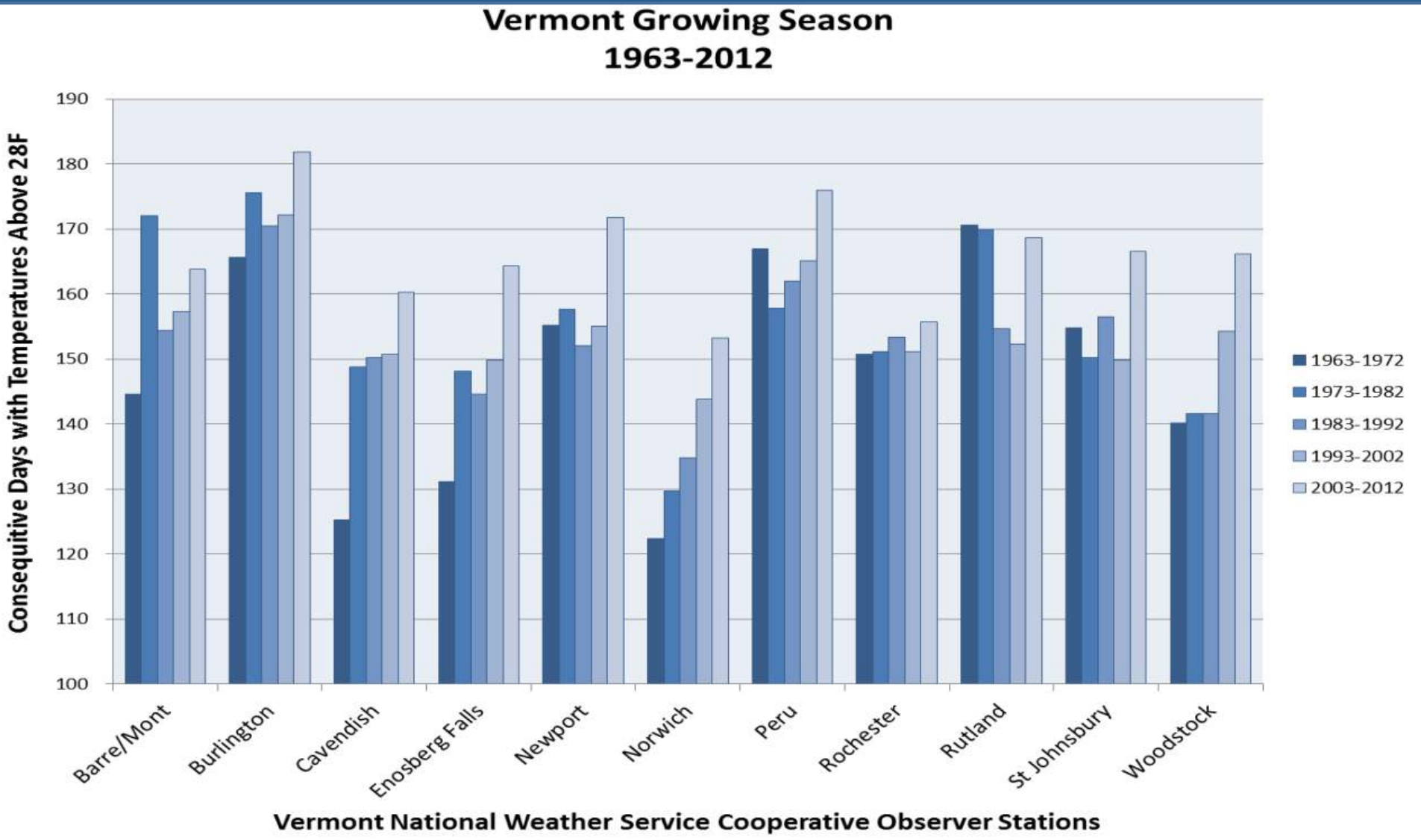

Vermont, Temperature, January-December
1913-2013 Trend
+0.2°F/Decade
1901-2000
Avg: 42.5°F
Temperature
46
45
44
43
42
41
40
39
7
6
5
4
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
Annual: 2°F
Winter: 4°F (in last 40 years)
Extremes…



(Galford et al., 2014. Vermont Climate Assessment)

Growing season increasing by 3.7 days/decade

How does climate change impact crops? (VT)

- Cool-season crops will be of lower yield or quality
  - Sweet corn
- Reduced grain yield (rapid maturation and moisture)
  - Field corn, nutrient content…
- Reduced vernalization lower some fruit yields; increased frost risk?
  - Apples
- New pests are able to over-winter, emerge early; increased pesticides
  - Flea beetle, SWD?
- Some warmer season crops will do better
  - Red wine grape, peaches, watermelon
- Water stress in crops…