Agriculture, Climate Change, and Water Quality in Vermont

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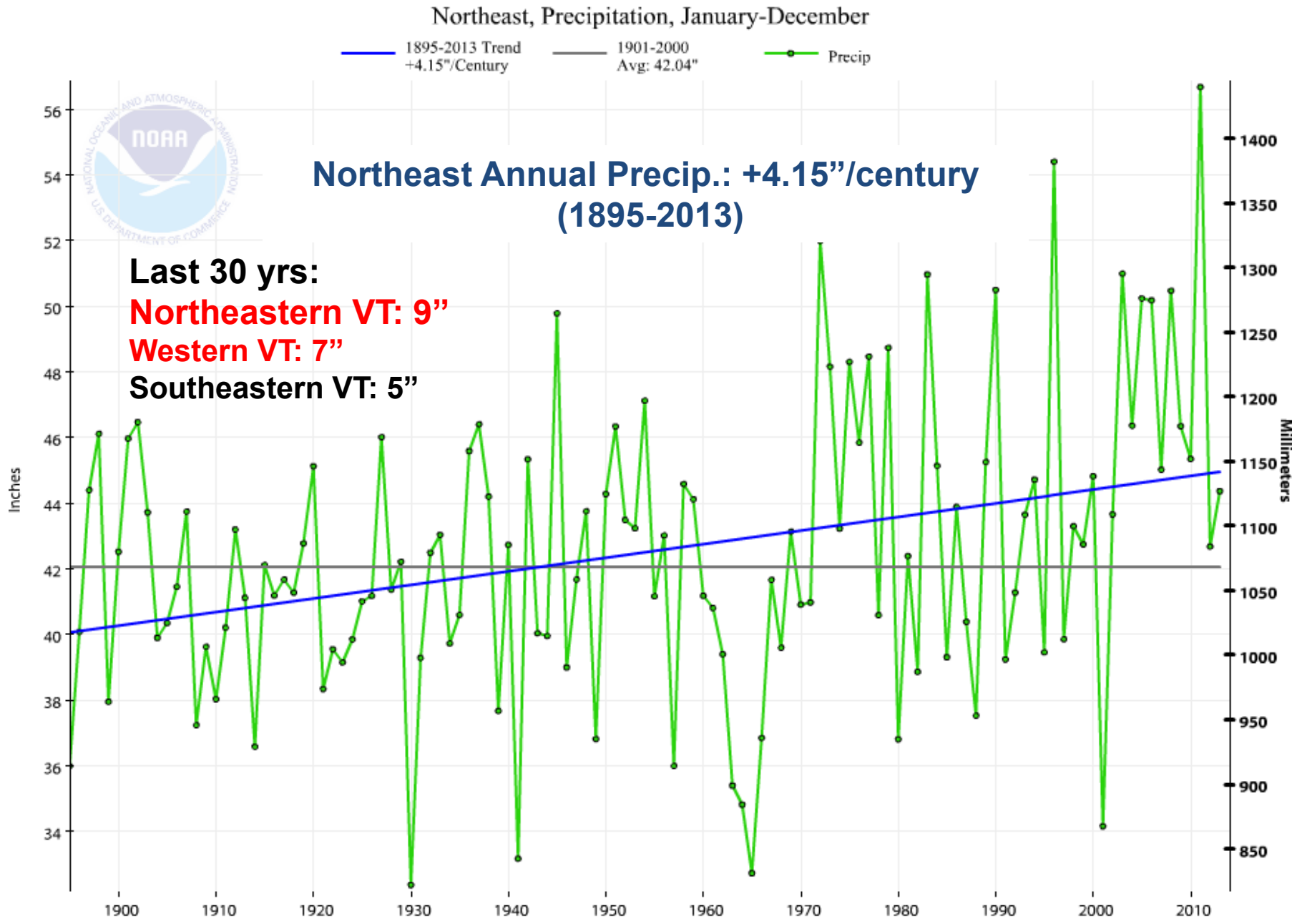
University of Vermont

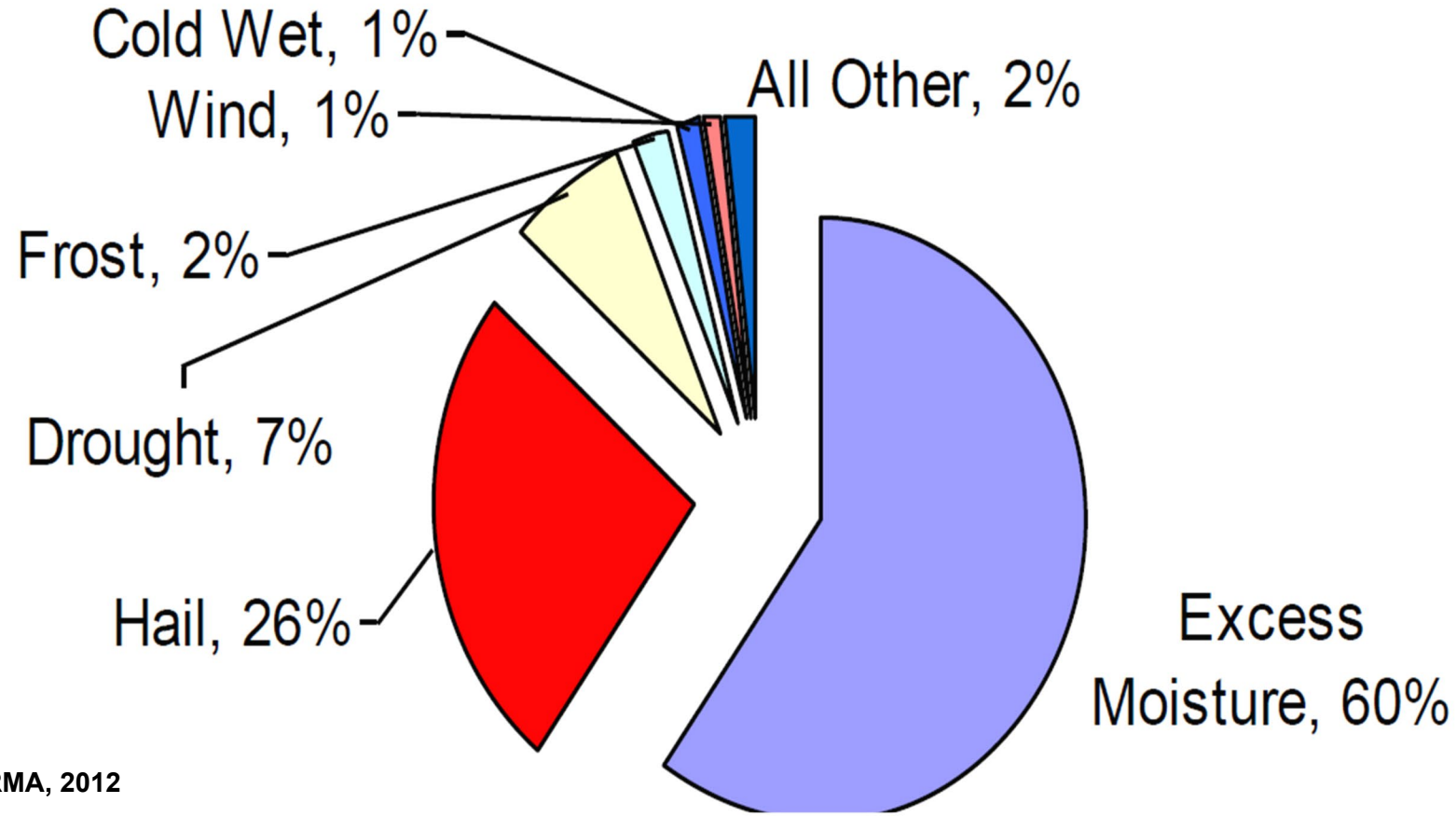
VT DEC Clean Water Conversation
January 12, 2023

AP Photo: Toby Talbot

THE UNIVERSITY OF VERMONT EXTENSION | Center for Sustainable Agriculture

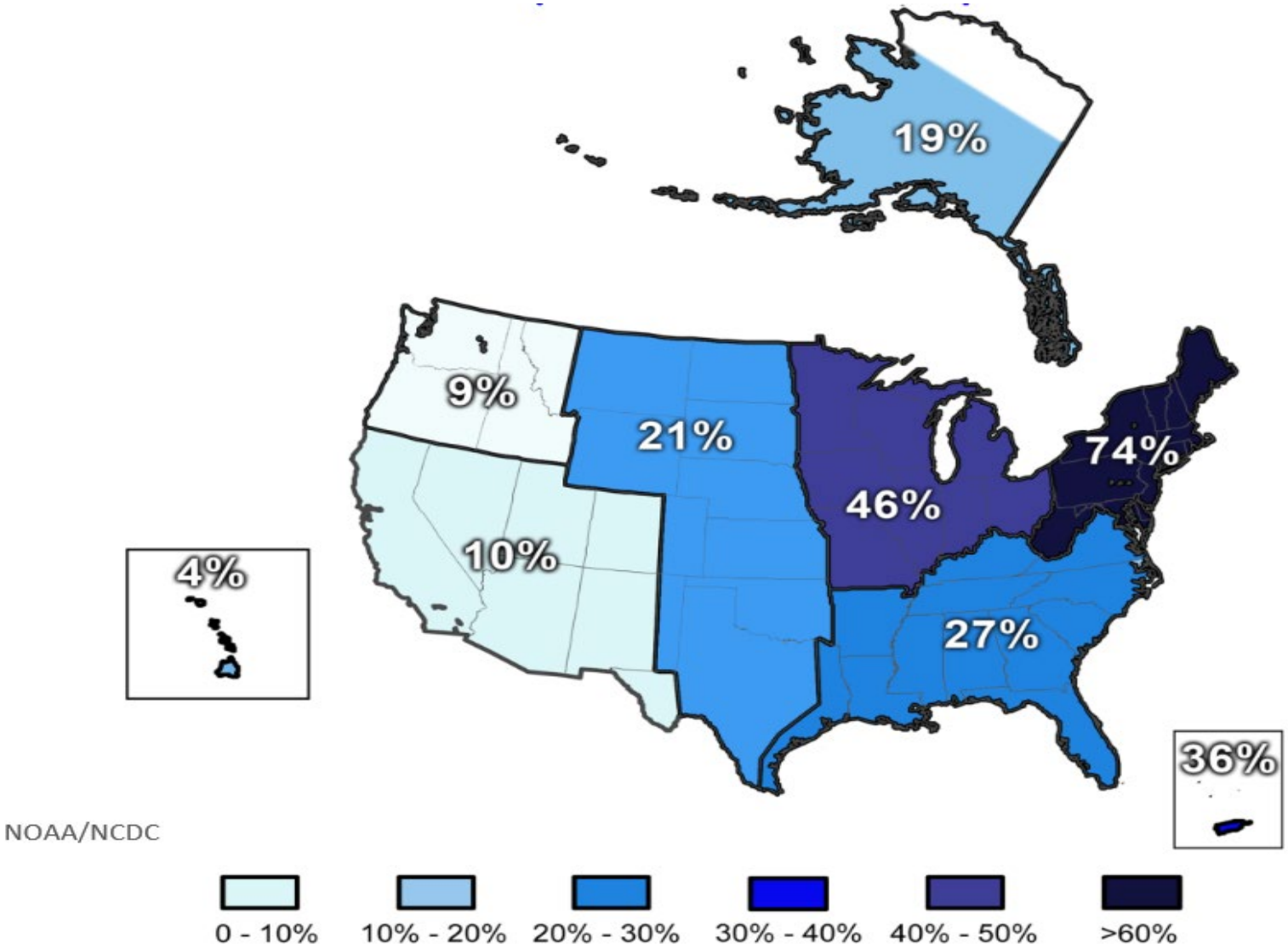

Northeast, Precipitation, January-December
1895-2013 Trend
+4.15"/Century
1901-2000
Avg: 42.04"
Precip
Northeast Annual Precip.: +4.15”/century
(1895-2013)
Last 30 yrs:
Northeastern VT: 9”
Western VT: 7”
Southeastern VT: 5”
Inches
Millimeters
56
54
52
50
48
46
44
42
40
38
36
34
1400
1350
1300
1250
1200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

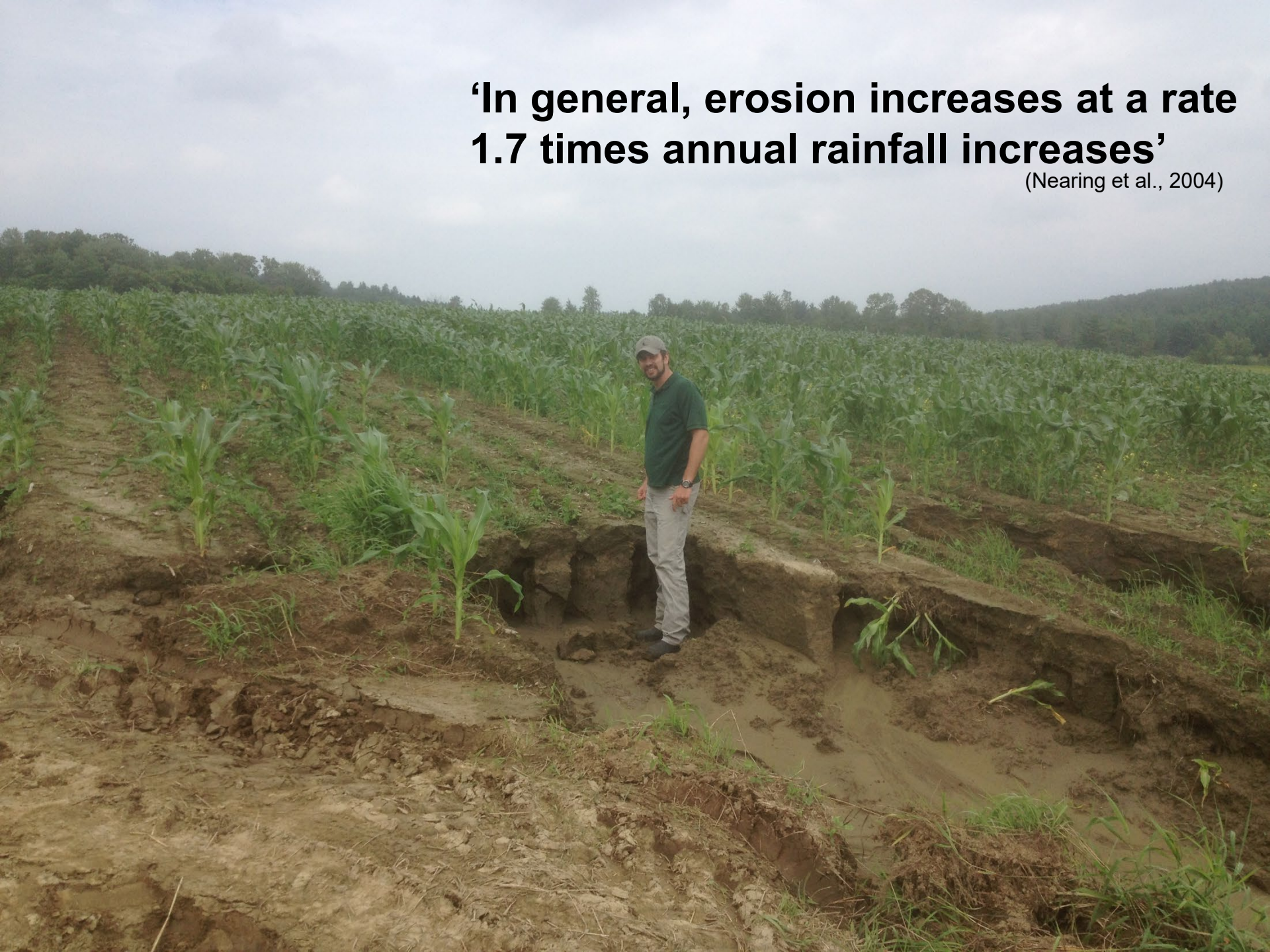
Why Vermont Crops Fail (2001-10)



RMA, 2012

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

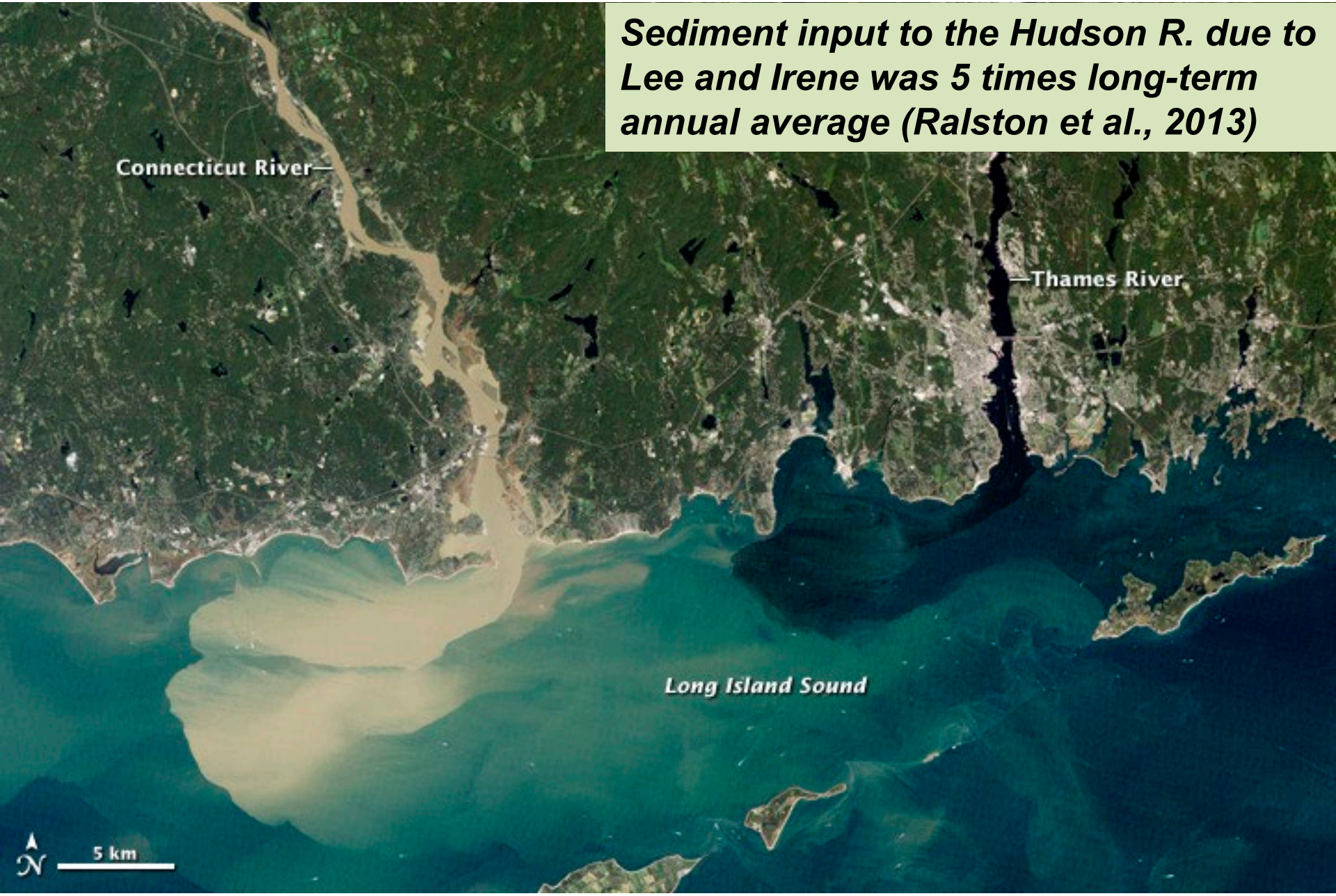



‘In general, erosion increases at a rate
1.7 times annual rainfall increases’
(Nearing et al., 2004)

Flooding and Downstream Impacts

Photo: Vern Grubinger, UVM

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))

Soil Management Approaches to Runoff Reduction

Three principles of healthy, resilient soils:

1. ***Constant soil cover (preferably living!)***
2. ***Building organic matter***
3. ***Reduced disturbance/soil structure***

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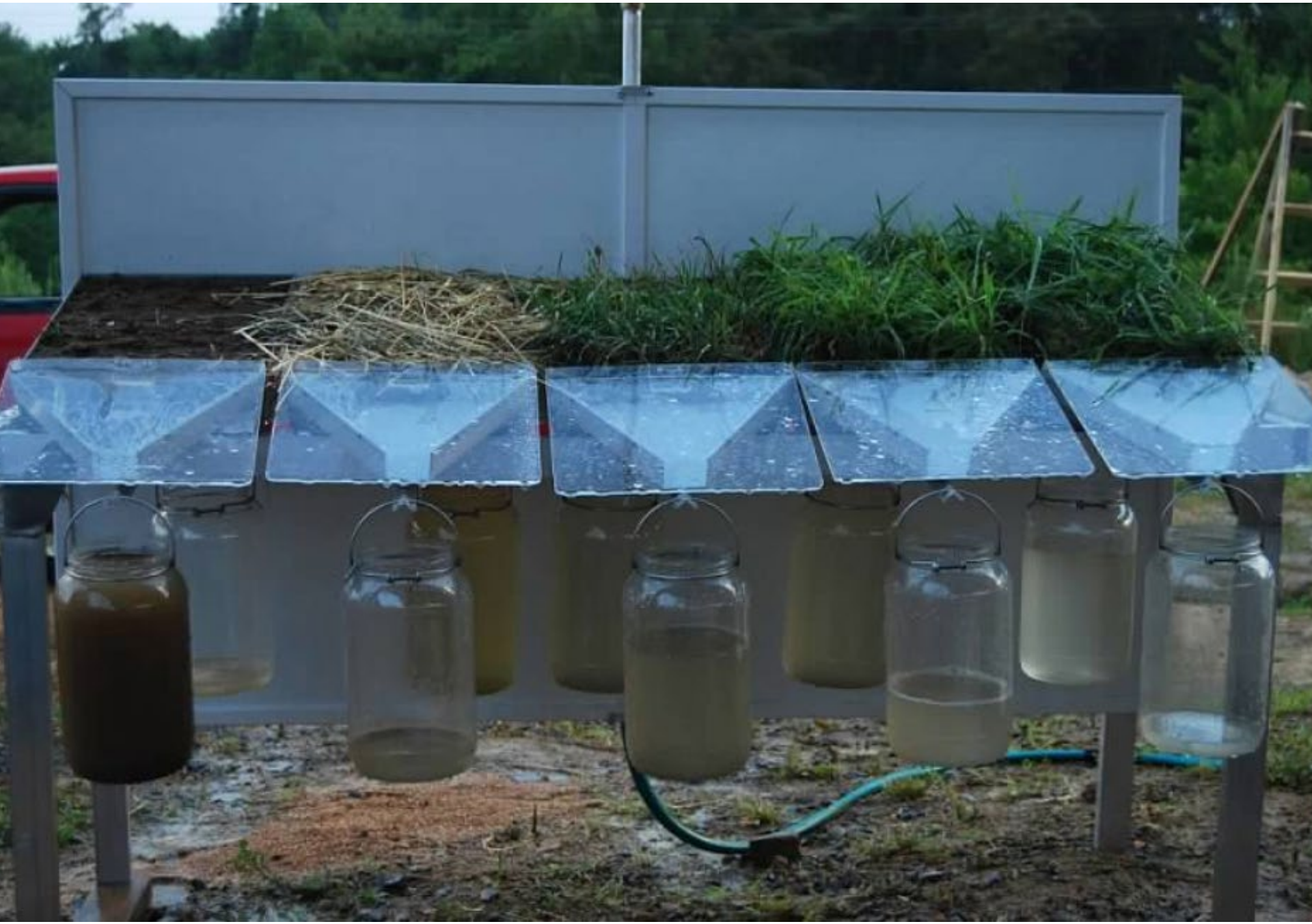
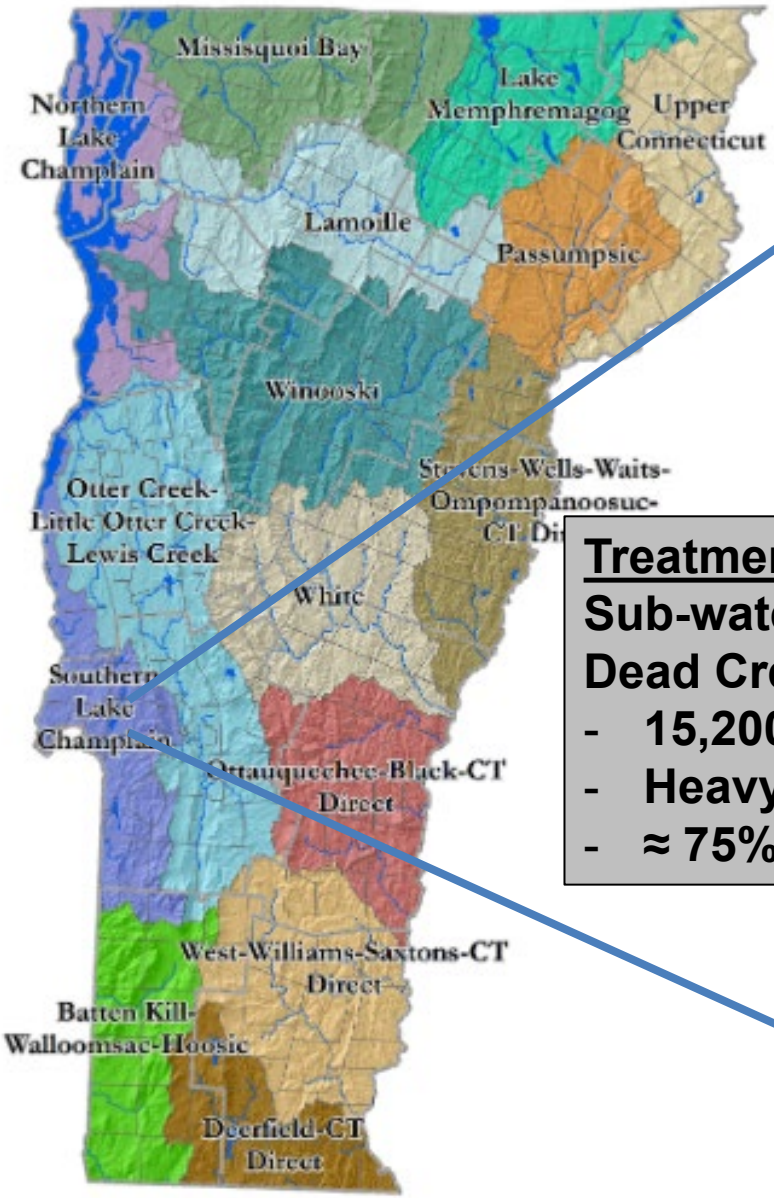
www.nrcs.usda.gov



Watershed Scale Research

- Long-term evaluation of conservation practices at the watershed-scale (via NRCS CEAP)
- Flow gages installed w/ each station
- Baseflow and storm samples analyzed for:
  - Phosphorus, Nitrogen, Sediment
- Documentation of land use and conservation practices on <u>every</u> field on <u>every</u> farm!

CEAP: Paired Watershed Approach

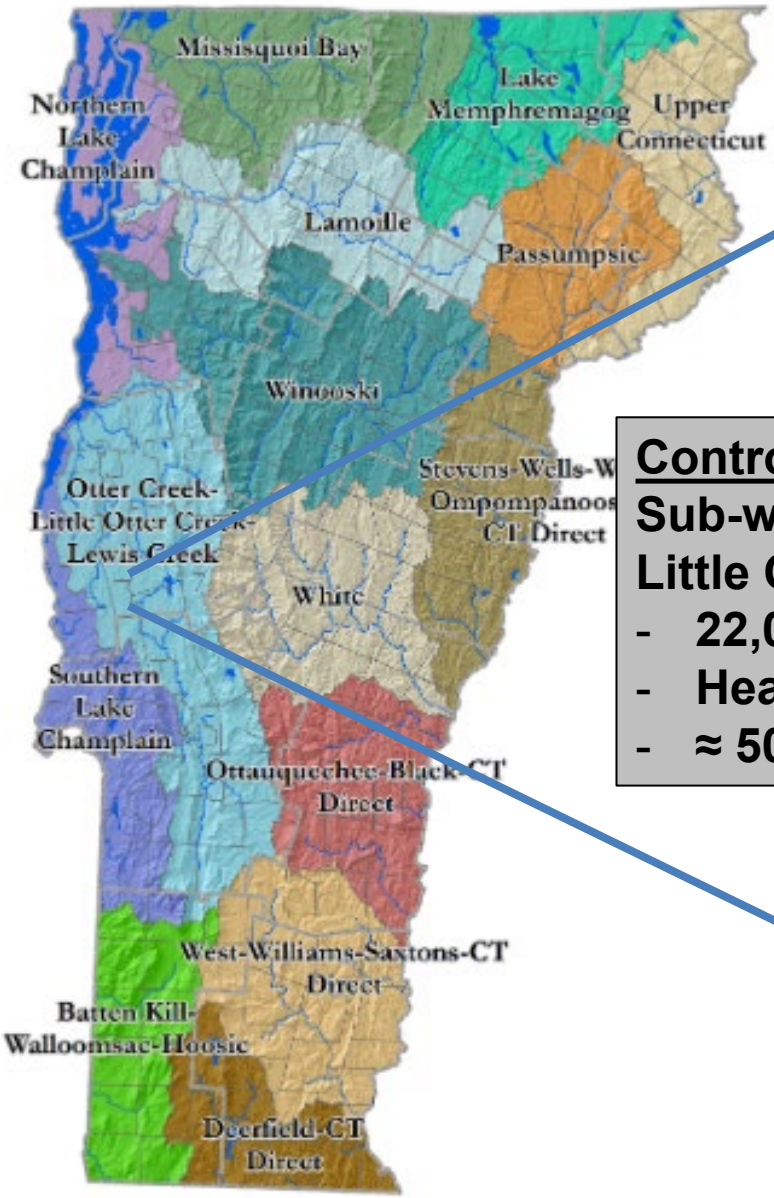


Treatment Watershed

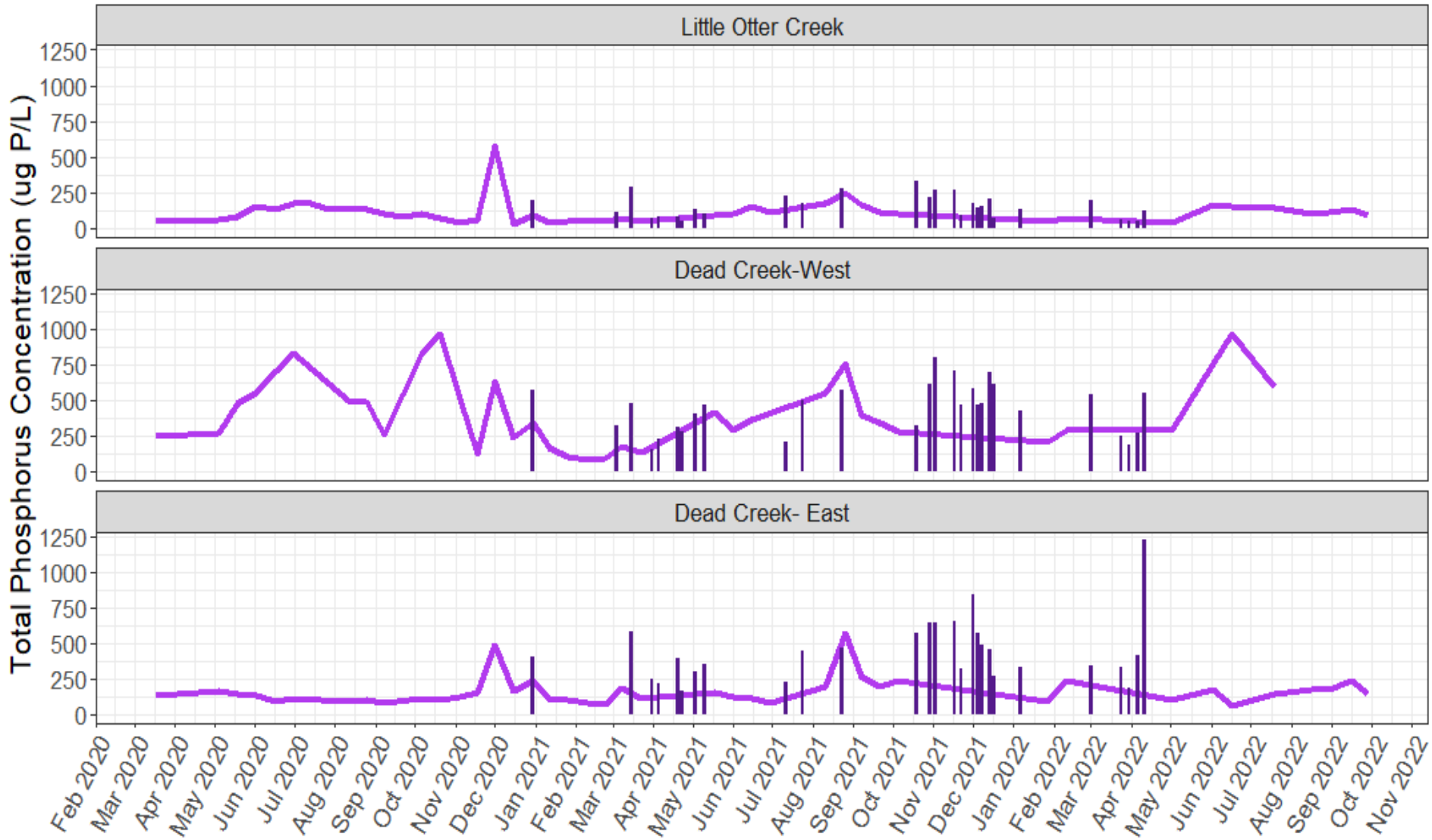
Sub-watersheds of Dead Creek

- **15,200 ac**
- **Heavy clay soils**
- **≈ 75% ag**

CEAP: Paired Watershed Approach



<u>Control Watershed</u>
Sub-watershed of Little Otter Creek
- **22,000 ac**
- **Heavy clay soils**
- **≈ 50% ag**



Light line = Baseflow concentrations
Dark vertical bars = Event concentrations

- **Approximately 60% of P is in the dissolved form**

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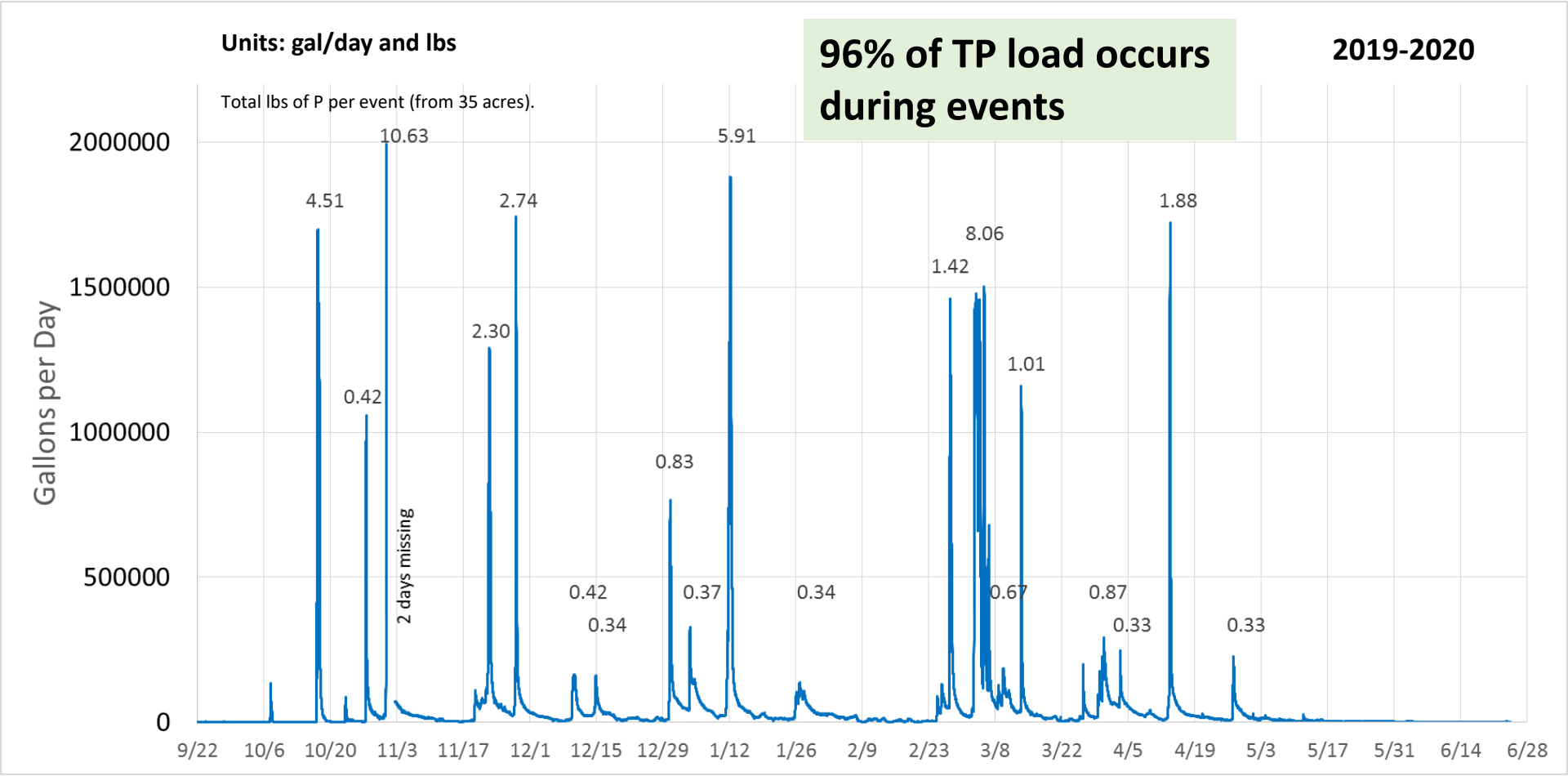
Photo: Dwight Burdette.

Field-Scale Research

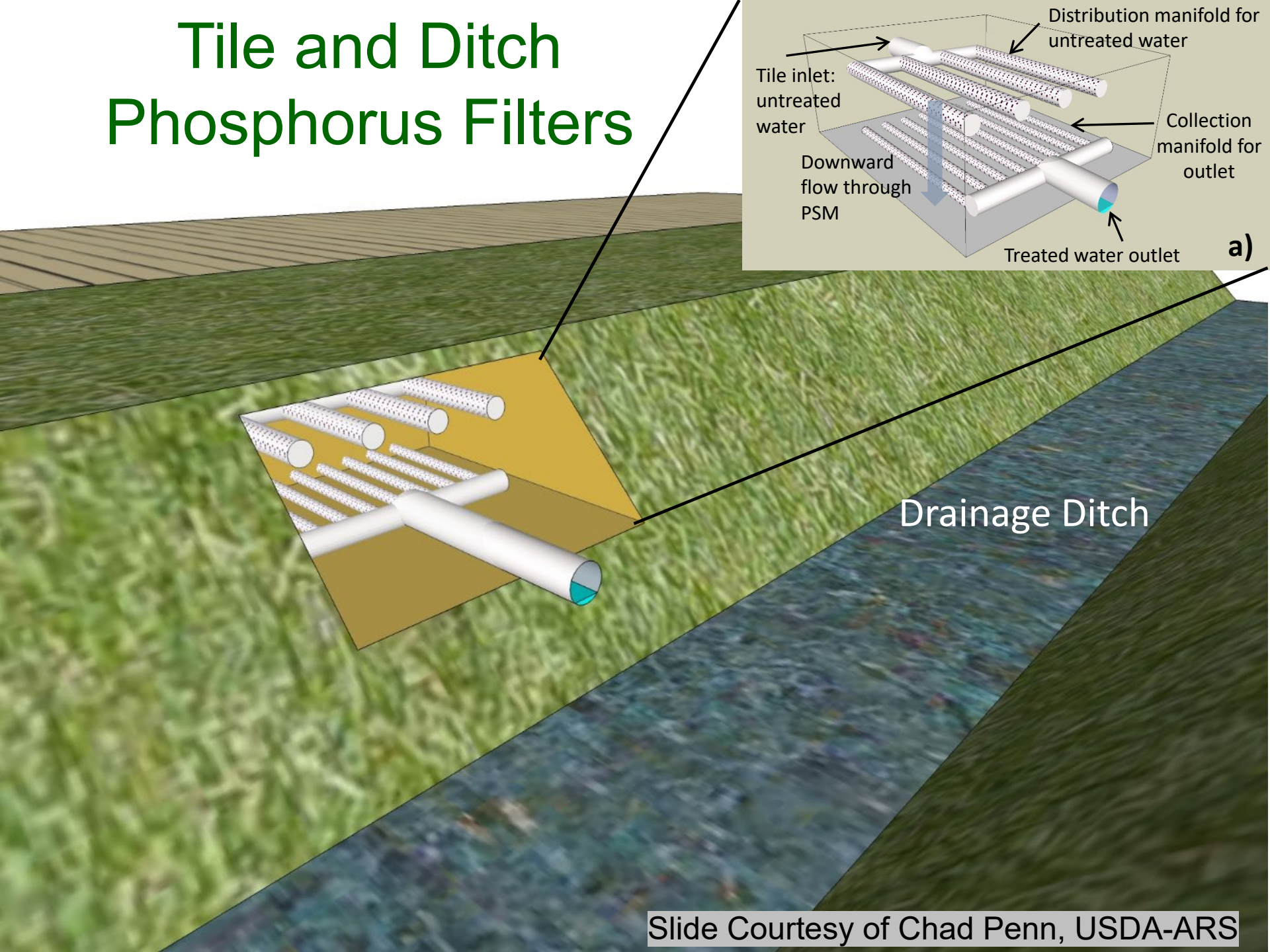
AHS Tile Study: From Oct 7, 2019 thru June 3, 2020, 45.0 lb of TP was exported or 1.4 lbs/acre



Management: Corn silage, fall injection, cover crops, very light spring tillage before planting

Large Plot Scale: Discovery Acres

Tile and Ditch Phosphorus Filters



Slide Courtesy of Chad Penn, USDA-ARS