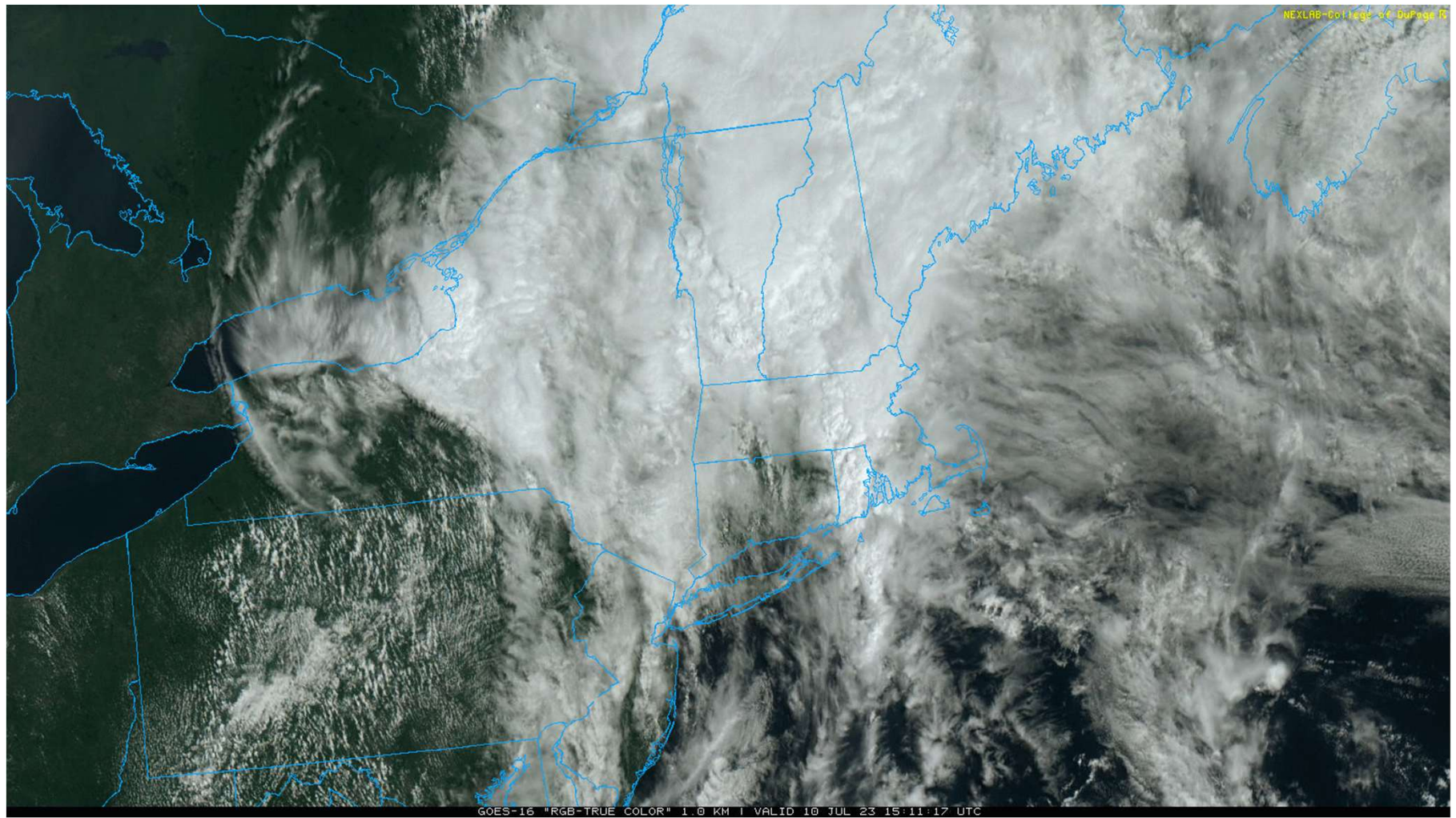


Wildland fire smoke – 17 July 2023

GOES-16 "RGB-TRUE COLOR" 1.0 KM | VALID 17 JUL 23 18:06:17 UTC

10 July 2023



Lesley-Ann L. Dupigny-Giroux, Ph.D.

Distinguished Professor – Geography & Geosciences, UVM

National Academies –Board on Atmospheric Sciences & Climate

Past President – American Association of State Climatologists

Lead author – Northeast chapter – Fourth National Climate Assessment

Fellow – American Meteorological Society & American Association of Geographers

Fellow – Vermont Academy of Science & Engineering; Vermont Academy of Arts & Sciences

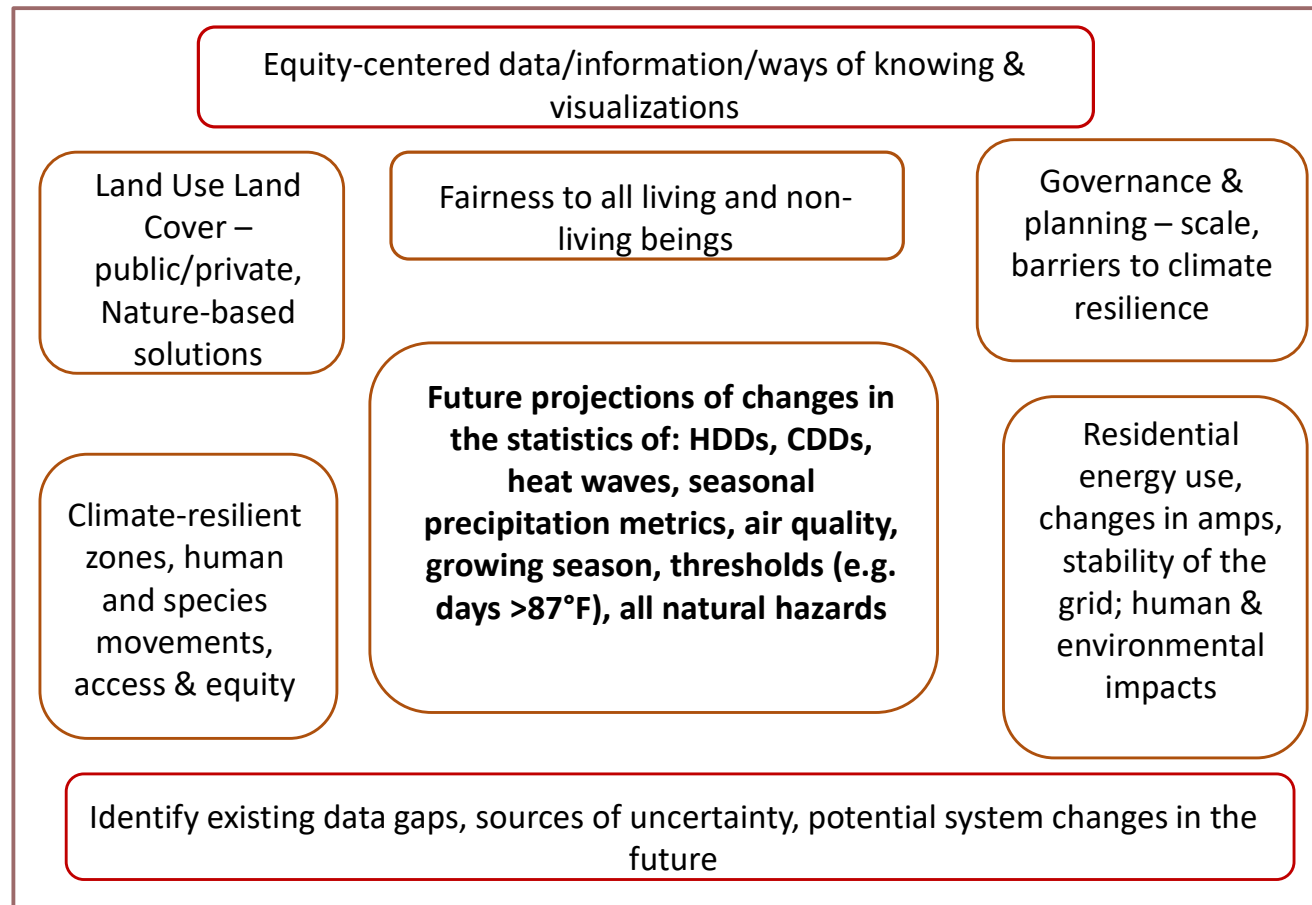
Fellow – Gund Institute of Environment

Vermont State Climatologist

Climate and Climate Change in Vermont: Setting the context for the 2025 Climate Action Plan



DO NO HARM – PEOPLES, COMMUNITIES, THE LAND



<https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2021-12/Initial%20Climate%20Action%20Plan%20-%20Final%20-%202012-1-21.pdf>

Originally created by L-A. L. Dupigny-Giroux for the Vermont Climate Council – June 2021

VULNERABILITY LENS

A thin, vertical white line is positioned to the right of the text, extending from the top of the word 'LENS' down to the bottom of the word 'VULNERABILITY'.

What sectors are vulnerable to climate change?

infrastructure

emergency management

human health

forestry

agriculture

tourism & recreation

energy

Geographies of vulnerability

historical legacy

race relations / ethnicity

immobility

health status

poverty

personality/disposition

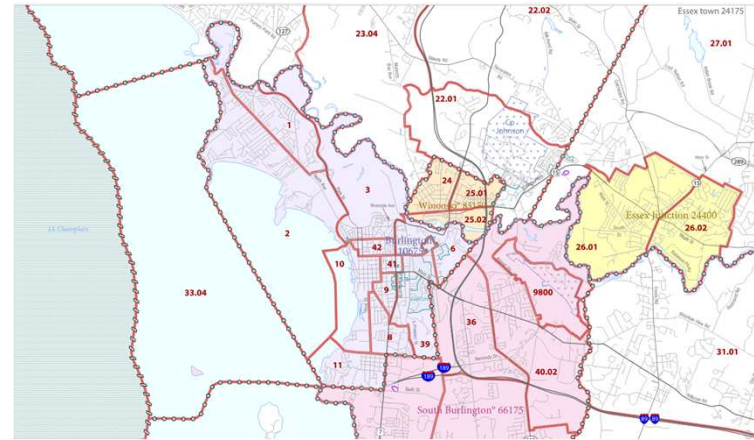
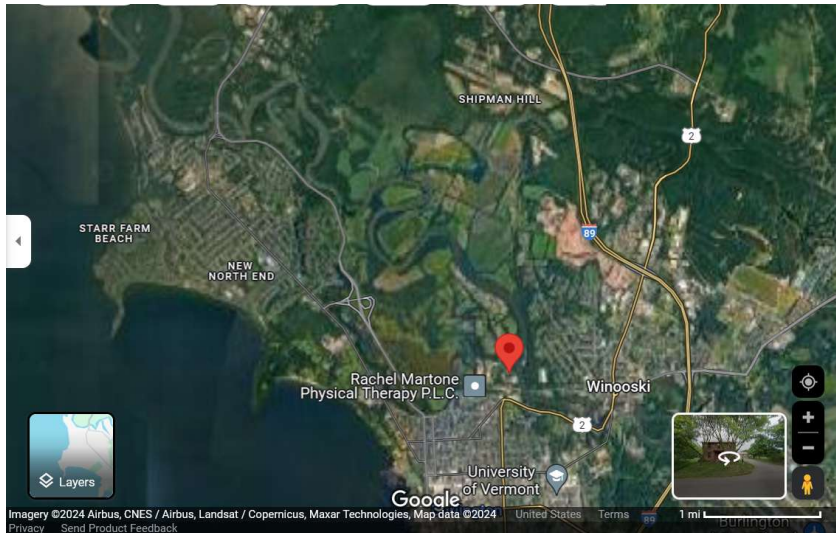
immigration status

nature and extent of social networks

gender

secondary factors

https://www2.census.gov/geo/maps/DC2020/PL20/st50_vt/censustract_maps/c50007_chittenden/DC20CT_C50007.pdf



CENSUS TRACT 3: HIGHEST SOCIAL VULNERABILITY IN VERMONT

Data Type	Census Tract 3	Chittenden County	Vermont	U.S.
Weather and Climate Risk				
Drought Risk	--	--	0.36	11.61
Flooding Risk	8.19	5.92	9.13	9.13
Freeze Risk	12.10	11.22	12.45	15.72
Severe Storm Risk	10.22	6.35	6.66	16.99
Tropical Cyclone Risk	6.05	3.15	2.79	4.36
Wildfire Risk	0.36	1.45	1.79	6.30
Winter Storm Risk	11.36	11.49	11.44	13.71

Data Type	Census Tract 3	Chittenden County	Vermont	U.S.
Age < 18	20.60%	18.20%	19.01%	22.36%
Age 65+	7.20%	14.10%	19.46%	18.37%
All Vulnerabilities (%)	16.29%	8.98%	9.95%	13.50%
Disabled Population	14.70%	11.60%	15.14%	15.92%
Limited English	8.80%	1.40%	0.36%	1.70%
Minority Population	38.30%	11.20%	5.99%	23.51%
Mobile Homes	--	4.50%	8.01%	12.93%
No High School Diploma	17.40%	5.90%	8.21%	13.41%
Below Poverty	22.80%	11.80%	11.27%	15.60%
Single Parent Households	10.60%	6.80%	7.59%	8.32%
No Vehicle	19.50%	7.30%	6.11%	6.35%
Veterans	3.00%	6.02%	8.32%	8.91%

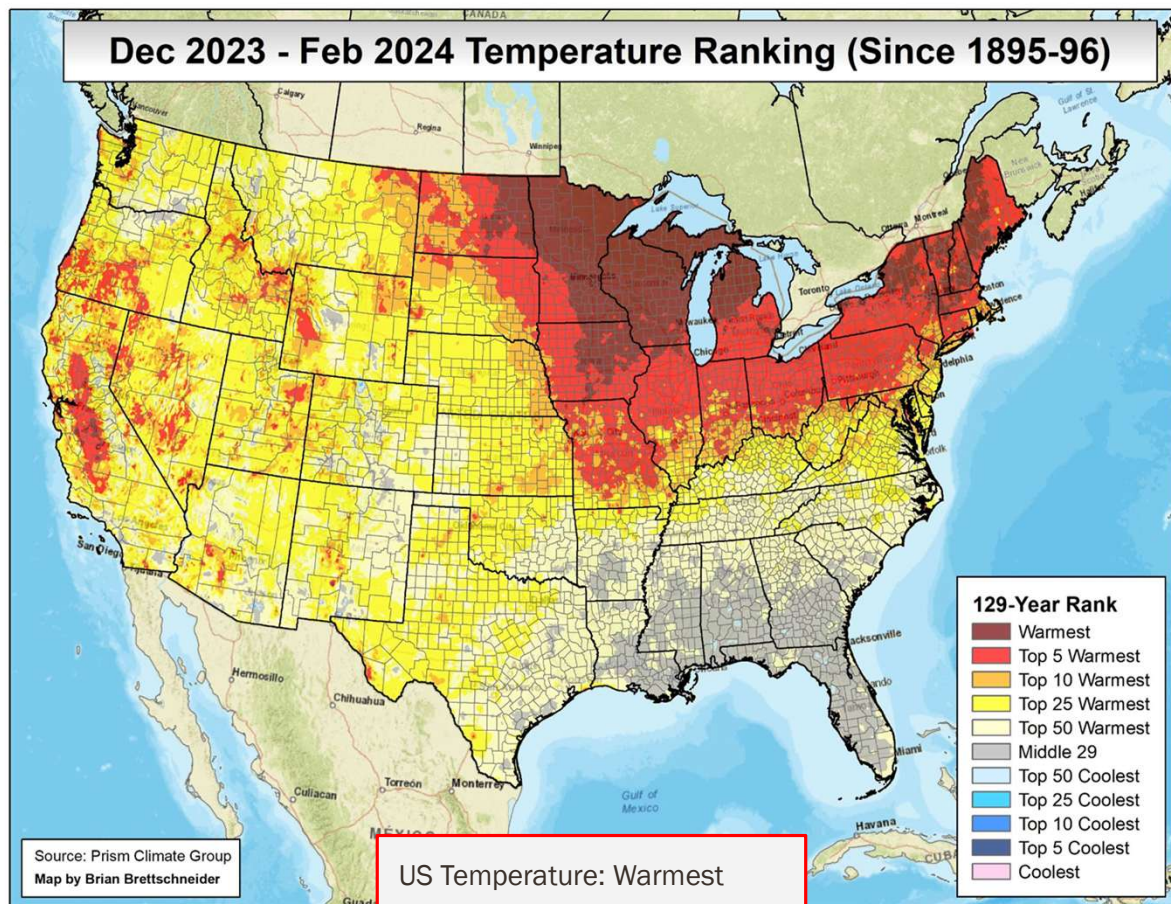
https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Vermont_Climate_Council/CAP2025_ChapterDrafts/Climate_Climate_Change.pdf?_gl=1*wr71a*_ga*NDcxNDYyNzQ2LjE3NTcwNzg0DU.*_ga_v9wQH77KLW*cZ3NTg5MTI2ODMKbzYkZzEkdDE3NTg5MTI3OTMkajUOJGwwJGgw

<https://www.ncei.noaa.gov/access/billions/risk>

A small green seedling with two leaves is growing out of a crack in dry, cracked earth. The background is a dark, textured surface of cracked soil.

Our changing climate

Winter temperature check: Our strongest changing season



Top 10 Warmest Winters at Burlington (1941-2024)

1	2023-2024	30.7
2	2015-2016	30.1
3	2016-2017	29.5
4	2022-2023	29.0
5	2001-2002	28.7
6	2011-2012	27.8
7	2019-2020	26.1
8	1948-1949	25.8
9	1996-1997	25.6
-	1952-1953	25.6

2023-2024 was also the second wettest

Warmer and Wetter Winters: More thaws, less reliable snow cover, heavier precipitation events, more wet snow

Backward spring



low temperatures in January – June

land-locked stations colder

winter freeze/thaw cycles – predictor

snow, freezing rain – April to June

summer killing frosts

summer drought

NW flow

Photo credit: L-A. & M. Dupigny-Giroux

Dupigny-Giroux, L-A. (2009) "Backward seasons, droughts and other bioclimatic indicators of variability," in [Historical climate variability and impacts in North America](#), Lesley-Ann Dupigny-Giroux and Cary Mock (Editors), Springer Publishers, pp.231-250.

Frosts in May 2010

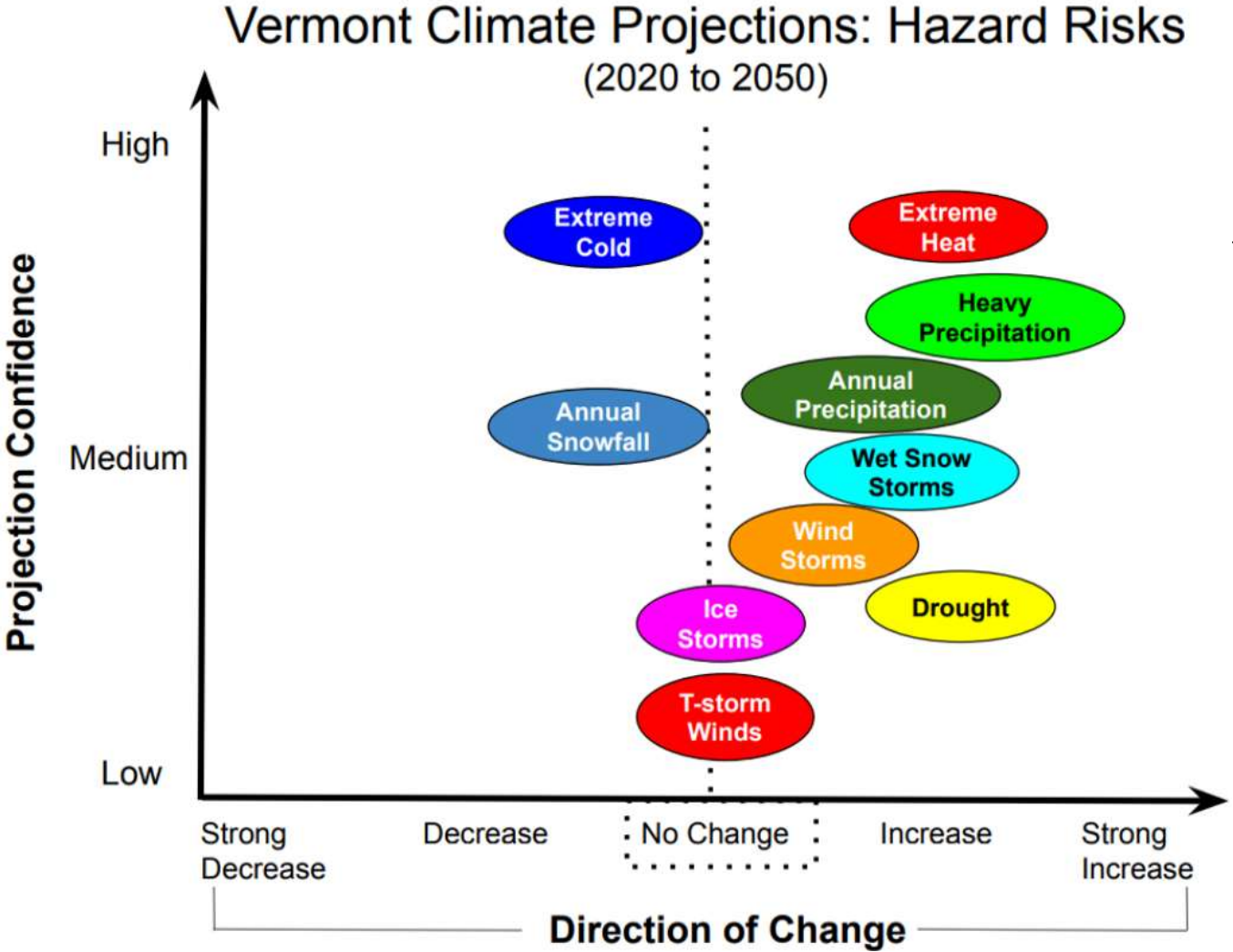


“Late spring frost injury to hardwoods is widespread.

Over 200,000 acres of damage have been observed during aerial surveys, with the heaviest damage to sugar maple.

Christmas tree growers are reporting heavy frost damage to balsam fir, the worst in many years if not ever.”

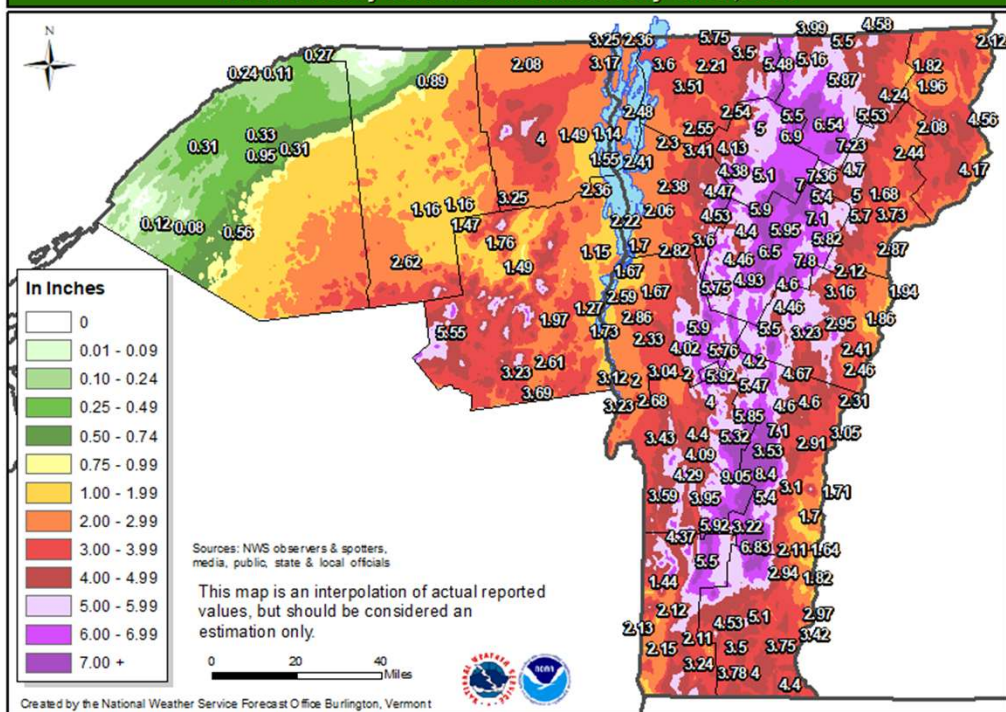
June 2010





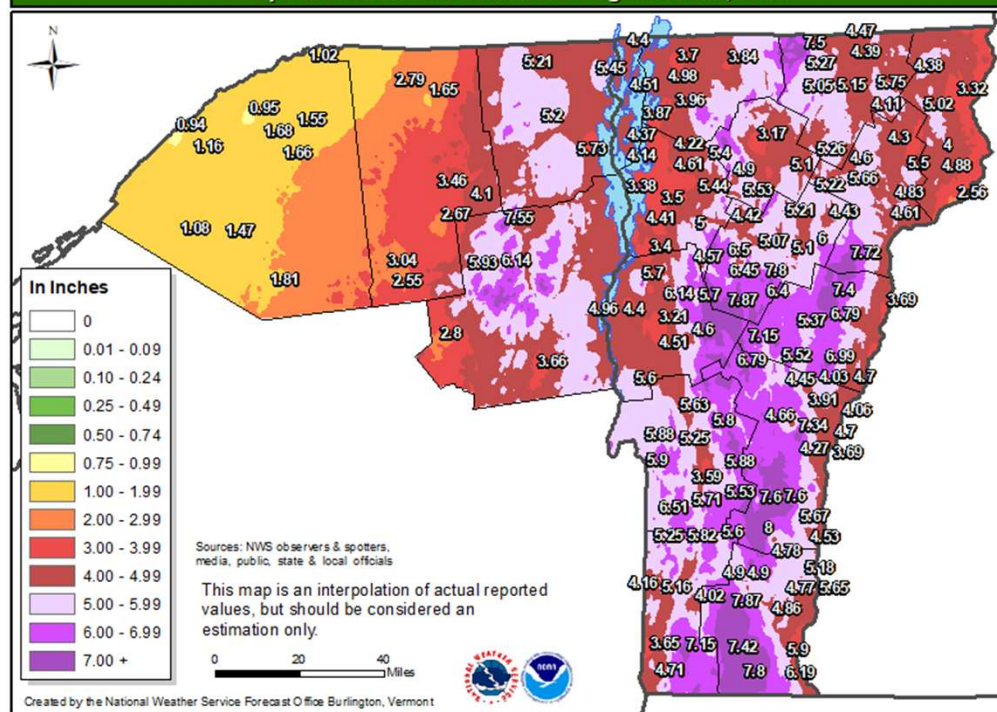
Rainfall Comparison

North Country Storm Total Rainfall July 10-11, 2023



July 10-11, 2023

Tropical Storm Irene Rainfall - August 27-28, 2011



August 27-28, 2011



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce

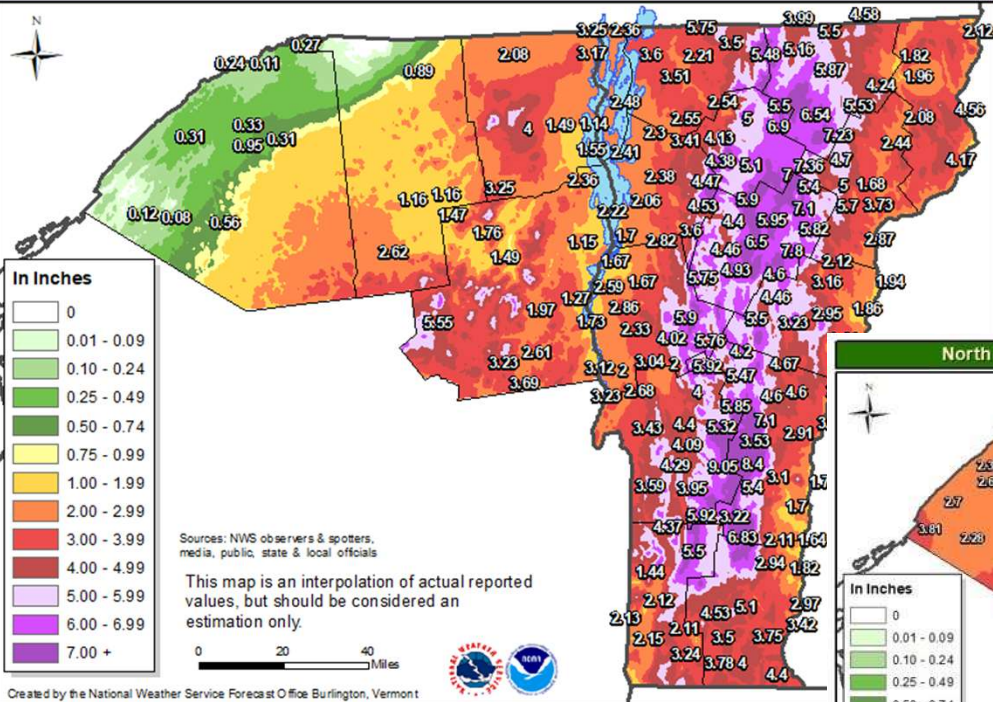
https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Vermont_Climate_Council/CAP2025_ChapterDrafts/Climate_Climate_Change.pdf?_gl=1*_wrb71a*_ga*NDcxNDYyZzQ2LjE3NTcwNzgZODU.*_ga_v9WQH77KLW*cZ3NTg5MTI2ODMkbzYkZzEkdDE3NTg5MTI3OTMkajU0JGwwJGgw

Burlington Weather Forecast Office



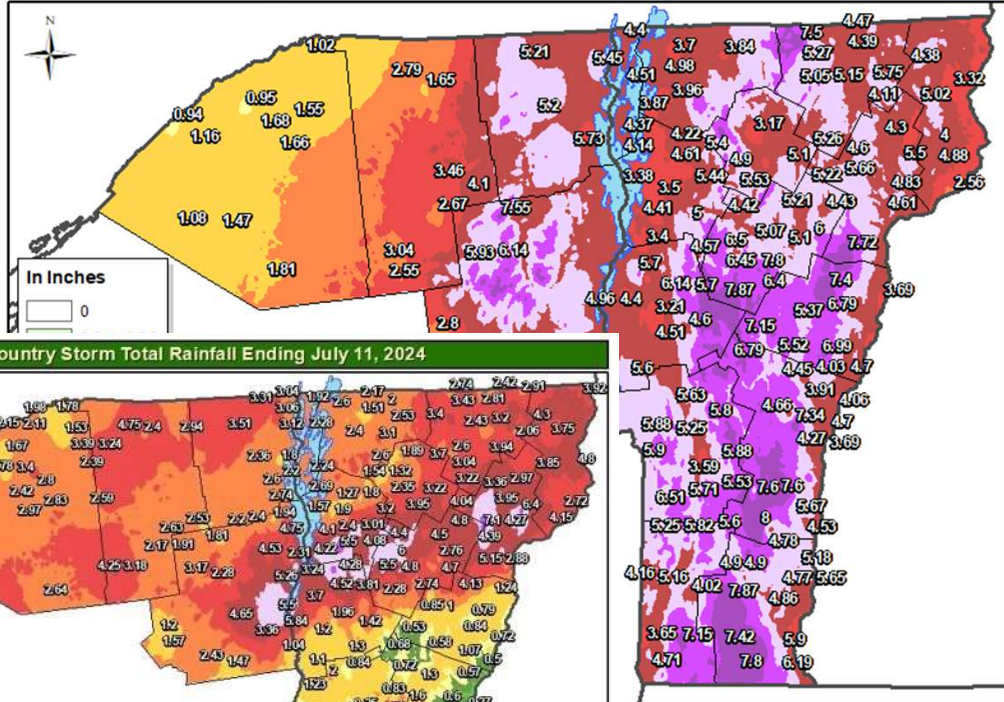
Rainfall Comparison

North Country Storm Total Rainfall July 10-11, 2023

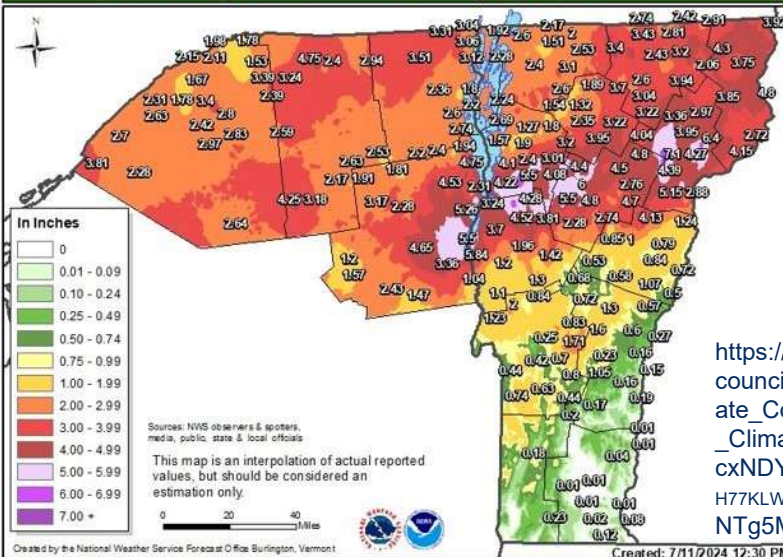


July 10-11, 2023

Tropical Storm Irene Rainfall - August 27-28, 2011

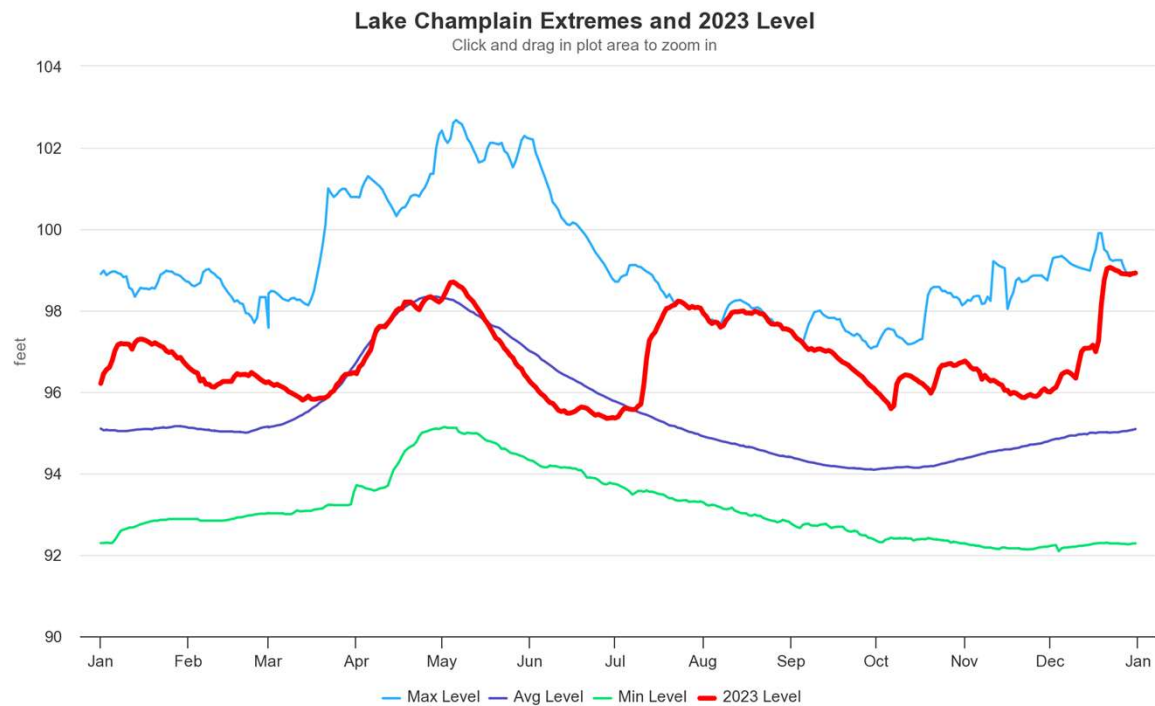


North Country Storm Total Rainfall Ending July 11, 2024



https://outside.vermont.gov/agency/anr/climate_council/Shared%20Documents/Vermont_Climate_Council/CAP2025_ChapterDrafts/Climate_Climate_Change.pdf?_gl=1*wr71a*_ga*NDcxNDYyNzQ2LjE3NTcwNzgZODU.*_ga_v9wqH77KLW*czE3NTg5MTI0ODMkbzYkZzEkdDE3NTg5MTI0OTMkajU0JGwwJGgw

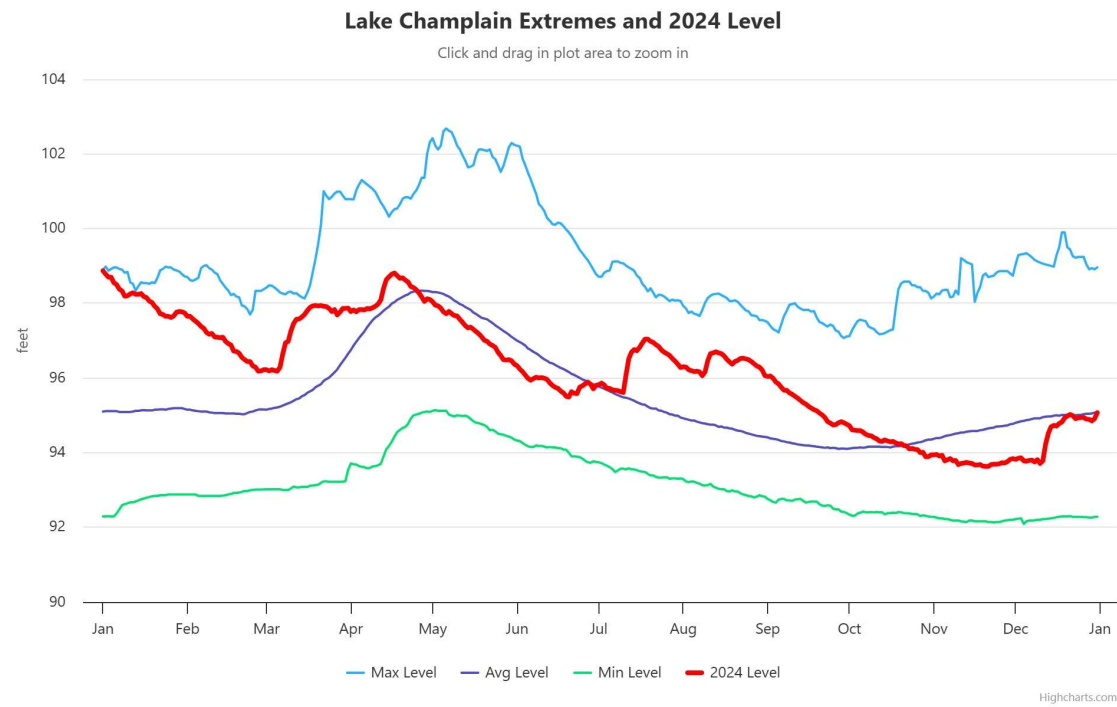
Lake Champlain daily levels in 2023



Highcharts.com

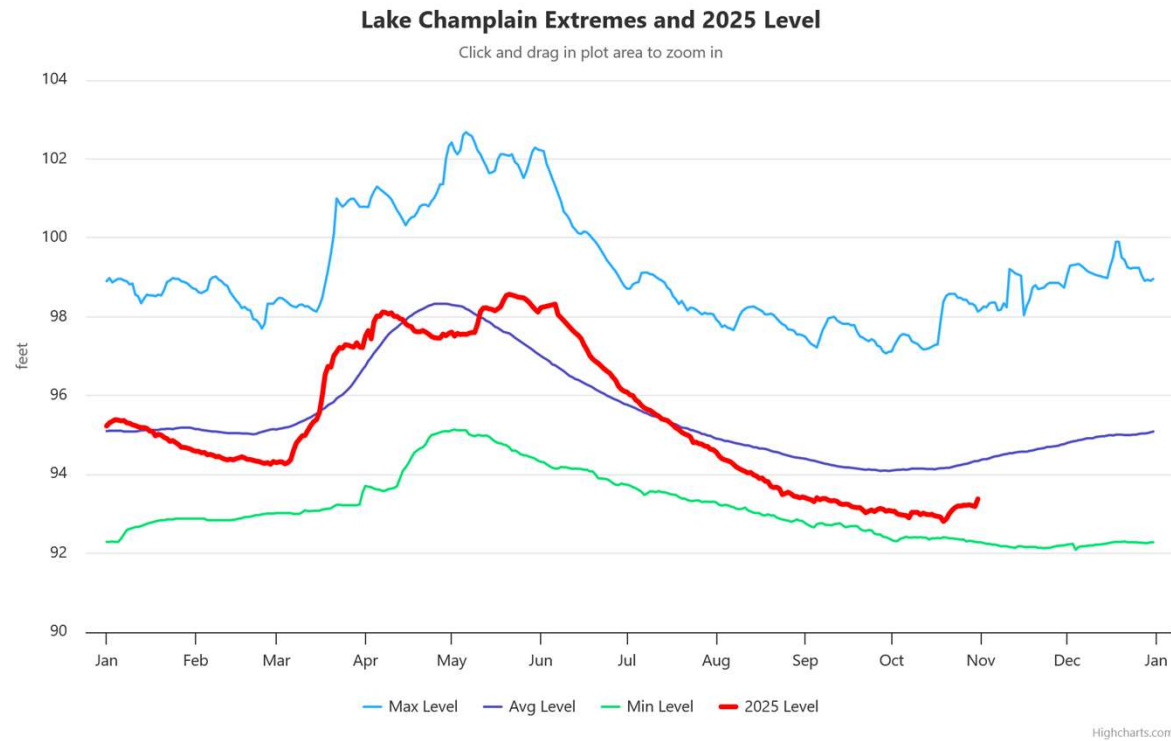
<https://www.weather.gov/btv/lakeLevel?year=2023>

Lake Champlain daily levels in 2024



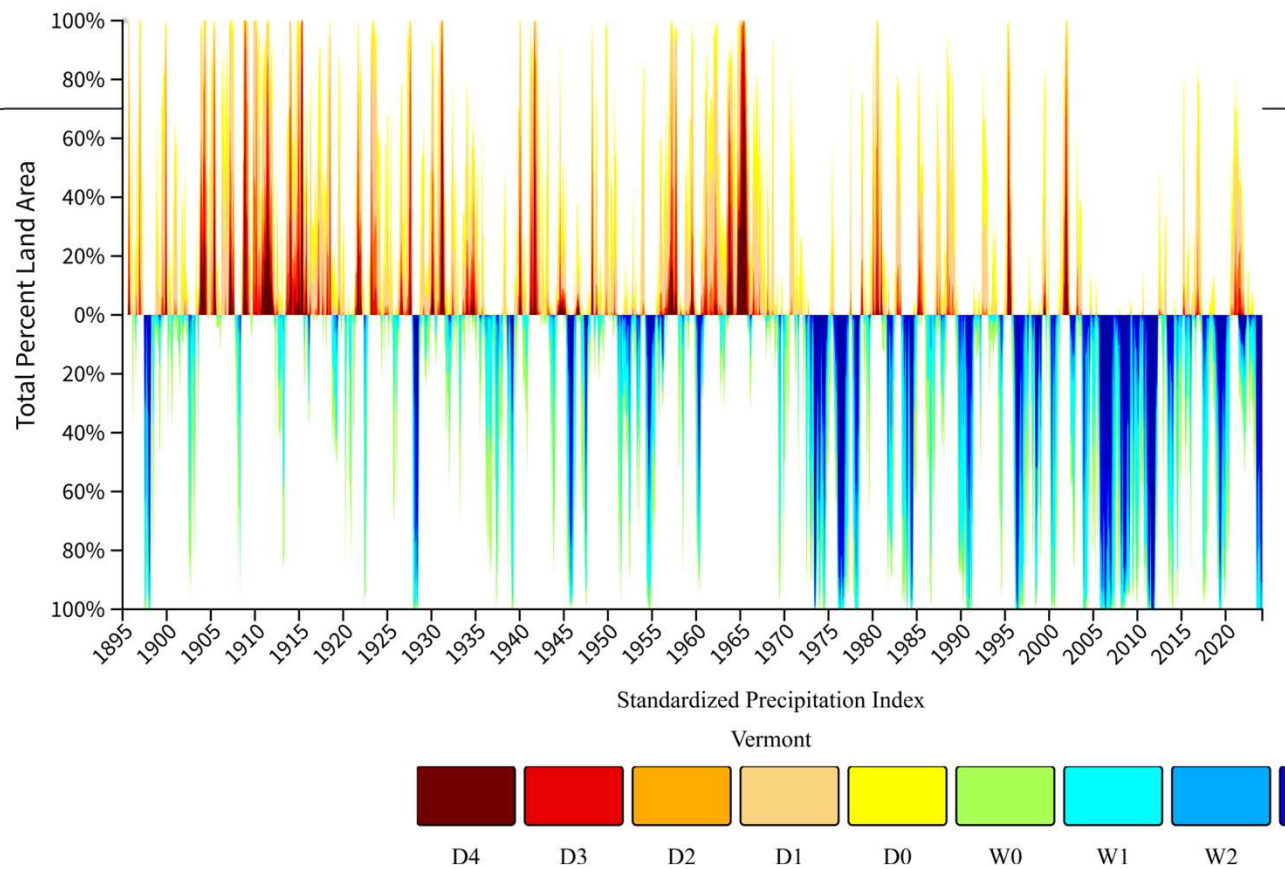
<https://www.weather.gov/btv/lakeLevel?year=2024>

Lake Champlain daily levels in 2025



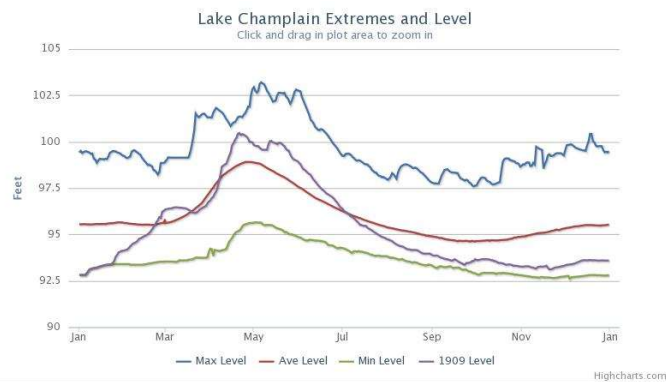
<https://www.weather.gov/btv/lakeLevel?year=2025>

Droughts in Vermont - 1895 to present

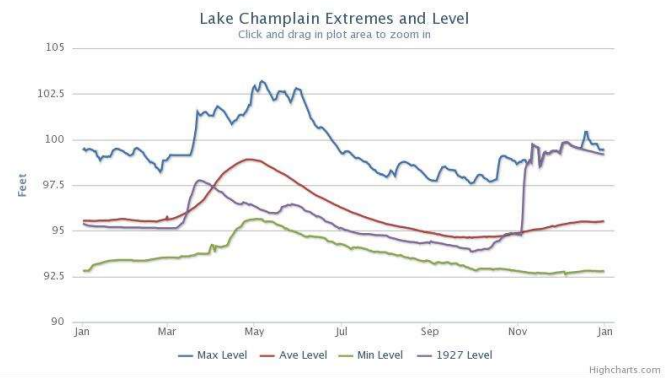


Floods & droughts

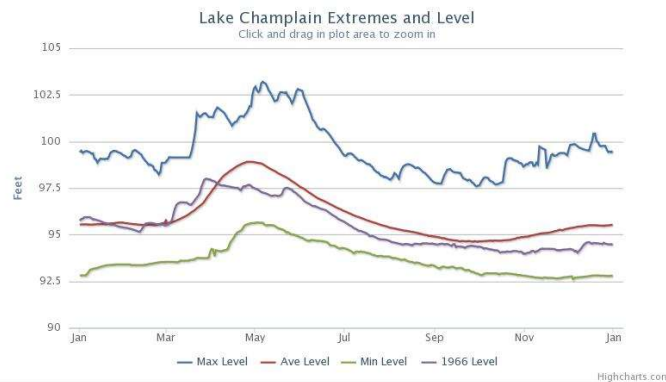
1909



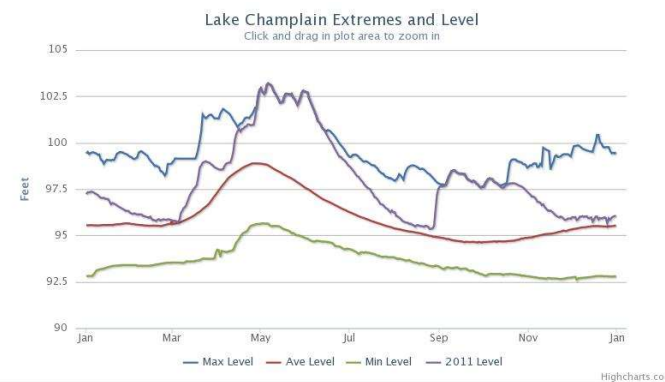
1927



1966

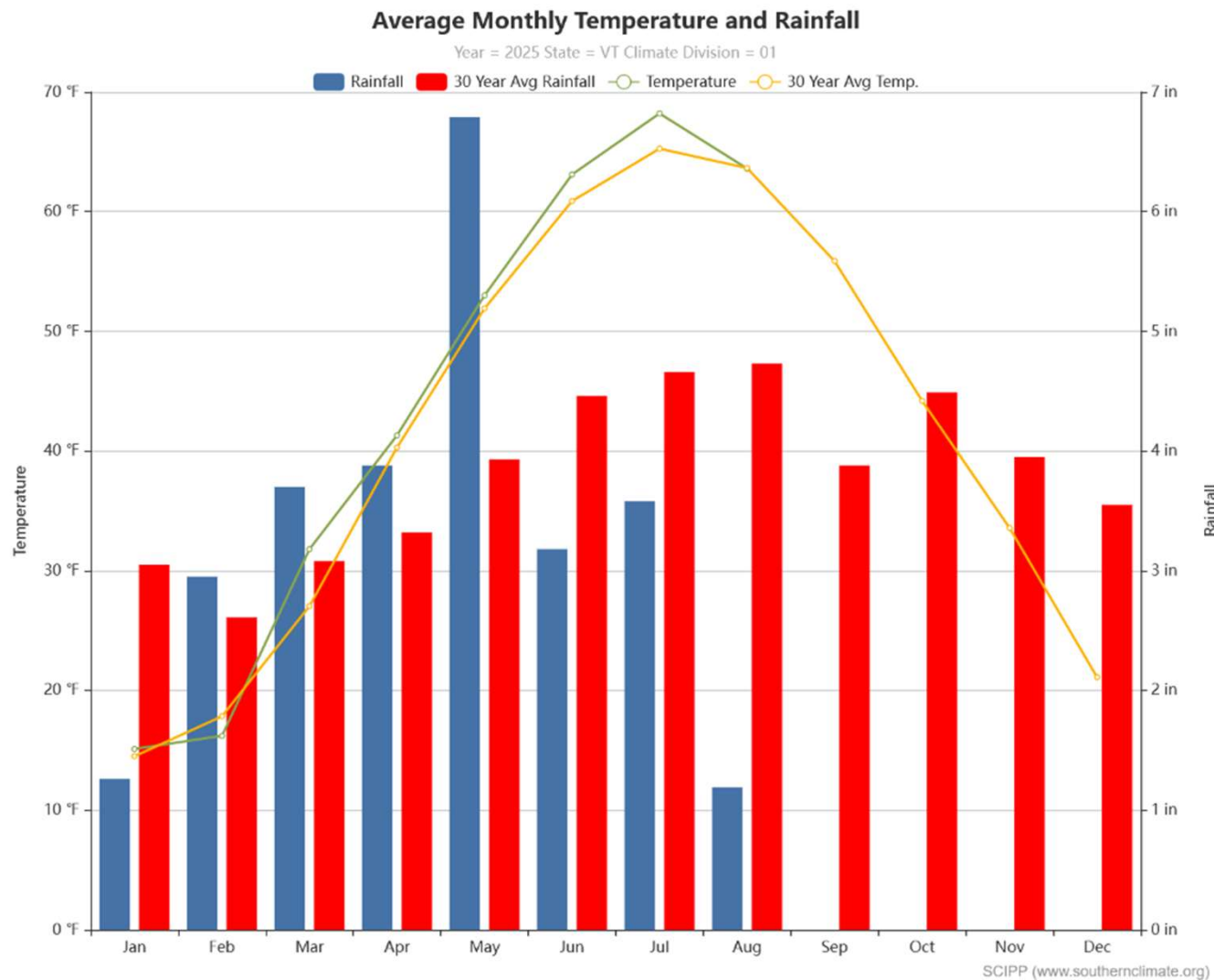


2011



Courtesy: National Weather Service

AUGUST 2025
WAS THE DRIEST
ACROSS
VERMONT SINCE
1895

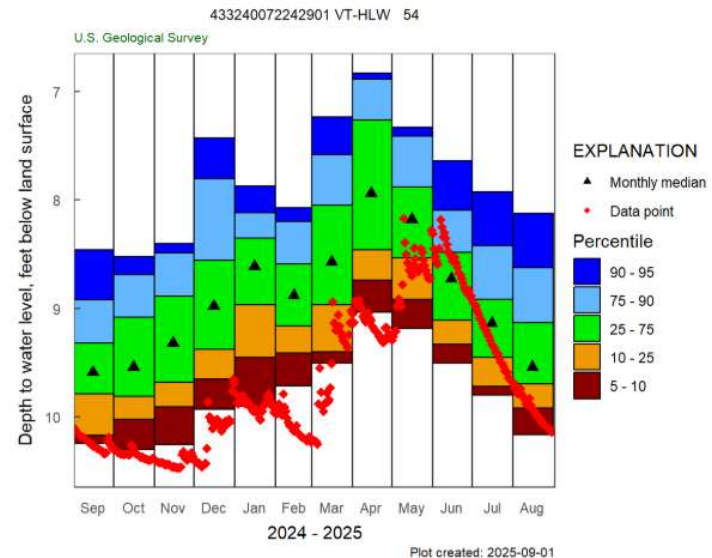
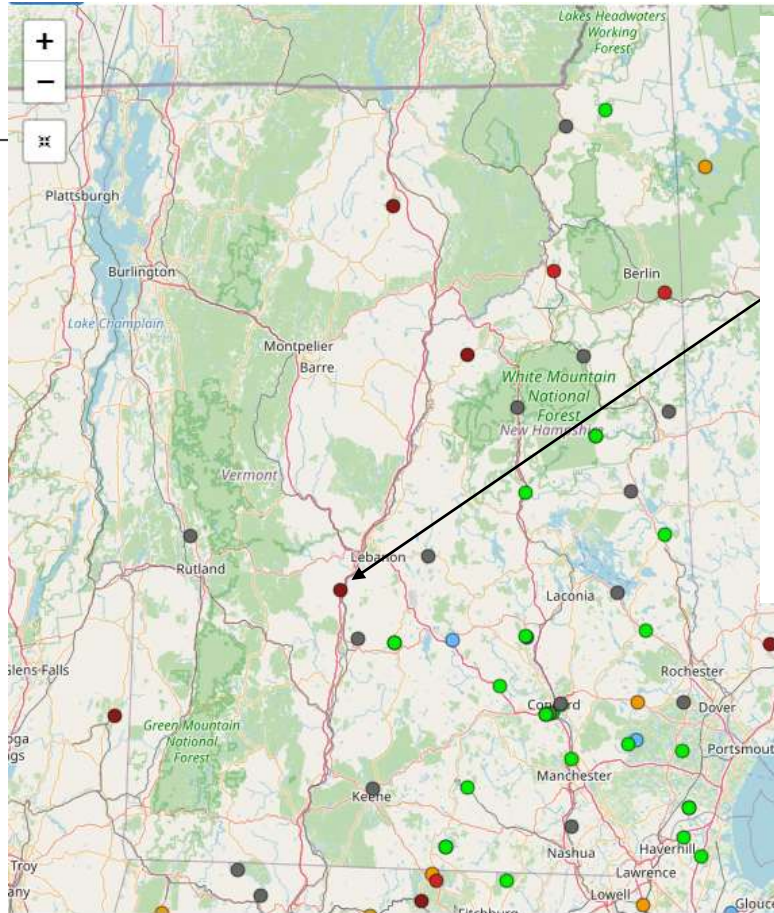


Winooski River at the Farr Farm in Richmond, VT 11 September 2025

Photo credit: L-A.L. Dupigny-Giroux



Groundwater Levels in Vermont



Period of record: 1969 to 2025



https://newengland.water.usgs.gov/web_app/GWW/GWW.html

Weather, climate and climate change are local

Precipitation Conditions 30 October 2025

7-Day

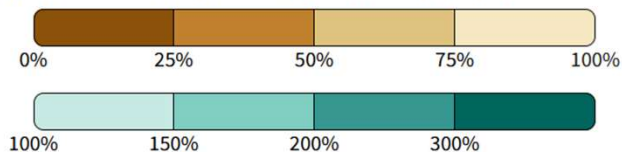
30-Day % Normal

60-Day % Normal



Legend

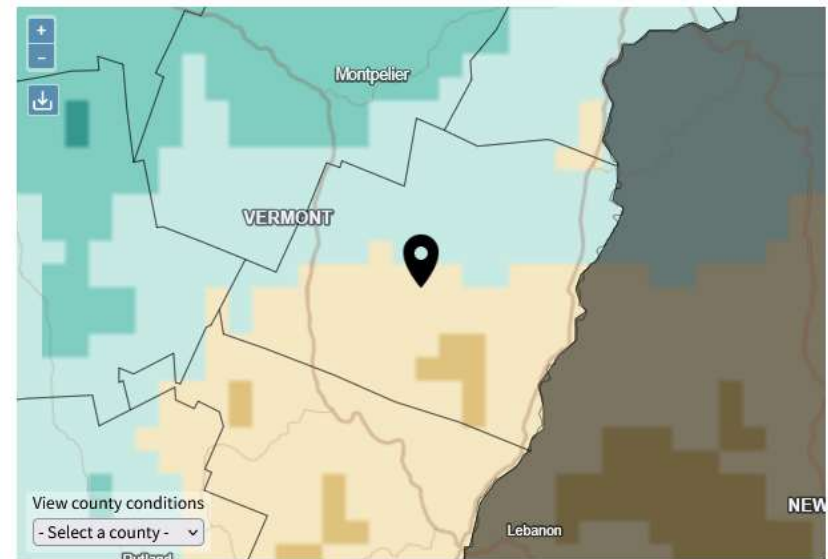
Precipitation Shown as a Percentage of Normal Conditions



2012 drought

[View More National Drought Maps](#)

Precipitation (30-Day % of Normal)



View county conditions

- Select a county -

Last Updated - 10/11/22

[Learn more about these data](#)

Mt. Ascutney & Springfield, VT – 3 October 2010



Photo credit: Marita Johnshon, Springfield, VT

Closing remarks

natural and human systems approach

honoring all abilities and ways of knowing
factors

all hazards

consecutive, compound, coincident
stressors

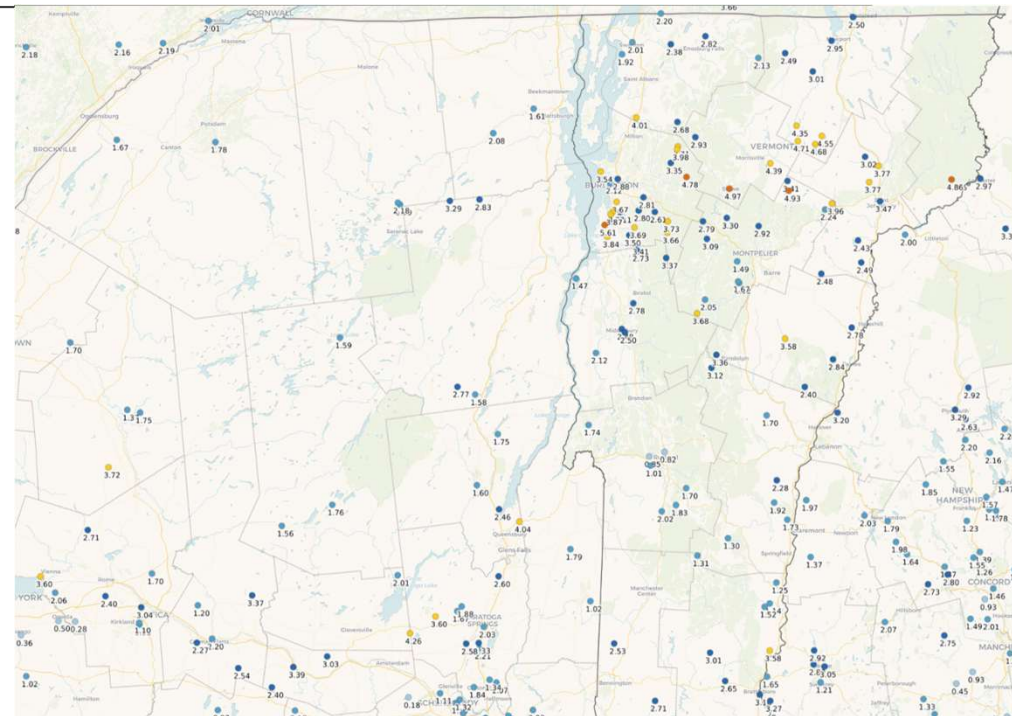
human systems – governance, funding,
fatigue

building resilience everywhere

Become a CoCoRaHS observer!!



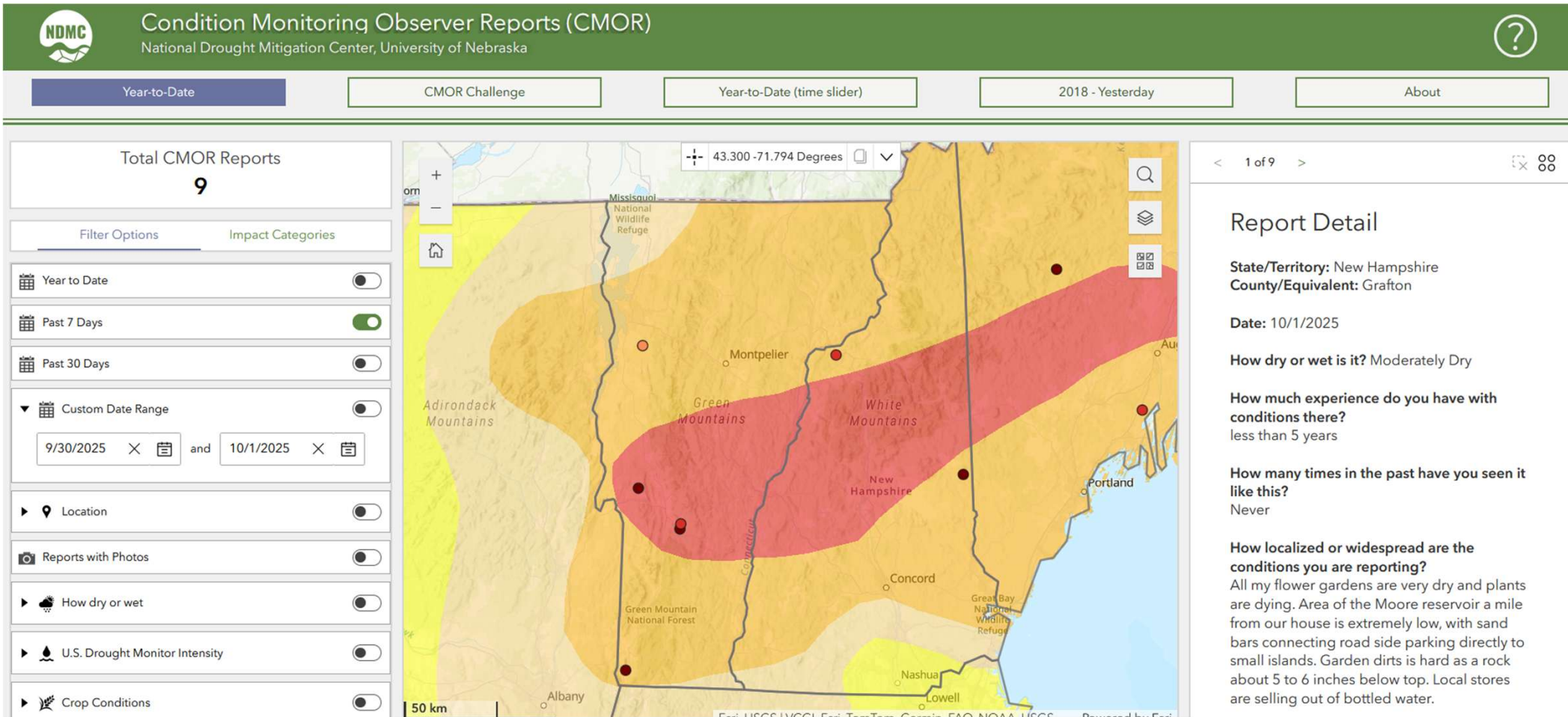
As of 26 June 2024



<https://maps.cocorahs.org/>

PLEASE REPORT ALL DRY CONDITIONS!!!!!!!!!!!!!!

1 October 2025



Thank you!

For more information contact:

Dr. Lesley-Ann L. Dupigny-Giroux

ldupigny@uvm.edu

802-656-2146

