

Fall 2024 Drought and Morgan Fire Review

Matthew Clay - Meteorologist
2025 Hybrid Fire Weather User Meeting
March 14, 2025

What We Will Discuss Today

Part 1

- We will start off by looking at the developing drought conditions across southern Vermont
- Climate statistics for southern Vermont using KVSF (Springfield)

Part 2

- Synoptic set-up on the day of the Morgan Road/Barnard fire
- Weather conditions observed on the day of the fire start and some information about the fire

Part 3

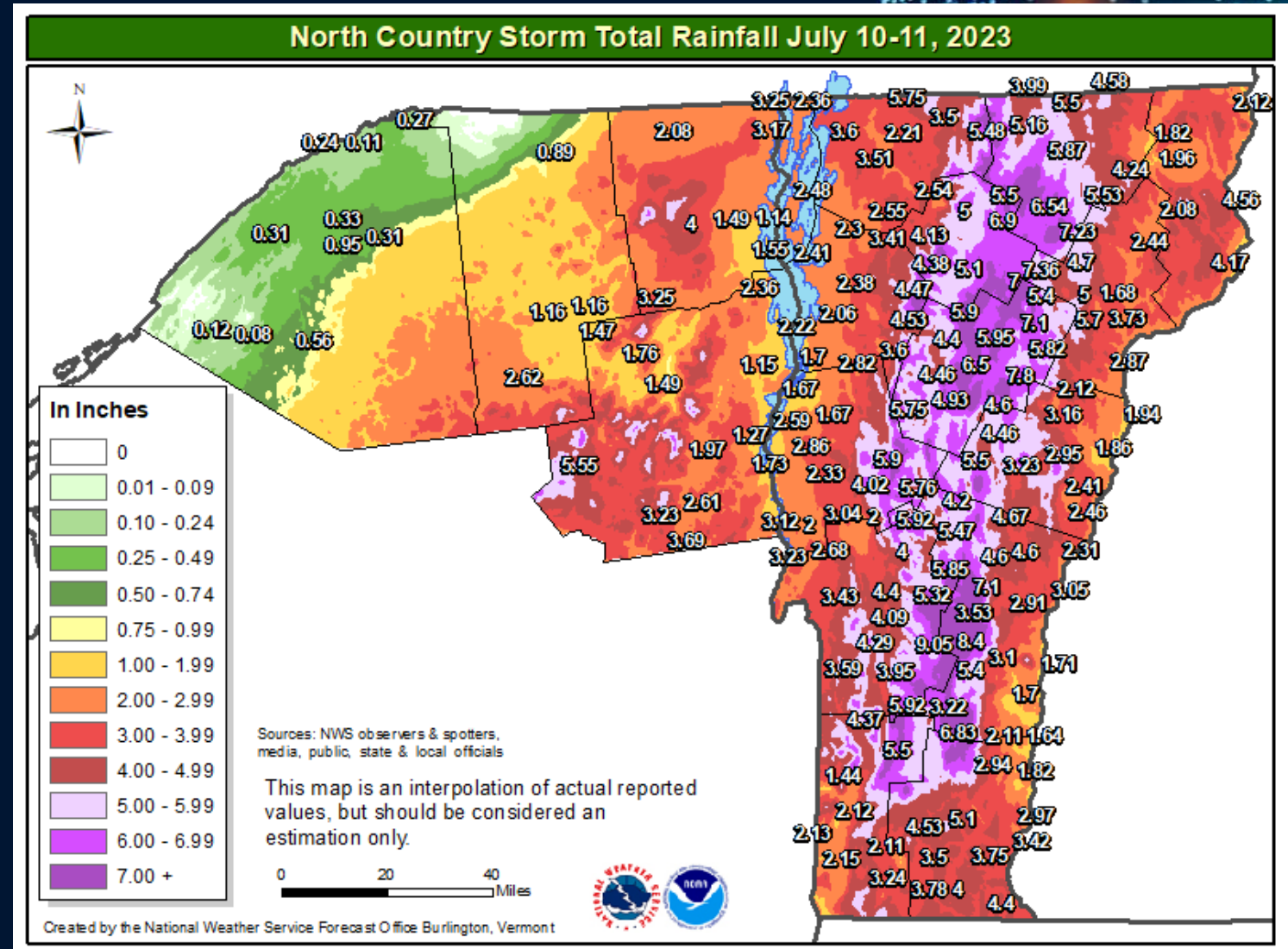
- Latest Red Flag Warnings Issued by NWS Burlington in mid-November!
- Conditions observed on these red flag days

Heavy rain in July, but not across southern Vermont

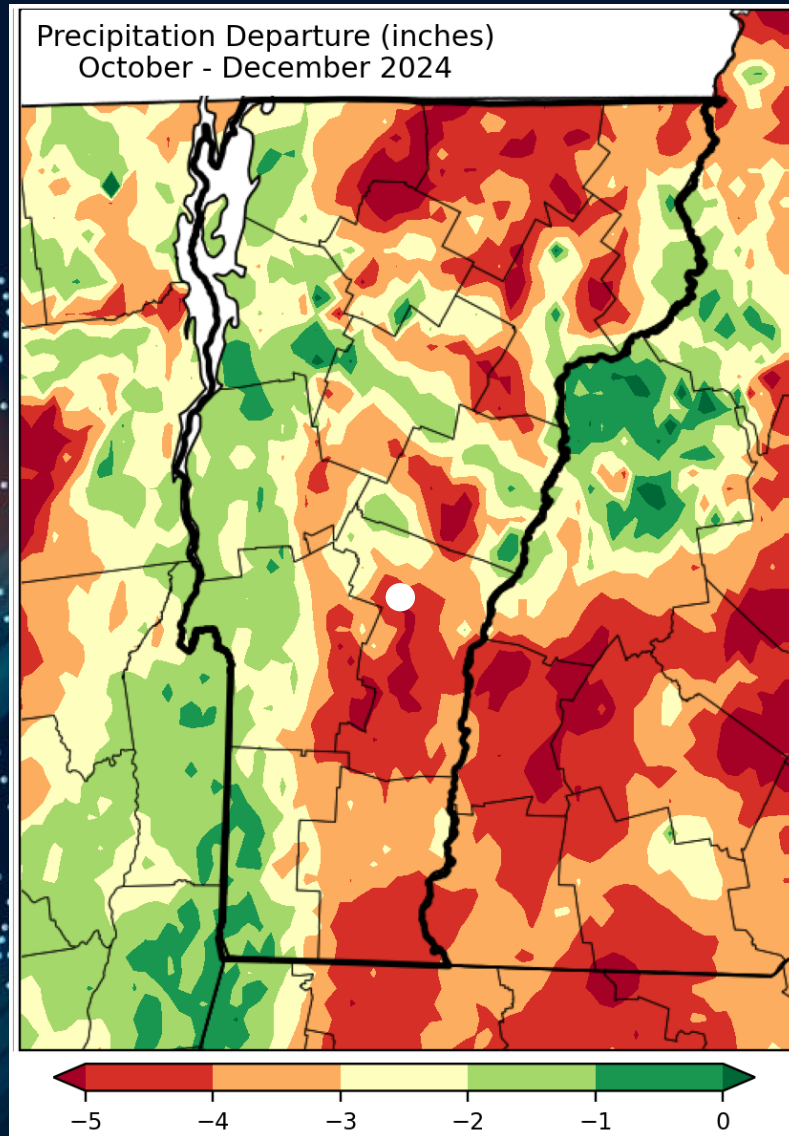
July 10th is becoming synonymous with flooding as we have seen major flooding events in both 2023 and 2024 on this date.

Unlike it 2023, last year's flooding was largely limited to the Winooski Basin and tributaries while southern Vermont got little to no rainfall.

This was the beginning of the drought that was able to take a foothold across the region by late summer, early fall.

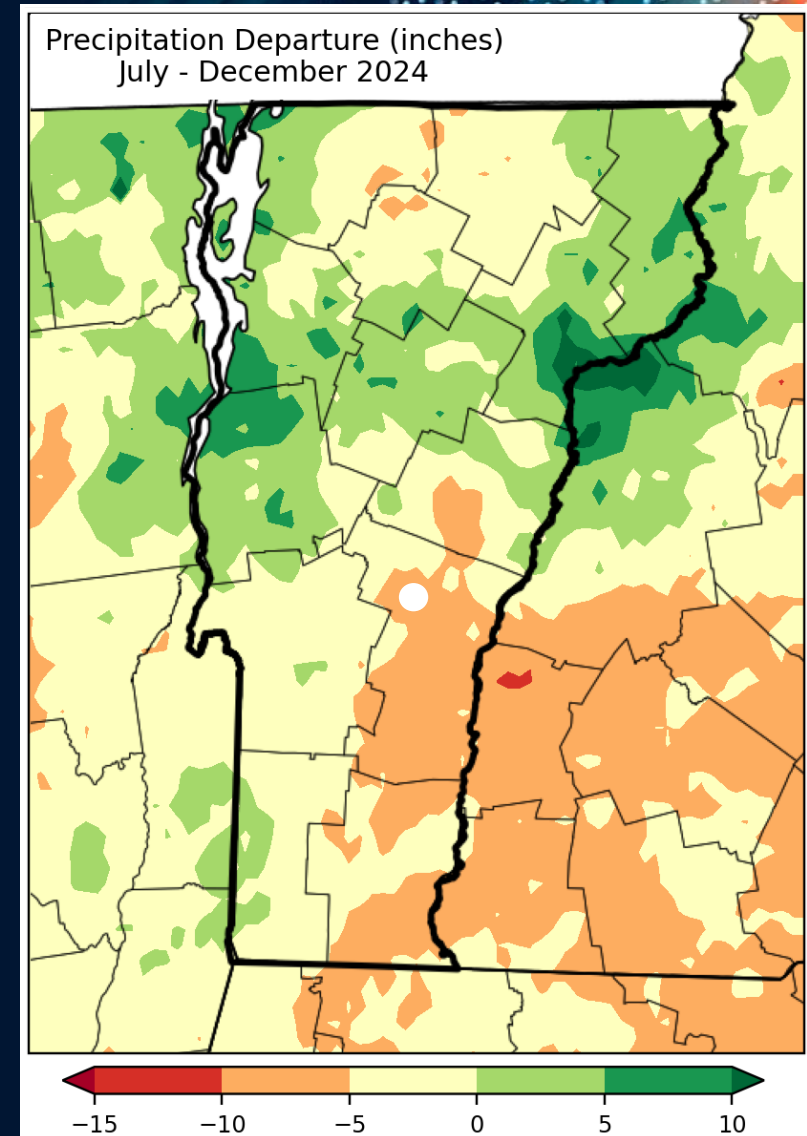


Precipitation Departure From Normal



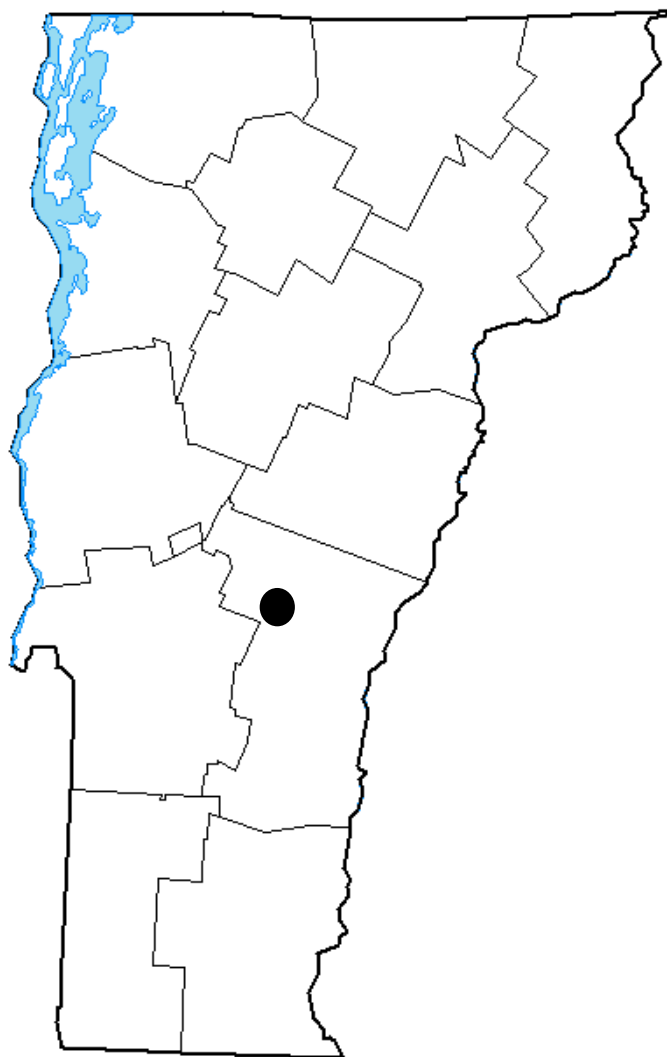
3 Month Departure from
Normal Precipitation

Well below
normal
precipitation was
seen across
southeastern
Vermont in the 3-
6 month period
ending in October
and November.



6 Month Departure from
Normal Precipitation

U.S. Drought Monitor Vermont



September 3, 2024
(Released Thursday, Sep. 5, 2024)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 08-27-2024	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago 06-04-2024	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-02-2024	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-26-2023	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago 09-05-2023	100.00	0.00	0.00	0.00	0.00	0.00

Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions.
Local conditions may vary. For more information on the
Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Lindsay Johnson
National Drought Mitigation Center



droughtmonitor.unl.edu

Early September – No drought conditions observed across Vermont.

Early October – Abnormally dry across southern and portions of central Vermont (32.89% of the state)

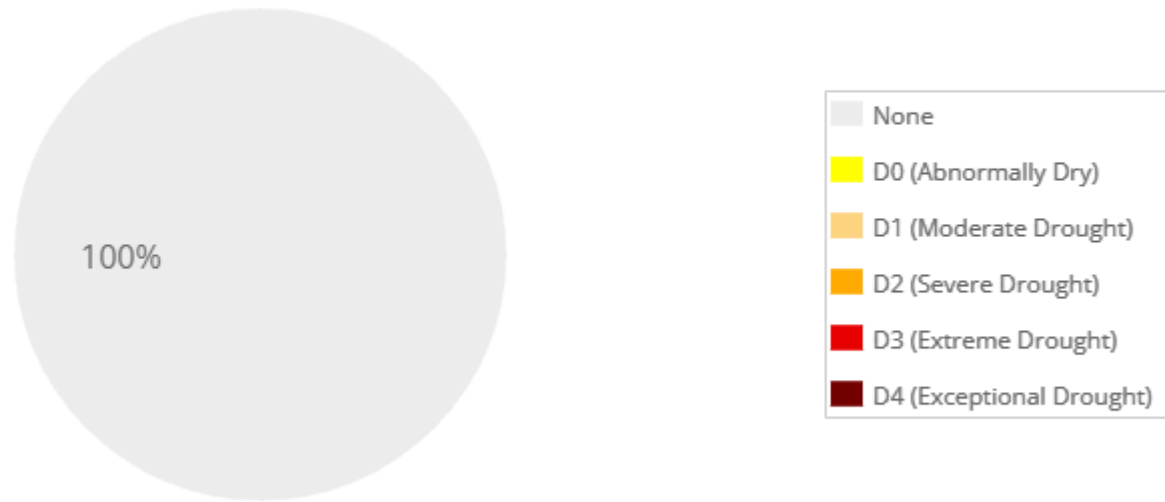
Mid October – Abnormally dry across southern and portions of central Vermont (33.19% if state) with moderate drought beginning in southern Vermont (2.54% of state)

Early November – Abnormally dry conditions spread (64% of state) with moderate drought expanding as well (25.19%)

2024 Drought Summary

August – December

Windsor County (VT) Percent Area in U.S. Drought Monitor Categories



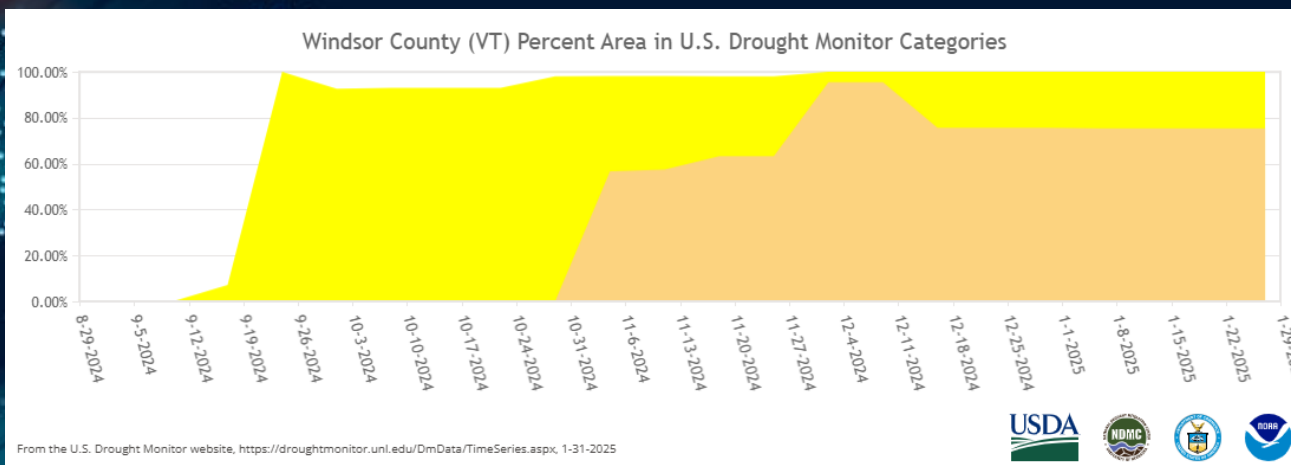
Here is a look at how the drought conditions evolved directly over Windsor County in Vermont. This is a proxy for the Barnard/Morgan Road fire.

Early September – No drought conditions present.

Mid September – 7% Abnormally dry

Early October – 93% Abnormally dry

Early November – 57% Moderate drought, 41% abnormally dry



Rank	Ending Date	Total Precipitation May 1 to Nov 30	Missing Count
1	2016-11-30	16.63	0
2	1998-11-30	16.89	0
3	2024-11-30	17.78	0
4	2019-11-30	18.94	0
5	2015-11-30	21.49	0
6	2012-11-30	22.52	0
7	2001-11-30	23.06	2
8	1999-11-30	23.33	3
9	2020-11-30	23.36	0
10	2000-11-30	23.63	4

May Through November Precipitation
Totals (Springfield, VT)

Data Dates Back to 1996

Rank	Ending Date	Total Precipitation Jul 1 to Nov 30	Missing Count
1	1998-11-30	7.95	0
2	2019-11-30	11.46	0
3	2016-11-30	12.26	0
4	2024-11-30	12.77	0
5	2001-11-30	13.15	2
6	2012-11-30	14.07	0
7	2015-11-30	15.03	0
8	2017-11-30	15.28	0
9	2000-11-30	16.44	3
10	2002-11-30	17.01	0

July Through November Precipitation
Totals (Springfield, VT)

Rank	Ending Date	Total Precipitation Aug 1 to Nov 30	Missing Count
1	1998-11-30	5.87	0
2	2016-11-30	8.68	0
3	2000-11-30	9.00	3
4	2019-11-30	9.60	0
5	2001-11-30	9.80	2
6	2024-11-30	9.97	0
7	2012-11-30	11.15	0
8	2017-11-30	12.05	0
9	2013-11-30	12.20	0
10	2014-11-30	12.26	0

August Through November Precipitation
Totals (Springfield, VT)

Rank	Ending Date	Total Precipitation Sep 1 to Nov 30	Missing Count
1	1998-11-30	4.35	0
2	2024-11-30	5.23	0
3	2016-11-30	6.08	0
4	2000-11-30	6.57	3
5	2019-11-30	7.05	0
6	2013-11-30	7.93	0
7	2012-11-30	8.31	0
8	2014-11-30	8.66	0
9	2001-11-30	8.67	2
10	2017-11-30	9.06	0

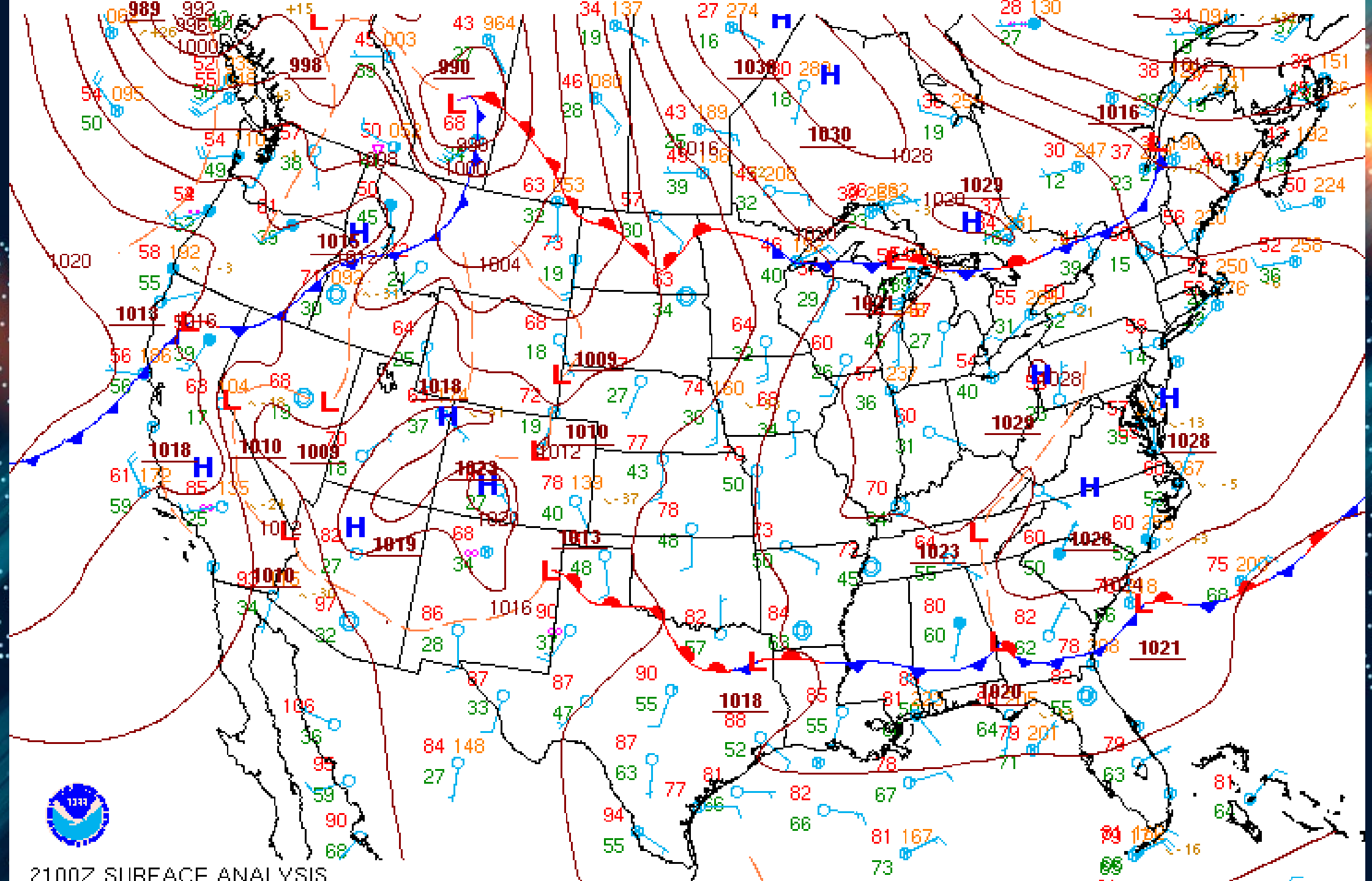
September Through November Precipitation
Totals (Springfield, VT)

Final Two Weeks in October – Springfield, VT

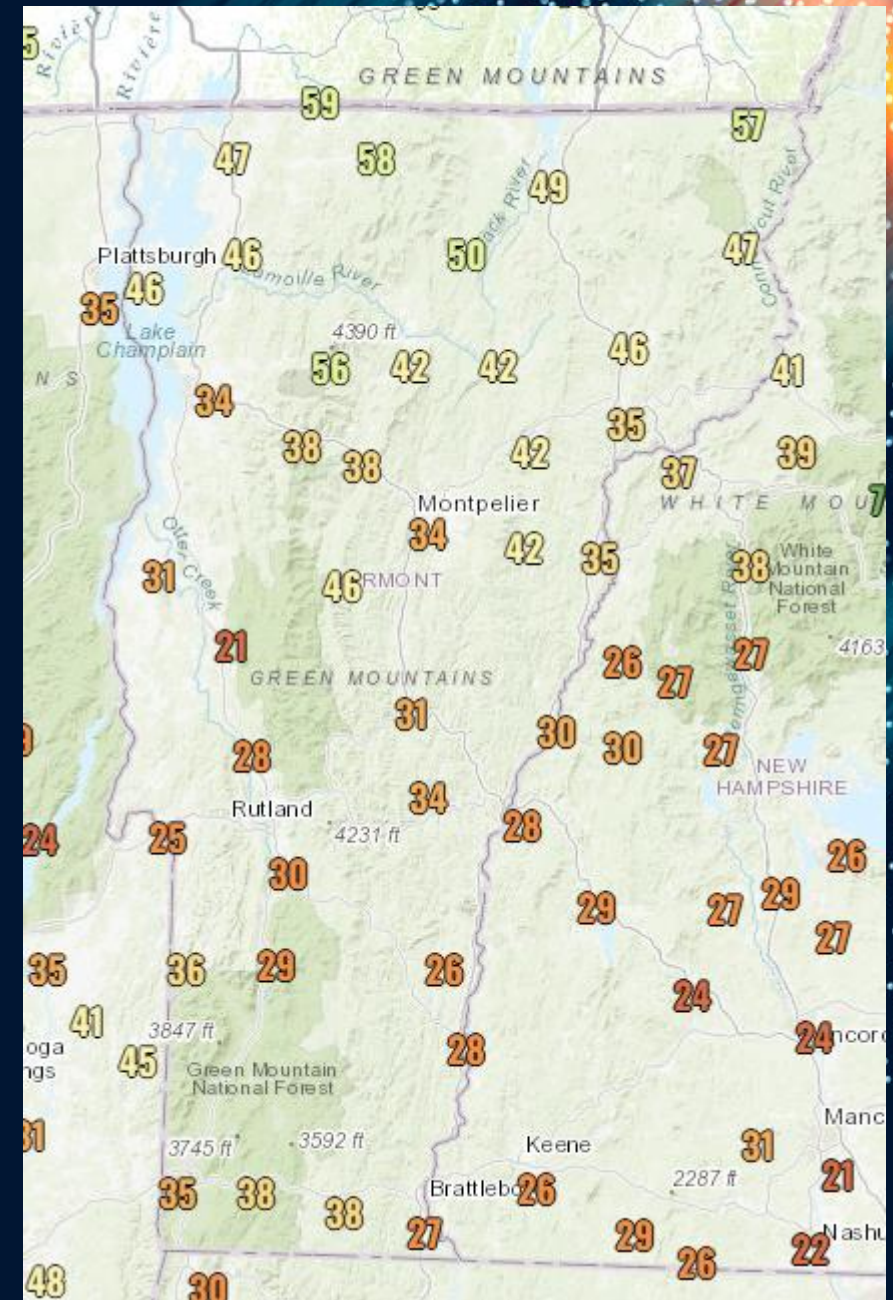
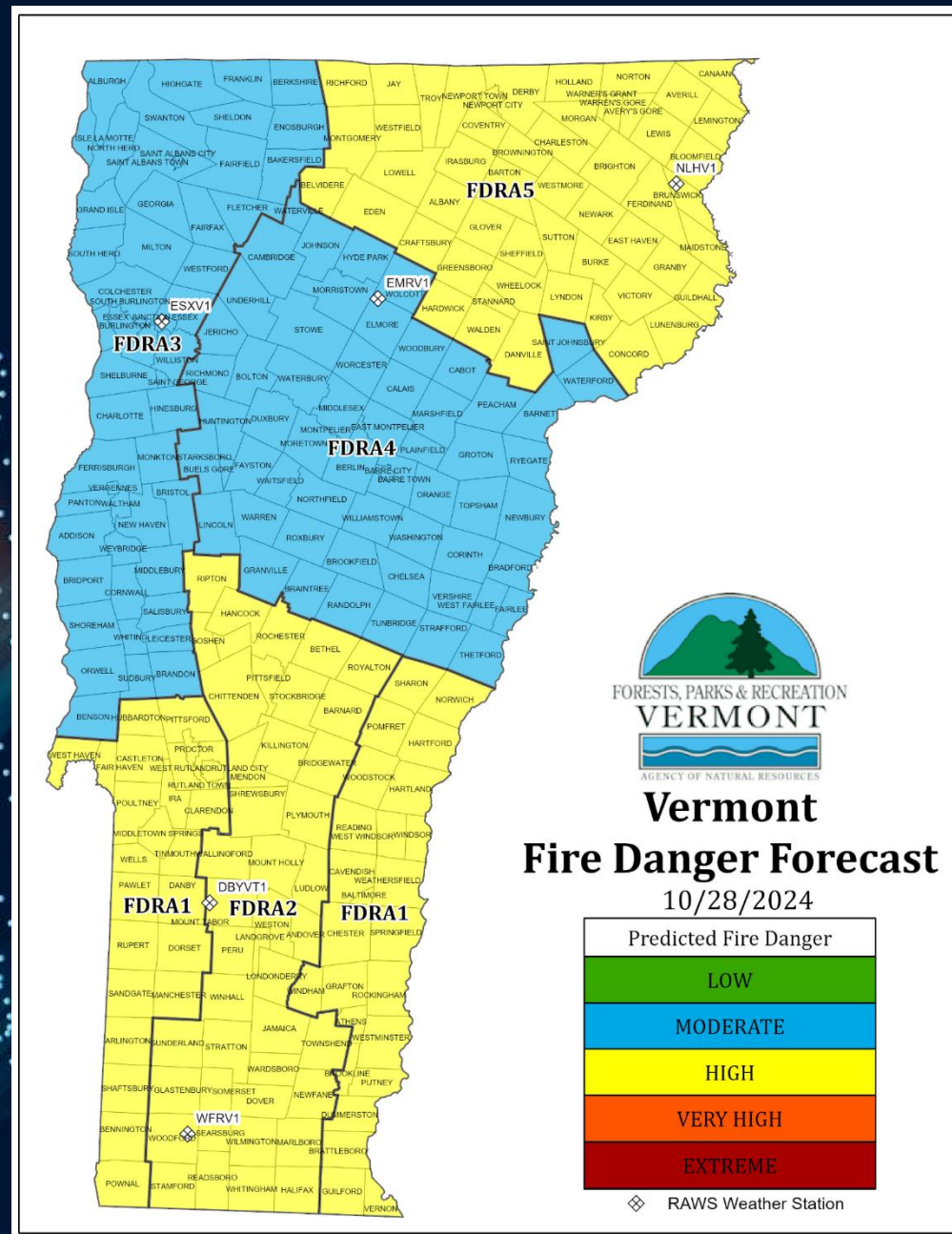
Date	Minimum RH	Highest Wind Speed
10/31	78%	9 mph
10/30	53%	18 mph
10/29	31%	13 mph
10/28	26%	29 mph
10/27	28%	40 mph
10/26	34%	12 mph
10/25	41%	30 mph
10/24	19%	27 mph
10/23	42%	17 mph
10/22	34%	21 mph
10/21	25%	15 mph
10/20	31%	9 mph
10/19	21%	20 mph
10/18	34%	17 mph

TEMPERATURE IN F:						:PCPN:		SNOW:			WIND		:SUNSHINE: SKY				:PK WND		
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18	
										12Z	AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR	
1	70	51	61	7	4	0	0.00	M	M	1.7	14	120	M	M	8	12	23	100	
2	66	47	57	4	8	0	0.00	M	M	2.4	14	150	M	M	8	12	21	170	
3	74	47	61	8	4	0	0.00	M	M	2.4	13	170	M	M	4		19	180	
4	72	43	58	6	7	0	0.00	M	M	1.5	10	160	M	M	4	12	14	140	
5	70	41	56	4	9	0	0.07	M	M	3.2	16	270	M	M	4	12	25	260	
6	68	35	52	1	13	0	0.00	M	M	1.7	12	160	M	M	3	12	17	120	
7	66	42	54	3	11	0	0.06	M	M	1.3	9	330	M	M	8	1	15	290	
8	62	39	51	0	14	0	T	M	M	3.1	14	280	M	M	4	12	20	260	
9	61	35	48	-2	17	0	0.07	M	M	4.2	13	290	M	M	6	12	21	280	
10	55	40	48	-2	17	0	0.02	M	M	5.7	16	290	M	M	8		32	280	
11	65	37	51	2	14	0	T	M	M	4.8	17	250	M	M	2		24	300	
12	63	36	50	1	15	0	0.00	M	M	8.1	20	290	M	M	1		33	280	
13	47	35	41	-8	24	0	0.62	M	M	1.3	9	160	M	M	8	1	14	160	
14	51	36	44	-4	21	0	0.42	M	M	3.5	14	310	M	M	8	1	23	340	
15	52	36	44	-4	21	0	T	M	M	5.8	15	250	M	M	5		26	270	
16	54	30	42	-6	23	0	T	M	M	5.1	18	300	M	M	4		30	320	
17	60	27	44	-3	21	0	0.00	M	M	1.4	12	60	M	M	1	12	17	60	
18	69	28	49	2	16	0	0.00	M	M	2.0	10	30	M	M	0		20	30	
19	70	30	50	4	15	0	0.00	M	M	0.9	7	160	M	M	0	1	9	170	
20	72	29	51	5	14	0	0.00	M	M	1.7	10	180	M	M	4	12	15	160	
21	79	39	59	13	6	0	0.00	M	M	2.2	15	280	M	M	0		21	270	
22	78	42	60	15	5	0	0.00	M	M	1.9	12	140	M	M	0	1	17	130	
23	78	43	61	16	4	0	0.00	M	M	3.2	17	170	M	M	2	12	27	180	
24	63	38	51	6	14	0	0.00	M	M	4.9	14	20	M	M	2		30	10	
25	60	31	46	2	19	0	0.00	M	M	1.1	9	300	M	M	1	1	12	290	
26	59	33	46	2	19	0	0.00	M	M	6.2	22	290	M	M	4		40	300	
27	54	27	41	-3	24	0	T	M	M	6.9	21	290	M	M	2	8	29	290	
28	48	27	38	-5	27	0	0.01	M	M	1.9	9	90	M	M	5	1	13	50	
29	48	26	37	-6	28	0	0.20	M	M	1.0	13	180	M	M	9	1	18	170	
30	61	43	52	9	13	0	0.02	M	M	1.0	7	160	M	M	9	12	9	160	
31	79	44	62	20	3	0	0.00	M	M	2.7	18	250	M	M	4	12	26	260	
=====																			
SM	1974	1137			450	0	1.49	M		94.8			M		128				
=====																			
AV	63.7	36.7								3.1	FASTST		M	M	4		MAX(MPH)		
										MISC	----	22	290					40	300

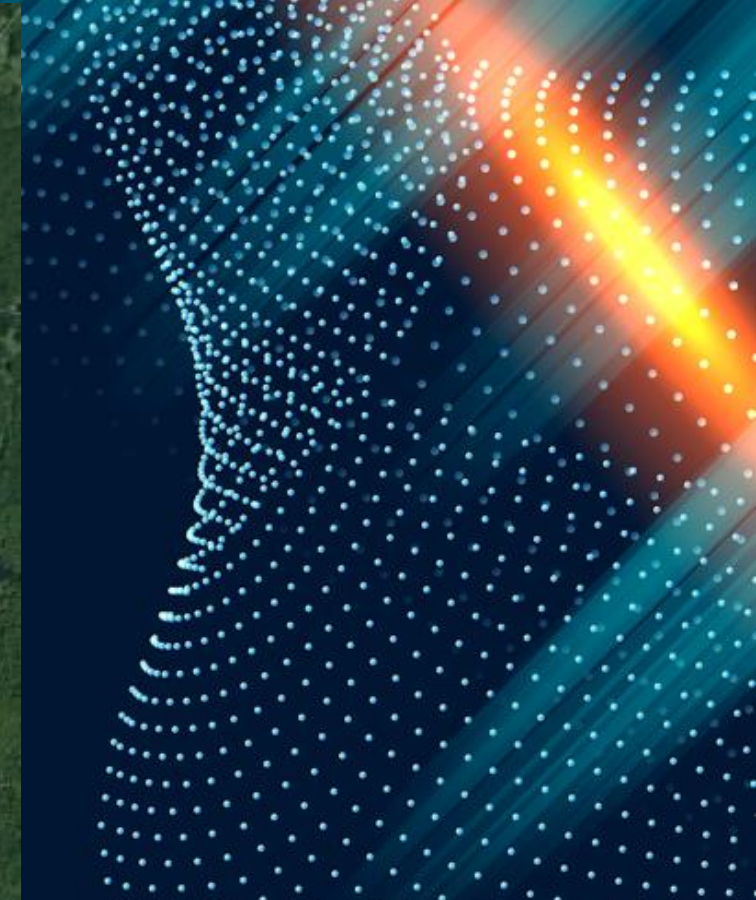
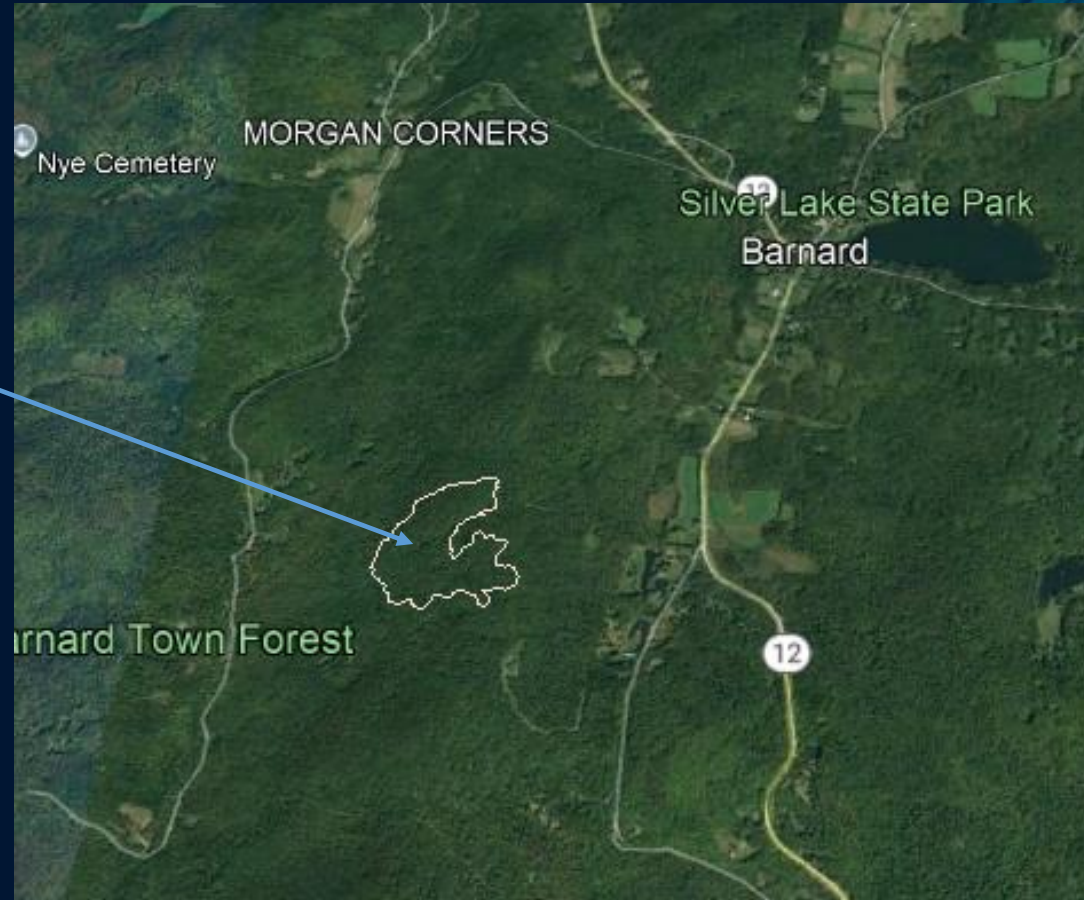
- Nearly all the observed precipitation for the month of October fell in 3 days with the rest of the month very dry.
- Near critical RH values were observed for many days in the second half of October.
- Fire was reported on October 27th with winds gusting up to 40 mph and RH values as low as 28%



2100Z SURFACE ANALYSIS



Morgan Road/Barnard Fire Perimeter



Graph: Min, Avg, Max **Elevation: 1620, 1836, 1983 ft**
Range Totals: Distance: 2.05 mi | Elev Gain/Loss: 715 ft, -714 ft | Max Slope: 44.2%, -33.9% | Avg Slope: 11.1%, -12.6%



Elevation map of the
fire perimeter shows
the complex terrain the
fire was burning in.

Morgan Road/Barnard Fire Stats

“I’ve been on the department for 47 years and it’s the largest fire we’ve ever had” – Scott Mills, Barnard Fire Warden



Size

73 acres as reported
on October 29th

Took nearly 2 weeks
to put out



Damage

Two camps were
destroyed by the
fire



Injuries

One person
sustained non-life
threatening injuries



Cause

Improper disposal
of ashes from a
wood stove –
human caused fire
according to VSP

Morgan Road/Barnard Fire Stats

8 total spot requests were fulfilled starting October 30th and continuing through November 6th.

.DISCUSSION...Rainfall last night at the spot location is estimated at about 0.25" to 0.33". Light and variable winds this morning may increase slightly early this afternoon once low cloud break, reaching around 10 MPH out of the southeast, before decreasing again late in the day. Winds overnight will increase and become westerly into the 10 to 15 MPH range and persist through Thursday. Minimum relative humidity today will tend to stay above 55%. While tomorrow will be warmer, minimum relative humidity is still expected to remain moderately high, above 45%.

.DISCUSSION... Terrain driven winds between 3 to 6 mph through noon, becoming southwesterly at 10 to 15 mph with gusts of 1A warm front will be passing by today with no appreciable chances of rain at the wildfire site. Winds will increase out of the southwesterly overnight, especially on the exposed ridges. Wsouth this afternoon with gusts 12 to 18 mph. While conditions should lighten in the protected valleys. Skies will be mostly sunny today with only a few thin high clouds. Record breaking is expected today, with highs between 72 to 75 degrees. Relative humidity values drop to 45 to 50 percent today, before recovering to around 80 percent tonight. There will be a few showers late tonight but rainfall totals should be under 0.1 inches. Wind conditions. The result will be continued gusts for the overnight increase during the day Friday, becoming westerly. Sustained winds will be between 15 to 20 mph, gusting to 25 mph between AM and 2 PM on Friday. A brief shower is possible Friday afternoon but anything would be light and unimpactful. Relative humidity values will drop to around 50 percent Friday.

A cold front will gradually move southward through northern New York this evening, bringing mainly isolated rain showers to the western Champlain Valley. Showers should move toward the Crown Point area between 8 and 10 pm, with occasional showers possible through daybreak Saturday. Any rain will be light with just a few hundredths of an inch expected this evening and overnight. West southwest winds 5 to 10 mph with gusts to 15 mph will turn to the north northwest behind the front, which should move through the southern Champlain Valley around 9 pm. Relative humidities will peak around 90 percent overnight. Saturday will be partly to mostly cloudy with no precipitation. Afternoon relative humidity values of 45-50 percent can be expected, along with north winds of 5 to 10 mph.

0.04 inches should a shower occur. More concerning, flow will shift slightly southwesterly resulting in some weakly downsloping conditions. The result will be continued gusts for the overnight hours with an increasing trend, average south- southwesterly gusts to 20 mph and maximum potential gusts up to 26 mph. Breezes at the site are expected to continue through Wednesday with gusts ranging 15 to 25 mph out of the southwest. Temperatures Tuesday and Wednesday will also be abnormally warm in the upper 60s to around 70 degrees with RH minimums ranging 60-70%. Towards the end of the week, periodic showers will be possible, but wetting rains are not likely. Gusts to 20 mph may continue as well with flow turning northwesterly.

2024 Fire Statistics

“It was very far from typical, but I think it’s sort of the new normal.” – Oliver Pierson, Vermont Department of Forests, Parks, and Recreation



Size

99 wildfires which
burned 180.6 total
acres in Vermont

Avg: 81/157



Timing

The October and
November acreage
was roughly 18
times higher than
the previous 25 year
average.



Causes

78 Human Caused
19 Undertermined
2 Lightning

COUNTY	2024	
	Fires	Acres
Addison	11	12.62
Bennington	12	27.15
Caledonia	6	4.19
Chittenden	13	7.15
Essex	1	0.5
Franklin	12	12.23
Grand Isle	1	1
Lamoille	2	0.75
Orange	7	7.08
Orleans	3	1.11
Rutland	7	6.9
Washington	3	3.76
Windham	12	19.93
Windsor	9	76.24
TOTALS	99	181

Green Up or Green Down?

Red Flag Criteria	Vegetation Stage I or II cured/transition - Spring/Fall	Vegetation Stage III green - Summer
Relative Humidity	Less than 30% for at least 2 hours	Less than 30% for at least 2 hours
Rainfall	N/A	Less than 1/4 inch in previous 8 days
Wind	Sustained or frequent gusts above 25 mph for at least 2 hours	Sustained or frequent gusts above 25 mph for at least 2 hours
Fuel	Partner confirmation of dry/receptive fuels	Keetch-Byram Drought Index above 300 Partner confirmation of dry/receptive fuels
Temperature	N/A	N/A

We ended up reverting to pre-green up conditions for Red Flag Warning (RFW) criteria in November given the fresh leaf litter and increasing drought conditions. This led to the latest issuance of a RFW from the NWS in Burlington.

Coordination

Thu, Nov 14, 2024 1:48 PM	Systems Collaboration	Kutikoff	Called Dan Dillner to check in on fuels and explain our fire weather concerns for tomorrow. Based on fuels and weather, will be issuing Red Flag Warning for southern zones in Vermont in effect tomorrow, and talked to Steve at ALY about the RFW issuance. He said NY would be interested in a fire weather SPS in some areas, which includes the Champlain Valley.
Fri, Nov 15, 2024 1:43 PM	Weather Fire Wx	Hastings	<p>Spoke with Dan Dillner regarding fire weather concerns for this weekend, and into next week. First - we agreed that another RFW for tomorrow is warranted (for those areas that are in the current RFW). At least some locations in those zones will hit RFW criteria tomorrow, and there is heightened concern given there will be hunters outdoors, who may have warm-up fires for their morning coffee. Also, their fire danger rating system is giving extreme fire danger for FDRA 2, which he has never seen before. Ratings will likely be very high elsewhere, except high in the Champlain Valley. So Marvin and I are also thinking an SPS for those areas that will be under high danger (or where gusts are 20+ mph). For messaging, Dan would like us to include the potential for rapid fire spread with any fires that may start, consulting local or state fire/forestry officials before burning and/or reminders there are burn bans in effect, and to never leave a campfire unattended. Dan will be on duty on Saturday, but he's off on Sunday, so we will need to contact either Devin or Kelsey for coordination late in the weekend.</p> <p>Also, coordinated with ALY and we are going to issue another SPS for Clinton and Essex Counties for tomorrow, as well. Franklin County could conceivably be added, but will let the evening shift coordinate with ALY. Thought is that the evening shift will need to issue these products after current headlines expire. That way, we ensure any hunters see them on the evening news, as they will likely be out the door prior to the morning news tomorrow.</p>

URGENT - FIRE WEATHER MESSAGE

National Weather Service Burlington VT

249 PM EST Thu Nov 14 2024

VTZ034-035-151000-

/O.NEW.KBTW.FW.W.0001.241115T1200Z-241115T2300Z/

South Central Greens-Lower Connecticut Valley North-

249 PM EST Thu Nov 14 2024

...RED FLAG WARNING IN EFFECT FROM 7 AM TO 6 PM EST FRIDAY FOR GUSTY WINDS AND LOW RELATIVE HUMIDITY FOR THE SOUTH CENTRAL GREEN MOUNTAIN REGION AND THE LOWER CONNECTICUT RIVER VALLEY

The National Weather Service in Burlington has issued a Red Flag Warning, which is in effect from 7 AM to 6 PM EST Friday.

* AFFECTED AREA...Portions of southern Vermont.

* Timing...From 7 AM Friday morning until 6 PM Friday evening. The strongest winds and lowest relative humidity values will occur between 9 AM and 1 PM.

* WINDS...Northwest 10 to 15 mph with gusts up to 30 mph.

* RELATIVE HUMIDITY...As low as 20 to 30 percent.

* TEMPERATURES...Ranging from the low 40s to low 50s.

* Impacts...Unusually dry vegetation combined with gusty winds and low relative humidity will promote the potential for rapid fire spread with any fires that may start.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A Red Flag Warning means that dangerous fire weather conditions are expected due to the combination of gusty winds, low relative humidities, and dry fuels. Any fires that develop may quickly get out of control and become difficult to contain.

VTZ034-035-161000-

/O.EXP.KBTW.FW.W.0001.000000T0000Z-241115T2300Z/

/O.NEW.KBTW.FW.W.0002.241116T1200Z-241116T2300Z/

South Central Greens-Lower Connecticut Valley North-

605 PM EST Fri Nov 15 2024

...RED FLAG WARNING FOR TODAY HAS EXPIRED FOR GUSTY WINDS AND LOW RELATIVE HUMIDITY FOR THE SOUTH CENTRAL GREEN MOUNTAIN REGION AND THE LOWER CONNECTICUT RIVER VALLEY...

...RED FLAG WARNING IN EFFECT FROM 7 AM TO 6 PM EST SATURDAY FOR GUSTY WINDS AND LOW RELATIVE HUMIDITY FOR THE SOUTH CENTRAL GREEN MOUNTAIN REGION AND THE LOWER CONNECTICUT RIVER VALLEY...

The National Weather Service in Burlington has issued a Red Flag Warning which is in effect from 7 AM to 6 PM EST Saturday.

* AFFECTED AREA...Portions of southern Vermont

* Timing...From 7 AM Saturday until 6 PM. The strongest winds and lowest relative humidity values will occur between 9 AM and 3 PM.

* WINDS...Northwest 10 to 15 mph with gusts up to 30 mph.

* RELATIVE HUMIDITY...As low as 25 percent.

* TEMPERATURES...Up to 50.

* Impacts...Unusually dry vegetation combined with gusty winds and low relative humidity will promote the potential for rapid fire spread with any fires that may start. Consult with local or state fire or forestry officials before burning. Remember that burn bans are in effect across Rutland, Windsor, Bennington, and Windham Counties. Never leave campfires unattended.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A Red Flag Warning means that dangerous fire weather conditions are expected due to the combination of gusty winds, low relative humidities, and dry fuels. Any fires that develop may quickly get out of control and become difficult to contain.

Latest Red Flag Warning on Record for Us

Red Flag Warning in Effect



What is a Red Flag Warning?

Very low relative humidity values and strong winds could allow for rapid fire spread and development of fires. Outdoor burning is not advised!

Impacts:

- Easier and faster fire starts
- Potential for rapid spread of fire

Timing:

- 7 AM to 6 PM Friday, November 15

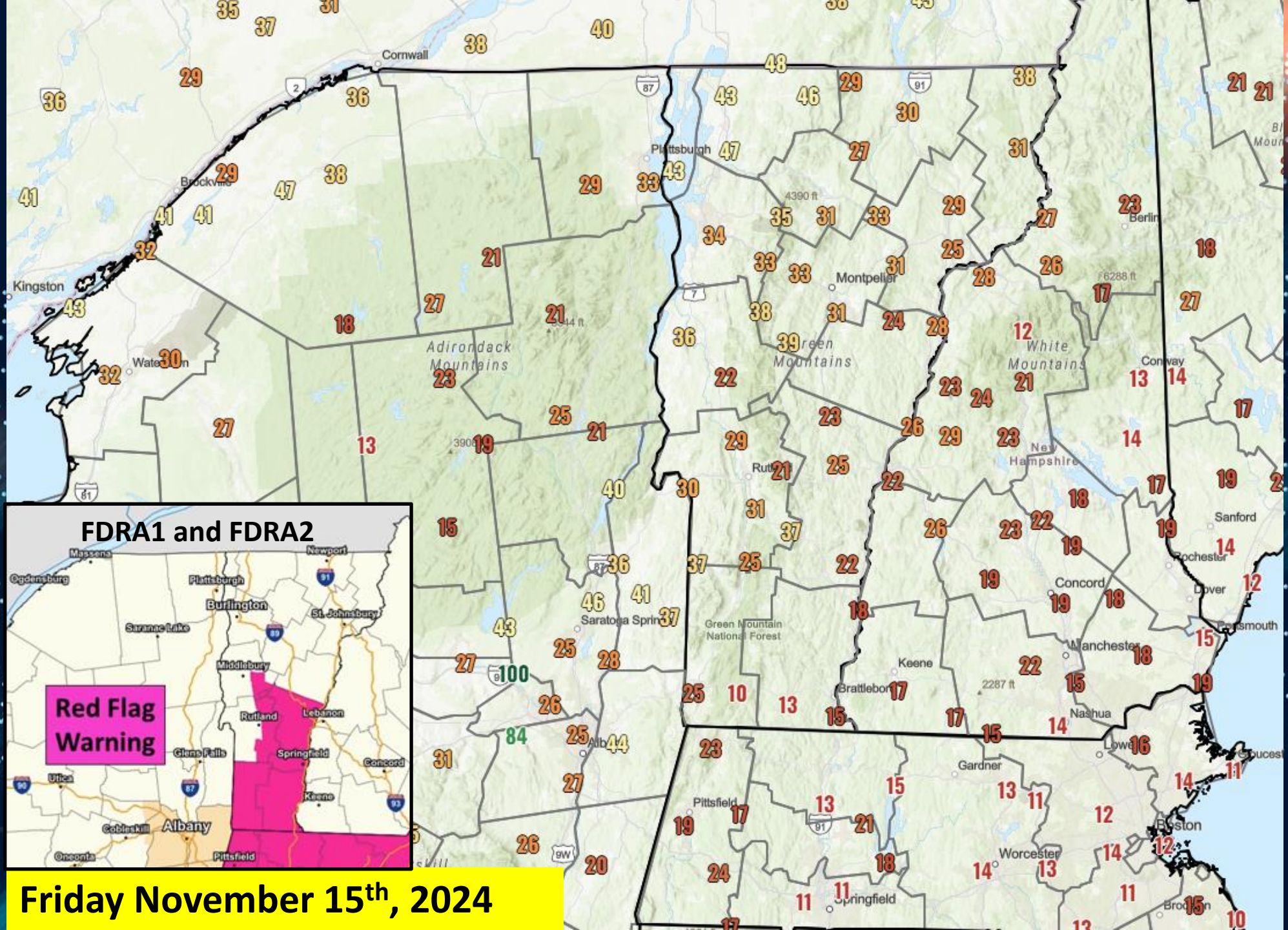
Winds and Relative Humidity:

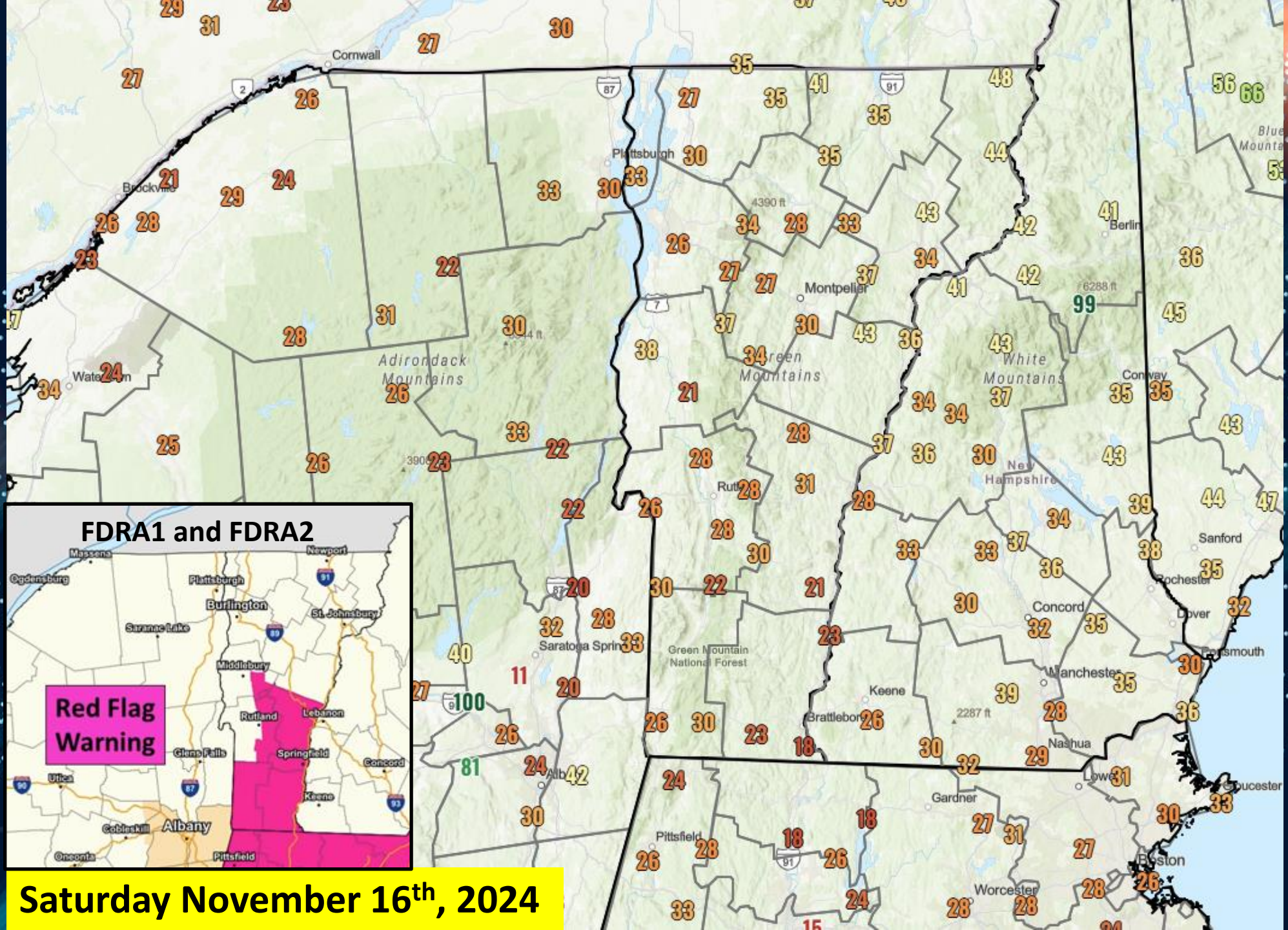
- Northwest winds 10 to 15 mph with gusts up to 30 mph
- Relative humidity values as low as 20 to 30%.

Remember: Burn bans remain in effect across all of New York and much of southern Vermont. Please avoid activities that could create a spark!

For more information, including the current fire danger rating and wildfire prevention, please visit your state forestry or environmental protection website.

- It's basically unheard for us to get Red Flag conditions in the fall as we typically have a wetter period of weather over the summer.
- The combination of very little rainfall and fresh leaf litter led to the increased fire danger risk.
- When training office meteorologists, we always mention our secondary "fall peak" for fire weather concerns but last year was anomalously dry and active.
- Latest RFW prior to this year was issued in the month of May!





Any Questions or Comments?

