New York-Sponsored Winter Weather Projects

Dr. Nick Bassill

February 20th, 2025

WWE/PEAR Seminar Series

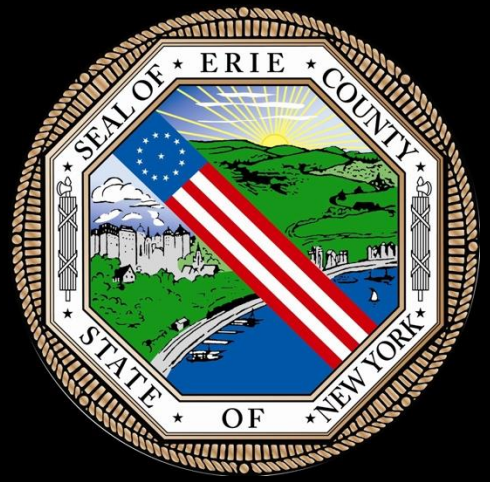
At right: Animation from the NYS Mesonet Dingens Thruway exit station during the 2022 Christmas Blizzard

NOTE: Presentation saved as PDF in the interest of space, so animations won't load when viewed here.

Contacts: nbassill@albany.edu, @NickPBassill

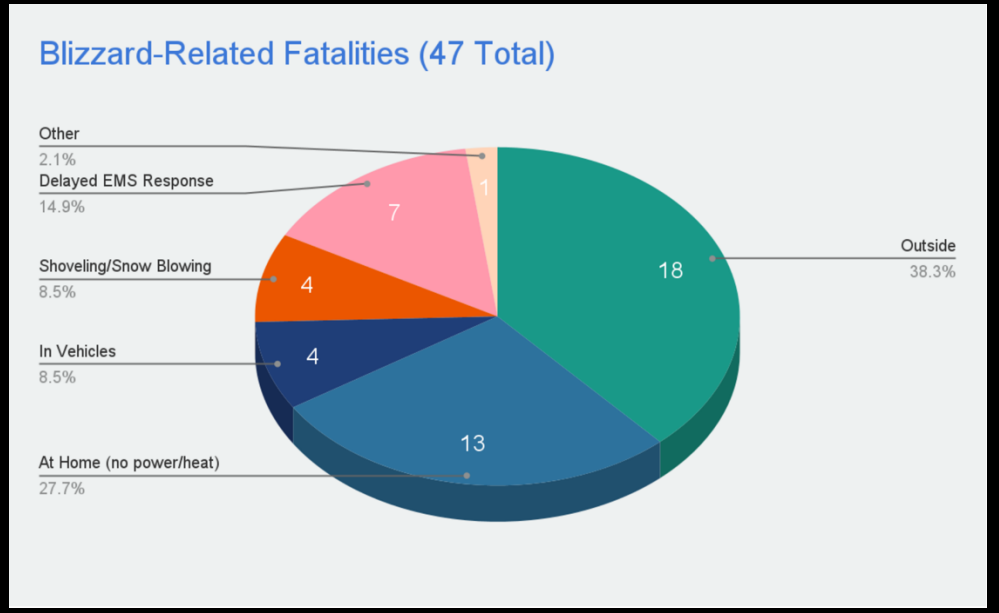
SWRCC Contacts: swrcc@albany.edu, @NYSWRCC

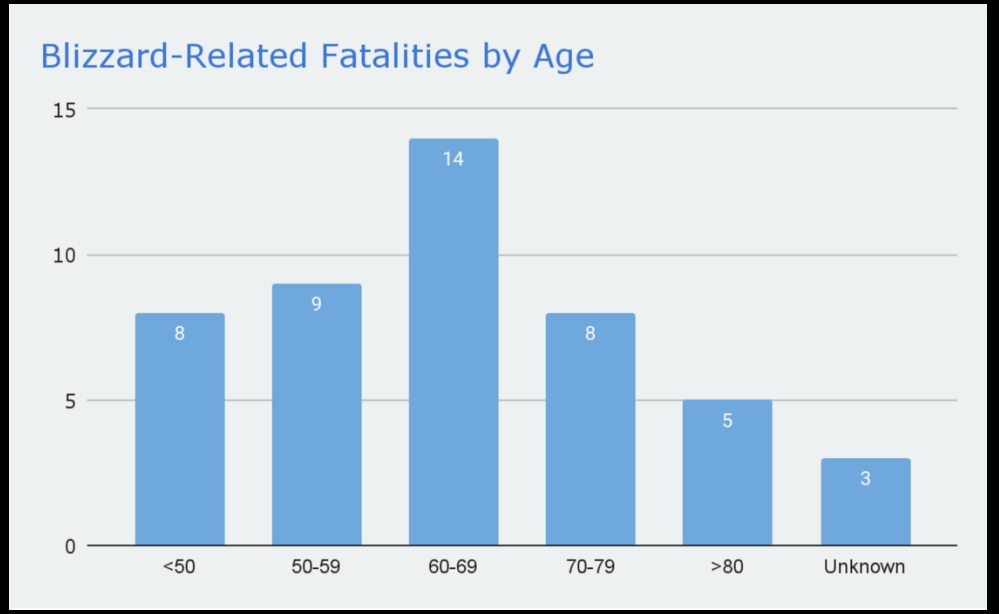
Erie County Winter Storm Scale Project



Motivation

- Several non-weather datasets not included in the WSSI
  - Socioeconomic factors (population & housing characteristics)
  - Road networks
  - Critical infrastructure
- An enhancement could help the end user better understand impacts to these
- Buffalo Blizzard (23-27 Dec. 2022, 47 deaths) reinvigorated push for better preparation, communication, & response to high-impact winter storms
- Erie County leaders expressed desire for a forecast tool that highlights impacts to vulnerable populations & infrastructure
- WSSI provides great starting point for such a tool



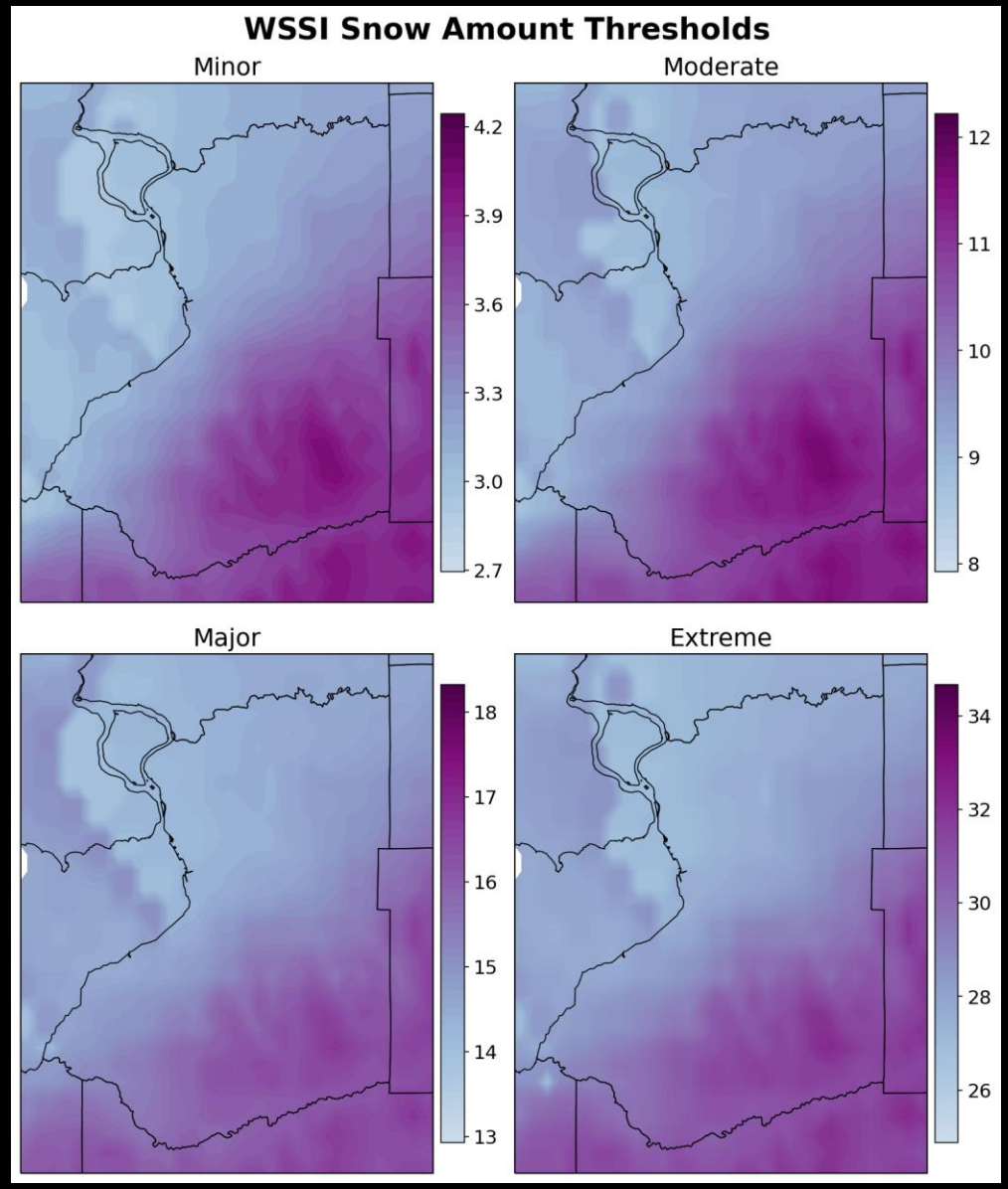


2022 Buffalo Blizzard fatalities by cause (top) and age (bottom). (NWS Eastern, 2023)

***Slide adapted from one created by Matt Seymour**

Data

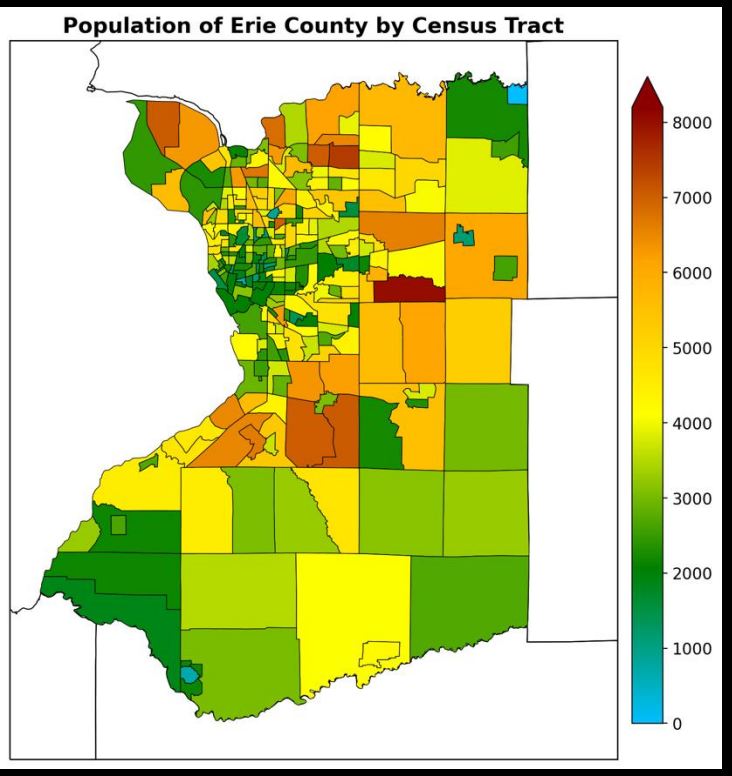
- WSSI snow threshold values
  - ~2.5-km resolution
- NWS snow forecasts
  - 11/1 to 3/31, 2020-21 to 2023-24
  - 72-hour forecast, beginning at 12 UTC
  - Data reprojected to match WSSI grid
- Socioeconomic, infrastructural, and geographic datasets
  - Population & housing characteristics, road networks, *traffic data*,* CDC Social Vulnerability Index, locations of hospitals & nursing homes, elevation, …

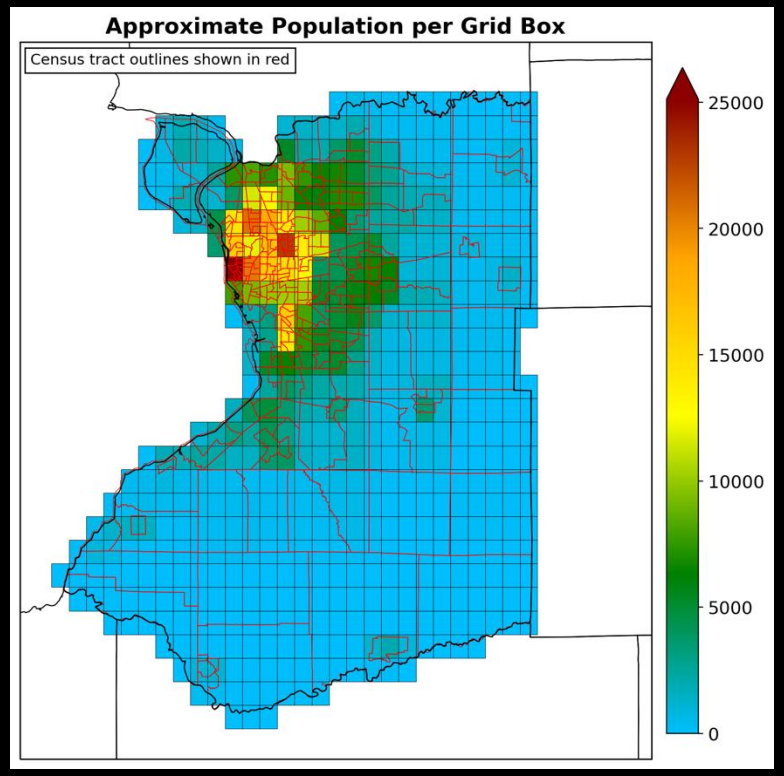


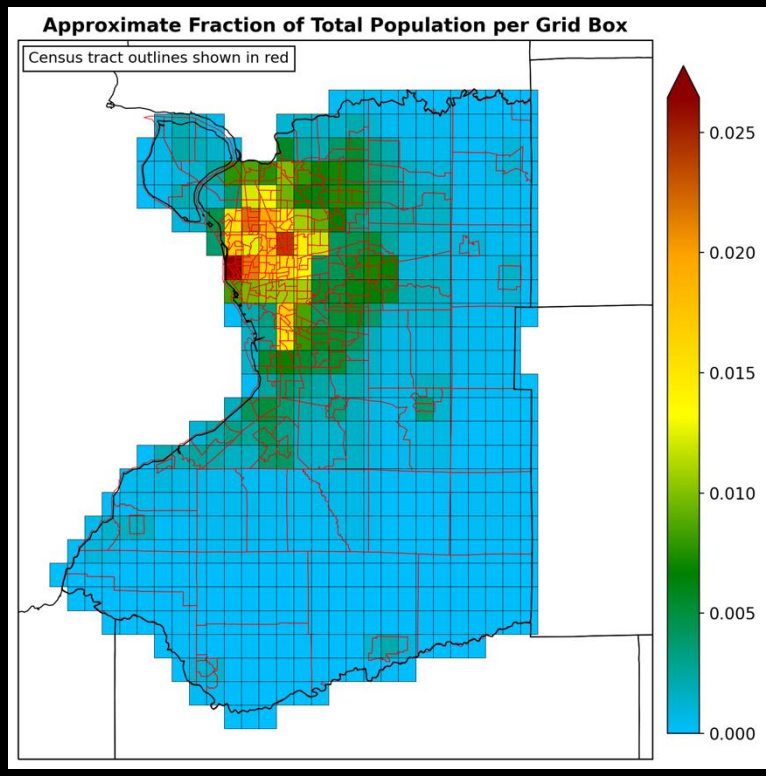
***Slide adapted from one created by Matt Seymour**

Methodology

- Transform census-tract data into a grid identical to that of the WSSI
- Normalize population
  - Divide each box's population by total population of Erie County



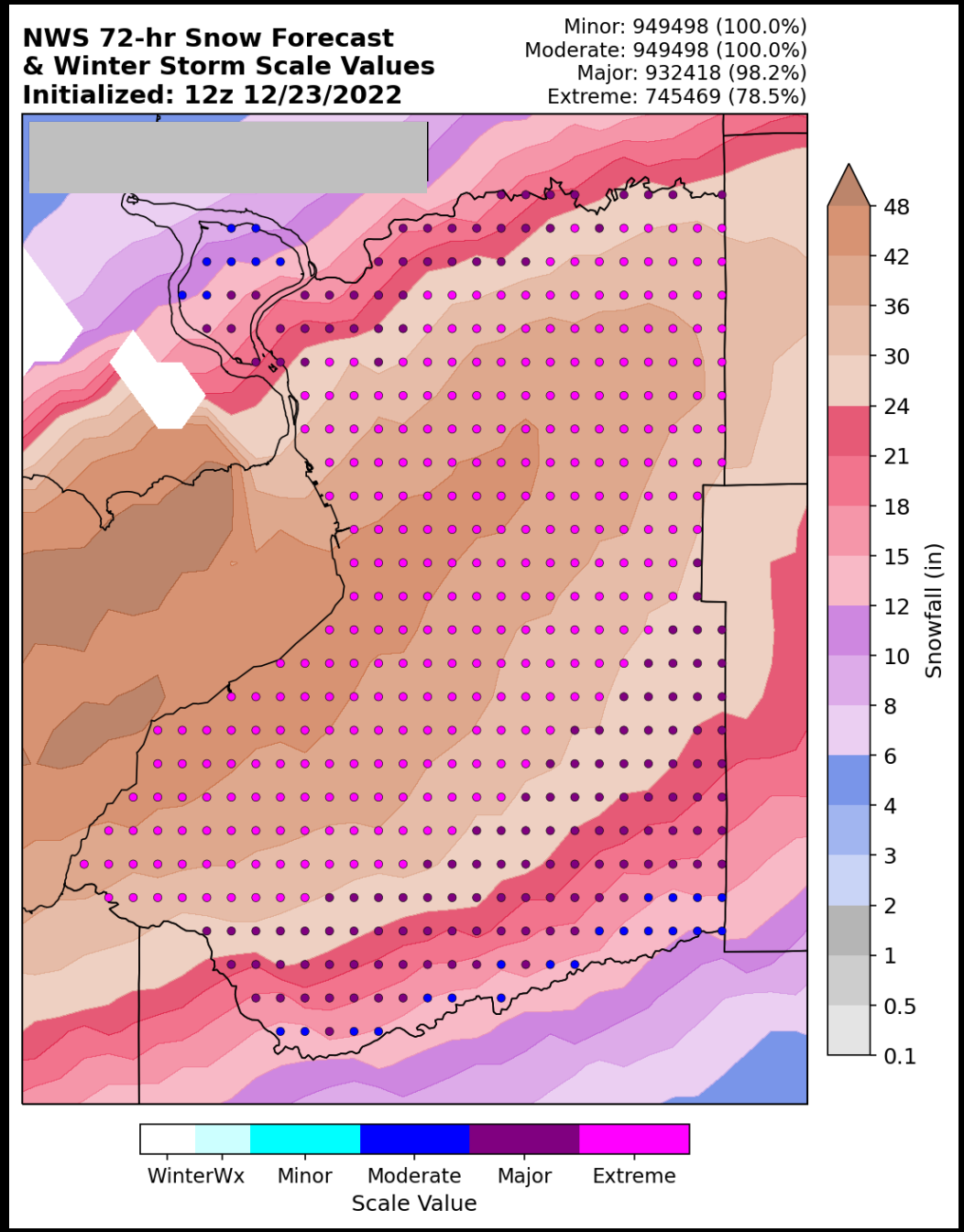




*Slide adapted from one created by Matt Seymour

Methodology

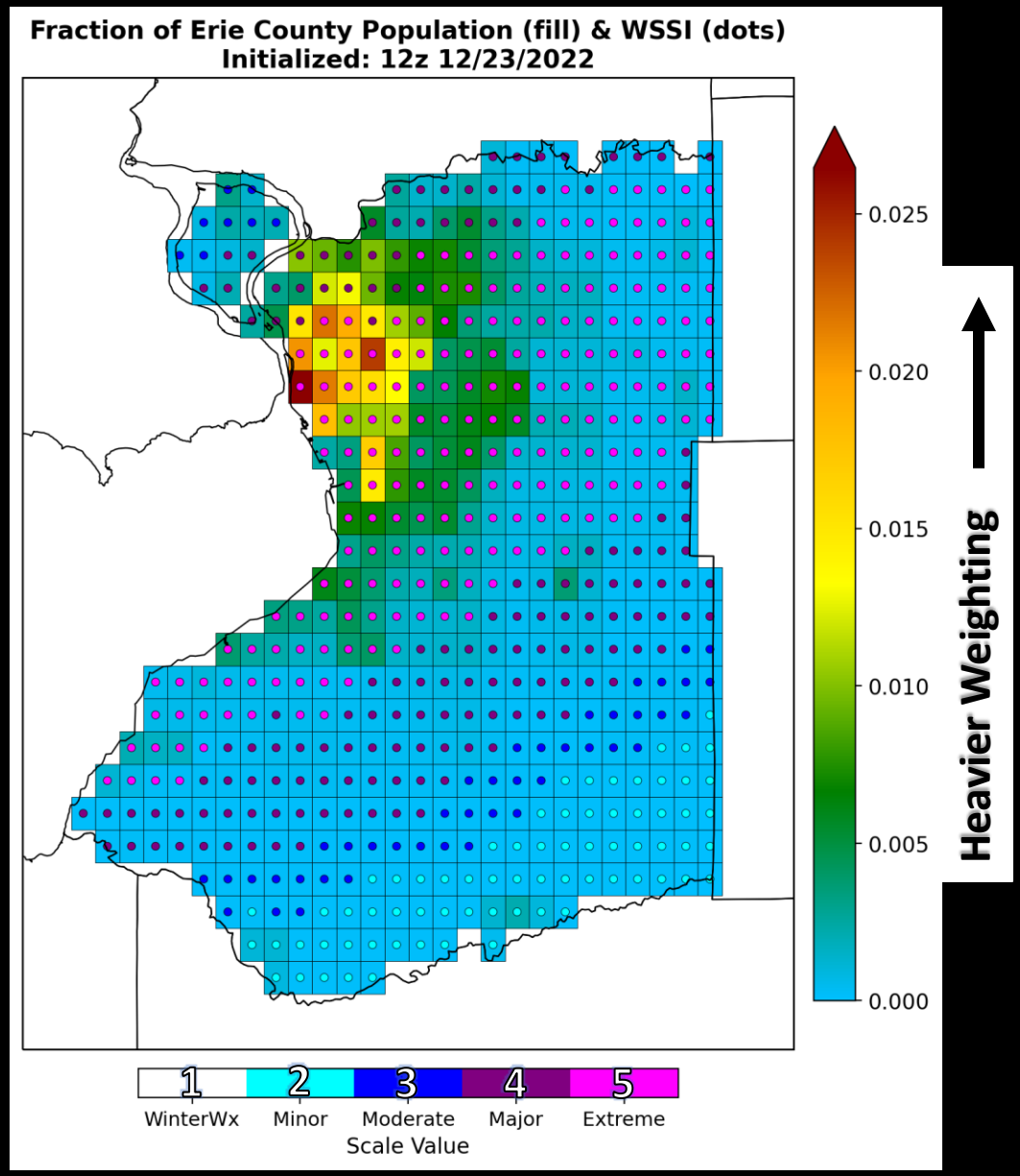
- For each day's snow forecast, assign impact level based on WSSI snow threshold
  - Example from 12/23/2022 (Buffalo Blizzard) →
  - Numbers in top right are number and % of Erie Co.'s population is in each WSSI category



*Slide adapted from one created by Matt Seymour

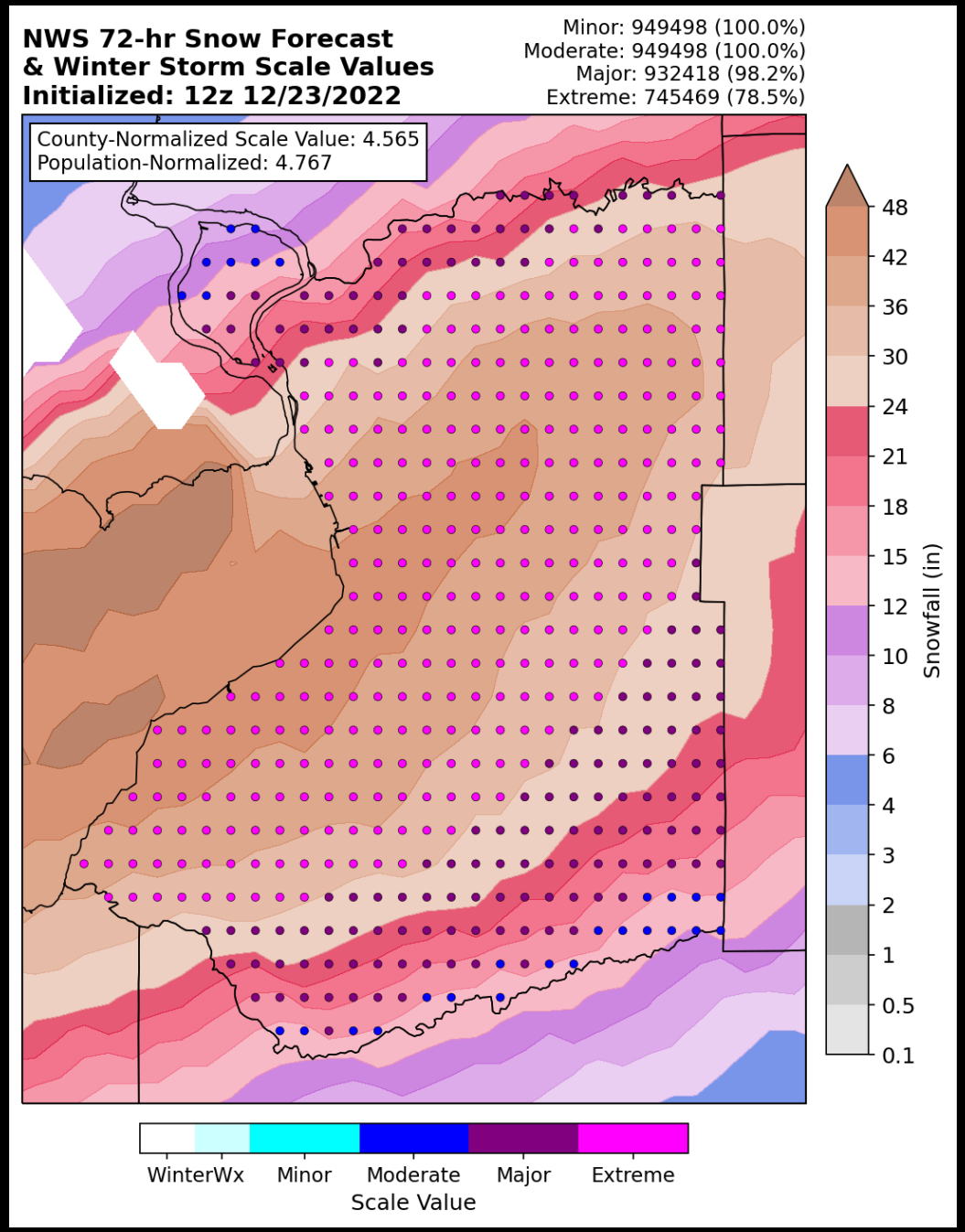
Methodology

- Calculate county- and population-normalized scale values for the county
  - Based on impact level at each point, translated to 0-5 scale
  - Population-normalized weights each box based on fraction of total pop. in each box
  - County-normalized weights each box equally
  - Multiply each box's impact level by its weight, then sum the results for all boxes to get the scale value



*Slide adapted from one created by Matt Seymour

Example:

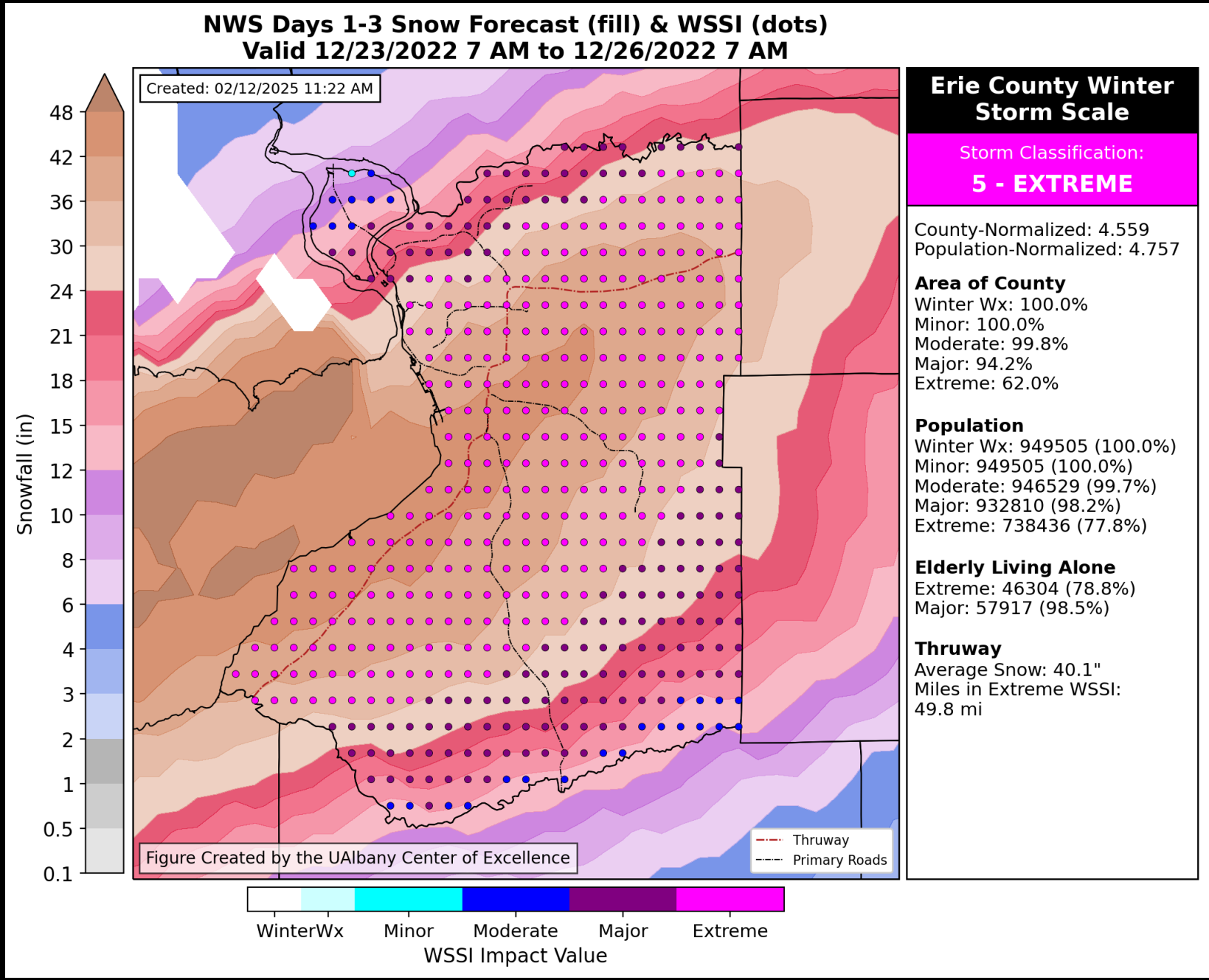


*Slide adapted from one created by Matt Seymour

Retrospective

"Storm Classification" based on two metrics:

- Population-normalized scale value percentile, based on data from past 4 winters + current season to date
  - 75th percentile = 2 ("Minor")
  - 90th = 3 ("Moderate")
  - 96th = 4 ("Major")
  - 99.2nd = 5 ("Extreme")
- >25% of the county being covered by X amount of snow
  - 0.1" = 1 ("Minimal")
  - 4" = 2 ("Minor")
  - 9" = 3 ("Moderate")
  - 18" = 4 ("Major")
  - 36" = 5 ("Extreme")



*Slide adapted from one created by Matt Seymour

“Live”

“Storm Classification” based on two metrics:

- Population-normalized scale value percentile, based on data from past 4 winters + current season to date
  - 75th percentile = 2 (“Minor”)
  - 90th = 3 (“Moderate”)
  - 96th = 4 (“Major”)
  - 99.2nd = 5 (“Extreme”)
- >25% of the county being covered by X amount of snow
  - 0.1” = 1 (“Minimal”)
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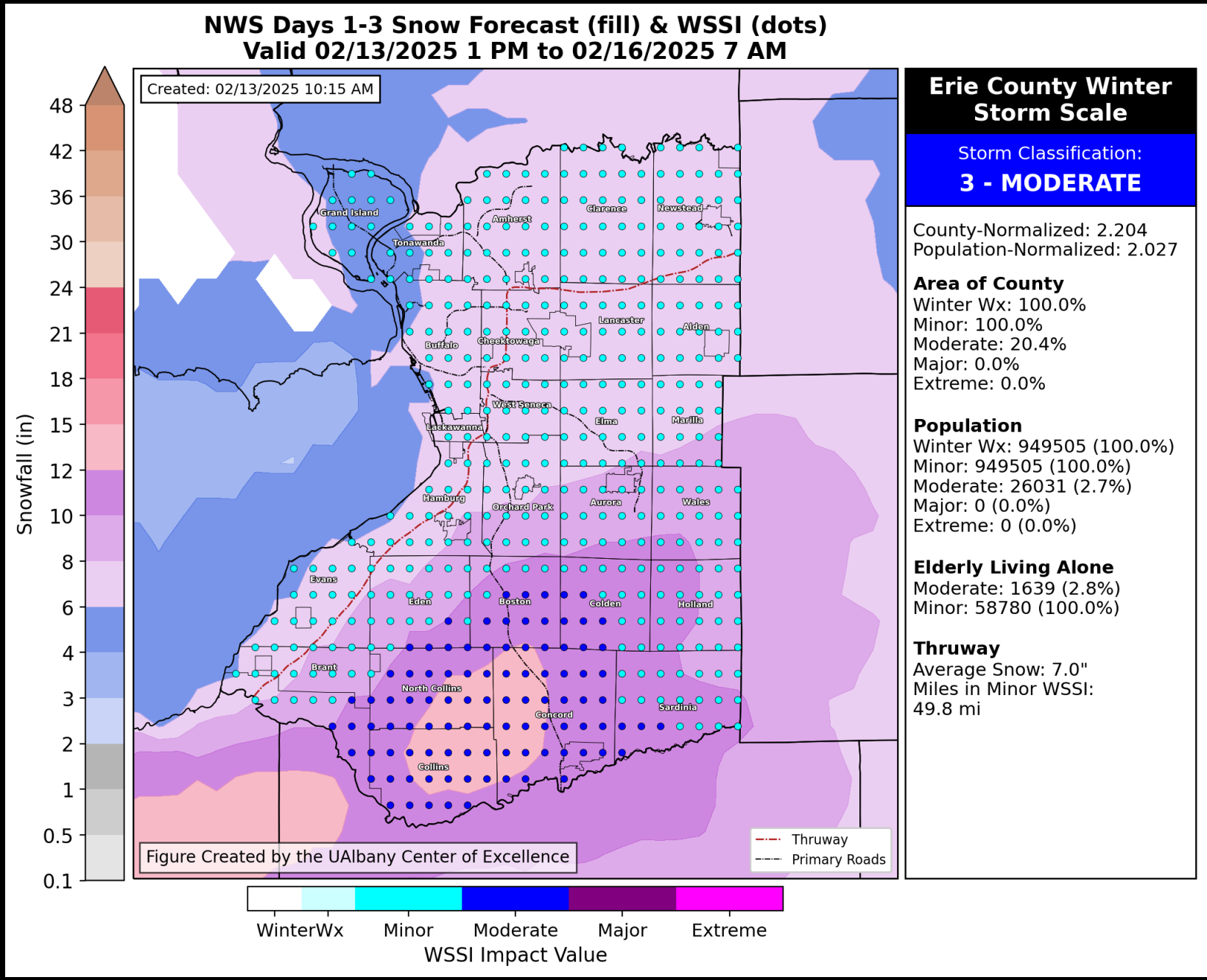
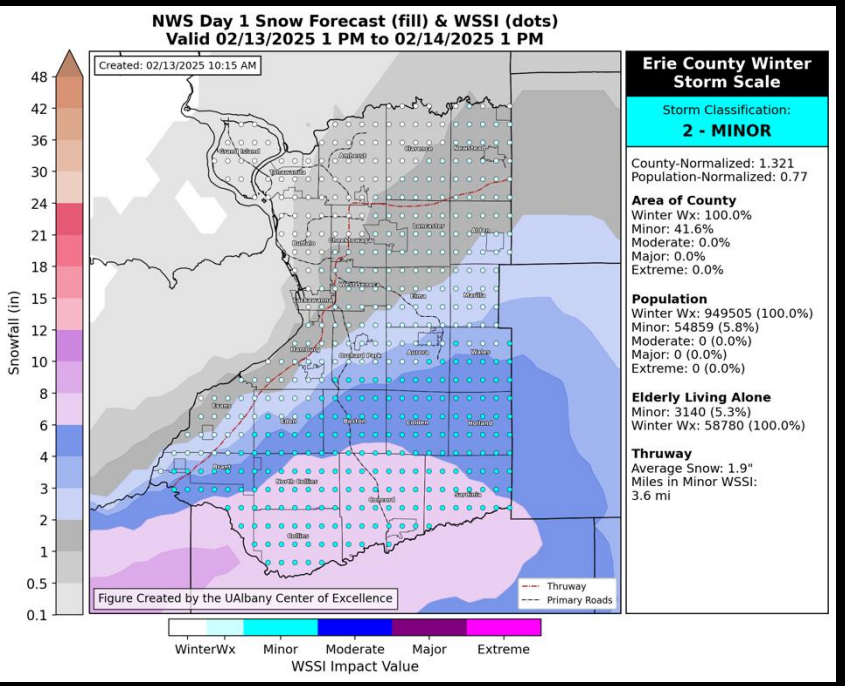
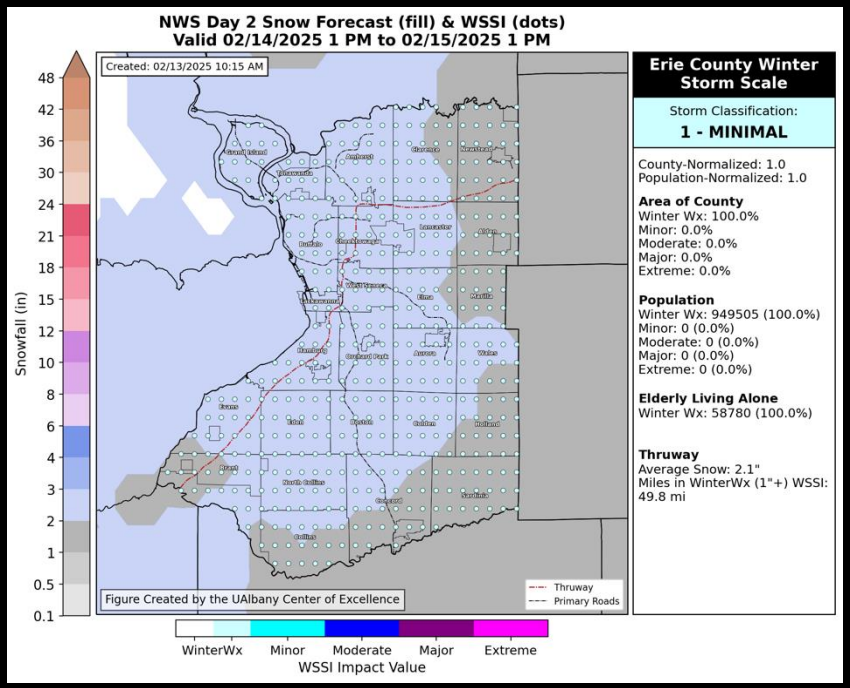


*Slide adapted from one created by Matt Seymour

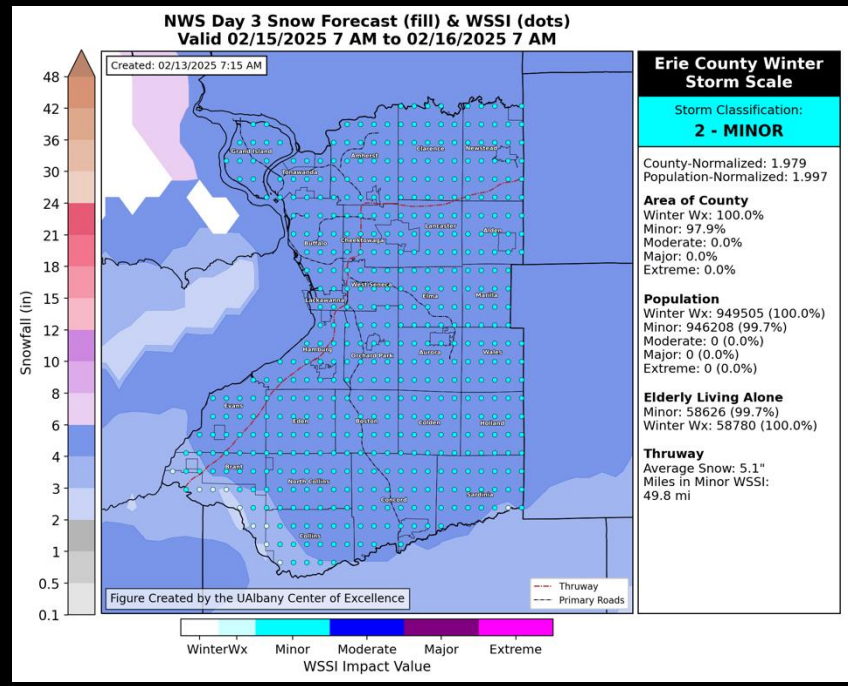
Day-by-Day



Day 1

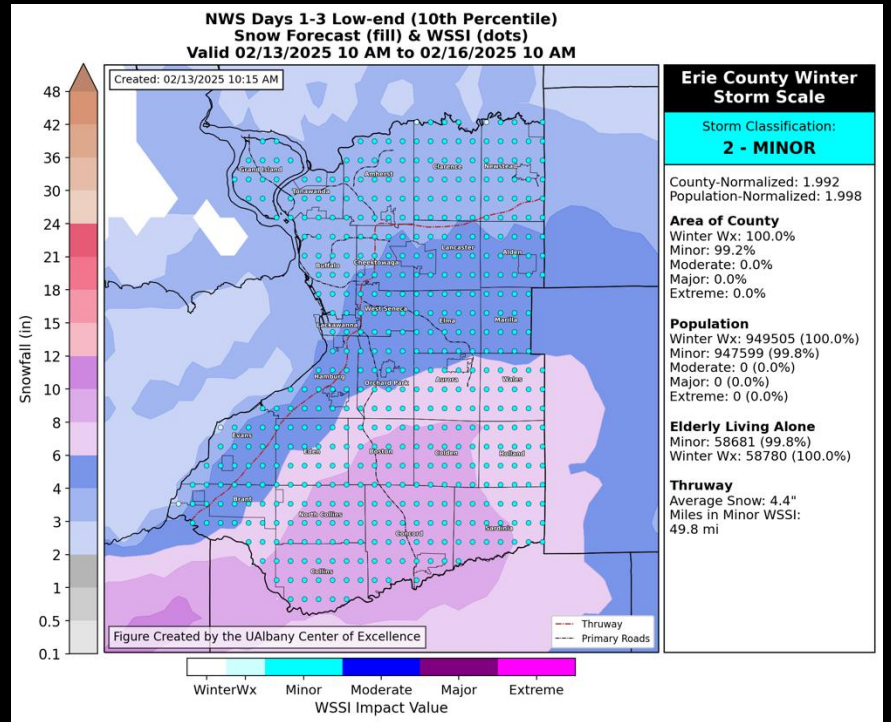


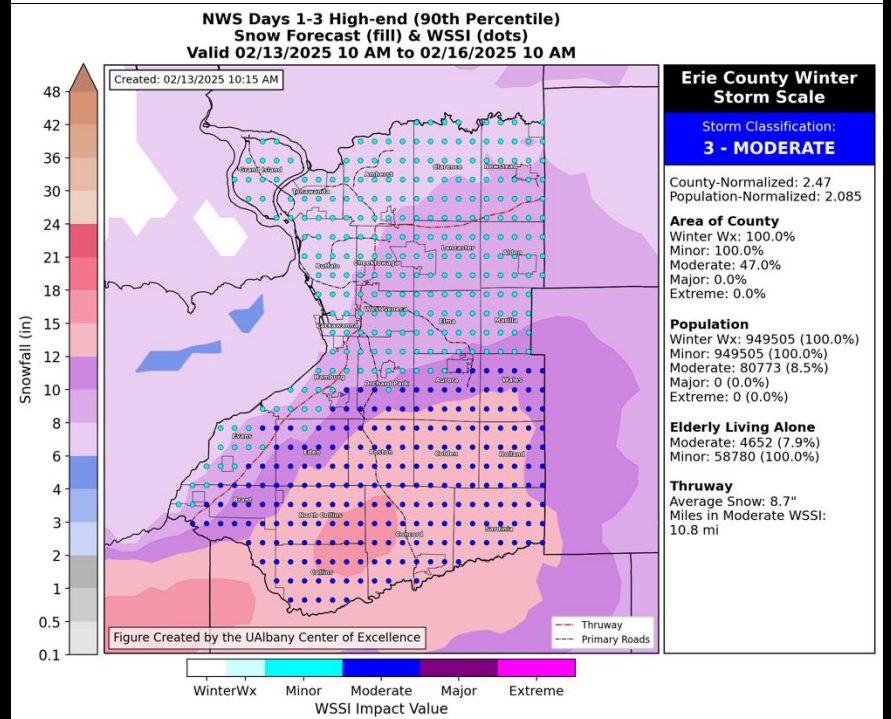
Day 2



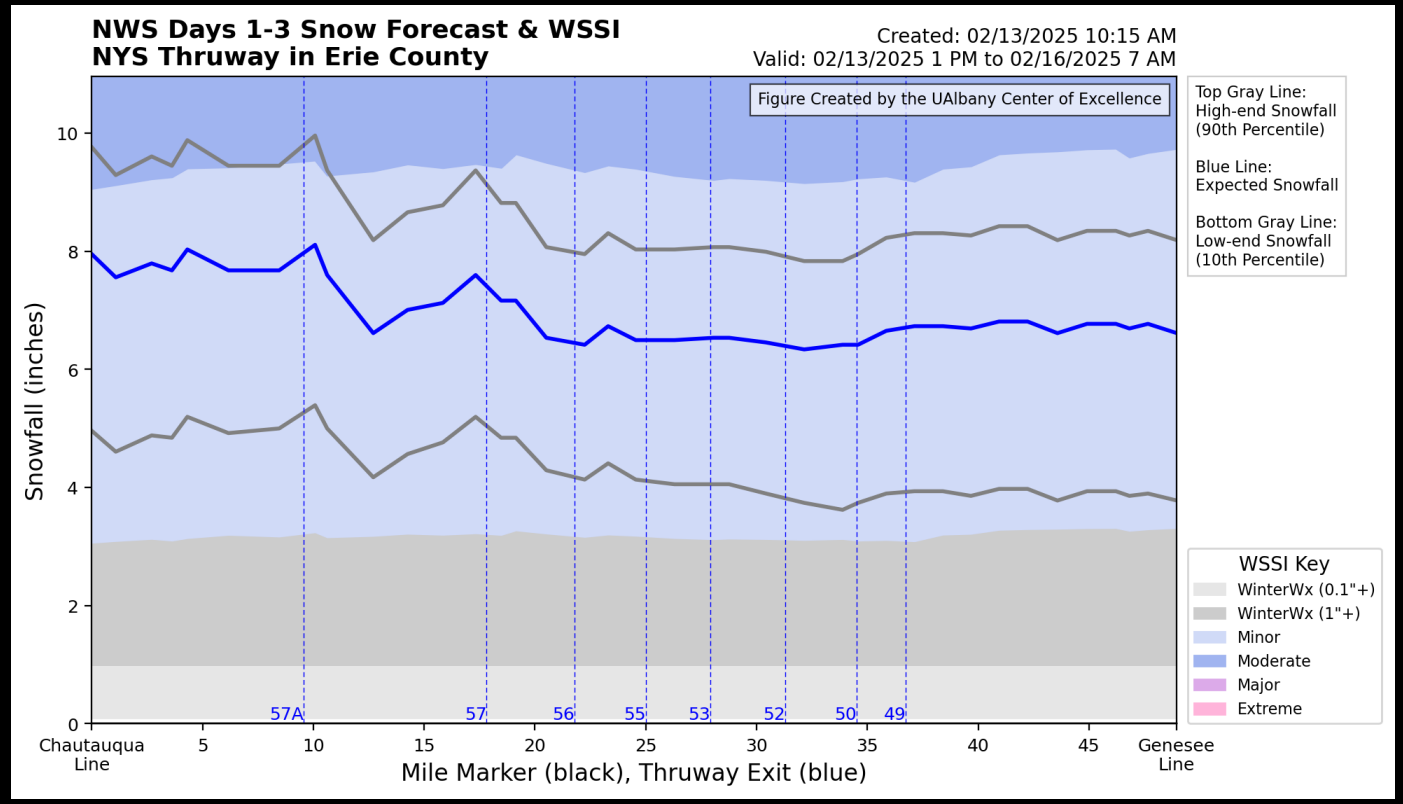
Day 3

*Slide adapted from one created by Matt Seymour





← 10th and 90th percentile snow forecasts

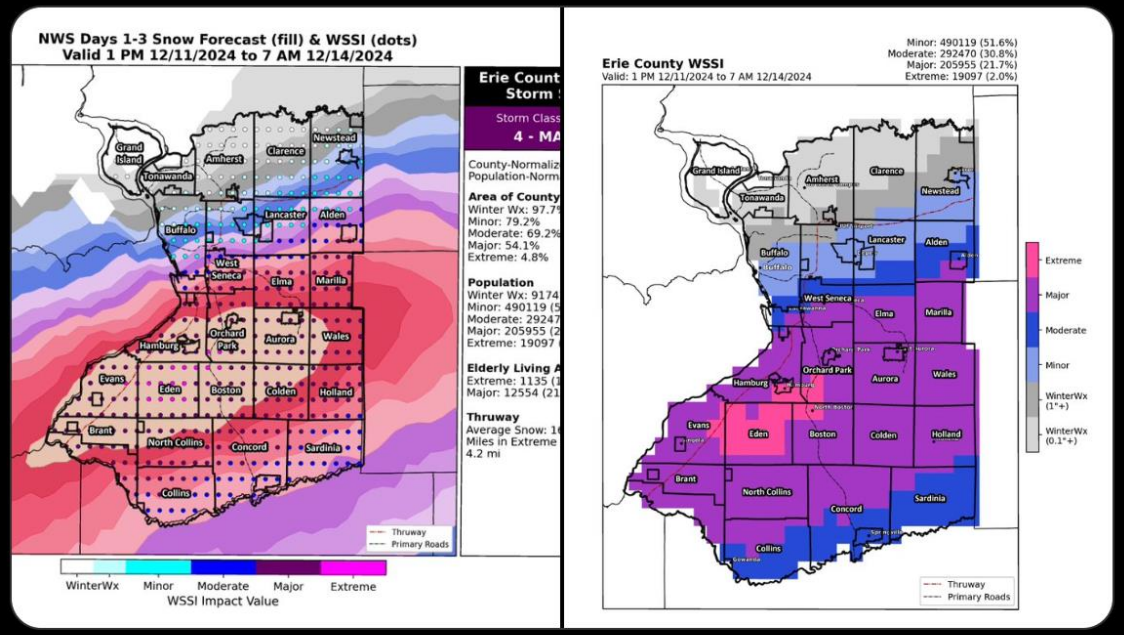


Snow forecast probabilities along Thruway with WSSI (work in progress)

***Slide adapted from one created by Matt Seymour**

Mark Poloncarz
@markpoloncarz

1 of 2: I asked our @ErieCoDEP GIS Office to come up with a similar map regarding storm snow totals that I hand drew on my computer yesterday. Using data obtained from the NYS Weather Risk Center at UAlbany, the office produced the below snow total and storm severity map.

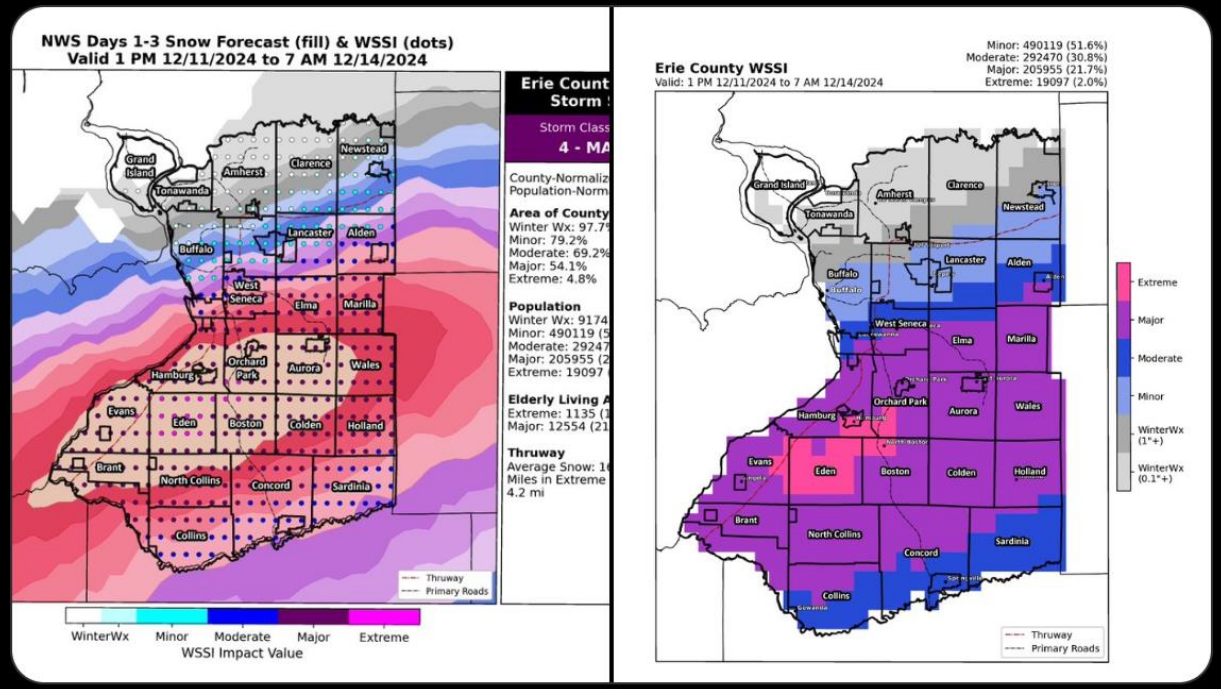


1:35 PM · Dec 11, 2024 · **42.5K** Views

27 24 129 13

Mark Poloncarz
@markpoloncarz

2 of 2: Great job by all on the maps. These really show the storm totals in great detail by municipality and how just a few miles can make a big difference between a few inches or a foot or more.



1:35 PM · Dec 11, 2024 · **10.7K** Views

10 2 20

2015-present:

New York State Mesonet

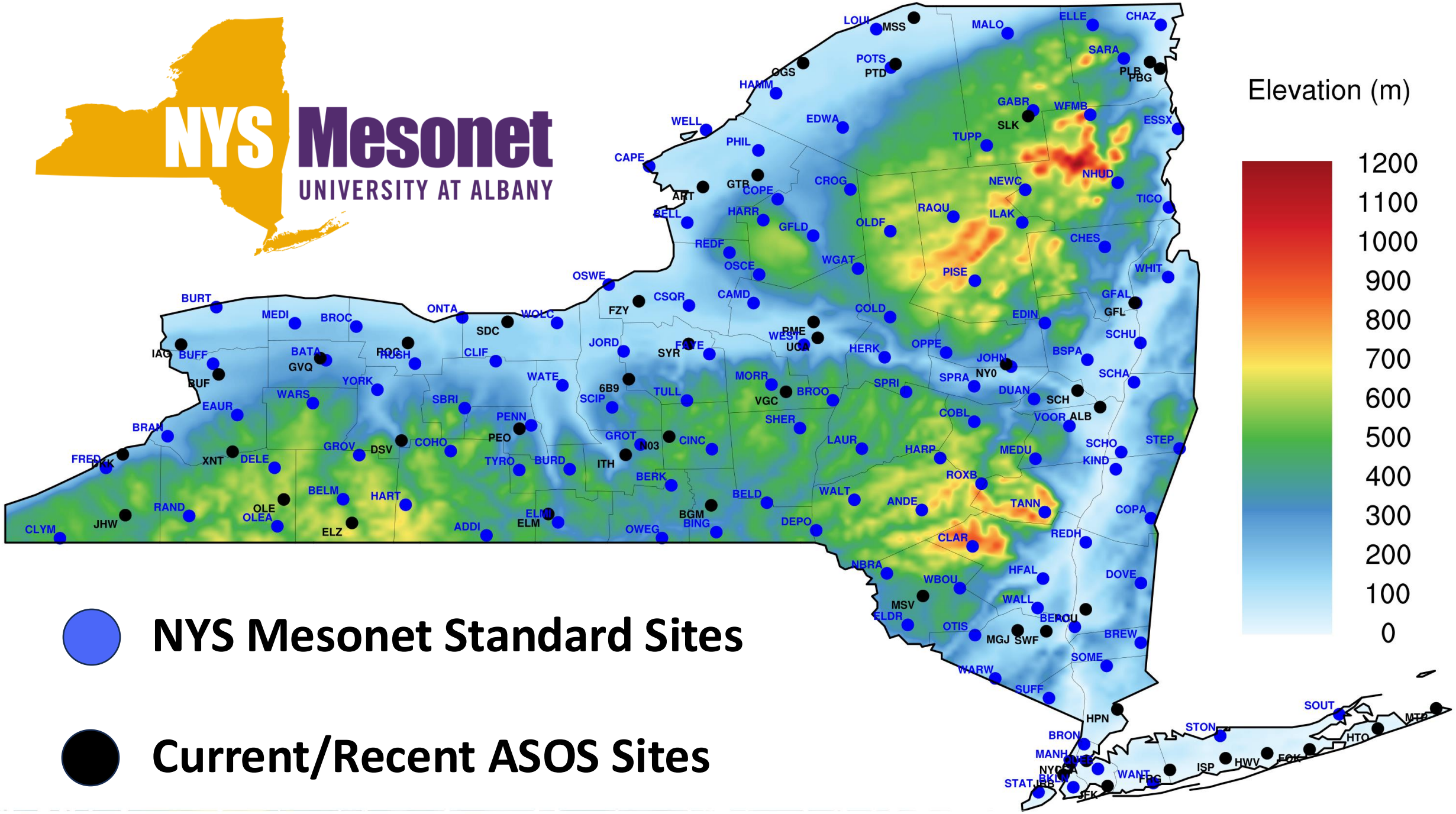
NYS Mesonet
UNIVERSITY AT ALBANY

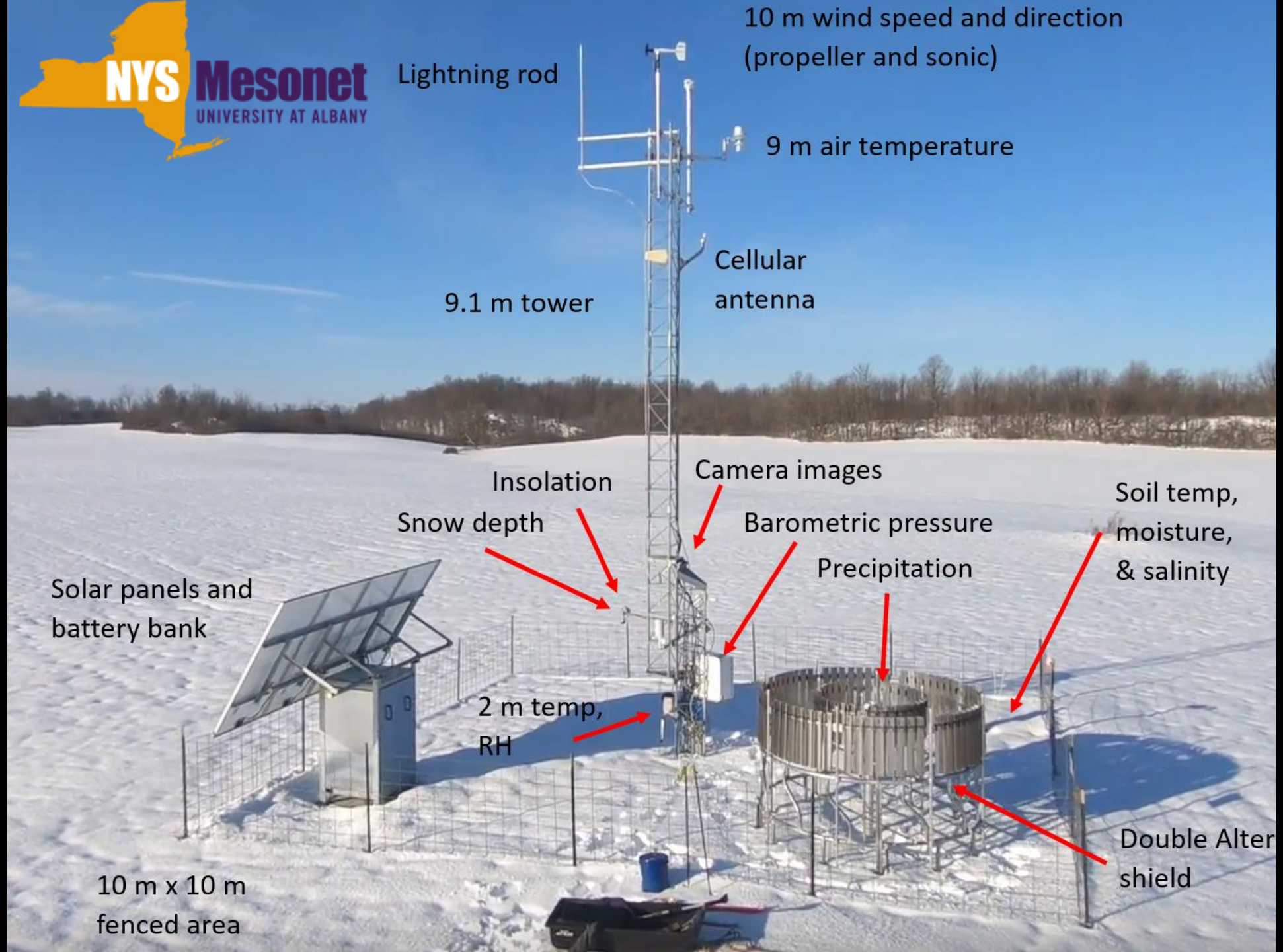
https://nysmesonet.org

NYS Mesonet

- $30M network conceived after Hurricane Irene (2011) and ***federally*** funded after Hurricane Sandy (2012)
- All original sites installed between August 2015 and April 2018
- Network includes various sub-networks
  - **127 Standard sites**
  - **20 Snow sites**
  - **17 Profiler sites**
  - **17*+1* Flux sites**
  - ***12 Thruway sites***
  - ***17 ConEd micronet sites***
  - ***DOT Skyway sensor***
  - ***12 NYSERDA Solar sites***
- Data is collected every 5 minutes
- *Mostly* funded for emergency management

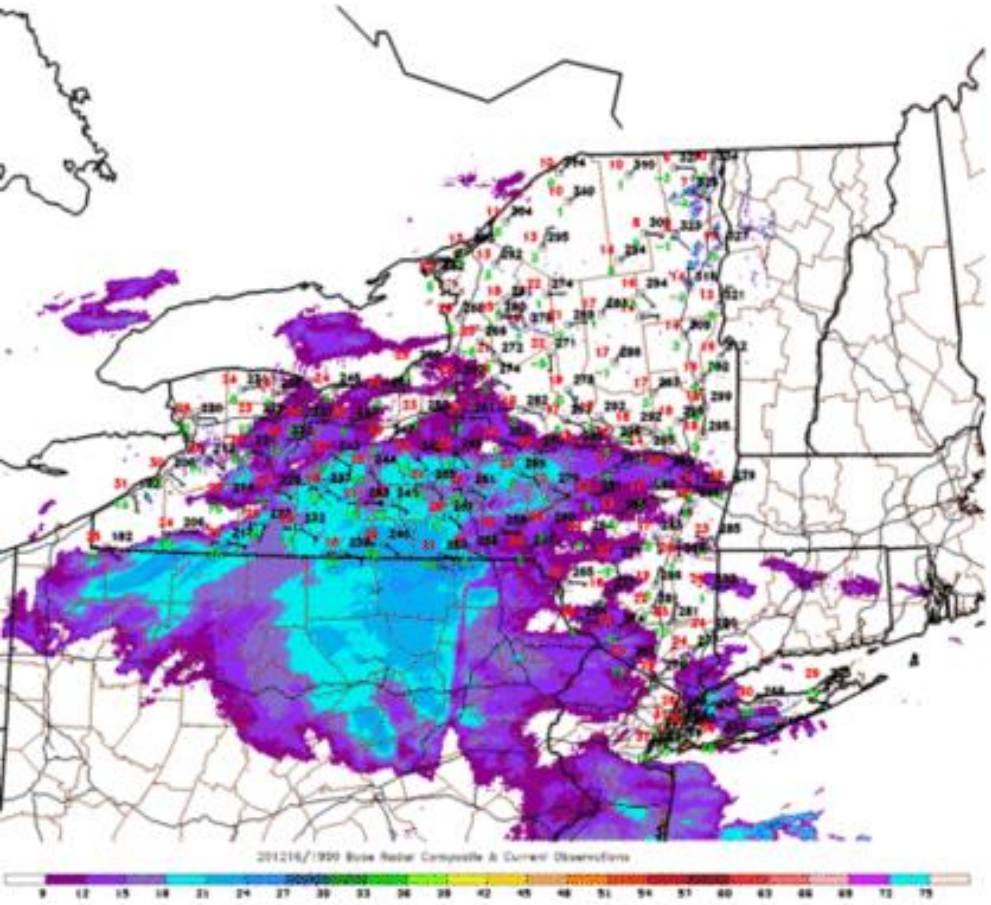
https://nysmesonet.org

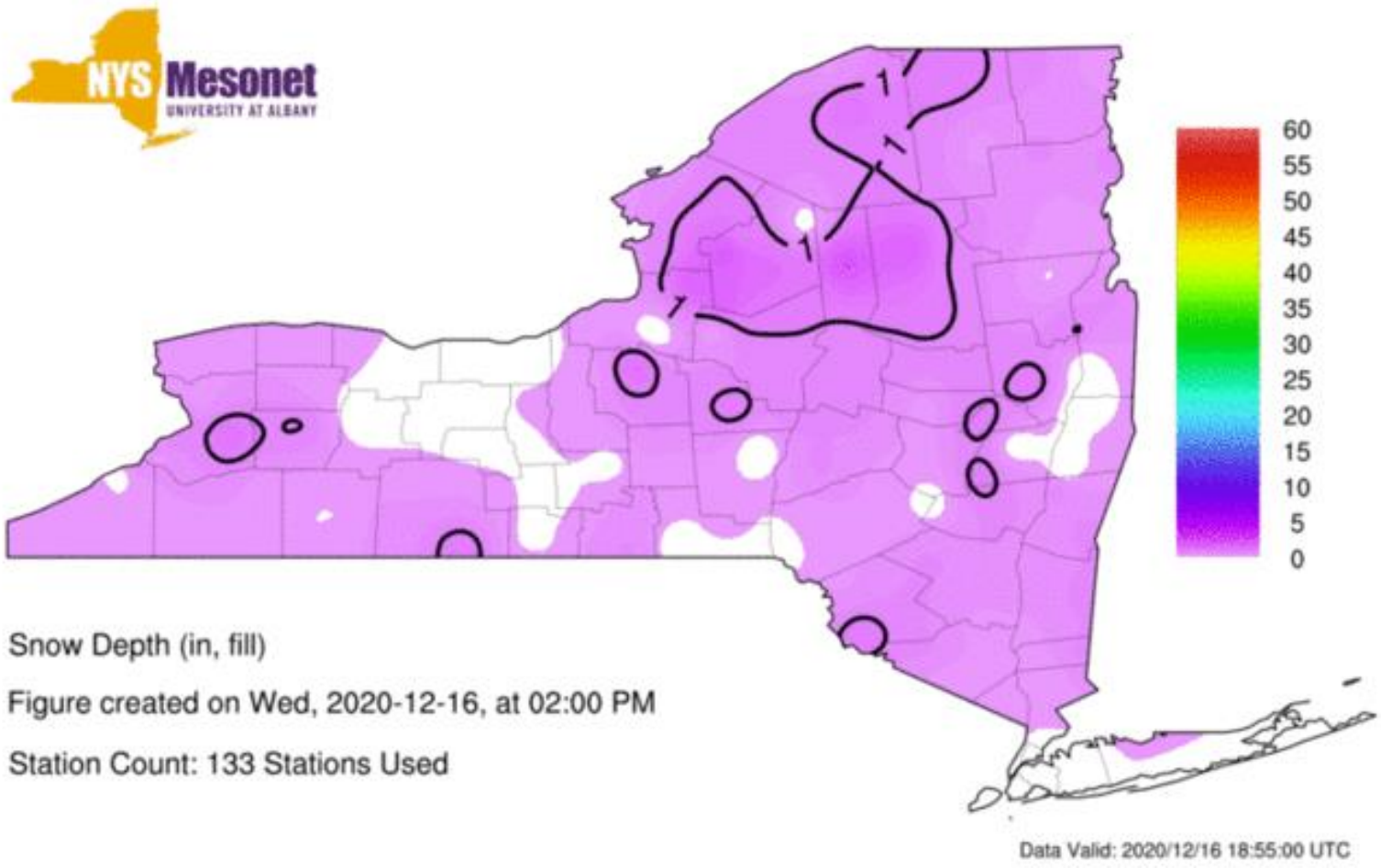

NYS Mesonet
UNIVERSITY AT ALBANY
Elevation (m)
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
NYS Mesonet Standard Sites
Current/Recent ASOS Sites


NYS Mesonet
UNIVERSITY AT ALBANY
Lightning rod
10 m wind speed and direction
(propeller and sonic)
9 m air temperature
Cellular
antenna
9.1 m tower
Insolation
Snow depth
Camera images
Barometric pressure
Precipitation
Soil temp,
moisture,
& salinity
Solar panels and
battery bank
2 m temp,
RH
Double Alter
shield
10 m x 10 m
fenced area

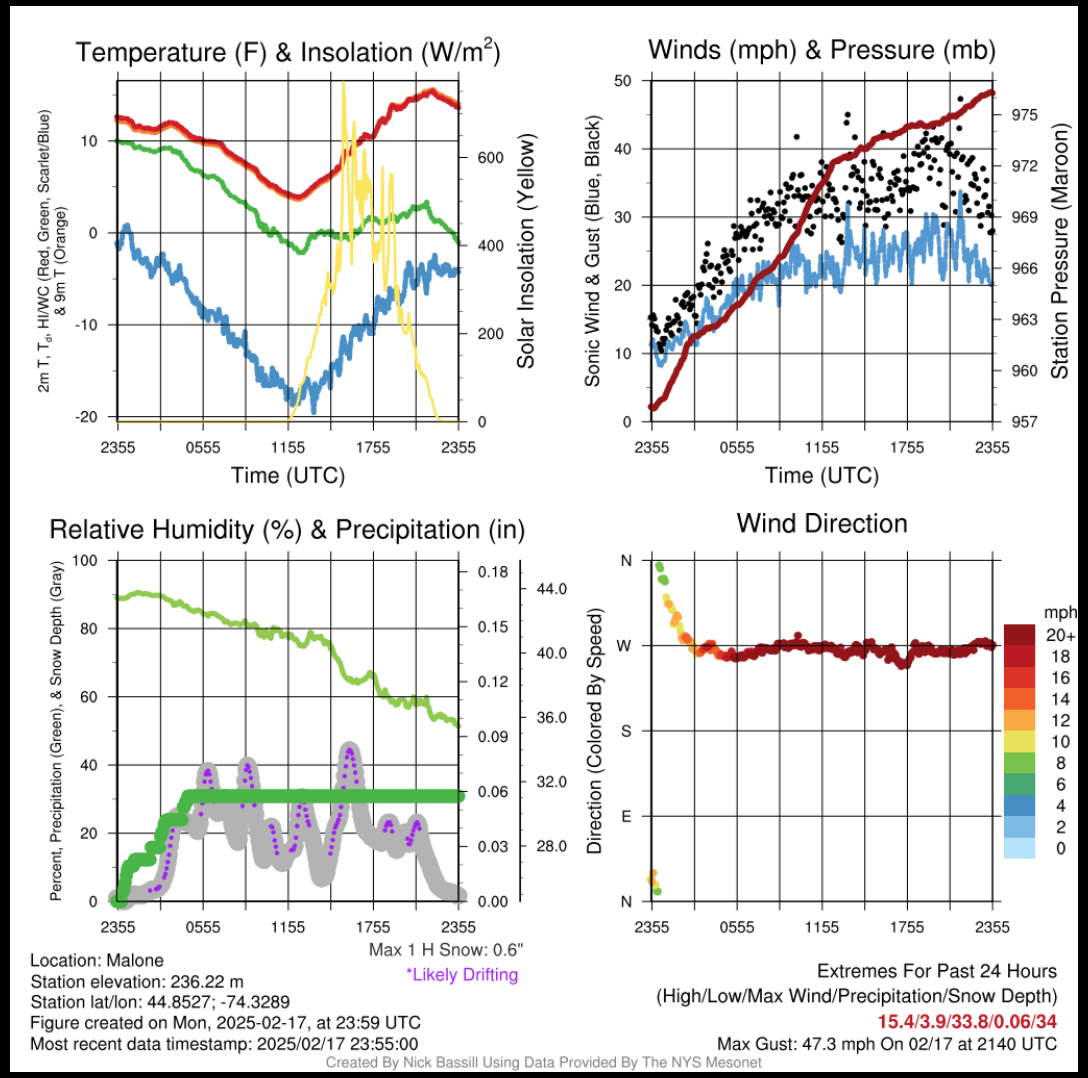
NYS Mesonet Data In Action

December 16-17th, 2020
Real-time Snow Depth

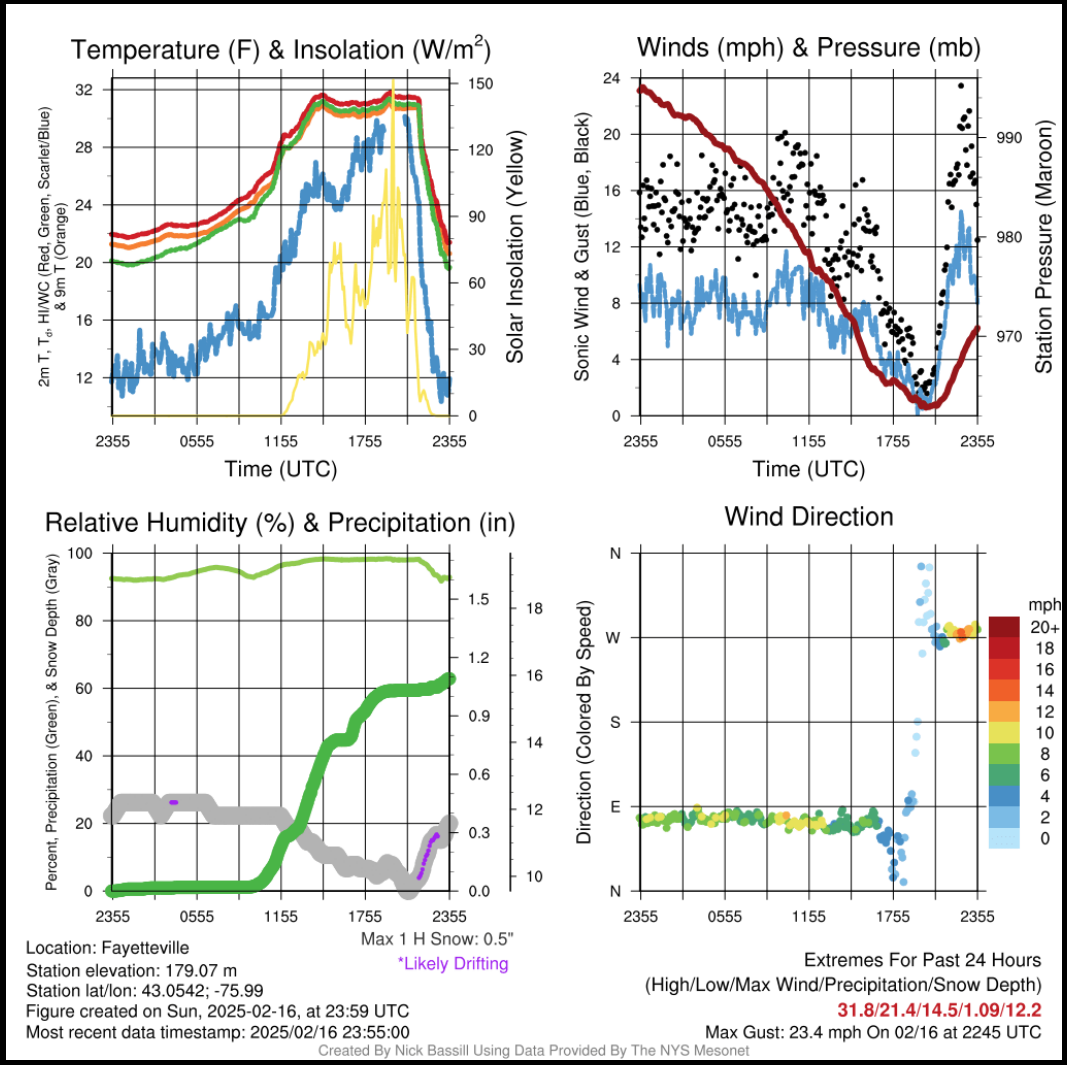


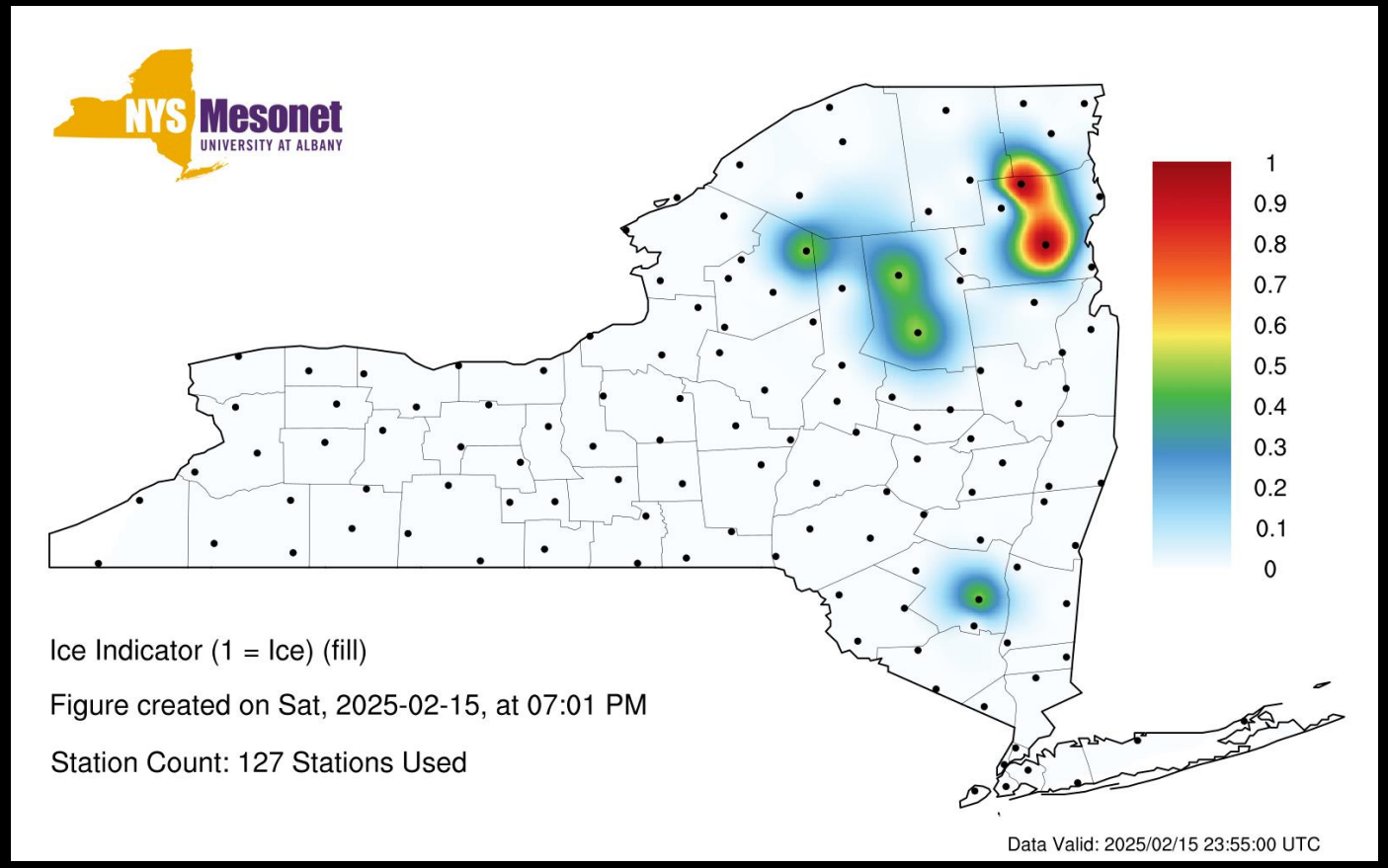


Snow Drifting



Freezing Rain





State Weather Risk Communication Center

- **$1.5M Recurring money from state, in Governor's Budget**
  - *"1.5 million for the State Weather Risk Communication Center at the University at Albany"**
- **Money mostly goes toward employees; expectation of 10 full-time employees and a rotating group of students/interns**
- **This new Center subsumes responsibilities of prior funded projects by DOT, Port Authority, DHSES, etc**

"Officially" announced December 7th, 2023
https://www.youtube.com/watch?v=aqaO-w6oOyQ

* https://www.budget.ny.gov/pubs/press/2024/fy25-executive-budget.html

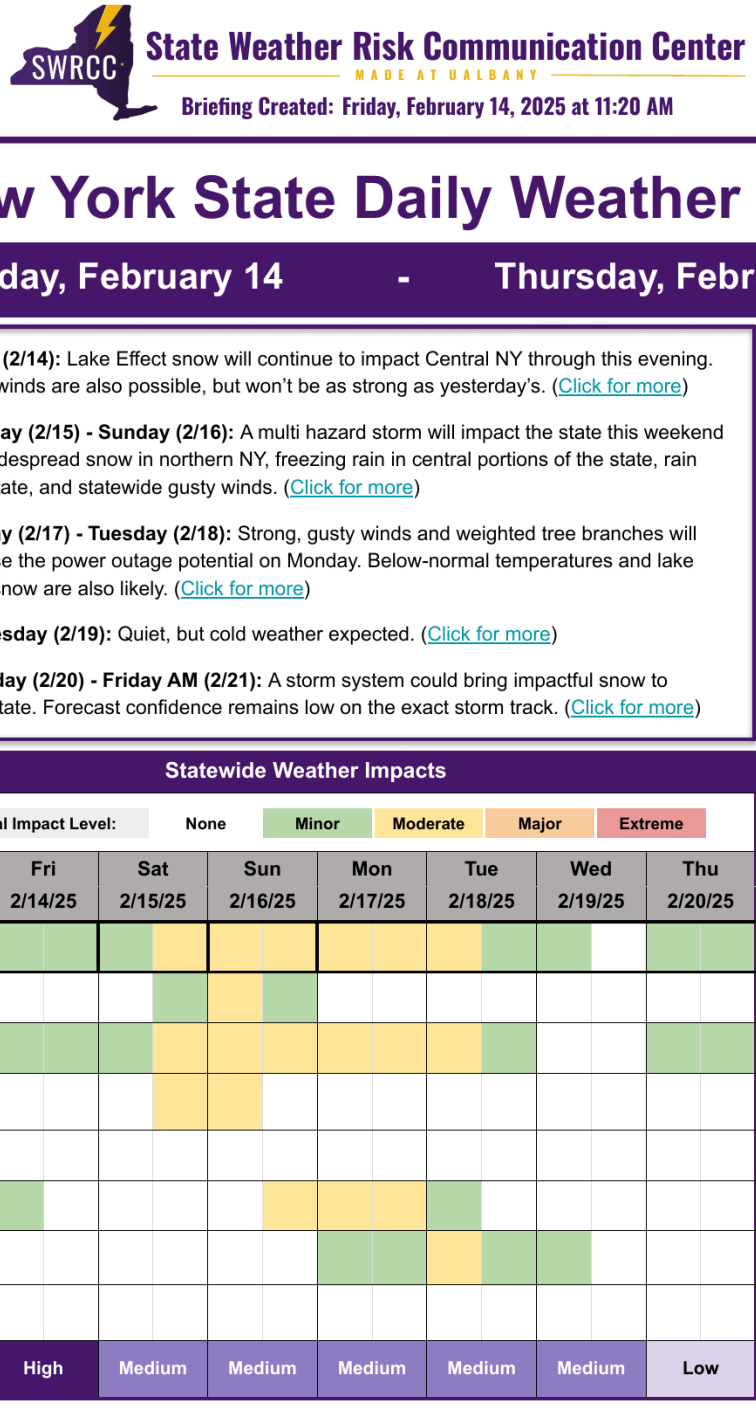
State Weather Risk Communication Center

Located entirely in UAlbany's ETEC building, this center is tasked with helping the state with a variety of weather needs:

- Detailed weather briefings & data/forecast interpretation
- Product development
- General weather reporting
- Developing weather-communication strategies
- Acquiring/interpreting datasets for research and other projects
- Training exercises
- Teaching skills via microcredentials

Note that the SWRCC is *not* designed to replace the National Weather Service!

SWRCC Contacts: swrcc@albany.edu, @NYSWRCC



Core weather briefings are "kitchen sink" daily briefings:

- Page 1 quick summary
- Detailed forecasts with worst-case scenarios where relevant
- Retrospective analysis (where relevant)
- Summaries of other important NY-centric info, such as:
  - River stages
  - Active NWS products
  - Tropical outlook
  - Space weather
  - Air quality
  - Climate outlooks
- Infographics as needed

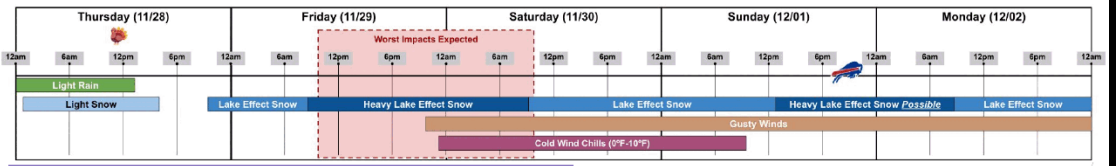
← Briefing is from the morning of February 14th

State Weather Risk Communication Center

MADE AT UALBANY

Briefing Created: Wednesday, November 27, 2024 at 11:05 AM

Department of Transportation: Region 5

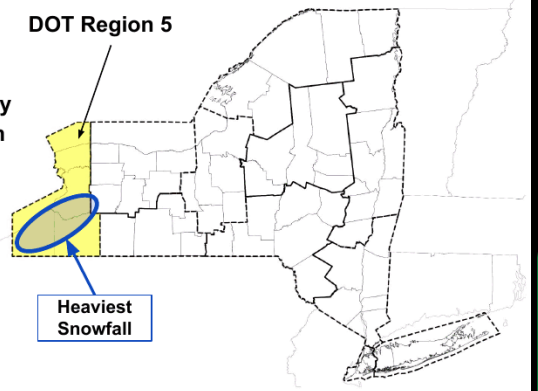


OVERVIEW

Snow: Lighter snow and rain is likely over the southern portions of Region 5 on Thursday. The **main concern will be Lake Effect Snow** which will begin overnight **Thursday into Friday**. Periods of heavy snow are expected **through the weekend and into Monday**.

Winds: Winds will increase Friday evening and remain gusty (**20-30 mph**) through early next week.

Temperatures: The coldest temperatures of the season thus far are expected **Friday night - Sunday morning**. Wind chills will likely be between 0ºF-15ºF across most of the region through the weekend.



SNOW FORECAST

This will be a longer duration snowfall, meaning snow totals will be high, but spread over multiple days.

Snowfall Amounts: Amounts have generally **trended up** for this region. Peak snowfall will likely occur in Chautauqua County, where amounts of **2 - 3 feet** is possible. Southern Erie and northwestern Cattaraugus County may see snowfall amounts of **1 - 2 feet**.

Snowfall Rates: Snowfall rates **may exceed 3"/hr**, this is most likely to occur in Chautauqua County Friday afternoon/Saturday. A storm average snowfall rate will likely be **1.0-2.0"/hr**.

- *Snowfall rates within a Lake Effect storm are highly dependent on how stationary the snowbands are.*

Thundersnow: While this would not increase impacts, the Lake Effect Snow may be strong enough to produce some thundersnow.

LOCATIONS

Thanksgiving Day Snow: Rain is expected along Lake Erie. Snow amounts over the Chautauqua Ridge will likely not exceed 1.0-2.0".

Lake Effect Snow: Most of the snow will be **south of Buffalo**. Snow will be heaviest in Chautauqua, southern Erie and northwestern Cattaraugus Counties.

IMPACTS

Transportation: Heavy snow will likely impact the Thruway along Lake Erie, this may cause significant travel disruptions due to this being the busiest travel week of the year. The **Monday morning commute** may also be impacted.

Visibility: Due to increased wind gusts Friday through Monday, blowing snow (**reduced visibility**) will be a concern for people travelling on roadways Friday through the start of next week.

Buffalo Bills Game: The heaviest snowfall is currently expected to be south of Orchard Park, **travel to/from the game may be impacted**.

Winter Impacts By Region

State Weather Risk Communication Center

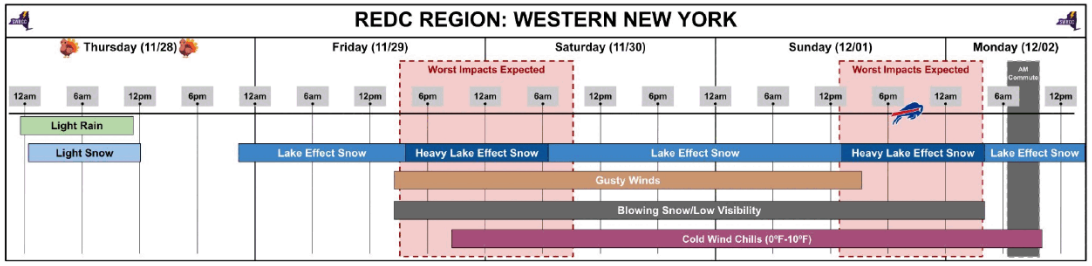
MADE AT UALBANY

Briefing Created: Wednesday, November 27, 2024 at 5:15 PM

Thanksgiving Week Travel for Western NY

LOW | MEDIUM | HIGH

Forecast Confidence



OVERVIEW

The **Thanksgiving Day storm** may only bring light snowfall to the southern portions of Western NY. The main concern will be heavy **Lake Effect Snow** Friday through early next week. The heaviest snow will likely be over Chautauqua, southern Erie and northwestern Cattaraugus Counties.

THANKSGIVING STORM

- **Snowfall Totals: 1.0-3.0"** is possible over the Chautauqua Ridge and Allegany County.

Impacts: Slick roads and reduced visibility are possible. Impacts will mainly be in the higher terrain well east of the Thruway.

NWS ALERTS

Winter Storm Watch	Northern Erie	Thursday Morning	to	Friday Morning
Lake Effect Snow Warning	Southern Erie, Chautauqua, Cattaraugus	Friday Morning	to	Monday Evening

This is the first Lake Effect Warning issued for Chautauqua & Cattaraugus *Counties since Nov. 28, 2024. This is the first for Southern Erie since Jan. 17, 2024.*

LAKE EFFECT SNOW

Notable snowfall totals are expected, though it will likely be spread over multiple days. The heaviest snow is expected to occur Friday evening though Saturday morning. An additional period of heavy snow is possible Sunday afternoon/evening.

- **Snowfall Totals:** Peak snowfall totals in Chautauqua, southern Erie and northwestern Cattaraugus Counties will likely reach **2 - 3 feet**, localized totals may exceed 3 feet. Areas surrounding this (including central Erie County) may see snowfall amounts of **1 - 2 feet**.
- **Snowfall Rates:** A general **1-2"/hr** is likely in this storm. Within the strongest snowbands, snowfall rates are likely to reach **3-4"/hr**.
- **Thundersnow:** Due to the intensity of some of the snowbands, thundersnow is likely to be observed. This does not increase impacts, but is something to note.

Impacts: Due to increased wind gusts, **blowing snow/low visibility** will be a concern Friday through the weekend. **Heavy snow may also cause significant travel disruptions.** Travel impacts may be elevated as this is the busiest travel week of the year. Additionally, fans travelling from areas south of Orchard Park will see the greatest impacts, travel may be dangerous with significant disruptions.

State Weather Risk Communication Center

Buffalo Bills Spot Forecast

Saturday - Sunday

LOW | MEDIUM | HIGH

Forecast Confidence

Here is what we know so far regarding this weekend's forecast:

- Favorable conditions for a long-lasting lake effect snow event exist.
  - **Winds from the west/southwest:**
    - **Winds will likely be gusting frequently between 35-50 mph. Its likely the peak wind gust will near/exceed 60 mph.**
    - We feel confident the peak wind gust would occur at some point Saturday late afternoon/evening.
  - **Cold surface temperatures:**
    - Temperatures will drop below freezing during the day on Saturday. By late Saturday night, temperatures will likely be in the mid 20s and wind chills will likely be in the single digits.
  - **Warm lake temperatures:**
    - Combined with the two hazards above, this could produce high snowfall rates. *How high? That's one of our biggest uncertainties right now.*

Here are our biggest uncertainties right now regarding this weekend's forecast:

- **Position of the most intense snow bands.**
  - This is very dependent on the wind direction and can easily shift a few miles north/south. This would determine what areas receive the most snowfall.
- **What the snowfall rates will look like**
  - This is not something that global models (low resolution) can resolve very well. We can recognize that this pattern is favorable for lake effect snow, but until the higher resolution models come in we can't pinpoint an estimate of snowfall rates and location of snow bands.
- **How long the heaviest snow will last for**
  - Again, for reasons explained above, we aren't able to determine just how long the heaviest snow band would last.

Something to keep in mind:

- Buffalo is playing Pittsburgh, which is only ~200 miles from the stadium. This means fans of both teams have a relatively "easy" drive to the stadium, there will most certainly be a large number of fans travelling to Buffalo from Pittsburgh.
- **Fans leaving Saturday night** with the intention of staying overnight in Buffalo could face very dangerous driving conditions even if the snowbands set up well south of Buffalo.
- **Fans leaving Sunday morning** driving conditions will likely be better than a Saturday night drive but can still be very dangerous if the snow remains intense throughout the night and into Sunday morning.
- **Best time to travel:** the best time to leave would be Saturday morning, though there will likely be some lingering rain and snow showers from the Friday night storm conditions will be significantly better than they will be later in the day Saturday and Sunday

Wind chills will be in the single digits throughout the day Sunday in any scenario. This is much warmer than what was observed during the Buffalo Blizzard and there is no scenario in which temperatures and winds reach Buffalo Blizzard level intensity during the day Sunday.

Next page includes our rough timeline, plus a best/worst case scenario for the forecast.

Bills' Forecast

State Weather Risk Communication Center

MADE AT UALBANY

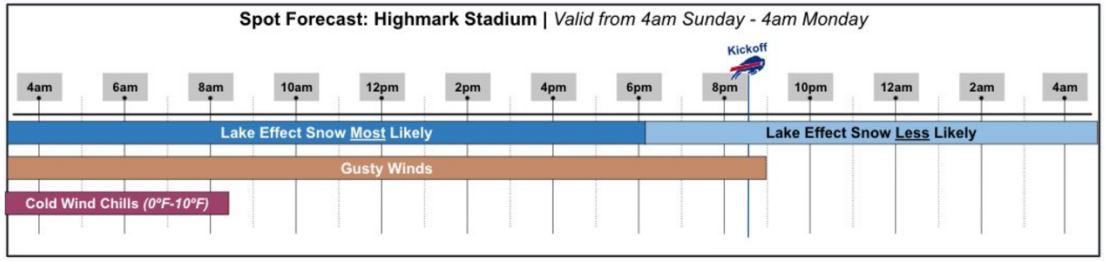
Briefing Created: Thursday, November 28, 2024 at 2:45 PM

Spot Forecast: Buffalo Bills

LOW | MEDIUM | HIGH

Forecast Valid for: 4am Sunday - 4am Monday

Forecast Confidence



Overview: A multi-day lake effect snow event will begin today and continue through early next week. On Sunday, lake effect snow is most likely in Orchard Park through roughly 6 pm. At this time, a slight change in the wind direction Sunday evening may make lake effect snow less likely after 6pm.

Notable changes since yesterday: The biggest change since yesterday is that snowfall totals have continued to increase for Highmark Stadium. We are confident that the majority of the snow will fall between late Saturday afternoon through Sunday afternoon.

Confidence: Our confidence continues to be **medium**. While small changes in the placement of the snowband could result in substantial changes within the snowfall totals, we feel confident in our most-likely scenario.

Snowfall Totals: Snowfall totals will be highly dependent on where the lake effect snowband sets up. Below we have laid out best case, most-likely and worst case scenarios.

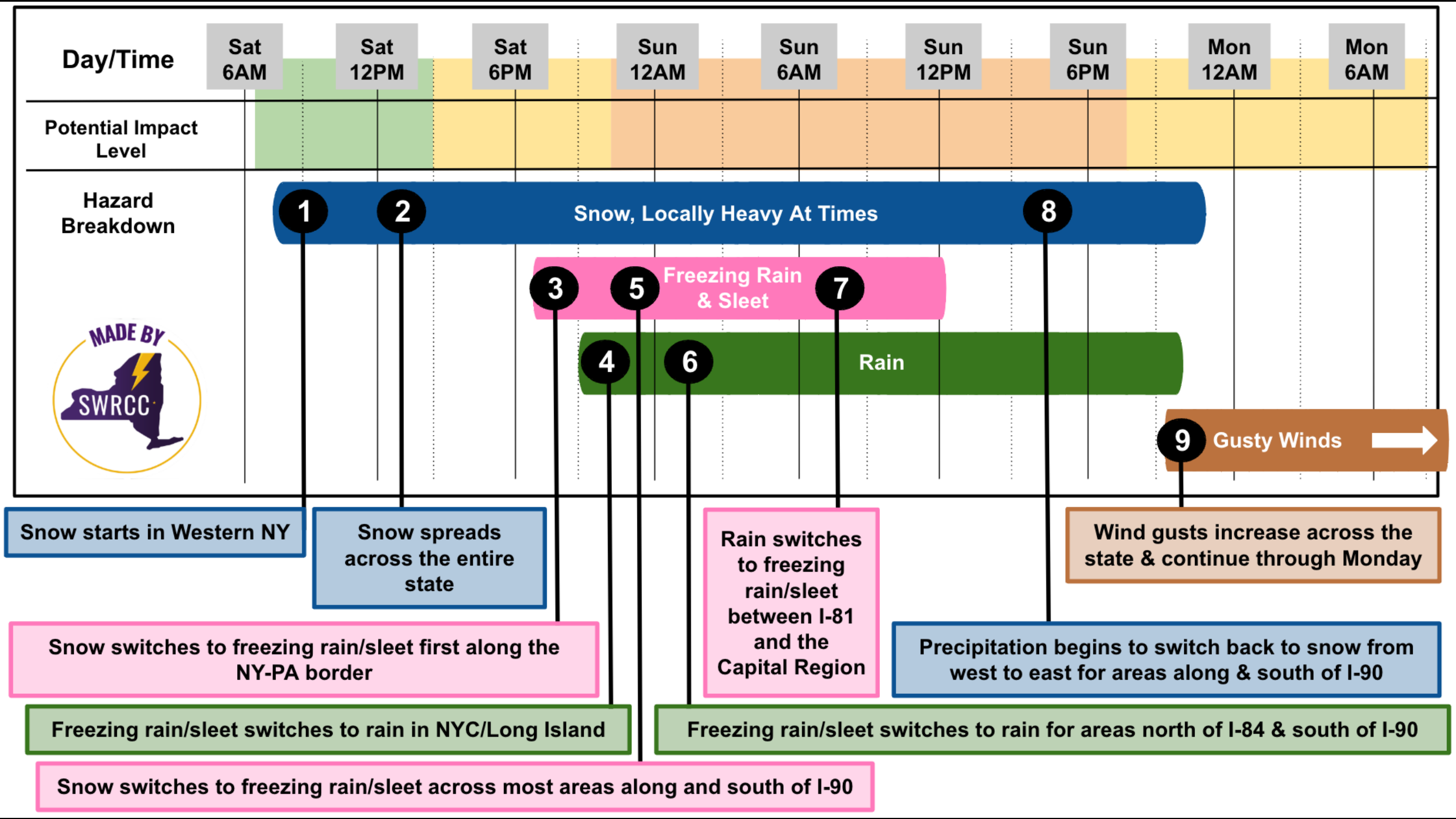
Orchard Park Total snowfall *(Friday - the time of kickoff)*

Best Case Scenario:	Most-likely scenario:	Worst Case Scenario:
Less than 15"	20-30"	3+ feet

FORECAST FOR FANS TRAVELING TO THE GAME

Fans coming from the South: The heaviest lake effect snow is most likely to occur in Chautauqua/northwestern Cattaraugus/far southern Erie Counties, where peak snowfall totals *(Friday - Sunday evening)* could reach up to **2-3 feet**. Snowfall rates will generally range between **1-2"/hr**, but could exceed **3"/hr** in the strongest snowbands. Gusty winds *(20-30 mph)* are possible, which may **reduce visibility on the roadways**. These factors may cause **dangerous travel** and/or **significant travel disruptions** for fans traveling to the game.

Fans coming from the North: Since the heaviest lake effect snow is most likely south of Buffalo, fans traveling to the game from northern cities/towns may not face as significant travel disruptions. While some snow is likely, snowfall totals will generally be **less than 1 foot** in far northern Erie/Niagara/Orleans, Genesee, northern Wyoming Counties.


Day/Time
Sat 6AM
Sat 12PM
Sat 6PM
Sun 12AM
Sun 6AM
Sun 12PM
Sun 6PM
Mon 12AM
Mon 6AM
Potential Impact Level
Hazard Breakdown
1
2
Snow, Locally Heavy At Times
8
3
5
Freezing Rain & Sleet
7
4
6
Rain
9
Gusty Winds
MADE BY
SWRCC
Snow starts in Western NY
Snow spreads across the entire state
Rain switches to freezing rain/sleet between I-81 and the Capital Region
Wind gusts increase across the state & continue through Monday
Snow switches to freezing rain/sleet first along the NY-PA border
Precipitation begins to switch back to snow from west to east for areas along & south of I-90
Freezing rain/sleet switches to rain in NYC/Long Island
Freezing rain/sleet switches to rain for areas north of I-84 & south of I-90
Snow switches to freezing rain/sleet across most areas along and south of I-90

& Training Exercises

"I went through the presentation and this is fantastic. I can't thank you enough for putting this together for us. Clearly a lot of work went into preparing this." – Requester feedback

EXERCISE

96 HRS BEFORE EVENT START

EXERCISE

Political Requests

Governor Kathy Hochul ✓
@GovKathyHochul

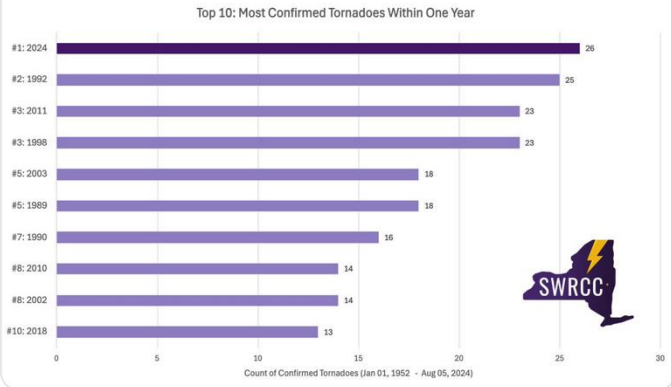
The @NWSBuffalo has confirmed that a tornado touched down in downtown Buffalo earlier today.

As severe storms continue in Western & Central New York, monitor your forecast & exercise caution.

Please report power outages to your utility & remember to never approach live wires.

NYSWRCC @NYSWRCC · 41m

With the now-confirmed tornado in Buffalo this afternoon, New York has officially broken its record for the most confirmed tornadoes in one year, at 26 tornadoes.



Weather | Storm Recovery

AUGUST 20, 2024 | Albany, NY

Governor Hochul Provides Support to Long Island Communities Impacted by Severe Weather on August 18-19

Division of Homeland Security and Emergency Services Working with Impacted Counties to Assess Damage for Potential Federal Disaster Relief

Record 9.4" of Rain Fell in 24 Hours in Western Suffolk County

State Agency Teams on the Ground Helping to Clear and Assess Dam Damage in Smithtown and Brookhaven

Governor Kathy Hochul today updated New Yorkers on the state response for communities affected by record rainfall that affected Long Island on August 18 and 19. Disaster recovery experts from the New York State Division of Homeland Security and Emergency Services have begun working with their local counterparts in Nassau and Suffolk counties to assess damage statewide in order to determine the state's ability to request federal disaster relief resources from FEMA and the U.S. Small Business Administration.

"My administration is working diligently to provide resources for Long Island communities affected by recent severe weather," **Governor Hochul said.** "As families and businesses look to rebuild, we are making every effort to help Suffolk County residents get the assistance they need."

The State's Weather Risk Communication Center reports that the NYS Mesonet's Stony Brook site in western Suffolk County recorded 9.4 inches of rain in 24 hours. Rainfall totals represent a 1-in-1000-year event at that location, exceeding prior records set during Hurricane Ida in 2021.

Federal disaster request for July storms was successful, which included assistance from us

Questions?

nbassill@albany.edu
swrcc@albany.edu

@NickPBassill
@NYSWRCC