

# CW3E East Coast AR Outlook: 10 Dec 2024

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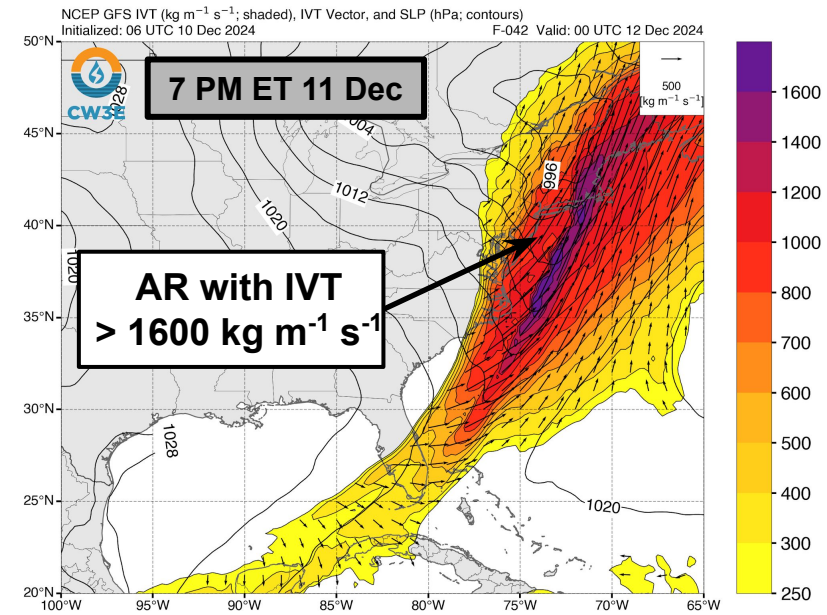
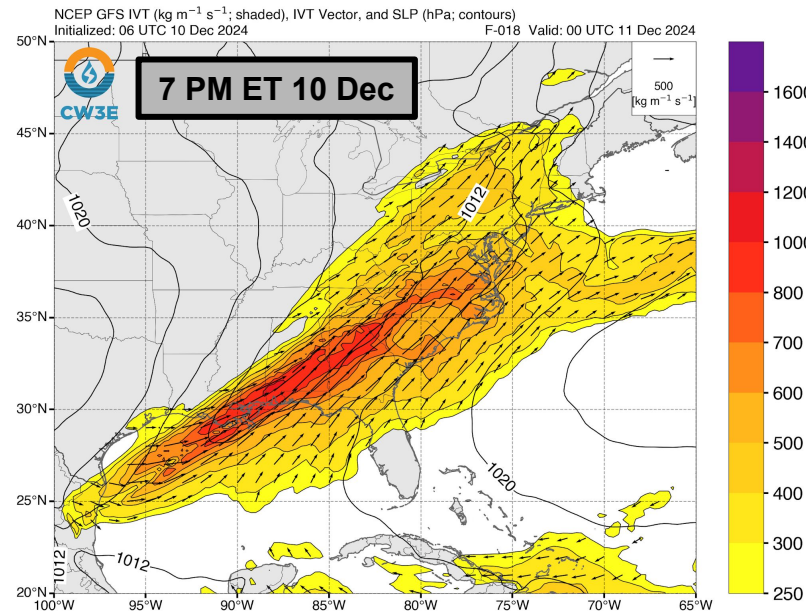
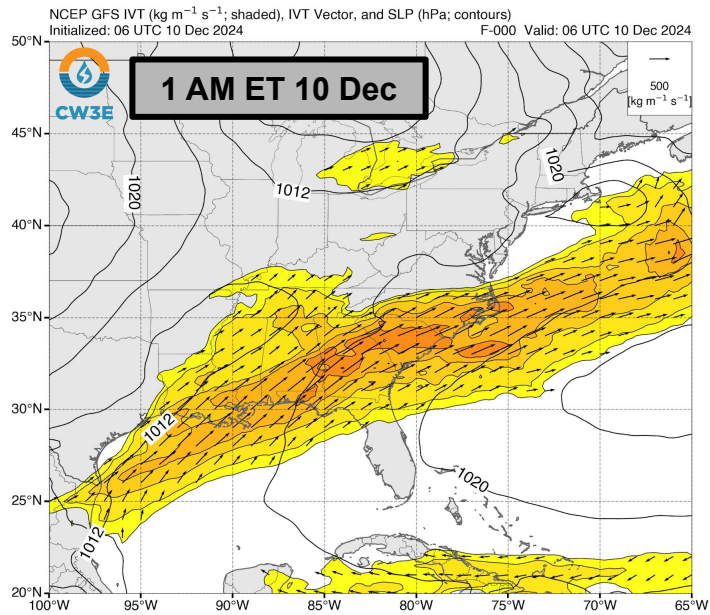
## Strong East Coast AR Forecast to Bring Significant Precipitation and Snowmelt to the Northeast

- A strong atmospheric river is forecast to develop over the southeastern US and transport significant tropical moisture up the East Coast into the Mid-Atlantic and New England, with the highest IVT  $> 1600 \text{ kg m}^{-1} \text{ s}^{-1}$ .
- GEFS and EPS ensemble models combined probabilities of IVT show high confidence of a period of IVT  $> 1000 \text{ kg m}^{-1} \text{ s}^{-1}$  over Providence, RI, with 15 combined ensemble members forecasting max IVT  $> 1750 \text{ kg m}^{-1} \text{ s}^{-1}$ .
- This AR is associated with anomalously high PWAT over the Northeast, with 3-week percentile rank PWAT values of 99.5 percent rank. An AR with IVT  $1600 \text{ kg m}^{-1} \text{ s}^{-1}$  would rank as the 14th strongest AR over the area since 1959 and be the highest non-tropical IVT since 18 Dec 2023, a major flooding event over the Northeast.
- The NWS WPC has forecast 72-hour precipitation totals  $> 1.5$  inch over much of the eastern US, with localized regions of 3-5 inches of precipitation over the Southeast, Mid-Atlantic, and New England. WPC also issued marginal and slight excessive rainfall outlooks over these areas of elevated precipitation between 10-12 Dec.
- Snow depths are forecast to reduce dramatically during this event in association with warm air temperatures and significant rainfall, leading to substantial river level rises and significant flooding along rivers in New England.
- The NWS Northeast RFC has highlighted the possibility of significant river flooding over much of the Northeast. Wind gust are forecast to exceed 40-50 mph for coastal locations between New York City and northern Maine.

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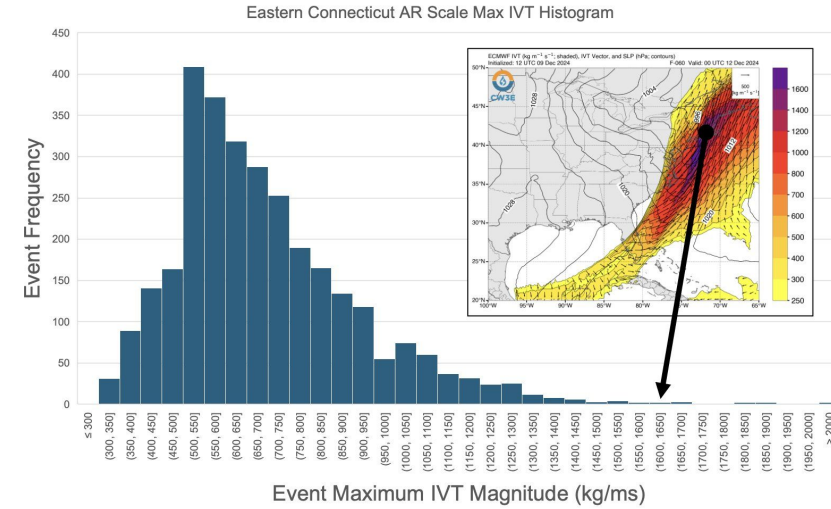
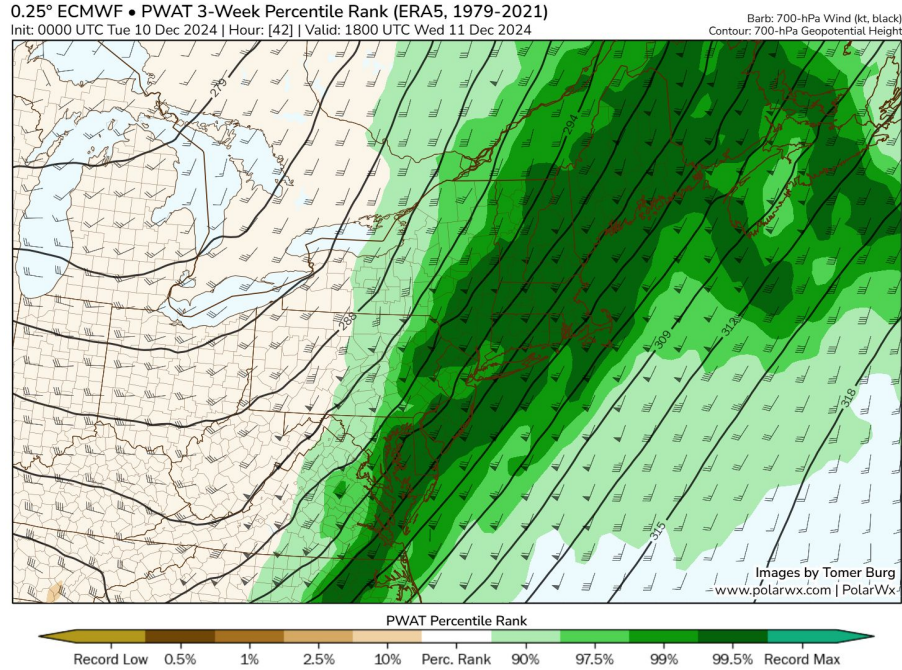
## GFS IVT Model Forecast: Initialized 18 UTC 9 Dec 2024



- A strong AR is forecast to develop over the Southeast US in association with a plume of tropical moisture extending north from the Gulf of Mexico and a surface cold front oriented from southwest to northeast.
- The AR is forecast to strengthen late Tue 10 Dec into Wed 11 Dec, with IVT > 1000  $\text{kg m}^{-1} \text{s}^{-1}$  in the core of the AR positioned over the Southeast US. The AR is forecast to quickly move offshore as the mid-level trough supporting this system quickly sweeps through the region.
- The AR is forecast to continue to strengthen on Wed 11 Dec and move offshore of the East Coast, with a maximum IVT in the core of the AR exceeding 1600  $\text{kg m}^{-1} \text{s}^{-1}$  oriented in a southwesterly direction over New England.

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## AR Climatology - Eastern Connecticut

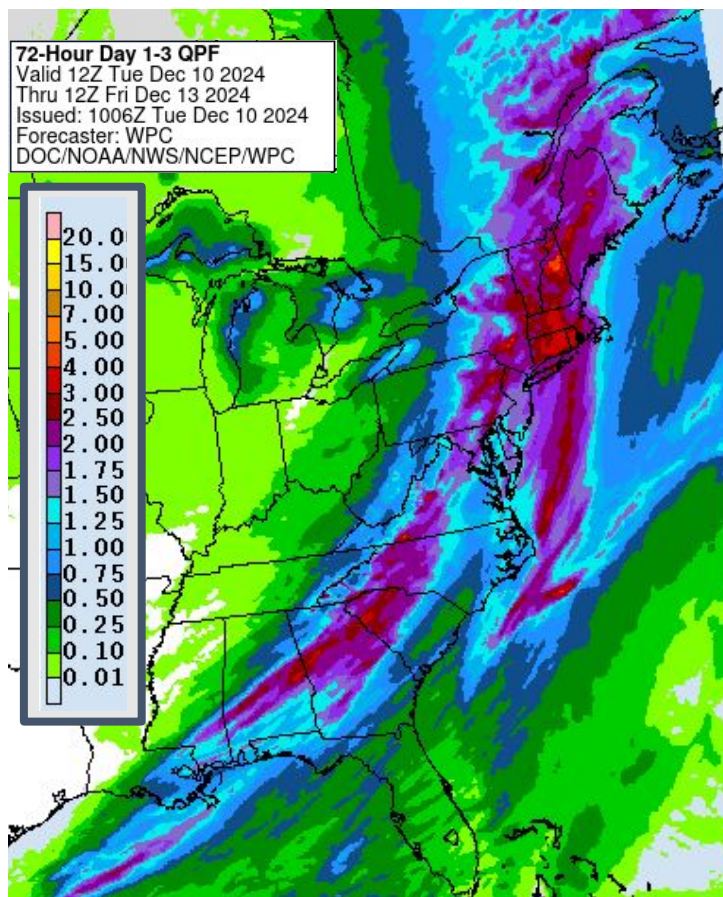


**Analysis by J. Cordeira, CW3E**

- GEFS and EPS ensemble model combined probability of southwesterly IVT > 1000 over Providence, RI is very high (~95%). Additionally, 15 combined ensemble members are forecasting extremely high IVT > 1750  $\text{kg m}^{-1} \text{s}^{-1}$  (not shown)
- PWAT 3-Week Percentile ranks are forecast to be greater than 99.5% over the East Coast compared to a 1979-2021 climatology.
- An AR with IVT > 1600  $\text{kg m}^{-1} \text{s}^{-1}$  falls along the tail of the distribution for AR events (24-hour period with IVT > 250  $\text{kg m}^{-1} \text{s}^{-1}$  as defined by Ralph et al. 2019) over Eastern Connecticut. IVT of 1600  $\text{kg m}^{-1} \text{s}^{-1}$  would rank 14th strongest AR over the area since 1959. This AR would be the strongest non-tropical IVT event since 18 Dec 2023, a major flooding event over the Northeast.

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## NWS WPC QPF and Excessive Rainfall Outlook

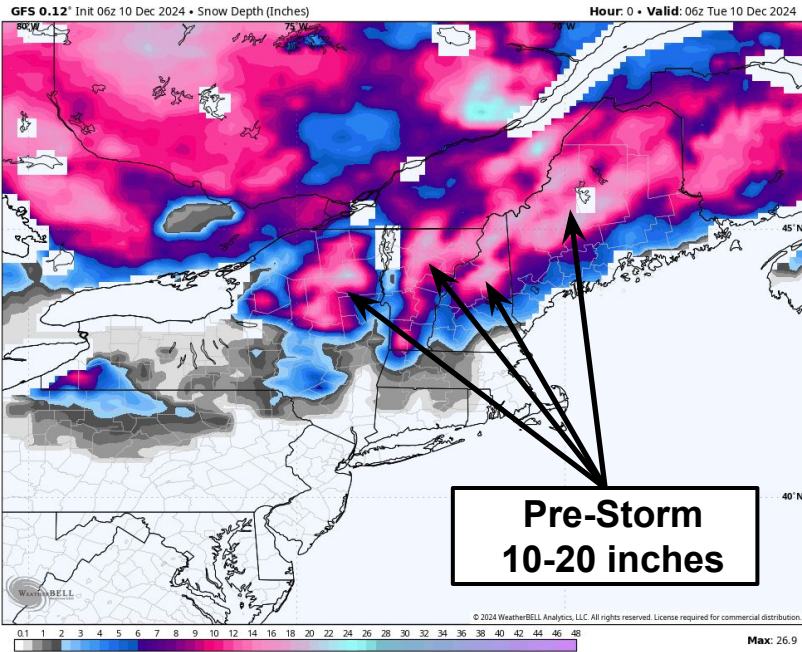


- The latest NWS WPC QPF forecast has the 72-hour rainfall totals greater than 1.5 inches broadly over the Eastern Seaboard, with localized totals between 3.0-5.0 inches over Alabama, Georgia, South Carolina, Vermont, New Hampshire, and Maine.
- WPC also issued marginal (5% probability) and slight (15% probability) risk of excessive rainfall exceeding flash flood guidance over Southeast US on Day 1 (7 AM Tue - 7 AM Wed) and the Mid-Atlantic & New England on Day 2 (7 AM Wed - 7 AM Thu).

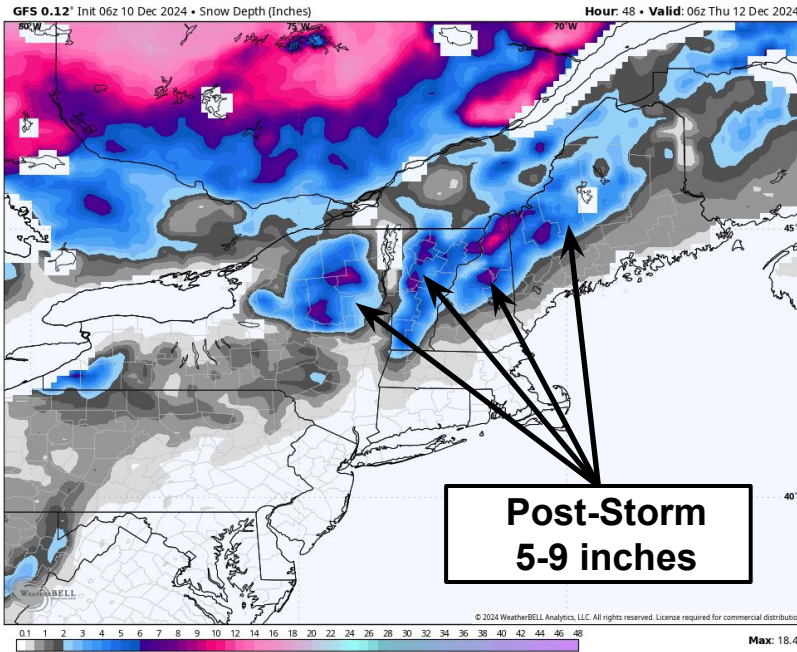
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## Snow Melt and Flood Forecast

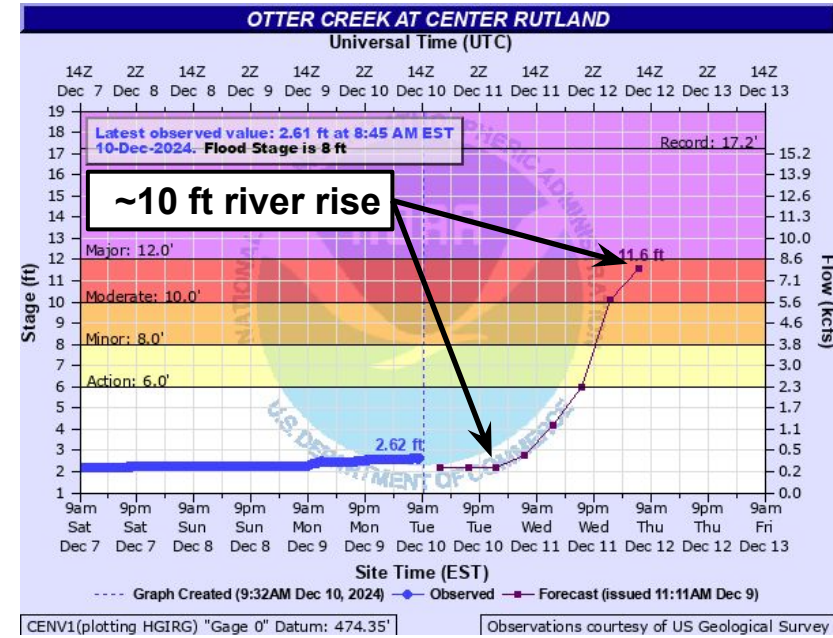
### GFS Snow Depth: 1 AM Tue 10 Dec 2024



### GFS Snow Depth: 1 AM Thu 12 Dec 2024



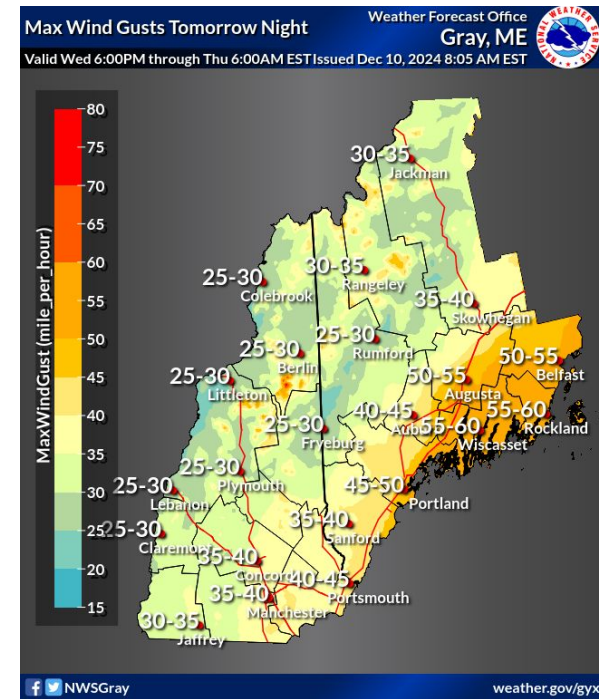
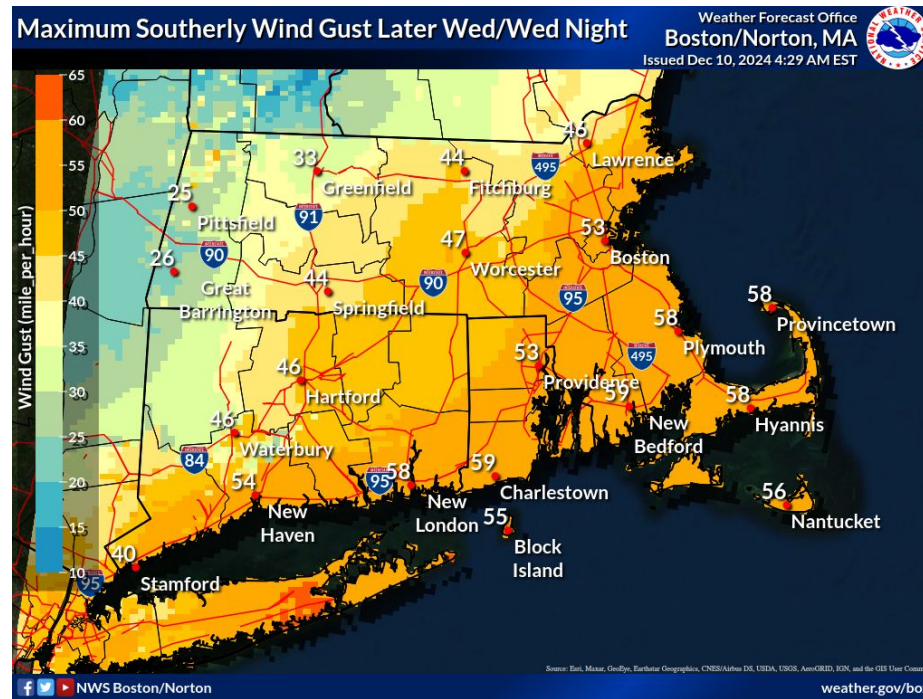
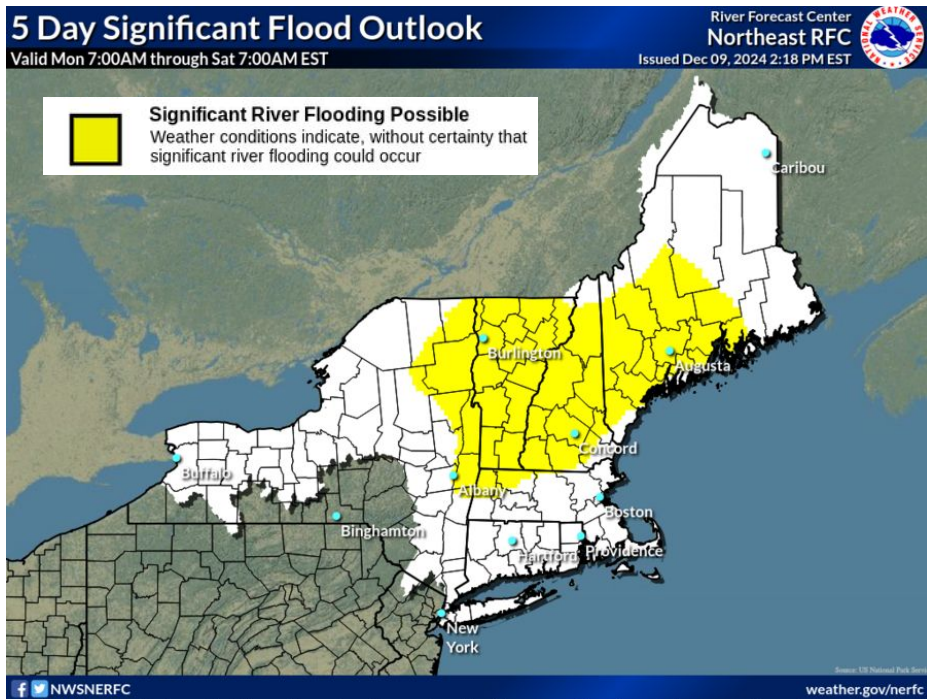
### Official NWS NERFC River Forecast



- The combination of heavy rain and snow melt due to this event will create favorable conditions for rapid river level rises.
- GFS snow depth forecasts illustrate the significant melt event associated with this AR, with the highest elevations in the Adirondacks, Green Mountains of VT, White Mountains of NH, and northern Maine forecast to decrease between 4-6 inches.
- Otter Creek at Center Rutland is forecast to exceed at least moderate flood stage between Wed 11 Dec and Thu 12 Dec.

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## National Weather Service Flood and Wind Related Hazards



- The NWS Northeast River Forecast Center has highlighted the possibility of significant river flooding over northeastern New York, Vermont, New Hampshire, and southwestern Maine in association with this period of heavy precipitation.
- Coastal NWS Weather Forecast Offices including NWS Boston/Norton, MA and Gray, ME have forecast maximum wind gusts between 40-50 mph for coastal regions of New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine