# **CW3E Atmospheric River Outlook: 30 October 2025**

#### Multiple Atmospheric Rivers Forecast to Impact US West Coast Over Next 7 Days

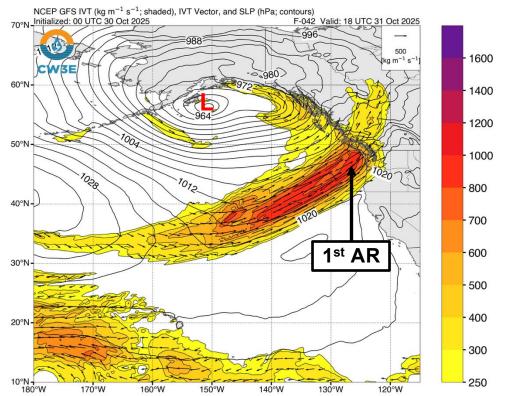
- A strong atmospheric river (AR) is forecast to make landfall over the Pacific Northwest early Fri 31 Oct and bring heavy precipitation to portions of western Washington.
- A second, weaker AR is forecast to make landfall over Oregon and far northern California on Mon 3 Nov.
- A third AR associated with a large closed low is forecast to approach the US West Coast on Tue 4 Nov, potentially bringing another round of heavy precipitation to the Pacific Northwest and northern California.
- The first AR is expected to produce AR 3/AR 4 conditions (based on the Ralph et al. 2019 AR Scale) over coastal Washington and northern coastal Oregon.
- There is considerable uncertainty in the timing and intensity of the third AR, with the ECMWF ensemble favoring an earlier AR landfall and higher peak IVT magnitudes compared to GEFS. About 70% of ECMWF members are forecasting an AR 4 or greater in southern coastal Oregon (versus only 35% of GEFS members).
- The first AR is forecast to produce 3–5 inches of precipitation in the Olympic Peninsula and North Cascades.
- A marginal risk excessive rainfall outlook (ERO) has been issued for much of western Washington Fri 31 Oct into early Sat 1 Nov due to potential for heavy precipitation from the first AR.
- High freezing levels and heavy rainfall during the first AR are expected to result in significant increases in streamflow in western Washington, with 7 stream gages currently forecast to exceed action/monitor stage.
- Both the deterministic ECMWF and EFS ensemble are forecasting higher precipitation totals in western
   Washington and western Oregon over the next 10 days compared to the deterministic GFS and GEFS ensemble.



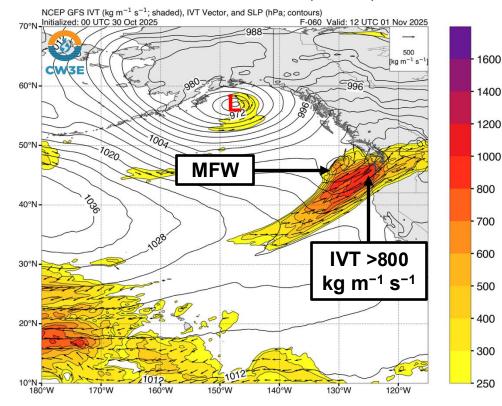


#### **GFS IVT Forecasts**

Valid: 11 AM PT 31 Oct (F-042)



Valid: 5 AM PT 1 Nov (F-060)



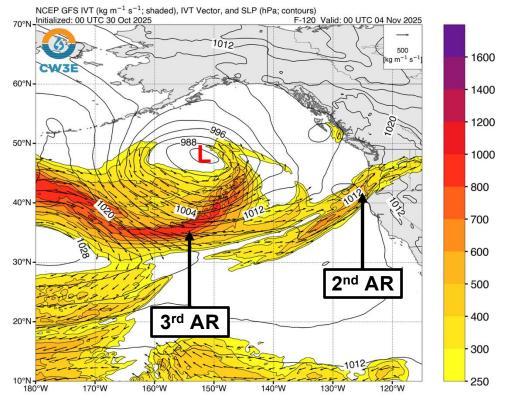
- A strong atmospheric river (AR) associated with a large area of low pressure in the Gulf of Alaska is forecast to make landfall over the Pacific Northwest early Fri 31 Oct.
- After the initial AR landfall, a mesoscale frontal wave (MFW) is forecast to develop along the AR and drive a second, stronger
  pulse of IVT into the region early Sat 1 Nov.
- IVT magnitudes are forecast to approach 1000 kg m<sup>-1</sup> s<sup>-1</sup> in coastal Washington and Oregon during this second IVT pulse.



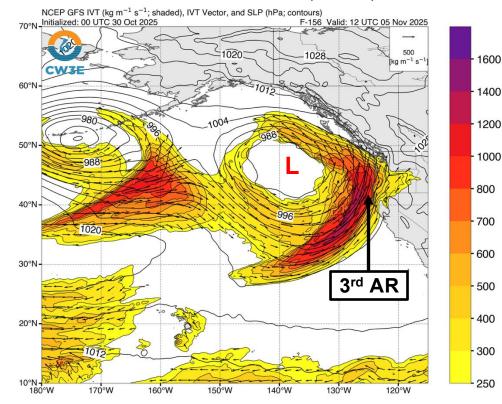


#### **GFS IVT Forecasts**





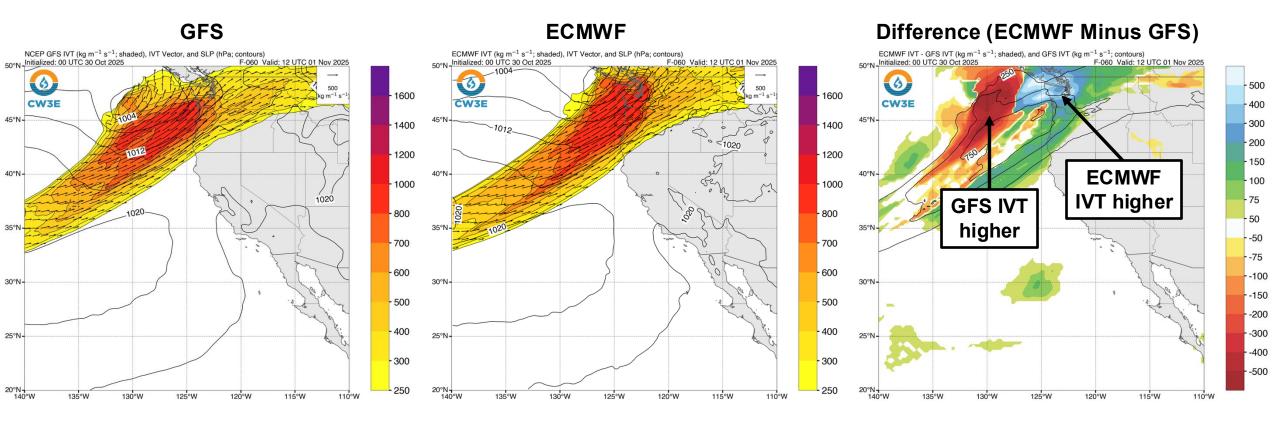
#### Valid: 4 AM PT 5 Nov (F-156)



- A second, weaker AR is forecast to develop off the US West Coast and move onshore over Oregon and far northern California on Mon 3 Nov.
- As the second AR begins to dissipate, a third AR associated with a large closed low over the Northeast Pacific is forecast to propagate eastward and make landfall along the US West Coast late Tue 4 Nov.



## GFS & ECMWF IVT Forecasts of First AR: Valid 5 AM PT 1 Nov (F-060)

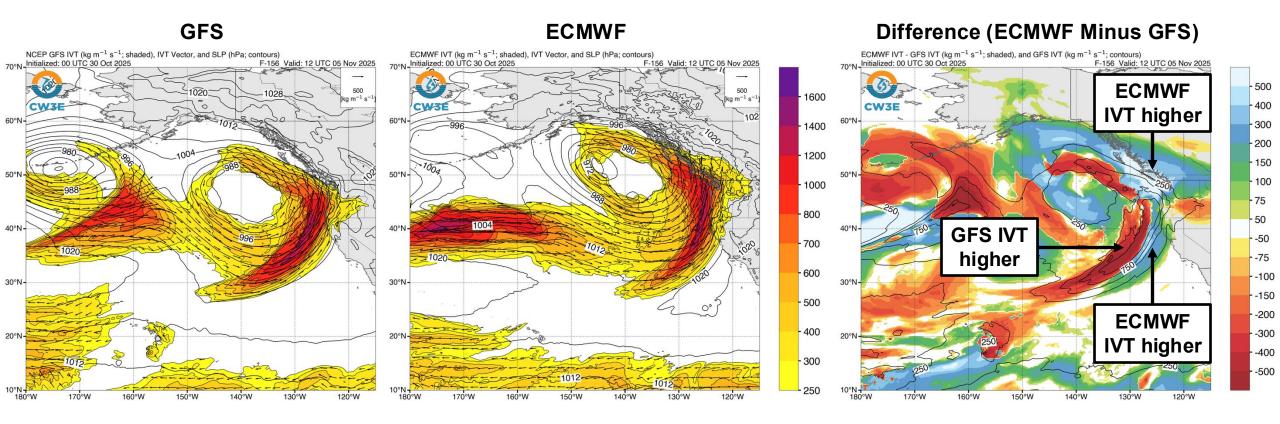


- There are subtle model-to-model differences in the forecast evolution of the MFW and its influence on the first AR.
- Compared to the 00Z GFS, the 00Z ECMWF is forecasting a faster progression of the MFW, resulting in an earlier arrival of the second IVT pulse over western Washington and northwestern Oregon.





## GFS & ECMWF IVT Forecasts of Third AR: Valid 4 AM PT 5 Nov (F-156)

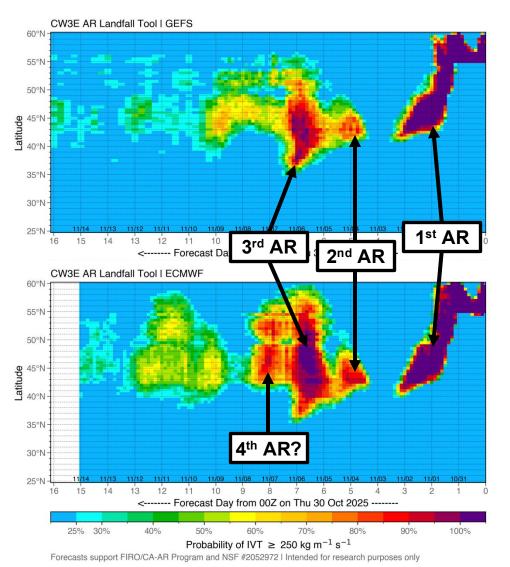


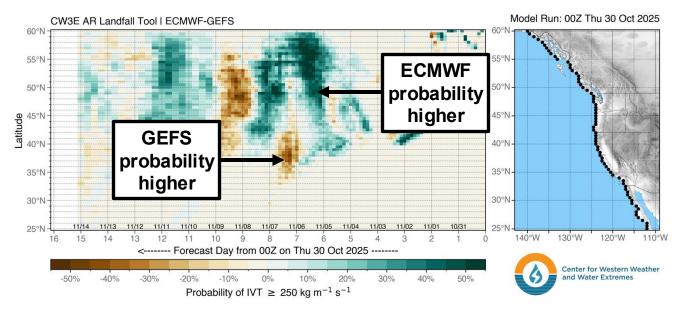
- There is also considerable uncertainty in the evolution of the closed low and third AR forecast to impact the US West Coast next week.
- Compared to the GFS, the ECMWF is forecasting a stronger surface low and an earlier AR landfall. In addition, the ECMWF is forecasting the core of the AR to extend farther north.





#### **GEFS vs. ECMWF Coastal AR Landfall Tool**



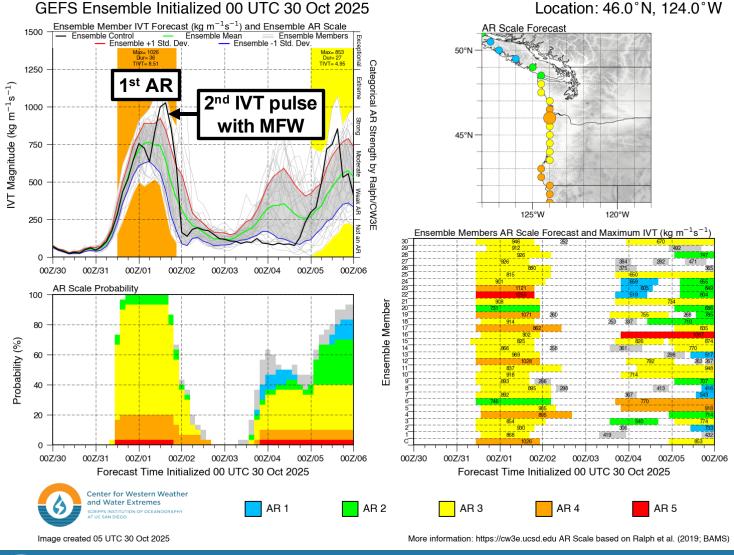


- Beyond the first AR, the 00Z GEFS and ECMWF ensembles are both showing high confidence (>70% probability) in AR conditions (IVT ≥250 kg m<sup>-1</sup> s<sup>-1</sup>) over coastal Oregon in association with the second AR on 3–4 Nov and very high confidence (>90% probability) in AR conditions over coastal Washington, Oregon, and northern California in association with the third AR on 5 Nov.
- For the third AR, ECMWF is generally forecasting a slightly earlier AR landfall and higher probabilities over the Olympic Peninsula and Vancouver Island, whereas GEFS is forecasting higher probabilities over northern California.
- The ECMWF is also showing a high likelihood (>80% probability) of a fourth landfalling AR over the Pacific Northwest on 6–7 Nov.





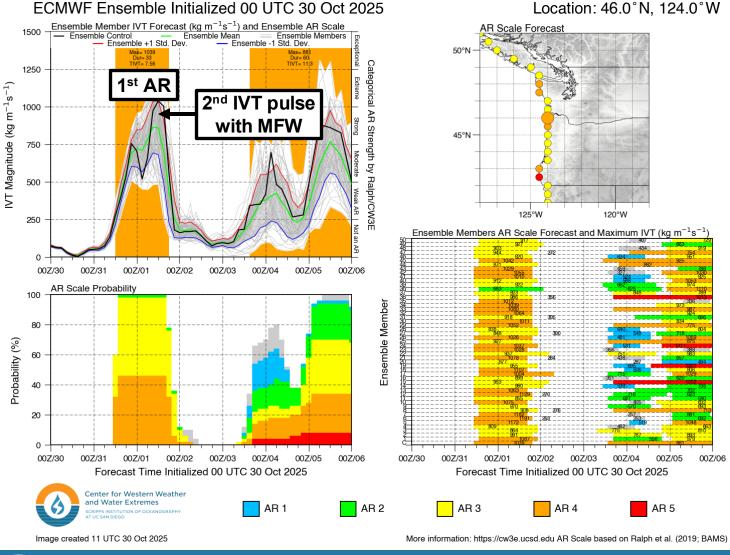
#### GEFS AR Scale and IVT Forecasts of First AR: Northern OR



- The GEFS control member is forecasting an AR 3/AR 4 (based on the Ralph et al. 2019 AR Scale) over coastal Washington and northern coastal Oregon during the first AR.
- While the control member is forecasting an AR 4 at 46°N, 124°W (Clatsop County, OR), only 7/31 (23%) of GEFS members are forecasting an AR 4 or greater.
- There is still considerable uncertainty in the magnitude of the second IVT pulse associated with the MFW. Only 5/31 (16%) GEFS members are forecasting maximum IVT >1000  $kg m^{-1} s^{-1}$ .

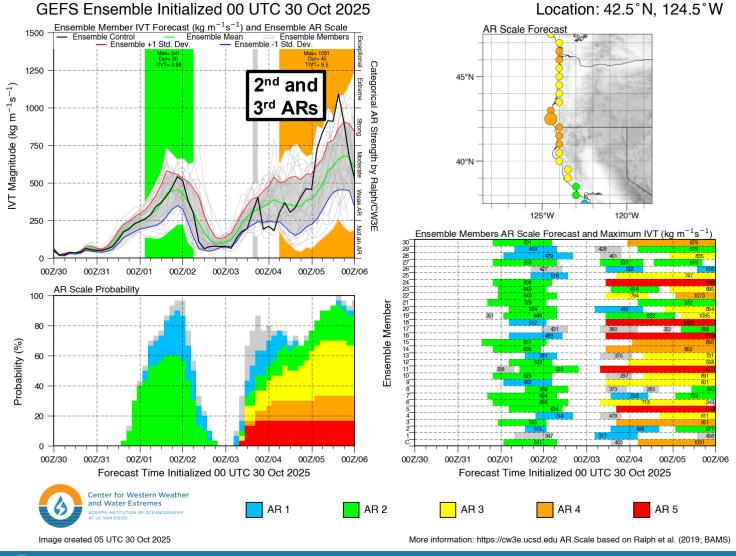


#### ECMWF AR Scale and IVT Forecasts of First AR: Northern OR



- The ECMWF control member is also forecasting an AR 3/AR 4 over coastal Washington and most of coastal Oregon during the first AR.
- Compared to GEFS, a higher percentage of ECMWF ensemble members (47% vs 23%) are forecasting an AR 4 or greater at 46°N, 124°W (Clatsop County, OR).
- The higher likelihood of an AR 4 is largely due to ECMWF members forecasting higher IVT magnitudes in association with the MFW. 24/51 (47%) of ECMWF members are forecasting maximum IVT > 1000 kg  $m^{-1}$  s<sup>-1</sup>.

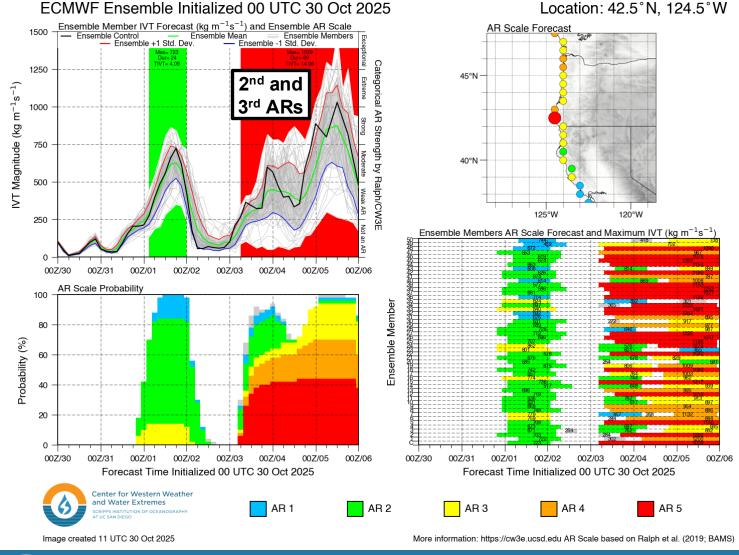
#### GEFS AR Scale and IVT Forecasts of Second/Third ARs: Southern OR



- The GEFS control member is forecasting an AR 4 over southern coastal Oregon during the second and third ARs.
- There is considerable uncertainty in the timing and intensity of these ARs, with many members forecasting a short break in AR conditions between the second and third ARs.
- 22/31 (71%) of GEFS members are forecasting an AR 3 or greater at 42.5°N, 124.5°W, and 11/31 (35%) are forecasting an AR 4 or greater.



#### ECMWF AR Scale and IVT Forecasts of Second/Third ARs: Southern OR



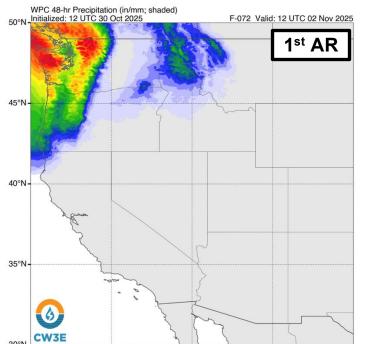
- The ECMWF control member is forecasting an AR 5 over southern coastal Oregon during the second and third ARs.
- Similar to GEFS, the ECMWF ensemble is showing considerable uncertainty in the timing and intensity of these ARs.
- 36/51 (71%) of ECWMF members are forecasting an AR 4 or greater at 42.5°N, 124.5°W, and 23/51 (45%) are forecasting an AR 5 or greater.
- The higher probability of an AR 4/AR 5 is due to ECWMF members forecasting higher IVT magnitudes during the third AR, as well as a smaller percentage of ECMWF members forecasting a break in AR conditions between the second and third ARs.



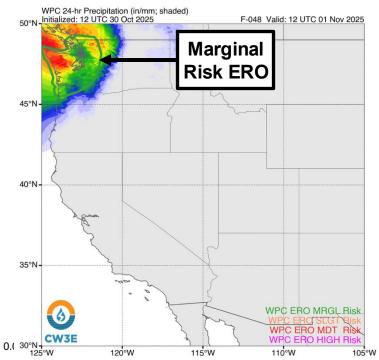
# AMBASSADOR<sup>1</sup>

# **WPC Precipitation Forecasts**

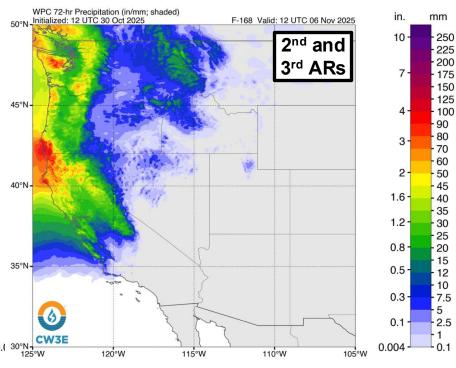
WPC 48-h Total QPF Valid: 4 AM PT 2 Nov



WPC Day 2 24-h QPF Valid: 5 AM PT 1 Nov



WPC 72-h Total QPF Valid: 4 AM PT 6 Nov



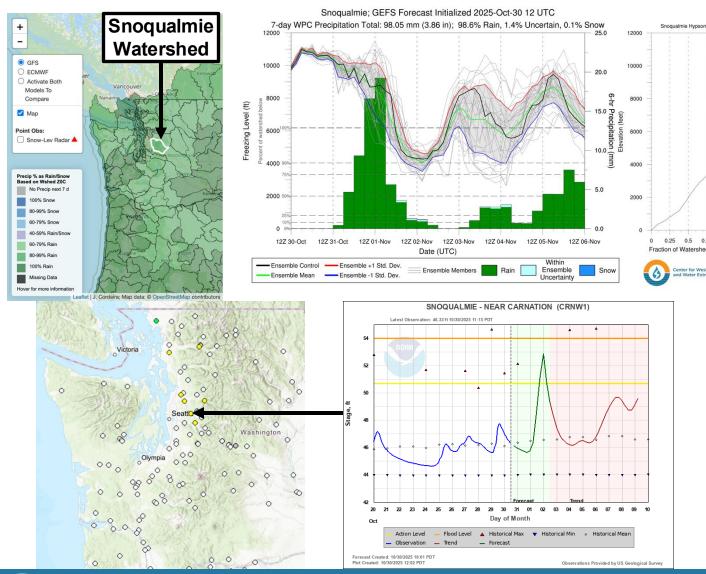
- The NWS Weather Prediction Center (WPC) is forecasting 3–5 inches of total precipitation in the Olympic Peninsula and North Cascades during the first AR. About 1–3 inches are forecast elsewhere in western Washington and northwestern Oregon.
- A marginal risk (level 1 of 4; ≥5% probability of flooding) excessive rainfall outlook (ERO) has been issued for western Washington on Day 2 (24-hour period ending 5 AM PT Sat 1 Nov) due to the potential for heavy precipitation during the first AR.
- The second and third ARs are forecast to produce at least 1–3 inches of total precipitation across western Washington, western Oregon, and northern California, with higher amounts (3–5 inches) forecast in the Olympic Mountains and Klamath Mountains.





# Freezing Level and Hydrologic Forecasts

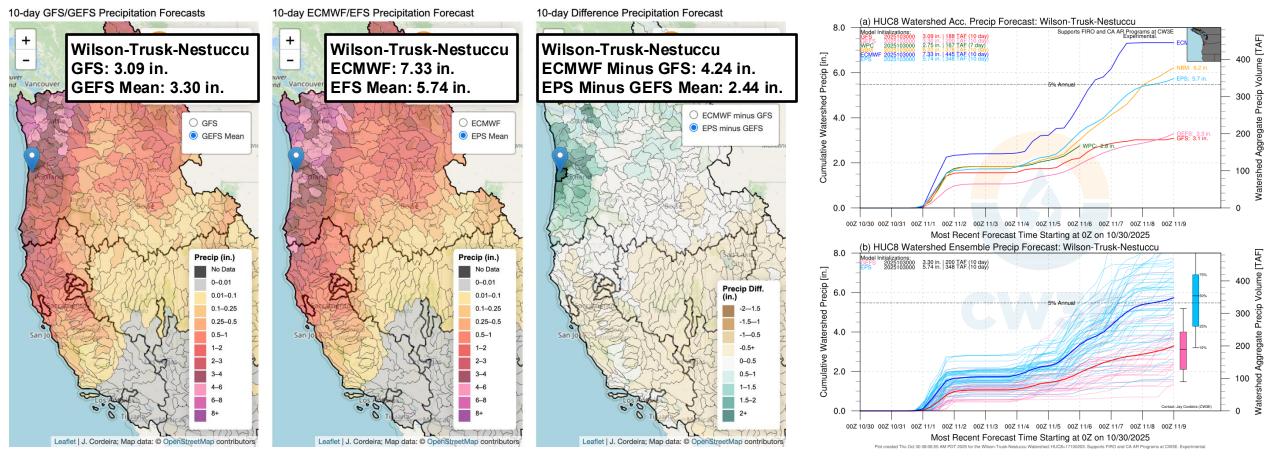




- Freezing levels are forecast to start out around 10,000 feet over the Olympic Mountains and Washington Cascades when the first AR makes landfall and remain above 6,000 feet for most of the event duration.
- The combination of high freezing levels and heavy rainfall during the first AR is expected to result in significant increases in streamflow in western Washington.
- Seven stream gages are currently forecast to rise above monitor/action stage on 1–2 Nov, including the Snoqualmie River near Carnation, WA.



# **Watershed Precipitation Forecasts**

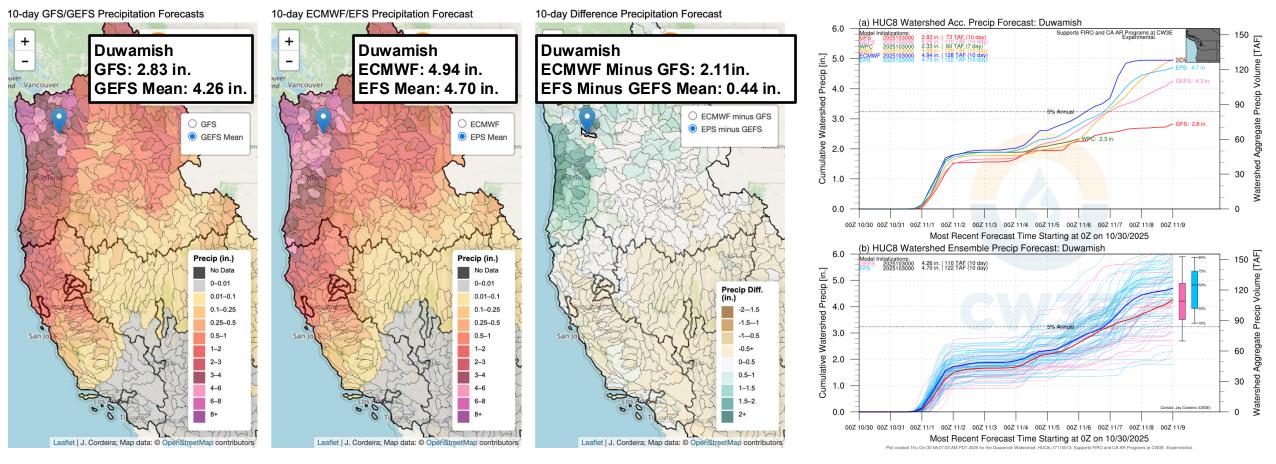


- Both the deterministic ECMWF and EFS ensemble are forecasting higher precipitation totals than the deterministic GFS and GEFS ensemble over much of western Washington and Oregon during the next 10 days.
- In the Wilson-Trusk-Nestuccu watershed, ~50% of EFS members are forecasting >6 inches of total precipitation whereas ~50% of GEFS members are forecasting <3 inches.





## **Watershed Precipitation Forecasts**



• In the Duwamish watershed, >75% of EFS and GEFS members are forecasting at least 5% of normal annual precipitation (~3.2) inches) over the next 10 days.



