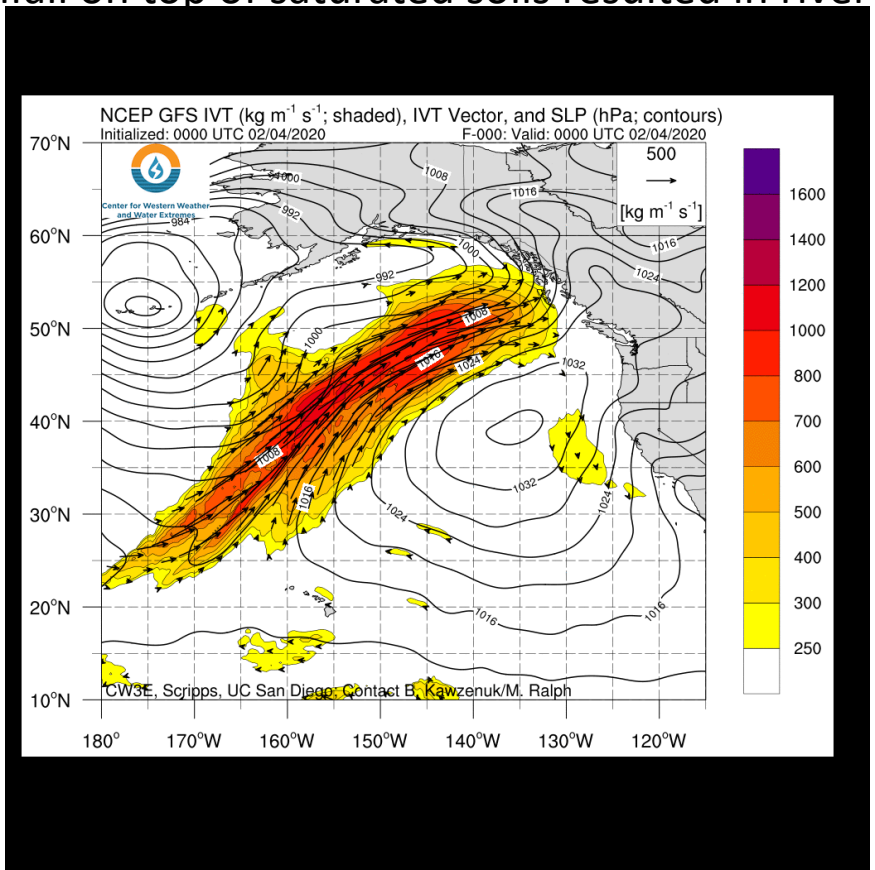
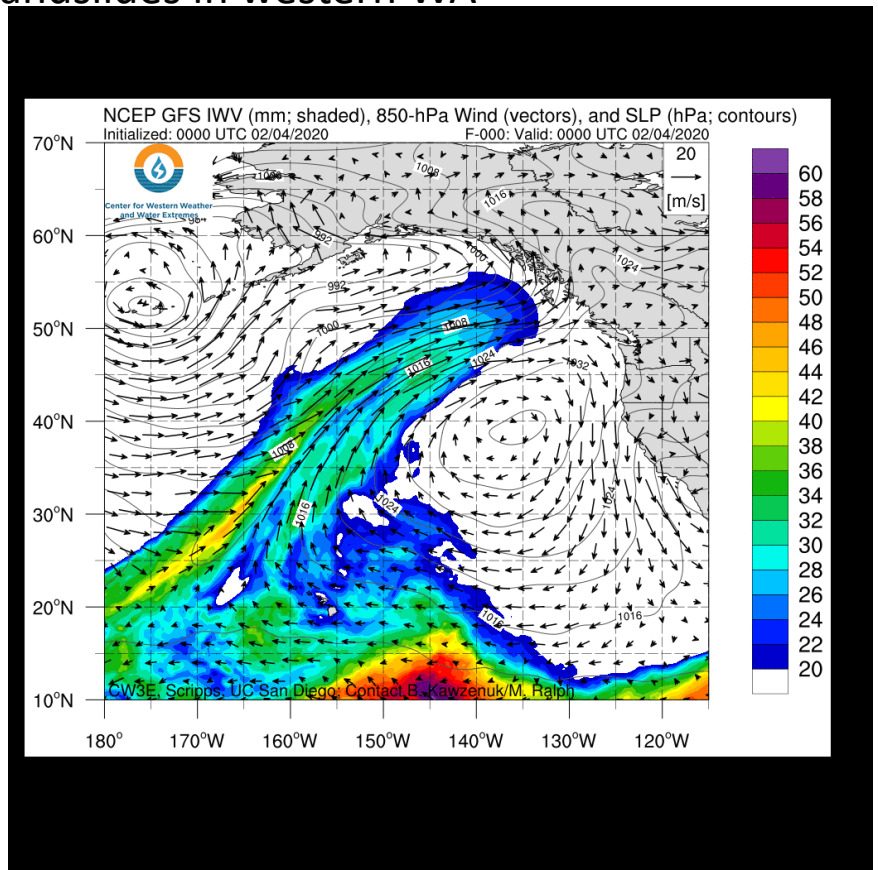
CW3E Event Summary: 4–8 Feb 2020

Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

Landfalling AR brings heavy rainfall, mountain snowfall, and flooding to the Western U.S.

- A long-duration, inland-penetrating AR impacted the Pacific Northwest and Rocky Mountains during 4–8 Feb
- Some locations in coastal Washington experienced AR conditions for more than 72 hours
- Total estimated 7-day precipitation between 3 Feb and 10 Feb exceeded 10 inches over the WA Cascades
- At least 1–3 feet of snow fell over the elevated terrain in the interior Pacific Northwest and the Rocky Mountains
- Heavy rainfall on top of saturated soils resulted in river flooding and landslides in western WA





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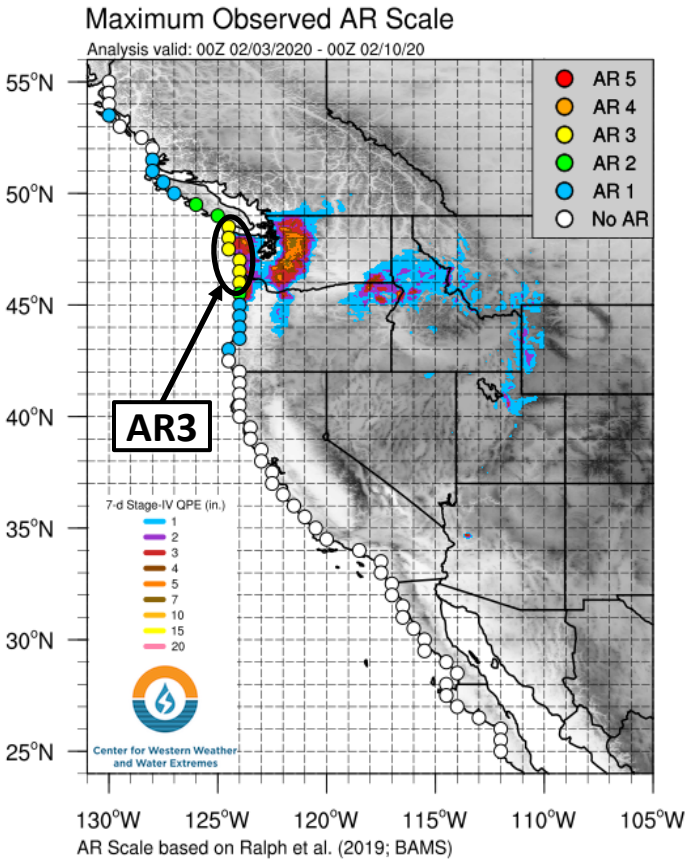

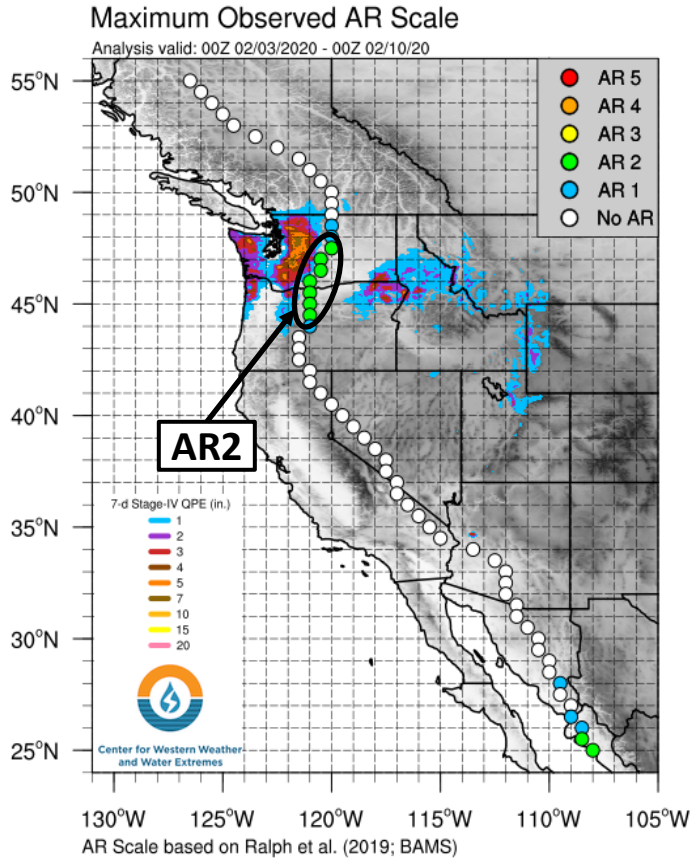

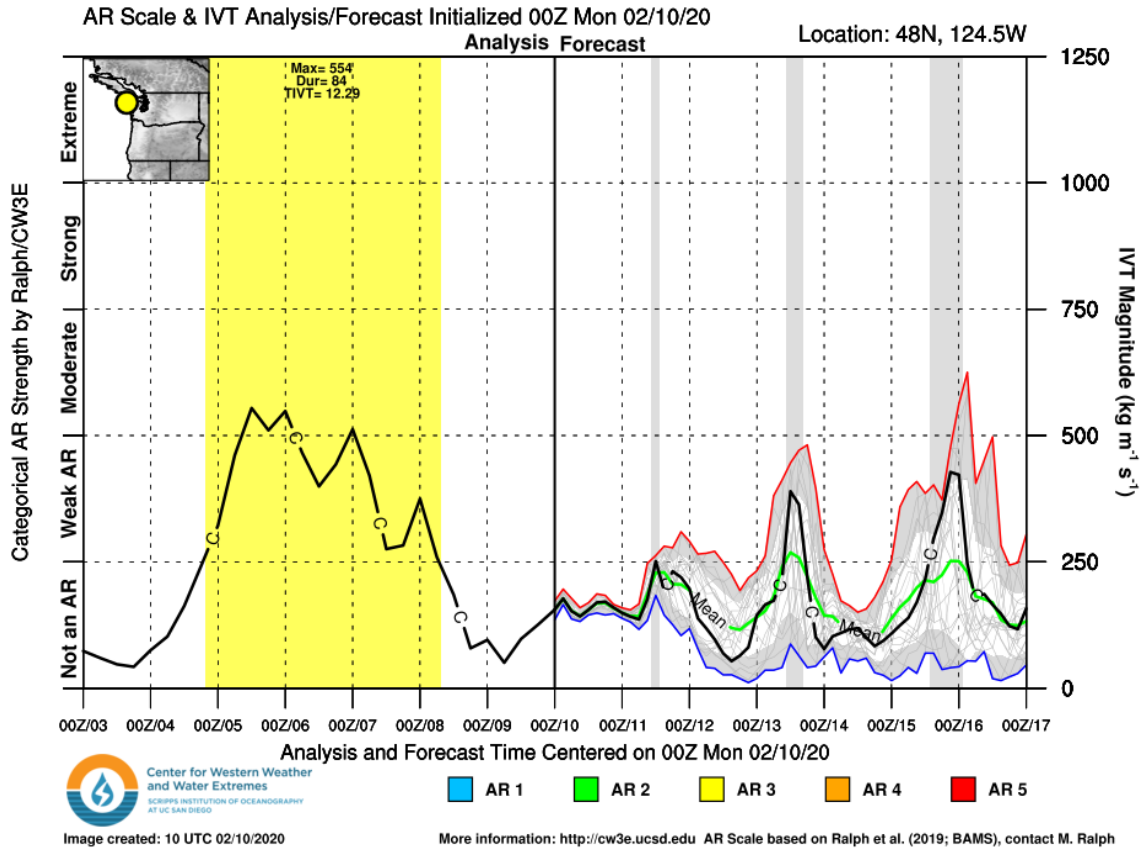

- **A landfalling AR brought a prolonged period of AR conditions to the Pacific Northwest during 4–8 Feb**
- **Although the IVT magnitude was not especially strong (max IVT ~ 500–600 kg m^{-1} s^{-1}), some locations along the WA coast experienced AR conditions for more than 72 hours [AR3 based on the *Ralph et al. (2019)* AR Scale]**
- **Significant inland AR penetration resulted in AR2 conditions east of the Cascades**

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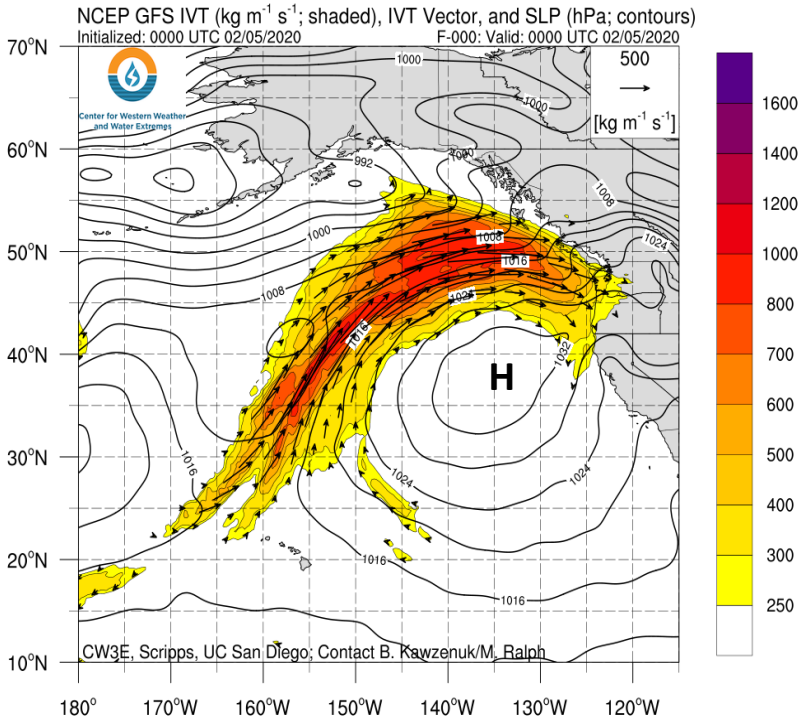
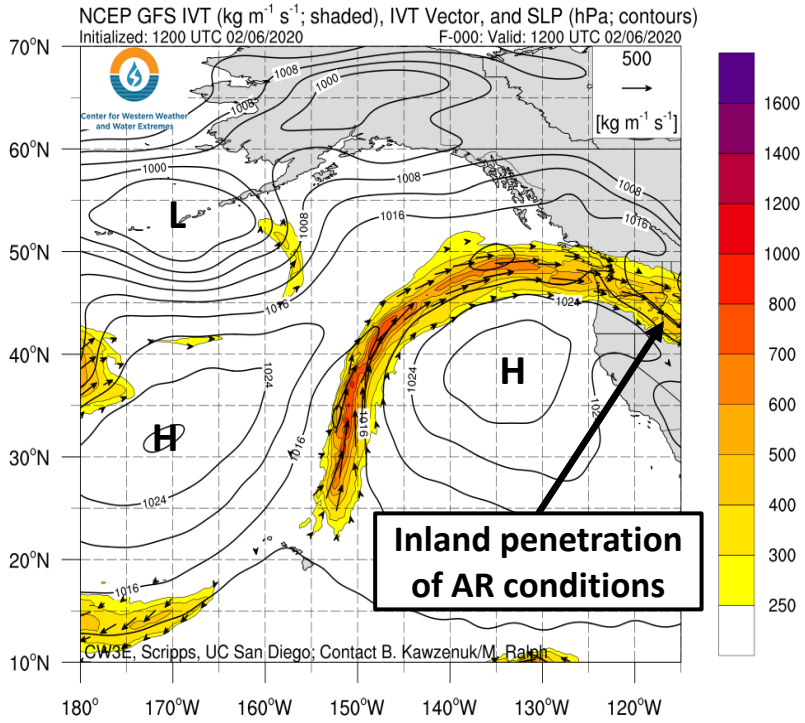
GFS IVT Analyses

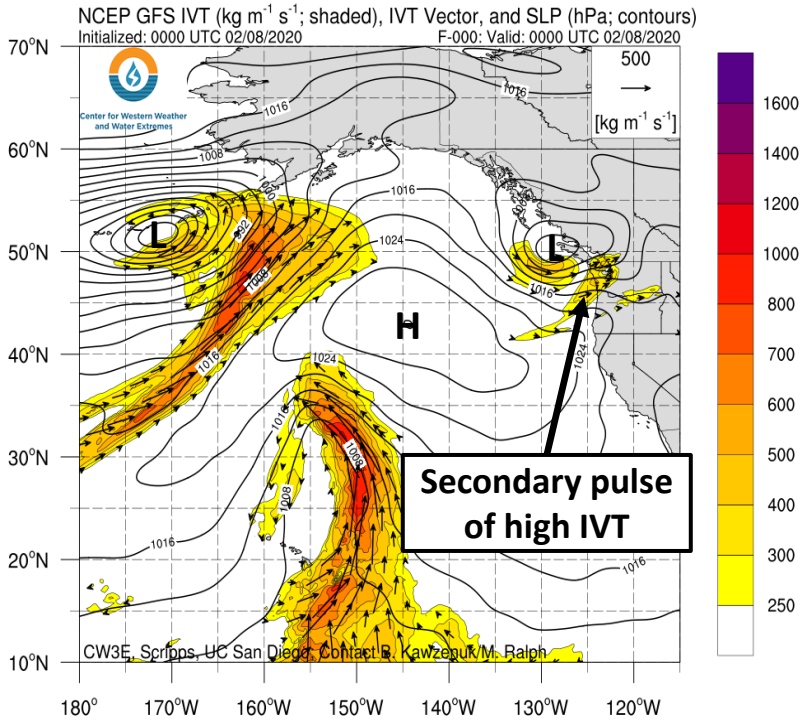
A) Valid: 0000 UTC 5 Feb



B) Valid: 1200 UTC 6 Feb



C) Valid: 0000 UTC 8 Feb



- An anticyclonically curved AR on the poleward side of surface high pressure made landfall in coastal WA and OR just before 0000 UTC 5 Feb (Figure A)
- As time progressed, AR conditions overspread interior portions of the Western U.S. (Figure B)
- After the main AR decayed, a secondary pulse of high IVT values associated with a cyclone off the coast of British Columbia prolonged AR conditions by 12–18 hours over the Olympic Peninsula (Figure C)

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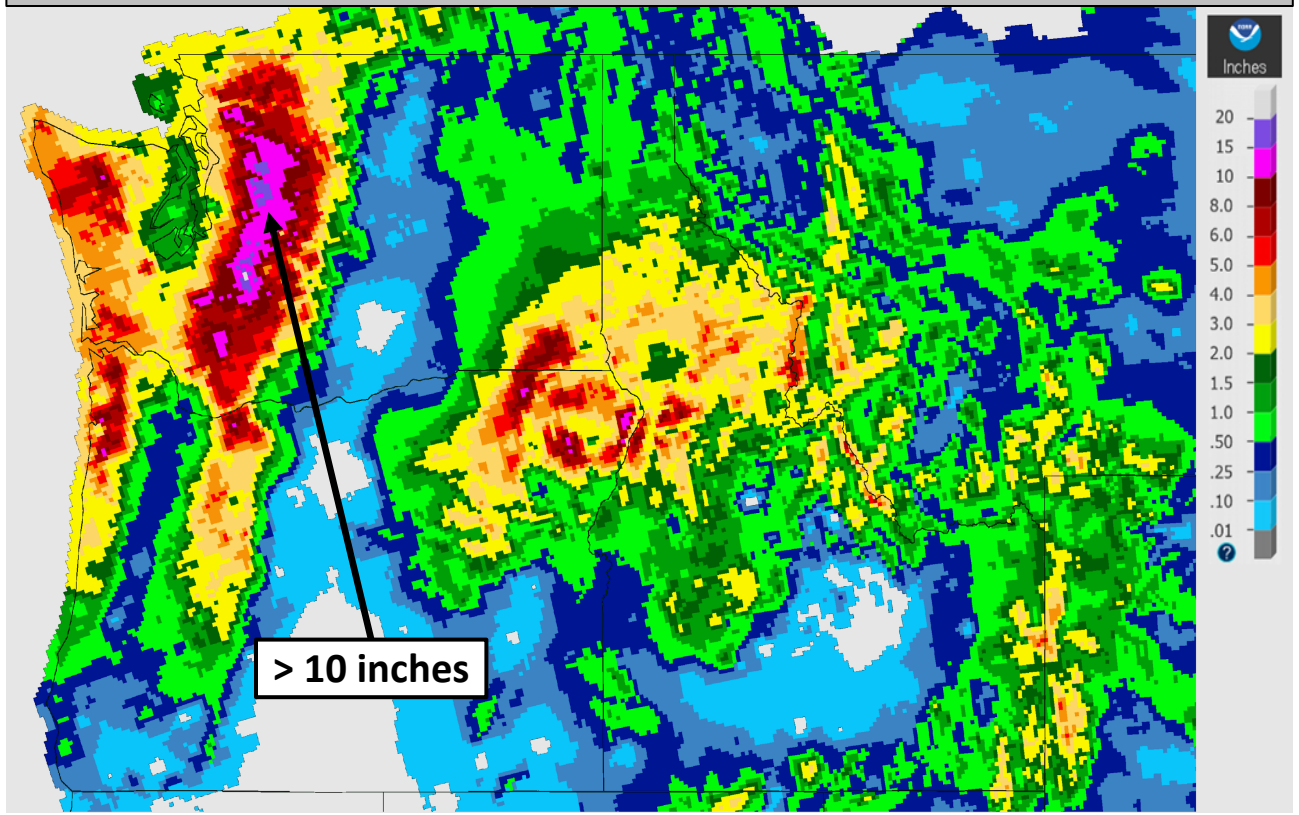
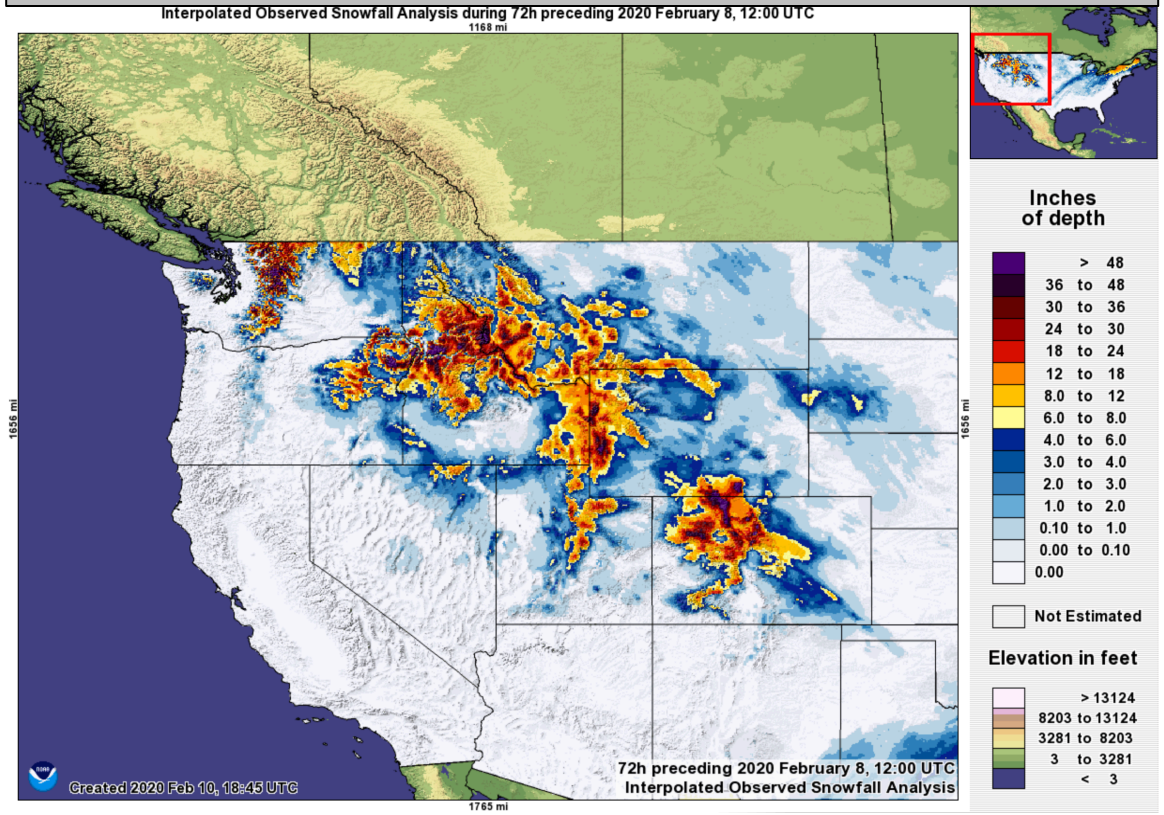
NWS 7-day Stage IV Precipitation: Valid 1200 UTC 10 Feb



Source: NOAA/NWS Advanced Hydrologic Prediction Service, https://water.weather.gov/ahps/

72-h Interpolated Snowfall: Valid 1200 UTC 8 Feb



Source: NOAA/NWS NOHRSC, https://www.nohrsc.noaa.gov/

- **Total estimated precipitation over the 7-day period ending 1200 UTC (4 AM PST) 10 Feb exceeded 5 inches over portions of western WA and northwestern OR, with the highest amounts (> 10 inches) over the WA Cascades**
- **Inland penetration of AR conditions also supported heavy snowfall (1–3 feet) across the higher terrain in the interior Pacific Northwest and Rocky Mountains**

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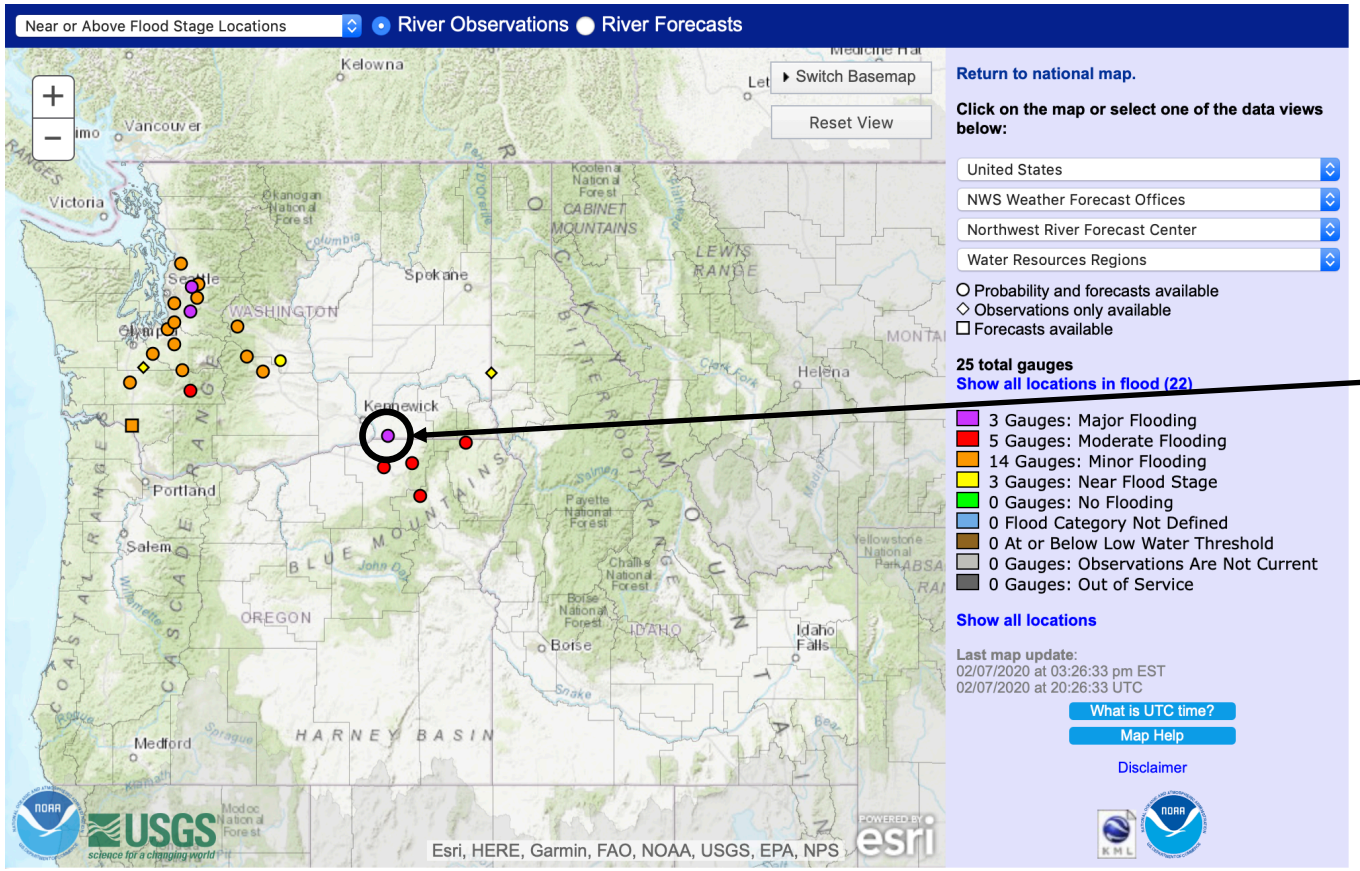

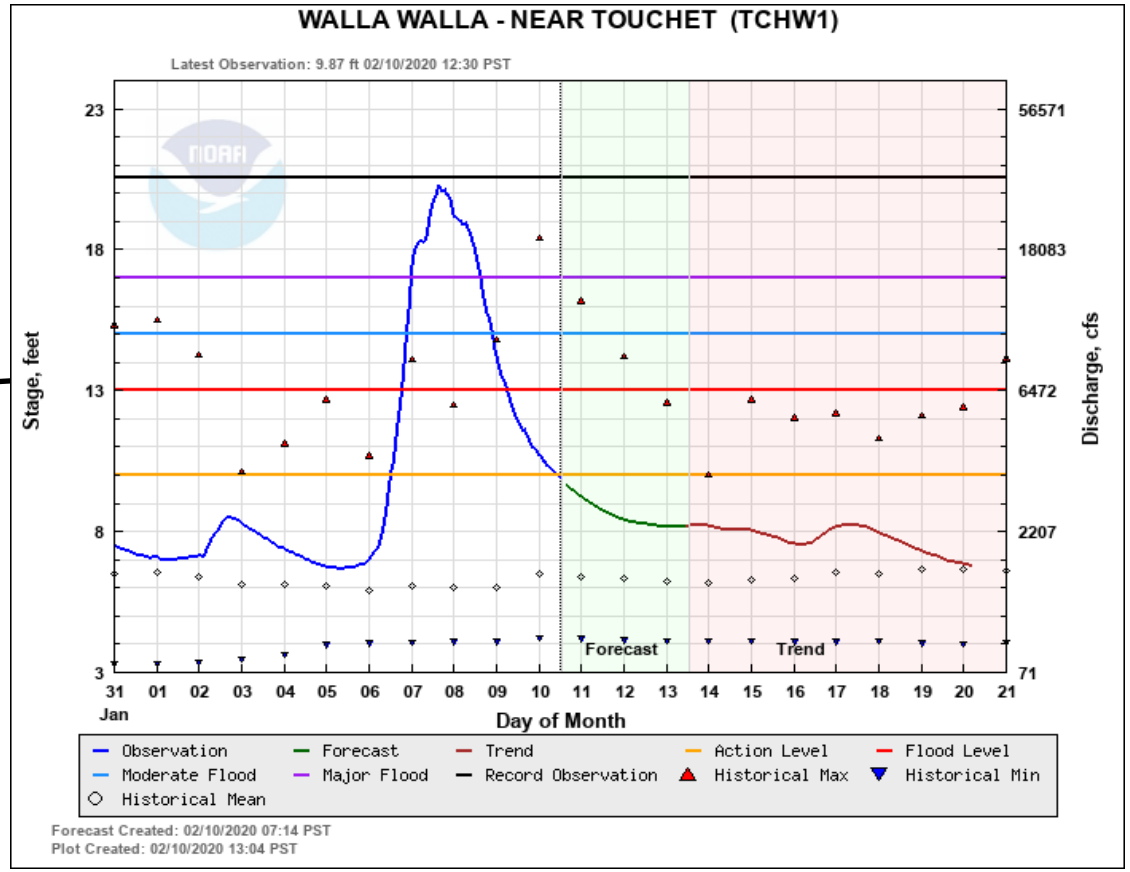

Source: NOAA/NWS Northwest River Forecast Center, https://www.nwrfc.noaa.gov/

- **The combination of heavy rainfall and saturated soils resulted in flooding at lower elevations downstream of the WA Cascades and the Blue Mountains in southeastern WA and northeastern OR**
- **The Walla Walla River (near Touchet, WA) rose 10 feet in 24 hours and reached a peak stage of 20.22 feet (2nd highest on record) and peak discharge of 29,800 cfs (3rd highest on record) on 7 Feb**

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Mudslide along SR-706 in Ashford, WA

Landslide along SR-410 near Greenwater, WA

Source: Washington State Department of Transportation, https://www.wsdot.wa.gov

- **Heavy rainfall on top of saturated soils produced another round of landslides west of the WA Cascades**
- **Mount Rainier National Park was closed to car traffic due to debris flows across SR-706 in Ashford, WA, and SR-410 near Greenwater, WA**

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Washington SNOTEL: Paradise (5,130 ft)

Date	Paradise (679) Snow Water Equivalent (in) Start of Day Values	Paradise (679) Snow Depth (in) Start of Day Values	Paradise (679) Precipitation Accumulation (in) Start of Day Values
2020-02-01	48.8	114	65.2
2020-02-02	48.4	105	66.3
2020-02-03	47.6	101	66.5
2020-02-04	47.8	105	66.7
2020-02-05	49.7	119	66.6
2020-02-06			67.0
2020-02-07			
2020-02-08	62.8		77.0
2020-02-09	64.4		77.2
2020-02-10	64.6		77.0

Washington SNOTEL: Corral Pass (5,800 ft)

Date	Corral Pass (418) Snow Water Equivalent (in) Start of Day Values	Corral Pass (418) Snow Depth (in) Start of Day Values	Corral Pass (418) Precipitation Accumulation (in) Start of Day Values
2020-02-01	29.2	78	29.5
2020-02-02	29.7	79	29.9
2020-02-03	29.5	77	29.9
2020-02-04	29.6	77	30.0
2020-02-05	31.2	87	31.1
2020-02-06			32.6
2020-02-07		107	34.1
2020-02-08		108	36.8
2020-02-09	40.8	111	38.2
2020-02-10	40.5	108	38.1

Oregon SNOTEL: High Ridge (4,920 ft)

Date	High Ridge (523) Snow Water Equivalent (in) Start of Day Values	High Ridge (523) Snow Depth (in) Start of Day Values	High Ridge (523) Precipitation Accumulation (in) Start of Day Values
2020-02-01	20.1	62	25.8
2020-02-02	21.5	72	26.8
2020-02-03	21.4	67	26.9
2020-02-04	21.2	64	27.0
2020-02-05	21.6	67	27.4
2020-02-06	27.3	80	30.5
2020-02-07	27.2	73	35.1
2020-02-08		72	36.4
2020-02-09	26.2	80	37.2
2020-02-10	25.9	78	37.6

Source: USDA | NRCS National Water and Climate Center, https://www.nrcs.usda.gov/wps/portal/wcc/home/

- **Between 4 Feb and 9 Feb, the Paradise and Corral Pass SNOTEL stations recorded SWE increases of 16.6 inches and 12.2 inches, respectively**
- **The High Ridge SNOTEL station recorded a 24-hour SWE increase of 5.7 inches between 5 Feb and 6 Feb**

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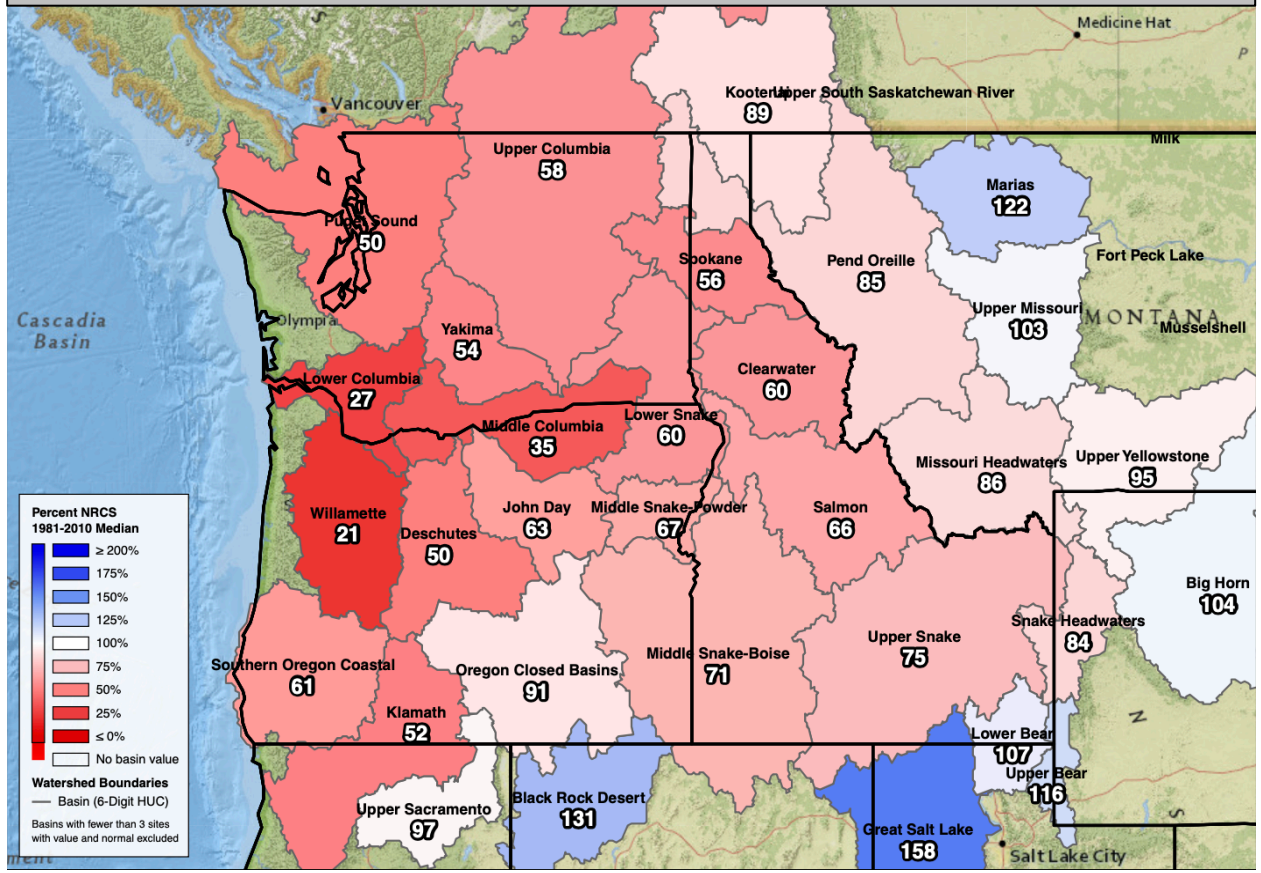
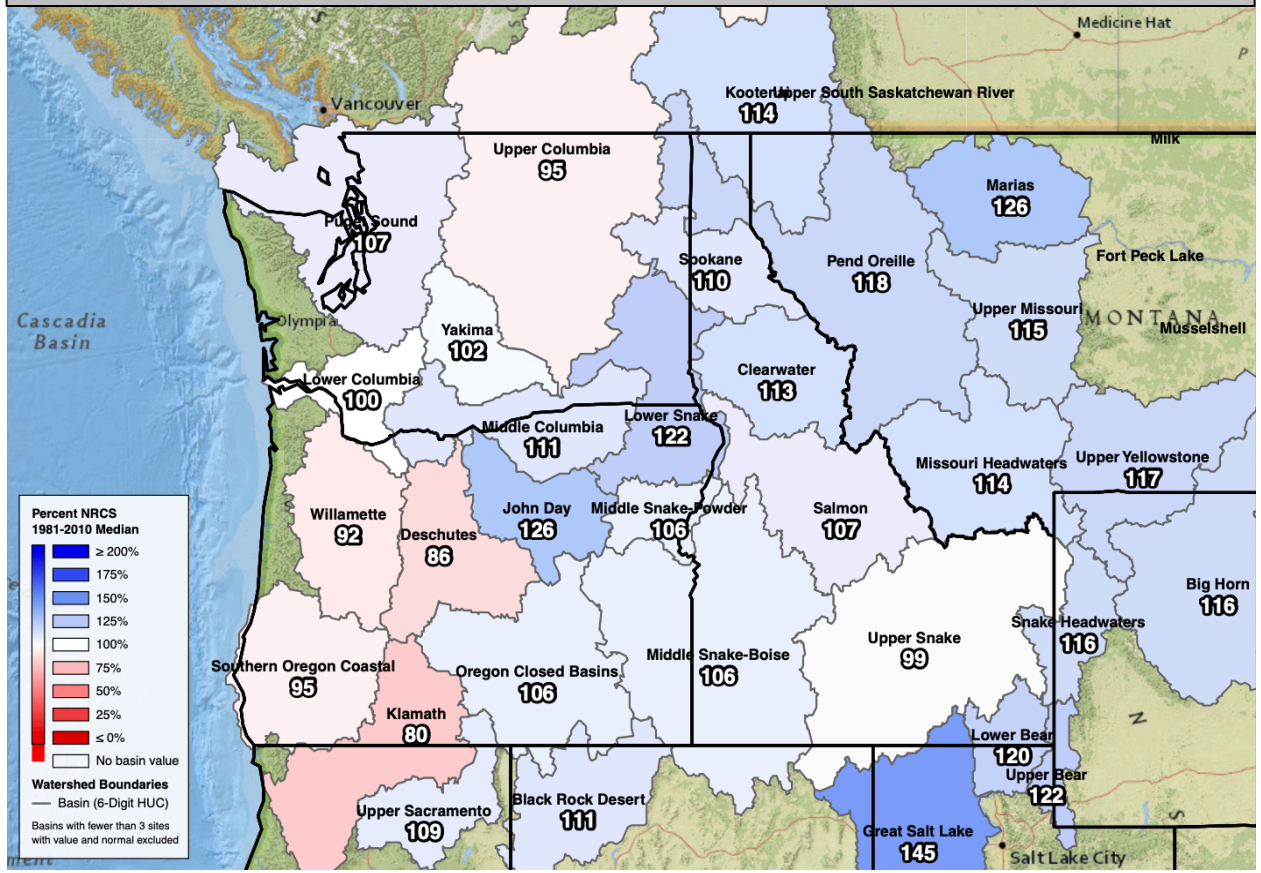
SWE Percent of NRCS 1981–2010 Median: 1 Jan



SWE Percent of NRCS 1981–2010 Median: 10 Feb



Source: USDA | NRCS National Water and Climate Center, https://www.nrcs.usda.gov/wps/portal/wcc/home/

- After an unusually dry start to the water year, the Pacific Northwest has experienced a prolonged period of very wet conditions
- As of 1 Jan, most basins were reporting only 50–75% of the 1981–2010 median SWE (< 40% in the Willamette, Lower Columbia, and Middle Columbia Basins)
- As of 1 Feb, most basins were reporting SWE near or slightly above the 1981–2010 median values