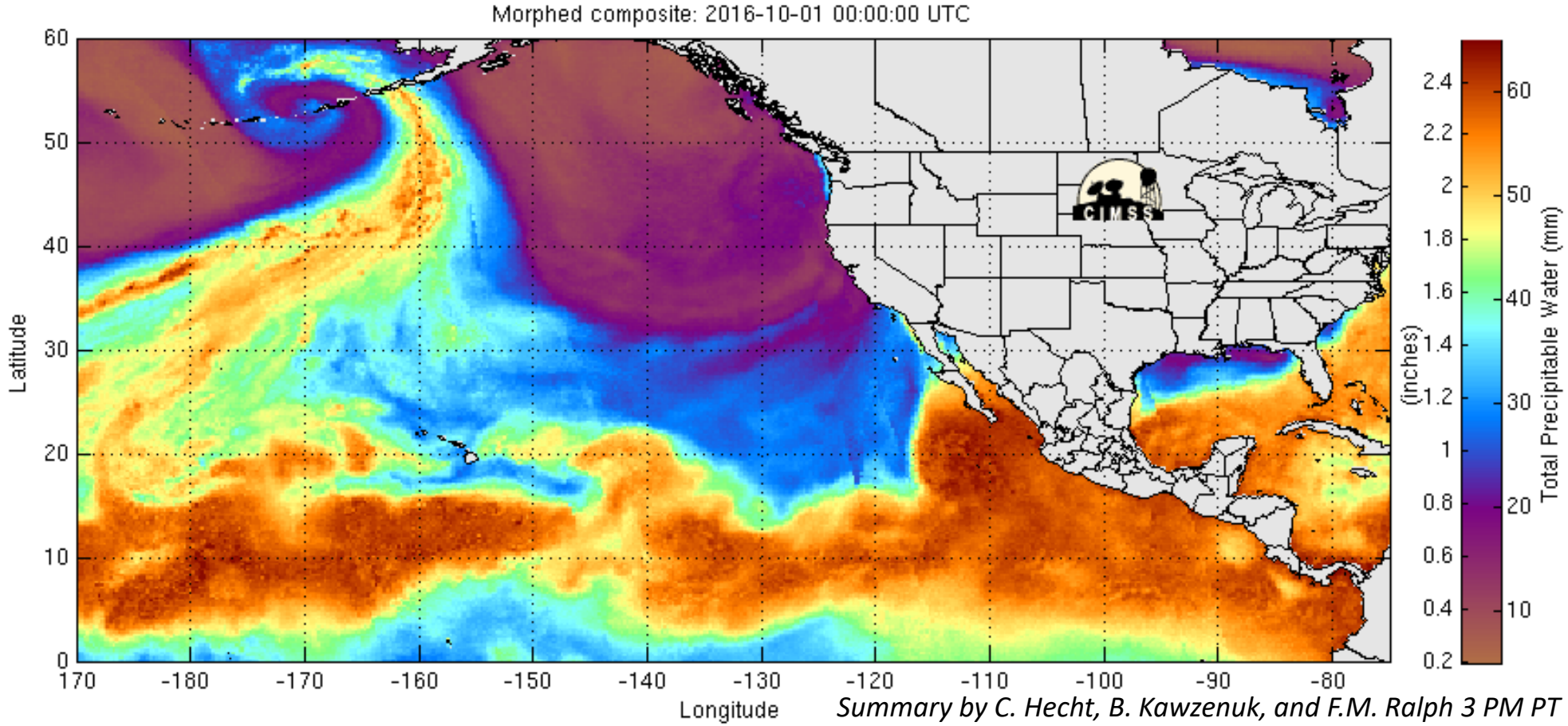
Summary of October 2016

For California's DWR's AR Program

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

Active Month Brings Substantial Rainfall to U.S. West Coast

- October saw several atmospheric rivers make landfall along the West Coast, making it one of the wettest Octobers on record
- Some locations in the Pacific Northwest received ~400% of the normal precipitation for October
- Oct. marks the first month of the Water Year and several locations have already received 75% of the normal WY precipitation
- While flooding was not a result due to drier soil conditions, the high precip. accumulations acted to mitigate a large region of abnormally dry and moderate drought conditions across the Northwest



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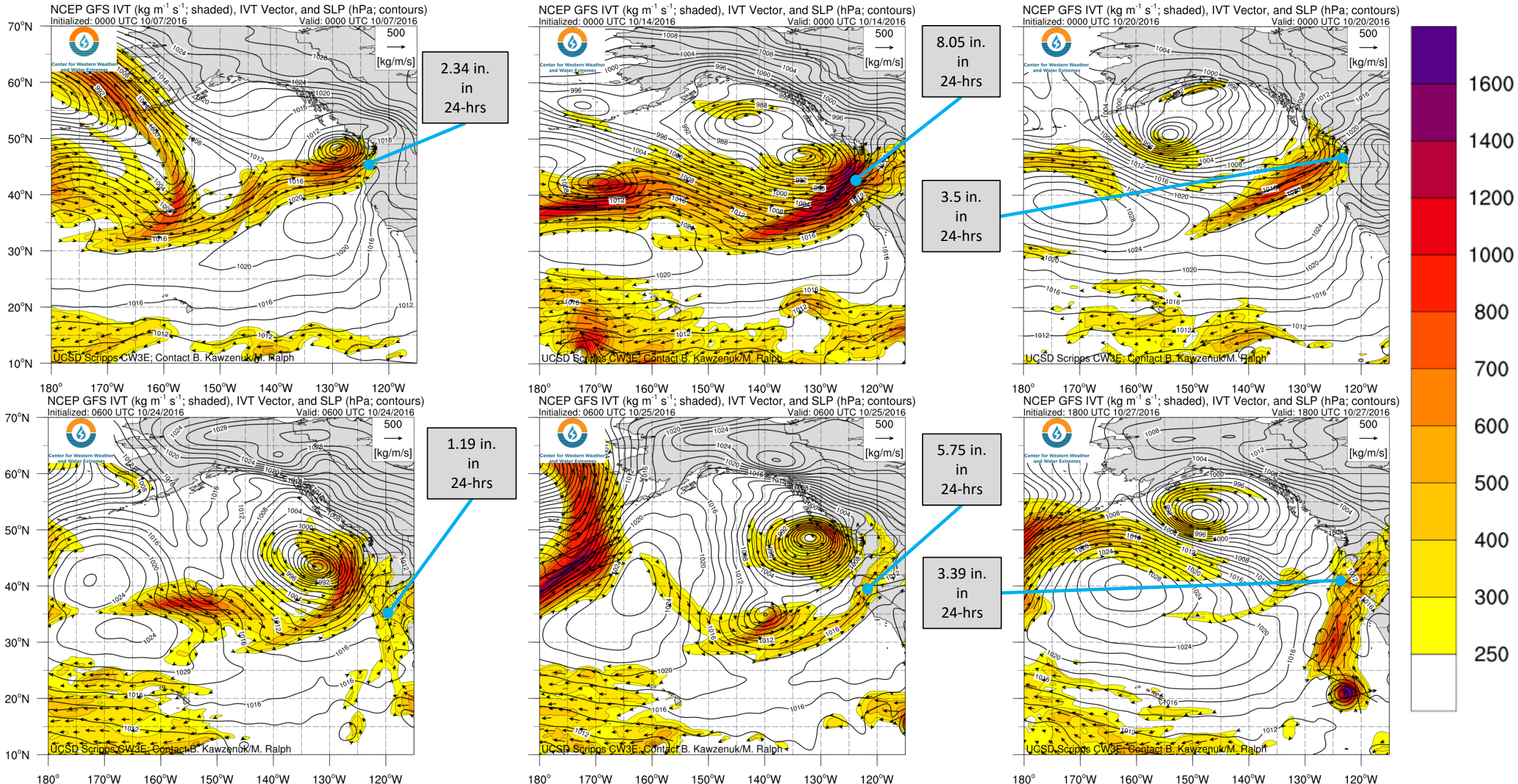
ARs in October 2016

The West Coast was repeatedly hit by several ARs bringing high precipitation accumulations



Precipitation in October 2016

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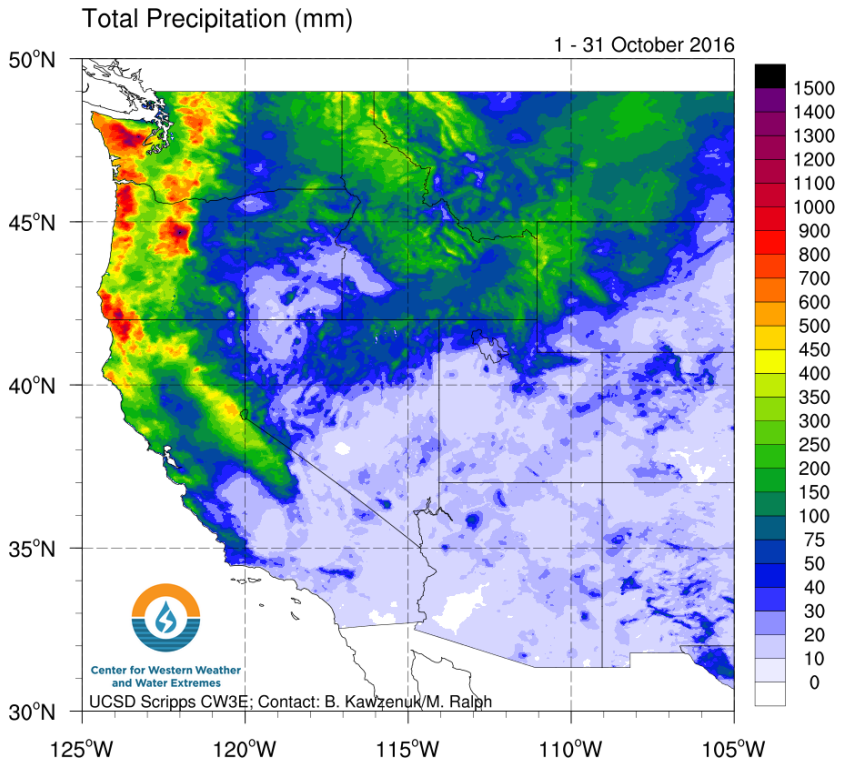

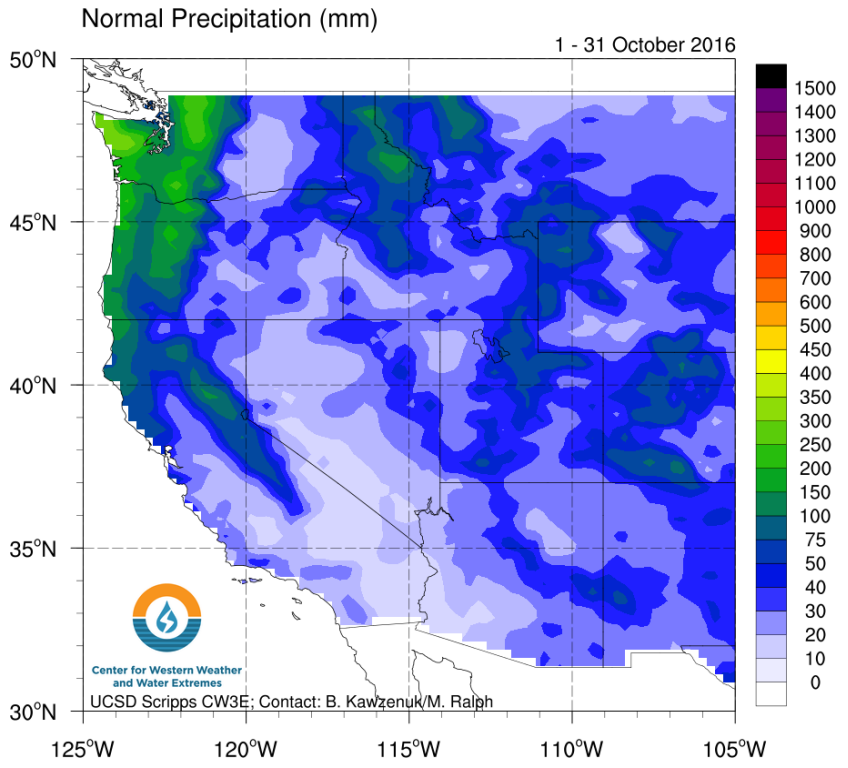

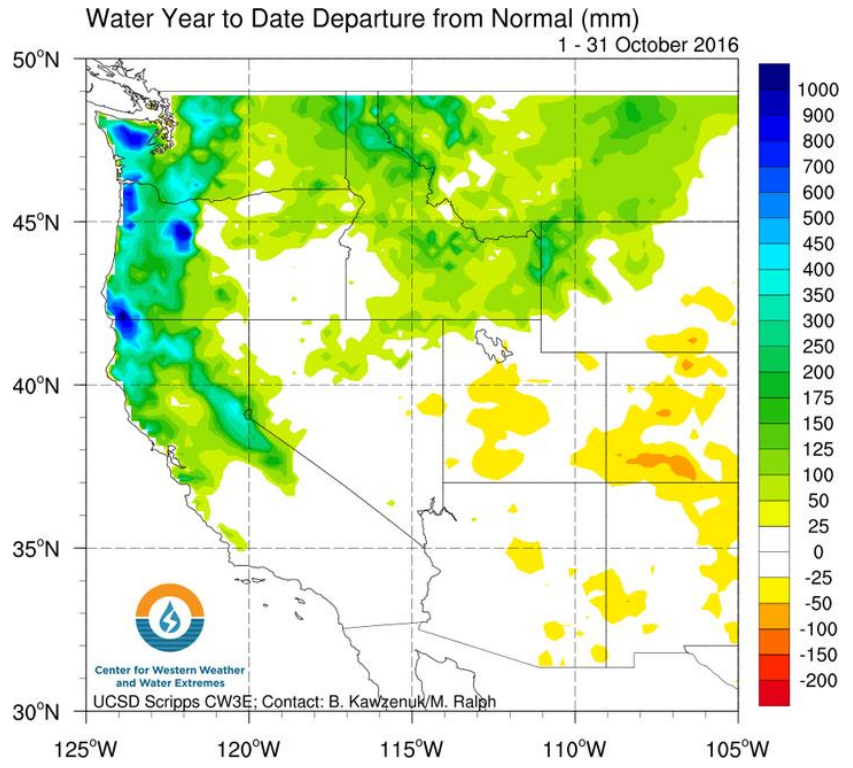

As much as ~1250 mm of precipitation fell over the high elevations of the Cascade, Coastal, and Olympic Mountain Ranges

The average precipitation for October over the West Coast ranges from ~50 mm at lower elevations to ~500 mm at higher elevations

This lead to some locations receiving up to 900 mm above normal monthly precipitation

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Precipitation in October 2016

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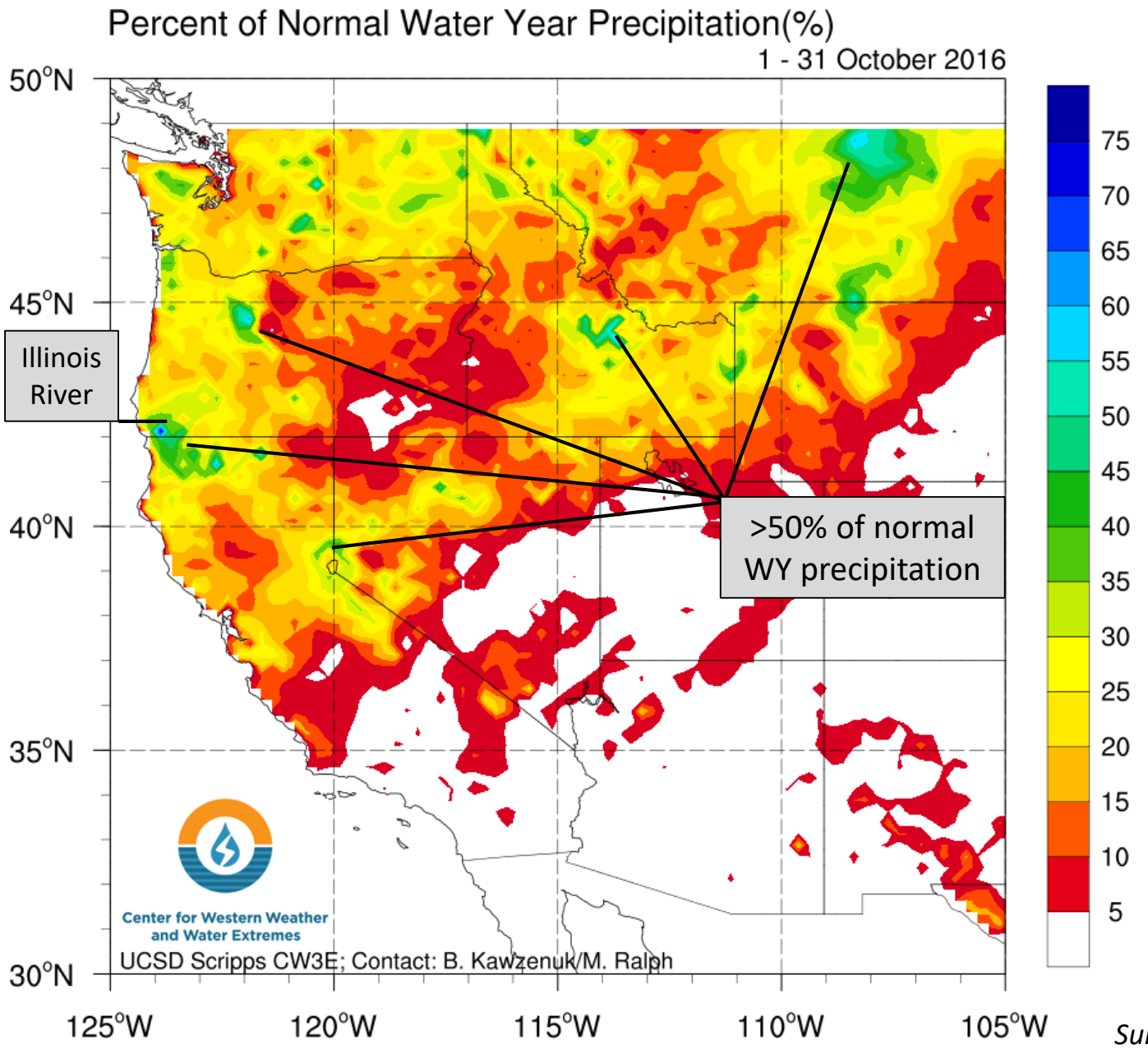
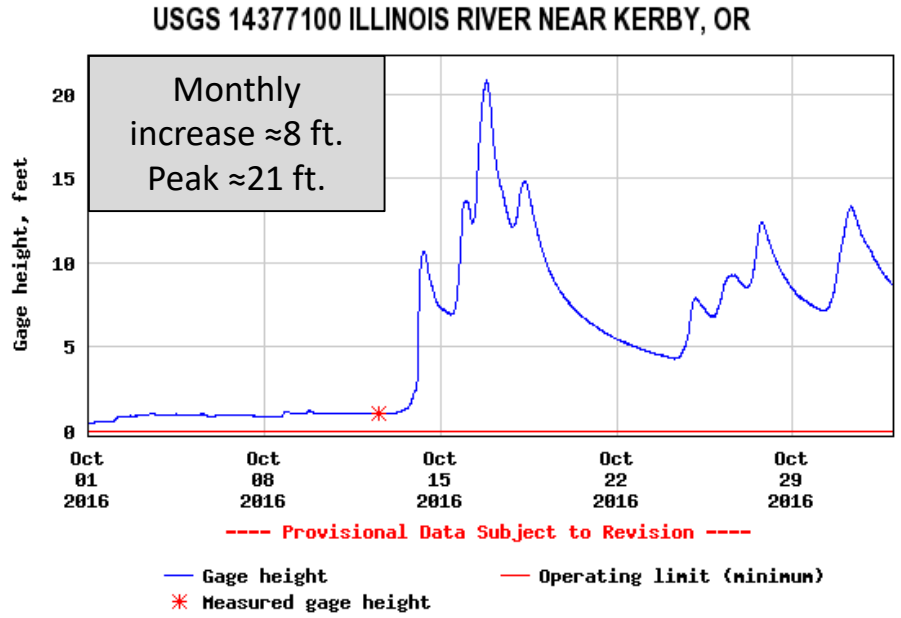


Several locations in higher elevations saw as much as 76% of their total normal water year precipitation

SW OR/NW CA saw >40% of normal water year precipitation resulting in large increases in river levels



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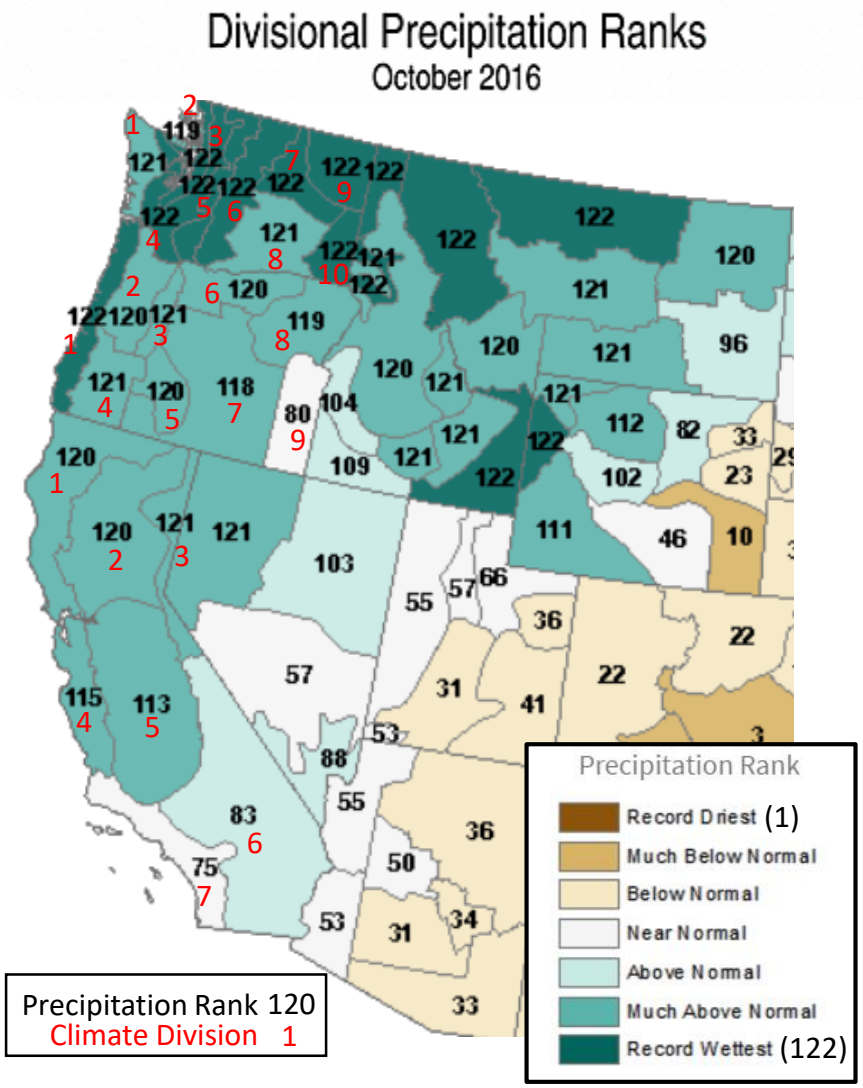
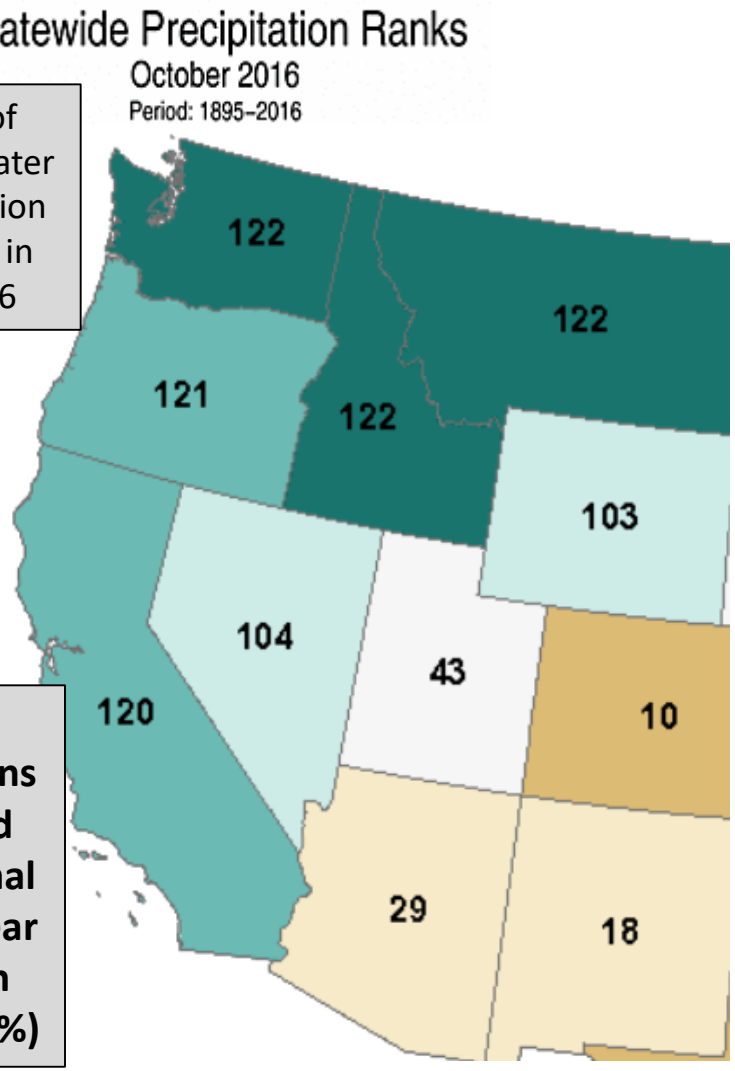


State / Climate Division		Oct 2016 Precip (in)	Normal WY Precip (in)	Percentage of Normal WY
	ALL	3.58	22.39	15.99
	1	**10.65**	**48.68**	**21.88**
	2	6.66	35.18	18.93
	3	**4.47**	**20.62**	**21.68**
	4	2.49	20.96	11.88
	5	2.39	20.07	11.91
	6	0.58	18.98	3.06
	7	0.39	6.26	6.23
OR	**ALL**	**6.87**	**32.21**	**21.33**
	1	**20.57**	**83.49**	**24.64**
	2	**13.22**	**57.42**	**23.02**
	3	**12.57**	**47.22**	**26.62**
	4	**17.91**	**79.53**	**22.52**
	5	**5.64**	**25.72**	**21.93**
	6	3.59	18.1	19.83
	7	2.66	15.73	16.91
	8	3.82	24.71	15.46
	9	1.05	12.55	8.37
WA	**ALL**	**9.98**	**42.03**	**23.74**
	1	**24.68**	**108.26**	**22.80**
	2	5.43	27.77	19.55
	3	**9.88**	**43.32**	**22.81**
	4	**16.55**	**73.79**	**22.43**
	5	**19.56**	**86.35**	**22.65**
	6	**8.45**	**36.96**	**22.86**
	7	**3.89**	**13.13**	**29.63**
	8	**2.95**	**10.16**	**29.04**
	9	**6.87**	**22.41**	**30.66**
	10	**4.94**	**19.66**	**25.13**

Percentage of normal total water year precipitation that occurred in October 2016



Bold rows indicate regions that received >20% of normal total water year precipitation (highlight >25%)

Several climate divisions in WA, Western OR had the wettest October on record

All but one Climate Division in California had above average precipitation for October

National Centers for Environmental Information
Fri Nov 4 2016

October 2016 was Washington's wettest, Oregon's second wettest, and California's third wettest October on Record

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Russian River Watershed

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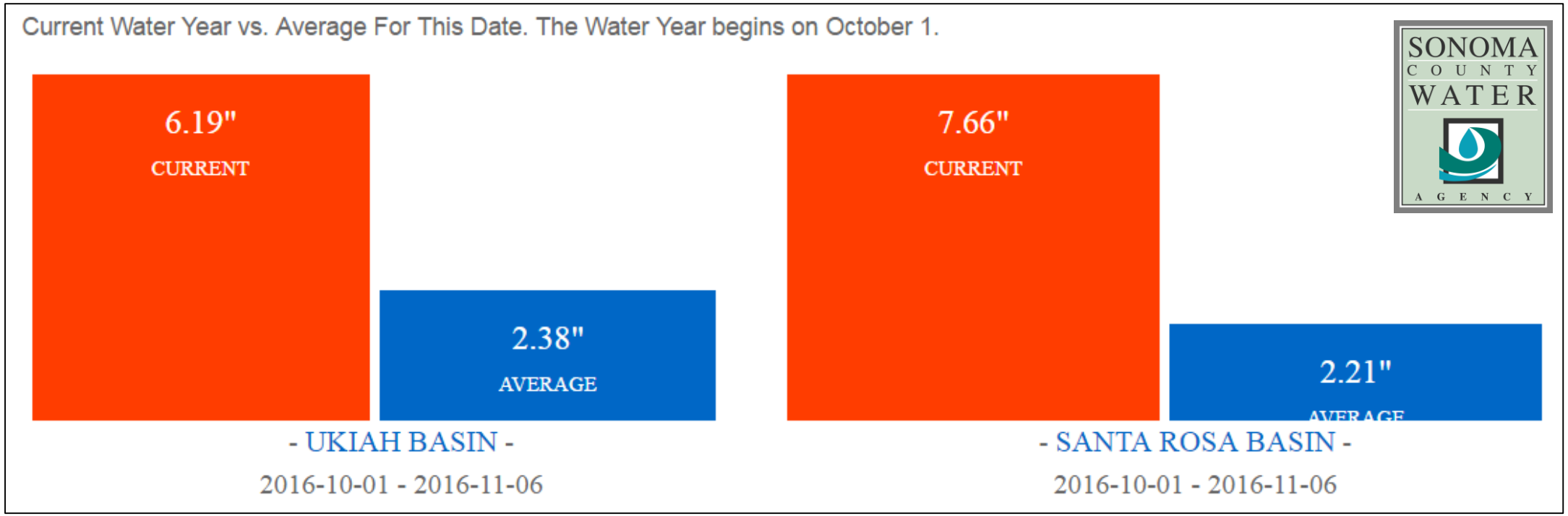

The Ukiah and Santa Rosa Basins in the Russian River Watershed, have received 3.81” and 5.45” more than the average WY precipitation to date

The ground water beneath these two basins provide a source of water for residents and municipal systems, irrigation water for agriculture, and base flow to streams, surface water bodies and associated ecosystems

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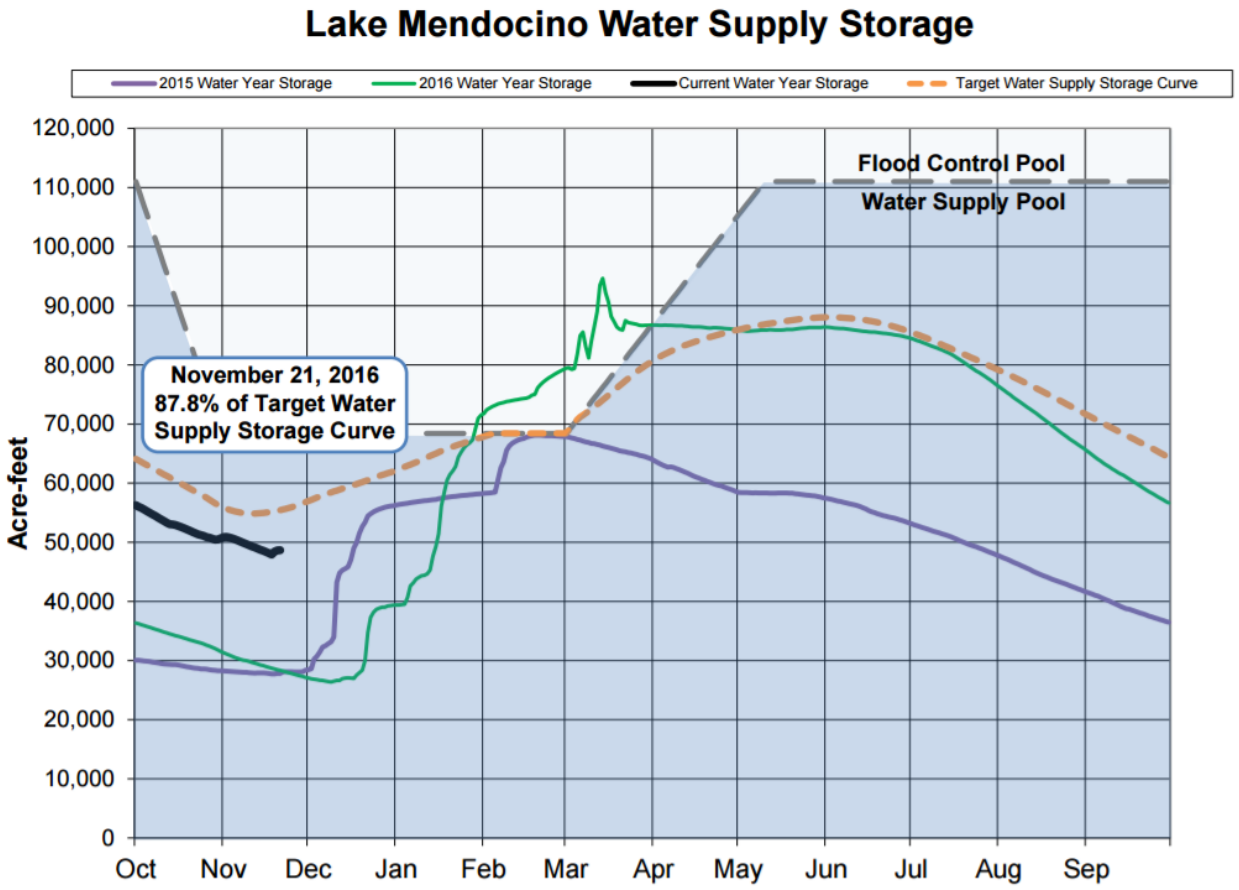
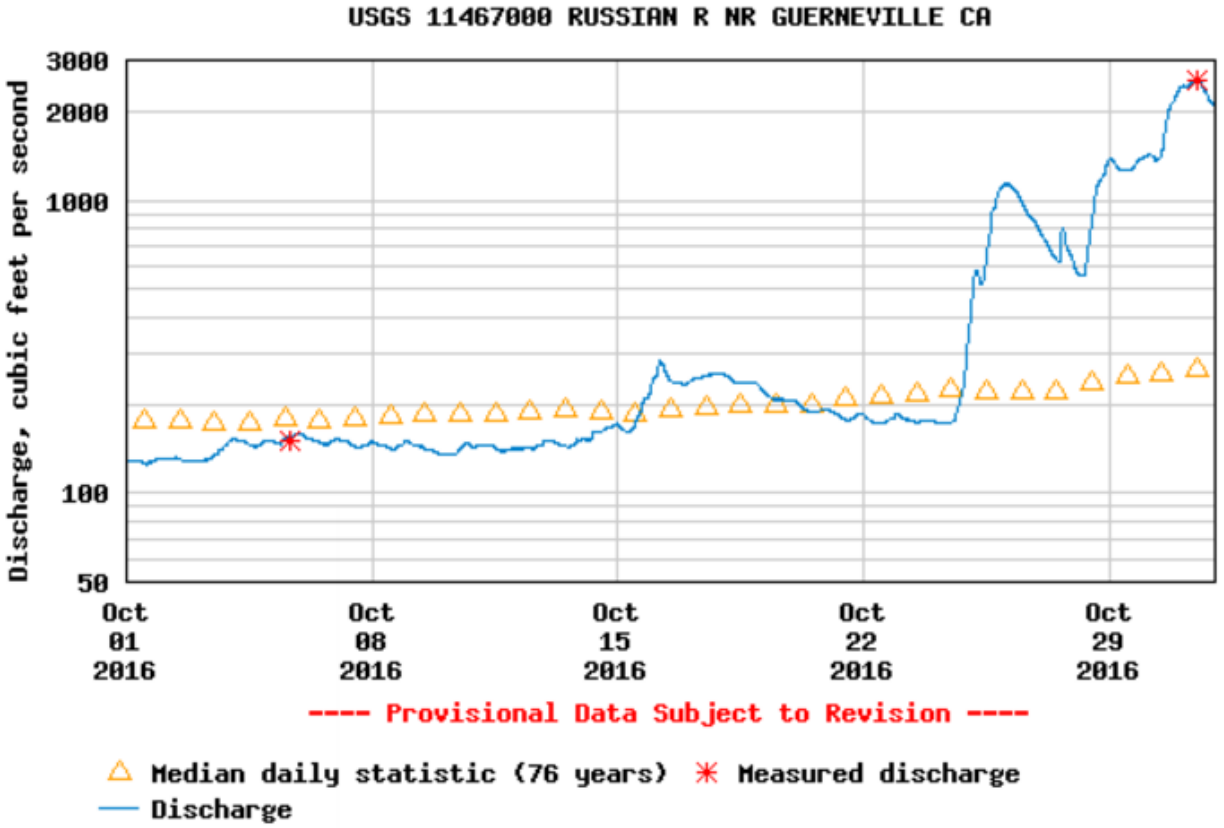
Russian River Watershed

Despite high precipitation, reservoir levels on the Russian River (Lakes Mendocino (below) and Sonoma) had a decrease in levels due to water supply needs of the region. Although the decrease in storage was slightly less than normal October decreases





The Russian River at Guerneville, California saw discharge reach as high as ~2500 cubic feet per second.

High precipitation occurred throughout the month, but most rivers did not show a response due to dry soils early in the month. Soil moisture increased sufficiently by late October resulting in high runoff.

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Northern Sierra 8-Station Index

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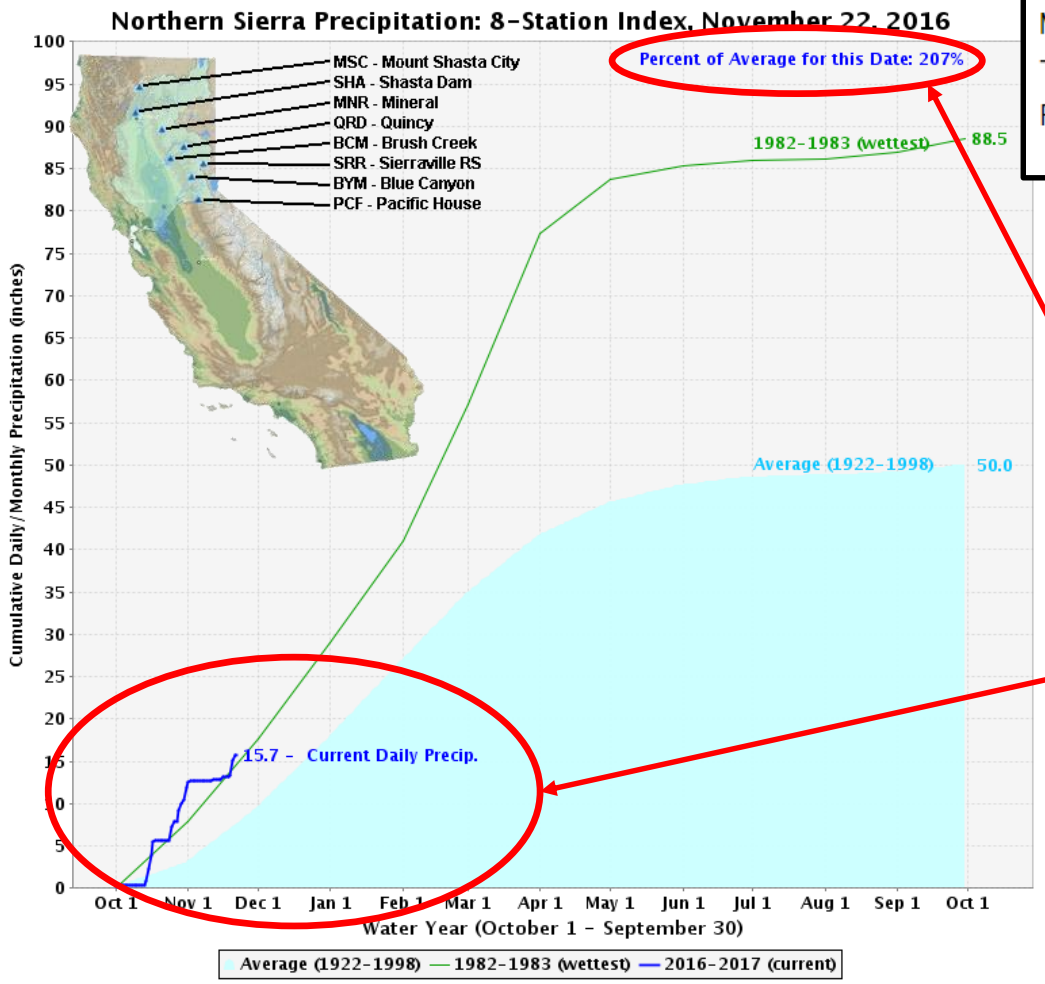
Percentage of WY Precipitation to Date for 16 October 2016 at Northern Sierra 8-station index

Current:	8.6% (1958/10/16)	1-day Δ:	2.87%	2-day Δ:	5.12%	3-day Δ:	7.79%
Rec_low:	0.0%	50-ptile:	0.15%	50-ptile:	0.25%	50-ptile:	0.34%
Typ_low:	0.0%	90-ptile:	1.82%	90-ptile:	2.82%	90-ptile:	3.58%
Mean:	2.5%	95-ptile:	2.70%	95-ptile:	4.34%	95-ptile:	5.47%
Typ_high:	5.4%	99-ptile:	4.68%	99-ptile:	7.12%	99-ptile:	9.12%
Rec_high:	32.8% (1962/10/16)	Record:	11.46% (1962/10/12)	Record:	20.52% (1962/10/13)	Record:	25.53% (1962/10/14)



The three day change from 14–16 October 2016 of the percentage of WY precipitation at the 8-station index in the Northern Sierra was 7.79%, which is approaching the 99th percentile of all events.

Due to the large precipitation amounts of Oct. and some more precipitation in Nov., the 8-station index is currently at 207% of average precipitation for this date (through November 22nd).

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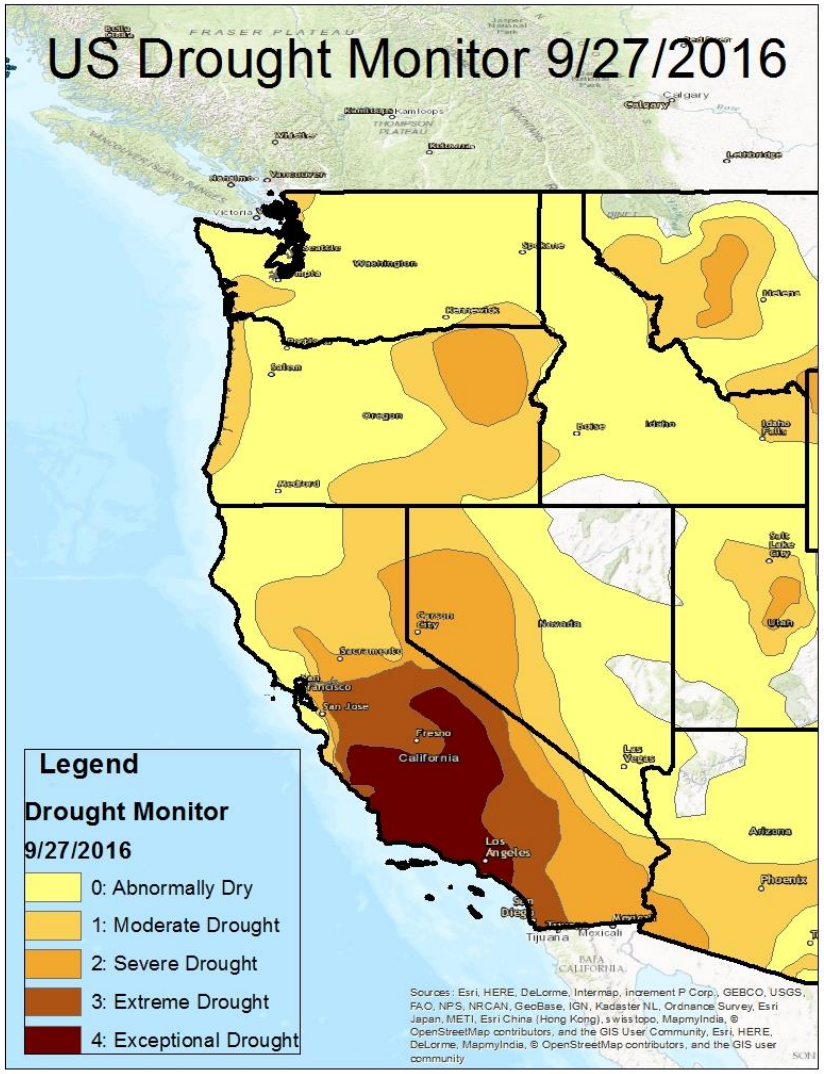
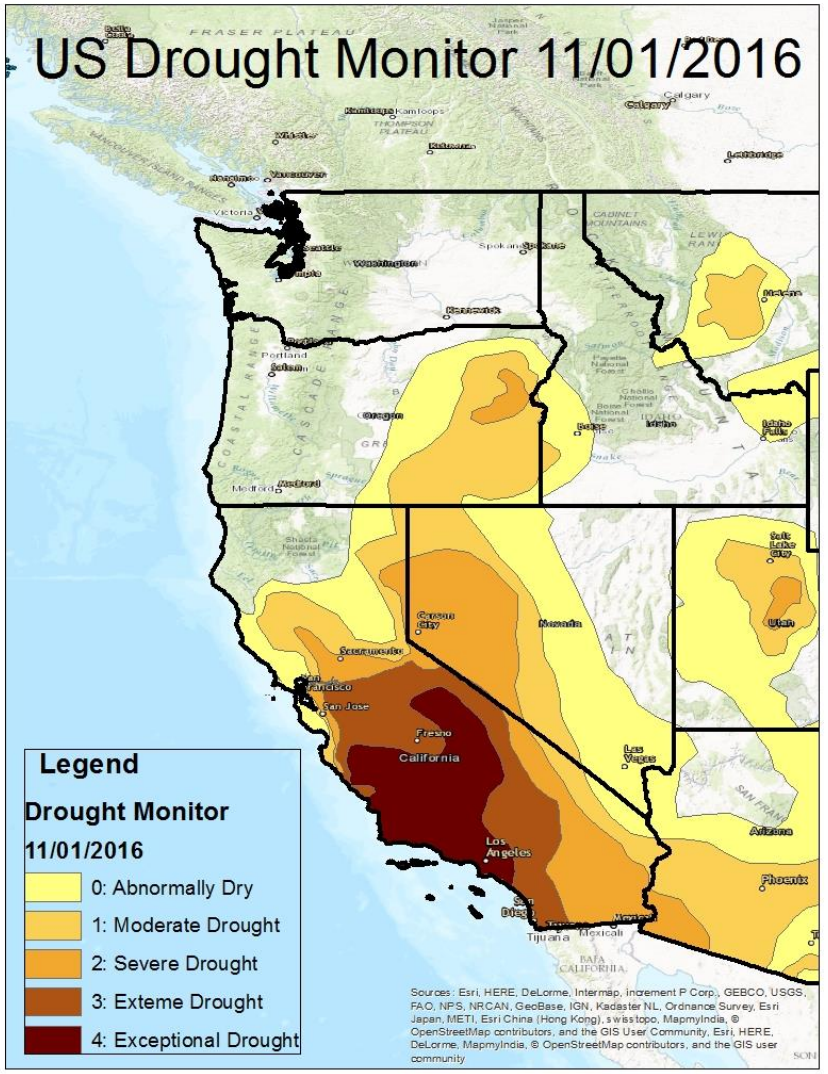
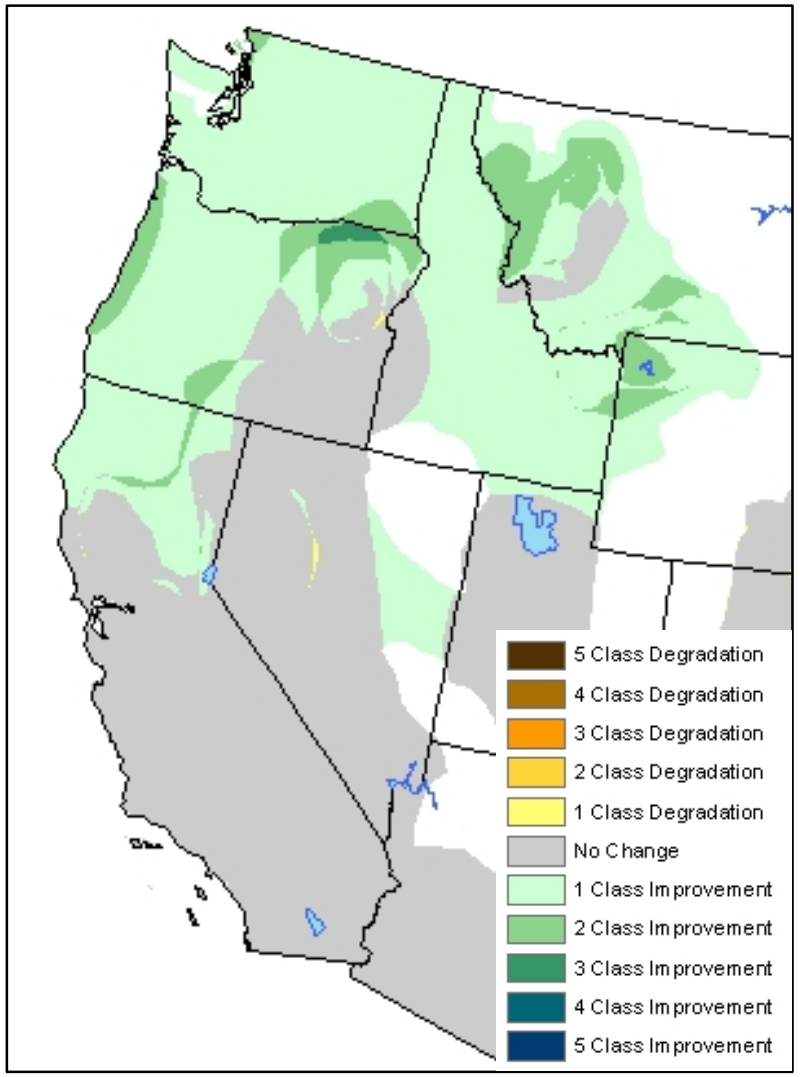
Drought Improvement







- The large amounts of precipitation resulted in drought mitigation over a large portion of the Pacific NW
- All of WA, a majority of OR and parts of northern CA saw a class improvement of at least 1

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Media Coverage

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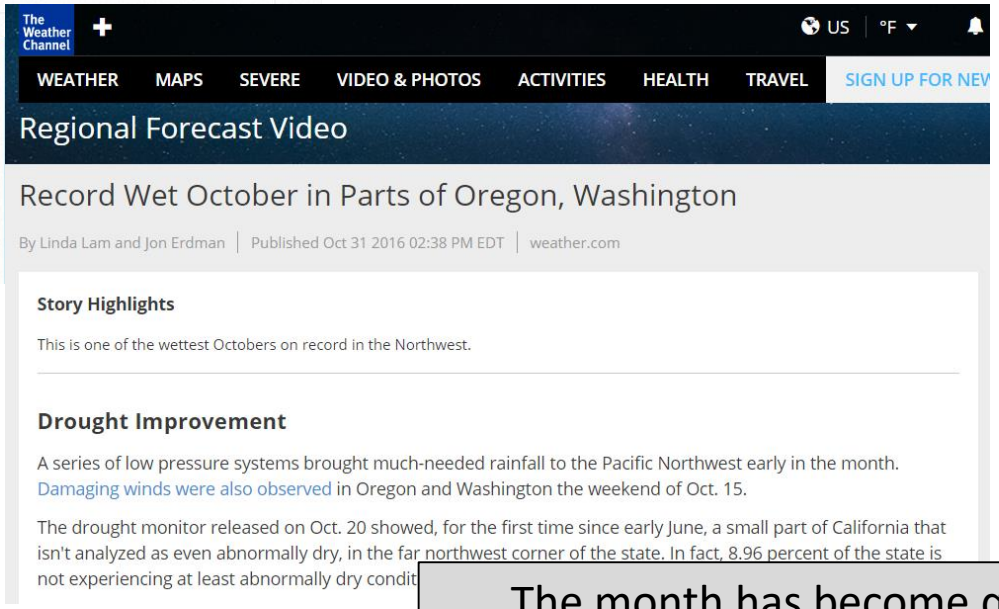
The active month of October 2016 made for one of the wettest Octobers on record for several locations in the Pacific Northwest



The month has become quite popular and has made headlines with several news outlets across the west

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