



United States
Department of
Agriculture



Natural Resources
Conservation
Service

Oregon Basin Outlook Report

April 1, 2019



Repair visit to Lucky Strike SNOTEL on March 7, 2019
Photo: Lauren Austin (Hydrologist, Oregon NRCS)

In early March, Snow Survey staff traveled to Lucky Strike SNOTEL in northeast Oregon to repair the transmission system and bring the site back online. As of April 1st, the snow water equivalent (SWE) at Lucky Strike is at 202% of normal. This site straddles the watershed boundary between the Umatilla and John Day basins, both of which held above average snowpack on April 1st (147% and 153%, respectively). Because of the ample snowpack, streamflow forecasts in this region of the state are above normal for the coming spring and summer flows.

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General Outlook

April 1st, 2019

SUMMARY

Statewide snowpack on the first of April remains above normal despite an overall dry month of March. A season's worth of snow was delivered during February and early March. The last week of winter showed the first signs of spring by bringing sunshine, abnormally warm temperatures and the first bouts of snowmelt. The abundant mountain snowpack was able to hold onto its above normal status even during late month losses due to snowmelt.

Based on the current conditions, most of Oregon's rivers and streams are expected to have near average to above average spring and summer flows. Where snow storms were less frequent this winter, the summer streamflow forecasts lean toward below average flows. These forecasts are subject to change depending on the next few months temperatures and rainfall. The Climate Prediction Center (CPC) long range weather forecasts are calling for warmer and drier conditions for the next 3 months: <https://www.cpc.ncep.noaa.gov/>. It's worth noting that if conditions are indeed abnormally dry and warm for extended periods of time, the seasonal streamflow may occur over a condensed period of time and result in less snowmelt-driven flows during the summer months. The U. S. Drought Monitor has eased up on the severity of drought conditions. However, most of the state remains in either abnormally dry to moderate drought category: <https://droughtmonitor.unl.edu/>.

In summary, the current snowpack conditions and forecasts point towards adequate spring and summer streamflow volumes for many rivers throughout the state, with the exception of basins in the northwest and parts of central Oregon. Given the climate outlook for warm and dry conditions in the coming months, cautious water users may wish to lean towards the drier, 70% chance of exceedance forecasts. Also, water users should be on the lookout for rapidly warming temperatures coupled with heavy rainfall, which could lead to short-term flooding. Even though the long-term climate outlook calls for warmer and drier conditions overall, it does not cover short-term forecasts for potential moisture-laden storm systems that could still occur during the spring months.

SNOWPACK

As of April 1st, mountain snow at all but the highest elevations has begun to melt, yet most of the state continues to hold onto an above normal snowpack. The lowest basin-wide snowpack is found in in the Hood, Sandy and Lower Deschutes basin at 94% of normal, even though some of the lower elevations in that basin have above normal amounts of snow. April 1st snowpack levels across the rest of the state are near normal to well above normal. The highest snowpack in the state is in Lake County and Goose Lake basins at 172% of normal.

Across most of the state, the record-breaking February snow storms caused mountain snowpacks to peak at near normal to above normal levels before transitioning to spring snowmelt in March. Over sixty percent of Oregon's SNOTEL sites either reached or surpassed their normal seasonal snow peak this winter, and most of these peaked on time or up to 3 weeks later than usual. This was especially true in parts of eastern and southern Oregon, where snow accumulation was more consistent all season. Highlighting local variability in weather and

snow conditions, some locations scattered throughout the northern and central Cascades remained below normal throughout the season and at the peak, even though February snow accumulation was more than double in some cases.

Now that the state is mostly past the peak of the snow accumulation season, the rate and timing of snowmelt will be a major influence in shaping the final water supply story. The best-case scenario would be for the snowpack to melt at normal rates and slowly contribute to streamflow over the next few months. If the CPC's warmer than normal forecast occurs through the spring months, the sustained warm temperatures could accelerate snowmelt rates.

PRECIPITATION

March brought below average precipitation to all of Oregon except a few sites near the divide of Klamath and Goose Lake basins, where precipitation continued to be above average. The lowest percent of normal amounts of precipitation fell in the Hood, Sandy and Lower Deschutes basins at a mere 35% of normal. Several long-term weather stations in western Oregon measured at or near record low March precipitation.

Most of southern and eastern Oregon has received near average amounts of precipitation since the water year began on October 1st. February's well above average precipitation made up for other months that were drier than usual during this snow season. The exception was in northwestern Oregon and parts of central Oregon, where storms have been lacking all winter long. Looking at the western United States, the storm track more or less followed precipitation patterns associated with El Nino conditions. As storms hammered through California (moving from southwest to northeast), parts of southern and eastern Oregon reaped the benefits. Meanwhile, northwestern Oregon and western Washington missed the consistent plume of moisture, even though February made a valiant effort and brought a pleasant surprise to snow recreationalists.

RESERVOIRS

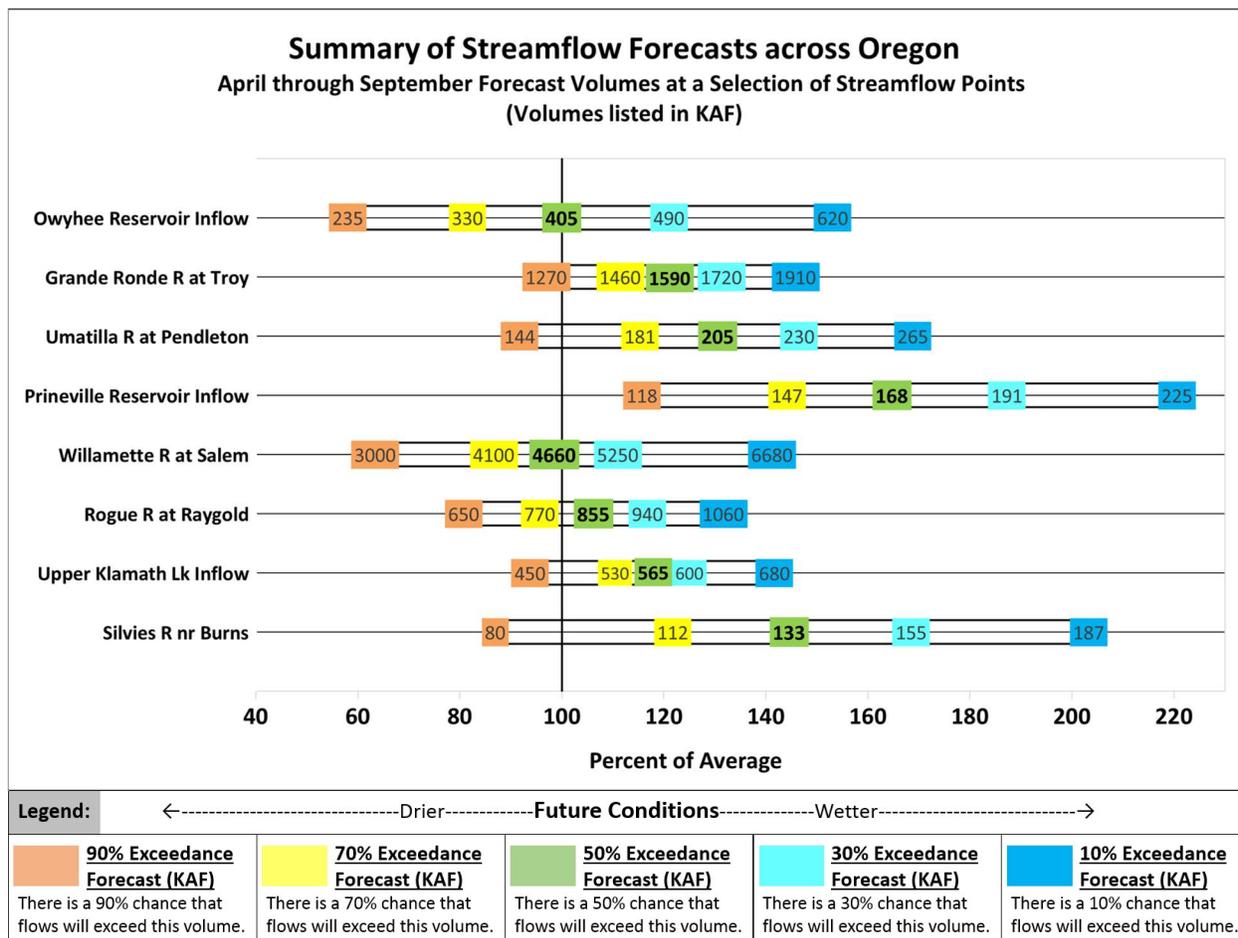
Similar to last month, reservoir storage is variable across Oregon. Many reservoirs are near or below average, though some basins are storing above average amounts of water. Collectively, the lowest basin-wide reservoirs are the Grande Ronde, Powder, Burnt, and Imnaha at 67% of normal and the Owyhee, Malheur, Upper Deschutes and Crooked basins at 80% of normal. The basins with the highest amount of reservoir storage are the Umatilla, Walla Walla, and Willow basins at 109% of normal. Within each larger basin there is broad variability among individual reservoirs; for example, in the Willamette basin, April 1st reservoir storage ranges from 74% (Detroit) to 114% of normal (Foster). Reservoir operators continue to balance a number of factors, including summer water supply and the potential for large spring runoff events if the above-average snowpack melts rapidly.

STREAMFLOW

March streamflow was also variable. Northwest Oregon's rivers all had below normal streamflows, while rivers in the Umpqua, John Day, Umatilla and Willow basins experienced above average streamflow for the month. The rest of the state was mixed in March, but the majority of rivers and streams had below average flow.

Looking forward, many of the streamflow forecasts are calling for near normal to above normal spring and summer streamflow volumes. Barring any rapid warm-ups or heavy rains that would accelerate snowmelt or deplete the snow too early, water users that rely on streamflow may

have adequate water supplies in many basins throughout the state. Below normal streamflow is expected in northwest Oregon and in the Upper Deschutes basins, where water year precipitation has been lagging and March streamflow volumes were well below normal.



To accompany the forecast summary graphic above, here are some helpful reminders about interpreting streamflow forecasts published in this document. For each forecast point, five possible streamflow volumes are predicted. Where the observed streamflow occurs within this spectrum depends on the range of future weather conditions. If water users wish to plan conservatively, they may lean toward using the 70% chance of exceedance forecast, or the drier forecast. Conversely, if a water user believes future conditions will provide more water to the system, they could choose to use the 30% chance of exceedance forecast (the wetter forecast). These arrays of forecasts are shown in the chart above and explained in more detail at the end of this document.

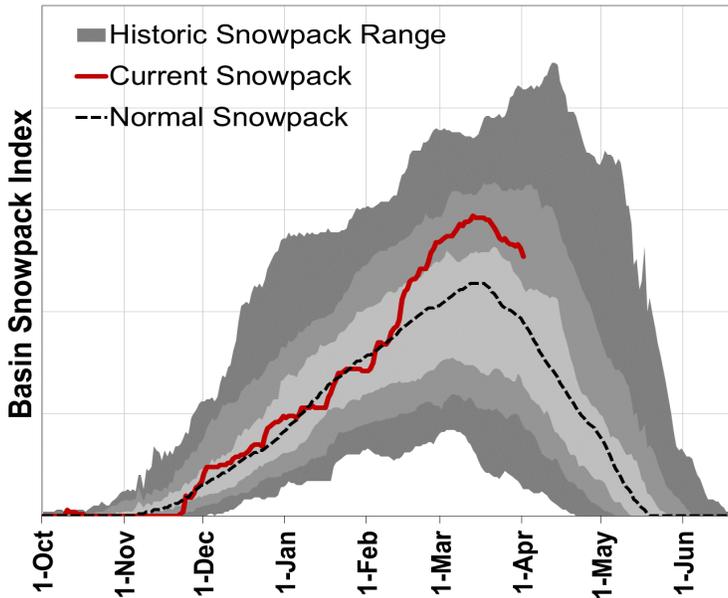
All forecasts are listed with units of 1000 acre-feet (KAF). This report contains data furnished by the Oregon Department of Water Resources, U.S. Geological Survey, NOAA National Weather Service and other cooperators. This report will be updated monthly, January through June.



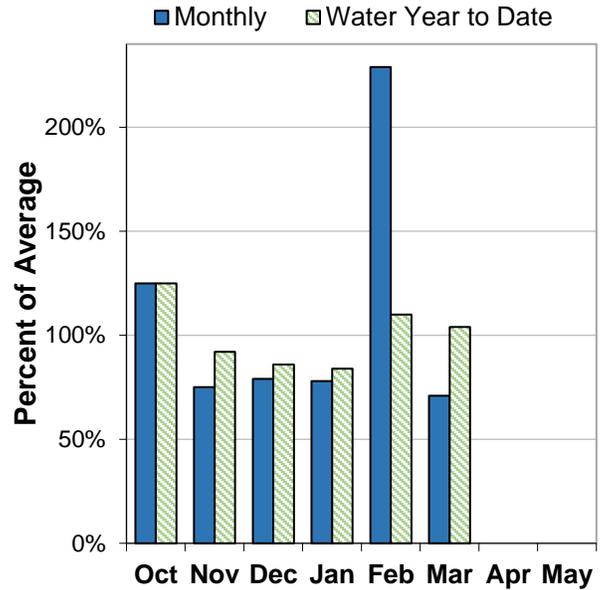
Owyhee and Malheur Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 140% of normal. This is similar to last month when the snowpack was 138% of normal. In general, SNOTEL sites in the basin have reached around 110% to 180% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 71% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 104% of average.

RESERVOIR

Reservoir storage across the basin is currently below average. As of April 1, storage at major reservoirs in the basin ranges from 49% of average at Warm Springs Reservoir to 88% of average at Lake Owyhee.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 100% to 154% of average. Overall, forecasts remain similar to last month's report. Water managers in the basin should expect near normal to well above normal streamflows this spring and summer.

Owyhee And Malheur Basins Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Owyhee R nr Rome	APR-JUL	184	275	350	101%	430	565	345
	APR-SEP	200	295	365	100%	450	585	365
Owyhee R bl Owyhee Dam ²	APR-JUL	210	305	380	101%	460	595	375
	APR-SEP	235	330	405	100%	490	620	405
Malheur R nr Drewsey	APR-JUL	75	93	105	154%	117	135	68
	APR-SEP	78	96	108	154%	120	137	70
NF Malheur R at Beulah ²	APR-JUL	58	70	77	138%	85	96	56
	APR-SEP	65	76	84	135%	92	103	62

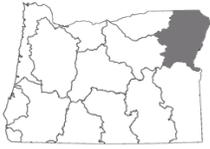
* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume
 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Beulah	33.5	35.4	43.5	77%	59.2
Bully Creek	20.4	16.5	23.8	86%	23.7
Lake Owyhee	434.4	569.8	495.8	88%	715.0
Warm Springs	56.3	120.3	113.8	49%	169.6

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
East Little Owyhee Basin	7	166%	51%
South Fork Owyhee Basin	7	131%	49%
Upper Malheur Basin	8	235%	41%
Upper Owyhee Basin	5	124%	54%

Owyhee And Malheur Basins Summary for April 1, 2019

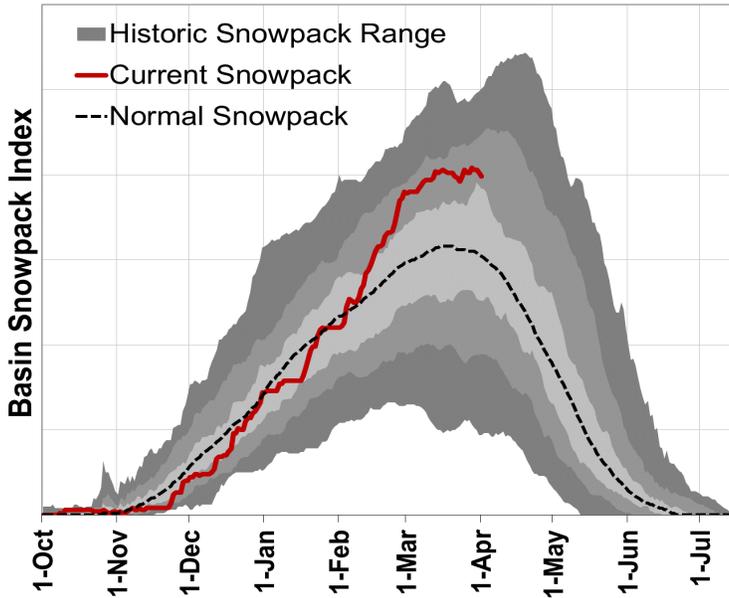
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Granite Peak SNOTEL	8543	1-Apr	80	30.2	14.6	21.2	142%
Toe Jam SNOTEL	7700	1-Apr	59	22.8	13.4		
Govt Corrals AM	7400	1-Apr	55	19.2	10.4	15.0	128%
Jack Creek Upper SNOTEL	7250	1-Apr	48	16.5	10.4	16.7	99%
Fawn Creek SNOTEL	7000	1-Apr	59	21.0	9.8	15.8	133%
Merritt Mountain AM	7000	1-Apr	32	10.9	1.2	5.5	198%
Buckskin Lower SNOTEL	6915	1-Apr	40	14.4	4.3	8.5	169%
Jack Creek Lower Snow Course	6800	26-Mar	0	0.0	0.0	0.8	0%
Gold Creek Snow Course	6707	25-Mar	19	6.5	0.0	2.0	325%
Big Bend SNOTEL	6700	1-Apr	26	10.4	2.7	7.7	135%
Fry Canyon SNOTEL	6700	1-Apr	6	1.4	0.6		
Fry Canyon Snow Course	6700	25-Mar	25	7.8	1.8	4.8	163%
Laurel Draw SNOTEL	6697	1-Apr	33	12.3	4.6	8.6	143%
Columbia Basin AM	6650	1-Apr	24	8.2	0.0	7.6	108%
Red Canyon AM	6600	1-Apr	20	7.6	0.0	4.1	185%
Louse Canyon AM	6530	1-Apr	26	9.1	0.0	3.2	284%
South Mtn. SNOTEL	6500	1-Apr	39	16.6	5.4	17.3	96%
Succor Creek AM	6310	1-Apr	20	7.6	0.4	8.0	95%
Quinn Ridge AM	6270	1-Apr	0	0.0	0.0	0.0	
Taylor Canyon SNOTEL	6200	1-Apr	18	8.3	0.0	1.3	638%
Blue Mountain Spring SNOTEL	5870	1-Apr	50	20.5	8.9	15.9	129%
Vaught Ranch AM	5850	1-Apr	2	0.7	0.0	0.0	
Barney Creek (New) Snow Course	5830	2-Apr	37	13.4	3.5		
Buck Pasture AM	5740	1-Apr	9	3.4	0.0	0.0	
Lookout Butte AM	5740	1-Apr	0	0.0	0.0	0.0	
Mud Flat SNOTEL	5730	1-Apr	8	3.4	0.0	2.5	136%
Battle Creek AM	5710	1-Apr	6	2.2	0.0	0.0	
Boulder Creek AM	5710	1-Apr	16	6.1	0.0	0.5	1220%
Reynolds Creek SNOTEL	5600	1-Apr	11	3.7	0.1	0.1	3700%
Bull Basin AM	5460	1-Apr	0	0.0	0.0	0.0	
Dooley Mountain Snow Course	5440	2-Apr	29	11.6	0.0	8.0	145%
Call Meadows AM	5380	1-Apr	21	7.9	0.0	1.2	658%
Bully Creek AM	5300	1-Apr	8	3.0	0.0	0.0	
Rock Springs SNOTEL	5290	1-Apr	13	5.4	0.0	0.9	600%
Lake Creek R.S. SNOTEL	5240	1-Apr	33	12.7	1.9	8.6	148%
Flag Prairie AM	4720	1-Apr	13	4.9	0.0	0.0	
Eldorado Pass Snow Course	4630	2-Apr	11	4.6	0.0	0.0	



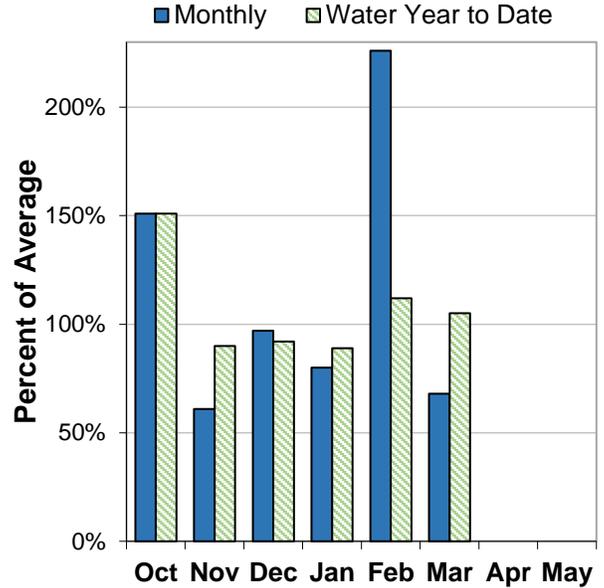
Grande Ronde, Powder, Burnt and Imnaha Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 130% of normal. This is similar to last month when the snowpack was 127% of normal. In general, SNOTEL sites in the basin below 7000 ft have reached around 110% to 150% of normal peak snowpack levels this winter. The two SNOTEL sites above 7000 ft (Mt. Howard and Aneroid Lake in the Wallowa Mtns) typically peak in April, so have likely not reached their seasonal peak yet.

PRECIPITATION

March precipitation was 68% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 105% of average.

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 29% of average at Phillips Lake to 126% of average at Wallowa Lake.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 107% to 131% of average. Overall, forecasts decreased slightly from last month's report. Water managers in the basin should expect above normal to well above normal streamflows this spring and summer.

Grande Ronde, Powder, Burnt And Imnaha Basins Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Burnt R nr Hereford ²	APR-JUL	30	38	44	133%	50	61	33
	APR-SEP	32	40	46	131%	53	63	35
Powder R nr Sumpter ²	APR-JUL	53	61	68	128%	75	85	53
	APR-SEP	54	63	69	128%	76	87	54
Pine Ck nr Oxbow	APR-JUL	153	183	205	131%	225	255	157
	APR-SEP	160	190	210	129%	230	260	163
Imnaha R at Imnaha	APR-JUL	245	285	310	122%	335	375	255
	APR-SEP	265	305	335	120%	360	400	280
Catherine Ck nr Union	APR-JUL	58	67	73	122%	80	89	60
	APR-SEP	62	72	78	122%	85	94	64
Lostine R nr Lostine	APR-JUL	100	109	114	108%	120	128	106
	APR-SEP	108	117	123	107%	130	139	115
Bear Ck nr Wallowa	APR-JUL	57	64	69	110%	74	81	63
	APR-SEP	59	66	71	109%	76	84	65
Grande Ronde R at Troy	APR-JUL	1170	1360	1490	122%	1620	1800	1220
	APR-SEP	1270	1460	1590	121%	1720	1910	1310

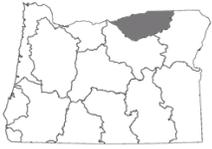
* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume
 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Phillips Lake	12.1	41.2	42.0	29%	73.5
Thief Valley	14.2	14.1	13.9	102%	13.3
Unity	15.3	21.6	20.6	74%	25.5
Wallowa Lake	21.4	23.4	17.0	126%	37.5
Wolf Creek	2.9	4.2	5.3	55%	11.1

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Burnt Basin	5	214%	55%
Imnaha Basin	5	116%	79%
Lower Grande Ronde Basin	5	105%	89%
Powder Basin	12	133%	70%
Upper Grande Ronde Basin	10	126%	85%
Wallowa Basin	8	109%	86%

Grande Ronde, Powder, Burnt And Innaha Basins Summary for April 1, 2019

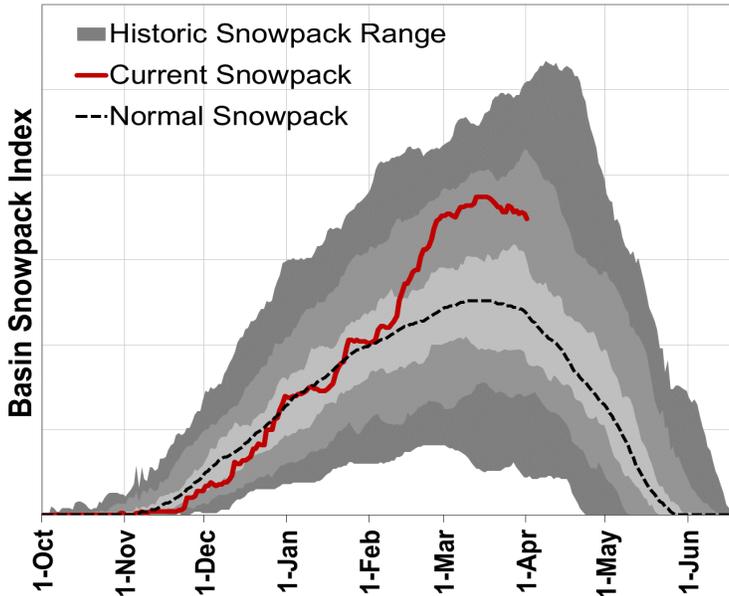
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Mirror Lake AM	8120	1-Apr	178	74.8		64.9	115%
Mt. Howard SNOTEL	7910	1-Apr	49	17.2	14.3	15.5	111%
Aneroid Lake #2 SNOTEL	7400	1-Apr	69	20.4	17.7	24.1	85%
Standley AM	7360	1-Apr	82	32.8	31.6	32.4	101%
Anthony Lake (Rev) Snow Course	7160	1-Apr	74	27.8	21.1	26.0	107%
TV Ridge AM	7050	1-Apr	53	21.0	15.6	17.8	118%
Bald Mtn AM	6600	1-Apr	80	32.0	25.9	25.8	124%
Little Alps Snow Course	6360	2-Apr	46	15.0	9.7	13.6	110%
Big Sheep AM	6230	1-Apr	67	26.8	18.6	24.2	111%
Bear Saddle SNOTEL	6180	1-Apr	73	29.1	15.8	22.3	130%
Placer Creek Snow Course	5860	1-Apr	68	24.7	16.1	16.4	151%
Bourne SNOTEL	5850	1-Apr	44	18.9	8.5	14.7	129%
Barney Creek (New) Snow Course	5830	2-Apr	37	13.4	3.5		
Moss Springs SNOTEL	5760	1-Apr	61	26.0	25.1	25.1	104%
Taylor Green SNOTEL	5740	1-Apr	56	27.8	15.3	19.6	142%
Boulder Creek AM	5710	1-Apr	16	6.1	0.0	0.5	1220%
Spruce Springs SNOTEL	5700	1-Apr	34	13.1	11.5	13.8	95%
Wolf Creek SNOTEL	5630	1-Apr	53	20.1	10.9	16.8	120%
Milk Shakes SNOTEL	5580	1-Apr	94	38.7	34.9		
West Branch SNOTEL	5560	1-Apr	63	28.8	15.5	21.0	137%
Touchet SNOTEL	5530	1-Apr	73	29.9	24.6	30.1	99%
Eilertson Meadows SNOTEL	5510	1-Apr	41	16.5	4.2	6.7	246%
West Eagle Meadows AM	5500	1-Apr	75	30.0	18.9	30.0	100%
Dooley Mountain Snow Course	5440	2-Apr	29	11.6	0.0	8.0	145%
Gold Center SNOTEL	5410	1-Apr	32	13.6	4.4	3.9	349%
Schneider Meadows SNOTEL	5400	1-Apr	88	38.5	21.7	26.5	145%
Beaver Reservoir SNOTEL	5150	1-Apr	37	15.1	7.3	8.6	176%
Tipton SNOTEL	5150	1-Apr	42	15.5	8.8	11.6	134%
High Ridge SNOTEL	4920	1-Apr	68	31.6	24.3	20.7	153%
County Line SNOTEL	4830	1-Apr	8	1.1	0.0	0.5	220%
Eldorado Pass Snow Course	4630	2-Apr	11	4.6	0.0	0.0	
Little Antone (Alt.) Snow Course	4560	1-Apr	30	12.2	6.4	6.8	179%
Bowman Springs SNOTEL	4530	1-Apr	32	14.4	3.3	5.5	262%
East Eagle Snow Course	4400	31-Mar	68	25.8	15.6	20.9	123%
Sourdough Gulch SNOTEL	4000	1-Apr	4	1.6	0.0	0.0	



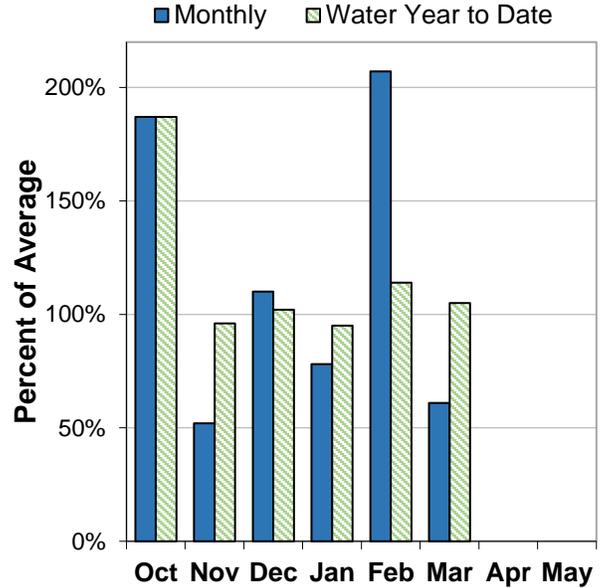
Umatilla, Walla Walla and Willow Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 147% of normal. This is similar to last month when the snowpack was 145% of normal. In general, SNOTEL sites in the basin have reached around 100% to 180% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 61% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 105% of average.

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 92% of average at Cold Springs Reservoir to 138% of average at Willow Creek Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 111% to 156% of average. Overall, forecasts remain similar to last month's report. Water managers in the basin should expect above normal to well above normal streamflows this spring and summer.

Umatilla, Walla Walla And Willow Basins Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
SF Walla Walla R nr Milton-Freewater	APR-JUL	47	54	59	109%	64	71	54
	APR-SEP	60	68	73	111%	78	86	66
Umatilla R ab Meacham nr Gibbon	APR-JUL	69	85	96	130%	108	124	74
	APR-SEP	74	91	102	128%	113	130	80
Umatilla R at Pendleton	APR-JUL	138	174	198	131%	225	260	151
	APR-SEP	144	181	205	131%	230	265	157
McKay Ck nr Pilot Rock	APR-JUL	19.7	32	42	145%	53	72	29
	APR-SEP	19.9	32	42	145%	53	72	29
Butter Ck nr Pine City	APR-JUL	7.8	10.5	12.7	135%	15.0	18.8	9.4
	APR-SEP	8.3	11.1	13.3	136%	15.6	19.4	9.8
Willow Ck ab Willow Lk nr Heppner	APR-JUL	6.0	8.7	10.8	154%	13.2	17.1	7.0
	APR-SEP	6.1	8.9	11.1	156%	13.6	17.6	7.1
Rhea Ck nr Heppner	APR-JUL	5.7	8.3	10.4	146%	12.7	16.6	7.1
	APR-SEP	6.1	8.9	11.0	147%	13.4	17.3	7.5

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Cold Springs	27.0	34.9	29.4	92%	38.6
Mckay	58.9	64.3	50.8	116%	71.5
Willow Creek	7.5	5.9	5.4	138%	9.8

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Umatilla Basin	5	161%	85%
Walla Walla Basin	7	147%	84%

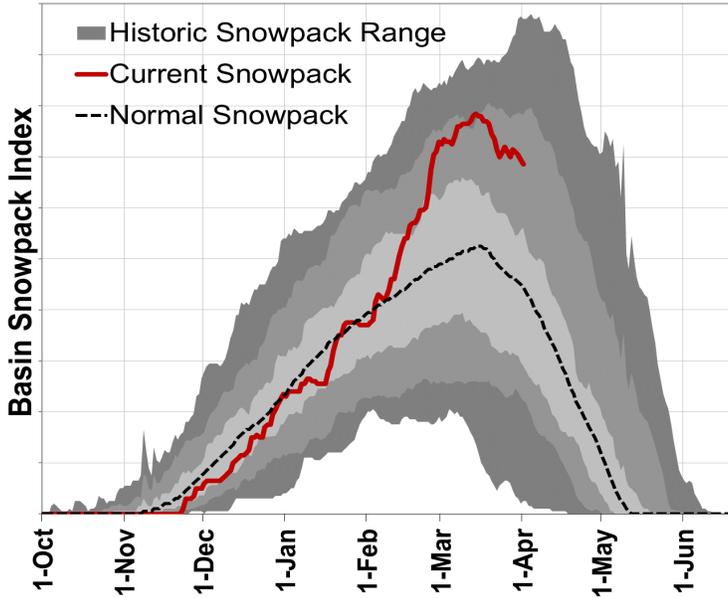
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Arbuckle Mtn SNOTEL	5770	1-Apr	54	18.2	11.8	18.8	97%
Spruce Springs SNOTEL	5700	1-Apr	34	13.1	11.5	13.8	95%
Milk Shakes SNOTEL	5580	1-Apr	94	38.7	34.9		
Touchet SNOTEL	5530	1-Apr	73	29.9	24.6	30.1	99%
Madison Butte SNOTEL	5150	1-Apr	20	9.3	1.4	1.2	775%
Lucky Strike SNOTEL	4970	1-Apr	30	12.5	4.2	6.2	202%
High Ridge SNOTEL	4920	1-Apr	68	31.6	24.3	20.7	153%
Indian Ridge Snow Course	4908	28-Mar	60	24.4	21.0		
Bowman Springs SNOTEL	4530	1-Apr	32	14.4	3.3	5.5	262%
Emigrant Springs SNOTEL	3800	1-Apr	13	5.6	0.0	0.0	



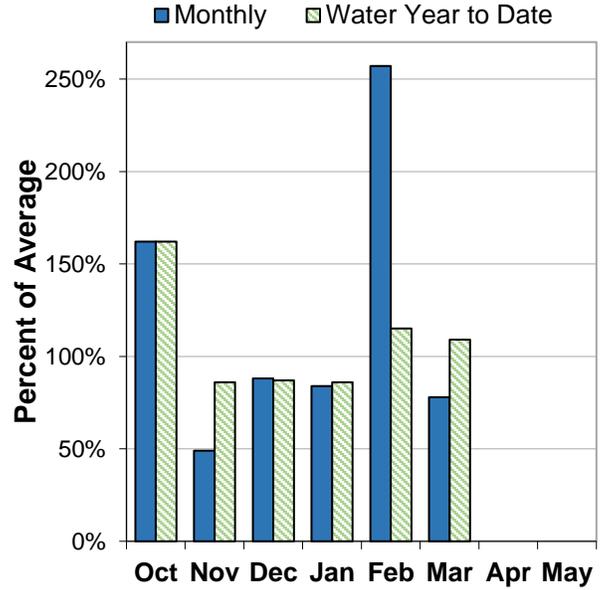
John Day Basin

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 153% of normal. This is slightly higher than last month when the snowpack was 149% of normal. In general, SNOTEL sites in the basin have reached around 110% to 150% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 78% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 109% of average.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 111% to 157% of average. Overall, forecasts decreased slightly from last month's report. Water managers in the basin should expect above normal to well above normal streamflows this spring and summer.

John Day Basin Summary for April 1, 2019

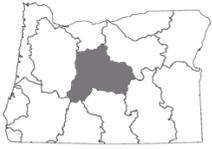
Forecast Exceedance Probabilities for Risk Assessment *

Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Strawberry Ck nr Prairie City	APR-JUL	6.4	8.0	9.0	111%	10.1	11.7	8.1
	APR-SEP	7.1	8.7	9.8	111%	10.9	12.6	8.8
Mountain Ck nr Mitchell	APR-JUL	3.7	4.8	5.6	117%	6.5	7.8	4.8
	APR-SEP	3.8	4.9	5.7	116%	6.6	8.0	4.9
Camas Ck nr Ukiah	APR-JUL	39	48	54	159%	60	69	34
	APR-SEP	40	49	55	157%	61	70	35
MF John Day R at Ritter	APR-JUL	109	135	152	126%	170	195	121
	APR-SEP	114	140	158	125%	176	200	126
NF John Day R at Monument	APR-JUL	650	750	820	141%	890	990	580
	APR-SEP	670	775	845	141%	915	1020	600

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Lower John Day Basin	6	197%	74%
North Fork John Day Basin	8	141%	73%
Upper John Day Basin	6	155%	59%

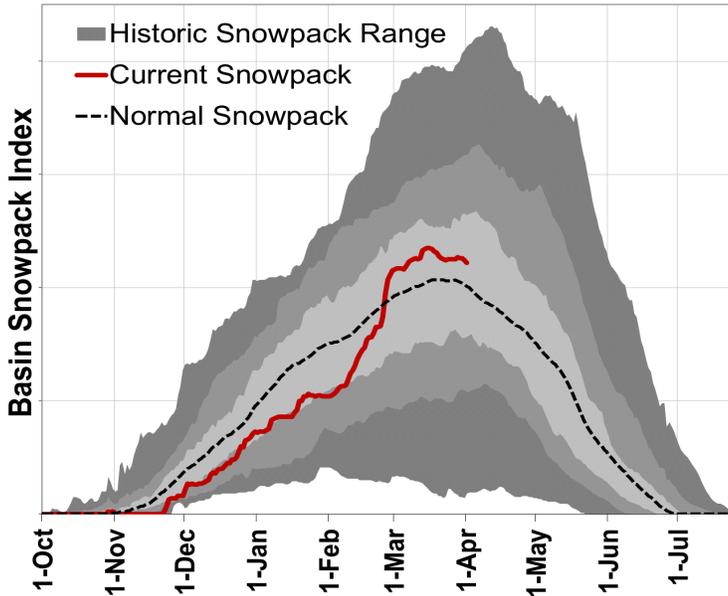
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Anthony Lake (Rev) Snow Course	7160	1-Apr	74	27.8	21.1	26.0	107%
Little Alps Snow Course	6360	2-Apr	46	15.0	9.7	13.6	110%
Snow Mountain SNOTEL	6230	1-Apr	41	15.7	7.8	12.2	129%
Blue Mountain Spring SNOTEL	5870	1-Apr	50	20.5	8.9	15.9	129%
Derr Snow Course	5860	4-Apr	31	14.0	5.9	7.6	184%
Bourne SNOTEL	5850	1-Apr	44	18.9	8.5	14.7	129%
Derr. SNOTEL	5850	1-Apr	45	18.6	8.8	12.0	155%
Barney Creek (New) Snow Course	5830	2-Apr	37	13.4	3.5		
Arbuckle Mtn SNOTEL	5770	1-Apr	54	18.2	11.8	18.8	97%
Ochoco Meadows SNOTEL	5430	1-Apr	34	14.3	5.1	9.5	151%
Gold Center SNOTEL	5410	1-Apr	32	13.6	4.4	3.9	349%
Starr Ridge SNOTEL	5250	1-Apr	16	5.8	0.0	0.0	
Lake Creek R.S. SNOTEL	5240	1-Apr	33	12.7	1.9	8.6	148%
Ochoco Meadows Snow Course	5190	29-Mar	37	15.4	7.6	8.8	175%
Madison Butte SNOTEL	5150	1-Apr	20	9.3	1.4	1.2	775%
Tipton SNOTEL	5150	1-Apr	42	15.5	8.8	11.6	134%
Lucky Strike SNOTEL	4970	1-Apr	30	12.5	4.2	6.2	202%
County Line SNOTEL	4830	1-Apr	8	1.1	0.0	0.5	220%
Marks Creek Snow Course	4580	28-Mar	10	5.3	0.0	0.0	
Little Antone (Alt.) Snow Course	4560	1-Apr	30	12.2	6.4	6.8	179%



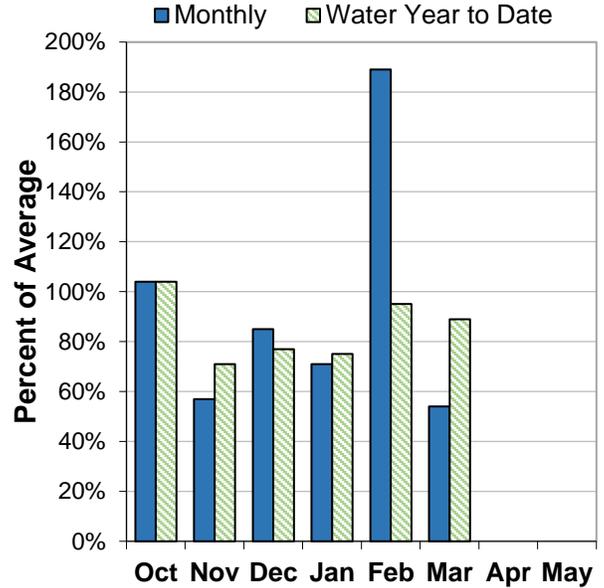
Upper Deschutes and Crooked Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 111% of normal. This is similar to last month when the snowpack was 111% of normal. In general, SNOTEL sites in the basin have reached around 90% to 130% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 54% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 89% of average.

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 52% of average at Ochoco Reservoir to 120% of average at Crescent Lake.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 53% to 165% of average. Water supplies in the Crooked River basin are likely to be well above normal this spring & summer, while most streamflow forecasts in the Upper Deschutes basin are currently well below normal.

Upper Deschutes And Crooked Basins Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Deschutes R bl Snow Ck	APR-JUL	11.9	16.2	19.1	64%	22	26	30
	APR-SEP	22	29	33	63%	37	44	52
Crane Prairie Reservoir Inflow ²	APR-JUL	29	36	40	71%	45	52	56
	APR-SEP	45	55	62	70%	70	80	88
Crescent Lake Inflow ²	APR-JUL	5.7	8.3	10.0	67%	11.8	14.4	15.0
	APR-SEP	4.2	7.2	9.3	53%	11.3	14.3	17.4
Little Deschutes R nr La Pine ²	APR-JUL	45	53	59	94%	65	73	63
	APR-SEP	45	54	60	87%	67	76	69
Deschutes R at Benham Falls ²	APR-JUL	250	265	275	86%	285	305	320
	APR-SEP	395	415	425	88%	440	460	485
Wychus Ck nr Sisters	APR-JUL	27	29	31	89%	33	35	35
	APR-SEP	37	39	41	87%	43	46	47
Prineville Reservoir Inflow ²	APR-JUL	118	146	167	164%	189	225	102
	APR-SEP	118	147	168	165%	191	225	102
Ochoco Reservoir Inflow ²	APR-JUL	22	28	33	157%	38	46	21
	APR-SEP	22	28	33	165%	38	46	20

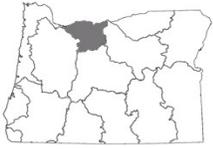
* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume
 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Crane Prairie	43.4	47.0	42.1	103%	55.3
Crescent Lake	57.9	78.2	48.4	120%	86.9
Ochoco	15.8	25.8	30.2	52%	44.2
Prineville	99.6	108.3	130.4	76%	148.6
Wickiup	136.6	199.5	189.2	72%	200.0

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Little Deschutes Basin	4	124%	74%
Upper Crooked Basin	5	178%	72%
Upper Deschutes Basin	12	102%	67%

Upper Deschutes And Crooked Basins Summary for April 1, 2019

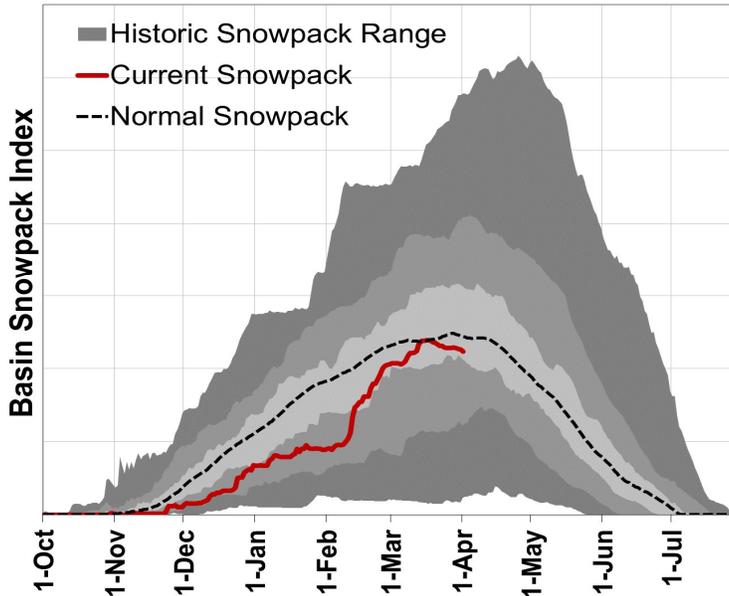
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
New Dutchman #3 Snow Course	6320	1-Apr	102	40.1	32.5	44.8	90%
Snow Mountain SNOTEL	6230	1-Apr	41	15.7	7.8	12.2	129%
Derr Snow Course	5860	4-Apr	31	14.0	5.9	7.6	184%
Derr. SNOTEL	5850	1-Apr	45	18.6	8.8	12.0	155%
Three Creeks Meadow SNOTEL	5690	1-Apr	42	16.8	6.6	18.4	91%
Summit Lake SNOTEL	5610	1-Apr	99	38.4	31.3	37.1	104%
Bald Peter Snow Course	5600	4-Apr	70	32.2		31.4	103%
Irish Taylor SNOTEL	5540	1-Apr	88	31.7	21.8	37.2	85%
Tangent Snow Course	5470	1-Apr	46	17.4	4.6	18.1	96%
Ochoco Meadows SNOTEL	5430	1-Apr	34	14.3	5.1	9.5	151%
Ochoco Meadows Snow Course	5190	29-Mar	37	15.4	7.6	8.8	175%
Racing Creek Snow Course	5160	4-Apr	49	21.8		13.6	160%
Cascade Summit SNOTEL	5100	1-Apr	83	31.9	23.9	31.0	103%
Roaring River SNOTEL	4950	1-Apr	62	29.9	20.3	26.0	115%
New Crescent Lake SNOTEL	4910	1-Apr	35	14.1	1.4	5.4	261%
Chemult Alternate SNOTEL	4850	1-Apr	25	9.7	0.0	2.5	388%
Hogg Pass SNOTEL	4790	1-Apr	64	23.6	13.5	26.0	91%
McKenzie SNOTEL	4770	1-Apr	77	34.9	27.8	37.4	93%
Marks Creek Snow Course	4580	28-Mar	10	5.3	0.0	0.0	
Hungry Flat Snow Course	4400	1-Apr	7	2.4	0.0	0.0	
Salt Creek Falls SNOTEL	4220	1-Apr	52	23.4	11.2	17.5	134%
Santiam Jct. SNOTEL	3740	1-Apr	17	7.8	7.4	9.8	80%



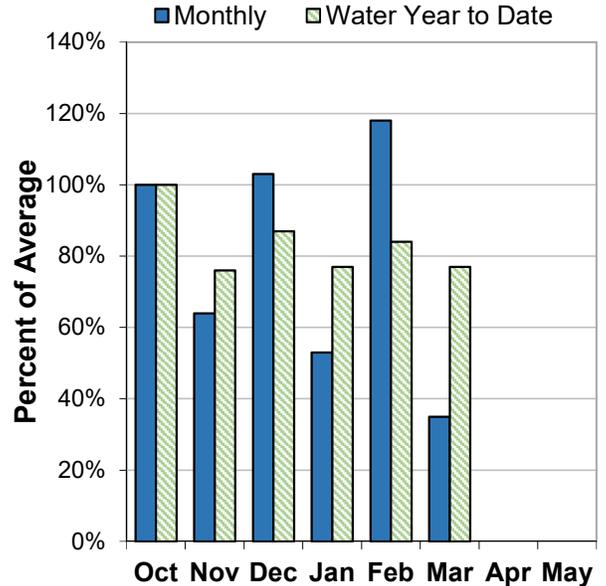
Hood, Sandy and Lower Deschutes Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 94% of normal. This is similar to last month when the snowpack was 92% of normal. In general, SNOTEL sites in the basin have reached around 70% to 110% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 35% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 77% of average. Five long-term monitoring sites in the basin recorded their second lowest March precipitation - all of these sites have been measured for at least 37 years and March 2019 precipitation was lower than all years except 1992. South Fork SNOTEL (measured for 22 years) in the Bull Run Watershed set a new record low for March precipitation (4.1", 31% of average).

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 82% to 90% of average. Overall, forecasts decreased slightly from last month's report. Water managers in the basin should expect below normal streamflows this spring and summer.

Hood, Sandy And Lower Deschutes Basins Summary for April 1, 2019

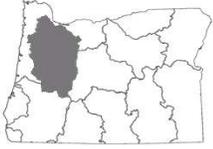
Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
WF Hood R nr Dee	APR-JUL	65	85	98	82%	112	131	120
	APR-SEP	79	100	114	82%	129	150	139
Hood R at Tucker Bridge	APR-JUL	133	165	187	83%	210	240	225
	APR-SEP	162	197	220	83%	245	280	265
Sandy R nr Marmot	APR-JUL	220	255	280	90%	305	345	310
	APR-SEP	260	300	325	90%	355	395	360

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Clear Lake	2.3	4.1	4.4	51%	13.1

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Lower Columbia - Sandy Basin	7	90%	92%
Lower Deschutes Basin	4	78%	77%
Middle Columbia - Hood Basin	6	85%	89%

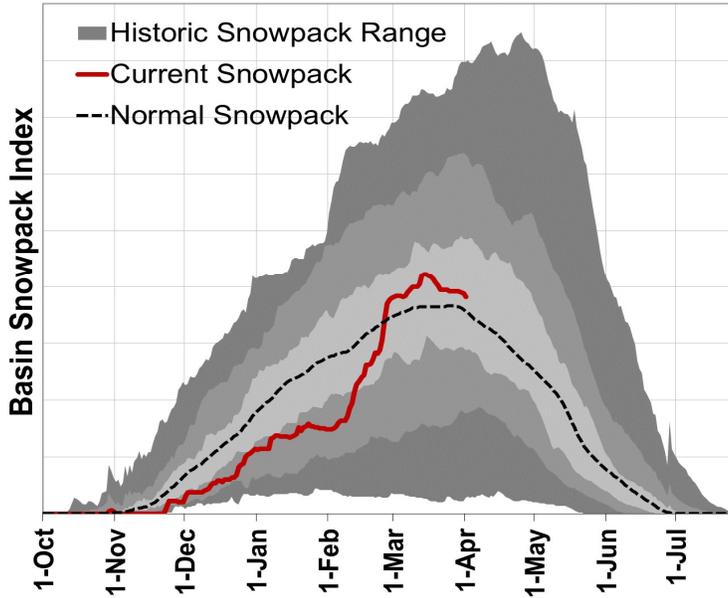
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Bald Peter Snow Course	5600	4-Apr	70	32.2		31.4	103%
Mt Hood Test Site SNOTEL	5370	1-Apr	100	40.2	42.8	60.2	67%
Racing Creek Snow Course	5160	4-Apr	49	21.8		13.6	160%
Red Hill SNOTEL	4410	1-Apr	82	40.2	37.2	45.7	88%
Surprise Lakes SNOTEL	4290	1-Apr	78	34.2	47.2	45.5	75%
Beaver Creek #2 Snow Course	4220	3-Apr	25	10.0		6.8	147%
Beaver Creek #1 Snow Course	4210	3-Apr	40	16.0		13.6	118%
Mud Ridge SNOTEL	4070	1-Apr	50	15.8	23.1	23.4	68%
Clear Lake SNOTEL	3810	1-Apr	33	11.6	5.6	10.4	112%
Blazed Alder SNOTEL	3650	1-Apr	57	24.5	30.2	25.6	96%
Clackamas Lake SNOTEL	3400	1-Apr	31	12.7	7.6	8.6	148%
Greenpoint SNOTEL	3310	1-Apr	38	16.4	8.0	15.6	105%
North Fork SNOTEL	3060	1-Apr	51	20.8	19.7	14.4	144%
South Fork Bull Run SNOTEL	2690	1-Apr	18	9.1	6.3	0.0	



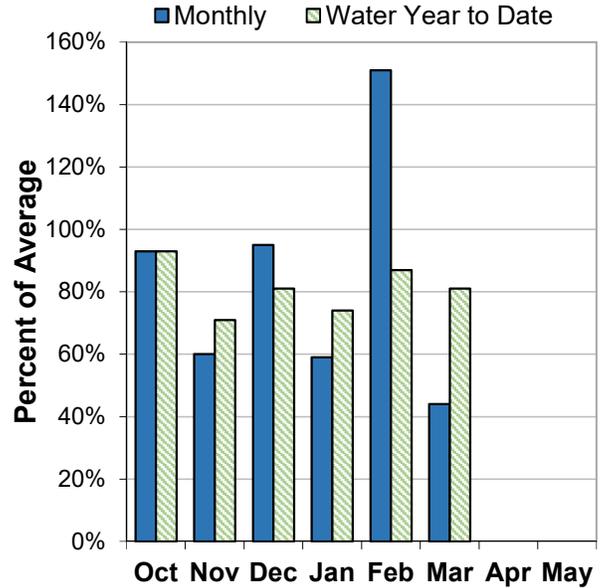
Willamette Basin

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 109% of normal. This is similar to last month when the snowpack was 109% of normal. In general, SNOTEL sites in the basin have reached around 80% to 120% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 44% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 81% of average. Ten long-term monitoring sites in the basin recorded their second lowest March precipitation - all of these sites have been measured for at least 38 years and March 2019 precipitation was lower than all years except 1992 (or 1965 in the case of Eugene Airport COOP station which has been measured for 80 years).

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 74% of average at Detroit Reservoir to 114% of average at Foster Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 91% to 100% of average. Overall, forecasts decreased slightly from last month's report. Water managers in the basin should expect below normal to near normal streamflows this spring and summer.

Willamette Basin Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Hills Creek Reservoir Inflow ^{1,2}	APR-JUN	148	215	245	100%	275	340	245
	APR-SEP	205	280	315	100%	350	425	315
Lookout Point Reservoir Inflow ^{1,2}	APR-JUN	400	575	655	101%	730	905	650
	APR-SEP	550	740	825	100%	915	1100	825
McKenzie R bl Trail Bridge	APR-JUN	158	185	198	94%	210	240	210
	APR-SEP	270	305	325	94%	345	385	345
Cougar Lake Inflow ^{1,2}	APR-JUN	108	149	170	92%	192	245	185
	APR-SEP	145	192	215	91%	240	300	235
Blue Lake Inflow ^{1,2}	APR-JUN	38	61	74	93%	87	121	80
	APR-SEP	43	67	80	93%	94	129	86
McKenzie R nr Vida ^{1,2}	APR-JUN	545	700	780	94%	860	1050	830
	APR-SEP	850	1040	1120	94%	1220	1440	1190
Detroit Lake Inflow ^{1,2}	APR-JUN	305	395	435	93%	480	570	470
	APR-SEP	425	530	580	95%	625	730	610
North Santiam R at Mehama ^{1,2}	APR-JUN	440	560	615	92%	665	785	665
	APR-SEP	580	715	775	92%	835	970	840
Green Peter Lake Inflow ^{1,2}	APR-JUN	147	210	245	92%	280	370	265
	APR-SEP	173	240	275	93%	315	405	295
Foster Lake Inflow ^{1,2}	APR-JUN	260	395	465	93%	540	730	500
	APR-SEP	310	450	525	93%	605	800	565
South Santiam R at Waterloo ²	APR-JUN	275	415	490	93%	570	770	525
	APR-SEP	325	475	555	94%	635	840	590
Willamette R at Salem ^{1,2}	APR-JUN	2360	3370	3890	98%	4440	5790	3950
	APR-SEP	3000	4100	4660	99%	5250	6680	4730
Oak Grove Fk ab Powerplant	APR-JUL	92	105	114	99%	123	136	115
	APR-SEP	125	141	152	98%	162	178	155
Clackamas R ab Three Lynx	APR-JUL	345	400	435	97%	470	525	450
	APR-SEP	425	480	520	97%	560	615	535
Clackamas R at Estacada	APR-JUL	475	555	610	98%	665	745	625
	APR-SEP	575	660	715	98%	770	855	730

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

1) 90% and 10% exceedance probabilities are actually 95% and 5%

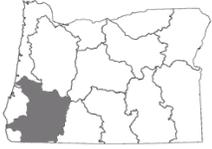
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Willamette Basin Summary for April 1, 2019

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Blue River	57.6	59.5	56.4	102%	82.3
Cottage Grove	20.2	27.4	19.3	105%	31.8
Cougar	91.8	93.1	118.6	77%	174.9
Detroit	247.0	301.3	335.5	74%	426.8
Dorena	45.4	45.5	44.4	102%	72.1
Fall Creek	90.3	62.4	81.6	111%	116.0
Fern Ridge	70.2	85.2	73.1	96%	97.3
Foster	35.3	23.4	30.9	114%	46.2
Green Peter	327.7	363.2	332.6	99%	402.8
Hills Creek	215.2	157.3	205.6	105%	279.2
Lookout Point	260.3	217.6	296.7	88%	433.2
Timothy Lake	54.6	63.0	52.7	104%	63.6
Henry Hagg Lake	49.4	51.2	50.0	99%	53.3

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Clackamas Basin	9	94%	89%
McKenzie Basin	17	111%	66%
Middle Fork Willamette Basin	7	106%	71%
North Santiam Basin	4	135%	106%
South Santiam Basin	4	144%	112%

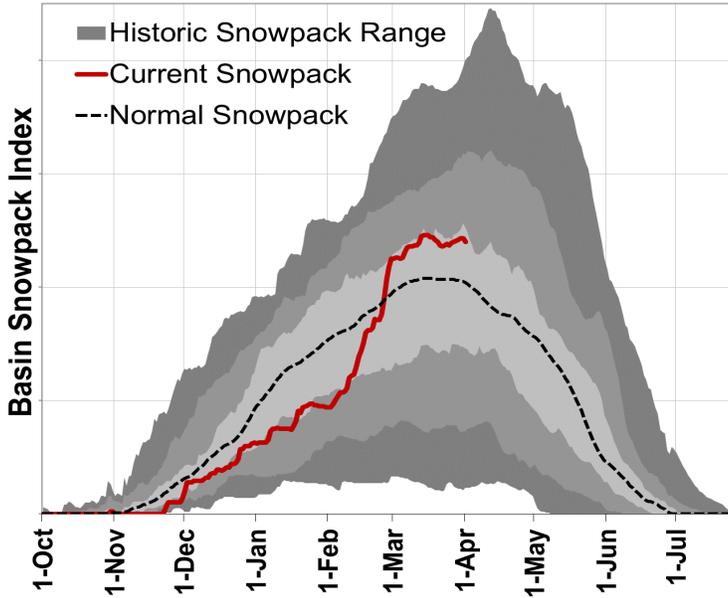
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Summit Lake SNOTEL	5610	1-Apr	99	38.4	31.3	37.1	104%
Irish Taylor SNOTEL	5540	1-Apr	88	31.7	21.8	37.2	85%
Cascade Summit SNOTEL	5100	1-Apr	83	31.9	23.9	31.0	103%
Roaring River SNOTEL	4950	1-Apr	62	29.9	20.3	26.0	115%
Holland Meadows SNOTEL	4930	1-Apr	53	25.5	11.3	21.1	121%
McKenzie SNOTEL	4770	1-Apr	77	34.9	27.8	37.4	93%
Bear Grass SNOTEL	4720	1-Apr	102	49.4	42.8		
Beaver Creek #2 Snow Course	4220	3-Apr	25	10.0		6.8	147%
Salt Creek Falls SNOTEL	4220	1-Apr	52	23.4	11.2	17.5	134%
Beaver Creek #1 Snow Course	4210	3-Apr	40	16.0		13.6	118%
Mud Ridge SNOTEL	4070	1-Apr	50	15.8	23.1	23.4	68%
Little Meadows SNOTEL	4020	1-Apr	65	30.1	26.5	23.3	129%
Clear Lake SNOTEL	3810	1-Apr	33	11.6	5.6	10.4	112%
Santiam Jct. SNOTEL	3740	1-Apr	17	7.8	7.4	9.8	80%
Daly Lake SNOTEL	3690	1-Apr	25	11.5	8.0	7.7	149%
Marys Peak (Rev.) Snow Course	3580	1-Apr	27	11.9			
Jump Off Joe SNOTEL	3520	1-Apr	22	9.2	7.6	7.8	118%
Peavine Ridge SNOTEL	3420	1-Apr	26	12.3	6.6	8.9	138%
Clackamas Lake SNOTEL	3400	1-Apr	31	12.7	7.6	8.6	148%
Smith Ridge SNOTEL	3270	1-Apr	11	4.7	1.5		
Saddle Mountain SNOTEL	3110	1-Apr	11	5.0	3.7		
Railroad Overpass SNOTEL	2680	1-Apr	0	0.0	0.0	0.0	
Marion Forks SNOTEL	2590	1-Apr	27	12.9	7.3	5.4	239%
Seine Creek SNOTEL	2060	1-Apr	0	0.0	0.0	0.0	
Miller Woods SNOTEL	420	1-Apr	0	0.0	0.0		



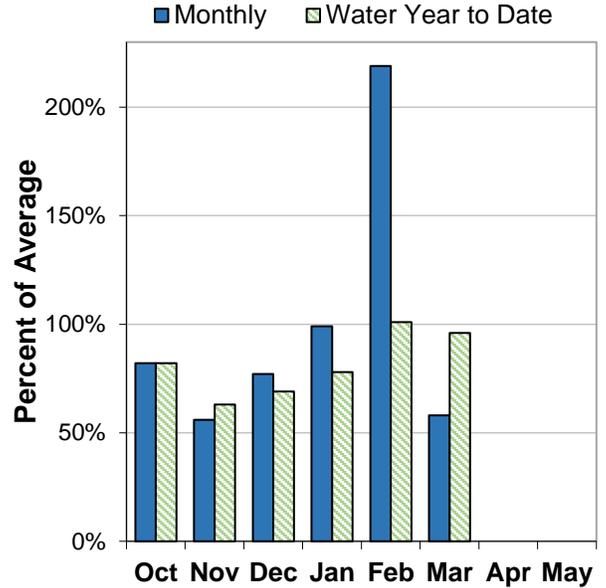
Rogue and Umpqua Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 120% of normal. This is slightly higher than last month when the snowpack was 112% of normal. In general, SNOTEL sites in the basin have reached around 100% to 130% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 58% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 96% of average.

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 29% of average at Hyatt Prairie Reservoir to 107% of average at Applegate Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 98% to 115% of average. Overall, forecasts remain similar to last month's report. Water managers in the basin should expect near normal to above normal streamflows this spring and summer.

Rogue And Umpqua Basins Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
South Umpqua R at Tiller	APR-JUL	138	187	220	114%	255	305	193
	APR-SEP	147	197	230	115%	265	315	200
Cow Ck ab Galesville Reservoir	APR-JUL	7.6	12.3	15.4	111%	18.6	23	13.9
	APR-SEP	8.7	13.4	16.7	111%	19.9	25	15.0
South Umpqua R nr Brockway	APR-JUL	355	410	450	115%	490	550	390
	APR-SEP	375	430	470	115%	510	570	410
North Umpqua R at Winchester	APR-JUL	510	670	775	100%	880	1040	775
	APR-SEP	620	780	890	100%	1000	1160	890
Lost Creek Lk Inflow ²	APR-JUL	420	480	520	100%	565	625	520
	APR-SEP	535	605	650	101%	695	765	645
Rogue R at Raygold ²	APR-JUL	525	640	720	107%	795	915	675
	APR-SEP	650	770	855	106%	940	1060	805
Rogue R at Grants Pass ²	APR-JUL	595	700	770	106%	845	950	725
	APR-SEP	710	820	895	106%	970	1080	845
Applegate Lake Inflow ²	APR-JUL	76	98	113	104%	128	150	109
	APR-SEP	82	104	120	104%	135	158	115
Sucker Ck bl Ltl Grayback nr Holland	APR-JUL	25	42	54	98%	65	82	55
	APR-SEP	29	46	58	98%	69	87	59
Illinois R nr Kerby	APR-JUL	78	144	189	101%	235	300	188
	APR-SEP	83	150	195	101%	240	305	193

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Applegate	47.1	31.8	44.0	107%	75.2
Emigrant Lake	26.9	25.4	33.6	80%	39.0
Fish Lake	3.8	5.9	5.2	74%	7.9
Fourmile Lake	4.3	7.3	7.5	57%	15.6
Howard Prairie	19.2	37.1	41.9	46%	62.1
Hyatt Prairie	3.5	6.3	12.1	29%	16.2
Lost Creek	267.2	248.5	266.7	100%	315.0

Rogue And Umpqua Basins Summary for April 1, 2019

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Applegate Basin	5	111%	41%
Middle Rogue Basin	8	138%	53%
North Umpqua Basin	7	147%	91%
South Umpqua Basin	10	323%	178%
Upper Rogue Basin	11	110%	57%

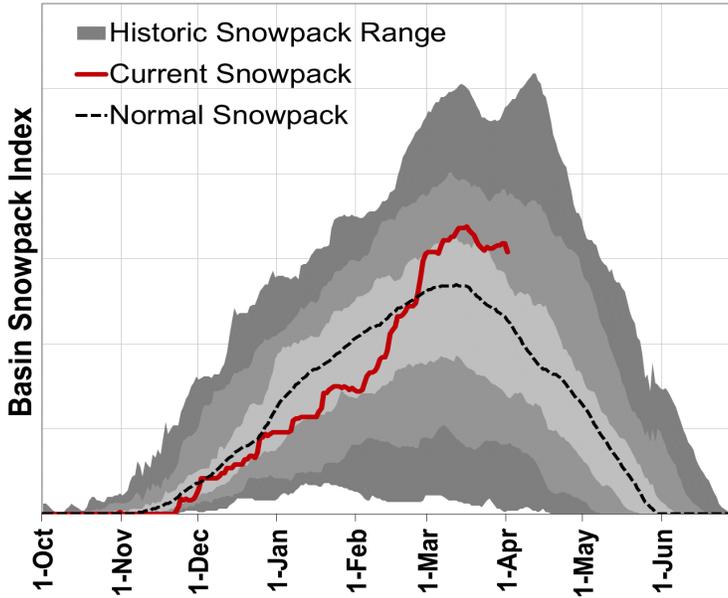
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Park H.Q. Rev Snow Course	6570	2-Apr	133	61.0	44.0	59.6	102%
Caliban (Alt.) Snow Course	6500	29-Mar	102	35.4	13.8	30.6	116%
Mt. Ashland Switchback Snow Course	6430	29-Mar	93	32.2	10.0	32.4	99%
Ski Bowl Road Snow Course	6070	29-Mar	71	23.5	7.7	23.6	100%
Big Red Mountain SNOTEL	6050	1-Apr	88	31.0	11.3	27.8	112%
Annie Springs SNOTEL	6010	1-Apr	110	41.3	25.7	41.0	101%
Fourmile Lake SNOTEL	5970	1-Apr	74	28.1	13.3	28.9	97%
Cold Springs Camp SNOTEL	5940	1-Apr	61	26.5	11.6	28.8	92%
Sevenmile Marsh SNOTEL	5700	1-Apr	80	34.9	17.8	31.8	110%
Summit Lake SNOTEL	5610	1-Apr	99	38.4	31.3	37.1	104%
Billie Creek Divide SNOTEL	5280	1-Apr	53	23.8	10.5	21.2	112%
Diamond Lake SNOTEL	5280	1-Apr	35	18.9	5.1	10.2	185%
Bigelow Camp SNOTEL	5130	1-Apr	33	17.1	8.2	10.8	158%
Beaver Dam Creek Snow Course	5120	1-Apr	30	12.1	2.9	8.0	151%
King Mountain 1 Snow Course	4760	2-Apr	34	14.2	8.7	3.2	444%
Deadwood Junction Snow Course	4660	1-Apr	20	8.6	0.6	3.0	287%
Fish Lk. SNOTEL	4660	1-Apr	33	11.3	4.9	6.8	166%
Howard Prairie SNOTEL	4580	1-Apr	24	8.8	2.1		
Howard Prairie Snow Course	4580	1-Apr	16	5.9	0.6	4.2	140%
Siskiyou Summit Rev. 2 Snow Course	4560	29-Mar	30	12.0	3.2	3.4	353%
Red Butte 1 Snow Course	4460	1-Apr	39	16.0	10.0	7.2	222%
King Mountain SNOTEL	4340	1-Apr	27	12.4	5.6	0.5	2480%
Red Butte 2 Snow Course	4050	1-Apr	8	3.7	3.3	1.0	370%
Silver Burn Snow Course	3680	2-Apr	31	11.9	5.7	7.5	159%
King Mountain 3 Snow Course	3680	2-Apr	0	0.0	0.5	0.0	
Red Butte 3 Snow Course	3500	1-Apr	1	0.5	0.8	0.0	
Toketee Airstrip SNOTEL	3240	1-Apr	12	3.9	0.0	0.0	
King Mountain 4 Snow Course	3050	2-Apr	0	0.0	0.0	0.0	
Red Butte 4 Snow Course	3000	1-Apr	0	0.0	0.0	0.0	



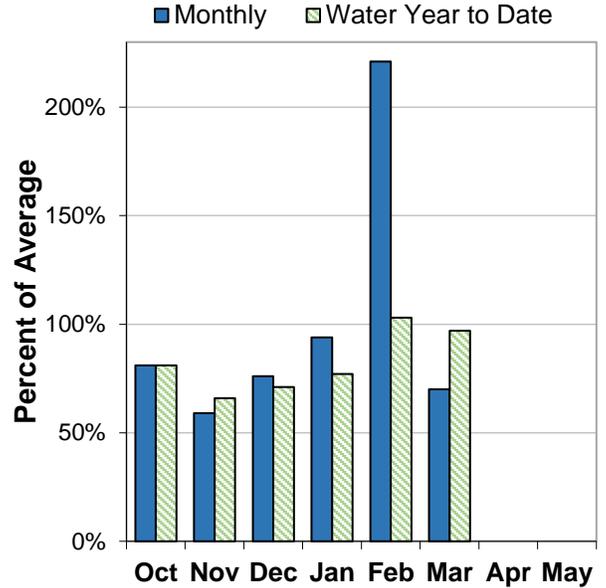
Klamath Basin

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 123% of normal. This is higher than last month when the snowpack was 109% of normal. In general, SNOTEL sites in the basin have reached around 100% to 140% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 70% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 97% of average. After measuring a record high February precipitation last month, Annie Springs SNOTEL (measured since 2000) set a new record low for March precipitation (4.2", 50% of average).

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 95% of average at Clear Lake to 135% of average at Gerber Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 117% to 139% of average. Overall, forecasts increased slightly from last month's report. Water managers in the basin should expect above normal to well above normal streamflows this spring and summer.

Klamath Basin Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Gerber Reservoir Inflow ²	APR-JUL	6.7	13.7	19.7	141%	27	40	14.0
	APR-SEP	7.0	14.1	20	139%	28	40	14.4
Sprague R nr Chiloquin	APR-JUL	189	220	245	130%	270	305	188
	APR-SEP	215	245	270	129%	295	330	210
Williamson R bl Sprague nr Chiloquin	APR-JUL	295	330	350	119%	375	410	295
	APR-SEP	355	390	415	117%	435	475	355
Upper Klamath Lake Inflow ^{1,2}	APR-JUL	370	440	475	119%	505	580	400
	APR-SEP	450	530	565	118%	600	680	480

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

1) 90% and 10% exceedance probabilities are actually 95% and 5%

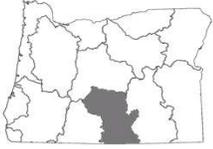
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Clear Lake	233.2	218.5	245.0	95%	513.3
Gerber	84.1	80.1	62.5	135%	94.3
Upper Klamath Lake	463.9	454.0	424.5	109%	523.7

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Lost Basin	3	542%	0%
Sprague Basin	7	206%	53%
Upper Klamath Lake Basin	8	106%	58%
Williamson River Basin	5	118%	64%

Klamath Basin Summary for April 1, 2019

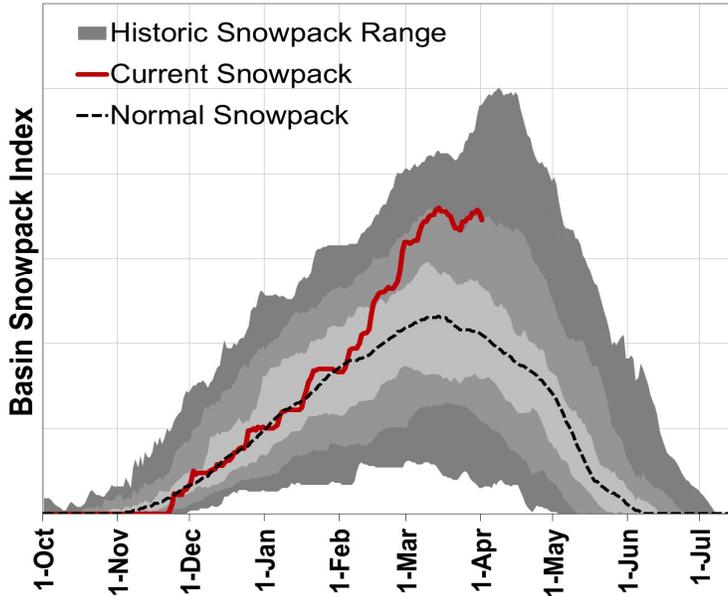
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Summer Rim SNOTEL	7080	1-Apr	58	22.4	11.9	16.4	137%
Swan Lake Mtn SNOTEL	6830	1-Apr	75	32.7	11.1		
Park H.Q. Rev Snow Course	6570	2-Apr	133	61.0	44.0	59.6	102%
Colvin Creek AM	6520	1-Apr	26	9.8	0.0	0.0	
Crazyman Flat SNOTEL	6180	1-Apr	54	25.8	7.7	13.1	197%
Ski Bowl Road Snow Course	6070	29-Mar	71	23.5	7.7	23.6	100%
Annie Springs SNOTEL	6010	1-Apr	110	41.3	25.7	41.0	101%
Finley Corrals AM	6000	1-Apr	53	20.1	7.2	13.0	155%
Fourmile Lake SNOTEL	5970	1-Apr	74	28.1	13.3	28.9	97%
Cold Springs Camp SNOTEL	5940	1-Apr	61	26.5	11.6	28.8	92%
Strawberry SNOTEL	5770	1-Apr	13	6.3	0.0	1.2	525%
Cox Flat AM	5750	1-Apr	28	10.9	0.0	0.2	5450%
Silver Creek SNOTEL	5740	1-Apr	34	13.9	1.2	7.2	193%
Quartz Mountain SNOTEL	5720	1-Apr	9	3.5	0.0	0.0	
Sevenmile Marsh SNOTEL	5700	1-Apr	80	34.9	17.8	31.8	110%
State Line SNOTEL	5680	1-Apr	21	8.7	0.0		
Sun Pass SNOTEL	5400	1-Apr	62	23.9	4.1		
Billie Creek Divide SNOTEL	5280	1-Apr	53	23.8	10.5	21.2	112%
Diamond Lake SNOTEL	5280	1-Apr	35	18.9	5.1	10.2	185%
Crowder Flat SNOTEL	5170	1-Apr	1	0.2	0.0	0.0	
Beaver Dam Creek Snow Course	5120	1-Apr	30	12.1	2.9	8.0	151%
Taylor Butte SNOTEL	5030	1-Apr	13	6.0	0.0	3.0	200%
Gerber Reservoir SNOTEL	4890	1-Apr	0	0.0	0.0	0.0	
Chemult Alternate SNOTEL	4850	1-Apr	25	9.7	0.0	2.5	388%
Deadwood Junction Snow Course	4660	1-Apr	20	8.6	0.6	3.0	287%
Fish Lk. SNOTEL	4660	1-Apr	33	11.3	4.9	6.8	166%
Howard Prairie SNOTEL	4580	1-Apr	24	8.8	2.1		
Howard Prairie Snow Course	4580	1-Apr	16	5.9	0.6	4.2	140%
Siskiyou Summit Rev. 2 Snow Course	4560	29-Mar	30	12.0	3.2	3.4	353%



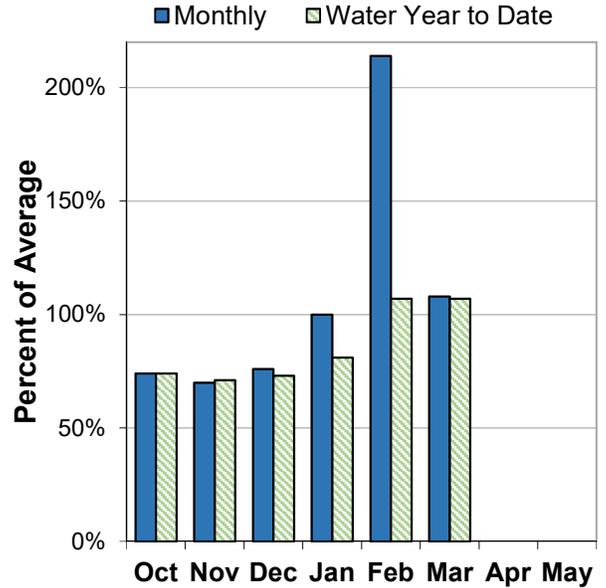
Lake County and Goose Lake Basins

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 172% of normal. This is higher than last month when the snowpack was 149% of normal. In general, SNOTEL sites in the basin have reached around 120% to 150% of normal peak snowpack levels this winter. Four long-term snow measurement sites set records for the highest April 1 SWE (Bear Flat Meadow Aerial Marker (6580ft, 20.1" SWE, 59 years of record), Barley Camp Aerial Marker (6890ft, 26.9" SWE, 33 years of record), Little Bally Mt. Aerial Marker (6580ft, 8.7" SWE, 53 years of record), and Camas Creek #3 Snow Course (5860ft, 23.6" SWE, 30 years of record).

PRECIPITATION

March precipitation was 108% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 107% of average.

RESERVOIR

As of April 1, storage at major reservoirs in the basin ranges from 53% of average at Cottonwood Reservoir to 110% of average at Drews Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 137% to 149% of average. Overall, forecasts increased slightly from last month's report. Water managers in the basin should expect well above normal streamflows this spring and summer.

Lake County And Goose Lake Basins Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Twentymile Ck nr Adel	APR-JUL	10.9	19.1	25	147%	30	38	17.0
	APR-SEP	11.4	19.7	25	144%	31	39	17.4
Deep Ck ab Adel	APR-JUL	68	78	85	135%	92	102	63
	APR-SEP	71	82	89	137%	96	107	65
Honey Ck nr Plush	APR-JUL	14.0	17.6	20	143%	23	26	14.0
	APR-SEP	14.9	18.5	21	149%	23	27	14.1
Chewaucan R nr Paisley	APR-JUL	78	92	101	142%	110	123	71
	APR-SEP	84	98	107	143%	116	130	75

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Cottonwood	3.4	3.3	6.3	53%	9.3
Drews	46.4	47.5	42.0	110%	63.5

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Goose Lake Basin	7	195%	61%
Lake Abert Basin	7	192%	55%
Summer Lake Basin	13	172%	59%
Upper Pit Basin	3	155%	58%

Lake County And Goose Lake Basins Summary for April 1, 2019

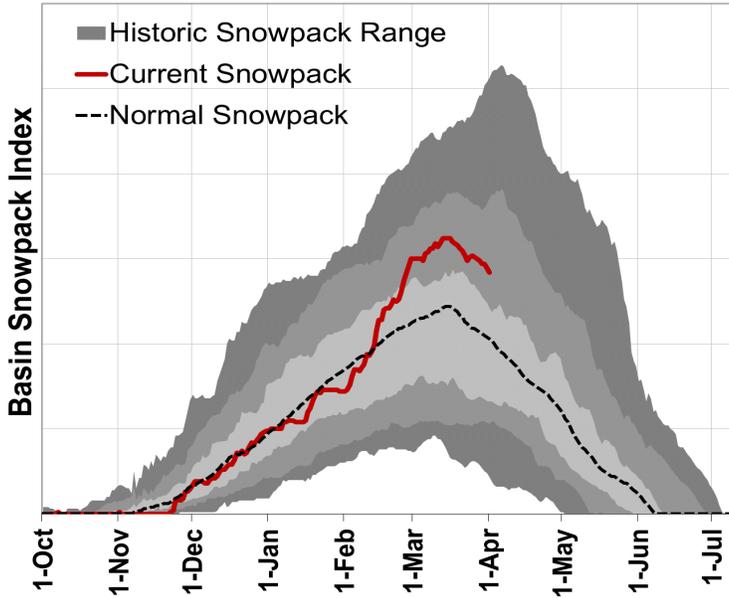
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Dismal Swamp SNOTEL	7360	1-Apr	94	42.5	22.6	28.4	150%
Summer Rim SNOTEL	7080	1-Apr	58	22.4	11.9	16.4	137%
Cedar Pass Snow Course	7050	2-Apr	61	26.4	11.0	14.8	178%
Cedar Pass SNOTEL	7030	1-Apr	57	23.8	11.2	17.9	133%
Barley Camp AM	6890	1-Apr	71	26.9	12.0	16.1	167%
Blue Lake Ranch Snow Course	6830	1-Apr	43	17.6	5.0	8.7	202%
Patton Meadows AM	6800	1-Apr	65	25.3	7.6	16.0	158%
Sherman Valley AM	6640	1-Apr	49	18.6	4.8	13.0	143%
Bear Flat Meadow AM	6580	1-Apr	53	20.1	5.2	11.8	170%
Colvin Creek AM	6520	1-Apr	26	9.8	0.0	0.0	
Hart Mountain AM	6430	1-Apr	12	4.5	0.0	0.0	
Rogger Meadow AM	6360	1-Apr	58	22.0	4.4	8.8	250%
Adin Mtn Snow Course	6190	2-Apr	52	21.6	7.8	12.2	177%
Adin Mtn SNOTEL	6190	1-Apr	47	21.4	5.8	11.3	189%
Crazyman Flat SNOTEL	6180	1-Apr	54	25.8	7.7	13.1	197%
Finley Corrals AM	6000	1-Apr	53	20.1	7.2	13.0	155%
Camas Creek #3 Snow Course	5860	1-Apr	63	23.6	7.1	11.0	215%
Sheldon SCAN	5860	1-Apr	0	0.0	0.0	0.0	
Strawberry SNOTEL	5770	1-Apr	13	6.3	0.0	1.2	525%
Cox Flat AM	5750	1-Apr	28	10.9	0.0	0.2	5450%
Silver Creek SNOTEL	5740	1-Apr	34	13.9	1.2	7.2	193%
State Line SNOTEL	5680	1-Apr	21	8.7	0.0		
Crowder Flat SNOTEL	5170	1-Apr	1	0.2	0.0	0.0	



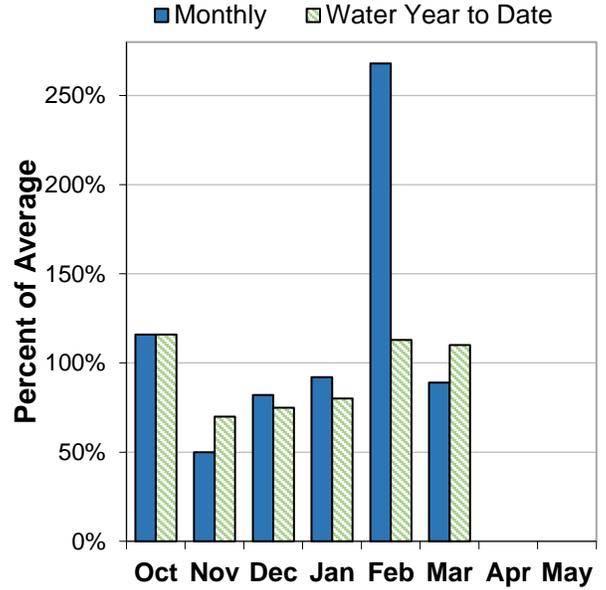
Harney Basin

April 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of April 1, the basin snowpack was 139% of normal. This is slightly higher than last month when the snowpack was 132% of normal. In general, SNOTEL sites in the basin have reached around 100% to 150% of normal peak snowpack levels this winter.

PRECIPITATION

March precipitation was 89% of average. Precipitation since the beginning of the water year (October 1 - April 1) has been 110% of average.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 113% to 145% of average. Overall, forecasts decreased slightly from last month's report. Water managers in the basin should expect above normal to well above normal streamflows this spring and summer.

Harney Basin Summary for April 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts April 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Silvies R nr Burns	APR-JUL	77	109	130	146%	152	183	89
	APR-SEP	80	112	133	145%	155	187	92
Donner Und Blitzen R nr Frenchglen	APR-JUL	45	60	70	113%	80	95	62
	APR-SEP	50	66	77	113%	88	104	68
Trout Ck nr Denio	APR-JUL	4.3	7.3	9.3	122%	11.3	14.3	7.6
	APR-SEP	4.7	7.7	9.8	123%	11.9	14.9	8.0

* 90%, 70%, 50%, 30% & 10% exceedance probabilities are the chance that observed streamflow volume will exceed the forecasted volume

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Alvord Lake Basin	7	141%	63%
Donner und Blitzen River Basin	5	127%	57%
Silvies River Basin	4	182%	45%
Upper Quinn Basin	6	145%	59%

Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Granite Peak SNOTEL	8543	1-Apr	80	30.2	14.6	21.2	142%
Fish Creek SNOTEL	7660	1-Apr	85	28.6	18.9	27.4	104%
Govt Corrals AM	7400	1-Apr	55	19.2	10.4	15.0	128%
Oregon Canyon AM	7050	1-Apr	22	7.7	0.4	3.0	257%
Silvies SNOTEL	6990	1-Apr	49	18.4	8.2	15.6	118%
Pueblo Summit AM	6970	1-Apr	7	2.6	0.0	0.0	
Buckskin Lower SNOTEL	6915	1-Apr	40	14.4	4.3	8.5	169%
V Lake AM	6600	1-Apr	28	10.3	0.0	4.9	210%
Louse Canyon AM	6530	1-Apr	26	9.1	0.0	3.2	284%
Disaster Peak SNOTEL	6500	1-Apr	19	6.6	0.0	1.9	347%
Hart Mountain AM	6430	1-Apr	12	4.5	0.0	0.0	
Quinn Ridge AM	6270	1-Apr	0	0.0	0.0	0.0	
Snow Mountain SNOTEL	6230	1-Apr	41	15.7	7.8	12.2	129%
Lamance Creek SNOTEL	6000	1-Apr	20	8.6	0.0	6.6	130%
Blue Mountain Spring SNOTEL	5870	1-Apr	50	20.5	8.9	15.9	129%
Sheldon SCAN	5860	1-Apr	0	0.0	0.0	0.0	
Buck Pasture AM	5740	1-Apr	9	3.4	0.0	0.0	
Call Meadows AM	5380	1-Apr	21	7.9	0.0	1.2	658%
Rock Springs SNOTEL	5290	1-Apr	13	5.4	0.0	0.9	600%
Starr Ridge SNOTEL	5250	1-Apr	16	5.8	0.0	0.0	
Lake Creek R.S. SNOTEL	5240	1-Apr	33	12.7	1.9	8.6	148%
Buckskin Lake AM	5190	1-Apr	0	0.0	0.0	0.0	

Recession Forecasts for Oregon

Recession flow forecasts are presented below for key streamflow sites where reliable daily streamflow data are available. The recession flow forecasts use exceedance probabilities in a format similar to the standard water supply forecasts presented in this document. Each forecast provides a range of possible outcomes representing the uncertainty of forecasting models.

The types of forecasts in the table below are:

- 1) Threshold flow -- Date that the daily streamflow rate falls below the given threshold flow
- 2) Peak flow -- Maximum daily flow
- 3) Date of peak flow -- Date of occurrence of maximum daily flow
- 4) Average daily flow on a given date

OWYHEE AND MALHEUR BASINS					
<i>FORECAST POINT</i>	<i>FORECAST THRESHOLD</i>	<i>FORECAST VALUE</i>			<i>LONG-TERM AVERAGE VALUE</i>
		<i>----- CHANCE OF EXCEEDING -----</i>			
		<i>90%</i>	<i>50%</i>	<i>10%</i>	
Owyhee R nr Rome	2000 cfs	Apr 6	May 3	Jun 9	May 5
Owyhee R nr Rome	1000 cfs	Apr 10	May 14	Jun 19	May 18
Owyhee R nr Rome	500 cfs	Apr 28	Jun 1	Jul 5	June 2

UPPER JOHN DAY BASIN					
<i>FORECAST POINT</i>	<i>FORECAST THRESHOLD</i>	<i>FORECAST VALUE</i>			<i>LONG-TERM AVERAGE VALUE</i>
		<i>----- CHANCE OF EXCEEDING -----</i>			
		<i>90%</i>	<i>50%</i>	<i>10%</i>	
John Day R at Service Creek	Average Daily Flow on Aug. 1st	141	350	560	271

UPPER DESCHUTES AND CROOKED BASINS					
<i>FORECAST POINT</i>	<i>FORECAST THRESHOLD</i>	<i>FORECAST VALUE</i>			<i>LONG-TERM AVERAGE VALUE</i>
		<i>----- CHANCE OF EXCEEDING -----</i>			
		<i>90%</i>	<i>50%</i>	<i>10%</i>	
Crane Prairie Inflow *	Date of Peak	May 10	May 26	Jun 11	May 25
Crane Prairie Inflow	Peak Flow	168	295	425	403
Crane Prairie Inflow	Average Daily Flow on Oct. 1st	164	198	230	269
Prineville Reservoir Inflow	150 cfs	May 23	Jun 13	Jul 4	May 30
Prineville Reservoir Inflow	80 cfs	May 29	Jun 19	Jul 10	June 7
Whychus Creek nr Sisters	100 cfs	Jul 7	Jul 28	Aug 22	August 16

ROGUE AND UMPQUA BASINS					
<i>FORECAST POINT</i>	<i>FORECAST THRESHOLD</i>	<i>FORECAST VALUE ----- CHANCE OF EXCEEDING ----- -----</i>			<i>LONG-TERM AVERAGE VALUE</i>
		90%	50%	10%	
South Umpqua R nr Brockway *	90 cfs	Jul 28	Aug 17	Sep 1	August 8
South Umpqua R at Tiller	140 cfs	Jun 28	Jul 18	Aug 7	July 11
South Umpqua R at Tiller	90 cfs	Jul 17	Aug 7	Aug 27	August 1
South Umpqua R at Tiller	60 cfs	Aug 7	Sep 1	Sep 26	August 28

*Dates are based on streamflow data adjusted for releases from Galesville Reservoir to reflect natural flow conditions and do not match observed gage data. There is an approximately 20% chance in any given year that the flow will not recede below 90 cfs; the dates given here are for the event that the flow does recede below 90 cfs.

LAKE COUNTY AND GOOSE LAKE BASINS					
<i>FORECAST POINT</i>	<i>FORECAST THRESHOLD</i>	<i>FORECAST VALUE ----- CHANCE OF EXCEEDING ----- -----</i>			<i>LONG-TERM AVERAGE VALUE</i>
		90%	50%	10%	
Deep Ck ab Adel	100 cfs	Jun 12	Jun 29	Jul 16	June 17
Honey Ck nr Plush	100 cfs	Apr 26	May 27	Jun 27	May 16
Honey Ck nr Plush	50 cfs	May 19	Jun 15	Jul 12	June 4
Twentymile Ck nr Adel	50 cfs	May 15	Jun 12	Jul 10	May 30
Twentymile Ck nr Adel	10 cfs	Jun 28	Jul 18	Aug 7	July 7

HARNEY BASIN					
<i>FORECAST POINT</i>	<i>FORECAST THRESHOLD</i>	<i>FORECAST VALUE ----- CHANCE OF EXCEEDING ----- -----</i>			<i>LONG-TERM AVERAGE VALUE</i>
		90%	50%	10%	
Silvies R nr Burns	400 cfs	May 1	May 22	Jun 12	May 21
Silvies R nr Burns	200 cfs	May 16	Jun 8	Jul 1	June 2
Silvies R nr Burns	100 cfs	Jun 2	Jun 26	Jul 18	June 13
Silvies R nr Burns	50 cfs	Jun 24	Jul 18	Aug 17	July 3
Donner Und Blitzen R nr Frenchglen	200 cfs	May 30	Jun 18	Jul 7	June 20
Donner Und Blitzen R nr Frenchglen	100 cfs	Jun 22	Jul 8	Jul 23	July 9

Basin Outlook Reports: How Forecasts Are Made

Federal – State – Private Cooperative Snow Surveys

For more water supply and resource management information, contact:

USDA, Natural Resources Conservation Service
Snow Survey Office
1201 NE Lloyd Suite 900
Portland, OR 97232
Phone: (503) 414-3271
Web site <http://www.or.nrcs.usda.gov/snow>

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertainty is in the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount. By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

Interpreting Water Supply Forecasts

Each month, five forecasts are issued for each forecast point and each forecast period. Unless otherwise specified, all streamflow forecasts are for streamflow volumes that would occur naturally without any upstream influences. Streamflow forecasts help users make risk-based decisions. Water users can select the forecast corresponding to the level of risk they are willing to accept in order to minimize the negative impacts of having more or less water than planned for. Users need to know what the different forecasts represent if they are to use the information correctly when making operational decisions. The following is an explanation of each of the forecasts.

90 Percent Chance of Exceedance Forecast. There is a 90 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 10 percent chance that the actual streamflow volume will be less than this forecast value.

70 Percent Chance of Exceedance Forecast. There is a 70 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 30 percent chance that the actual streamflow volume will be less than this forecast value.

50 Percent Chance of Exceedance Forecast. There is a 50 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 50 percent chance that the actual streamflow volume will be less than this forecast value. Generally, this forecast is the middle of the range of possible streamflow volumes that can be produced given current conditions.

30 Percent Chance of Exceedance Forecast. There is a 30 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 70 percent chance that the actual streamflow volume will be less than this forecast value.

10 Percent Chance of Exceedance Forecast. There is a 10 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 90 percent chance that the actual streamflow volume will be less than this forecast value.

*Note: There is still a 20 percent chance that actual streamflow volumes will fall either below the 90 percent exceedance forecast or above the 10 percent exceedance forecast.

These forecasts represent the uncertainty inherent in making streamflow predictions. This uncertainty may include sources such as: unknown future weather conditions, uncertainties associated with the various prediction methodologies, and the spatial coverage of the data network in a given basin. AF stands for acre-feet. Forecasted volumes of water are typically in thousands of acre-feet.

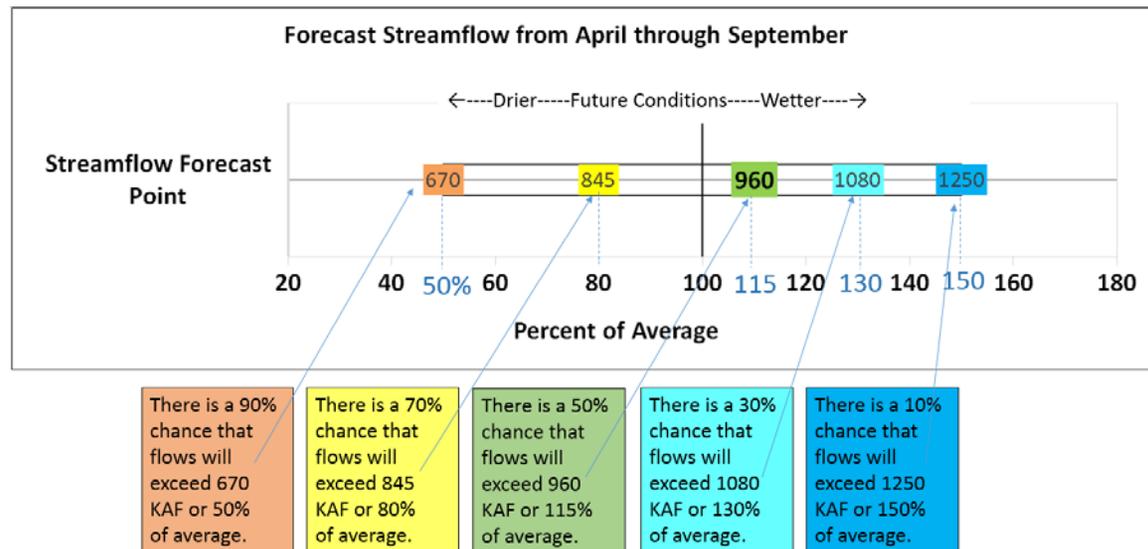
30-Year Average. The 30-year average streamflow for each forecast period is provided for comparison. The average is based on data from 1981-2010. The % AVG. column compares the 50% chance of exceedance forecast to the 30-year average streamflow; values above 100% denote when the 50% chance of exceedance forecast would be greater than the 30-year average streamflow.

To Decrease the Chance of Having Less Water than Planned for: A user might determine that making decisions based on a 50 percent chance of exceedance forecast is too much risk to take (there is still a 50% chance that the user will receive less than this amount). To reduce the risk of having less water than planned for, users can base their operational decisions on one of the forecasts with a greater chance of being exceeded such as the 90 or 70 percent exceedance forecasts.

To Decrease the Chance of Having More Water than Planned for: A user might determine that making decisions based on a 50 percent chance of exceedance forecast is too much risk to take (there is still a 50% chance that the user will receive more than this amount). To reduce the risk of having more water than planned for, users can base their operational decisions on one of the forecasts with a lesser chance of being exceeded such as the 30 or 10 percent exceedance forecasts.

Graphical Representation of Streamflow Forecast Range:

This type of graphic is used in the state-wide streamflow forecast summary



Using the Forecasts - an Example

Using the 50 Percent Exceedance Forecast.

Using the example forecasts shown here, there is a 50% chance that actual streamflow volume at the Mountain Creek near Mitchell will be less than 4.4 KAF between April 1 and Sept 30. There is also a 50% chance that actual streamflow volume will be greater than 4.4 KAF.

Using the 90 and 70 Percent Exceedance Forecasts. If an unexpected shortage of water could cause problems (such as irrigated agriculture), users might want to plan on receiving 3.3 KAF (from the 70 percent exceedance forecast). There is a 30% chance of receiving *less* than 3.3 KAF.

Alternatively, if users determine the risk of using the 70 percent exceedance forecast is too great, then they might plan on receiving 1.7 KAF (from the 90 percent exceedance forecast). There is 10% chance of receiving less than 1.7 KAF.

JOHN DAY BASIN									
Streamflow Forecasts - February 1, 2013									
Forecast Point	Forecast Period	Future Conditions				Wetter		30-Yr Avg. (1000AF)	
		Drier		Chance Of Exceeding *		30%	10%		
		90% (1000AF)	70% (1000AF)	50% (1000AF)	(% AVG.)	(1000AF)	(1000AF)		
Strawberry Ck nr Prairie City	MAR-JUL	5.0	6.6	7.6	89	8.6	10.2	8.5	
	APR-SEP	5.2	6.8	7.9	90	9.0	10.6	8.8	
Mountain Ck nr Mitchell	FEB-JUL	3.2	5.4	6.9	99	8.4	10.6	7.0	
	APR-SEP	1.7	3.3	4.4	90	5.5	7.1	4.9	

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

Using the 30 or 10 Percent Exceedance Forecasts. If an unexpected excess of water could cause problems (such as operating a flood control reservoir), users might plan on receiving 5.5 KAF (from the 30 percent exceedance forecast). There is a 30% chance of receiving *more* than 5.5 KAF.

Alternatively, if users determine the risk of using the 30 percent exceedance forecast is too great, then they might plan on receiving 7.1 KAF (from the 10 percent exceedance forecast). There is a 10% chance of receiving more than 7.1 KAF.

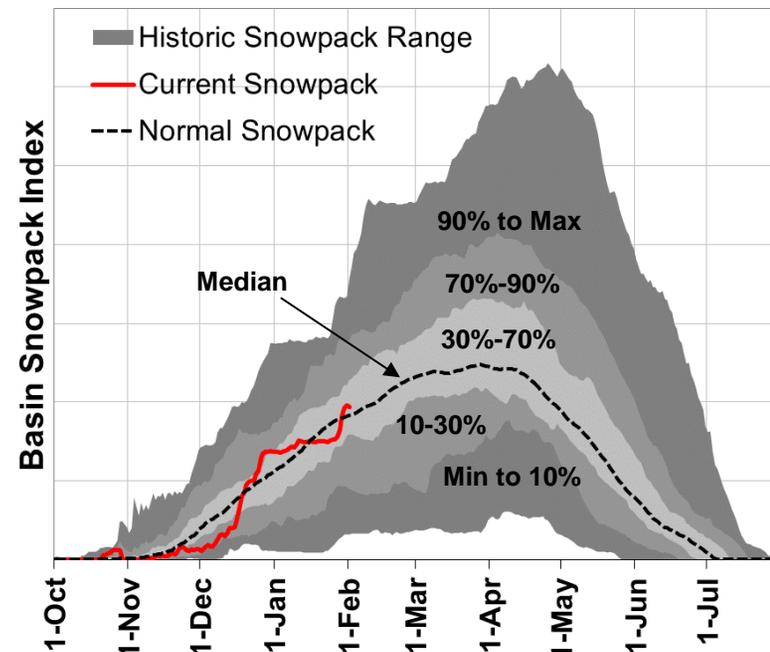
Interpreting Snowpack Plots

The basin snowpack plots display an index calculated using daily SNOTEL data for many sites in each basin. They show how the current year's snowpack data compares to historical data in the basin. The "Current Snowpack" line can be compared with the "Normal Snowpack" (median) line, as well as the historic range of snowpack in the basin.

The grey shaded areas represent different percentiles of the historical range of the snowpack index for each day. The dark grey shading indicates the extreme lows and highs in the SNOTEL record (minimum to the 10th percentile and the 90th percentile to maximum). The medium grey shading indicates the range from the 10th to 30th percentiles and the 70th to 90th percentiles. The light grey shading indicates the range between the 30th to 70th percentiles, while the median is the 50th percentile. A percentile is the value of the snowpack index below which the given percent of historical years fall. For instance, the 90th percentile line indicates that the snowpack index has been below this line for 90 percent of the years of record.

** Please note: These plots only use daily data from SNOTEL sites in the basin. Because snow course data is collected monthly, it cannot be included in these plots. The official snowpack percent of normal for the basin incorporates both SNOTEL and snow course data, so occasionally there might be slight discrepancies between the plot and official basin percent of normal (stated in basin summary below each plot).

Mountain Snowpack



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Official Business



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<http://www.or.nrcs.usda.gov/snow>

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