



United States
Department of
Agriculture



Natural Resources
Conservation
Service

Oregon Basin Outlook Report

March 1, 2019



Mt Ashland Switchback Snow Course, 1/28/19 (left) and 2/28/19 (right)

Left Photo, Shavon Haynes (Snow Surveyor, Jackson County)

Right photo, Ben Thorpe (Snow Surveyor, Jackson County)

The Mt. Ashland Switchback snow course in the Rogue River basin looked significantly different on January 28 (left) than it did on February 28 (right). Across the state, February was characterized by cold temperatures and above-normal precipitation, which resulted in significant snow accumulation in the mountains, as well as in many towns and cities and even ocean beaches. Many long-term measurement sites broke monthly precipitation records for February, and the sustained cold temperatures meant that the snowpack has rebounded significantly across the state. Given the current snowpack conditions, spring & summer streamflows across most of the state are forecast to be near average to above average.

Contents

General Outlook	1
Owyhee and Malheur Basins	4
Grande Ronde, Powder, Burnt and Imnaha Basins	7
Umatilla, Walla Walla, and Willow Basins	10
John Day Basin	12
Upper Deschutes and Crooked Basins	14
Hood, Sandy, and Lower Deschutes Basins	17
Willamette Basin	19
Rogue and Umpqua Basins	22
Klamath Basin	25
Lake County and Goose Lake	28
Harney Basin	30
Recession Forecasts for Oregon	32
Basin Outlook Reports: How Forecasts Are Made	34
Interpreting Water Supply Forecasts	35
Interpreting Snowpack Plots	36

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General Outlook

March 1st, 2019

SUMMARY

A remarkable and unexpected recovery in snowpack occurred during the shortest month of the year, dramatically improving the water supply outlook across Oregon. Mountain snowpack tipped the scales and is now above normal for most of the state. February storm cycles more than doubled the amount of snow on the ground in most locations, breaking many records along the way. Every long-term SNOTEL site in the state received above average February precipitation, and many sites received well over 200% the normal amount for the month, also setting new records. Based on these March 1st conditions, the streamflow forecasts increased significantly from last month's outlook report and are now calling for near normal to well above normal streamflows this spring and summer for most locations in Oregon.

However, while a very wet month greatly improved conditions, it did not entirely eradicate drought concerns. While the extreme drought status has been dropped, over 60% of the state remains in moderate to severe drought status according to the drought monitor:

<https://droughtmonitor.unl.edu/>. The unexpected amount of snow received in February serves as a good reminder that forecasts should be used as guidance and not gospel, as conditions can and do change rapidly. If the next few months stay cool and stormy, then streams will experience their normal seasonal volumes and drought concerns will continue to decrease. If there are sustained warm periods and long stretches of dry weather, then the water supply forecasts will likely decrease. As of March 1st, the snowpack and streamflow forecasts lean towards an adequate water supply situation for many areas of the state, but the next few weeks and months will ultimately determine the water supply picture for spring and summer.

SNOWPACK

The early season snowpack deficit was replenished by the perfect combination of weather systems. With unseasonably cold temperatures persisting for most of February and several storm systems bringing ample moisture, Oregon's mountain snowpack made a remarkable recovery in just one month. Seven of Oregon's long-term snow monitoring sites (with over 35 years of measurement) broke their records for highest March 1st snowpack and over 30% of these sites experienced their highest February snow accumulation on record. As of March 1st, snowpack conditions in all but one basin are above normal. The snowpack in the Hood, Sandy, and Lower Deschutes basins around Mt. Hood is collectively at 92% of normal – the lowest in the state. February storms in this region were not enough to make up for the early season deficit in the higher elevations. Snowpack in the John Day, Lake County and Goose Lake basins is at 149% of normal – the highest in the state.

The dynamic, snowy month of February made quite an impact across almost all of Oregon. Unusual amounts of lowland snow caused power outages, closed mountain passes, shuttered schools and business and presented looming flood concerns. During one stormy 7-day period (Feb 20-26), almost every SNOTEL site in the hardest hit part of the state (from Crater Lake to Mt. Jefferson) set new snow depth accumulation records by piling up 2 to 3 feet of new snowfall. Given this, a handful of long-term snow courses were not measured this month due to extreme difficulty in accessing them. 60% of SNOTEL sites with over 15 years of record have already

reached their average seasonal peak amounts for the season. If temperatures stay cold over the next month, then over half of the network will end the snow accumulation season with the normal to above normal amounts. Once into springtime, attention will turn to rate and timing of snowmelt, which will be a major factor in determining streamflow and water supplies.

PRECIPITATION

The month of February brought much higher than average precipitation to most of the state. Oregon's basins received between 115 and 270 percent of normal February precipitation, with most basins in eastern and southern Oregon receiving over twice their normal monthly precipitation. Across the state and through all elevation bands, most of this precipitation fell as snow, toppling trees, closing roads, and snarling transportation in urban areas. Much of the snow that fell at lower elevations remains on the ground due to persistent cold temperatures as of March 1st.

Out of 68 Oregon SNOTEL sites that have more than 35 years of record, sixteen sites set records for the most February precipitation ever measured. Many more low elevation NWS COOP precipitation sites also received record amounts of February precipitation, including Heppner (119 years of record), Baker City (76 years of record), and Rome (67 years of record).

RESERVOIRS

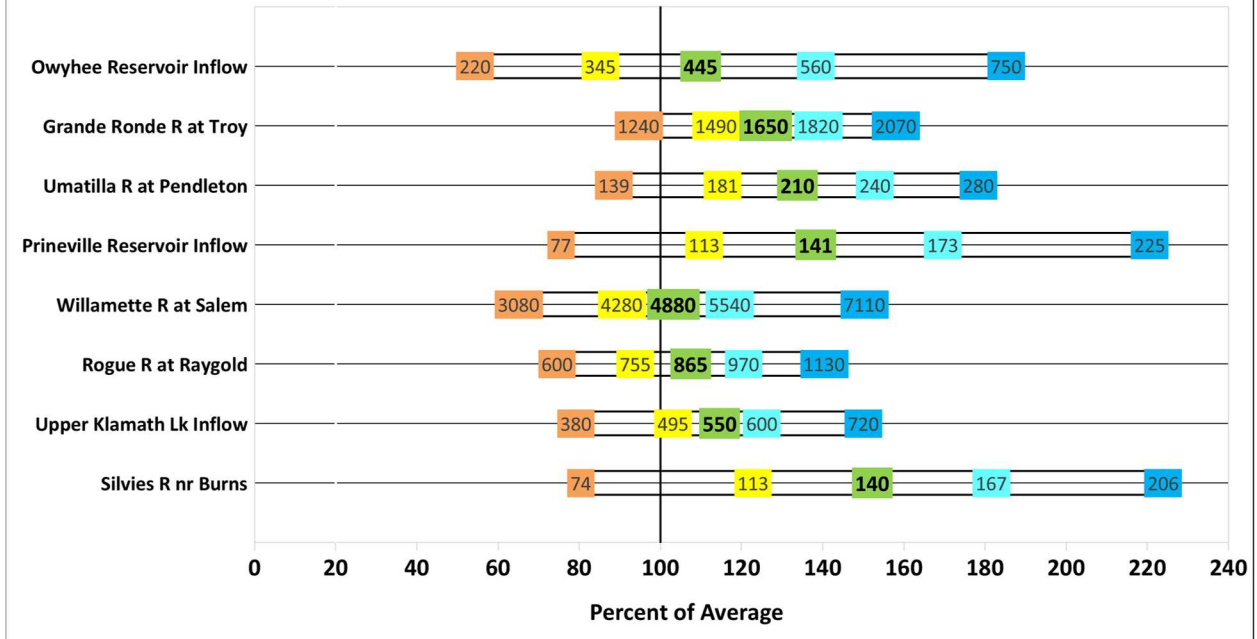
At the end of February, reservoir storage varied widely across the state. In general, most reservoirs are storing below average to near average amounts of water for this time of year. Basin reservoir storage conditions range from 65% to 97% of normal across Oregon. Given the recent snow at all elevations, reservoir managers are actively balancing many factors, including streamflows, flood control, and water supply needs. The current normal to above normal snowpack across the state means that most reservoirs will receive significant inflows in the coming months as the snowpack melts.

STREAMFLOW

Streamflow forecasts bumped up significantly from last month due to the impressive storm cycles in February. Because of the abundant mountain snowpack, spring and summer streamflow volumes are expected to be near normal to well above normal in most basins throughout the state. There are a few areas where the forecasts remain below normal – streamflow forecasts in parts of the Deschutes River basin as well as the Mt. Hood region are around 80-95% of normal as of March 1st. The highest streamflow forecasts are located in eastern Oregon where snow-laden storms have been more consistent this season. The highest set of forecasts in the state is in the Umatilla, Walla Walla and Willow basins at around 140% of normal. The weather over the next few months will greatly affect the summer water supply story for this year, but the current trajectory is looking positive for the state's streams and rivers.

To accompany the forecast summary graphic on the following page, 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 (which may be below average depending on the region). 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 on the following page and explained in more detail at the end of this document.

Summary of Streamflow Forecasts across Oregon
April through September Forecast Volumes at a Selection of Streamflow Points
(Volumes listed in KAF)



Legend: ←-----Drier----- Future Conditions -----Wetter-----→				
90% Exceedance Forecast (KAF) There is a 90% chance that flows will exceed this volume.	70% Exceedance Forecast (KAF) There is a 70% chance that flows will exceed this volume.	50% Exceedance Forecast (KAF) There is a 50% chance that flows will exceed this volume.	30% Exceedance Forecast (KAF) There is a 30% chance that flows will exceed this volume.	10% Exceedance Forecast (KAF) There is a 10% chance that flows will exceed this volume.

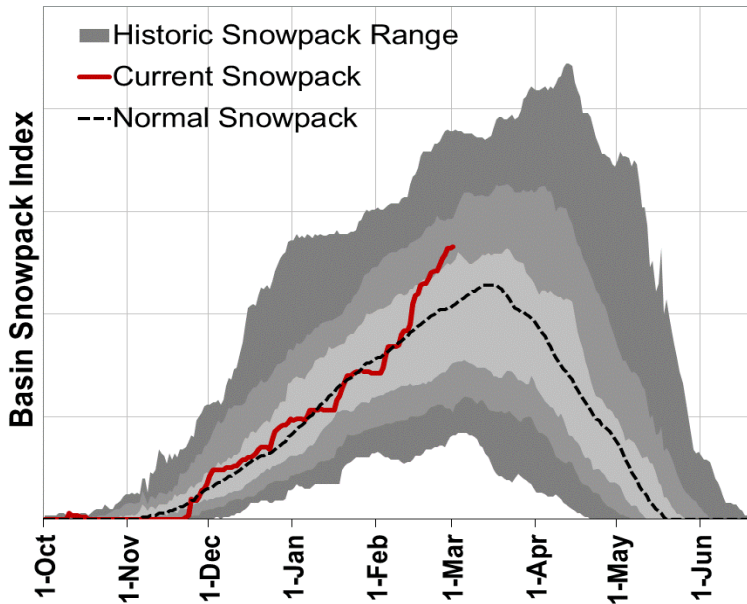
All forecasts are listed with units of 1000 acre-feet (KAF). This report contains data furnished by the Oregon Department of Water Resources, U.S. Geological Survey, NOAA National Weather Service and other cooperators. This report will be updated monthly, January through June.



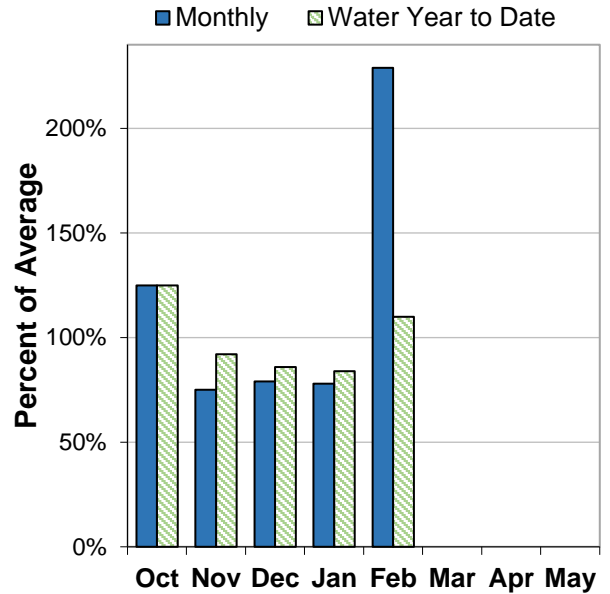
Owyhee and Malheur Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 138% of normal. This is significantly higher than last month when the snowpack was 95% of normal. Out of 60 years of measurement, Bully Creek Aerial Marker set a record for highest March 1st snowpack (10.2" of SWE).

PRECIPITATION

February precipitation was 229% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 110% of average. Two long-term SNOTEL sites (with over 37 years of measurement) - Lake Creek R.S and Rock Springs - set new records for highest February precipitation. Also setting a record for February precipitation was Rome 2NW NWS site, which has been measured for 67 years.

RESERVOIR

Reservoir storage across the basin is currently well below average. As of March 1, storage at major reservoirs in the basin ranges from 28% of average at Warm Springs Reservoir to 78% of average at Lake Owyhee.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 110% to 141% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be above normal to well above normal this summer.

Owyhee And Malheur Basins Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	355	495	605	117%	725	925	515
	MAR-SEP	370	515	625	118%	745	945	530
	APR-JUL	169	285	385	112%	495	690	345
	APR-SEP	184	305	405	111%	520	710	365
Owyhee R bl Owyhee Dam ²	MAR-JUL	370	525	650	117%	785	1010	555
	MAR-SEP	405	560	680	116%	815	1030	585
	APR-JUL	191	315	415	111%	525	720	375
	APR-SEP	220	345	445	110%	560	750	405
Malheur R nr Drewsey	MAR-JUL	94	129	152	149%	175	210	102
	APR-SEP	53	80	99	141%	118	145	70
NF Malheur R at Beulah ²	MAR-JUL	75	95	109	143%	123	143	76
	APR-SEP	57	74	86	139%	98	115	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	18.3	28.5	32.1	57%	59.2
Bully Creek	10.6	13.0	16.4	65%	23.7
Lake Owyhee	305.4	513.8	392.6	78%	715.0
Warm Springs	23.0	108.5	82.2	28%	169.6

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
East Little Owyhee Basin	7	158%	40%
South Fork Owyhee Basin	6	125%	40%
Upper Malheur Basin	8	204%	35%
Upper Owyhee Basin	5	116%	45%

Owyhee And Malheur Basins Summary for March 1, 2019

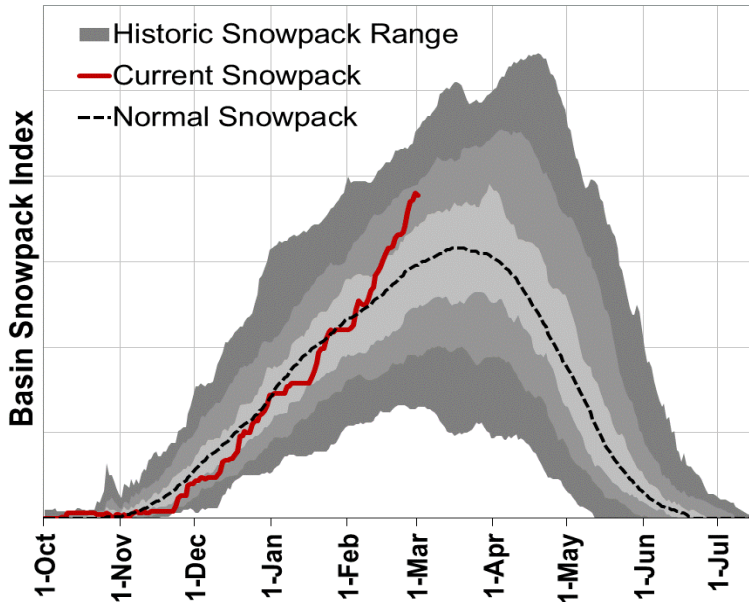
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Granite Peak SNOTEL	8543	1-Mar	83	25.4	9.0	18.3	139%
Trout Creek AM	7890	1-Mar	43	11.2	4.0	11.5	97%
Toe Jam SNOTEL	7700	1-Mar	64	19.4	8.6		
Govt Corrals AM	7400	1-Mar	61	17.7	4.8		
Jack Creek Upper SNOTEL	7250	1-Mar	47	14.0	7.3	14.4	97%
Fawn Creek SNOTEL	7000	1-Mar	61	16.8	6.4	13.4	125%
Merritt Mountain AM	7000	25-Feb	37	10.4	1.3	6.2	168%
Buckskin Lower SNOTEL	6915	1-Mar	47	12.0	4.4	8.1	148%
Gold Creek Snow Course	6707	25-Feb	26	7.4	0.7	5.8	128%
Big Bend SNOTEL	6700	1-Mar	37	11.3	3.9	8.4	135%
Fry Canyon SNOTEL	6700	1-Mar	13	4.6	1.6		
Fry Canyon Snow Course	6700	25-Feb	30	8.3	2.0	7.9	105%
Laurel Draw SNOTEL	6697	1-Mar	38	11.9	4.9	10.0	119%
Columbia Basin AM	6650	25-Feb	40	11.2	1.0	8.6	130%
Red Canyon AM	6600	1-Mar	33	10.2	1.8	7.7	132%
Louse Canyon AM	6530	1-Mar	36	10.4	0.7	4.2	248%
South Mtn. SNOTEL	6500	1-Mar	53	16.6	5.5	15.0	111%
Succor Creek AM	6310	1-Mar	32	9.9	1.4	8.4	118%
Quinn Ridge AM	6270	1-Mar	20	6.0	0.4	2.0	300%
Taylor Canyon SNOTEL	6200	1-Mar	29	10.4	0.4	5.2	200%
Blue Mountain Spring SNOTEL	5870	1-Mar		20.4	8.4	14.4	142%
Vaught Ranch AM	5850	1-Mar	18	5.4	0.7	4.8	113%
Barney Creek (New) Snow Course	5830	1-Mar	52	13.6	3.3		
Buck Pasture AM	5740	1-Mar	20	5.8	0.5	1.6	363%
Lookout Butte AM	5740	1-Mar	0	0.0	0.4	0.0	
Mud Flat SNOTEL	5730	1-Mar	25	7.6	1.3	7.1	107%
Battle Creek AM	5710	1-Mar	16	4.8	0.2	3.6	133%
Boulder Creek AM	5710	1-Mar	33	9.3		3.0	310%
Reynolds Creek SNOTEL	5600	1-Mar	27	8.7	1.5	2.1	414%
Bull Basin AM	5460	1-Mar	9	2.7	0.2	1.9	142%
Dooley Mountain Snow Course	5440	1-Mar	49	13.6	1.6	8.2	166%
Call Meadows AM	5380	1-Mar	35	10.8	0.4	4.4	245%
Bully Creek AM	5300	1-Mar	33	10.2	0.2	1.8	567%
Rock Springs SNOTEL	5290	1-Mar	33	10.3	0.6	6.2	166%
Lake Creek R.S. SNOTEL	5240	1-Mar	58	16.1	5.5	10.3	156%
Flag Prairie AM	4720	1-Mar	33	10.2	0.2	4.0	255%
Eldorado Pass Snow Course	4630	1-Mar	32	9.6	0.0	3.0	320%



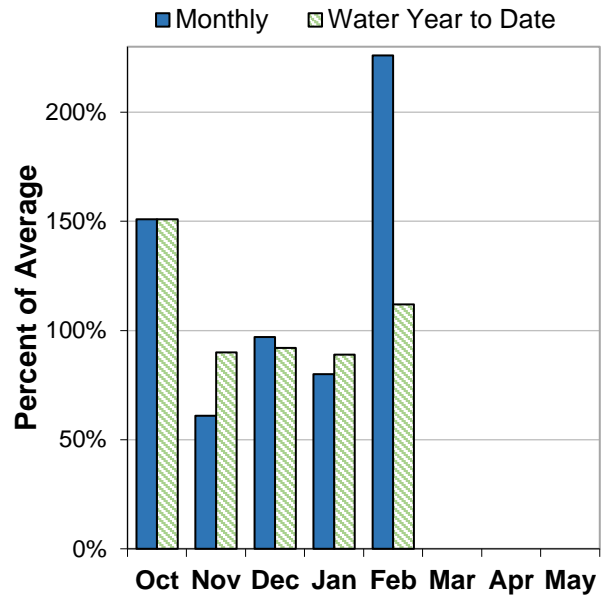
Grande Ronde, Powder, Burnt and Imnaha Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 127% of normal. This is significantly higher than last month when the snowpack was 91% of normal. Four long-term snow monitoring sites, have set a new record for highest March 1st snowpack: Eilertson Meadows SNOTEL; Taylor Green SNOTEL (both with over 38 years of measurements); Little Antone Alt snow course (measured since 1974) and Eldorado Pass snow course (measured since 1955).

PRECIPITATION

February precipitation was 226% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 112% of average. Five long-term monitoring sites set new records for highest February precipitation: Beaver Reservoir SNOTEL; County Line SNOTEL; Taylor Green SNOTEL; Wolf Creek SNOTEL (all with over 38 years of measurements) and Baker FAA AP (measured since 1943).

RESERVOIR

As of March 1, storage at major reservoirs in the basin ranges from 20% of average at Phillips Lake to 128% of average at Wallowa Lake.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 113% to 137% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be above normal to well above normal this summer.

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

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	41	54	64	139%	74	91	46
	APR-SEP	27	39	48	137%	58	76	35
Powder R nr Sumpter ²	MAR-JUL	60	73	83	132%	93	109	63
	APR-SEP	48	61	70	130%	80	97	54
Pine Ck nr Oxbow	MAR-JUL	199	240	270	135%	295	335	200
	APR-SEP	155	193	220	135%	245	280	163
Imnaha R at Imnaha	APR-JUL	240	290	325	127%	355	405	255
	APR-SEP	260	315	350	125%	385	440	280
Catherine Ck nr Union	APR-JUL	56	67	75	125%	83	95	60
	APR-SEP	60	72	80	125%	88	101	64
Lostine R nr Lostine	APR-JUL	103	113	120	113%	127	137	106
	APR-SEP	111	122	130	113%	138	149	115
Bear Ck nr Wallowa	APR-JUL	55	65	71	113%	78	87	63
	APR-SEP	58	67	74	114%	80	90	65
Grande Ronde R at Troy	MAR-JUL	1510	1760	1930	128%	2100	2340	1510
	APR-SEP	1240	1490	1650	126%	1820	2070	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	7.0	37.1	34.8	20%	73.5
Thief Valley	14.0	14.1	13.7	102%	13.3
Unity	9.6	15.0	14.5	67%	25.5
Wallowa Lake	21.1	26.0	16.4	128%	37.5
Wolf Creek	2.4	2.8	3.4	71%	11.1

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Burnt Basin	4	165%	50%
Imnaha Basin	5	104%	67%
Lower Grande Ronde Basin	4	112%	72%
Powder Basin	12	132%	64%
Upper Grande Ronde Basin	9	133%	76%
Wallowa Basin	6	114%	72%

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

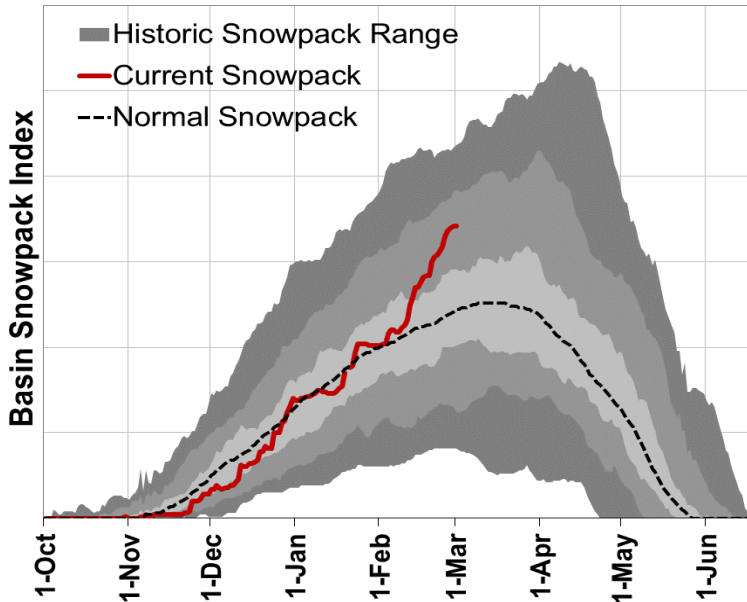
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Mt. Howard SNOTEL	7910	1-Mar	50	13.4	9.3	11.8	114%
Aneroid Lake #2 SNOTEL	7400	1-Mar	64	16.8	11.7	20.2	83%
Anthony Lake (Rev) Snow Course	7160	28-Feb	83	25.5	15.7	19.8	129%
TV Ridge AM	7050	1-Mar	54	14.6	9.3	14.2	103%
Bald Mtn AM	6600	1-Mar	97	27.1		22.2	122%
Little Alps Snow Course	6360	27-Feb	53	12.8	6.4	10.4	123%
Big Sheep AM	6230	1-Mar	75	21.0	14.4	21.4	98%
Bear Saddle SNOTEL	6180	1-Mar	94	28.1	11.4	21.0	134%
Placer Creek Snow Course	5860	28-Feb	87	23.1	9.2	15.4	150%
Bourne SNOTEL	5850	1-Mar	67	18.6	7.5	14.0	133%
Barney Creek (New) Snow Course	5830	1-Mar	52	13.6	3.3		
Moss Springs SNOTEL	5760	1-Mar	82	24.1	20.1	20.9	115%
Taylor Green SNOTEL	5740	1-Mar	77	26.3	13.8	18.1	145%
Boulder Creek AM	5710	1-Mar	33	9.3		3.0	310%
Spruce Springs SNOTEL	5700	1-Mar	52	13.8	10.0	14.7	94%
Wolf Creek SNOTEL	5630	1-Mar	68	18.4	8.1	14.6	126%
Milk Shakes SNOTEL	5580	1-Mar	112	34.8	29.0		
West Branch SNOTEL	5560	1-Mar	92	27.8	12.8	19.0	146%
Touchet SNOTEL	5530	1-Mar	92	28.2	19.9	26.5	106%
Eilertson Meadows SNOTEL	5510	1-Mar	58	16.0	4.2	9.2	174%
West Eagle Meadows AM	5500	1-Mar	103	33.0	17.4	27.4	120%
Dooley Mountain Snow Course	5440	1-Mar	49	13.6	1.6	8.2	166%
Gold Center SNOTEL	5410	1-Mar	57	14.9	6.3	9.0	166%
Schneider Meadows SNOTEL	5400	1-Mar	118	35.4	18.8	25.3	140%
Beaver Reservoir SNOTEL	5150	1-Mar	54	13.2	6.4	8.9	148%
Tipton SNOTEL	5150	1-Mar	58	13.6	7.6	11.1	123%
High Ridge SNOTEL	4920	1-Mar	91	28.6	19.5	21.4	134%
County Line SNOTEL	4830	1-Mar	32	6.8	1.9	4.3	158%
Eldorado Pass Snow Course	4630	1-Mar	32	9.6	0.0	3.0	320%
Little Antone (Alt.) Snow Course	4560	27-Feb	51	13.2	5.0	8.8	150%
Bowman Springs SNOTEL	4530	1-Mar	56	14.6	5.3	7.5	195%
East Eagle Snow Course	4400	28-Feb	85	17.4	13.0	21.1	82%
Sourdough Gulch SNOTEL	4000	1-Mar	23	5.6	0.8	0.2	2800%



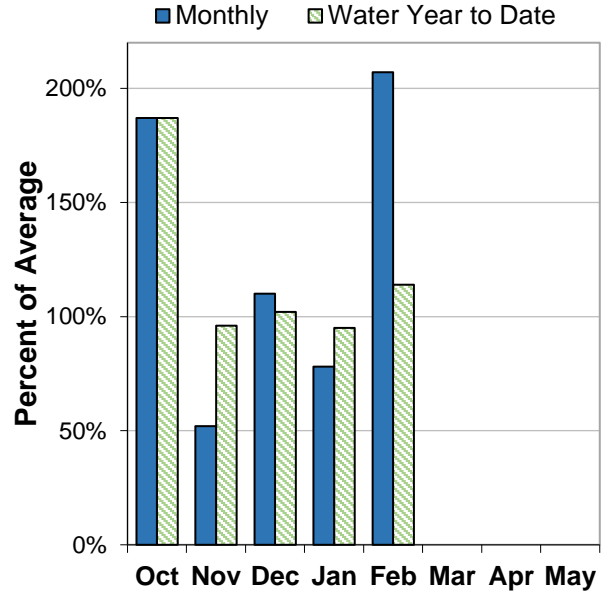
Umatilla, Walla Walla and Willow Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 145% of normal. This is significantly higher than last month when the snowpack was 102% of normal.

PRECIPITATION

February precipitation was 207% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 114% of average. Five long-term monitoring sites set new records for highest February precipitation: Bowman Springs SNOTEL; High Ridge SNOTEL; Lucky Strike SNOTEL (all with 41 years of measurements); Heppner (measured since 1893); Pendleton WFO (measured since 2003).

RESERVOIR

As of March 1, storage at major reservoirs in the basin ranges from 90% of average at Cold Springs Reservoir to 113% of average at Willow Creek Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 111% to 162% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be above normal to well above normal this summer.

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

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	60	69	75	110%	81	90	68
	APR-SEP	58	67	73	111%	79	87	66
Umatilla R ab Meacham nr Gibbon	MAR-JUL	100	119	132	131%	145	164	101
	APR-SEP	73	91	104	130%	116	134	80
Umatilla R at Pendleton	MAR-JUL	220	265	295	131%	325	370	225
	APR-SEP	139	181	210	134%	240	280	157
McKay Ck nr Pilot Rock	MAR-JUL	44	61	74	145%	89	112	51
	APR-SEP	17.7	30	40	138%	52	71	29
Butter Ck nr Pine City	MAR-JUL	15.0	19.5	23	154%	27	32	14.9
	APR-SEP	8.3	11.6	14.2	145%	17.0	22	9.8
Willow Ck ab Willow Lk nr Heppner	MAR-JUL	10.3	14.0	16.8	166%	20	25	10.1
	APR-SEP	5.9	9.0	11.5	162%	14.3	19.0	7.1
Rhea Ck nr Heppner	MAR-JUL	11.6	15.4	18.4	166%	22	27	11.1
	APR-SEP	6.0	9.1	11.5	153%	14.3	18.8	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	17.6	25.7	19.6	90%	38.6
Mckay	37.2	49.7	39.2	95%	71.5
Willow Creek	5.2	4.1	4.6	113%	9.8

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Umatilla Basin	5	154%	79%
Walla Walla Basin	7	145%	77%

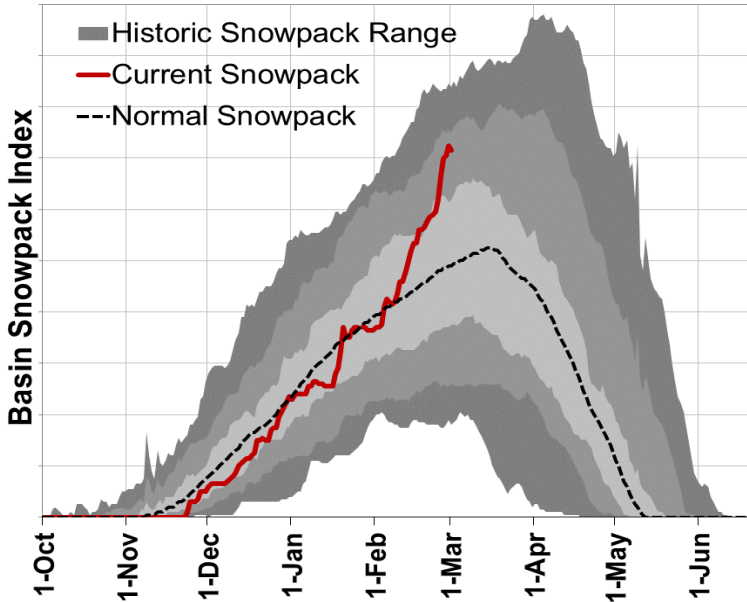
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Arbuckle Mtn SNOTEL	5770	1-Mar	74	19.1	10.5	15.2	126%
Spruce Springs SNOTEL	5700	1-Mar	52	13.8	10.0	14.7	94%
Milk Shakes SNOTEL	5580	1-Mar	112	34.8	29.0		
Touchet SNOTEL	5530	1-Mar	92	28.2	19.9	26.5	106%
Madison Butte SNOTEL	5150	1-Mar	41	10.6	2.4	3.9	272%
Lucky Strike SNOTEL	4970	1-Mar		13.3	4.5	6.8	196%
High Ridge SNOTEL	4920	1-Mar	91	28.6	19.5	21.4	134%
Bowman Springs SNOTEL	4530	1-Mar	56	14.6	5.3	7.5	195%
Emigrant Springs SNOTEL	3800	1-Mar	42	9.1	3.6	4.1	222%



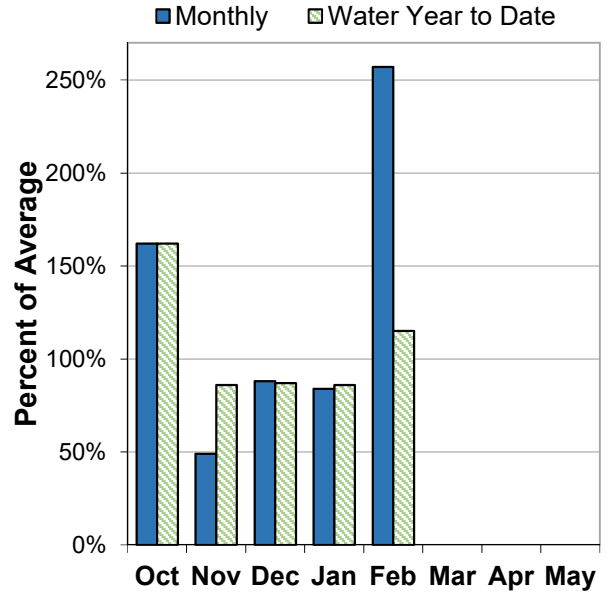
John Day Basin

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 149% of normal. This is significantly higher than last month when the snowpack was 92% of normal.

PRECIPITATION

February precipitation was 257% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 115% of average. Three long-term sites – Madison Butte SNOTEL; Gold Center SNOTEL (both with 39 years of measurements) and Mitchell 2E (measured since 1996) - set new records for highest February precipitation.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 119% to 151% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be above normal to well above normal this summer.

John Day Basin Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	7.1	8.9	10.1	119%	11.4	13.2	8.5
	APR-SEP	7.4	9.2	10.5	119%	11.7	13.5	8.8
Mountain Ck nr Mitchell	MAR-JUL	5.3	6.8	8.0	127%	9.2	11.2	6.3
	APR-SEP	3.6	5.1	6.2	127%	7.4	9.4	4.9
Camas Ck nr Ukiah	MAR-JUL	57	67	74	154%	81	91	48
	APR-SEP	34	45	53	151%	60	71	35
MF John Day R at Ritter	MAR-JUL	139	176	200	128%	225	260	156
	APR-SEP	102	137	161	128%	185	220	126
NF John Day R at Monument	MAR-JUL	840	990	1090	142%	1200	1350	765
	APR-SEP	595	745	845	141%	945	1090	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	5	162%	60%
North Fork John Day Basin	8	146%	67%
Upper John Day Basin	5	145%	56%

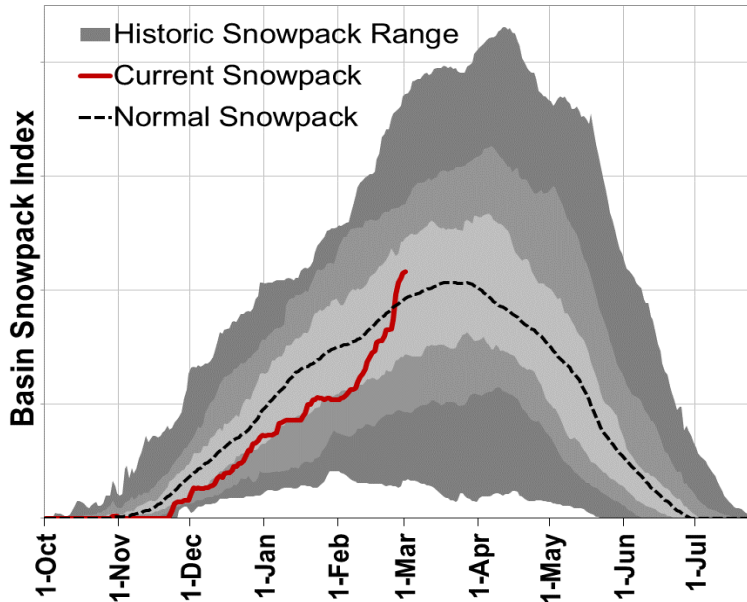
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Anthony Lake (Rev) Snow Course	7160	28-Feb	83	25.5	15.7	19.8	129%
Little Alps Snow Course	6360	27-Feb	53	12.8	6.4	10.4	123%
Snow Mountain SNOTEL	6230	1-Mar	51	13.6	5.0	9.8	139%
Blue Mountain Spring SNOTEL	5870	1-Mar		20.4	8.4	14.4	142%
Bourne SNOTEL	5850	1-Mar	67	18.6	7.5	14.0	133%
Derr. SNOTEL	5850	1-Mar	65	17.3	7.4	12.8	135%
Barney Creek (New) Snow Course	5830	1-Mar	52	13.6	3.3		
Arbuckle Mtn SNOTEL	5770	1-Mar	74	19.1	10.5	15.2	126%
Ochoco Meadows SNOTEL	5430	1-Mar	54	15.4	5.0	10.0	154%
Gold Center SNOTEL	5410	1-Mar	57	14.9	6.3	9.0	166%
Starr Ridge SNOTEL	5250	1-Mar	38	10.0	3.5	6.2	161%
Lake Creek R.S. SNOTEL	5240	1-Mar	58	16.1	5.5	10.3	156%
Ochoco Meadows Snow Course	5190	1-Mar	53	13.1	7.0	10.0	131%
Madison Butte SNOTEL	5150	1-Mar	41	10.6	2.4	3.9	272%
Tipton SNOTEL	5150	1-Mar	58	13.6	7.6	11.1	123%
Lucky Strike SNOTEL	4970	1-Mar		13.3	4.5	6.8	196%
County Line SNOTEL	4830	1-Mar	32	6.8	1.9	4.3	158%
Marks Creek Snow Course	4580	1-Mar	27	8.0	2.0	3.1	258%
Little Antone (Alt.) Snow Course	4560	27-Feb	51	13.2	5.0	8.8	150%



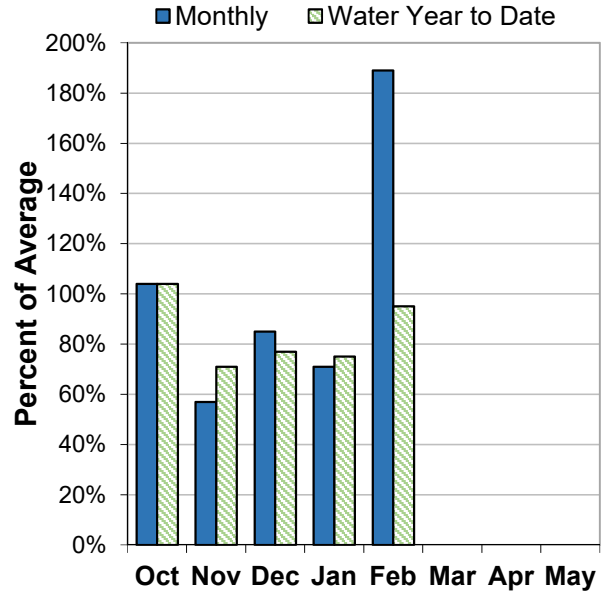
Upper Deschutes and Crooked Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 111% of normal. This is significantly higher than last month when the snowpack was 66% of normal.

PRECIPITATION

February precipitation was 189% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 95% of average. Three long-term sites – Ochoco Meadows SNOTEL; Derr SNOTEL (both with 39 years of measurements) and Prineville 4 NW (measured since 1897) - set new records for highest February precipitation.

RESERVOIR

As of March 1, storage at major reservoirs in the basin ranges from 29% of average at Ochoco Reservoir to 126% of average at Crescent Lake.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 79% to 140% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the Crooked and Little Deschutes basins are likely to be near normal to well above normal this summer. Elsewhere in the basin, streamflow forecasts are currently in the below normal to near normal range.

Upper Deschutes And Crooked Basins Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	19.5	24	28	78%	31	36	36
	MAR-SEP	32	40	46	79%	51	60	58
	APR-JUL	15.8	20	23	77%	26	31	30
	APR-SEP	27	35	41	79%	47	55	52
Crane Prairie Reservoir Inflow ²	MAR-JUL	40	50	57	86%	64	73	66
	MAR-SEP	59	74	84	87%	94	109	97
	APR-JUL	33	42	49	88%	55	64	56
	APR-SEP	51	66	75	85%	85	100	88
Crescent Lake Inflow ²	MAR-JUL	8.6	12.5	15.2	88%	17.8	22	17.2
	MAR-SEP	8.2	12.9	16.2	83%	19.4	24	19.5
	APR-JUL	8.4	11.7	13.9	93%	16.1	19.4	15.0
	APR-SEP	7.9	12.1	14.9	86%	17.7	22	17.4
Little Deschutes R nr La Pine ²	MAR-JUL	51	67	78	101%	89	105	77
	MAR-SEP	52	70	82	99%	94	112	83
	APR-JUL	45	58	68	108%	77	91	63
	APR-SEP	46	61	72	104%	82	98	69
Deschutes R at Benham Falls ²	MAR-JUL	330	350	365	92%	380	400	395
	MAR-SEP	480	505	525	94%	540	570	560
	APR-JUL	275	290	305	95%	315	335	320
	APR-SEP	425	450	465	96%	480	500	485
Wychus Ck nr Sisters	MAR-JUL	31	35	38	97%	41	45	39
	MAR-SEP	41	46	49	96%	52	57	51
	APR-JUL	28	31	34	97%	36	39	35
	APR-SEP	38	42	45	96%	48	52	47
Prineville Reservoir Inflow ²	MAR-JUL	163	205	240	140%	275	330	171
	MAR-SEP	162	205	240	140%	275	335	171
	APR-JUL	78	113	141	138%	172	225	102
	APR-SEP	77	113	141	138%	173	225	102
Ochoco Reservoir Inflow ²	MAR-JUL	30	39	46	139%	53	65	33
	MAR-SEP	30	39	46	144%	54	66	32
	APR-JUL	15.7	23	29	138%	36	46	21
	APR-SEP	14.8	22	28	140%	35	45	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

Upper Deschutes And Crooked Basins Summary for March 1, 2019

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Crane Prairie	42.3	45.3	39.8	106%	55.3
Crescent Lake	59.7	78.1	47.5	126%	86.9
Ochoco	6.8	21.8	23.4	29%	44.2
Prineville	60.5	89.2	98.9	61%	148.6
Wickiup	121.8	190.1	176.1	69%	200.0

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Little Deschutes Basin	4	117%	64%
Upper Crooked Basin	4	150%	60%
Upper Deschutes Basin	13	107%	59%

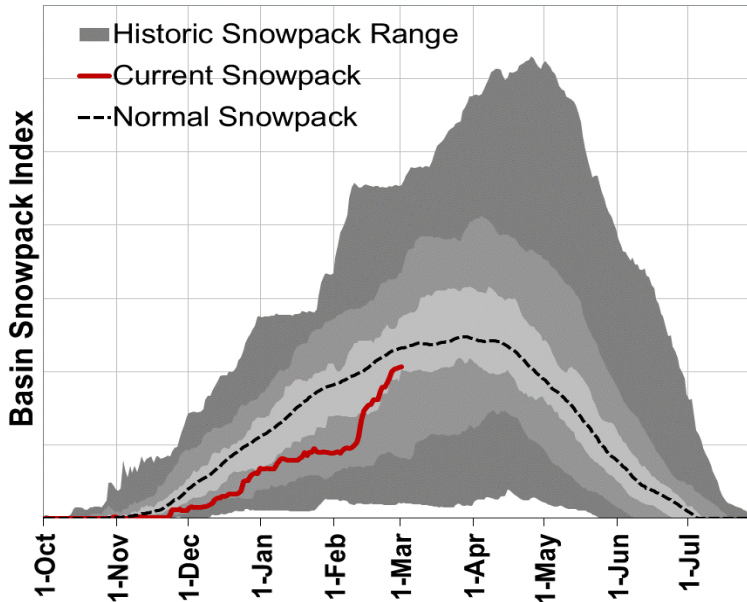
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
New Dutchman #3 Snow Course	6320	28-Feb	125	36.2	27.1	39.6	91%
Snow Mountain SNOTEL	6230	1-Mar	51	13.6	5.0	9.8	139%
Derr. SNOTEL	5850	1-Mar	65	17.3	7.4	12.8	135%
Three Creeks Meadow SNOTEL	5690	1-Mar	68	17.2	6.6	16.1	107%
Summit Lake SNOTEL	5610	1-Mar	119	33.9	23.5	31.2	109%
Irish Taylor SNOTEL	5540	1-Mar	109	28.8	18.2	30.8	94%
Tangent Snow Course	5470	28-Feb	78	18.6	5.4	18.1	103%
Ochoco Meadows SNOTEL	5430	1-Mar	54	15.4	5.0	10.0	154%
Ochoco Meadows Snow Course	5190	1-Mar	53	13.1	7.0	10.0	131%
Racing Creek Snow Course	5160	5-Mar	70	20.8	5.0	12.3	169%
Cascade Summit SNOTEL	5100	1-Mar	107	29.4	20.0	26.2	112%
Roaring River SNOTEL	4950	1-Mar	89	27.3	13.4	25.0	109%
New Crescent Lake SNOTEL	4910	1-Mar	65	14.9	4.6	12.0	124%
Chemult Alternate SNOTEL	4850	1-Mar	60	12.4	1.8	8.1	153%
Hogg Pass SNOTEL	4790	1-Mar	87	22.6	10.9	20.1	112%
McKenzie SNOTEL	4770	1-Mar	109	32.9	23.8	36.4	90%
Marks Creek Snow Course	4580	1-Mar	27	8.0	2.0	3.1	258%
Hungry Flat Snow Course	4400	28-Feb	33	5.6	1.5	2.1	267%
Salt Creek Falls SNOTEL	4220	1-Mar	80	22.7	8.1	16.3	139%
Santiam Jct. SNOTEL	3740	1-Mar	52	14.1	8.4	15.5	91%



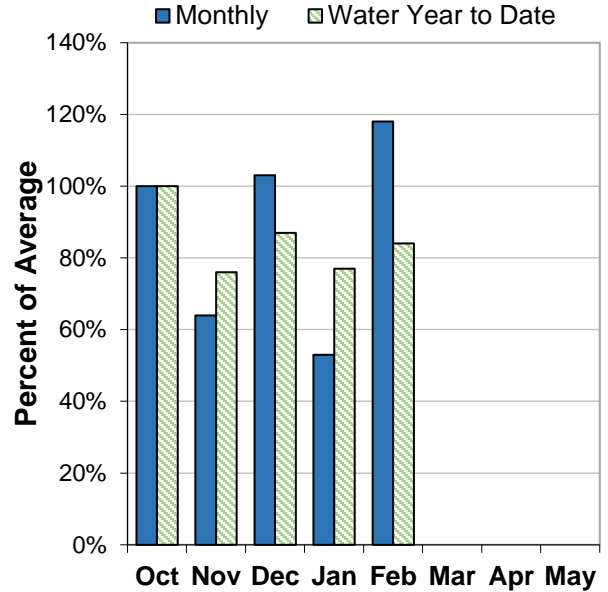
Hood, Sandy and Lower Deschutes Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 92% of normal. This is significantly higher than last month when the snowpack was 54% of normal.

PRECIPITATION

February precipitation was 118% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 84% of average.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 91% to 93% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be slightly below normal this summer.

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

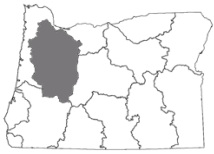
Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 1, 2019	Forecast Period	←-----Drier-----Future Conditions-----Wetter-----→						30-Year Average (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
WF Hood R nr Dee	APR-JUL	71	94	110	92%	126	150	120
	APR-SEP	85	110	127	91%	144	170	139
Hood R at Tucker Bridge	APR-JUL	137	179	205	91%	235	275	225
	APR-SEP	167	210	245	92%	275	320	265
Sandy R nr Marmot	APR-JUL	220	260	290	94%	320	360	310
	APR-SEP	260	305	335	93%	365	410	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	2.1	3.8	3.8	55%	13.1

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Lower Columbia - Sandy Basin	7	90%	85%
Lower Deschutes Basin	8	90%	63%
Middle Columbia - Hood Basin	8	88%	79%

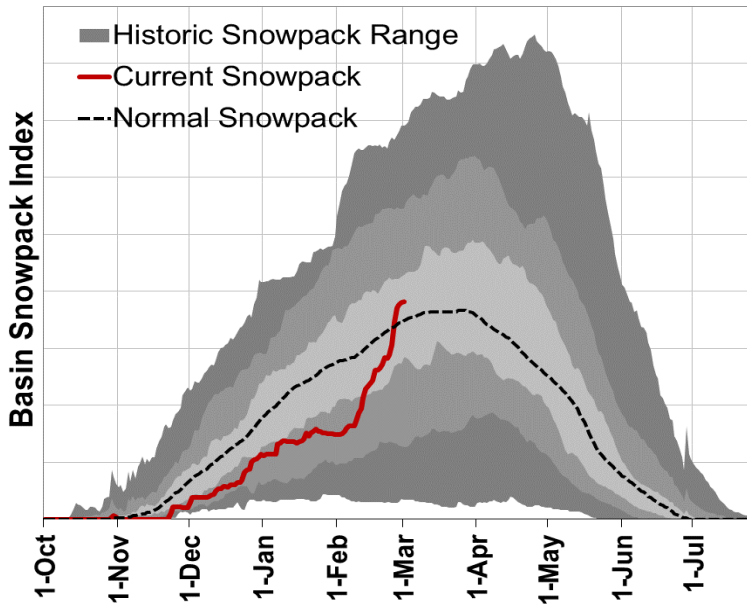
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
High Prairie Snow Course	6080	1-Mar	112	32.4	22.1	36.6	89%
Mt Hood Test Site SNOTEL	5370	1-Mar	113	35.7	36.1	48.0	74%
Racing Creek Snow Course	5160	5-Mar	70	20.8	5.0	12.3	169%
Red Hill SNOTEL	4410	1-Mar	103	35.0	32.2	41.7	84%
Mill Creek Meadow Snow Course	4400	1-Mar	60	15.7	6.7	11.7	134%
Surprise Lakes SNOTEL	4290	1-Mar	102	32.9	40.3	39.7	83%
Beaver Creek #2 Snow Course	4220	4-Mar	43	10.4	5.2	9.0	116%
Beaver Creek #1 Snow Course	4210	4-Mar	54	14.0	6.6	14.0	100%
Mud Ridge SNOTEL	4070	1-Mar	72	15.7	19.2	24.1	65%
Clear Lake SNOTEL	3810	1-Mar	47	10.6	4.2	12.4	85%
Blazed Alder SNOTEL	3650	1-Mar	79	23.1	26.3	25.0	92%
Clackamas Lake SNOTEL	3400	1-Mar		12.4	7.9	12.4	100%
Greenpoint SNOTEL	3310	1-Mar	55	15.3	6.3	18.0	85%
North Fork SNOTEL	3060	1-Mar	67	18.0	16.3	14.8	122%
South Fork Bull Run SNOTEL	2690	1-Mar	41	12.1	8.0	1.7	712%



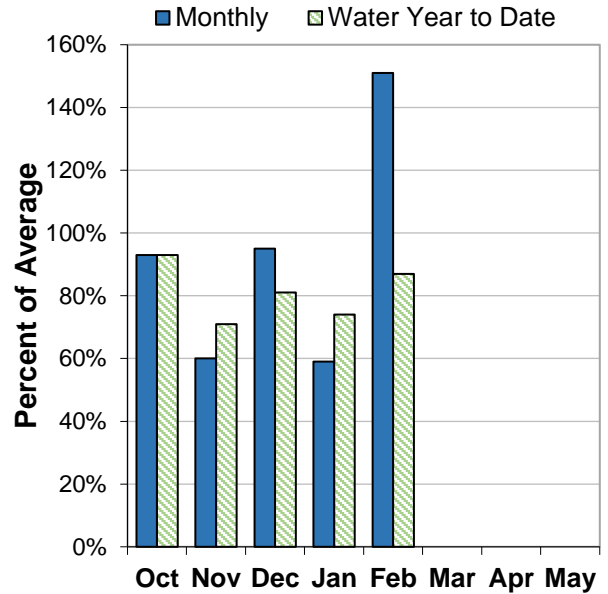
Willamette Basin

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 109% of normal. This is significantly higher than last month when the snowpack was 51% of normal.

PRECIPITATION

February precipitation was 151% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 87% of average.

RESERVOIR

As of March 1, storage at major reservoirs in the basin ranges from 65% of average at Fall Creek Reservoir to 159% of average at Fern Ridge Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 96% to 108% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be near normal to above normal this summer.

Willamette Basin Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	152	230	260	106%	295	370	245
	APR-SEP	210	300	340	108%	380	465	315
Lookout Point Reservoir Inflow ^{1,2}	APR-JUN	400	590	680	105%	765	960	650
	APR-SEP	550	765	860	104%	955	1170	825
McKenzie R bl Trail Bridge	APR-JUN	158	190	205	98%	220	260	210
	APR-SEP	270	315	340	99%	360	415	345
Cougar Lake Inflow ^{1,2}	APR-JUN	114	160	184	99%	210	270	185
	APR-SEP	148	200	230	98%	260	325	235
Blue Lake Inflow ^{1,2}	APR-JUN	41	65	77	96%	90	124	80
	APR-SEP	44	71	85	99%	101	139	86
McKenzie R nr Vida ^{1,2}	APR-JUN	605	735	800	96%	865	1020	830
	APR-SEP	850	1070	1170	98%	1280	1550	1190
Detroit Lake Inflow ^{1,2}	APR-JUN	280	415	475	101%	535	670	470
	APR-SEP	435	555	610	100%	665	785	610
North Santiam R at Mehama ^{1,2}	APR-JUN	375	585	685	103%	780	990	665
	APR-SEP	510	750	855	102%	965	1200	840
Green Peter Lake Inflow ^{1,2}	APR-JUN	136	215	260	98%	305	425	265
	APR-SEP	176	250	290	98%	330	425	295
Foster Lake Inflow ^{1,2}	APR-JUN	280	410	475	95%	545	725	500
	APR-SEP	330	475	545	96%	625	820	565
South Santiam R at Waterloo ²	APR-JUN	465	500	515	98%	530	570	525
	APR-SEP	350	500	575	97%	655	855	590
Willamette R at Salem ^{1,2}	APR-JUN	2460	3520	4070	103%	4660	6090	3950
	APR-SEP	3080	4280	4880	103%	5540	7110	4730
Oak Grove Fk ab Powerplant	APR-JUL	96	110	120	104%	130	145	115
	APR-SEP	126	144	155	100%	167	184	155
Clackamas R ab Three Lynx	APR-JUL	365	420	460	102%	495	555	450
	APR-SEP	440	500	540	101%	585	640	535
Clackamas R at Estacada	APR-JUL	480	565	625	100%	680	765	625
	APR-SEP	575	665	725	99%	785	875	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 March 1, 2019

Reservoir Storage	Current (KAF)	Last Year (KAF)	Average (KAF)	% of Average	Useable Capacity (KAF)
Blue River	25.4	24.8	34.6	73%	82.3
Cottage Grove	16.4	10.0	11.0	149%	31.8
Cougar	57.4	61.2	85.4	67%	174.9
Detroit	195.7	220.2	252.3	78%	426.8
Dorena	40.8	18.2	26.5	154%	72.1
Fall Creek	32.9	14.7	50.3	65%	116.0
Fern Ridge	67.7	30.6	42.5	159%	97.3
Foster	34.9	24.0	27.7	126%	46.2
Green Peter	230.8	255.0	264.2	87%	402.8
Hills Creek	146.0	112.6	154.3	95%	279.2
Lookout Point	174.7	147.3	216.2	81%	433.2
Timothy Lake	56.5	63.0	51.2	110%	63.6
Henry Hagg Lake	43.7	44.4	45.2	97%	53.3

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Clackamas Basin	11	92%	75%
McKenzie Basin	17	111%	58%
Middle Fork Willamette Basin	7	117%	63%
North Santiam Basin	4	117%	72%
South Santiam Basin	4	121%	75%

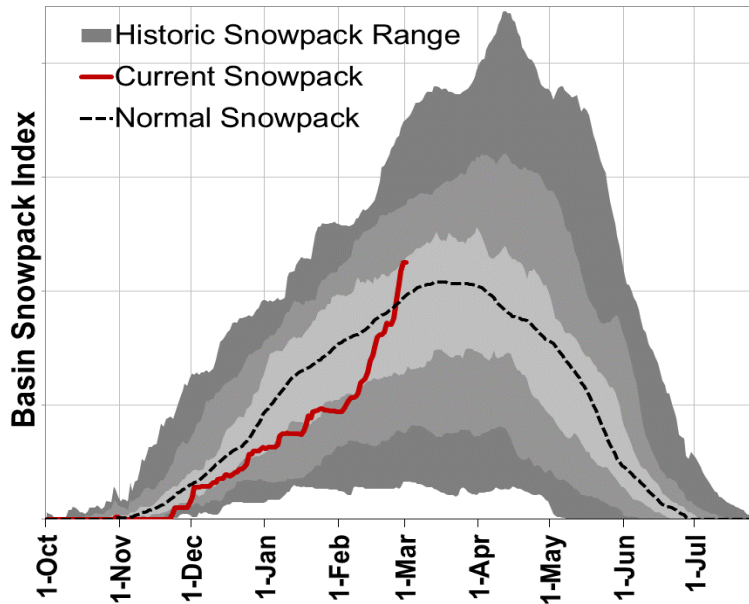
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Summit Lake SNOTEL	5610	1-Mar	119	33.9	23.5	31.2	109%
Irish Taylor SNOTEL	5540	1-Mar	109	28.8	18.2	30.8	94%
Cascade Summit SNOTEL	5100	1-Mar	107	29.4	20.0	26.2	112%
Roaring River SNOTEL	4950	1-Mar	89	27.3	13.4	25.0	109%
Holland Meadows SNOTEL	4930	1-Mar	89	25.4	7.9	18.0	141%
McKenzie SNOTEL	4770	1-Mar	109	32.9	23.8	36.4	90%
Bear Grass SNOTEL	4720	1-Mar	134	44.0	33.7		
Beaver Creek #2 Snow Course	4220	4-Mar	43	10.4	5.2	9.0	116%
Salt Creek Falls SNOTEL	4220	1-Mar	80	22.7	8.1	16.3	139%
Beaver Creek #1 Snow Course	4210	4-Mar	54	14.0	6.6	14.0	100%
Mud Ridge SNOTEL	4070	1-Mar	72	15.7	19.2	24.1	65%
Little Meadows SNOTEL	4020	1-Mar	86	26.2	19.1	21.2	124%
Clear Lake SNOTEL	3810	1-Mar	47	10.6	4.2	12.4	85%
Santiam Jct. SNOTEL	3740	1-Mar	52	14.1	8.4	15.5	91%
Daly Lake SNOTEL	3690	1-Mar	55	13.6	6.8	11.3	120%
Marys Peak (Rev.) Snow Course	3580	1-Mar	54	16.8	6.8		
Jump Off Joe SNOTEL	3520	1-Mar	50	10.8	6.5	11.2	96%
Peavine Ridge SNOTEL	3420	1-Mar	52	15.1	6.0	11.2	135%
Clackamas Lake SNOTEL	3400	1-Mar		12.4	7.9	12.4	100%
Smith Ridge SNOTEL	3270	1-Mar	51	12.1	6.0		
Saddle Mountain SNOTEL	3110	1-Mar	36	12.4	6.2		
Railroad Overpass SNOTEL	2680	1-Mar	16	5.3	1.6	0.0	
Marion Forks SNOTEL	2590	1-Mar	37	11.2	5.9	7.5	149%
Seine Creek SNOTEL	2060	1-Mar	15	4.8	1.5	0.0	
Miller Woods SNOTEL	420	1-Mar	0	0.0	0.0		



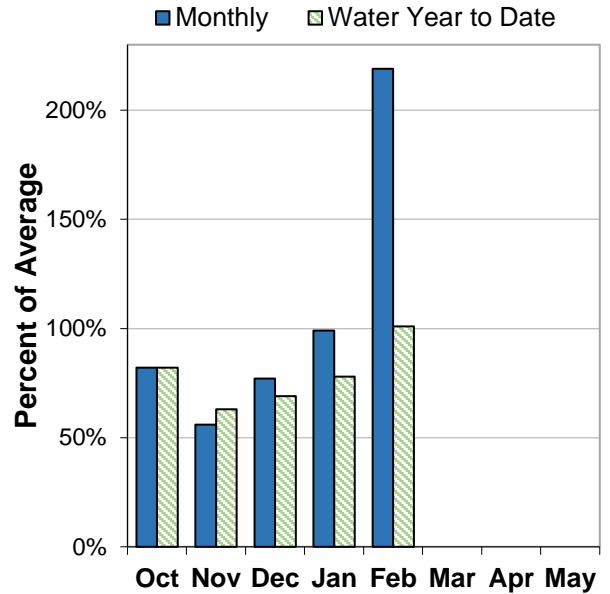
Rogue and Umpqua Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 112% of normal. This is significantly higher than last month when the snowpack was 60% of normal.

PRECIPITATION

February precipitation was 219% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 101% of average. Out of 72 years of measurements, Sexton Summit set a new record for highest February precipitation (12.8 inches).

RESERVOIR

As of March 1, storage at major reservoirs in the basin ranges from 23% of average at Hyatt Prairie Reservoir to 108% of average at Applegate Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 100% to 115% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be near normal to above normal this summer.

Rogue And Umpqua Basins Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	132	183	220	114%	255	305	193
	APR-SEP	142	193	230	115%	265	315	200
Cow Ck ab Galesville Reservoir	APR-JUL	6.0	11.5	15.3	110%	19.1	25	13.9
	APR-SEP	6.8	12.5	16.4	109%	20	26	15.0
South Umpqua R nr Brockway	APR-JUL	340	400	440	113%	480	540	390
	APR-SEP	360	420	460	112%	500	560	410
North Umpqua R at Winchester	APR-JUL	520	690	810	105%	930	1100	775
	APR-SEP	625	805	930	104%	1050	1230	890
Lost Creek Lk Inflow ²	MAR-JUL	540	640	705	106%	775	875	665
	MAR-SEP	655	765	835	106%	910	1020	790
	APR-JUL	410	490	545	105%	600	680	520
	APR-SEP	525	615	680	105%	740	830	645
Rogue R at Raygold ²	APR-JUL	480	625	725	107%	825	970	675
	APR-SEP	600	755	865	107%	970	1130	805
Rogue R at Grants Pass ²	APR-JUL	570	695	775	107%	860	980	725
	APR-SEP	690	820	905	107%	990	1120	845
Applegate Lake Inflow ²	MAR-JUL	106	144	170	110%	196	235	155
	MAR-SEP	110	149	175	109%	200	240	161
	APR-JUL	68	98	119	109%	140	170	109
	APR-SEP	73	104	125	109%	146	177	115
Sucker Ck bl Ltl Grayback nr Holland	APR-JUL	24	43	56	102%	68	88	55
	APR-SEP	27	46	59	100%	73	92	59
Illinois R nr Kerby	APR-JUL	81	152	200	106%	250	320	188
	APR-SEP	89	160	210	109%	255	325	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	27.0	17.4	25.0	108%	75.2
Emigrant Lake	19.3	20.0	27.2	71%	39.0
Fish Lake	3.8	5.8	5.0	75%	7.9
Fourmile Lake	3.9	6.9	7.5	52%	15.6
Howard Prairie	17.3	37.9	37.9	46%	62.1
Hyatt Prairie	2.5	6.9	10.9	23%	16.2
Lost Creek	211.6	194.6	219.0	97%	315.0

Rogue And Umpqua Basins Summary for March 1, 2019

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Applegate Basin	5	116%	30%
Middle Rogue Basin	5	127%	32%
North Umpqua Basin	3	131%	66%
South Umpqua Basin	3	258%	79%
Upper Rogue Basin	11	101%	51%

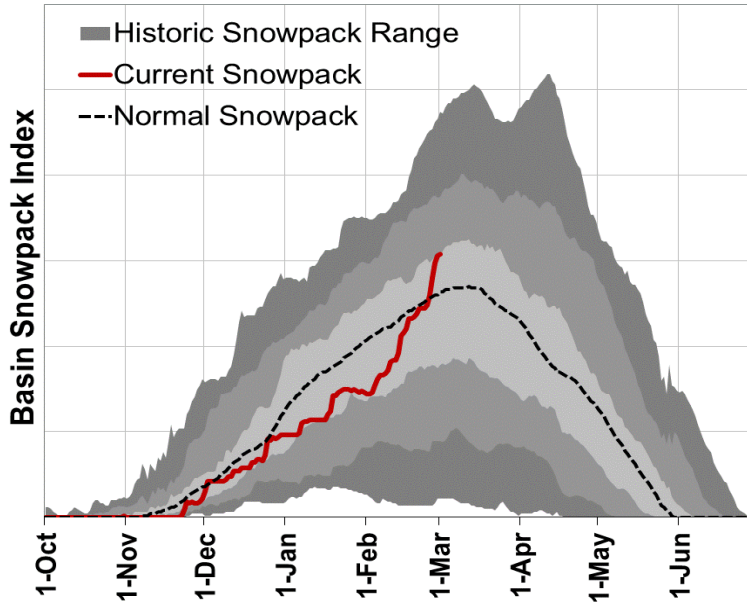
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Park H.Q. Rev Snow Course	6570	28-Feb	160	45.6	32.8	53.2	86%
Caliban (Alt.) Snow Course	6500	28-Feb	115	29.6	7.4	25.2	117%
Mt. Ashland Switchback Snow Course	6430	28-Feb	103	29.0	6.7	27.6	105%
Ski Bowl Road Snow Course	6070	28-Feb	77	20.8	4.2	21.0	99%
Big Red Mountain SNOTEL	6050	1-Mar	97	25.6	7.8	22.6	113%
Annie Springs SNOTEL	6010	1-Mar	130	36.4	21.5	35.1	104%
Fourmile Lake SNOTEL	5970	1-Mar	88	25.0	10.7	27.2	92%
Cold Springs Camp SNOTEL	5940	1-Mar	80	23.8	10.7	29.9	80%
Sevenmile Marsh SNOTEL	5700	1-Mar	102	30.6	12.9	28.7	107%
Summit Lake SNOTEL	5610	1-Mar	119	33.9	23.5	31.2	109%
Billie Creek Divide SNOTEL	5280	1-Mar	77	22.6	10.9	20.6	110%
Diamond Lake SNOTEL	5280	1-Mar	63	19.9	5.4	15.6	128%
Bigelow Camp SNOTEL	5130	1-Mar	65	18.7	6.5	10.6	176%
Beaver Dam Creek Snow Course	5120	4-Mar	45	13.1	5.0	10.9	120%
Deadwood Junction Snow Course	4660	4-Mar	33	11.0	5.4	6.8	162%
Fish Lk. SNOTEL	4660	1-Mar	47	11.6	5.4	10.7	108%
Howard Prairie SNOTEL	4580	1-Mar	29	8.4	2.3		
Howard Prairie Snow Course	4580	4-Mar	26	7.8	2.0	6.6	118%
Siskiyou Summit Rev. 2 Snow Course	4560	28-Feb	50	11.2	3.4	6.1	184%
King Mountain SNOTEL	4340	1-Mar	52	13.6	4.3	2.4	567%
Silver Burn Snow Course	3680	1-Mar	54	15.9	4.6	11.5	138%
Tokenetee Airstrip SNOTEL	3240	1-Mar	27	8.4	2.7	0.8	1050%



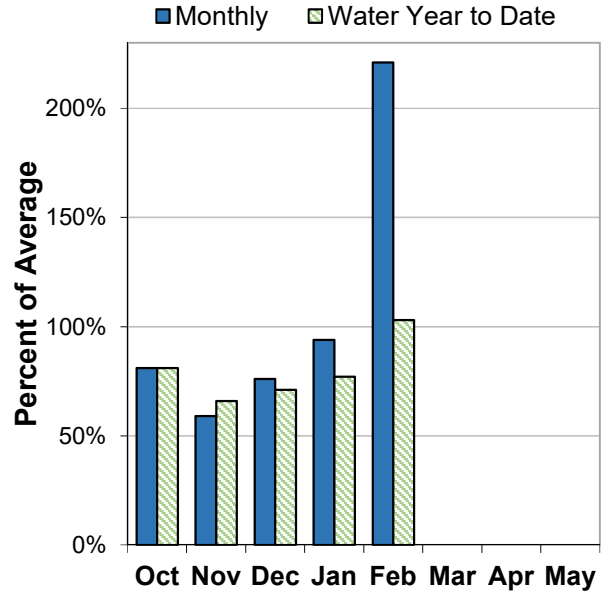
Klamath Basin

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 109% of normal. This is significantly higher than last month when the snowpack was 69% of normal. Out of 18 years of measurements, Crazyman Flat SNOTEL set a record for highest March 1st snowpack (23.6" of SWE).

PRECIPITATION

February precipitation was 221% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 103% of average. Three long-term SNOTEL sites - Annie Springs (measured since 2000); Crazyman Flat (measured since 2001) and Cold Springs Camp (measured since 1979) - set new records for highest February precipitation.

RESERVOIR

As of March 1, storage at major reservoirs in the basin ranges from 84% of average at Clear Lake to 123% of average at Gerber Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 114% to 126% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be above normal to well above normal this summer.

Klamath Basin Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	21	34	44	138%	56	76	32
	APR-SEP	4.7	11.7	18.2	126%	26	40	14.4
Sprague R nr Chiloquin	MAR-JUL	225	280	320	125%	360	430	255
	MAR-SEP	250	305	345	125%	390	460	275
	APR-JUL	162	205	235	125%	270	325	188
	APR-SEP	186	230	265	126%	300	355	210
Williamson R bl Sprague nr Chiloquin	MAR-JUL	340	410	455	114%	500	570	400
	MAR-SEP	395	465	515	112%	565	635	460
	APR-JUL	245	300	340	115%	380	435	295
	APR-SEP	305	365	405	114%	445	505	355
Upper Klamath Lake Inflow ^{1,2}	MAR-JUL	445	590	650	112%	715	860	580
	MAR-SEP	515	665	735	112%	805	955	655
	APR-JUL	300	410	460	115%	510	615	400
	APR-SEP	380	495	550	115%	600	720	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	183.6	202.0	217.4	84%	513.3
Gerber	61.7	62.9	50.3	123%	94.3
Upper Klamath Lake	374.5	375.3	370.9	101%	523.7

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Lost Basin	4	202%	34%
Sprague Basin	7	151%	35%
Upper Klamath Lake Basin	8	96%	51%
Williamson River Basin	5	102%	53%

Klamath Basin Summary for March 1, 2019

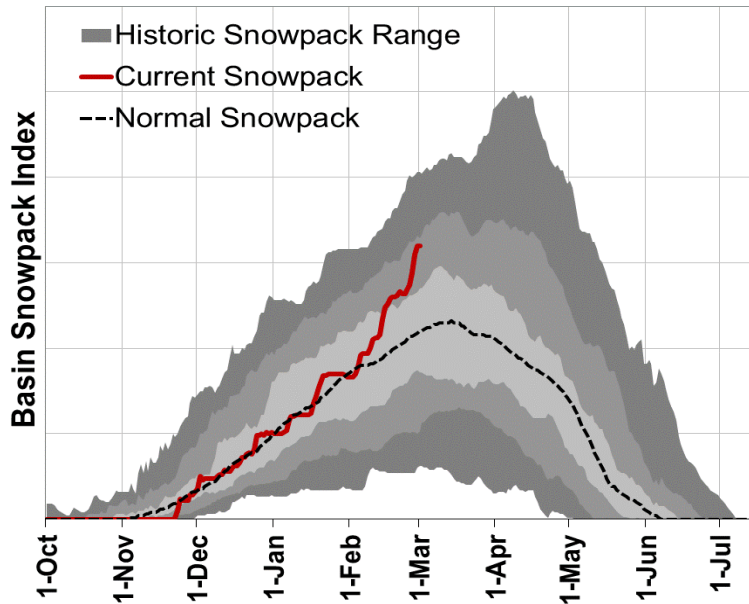
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Summer Rim SNOTEL	7080	1-Mar	59	18.8	7.5	14.1	133%
Swan Lake Mtn SNOTEL	6830	1-Mar	85	27.9	7.7		
Park H.Q. Rev Snow Course	6570	28-Feb	160	45.6	32.8	53.2	86%
Colvin Creek AM	6520	1-Mar	29	9.6		2.9	331%
Crazyman Flat SNOTEL	6180	1-Mar	69	23.6	6.2	14.8	159%
Ski Bowl Road Snow Course	6070	28-Feb	77	20.8	4.2	21.0	99%
Annie Springs SNOTEL	6010	1-Mar	130	36.4	21.5	35.1	104%
Finley Corrals AM	6000	1-Mar	68	23.1	5.2	13.2	175%
Fourmile Lake SNOTEL	5970	1-Mar	88	25.0	10.7	27.2	92%
Cold Springs Camp SNOTEL	5940	1-Mar	80	23.8	10.7	29.9	80%
Strawberry SNOTEL	5770	1-Mar	22	7.7	1.2	4.3	179%
Cox Flat AM	5750	1-Mar	35	9.5	2.0	5.8	164%
Silver Creek SNOTEL	5740	1-Mar	49	14.4	2.1	10.3	140%
Quartz Mountain SNOTEL	5720	1-Mar	19	4.7	1.2	1.5	313%
Sevenmile Marsh SNOTEL	5700	1-Mar	102	30.6	12.9	28.7	107%
State Line SNOTEL	5680	1-Mar	33	11.4	1.4		
Sycan Flat AM	5580	1-Mar	35	11.2	0.8	6.2	181%
Sun Pass SNOTEL	5400	1-Mar	86	23.4	4.3		
Billie Creek Divide SNOTEL	5280	1-Mar	77	22.6	10.9	20.6	110%
Diamond Lake SNOTEL	5280	1-Mar	63	19.9	5.4	15.6	128%
Crowder Flat SNOTEL	5170	1-Mar	14	5.2	0.7	4.0	130%
Beaver Dam Creek Snow Course	5120	4-Mar	45	13.1	5.0	10.9	120%
Taylor Butte SNOTEL	5030	1-Mar	30	7.2	1.0	7.0	103%
Dog Hollow AM	4920	1-Mar	10	2.6	0.4	0.0	
Gerber Reservoir SNOTEL	4890	1-Mar	9	2.3	0.7	0.5	460%
Chemult Alternate SNOTEL	4850	1-Mar	60	12.4	1.8	8.1	153%
Deadwood Junction Snow Course	4660	4-Mar	33	11.0	5.4	6.8	162%
Fish Lk. SNOTEL	4660	1-Mar	47	11.6	5.4	10.7	108%
Howard Prairie SNOTEL	4580	1-Mar	29	8.4	2.3		
Howard Prairie Snow Course	4580	4-Mar	26	7.8	2.0	6.6	118%
Siskiyou Summit Rev. 2 Snow Course	4560	28-Feb	50	11.2	3.4	6.1	184%



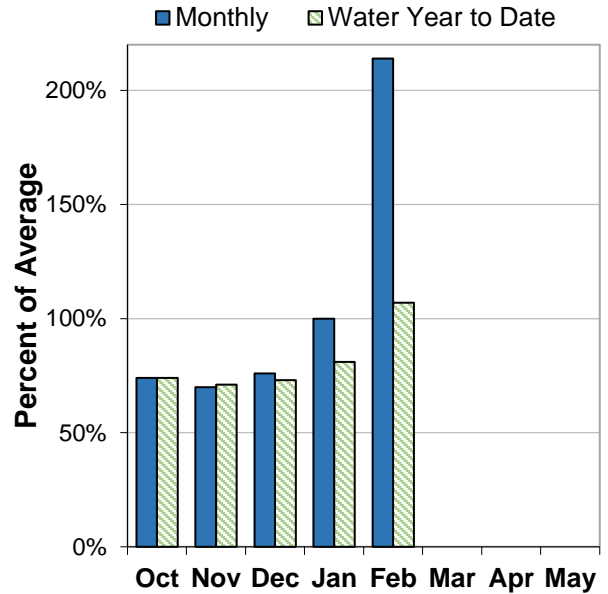
Lake County and Goose Lake Basins

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 149% of normal. This is significantly higher than last month when the snowpack was 100% of normal. Two long-term aerial marker (AM) sites - Little Bally Mt. (measured since 1961) and Rogger Meadow (measured since 1976) - set new records for highest March 1st snowpack.

PRECIPITATION

February precipitation was 214% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 107% of average.

RESERVOIR

Reservoir storage across the basin is currently below average. As of March 1, storage at major reservoirs in the basin ranges from 36% of average at Cottonwood Reservoir to 89% of average at Drews Reservoir.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 127% to 138% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be well above normal this summer.

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

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	18.6	30	38	141%	46	57	27
	APR-SEP	10.0	18.4	24	138%	30	38	17.4
Deep Ck ab Adel	MAR-JUL	81	98	110	139%	121	138	79
	APR-SEP	63	78	89	137%	99	114	65
Honey Ck nr Plush	MAR-JUL	14.1	18.8	22	129%	25	30	17.1
	APR-SEP	11.2	15.9	19.0	135%	22	27	14.1
Chewaucan R nr Paisley	MAR-JUL	77	97	110	131%	123	143	84
	APR-SEP	71	85	95	127%	105	119	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	1.6	2.3	4.4	36%	9.3
Drews	28.9	37.1	32.4	89%	63.5

Snowpack Summary by Basin	Basin Snowpack % of Median		
	# of Sites	Current Yr	Last Yr
Goose Lake Basin	7	157%	42%
Lake Abert Basin	6	153%	36%
Summer Lake Basin	13	149%	44%
Upper Pit Basin	3	149%	46%

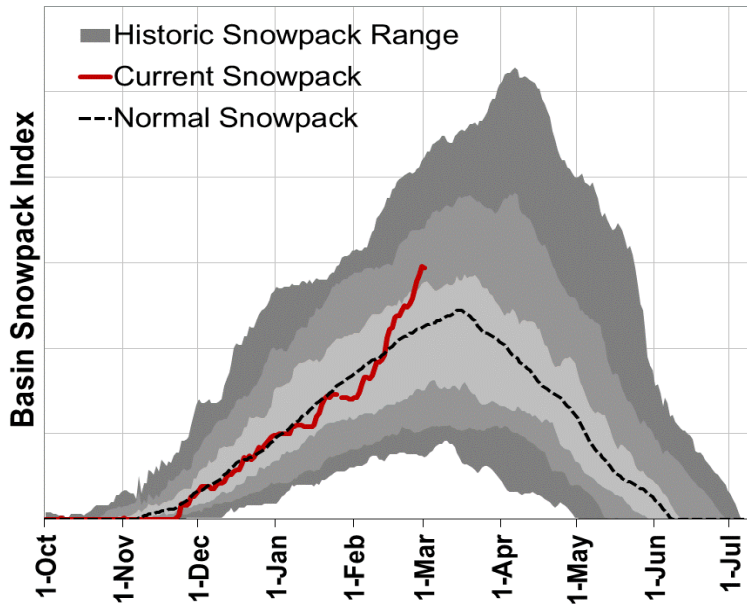
Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	Median	% of Median
Dismal Swamp SNOTEL	7360	1-Mar	95	33.8	14.5	24.5	138%
Summer Rim SNOTEL	7080	1-Mar	59	18.8	7.5	14.1	133%
Cedar Pass SNOTEL	7030	1-Mar	57	19.2	8.5	14.2	135%
Barley Camp AM	6890	1-Mar	72	24.8	9.9	14.4	172%
Patton Meadows AM	6800	1-Mar	68	21.8	6.9	14.4	151%
Sherman Valley AM	6640	1-Mar	47	15.5	2.8	11.3	137%
Bear Flat Meadow AM	6580	1-Mar	58	19.1	2.4	11.2	171%
Colvin Creek AM	6520	1-Mar	29	9.6		2.9	331%
Hart Mountain AM	6430	1-Mar	15	3.7	0.6	1.0	370%
Rogger Meadow AM	6360	1-Mar	59	19.5	3.2	10.1	193%
Adin Mtn SNOTEL	6190	1-Mar	53	19.1	4.1	10.9	175%
Crazyman Flat SNOTEL	6180	1-Mar	69	23.6	6.2	14.8	159%
Finley Corrals AM	6000	1-Mar	68	23.1	5.2	13.2	175%
Camas Creek #3 Snow Course	5860	28-Feb	69	16.6	4.5	11.4	146%
Sheldon SCAN	5860	1-Mar	1	0.1	0.3	0.0	
Strawberry SNOTEL	5770	1-Mar	22	7.7	1.2	4.3	179%
Cox Flat AM	5750	1-Mar	35	9.5	2.0	5.8	164%
Silver Creek SNOTEL	5740	1-Mar	49	14.4	2.1	10.3	140%
State Line SNOTEL	5680	1-Mar	33	11.4	1.4		
Sycan Flat AM	5580	1-Mar	35	11.2	0.8	6.2	181%
Crowder Flat SNOTEL	5170	1-Mar	14	5.2	0.7	4.0	130%



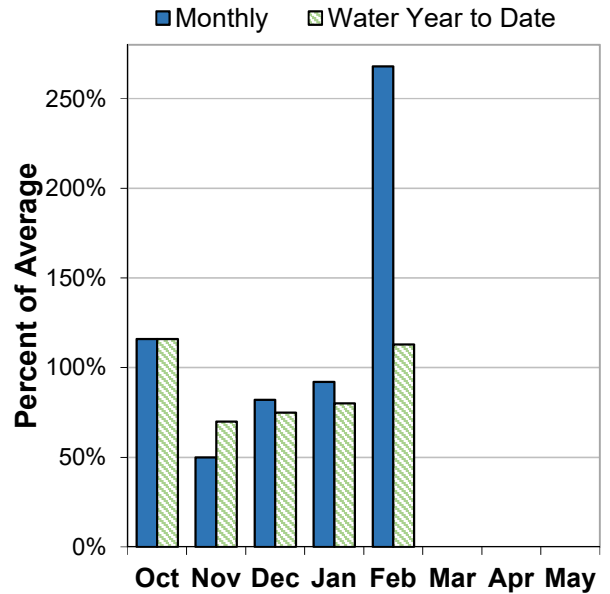
Harney Basin

March 1, 2019

Mountain Snowpack



Basin Precipitation



Summary of Water Supply Conditions

SNOWPACK

As of March 1, the basin snowpack was 132% of normal. This is significantly higher than last month when the snowpack was 86% of normal.

PRECIPITATION

February precipitation was 268% of average. Precipitation since the beginning of the water year (October 1 - March 1) has been 113% of average. Four long-term sites – Snow Mountain SNOTEL; Starr Ridge SNOTEL (both with over 38 years of measurements); Hart Mountain Refuge (measured since 1938) and Sheldon (measured since 1988) - set new records for highest February precipitation.

STREAMFLOW FORECAST

The April through September streamflow forecasts in the basin range from 118% to 152% of average. Overall, forecasts increased significantly from last month's report. Water supplies in the basin are likely to be above normal to well above normal this summer.

Harney Basin Summary for March 1, 2019

Forecast Exceedance Probabilities for Risk Assessment *								
Streamflow Forecasts March 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	MAR-JUL	119	161	190	154%	220	260	123
	APR-SEP	74	113	140	152%	167	205	92
Donner Und Blitzen R nr Frenchglen	MAR-JUL	60	77	88	122%	99	116	72
	APR-SEP	53	69	80	118%	91	107	68
Trout Ck nr Denio	MAR-JUL	3.6	8.0	11.0	126%	14.0	18.4	8.7
	APR-SEP	2.7	7.0	10.0	125%	13.0	17.3	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	6	130%	43%
Donner und Blitzen River Basin	5	124%	48%
Silvies River Basin	4	154%	45%
Upper Quinn Basin	5	124%	36%

Basin Snowpack Measurement Sites	Elevation (ft)	Date Measured	Snow Depth	Snow Water Equivalent (in)			
				Current SWE	Last Yr SWE	% of Median	% of Median
Granite Peak SNOTEL	8543	1-Mar	83	25.4	9.0	18.3	139%
Trout Creek AM	7890	1-Mar	43	11.2	4.0	11.5	97%
Fish Creek SNOTEL	7660	1-Mar	91	23.8	14.0	21.3	112%
Govt Corrals AM	7400	1-Mar	61	17.7	4.8		
Oregon Canyon AM	7050	1-Mar	30	8.7	1.1	5.8	150%
Silvies SNOTEL	6990	1-Mar	54	14.4	5.9	14.6	99%
Pueblo Summit AM	6970	1-Mar	12	3.6	1.2	2.4	150%
Buckskin Lower SNOTEL	6915	1-Mar	47	12.0	4.4	8.1	148%
V Lake AM	6600	1-Mar	32	9.6	0.0	5.6	171%
Louse Canyon AM	6530	1-Mar	36	10.4	0.7	4.2	248%
Disaster Peak SNOTEL	6500	1-Mar	34	10.9	0.9	7.6	143%
Hart Mountain AM	6430	1-Mar	15	3.7	0.6	1.0	370%
Quinn Ridge AM	6270	1-Mar	20	6.0	0.4	2.0	300%
Snow Mountain SNOTEL	6230	1-Mar	51	13.6	5.0	9.8	139%
Lamance Creek SNOTEL	6000	1-Mar	29	10.8	1.4	11.0	98%
Blue Mountain Spring SNOTEL	5870	1-Mar		20.4	8.4	14.4	142%
Sheldon SCAN	5860	1-Mar	1	0.1	0.3	0.0	
Buck Pasture AM	5740	1-Mar	20	5.8	0.5	1.6	363%
Call Meadows AM	5380	1-Mar	35	10.8	0.4	4.4	245%
Rock Springs SNOTEL	5290	1-Mar	33	10.3	0.6	6.2	166%
Starr Ridge SNOTEL	5250	1-Mar	38	10.0	3.5	6.2	161%
Lake Creek R.S. SNOTEL	5240	1-Mar	58	16.1	5.5	10.3	156%
Buckskin Lake AM	5190	1-Mar	0	0.0	0.2	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					
FORECAST POINT	FORECAST THRESHOLD	FORECAST VALUE ----- CHANCE OF EXCEEDING ----- -----			LONG-TERM AVERAGE VALUE
		90%	50%	10%	
Owyhee R nr Rome	2000 cfs	Mar 27	May 8	Jun 19	May 5
Owyhee R nr Rome	1000 cfs	Apr 7	May 20	Jul 2	May 18
Owyhee R nr Rome	500 cfs	Apr 25	Jun 6	Jul 18	June 2

UPPER JOHN DAY BASIN					
FORECAST POINT	FORECAST THRESHOLD	FORECAST VALUE ----- CHANCE OF EXCEEDING ----- -----			LONG-TERM AVERAGE VALUE
		90%	50%	10%	
John Day R at Service Creek	Average Daily Flow on Aug. 1st	170	395	620	271

UPPER DESCHUTES AND CROOKED BASINS					
FORECAST POINT	FORECAST THRESHOLD	FORECAST VALUE ----- CHANCE OF EXCEEDING ----- -----			LONG-TERM AVERAGE VALUE
		90%	50%	10%	
Crane Prairie Inflow *	Date of Peak				May 25
Crane Prairie Inflow	Peak Flow	230	370	510	403
Crane Prairie Inflow	Average Daily Flow on Oct. 1st	177	225	270	269
Prineville Reservoir Inflow	150 cfs	May 23	Jun 15	Jul 8	May 30
Prineville Reservoir Inflow	80 cfs	May 28	Jun 21	Jul 15	June 7
Whychus Creek nr Sisters	100 cfs	Jul 13	Aug 7	Sep 1	August 16

*No prediction possible until April 1. Historic values are shown for reference prior to the April 1 report.

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>
		<i>90%</i>	<i>50%</i>	<i>10%</i>	
South Umpqua R nr Brockway *	90 cfs	Jul 28	Aug 17	Sep 1	August 8
South Umpqua R at Tiller	140 cfs	Jun 26	Jul 17	Aug 7	July 11
South Umpqua R at Tiller	90 cfs	Jul 16	Aug 7	Aug 27	August 1
South Umpqua R at Tiller	60 cfs	Aug 7	Sep 1	Oct 1	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>
		<i>90%</i>	<i>50%</i>	<i>10%</i>	
Deep Ck ab Adel	100 cfs	Jun 6	Jun 28	Jul 18	June 17
Honey Ck nr Plush	100 cfs	Apr 20	May 23	Jun 25	May 16
Honey Ck nr Plush	50 cfs	May 10	Jun 9	Jul 9	June 4
Twentymile Ck nr Adel	50 cfs	May 18	Jun 13	Jul 9	May 30
Twentymile Ck nr Adel	10 cfs	Jun 24	Jul 17	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>
		<i>90%</i>	<i>50%</i>	<i>10%</i>	
Silvies R nr Burns	400 cfs	Apr 28	May 27	Jun 25	May 21
Silvies R nr Burns	200 cfs	May 17	Jun 15	Jul 14	June 2
Silvies R nr Burns	100 cfs	Jun 1	Jul 3	Aug 2	June 13
Silvies R nr Burns	50 cfs	Jun 23	Jul 28	Sep 1	July 3
Donner Und Blitzen R nr Frenchglen	200 cfs	May 26	Jun 17	Jul 9	June 20
Donner Und Blitzen R nr Frenchglen	100 cfs	Jun 18	Jul 8	Jul 28	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.

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	Drier Future Conditions			Wetter			30-Yr Avg. (1000AF)
		90% (1000AF)	70% (1000AF)	50% (1000AF) (% AVG.)	30% (1000AF)	10% (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.

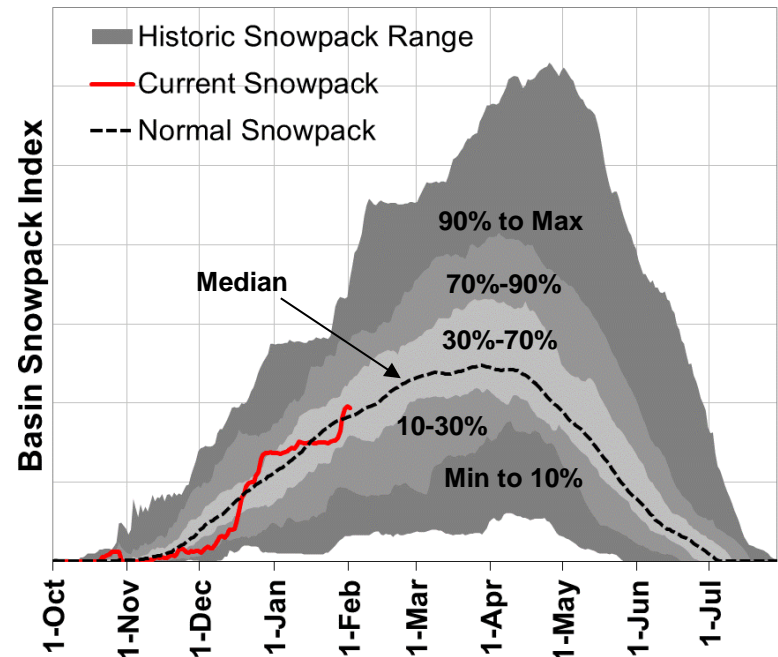
Interpreting Snowpack Plots

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



This publication may be found online at:
<http://www.or.nrcs.usda.gov/snow>

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