

OFFICIAL FORECAST

Last Updated: Mar-19

North Platte River Basin Forecasts

Location	Variable	Time Period	Forecast Value	Forecast Category ⓘ
Lewellen gage (NE)	streamflow	May-July	262,900 acre-feet	High Average
Glendo reservoir (WY)	inflow	May-July	554,100 acre-feet	High Average
Alcova reservoir (WY)	inflow	May-July	388,700 acre-feet	Average
Pathfinder reservoir (WY)	inflow	May-July	405,700 acre-feet	High Average
Seminole Reservoir (WY)	inflow	May-July	741,700 acre-feet	Average

South Platte River Basin Forecasts

Location	Variable	Time Period	Forecast Value	Forecast Category ⓘ
Julesburg gage (CO)	streamflow	May-July	90,200 acre-feet	Average
Kersey gage (CO)	streamflow	May-July	260,400 acre-feet	Average
South Platte higher elevations	max snow water equivalent	N/A	N/A	Only available in Jan.
South Platte lower elevations	precipitation	April-June	Probability >50%: 70% Probability <33%: <5%	N/A

Forecast Category	Exceed %	Lewellen	Glendo	Alcova	Pathfinder	Seminole
Above Average	<20%	>372	>562	>523	>531	>885
High Average	20-40%	226-372	414-562	397-523	368-531	761-885
Average	40-60%	154-226	366-414	332-397	290-368	503-761
Low Average	60-80%	100-154	322-366	289-332	209-290	316-503
Below Average	>80%	<100	<322	<289	<209	<316

units: thousands of acre-feet

Forecast Category	Exceed %	Julesburg	Kersey
Above Average	<20%	>332	>554
High Average	20-40%	101-332	272-554
Average	40-60%	38-101	143-272
Low Average	60-80%	14-38	58-143
Below Average	>80%	<14	<58

units: thousands of acre-feet

Discussion

The weak El Niño event in the eastern Tropical Pacific continues. Its effect on the atmosphere continues to be weak to negligible, although the recent few weeks have experienced several storms over the southwest US in a manner reminiscent of an El Niño. Figure 1 shows the 500-mb (~18,000 feet) geopotential height anomaly over the past 30 days. Note the strong negative (low-pressure) anomaly over the Pacific Northwest, a stark departure from earlier this winter when no such anomaly was seen over western North America and the eastern North Pacific Ocean. Whether this can be attributed to El Niño is uncertain, and it is possible that this pattern change is progressive and will not last long. Nonetheless, sub-surface ocean temperatures remain substantially warmer than normal along parts of the Pacific equatorial region, implying a chance for this El Niño event to re-strengthen. However, this outcome becomes increasingly less likely the farther out from winter we head. Regardless, a weak/moderate El Niño has little to no impact on the North Platte basin, but does imply above normal spring precipitation in the South Platte basin as is currently being forecasted.

The North Platte and South Platte basin snowpack is currently tracking very close to seasonal normal, which at this point in the season begins to greatly reduce the chance of a very low spring runoff.

The latest North Platte forecast showed significantly higher projected flows at all sites, likely incorporating the change in the recent atmospheric circulation. Notably, the Lewellen projected increased to 263K acre-feet (on the low side of the High Average category), up from 136K only a month ago. Interestingly, the probabilistic Low Flow forecast showed little change for both Lewellen and Guernsey, suggesting that the recent increase in the deterministic forecast value may be slightly exaggerated due to short-term atmospheric pattern changes that may not persist. Overall though, the chance of very low flow appears to be significantly reduced now, compared to the earlier forecasts.

On the South Platte, both Julesburg and Kersey saw ~10% increases in forecasted flow. However, both sites remain in the Average category, as in the February forecast.

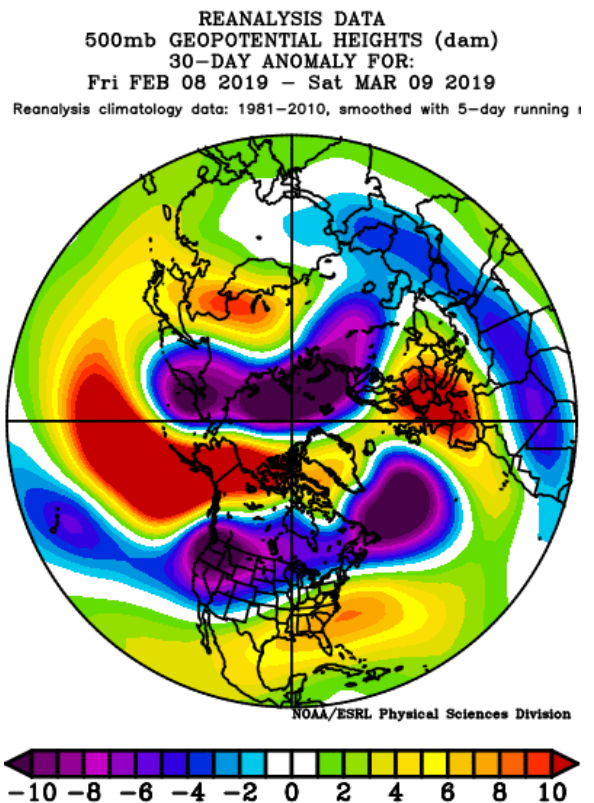


Figure 1: 500 millibar geopotential height anomalies over the past 30 days. Source: [NOAA ESRL Map Room](#).

PROBABILITY OF LOW FLOW

During 2018, additional forecasts were developed to inform the probability of “Low Flow” for (i) Guernsey April-September outflow and (ii) Lewellen May-July streamflow. These forecasts are being used operationally for the first time. Note that Low Flow was defined as flow below the 25th percentile at each site, which translates to 2,931 c.f.s. for Guernsey outflow and 621 c.f.s. for Lewellen. Thus, the climatological probability of Low Flow is 25%.

Table 1 shows the probability of Low Flow, with the latest projections of 11% and 30% at Guernsey and Lewellen, respectively. This amounts to little or no change compared to the February forecast. The reason for the substantially lower Guernsey probability is due to the relatively high reservoir storage that currently exists at the major North Platte reservoirs.

Table 1: Probability of Low Flow at Lewellen and Guernsey Reservoir.

Forecast Location	Time Period	Probability of flow <25%				
		Forecast Time				
		Nov '18	Dec '18	Jan '19	Feb '19	Mar '19
Guernsey res. outflow	Apr - Sep	17%	16%	13%	12%	11%
Lewellen streamflow	May - Jul	44%	41%	30%	28%	30%

RESERVOIR STORAGE

As of March 1, 2019, the total reservoir storage at the five main reservoirs upstream of Lake McConaughy (Seminoe, Pathfinder, Alcova, Glendo and Guernsey) was **1,754,663 acre-feet**. Using data from 1959-present, this value is in the **64th** percentile for the date, with little change from the February value**. Although total storage has decreased significantly over the past 2 years, it continues to remain high enough to buffer against a significant precipitation deficit for at least one more runoff season during spring 2019.

****Note: there was an ~10% underestimate error in the storage percentiles reported in the November-February forecasts. However, this did not affect the actual Low Flow probability calculation, as it is only provided for reference.**

COMPARISON TO OTHER FORECASTS

Forecasts developed herein are compared to similar forecasts from the US Bureau of Reclamation (USBR), the Natural Resources Conservation Service (NRCS) and the Climate Prediction Center (CPC).

USBR

Link: https://www.usbr.gov/gp/lakes_reservoirs/warepts/wsnpjan.pdf

The February 1 USBR forecast is shown in Table 2 (the March update was unexpectedly not available when this forecast was completed). Above normal (+19%) volumetric flow was expected at Seminole Reservoir with slightly below normal (-10%) flow at Glendo. These numbers were higher than our February forecast but more consistent with our March forecast, though our estimates at Glendo are notably higher.

Table 2: USBR projected flow, as of the February 1 update.

(1000 acre-feet)

Forecast Points	February 1, 2019 Forecast of April-July Runoff			30 Yr. April-July Runoff Avg. ²	Expected % of Avg.	Comparative Actual April - July Runoff			
	Reasonable Maximum ¹	Expected	Reasonable Minimum ¹			W. Yr. 2018	W. Yr. 2017	W. Yr. 2016	W. Yr. 2015
Seminole Reservoir	1060	810	560	683	119	393	683	1030	654
Sweetwater River Above Pathfinder Reservoir	75	50	25	54	93	35	159	69	41
Alcova to Glendo	180	120	60	134	90	71	135	301	196

¹ The probability is estimated to be 9 chances in 10 that the actual volume will fall between the reasonable minimum and reasonable maximum.

² Average is based on the 1989-2018 period.

NRCS

Link: <http://www.wrds.uwyo.edu/wrds/nrcs/snowpack/snowmap.html>

NOTE: The February update was unavailable as of this forecast. An inquiry has been submitted to NRCS. The January forecast is again shown below, with updated discussion.

Tables 3 and 4 show forecasts of North Platte River spring/summer flow for the Upper and Lower parts of the river, respectively. All sites are forecasted to be within 8% of their average value, except the Sweetwater River near Alcova, which is forecasted to see 66% of its normal flow. **Overall, the NRCS forecast was higher than our forecast as of February, but is more consistent with our March estimates. However, keep in mind that the NRCS predictions are strongly constrained by current snowpack, which is very close to average. Thus, we expect little to no change in the February NRCS update.**

Table 3: NRCS forecast for Upper North Platte River

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
UPPER NORTH PLATTE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
North Platte R nr Northgate								
	APR-JUL	105	182	235	104%	290	365	225
	APR-SEP	118	200	260	104%	315	400	250
Encampment R nr Encampment ²								
	APR-JUL	75	111	135	105%	159	195	129
	APR-SEP	83	120	145	105%	170	205	138
Rock Ck nr Arlington								
	APR-JUL	35	46	53	108%	60	71	49
	APR-SEP	36	47	55	106%	63	74	52
Sweetwater R nr Alcova								
	APR-JUL	3.5	25	39	66%	53	75	59
	APR-SEP	5.2	28	43	67%	58	81	64
Seminole Reservoir Inflow								
	APR-JUL	375	605	760	106%	915	1140	715
	APR-SEP	415	650	815	106%	975	1220	770
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								
3) Median value used in place of average								

Table 4: NRCS forecast for Lower North Platte River.

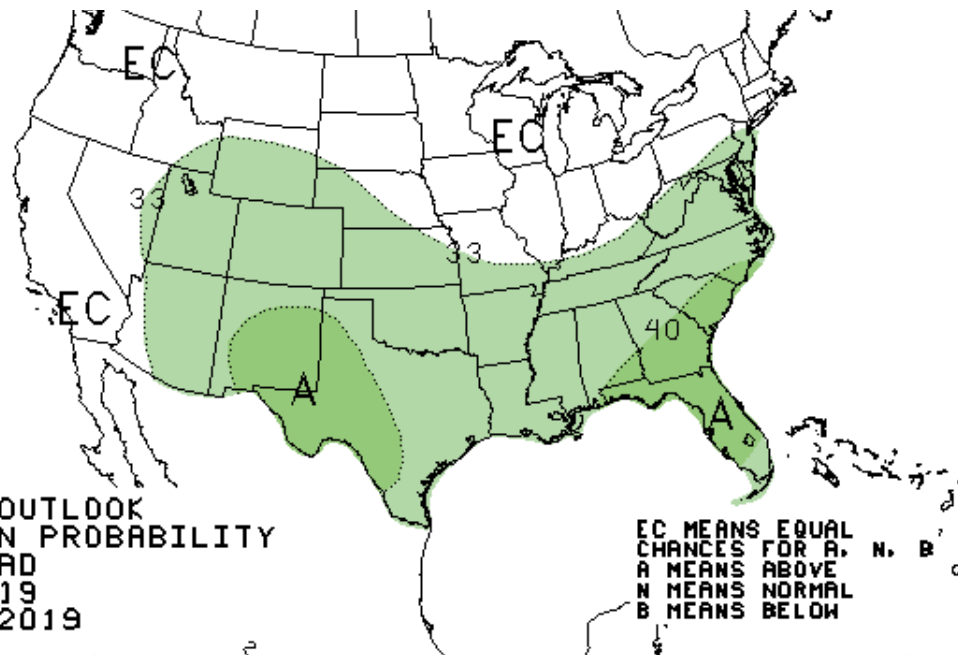
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
LOWER NORTH PLATTE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
La Prele Ck ab La Prele Reservoir								
	APR-JUL	3.2	13.8	21	106%	28	39	19.9
	APR-SEP	2.9	13.7	21	106%	28	39	19.9
North Platte R bl Glendo Reservoir								
	APR-JUL	270	590	805	98%	1020	1340	820
	APR-SEP	285	610	835	98%	1060	1380	850
North Platte R bl Guernsey Reservoir								
	APR-JUL	255	585	805	98%	1030	1360	820
	APR-SEP	270	605	835	98%	1060	1400	850
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								
3) Median value used in place of average								

CPC

Figure 2, below, shows the latest March-May 2019 precipitation forecast from the CPC. Both the North Platte and South Platte continue to be forecasted to experience above normal springtime precipitation by the CPC, though with less confidence than the last update. The CPC forecast is generally consistent with the expectation of a weak to moderate El Nino persisting into the spring, and also consistent with our latest South Platte precipitation projection.



THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID MAM 2019
MADE 21 FEB 2019



EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

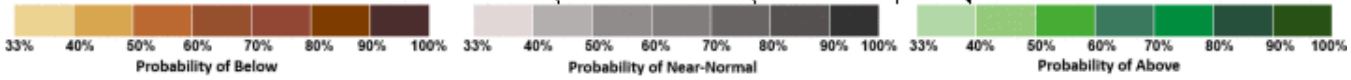


Figure 2: Climate Prediction Center's 3-month precipitation probability forecast for March-May 2019.