NIDIS Intermountain West Drought Early Warning System March 12, 2019

Precipitation



The images above use daily precipitation statistics from NWS COOP, CoCoRaHS, and CoAgMet stations. From top to bottom, and left to right: most recent 7-days of accumulated precipitation in inches; current month-to-date accumulated precipitation in inches; last month's precipitation as a percent of average; water-year-to-date precipitation as a percent of average.

Standardized Precipitation Index



Standardized Precipitation Index standardizes precipitation accumulations for a specified time period into percentile rankings. -1.0 to -1.5 is equivalent to a D1 to D2. -1.5 to -2.0 is equivalent to a D2 to D3. -2.0 and worse is equivalent to a D3 to D4. 30- and 60-day SPIs focus on short-term conditions while 6- and 9-month SPIs focus on long-term conditions. SPI data provided by High Plains Regional Climate Center.

Snotel and Snowpack



The above image shows SNOTEL snowpack percentiles for each SNOTEL site in the Intermountain West. The images below show accumulated snow water equivalent in inches (green) compared to average (blue) and last year (red) for several different sub-basins across the UCRB (and were created by the Colorado Basin River Forecast Center).



Streamflow





The top left image shows 7-day averaged streamflows as a percentile ranking across the UCRB. The top right image shows 7-day averaged discharge over time at three key sites around the UCRB: The Colorado River at the CO-UT state line; the Green River at Green River, UT; and the San Juan River near Bluff, UT. All streamflow data provided by United States Geological Survey.

Surface Water



The top left image shows VIC modeled soil moisture as a percentile ranking. The top right image shows satellite-derived vegetation from the VegDRI product (which updates on Mondays).

The graphs shown below are plots of reservoir volumes over the past full year and current year to date (black). The dashed line at the top of each graphic indicates the reservoir's capacity, and the background color-coded shading provides context for the range of reservoir

levels observed over the past 30 years. The data are obtained from the Bureau of Reclamation. Some of the reservoir percentiles don't line up at the new year due to differences in reservoir levels at the beginning of 1985 and the end of 2014. Dead storage has been subtracted. Note: Lake Granby data are obtained from the Colorado Division of Water Resources, and only goes back to the year 2000.



Evaporative Demand





The above images are available courtesy of NOAA's Evaporative Demand Drought Index (EDDI). Drought classification listed is a function of the depth of reference evapotranspiration accumulated over a given period of record with respect to a climatology of 1981-2010. The drought categories displayed are in line with the <u>US Drought Monitor's Percentile Ranking Scheme</u>. Data used to generate these maps come from the North American Land Data Assimilation System Phase-2 (NLDAS-2) project, which assimilates observations of temperature, wind speed, radiation, and vapor pressure deficit. The date indicates the last day of the period of record, and the week number indicates the window size for the period of record.

Temperature



All images show temperature departures from average over different time periods (last 7 days on top left; month-to-date on top right; last full month on bottom). Temperature departure maps provided by HPRCC ACIS.



Condition Monitoring and Impacts



Map of current condition monitoring reports submitted to CoCoRaHS in the last week overlaid on the

current U.S. Drought Monitor depiction. Specific impacts reports from local experts listed below.

Blue Mesa Projections: Via Bureau of Reclamation, "Blue Mesa is still not projected to fill, partly due to last year's extremely low storage and partly due to the downstream flow targets that become greater as the runoff forecasts increase. Earlier this year we did some long term projections and those showed that runoff to Blue Mesa would most likely need to be near 150% of average to have a pretty good chance of filling the reservoir. The last forecast was for 110% of average, although since then the forecast model runs have been increasing daily. It's actually possible that we could get to that runoff level if the snow keeps coming but it's still a bit of a long shot. Those scenarios also showed that there could be small chance for filling Blue Mesa at the current forecast level but that would require really high flows on the downstream tributaries (mainly the North Fork). So far runoff projections for those areas aren't quite as high as for the Upper Gunnison so we are still likely to be short of fill but maybe by only 5-10 feet."

Lake Dillion Projections: Via Denver Water, "Dillon will fill this year, unless there is historically low precipitation between now and May. It is a bit early to tell how much Dillon will spill given there are 4 to 8 weeks before runoff is expected to start. I would say that the recent storms have improved the odds of Green Mountain filling significantly. Base on the March 1 inflow projections, which were published before the last couple of large storms, we projected the Green Mountain would not fill in dry years (bottom 10%)."

McPhee Projections: Via Dolores Water Conservancy District, "Right now, using CBRFC's 1-MAR 50% exceedance forecast, we do end up with a full supply as well as some carryover going into next year, but (forecasting using generic diversions) it does not look like we're going to reach full or spill. Though, I will say that if the forecast continues to rise as rapidly as it has been, and the 50% forecast approaches what is now the 30% forecast, there may be some possibility of filling."

Gunnison County Colorado: Already received three inches of snow in three hours this morning before the 10 am webinar. Historic avalanches, lots of road closures for avalanche potential. One roof avalanche related death.

Kiowa County Colorado: Good winter precip, cattle have been able to graze. However, some cattle were lost during cold temps last week.

Durango County Colorado: Great snow accumulation in Feb, been experiencing temps in the 50s and high winds causing snow pack to melt quickly and saturate the soil.

Baca County Colorado: Nice recent moisture events. However, still need a bit more to get good and muddy to start the grass growing. Had tractors in and out of the fields all winter.

Sweetwater County Wyoming: East of town is variable however current conditions do not concur with what is depicted on current soil moisture graphic.

Outlook



The top two images show Climate Prediction Center's Precipitation and Temperature outlooks for 8 - 14 days. The middle image shows the Weather Prediction Center's Quantitative Precipitation Forecast accumulation for seven days. The bottom left image shows the 3-month precipitation outlook from Climate Prediction Center, and the bottom right image shows the Climate Prediction Center's most recent release of the U.S. Seasonal Drought Outlook.



Summary and Recommendations



Above is the most recent release of the U.S. Drought Monitor map for the UCRB region. Below shows the proposed changes for this week, with supporting text.



Summary: March 12, 2019

Last week widespread precipitation accumulated across many parts of Utah and western Colorado. Additional snow blanketed the higher elevations of the Upper Colorado River basin (UCRB) and surrounding ranges. These areas continued to be dominated by colder than average temperatures, especially far northern Wyoming, which experienced temperatures more than 10° below average. In eastern Colorado, precipitation amounts were little to none but temperatures were cooler than average.

For most of the UCRB, the winter pattern of colder and wetter than average continued, with the exception of parts of western WY where little precipitation occurred. The plains in eastern Colorado also received little to no precipitation and experienced below averages temperature, as low as -15 to -20 in the northeast corner. Over the plains the cold is a double-edged sword. It limits any possible early evapotranspiration off of crops, lowers the risk of wildfires, and keeps vegetation in dormancy. But the extreme cold has been hard on cattle. The good news about drier than average or near average conditions is that they've been confined to places that are typically dry during the winter. The regions that should get their bulk of moisture in the winter have risen to the occasion.

Basin-wide snowpack throughout the IMW is mostly above average now, after a fantastic February, with repeated large snow events. Below average snowpack is confined to the central and southern mountains of AZ and NM. For the UCRB, not only are all the basins near or above average, but several basins (Duchesne, Gunnison, and San Juan) have already reached their normal peak snowpack, with still a month of accumulating still to go.

At the beginning of last month, the main areas of concern were low streamflows, very dry soils (at the beginning of the cold season), and low water supply. With each passing storm, each of these becomes less of a concern. While streamflows are still low right now, it is expected that the snowpack can more than make up for the soil moisture deficits, bring flows back to normal, and replenish some of the water supply. While reservoir inflows will be better off this spring, depending on the size of the reservoirs, they may not fully bounce back. Blue Mesa, Lake Dillion and McPhee reservoir projections can be seen under the "Impact Reports".

The forecast outlook is showing a major system bringing in precipitation and colder temperatures this week. A major early spring storm continues to affect the Four Corners region this Tuesday afternoon into Wednesday. Impactful weather will include moderate to heavy snow above 9000 feet in all mountain ranges, with around 0.5 inches of rain falling in the valleys. Mid-level cyclone will be pounding the Plains with a fully stacked system and surface low moving toward the occluded stage by Wednesday evening. This system is so tightly wound by this time that it appears the trough of warm air aloft will be east of the divide and really feeding a good frontal band across the High Plains through to the Dakotas where Blizzard conditions are looking nasty. As of 15:00 MST on 3/12/2019 there are a plethora of Winter Weather advisories, watches, and warning. For example Tavaputus Plateau and Eastern Uinta Mountains in Utah and in Colorado the Elkhead, Park Mountains, West Elk, and Sawatch Mountains currently have an advisory in place until 6AM Thursday for 6-12 inches of snow. Portions of east and northeast Colorado has a blizzard warning in effect from noon Wednesday to

noon Thursday. "Blizzard conditions expected. Total snow accumulations of 6 to 12 inches expected. Winds gusting as high as 75 mph." Avalanche Watch is also in effect for the Front Range, Gore Range, Elk Mountains, Ruby Range, West Elk Mountains, Sawatch Range, Grand Mesa, San Juan Mountains and La Plata Mountains. It appears next week improvements might be added to eastern Colorado as well.

Recommendations:

Western Utah: Much of the Upper Colorado River Basin has been experiencing above average precipitation and below average temperatures since February. Areas of western Utah saw 1.00-4.00 inches of precipitation in the last week. We recommend a large-scale improvement from D1 to D0 from southern Box Elder county down through Iron county (blue line) and an improvement from D0 to D nada (purple line) from Washington County through Kane County. This is supported by short term SPIs and snowpack.

UCRB and the San Luis Valley: A large scale improvement is recommended for most of western Colorado. An improvement from D1 to D0 (blue line) is recommended across the Yampa/White basin down through the Gunnison Basin. This region received well above average precipitation in February, as well as continuing decent precipitation into March. The Gunnison basin is already well past the normal seasonal peak, that we usually do not see until April, and received another 2.00-4.00 inches of precipitation over the last week. We are also recommending an improvement from D2 to D1 (green line) over the San Juan Basin east through the San Luis Valley. The San Juans received well above average precipitation in February with decent precipitation continuing through March, and basin-wide snowpack is already past the normal seasonal peak with more expected. It is recommended to improve the area over the Colorado mainstream that extends north into Carbon county Wyoming (purple line) to D nada. Some of this region is a 2-category drought improvement. This drastic improvement is in an area where SNOTEL sites are above the 95th percentile, avalanches have been problematic, and reservoirs area projected to fill.

Eastern Colorado: Eastern Colorado experienced little to no precipitation over the last week but temperatures were cooler than normal. We are recommending status quo currently but the upcoming storm could impact improvements for next week's depiction.