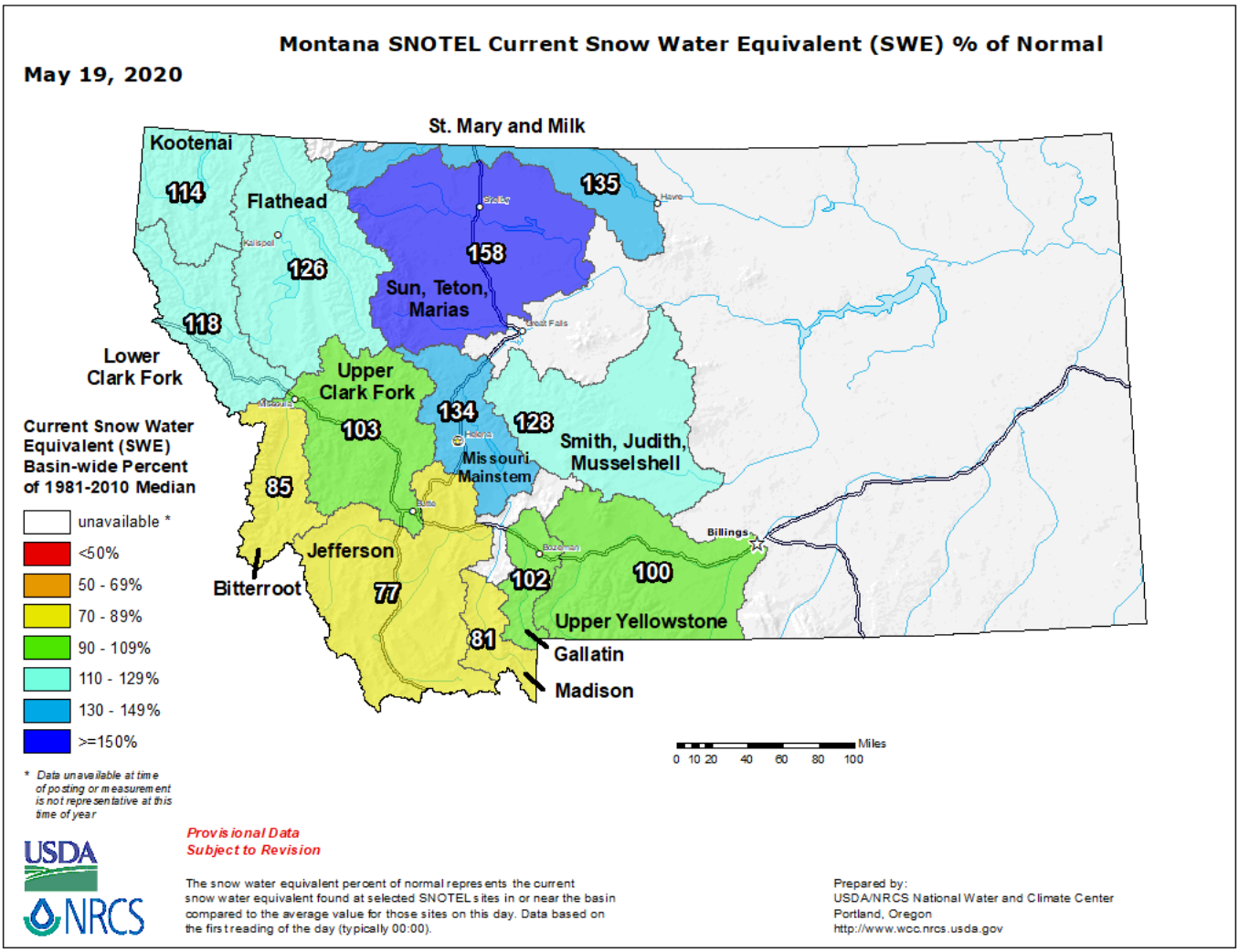
Montana Water Supply Outlook – Late Spring 2020

Water Supply Overview:

On behalf of the Governor's Drought and Water Supply Advisory Committee, DNRC Water Planners have compiled this Spring Water Supply Outlook. This report provides a synopsis of statewide conditions gleaned from multiple sources and offers links to additional resources with more in-depth information. In partnership with other state and federal agencies, DNRC staff gather this information from experts in climate science, snowpack, streamflow and other important drought and flooding indicators.

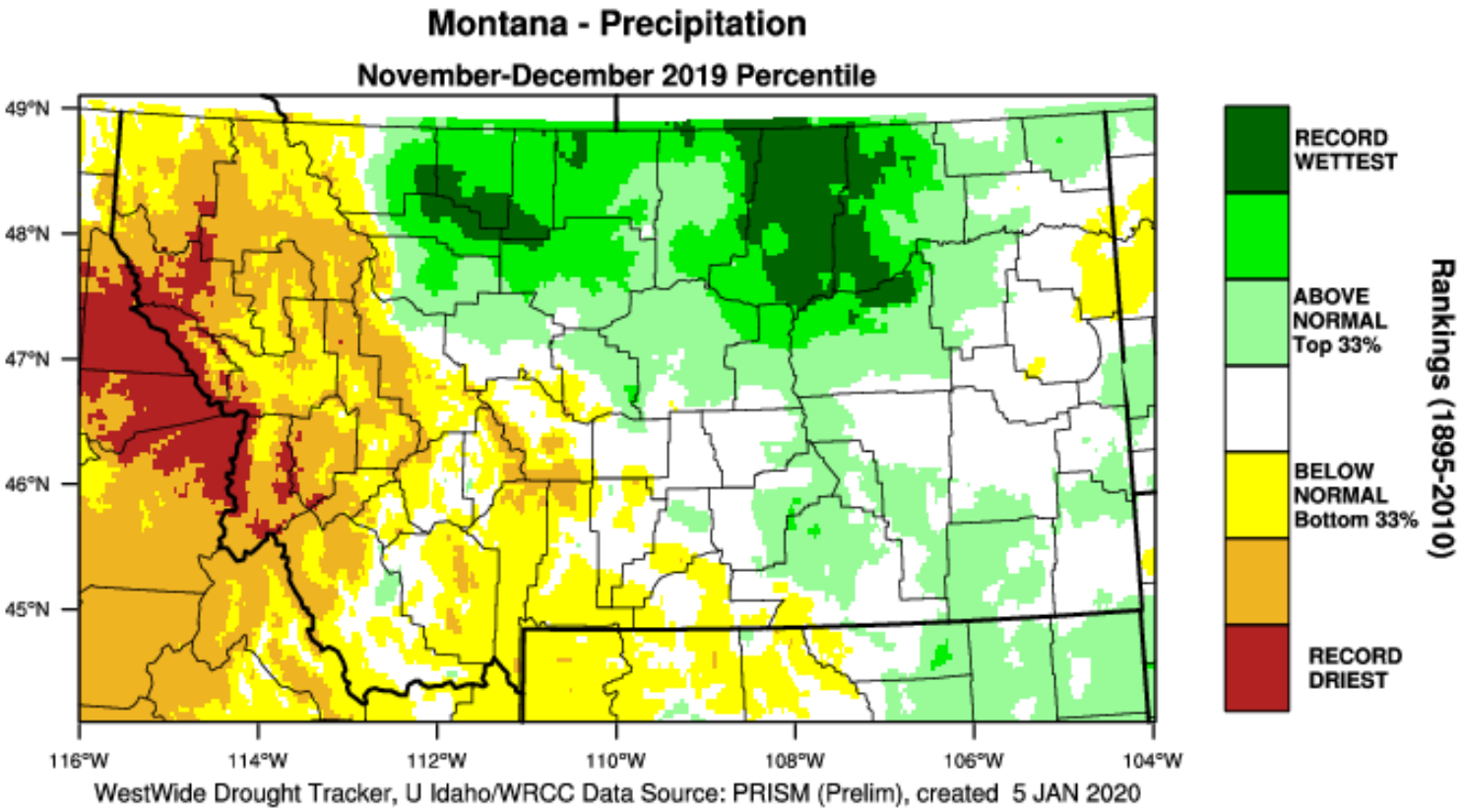


Precipitation:

The 2019 water year closed with an exceptionally wet September followed by an exceptionally cold October that dashed all hope for one of Montana's famous Indian summers. October of 2019 ranked as Montana's coldest on record across much of the state with multiple daily lows that fell well below zero and averages for the month as much as 8 degrees

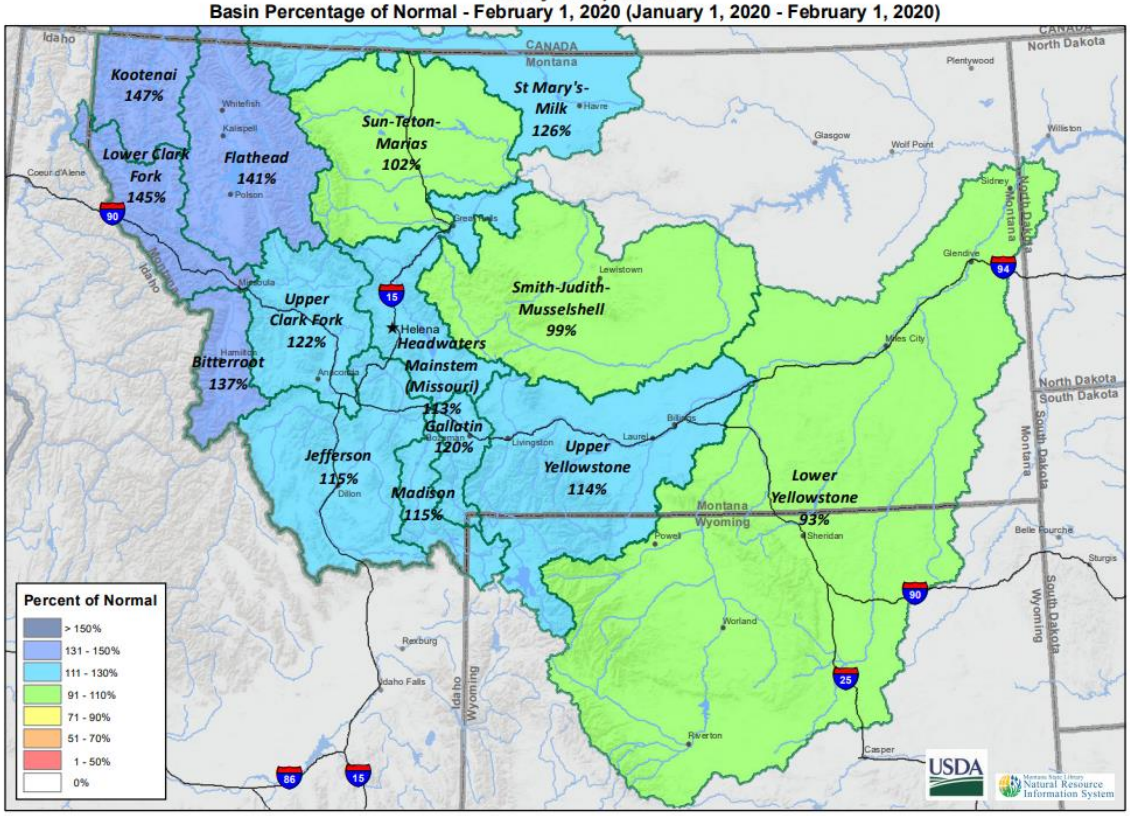
below normal. The cold temperatures and above normal precipitation in the western half of the state jump started the mountain snowpack which remained strong well into April. The wet and cold fall weather was followed by unusually warm and dry conditions in November which continued through December of 2019. However, some areas in north central Montana received above to near record moisture in November and December, another great indicator of the variability that makes Montana so unique and makes it so difficult to accurately forecast weather and water supply conditions.

Following the warm and dry November and December, conditions at the turn of the new year looked a bit desperate in the far western portion of the state. Fortunately, conditions turned around in January with several cold fronts moving

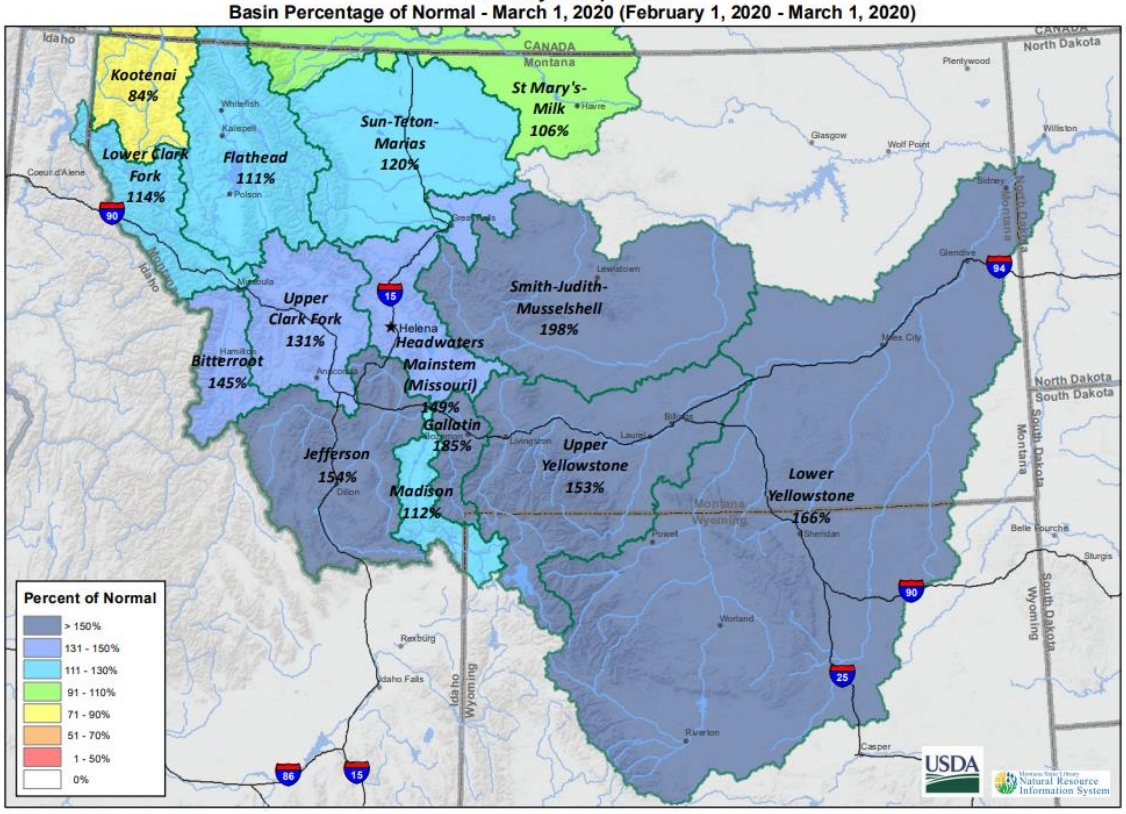


through the state that provided good precipitation for the month. Precipitation in January and February increased snowpack from near normal to well above normal across much of Montana. A steady stream of moisture from the Pacific yielded a significant amount of snowfall in the northwest river basins between December 30th, 2019 and March 1st, 2020. Many mountain SNOTEL sites reported the highest, or second-highest January snow totals on record. Although basins west of the Divide would receive the most snowfall, the entire state benefited from the weather patterns during January, with all river basins increasing their basin snowpack. Unstable northwest flow (storms approaching from the northwest in Canada) during the first three weeks of February resulted in above normal to record-setting snowfall across high elevation sites in the western half of the state.

Montana Data Collection Office
Monthly Precipitation
Basin Percentage of Normal - February 1, 2020 (January 1, 2020 - February 1, 2020)

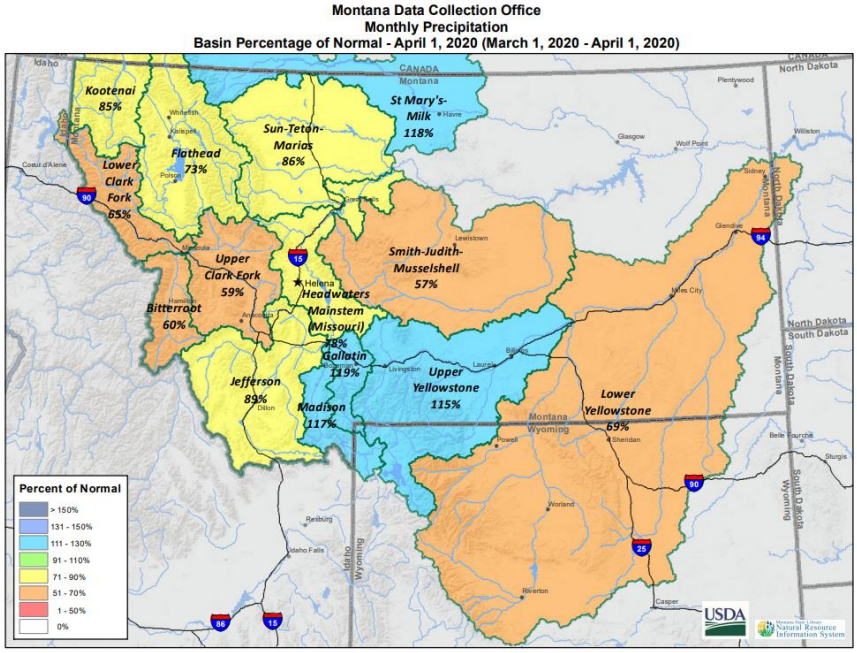


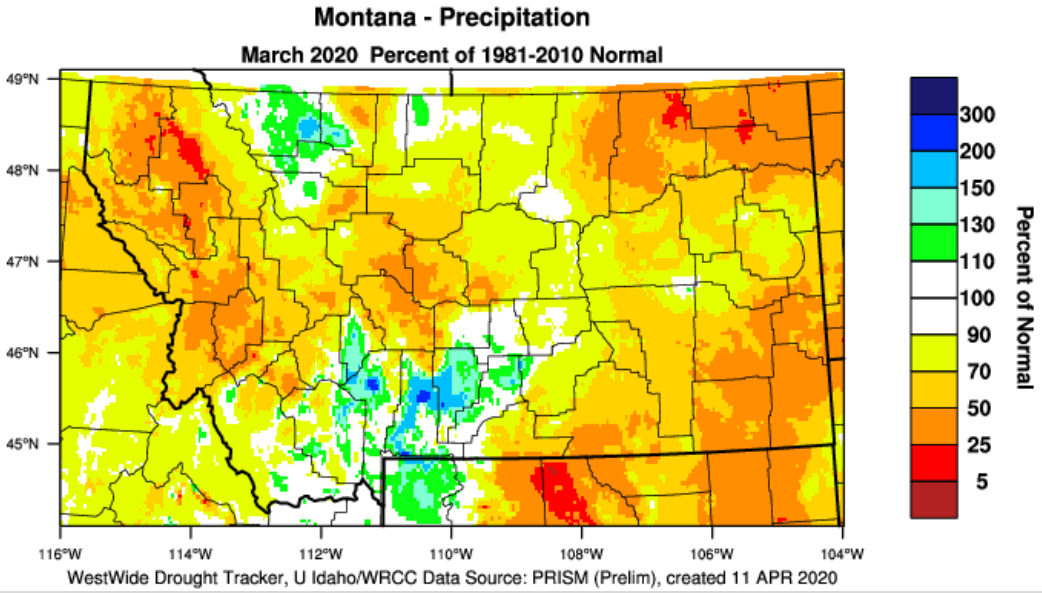
Montana Data Collection Office
Monthly Precipitation
Basin Percentage of Normal - March 1, 2020 (February 1, 2020 - March 1, 2020)



March and April didn't yield the abundance of moisture to Montana as January and February. Storms during March favored the southwest and south-central mountain ranges. In these areas, above normal monthly snow totals were reported due to periods of southwest flow during mid-March. Other regions were left with below normal snow totals and prolonged periods between reported snowfall. Weather patterns during the first three weeks of April were dominated by dry, but cool, west-northwest flow. Although snowpack gains were below normal, the above to well above normal snowpack in place on April 1st held strong through the end of the month due to the below-average temperatures

March started on the warm side, with many mountain locations setting new records for the highest daily average temperature on record at SNOTEL sites for March 6th (+/-25 years of history). The warm air moved out of the state for the remainder of the month, with temperatures across the state remaining near to below average for the daily average temperature through March to well below normal across the state during the first half of April at most locations.





Streamflow: (DNRC/USGS/MBMG Gaging Stations, Missouri Basin Forecast Center, Northwest River Forecast Center)

Peak snowpack in most mountain locations occurred during April. This year, the translation of current snowpack into summer stream forecasts results in a variety of outcomes because there is a disparity between mountain snowpack and overall water year precipitation which began on October 1st. While mountain snowpack in many locations is near to well above normal for this date, many parts of the state are still behind in water year precipitation. This means that some of the water that is typically in the hydrologic system is currently missing. Although this situation is not occurring in all river basins in the state, these precipitation deficits impact runoff forecasts in those watershed basins where they occur. For example, looking at the Lower Clark Fork River Basin, snowpack in the region is 111 percent of normal for April 1st. However, water year precipitation is approximately 90 percent of normal. As a result, the streamflow forecasts in watersheds like this one fall below normal for the April 1st through July 31st period.

Snowpack is a critical component of stream runoff across the state of Montana, but it's certainly not the only component. Total water year precipitation, peak snowpack accumulation, spring and summer precipitation and seasonal average temperatures all contribute to the overall water volume available during the growing season. As a whole, streamflow forecasts in most watersheds across the state are currently forecast for slightly above average for the April 1st through July 31st period.

Reservoirs: (Bureau of Reclamation Reservoirs, State Reservoirs)

It's getting to be that time of the year when water managers across Montana start to fill the irrigator controlled and federally managed reservoirs. It is also a time that leaves most water managers and dam tenders feeling uneasy as they consider changing conditions and try to anticipate spring run-off and water demands moving into the summer months. It is important to keep in mind that water management in Montana isn't only about water supplies here in Montana. Historic downstream flooding in the Dakotas, Nebraska and Missouri require federal water managers with the Bureau of Reclamation and US Army Corp of Engineers to adjust the flood pools of Montana reservoirs to accommodate projected run-off as well as the potential for flooding downstream. This year, cooler temperatures in late March and early April and a diminished prairie snowpack across the Northern Great Plains have reduced the threat of flooding farther down the Missouri River. As a result, river managers are reducing reservoir releases and holding more water at federal water projects along the Missouri Mainstem.

Water elevations at state water projects across Montana are currently normal to above normal. Ample snowpack indicates that most of Montana's reservoirs should not have trouble filling this year. Conditions for the smaller irrigator-controlled reservoirs across the State are equally optimistic. Carryover storage from last year's ample runoff and wet fall, combined with this year's strong snowpack, looks to deliver full storage in most areas of the state. Overall, reservoir storage is above average in the state of Montana for April 1.

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

WATER RESOURCES DIVISION - STATE WATER PROJECTS BUREAU

April 30, 2020

All Contents in Acre-Feet

RESERVOIR	TOTAL CAPACITY (includes dead storage)*	CONTENTS					%AVERAGE for April	READING DATE	COMMENTS
	Full Pool Contents	30 YR AVERAGE 1989- 2019 for April	Last Year 4/30/2019	Last Month 3/31/2020	PRESENT 4/30/2020	% CAPACITY 4/30/2020			
Clark Fork Basin									
E.F. ROCK CREEK	16,040	9,310	9,513	9,949	**10,405**	65	112	5/1/2020	elev.= 6,039.8 ft
NEVADA CREEK	11,207	10,101	11,336	8,665	**11,439**	102	113	4/29/2020	elev.= 4,616.63 ft
W.F. BITTERROOT	32,362	21,971	28,519	6,808	**22,106**	68	101	4/29/2020	elev.= 4,707.5 ft
Lower Missouri Basin									
ACKLEY	6,722	3,510	5,198	4,364	**4,427**	66	126	5/1/2020	elev.= 4,308.3 ft (3,426 AF)
BAIR	7,300	4,743	6,876	6,015	**6,444**	88	136	5/1/2020	elev.= 5,321.8 ft
DEADMAN'S BASIN	75,968	53,484	71,853	66,055	**72,652**	96	136	5/1/2020	elev.= 3,919.4 ft (68,902 AF)
FRENCHMAN	2,777	2,735	--	--	**--**	--	--	--	Not Reported
MARTINSDALE	23,348	13,024	19,964	15,412	**18,626**	80	143	4/29/2020	elev.= 4,774.09 ft
N.FK. SMITH RIVER	11,406	8,363	11,558	8,541	**10,180**	89	122	4/30/2020	elev.= 5,484.15 ft
YELLOWATER	3,842	1,944	3,835	3,187	**3,317**	86	171	5/1/2020	elev.= 3,117.15 ft
Upper Missouri Basin									
MIDDLE CREEK	10,184	6,583	6,459	5,491	**6,103**	60	93	5/1/2020	elev.= 6,701.2 ft
NILAN	10,992	8,000	10,434	7,697	**9,130**	83	114	5/1/2020	elev.= 4,438.81 ft (8,230 AF)
RUBY RIVER	37,612	36,545	37,894	31,237	**36,696**	98	100	5/1/2020	elev.= 5,392.1 ft
WILLOW CREEK	18,000	16,784	13,145	12,261	**13,784**	77	82	4/27/2020	elev.= 4,730.71 ft
Yellowstone Basin									
COONEY	28,230	22,668	25,136	22,350	**27,557**	98	122	5/1/2020	elev.= 4,250.2 ft (27,467 AF)
COTTONWOOD	1,900	1,635	1,958	1,583	**1,651**	87	101	4/17/2020	elev.= 5,101.37 ft
TONGUE RIVER	79,071	55,823	73,373	57,620	**58,581**	74	105	5/1/2020	elev.= 3,422.3 ft

* Note: Reservoir contents include dead storage at the following:

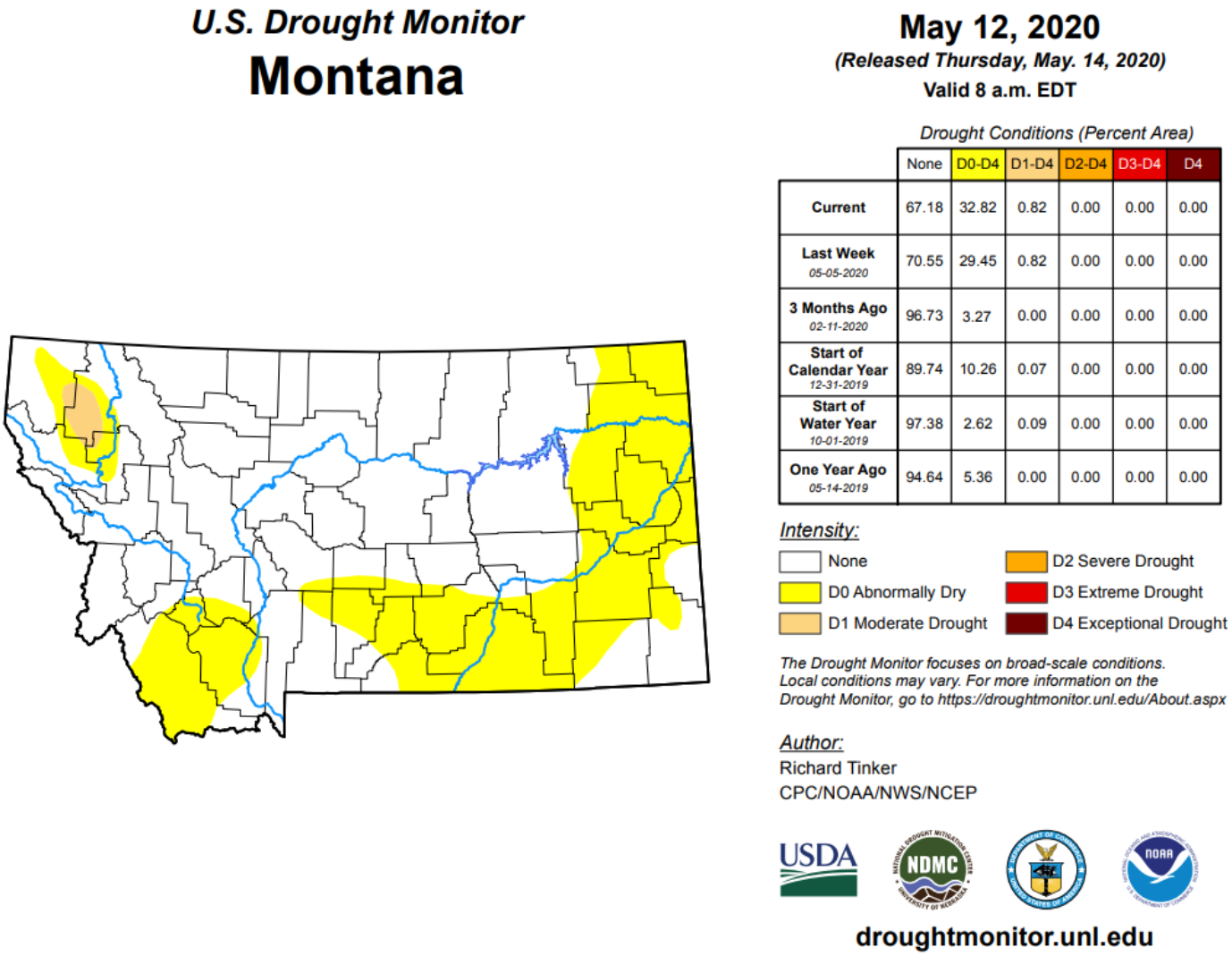
Ackley	1001 AF	**	Tongue River	711 AF	(O&M storage table includes dead storage)
Cooney	90 AF	**	W. F. Bitterroot	656 AF	(O&M storage table includes dead storage)
Deadman's	3750 AF	**	Willow Creek	269 AF	(O&M storage table includes dead storage)
Nilan	900 AF	**			

** O&M slope storage table does not include dead storage (so dead storage has to be added into the storage from the table)

* Note: Cooney capacity reflects capacity after 1982 dam rehabilitation; prior capacity was 24,195 A.F. Average storage shown is for post rehabilitation data.
* Note: Middle Creek capacity reflects capacity after 1993 dam rehabilitation; prior capacity was 8,027 A.F. Average storage shown is for post rehabilitation data.
* Note: Nevada Creek Reservoir Capacity reflects live storage capacity survey conducted in year 2000. Prior live storage capacity documented as 12,723 AF.
* Note: Tongue River capacity reflects capacity after 1999 dam rehabilitation; prior capacity was 68,040 A.F. Average storage is post rehabilitation data.
* Note: Frenchman Reservoir capacity tables updated based on aerial survey; prior capacity was 3752 A.F. Average shown is from 2008 forward.

Drought Watch: (Montana Drought Information and Montana Drought Impacts Reporter)

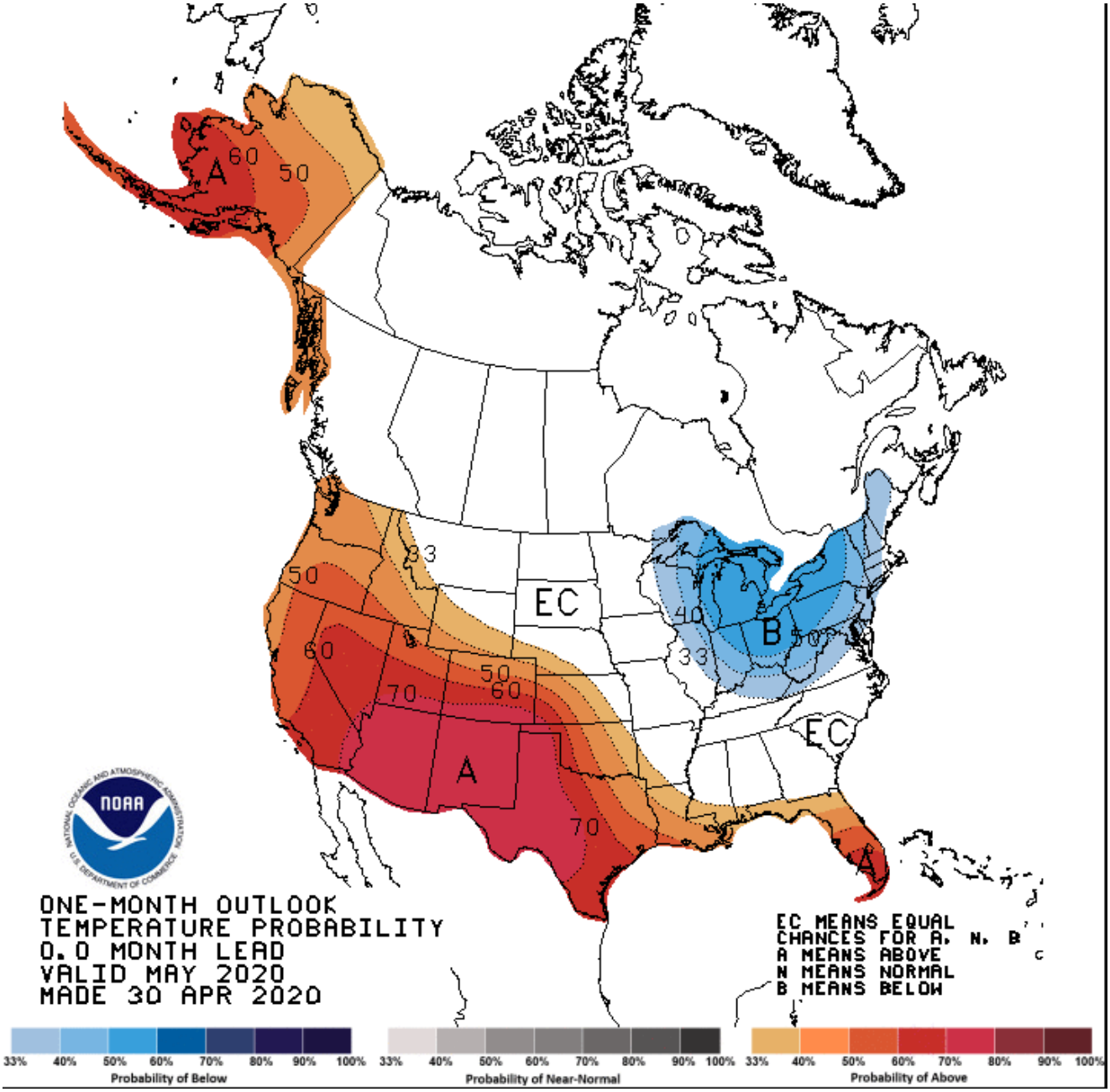
As we move into late spring, there are parts of the state that are abnormally dry and a small area in a moderate drought. While there is still time to turn things around, persistent dryness in northwest Montana has resulted in moderate drought conditions (D-1) although wet weather in the forecast should improve those conditions. There is also an irregular area of abnormal dryness in the southwest, southcentral, and eastern parts of the state. Adequate summer precipitation and average or below average temperatures could prevent the onset of drought in these areas. Wet conditions from last summer and fall left the area with good soil moisture conditions, and there is still time in the next 6 to 8 weeks to make up for current deficits. It is important to keep in mind that the development of drought is typically driven as much by temperature as it is precipitation. Despite the strong snowpack in 2017, the absence of any precipitation after July 1 along with considerably higher than normal temperatures resulted in that summer's extreme drought. The next 8 to 10 weeks will tell much of the story, so stay tuned. Below is the most recent map from the U.S. Drought Monitor. Additional information on drought, weather and climate is also available from the National Integrated Drought Information System (NIDIS)



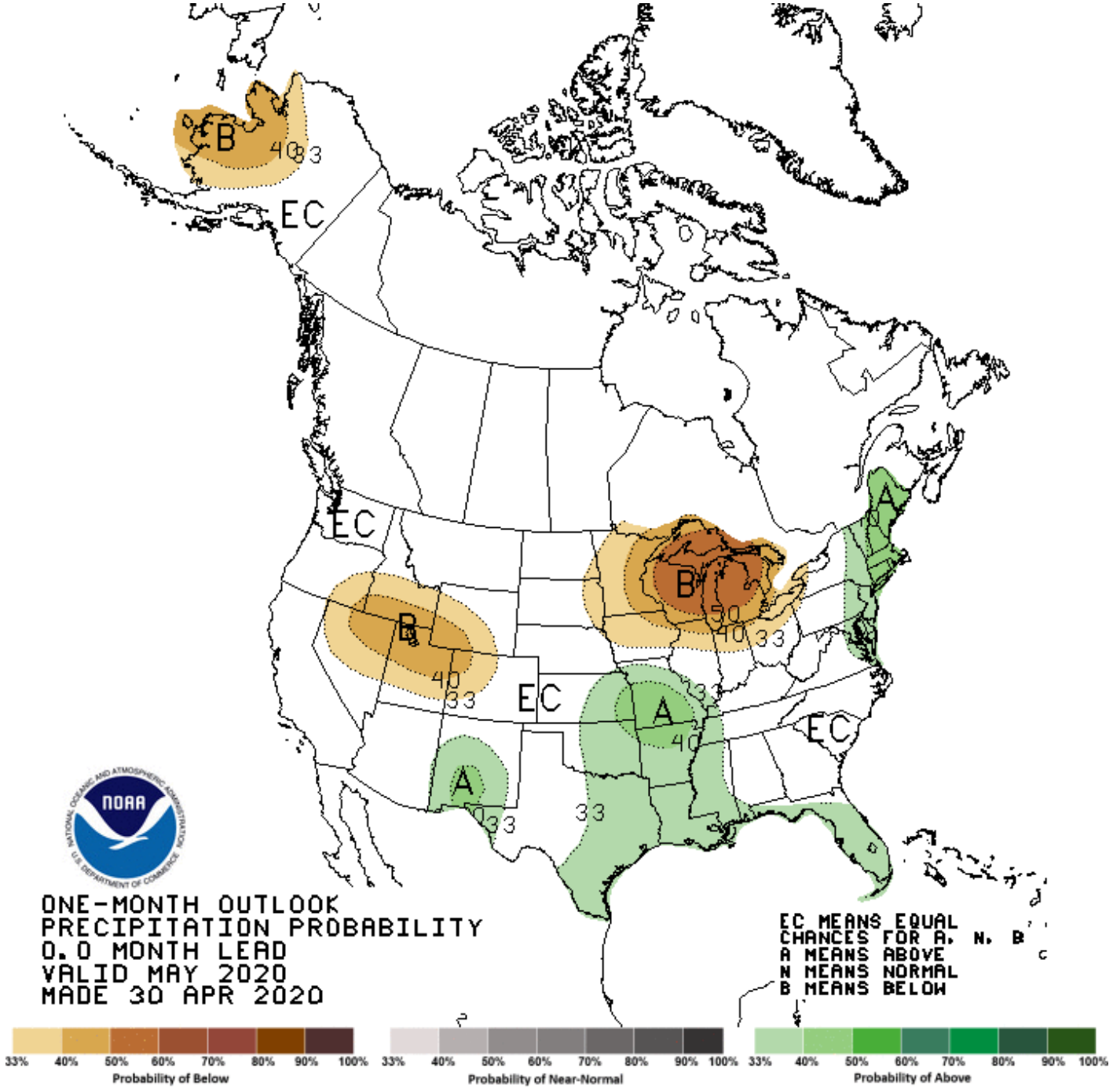
Long Term Forecast:

The Climate Prediction Center, a division of the National Weather Service, provides long-term forecasts for the contiguous United States, Alaska and Hawaii. The current temperature outlook for May calls for 30% chance of above normal temperatures in western Montana, and there are not any clear signals on the horizon that indicate below average or above average temperatures in the rest of the state. The precipitation outlook does not show a clear indication in one direction or the other. The maps below show the 1-month forecast for both temperature and precipitation.

1 Month Temperature Forecast



1 Month Precipitation Forecast:



These combined indicators tell the current water supply story in Montana. As always, the ending may differ radically from this current outlook. DNRC can help answer questions about water resources in your area or provide information about water management tools like stream gages, near you. DNRC also provides planning assistance and technical support for local water supply planning for your community and in your watershed.

Please don't hesitate to get in touch if you have any questions or feedback, and keep an eye out for the next update in late June. Contact the DNRC staff listed below for assistance or additional information.

Lower Missouri Basin
Water Planner - Michael Downey
Drought Monitoring Coordinator

Yellowstone River Basin
Water Planner - Sara Meloy

Upper Missouri River Basin
Water Planner - Ann Schwend

Clark Fork & Kootenai River Basins
Water Planner – Valerie Kurth

Much of the information contained in this report comes from the NRCS Water Supply Outlook Report, U.S. Drought Monitor, Climate Prediction Center, National Integrated Drought Information System and others. This report would not be possible without the ongoing participation and contributions of our local, university, state, tribal and federal partners, some of which are listed below:

This report was developed by the MT DNRC on behalf of the Governor's Drought & Water Supply Advisory Committee pursuant to MCA 2-15-3308(5).