

BLACKFOOT CHALLENGE

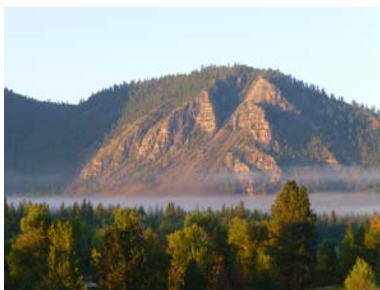
WEEKLY IRRIGATION REPORT

Friday June 4, 2021



Crops grew well this week due to very warm temperatures and sunny skies. Most areas had less than ¼ inch of rain. Next week will have cooler temperatures and little rain. Soil moisture levels dropped significantly without irrigation. The snowpack dropped from 140% of average to 108%. Streamflows continued above average but should fall with the cooler weather. There is plenty of water for early season irrigation and storage but predicted hot, dry weather could change that later on. The NOAA US Drought Monitor Map shows that all Blackfoot croplands are again not yet in drought conditions!

WEATHER -SUNNY AND VERY WARM TO SUNNY AND SLIGHTLY COOLER



Warm, dry weather last week reduced the 30-day rainfall to 150% of normal for the Blackfoot drainage. Next week will again be mostly sunny but slightly cooler with highs in the 70s. Lows will be in the 40s. **Both the 30-day and 90-day forecasts now say below average rainfall and above average temperatures.**



CROP WATER USE - JUMPED TO AVERAGE WITH WARM, DRY WEATHER

Very warm, sunny weather caused crop water use to jump from weeks of below average to above average for all crops. **Hay crops used about 1.2 inches of water last week and will use about the same next week.** Note that in these early season reports, we list a range of crop water use for spring grains planted at different dates. Crop water use will then even out as spring grains mature. The table below provides a quick summary of crop water use this last week and an estimate for next week.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS TOTAL¹	NEXT 7 DAYS DAILY AVE²	SEASON TOTAL³
HAY CROPS	1.2	1.2	.17	3.4
PASTURE	1.0	1.0	.14	3.1
SPRING GRAINS	0.6-0.9	0.7 – 1.2	.09 - .17	1.9
WINTER WHEAT	1.3	1.4	.20	4.1
LAWNS	1.2	1.2	.17	3.9



¹Expected water use over the next week (range if weather becomes cooler or hotter than expected)

²Expected average daily water use over the next week (compare this with your soil moisture content)

³Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but since include April

The table and chart below summarize the entire irrigation season and compare it with average, hot and cool conditions so you can plan ahead. This table and chart will be updated weekly all season.

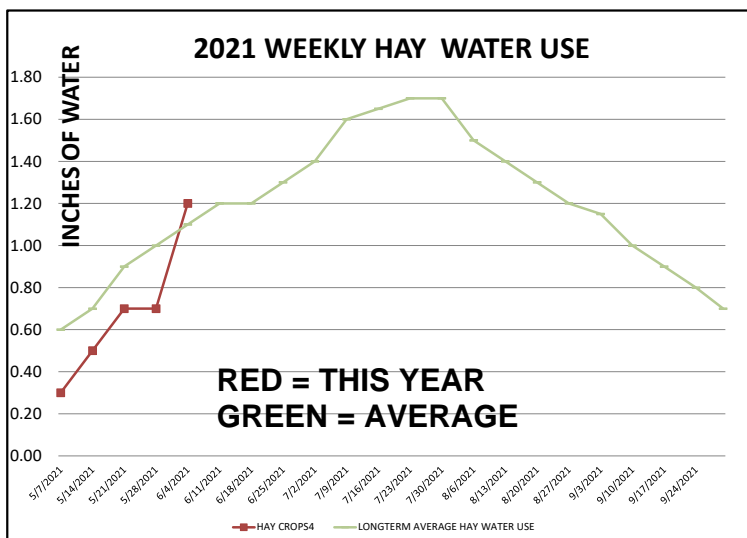
BLACKFOOT 2021 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)										
WEEK ENDING	RAIN ¹	2021 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE WEEKLY CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
5/7/2021	0.40	0.30	0.40	0.00	0.00	0.50	0.50	0.60	1.00	0.30
5/14/2021	0.20	0.50	0.50	0.10	0.00	0.70	0.70	0.70	1.10	0.40
5/21/2021	0.50	0.70	0.60	0.30	0.10	0.80	0.80	0.90	1.20	0.50
5/28/2021	2.00	0.70	0.60	0.60	0.20	0.80	0.70	1.00	1.30	0.50
6/4/2021	0.10	1.20	1.00	0.90	0.60	1.30	1.20	1.10	1.50	0.60
6/11/2021								1.20	1.70	0.70
6/18/2021								1.20	1.90	0.70
6/25/2021								1.30	2.00	0.80
7/2/2021								1.40	2.00	0.90
7/9/2021								1.60	2.10	1.00
7/16/2021								1.65	2.20	1.00
7/23/2021								1.70	2.20	1.00
7/30/2021								1.70	2.00	1.00
8/6/2021								1.50	1.80	0.90
8/13/2021								1.40	1.70	0.80
8/20/2021								1.30	1.60	0.80
8/27/2021								1.20	1.40	0.70
9/3/2021								1.15	1.40	0.70
9/10/2021								1.00	1.30	0.60
9/17/2021								0.90	1.20	0.50
9/24/2021								0.80	1.10	0.50
9/30/2021								0.70	1.00	0.40
TOTAL	3.20	3.40	3.10	1.90	0.90	4.10	3.90	26.00	34.70	15.30

¹ Rainfall should be reduced to account for immediate evaporation from crop and soil surfaces (0.1-April, May and Sept, 0.15-June and August, 0.2-July) (This rainfall figure is an average across all Blackfoot croplands - use your own rain gauge for better accuracy)

² **This years** maximum water use by healthy crops that are well-fertilized and irrigated, disease and insect-free. Will vary slightly across the drainage.

³ **Longterm average** water use for each crop each week based on long-term historic data.

⁴ Hay Crop water use drops approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third.



SOIL MOISTURE - DROPPED OVER 1 INCH IF NOT IRRIGATED

Soil moisture dropped this week with warm temperatures and little rain across most croplands. This dried out surface soils unless irrigated. Most soils lost 1 to 1 ¼ inch of moisture. Now is the time to pour on the irrigation – June is the most effective time to irrigate for maximum crop production. Hay crops yields are highest for the first cutting and local small grain crops produce most of their growth in June. Check soil moisture and keep it above 50% of Water Holding Capacity to get the best yields. Remember that Silty, Clayey and Loamy soils with good organic matter content can hold 2 inches of water per foot of soil. Sandy and rocky soils can hold up to 1.5 inches of water per foot but many only hold ¾ to 1 inch per foot.



Soil near 100% of its water holding forms a ball when squeezed and leaves the hand visibly moist. Water is visible on the surface of the soil and the hand is moistened. Soil near 50% of its water holding capacity also forms a ball but leaves little moisture on the hand. Call or email us if you have questions about evaluating your soil moisture content and irrigation options.



WEEKLY TIPS

Water Supply - Big Drop In Snowpack Due to Warm Temperatures!

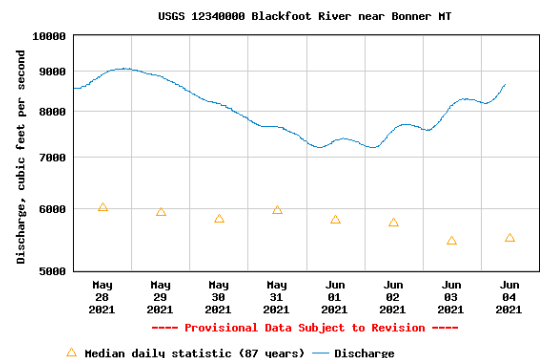


The Blackfoot drainage snowpack dropped from 140% of average last week to 108% this week. Warm temperatures turned the snowpack into above average streamflows. Similar weather next week will continue to quickly reduce snowpack. Blackfoot precipitation was at 150% of normal in the last 30 days, mainly due to the monsoon last week. Reservoir storage remains good. Blackfoot river flows should continue to be above normal for the next week or so but may drop with the hot, dry weather predicted for later in the season.

Right now 80% of Montana is listed in drought condition. Over 30% of the state is listed as in severe or extreme drought, mainly in the northeast portion.

Streamflows - High

The Blackfoot river flow at Bonner is flowing at **8,650 CFS today** which is about 140% of average for this date (6,080 CFS). The highest flow was 17,700 CFS in 1953 while the lowest flow was 1,440 CFS in 1977. Streamflows will continue to be high next week with warm temperatures and sunny skies.



BIOCHAR HELPS SANDY SOILS RETAIN MORE WATER

Researchers from Rice University report this week that **biochar** can increase the water holding capacity of sandy soils and reduce percolation below the root zone. Biochar looks like granulated charcoal and is made by heating organic matter without oxygen. It's used as a soil amendment to increase water and nutrient holding capacity as well as having other benefits. Biochar may become an important method to sequester carbon in soils and fight climate change. It lasts in soils for hundreds to thousands of years, unlike regular organic matter which is quickly decomposed by soil organisms. The Blackfoot Challenge is considering a biochar project to demonstrate its benefits for crop production locally. Slash from timber harvests is an obvious potential local source of biochar. This could improve soil health while reducing air pollution and greenhouse gas emissions from slash burning. There are thousands of studies and field trials being conducted around the world to examine the potential for biochar.



USDA CONSIDERS INCREASED SUBSIDIES FOR CARBON SEQUESTRATION

The USDA has been directed by the Biden administration to consider a multi-billion-dollar program to fund carbon sequestration practices in agriculture. This effort has lots of complex concerns and details but could become a significant source of future farm income. Some folks have concerns about whether carbon put in the soil will stay there over the long term and whether these practices will be used to let polluters off the hook in the short term. Biochar may be one of the solutions to these concerns.

WHERE IS THE CARBON ON EARTH?

Most of earth's carbon is held in rocks, especially sedimentary rocks. The ocean is the next largest "carbon sink" on earth followed by fossil fuel deposits (coal, oil, gas). Soil organic matter is the fourth largest carbon source on earth and the one most likely to be used to sequester organic matter in the future. There is three times as much carbon in the soil as in the atmosphere. Here is a list of the earth's carbon distribution in billions of metric tons (figures are approximate).

Marine Sediments and Sedimentary Rocks	80,000,000	billion metric tons
Ocean	40,000	
Fossil Fuel Deposits	4,000	
Soil Organic Matter	1,550	
Atmosphere	580	(as of 1700AD - 766 as of 1999AD)
Terrestrial Plants	575	

For further information contact Jennifer Schoonen, Blackfoot Challenge Water Steward, 406-360-6445 or Barry Dutton, Professional Soil Scientist, 406-240-7798 barry@landandwaterconsulting.net

THE BLACKFOOT DRAINAGE IRRIGATION SEASON IN BRIEF

This is a summary of general activities and recommendations for the whole season (more detail in the irrigation guide).

APRIL – GET READY AND PLAN YOUR IRRIGATION STRATEGY!

- Get your irrigation system ready – perform maintenance and test system.
- Evaluate soil moisture conditions and weather predictions then plan for irrigation and drought if needed.



MAY – CHECK SOIL MOISTURE & BE READY FOR UNUSUAL HEAT OR COLD!

- Check the soil moisture content at the start of growing season and fill up the soil to its water holding capacity during early irrigations (2-4 inches).
- Watch for dry soil conditions, especially with new plantings and apply water to ensure good germination and emergence.
- Irrigate deeply at least once early in the season to promote deep root growth.
- Apply 2-5 inches of irrigation to hay and pasture crops in May depending on weather. Apply 0-2 inches to spring grains and new plantings as needed based on weather and growth. Apply extra water to fill up the soil (2-4 in).

JUNE – THIS IS THE TIME TO MAKE YOUR BIGGEST EFFORT SO POUR IT ON!

- Apply 6-8 inches of irrigation in June to hay and pasture crops and winter wheat depending on weather. Apply 5-8 inches to spring grains and new plantings as needed based on weather and growth.
- Consider irrigating deeply to fill up soil root zone and promote deep root growth.
- Be sure small grains are irrigated well during their critical periods of boot, bloom and early heading.



JULY – POUR IT ON UNTIL HARVEST AND RETURN QUICKLY

- Apply 1 - 2 ½ inches of irrigation per week in July to all crops - depending on weather.
- Cutting is a critical stress period for hay crops, especially alfalfa so irrigate deeply to fill up the root zone before cutting then get back across the field quickly after cutting. Crop water use declines when hay is cut so this is a good opportunity to fill up the soil again. Irrigate at least once after cutting. Small grains harvested for seed are usually irrigated up to the milk to soft dough stage but be sure soil moisture remains to prevent kernel shriveling. Small grains for forage are often harvested earlier when plants are less dry and seeds soft.

AUGUST- KEEP IRRIGATING SMALL GRAINS UNTIL KERNELS MATURE, BE DROUGHT AWARE!

- Apply 1 - 2 inches of irrigation per week in August to hay and pasture crops for full production depending on weather. Irrigate new plantings as needed.
- Many folks irrigate for pasture following their one hay cutting. Irrigate according to how much pasture you seek and with consideration for other water needs in the drainage, especially in drought years.
- Reduce river withdrawals by rotating systems and reducing the amount of irrigation at one time. Stop irrigating if you can.



SEPTEMBER – APPLY AS NEEDED/AVAILABLE & GET READY FOR SPRING!

- Apply ½ - 1 ½ inches of irrigation per week in September to hay and pasture crops for full production depending on weather. Irrigate new plantings as needed. Prepare the system for winter and an early start next spring.