

BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

Friday June 25, 2021



Blackfoot croplands had little to no rain this week and warm temperatures. Next week looks downright hot, sunny and dry with temperatures approaching 100F! Crop water use this week reduced soil moisture levels by about 1½ inches unless irrigated. Next week crop water use will approach 2 inches. The snowpack is mostly gone. Blackfoot River streamflows are likely to be below average for the remainder of the irrigation season. The NOAA US Drought Monitor Map of the western United States continues to show the Blackfoot Drainage as one of the only spots not in drought! But it still may feel like the desert this week so keep cool and irrigate yourself as well.

WEATHER - HOTTER AND DRY NEXT WEEK



Warm, sunny weather last week with little or no rain will turn into HOT, sunny weather next week. Even the upper drainage may approach 100F later in the week so plan to work early and siesta. Highs will mostly be in the 90s and lows in the 50s. Both the 30-day and 90-day forecasts say **below average rainfall and above average temperatures.**

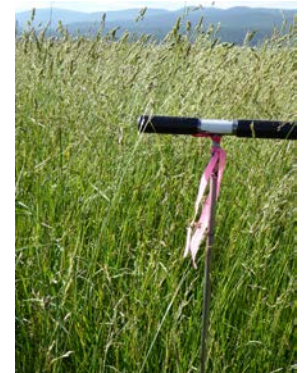


I don't have to tell you that your own rain gauge is your best source of rainfall information.

CROP WATER USE - ABOVE AVERAGE - ¼ INCH PER DAY NEXT WEEK

Warm temperatures and sunny skies kept crop water use above average again this last week. **Hay crops used about 1.6 inches of water and this will increase next week to about 1.8 inches.** Note that in these early season reports, we list a range of crop water use for spring grains planted at different dates so adjust for your crops maturity. 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. We also list season totals and compare them with past years in our annual reports available on the Challenge website.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS TOTAL¹	NEXT 7 DAYS DAILY AVE²	SEASON TOTAL³
HAY CROPS	1.6	1.8	.26	7.9
PASTURE	1.4	1.6	.23	7.0
SPRING GRAINS	1.3 – 1.5	1.6 – 1.9	.23 -.23	6.0
WINTER WHEAT	1.7	1.9	.26	8.9
LAWNS	1.5	1.7	.23	8.1



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.

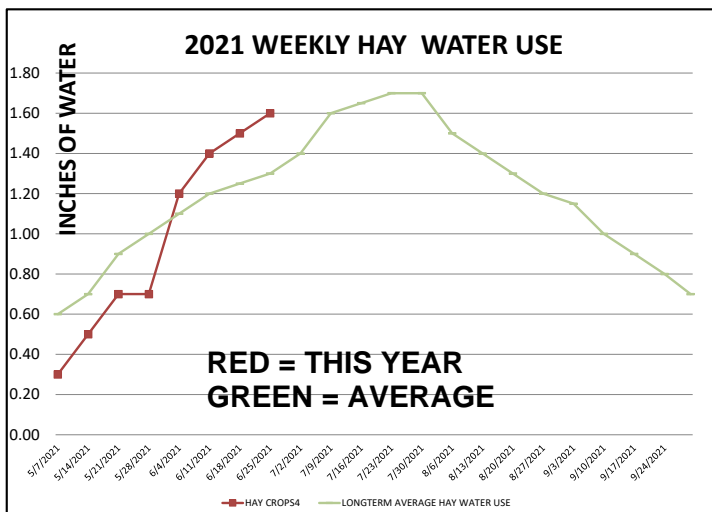
BLACKFOOT 2021 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)											
WEEK ENDING	RAIN ¹	2021 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE WEEKLY CROP WATER USE ³			
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE 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	0.10	1.40	1.20	1.10	0.80	1.50	1.30	1.20	1.70	0.70	
6/18/2021	0.20	1.50	1.30	1.40	1.10	1.60	1.40	1.25	1.90	0.70	
6/25/2021	0.20	1.60	1.40	1.60	1.40	1.70	1.50	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	3.70	7.90	7.00	6.00	4.20	8.90	8.10	26.05	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 ABOUT 1 ½ INCH IF NOT IRRIGATED

Soil moisture dropped about 1½ inches this week in fields not irrigated due to higher crop water use and almost no rain. This dried out surface soils unless irrigated. **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

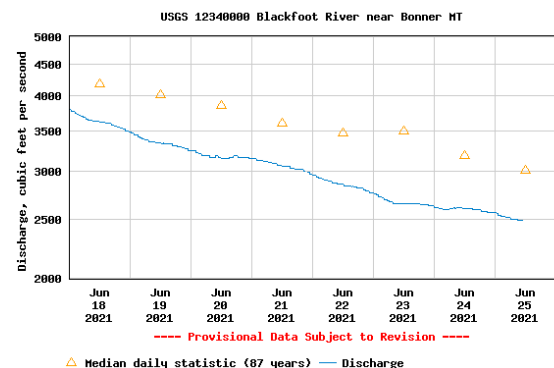
Water Supply - Snowpack Mostly Gone and Drought Surrounds Us!

The Blackfoot drainage snowpack is mostly gone but for a few lingering snowfields at high elevations and north aspects. Most streamflows will now come from groundwater, wetlands and lakes slowly releasing water to streams. Hot weather next week will continue to melt the little remaining snowpack. Right now 90% of Montana is listed as *Excessively Dry* and 70% is in *Drought*. Our part of western Montana remains the only part of the state not currently listed in drought condition.



Streamflows - Now Below Average

After starting the irrigation season above average, Blackfoot river flows continue to drop further below average. Today flow at Bonner is **2,490 CFS** compared with an average of 3,740 CFS. The highest flow ever recorded was 12,100 CFS in 1899 while the lowest flow was 764 CFS in 1977. Streamflows will continue to drop this week with the end of snowpack and no predicted rain.



Soil Moisture Sensors Show Great Irrigation Patterns So Far in 2021

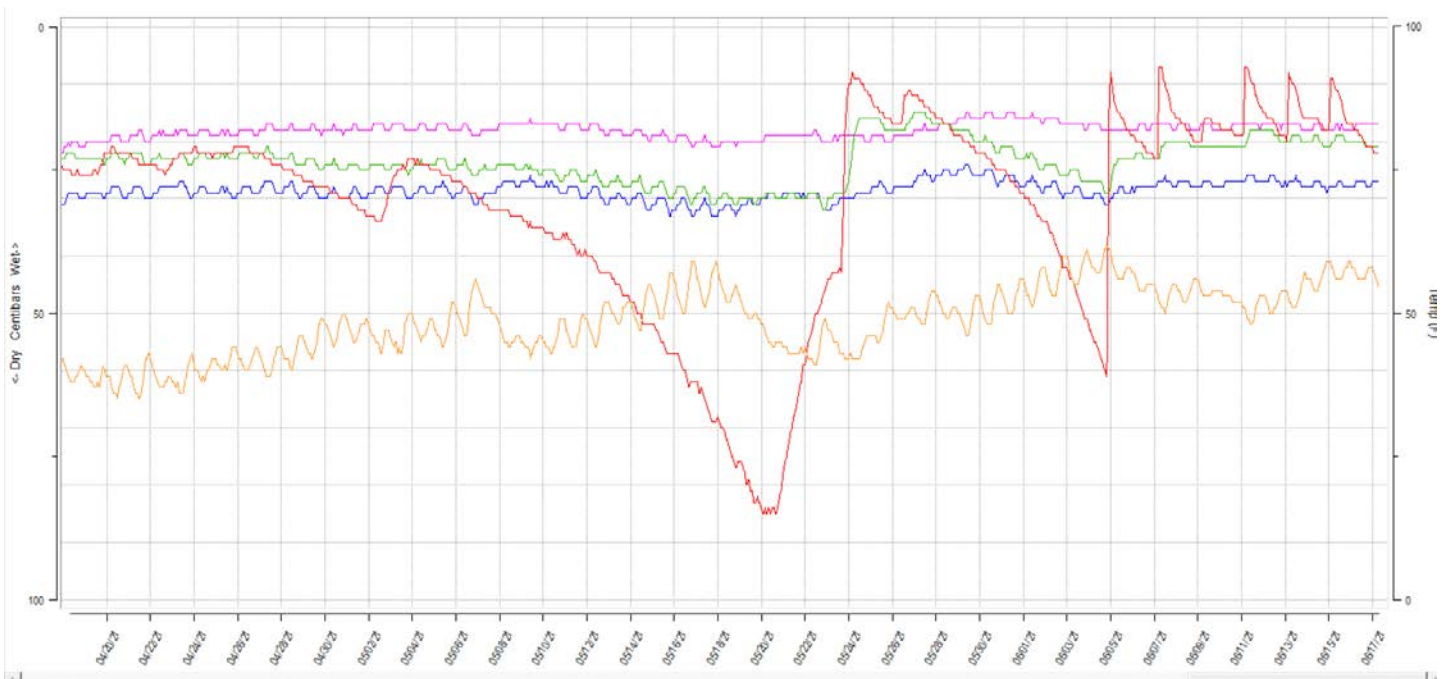
It's been a good year for Blackfoot Irrigators due to an above-average snowpack and rain at the right times. Irrigators have been able to keep soil moisture levels high and crops growing well (when it finally warmed up). Folks with soil moisture sensors recorded patterns like the one below showing mid-April to mid-June. Red line is the 1st foot, green line the 2nd foot, blue line the 3rd foot, pink line the 5th foot. Orange line is the 1st foot temp. This site has a hay crop and a great silty clay soil with high water holding capacity (2inches/foot).

The soil moisture scale is on the left side in Centibars (the suction force needed to extract water from the soil). The higher number, the more difficult it is for plants to extract water. In this case, the soil moisture starts the season in mid-April looking great in all depths (20-30 CB). Anything above 200 is good in this silty clay soil.

The 1st foot of soil (red line) is where most of the action is. You can see it drop in late April, increase slightly from rain in early May, then drop continually to 85 CB by May 20 when we had a 2 inch monsoon of rain that boosted it back up to only 10 CB (perhaps with a little irrigation as well). It drops to about 60 CB then a series of irrigations keep boosting it into this same range which is great.

Note that the 2nd foot of soil (green line) is next to respond after the surface foot and then the third foot (blue line) responds next. These patterns will be more obvious later in the season when less water is applied and more is extracted from deeper layers.

The 5th foot of soil shows little change in soil moisture so far but is expected to show water use by the crop later in the season when the upper layers become drier. One goal of this program is to promote the advantages of deep-rooted crops for utilizing deep soil moisture which can be stored earlier in the season and used during drought.



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.