

BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

Friday June 23, 2023



Most Blackfoot watershed croplands again had ¼ to ½ inch of rain this week, but it was highly variable with some sites getting none. **Crop water use is about 1 inch last week and next week which continues to be below average.** Surface soils and many subsoils have dried out unless they've been irrigated or had extra rainfall. Crops are growing well but are still set back slightly by the late start of the growing season and cooler than normal weather. The snowpack is exhausted and stream flows are now predicted to be below average for the rest of the season. Blackfoot river flows are now less than half of average. Please send us your ideas or questions about these reports and anything you would like to hear about related to irrigation, soil health, water quality, or other subjects. We will respond and share them with everyone.

WEATHER - SHOWERS AND THUNDERSTORMS

It was cool this week with lows in the 30s! Rainfall was again variable this week across Blackfoot croplands with many sites having ¼ to ½ in while others had little or none. The forecast next week is for more showers and thunderstorms which means mostly small but variable rainfall amounts with more rain during thunderstorms. Temperatures will be warmer next week with **highs mostly in the 70s and lows mostly in the 40s.** The 30-day day forecast predicts above average rainfall and temperatures. The 90-day forecast predicts above average temperatures and average rainfall.



Your own rain gauge is your best source of rainfall information.

CROP WATER USE - LOW NEXT WEEK WITH COOL WEATHER

Crop water use was again below average this last week due to somewhat cool, cloudy weather. **It was about 1 inch for most crops** and will increase slightly next week due to warmer weather. Spring grains will have the largest increase since they are maturing rapidly.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS TOTAL¹	NEXT 7 DAYS DAILY AVE²	SEASON TOTAL³
HAY CROPS	1.0	1.1	.16	6.7
PASTURE	0.8	1.0	.14	6.1
SPRING GRAINS	1.0	1.2	.17	4.4
WINTER WHEAT	1.1	1.3	.19	7.6
LAWNS	0.9	1.1	.16	6.8

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 on Page 1 provides a quick summary of crop water use this last week and an estimate for next week. 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 2023 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

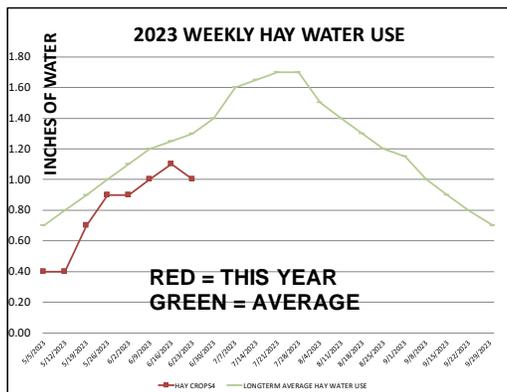
WEEK ENDING	RAIN ¹	2023 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE WEEKLY CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
APRIL	0.25	0.25	0.25	0.00	0.00	0.25	0.25			
5/5/2023	0.10	0.40	0.40	0.00	0.00	0.50	0.40	0.70	1.00	0.40
5/12/2023	1.50	0.40	0.50	0.20	0.00	0.60	0.50	0.80	1.10	0.60
5/19/2023	0.25	0.70	0.70	0.30	0.00	0.80	0.80	0.90	1.20	0.70
5/26/2023	0.75	0.90	0.80	0.50	0.30	1.00	1.00	1.00	1.30	0.70
6/2/2023	0.25	0.90	0.80	0.60	0.40	1.00	0.90	1.10	1.50	0.80
6/9/2023	0.25	1.00	0.90	0.80	0.60	1.10	1.00	1.20	1.70	0.80
6/16/2023	0.40	1.10	0.90	1.00	0.80	1.20	1.00	1.25	1.90	0.90
6/23/2023	0.25	1.00	0.80	1.00	0.90	1.10	0.90	1.30	2.00	1.00
6/30/2023								1.40	2.00	1.00
7/7/2023								1.60	2.10	1.10
7/14/2023								1.65	2.20	1.10
7/21/2023								1.70	2.20	1.10
7/28/2023								1.70	2.20	1.10
8/4/2023								1.50	2.20	1.00
8/11/2023								1.40	2.20	1.00
8/18/2023								1.30	2.00	0.90
8/25/2023								1.20	1.80	0.90
9/1/2023								1.15	1.60	0.70
9/8/2023								1.00	1.40	0.60
9/15/2023								0.90	1.40	0.50
9/22/2023								0.80	1.20	0.50
9/30/2023								0.70	1.00	0.40
TOTAL	3.75	6.65	6.05	4.40	3.00	7.55	6.75	26.25	37.20	17.80

¹ Average across watershed (50-80% gets to the crop depending on irrigation method, weather, evaporation from crop and soil surfaces)

² This years potential water use by healthy crops that are well-fertilized and irrigated, disease and insect-free. Varies across watershed.

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

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



SOIL MOISTURE FALLING ABOUT AN INCH A WEEK

Most sites did not have enough rain this week to completely replenish crop water use (unless they had more than 1 inch). Only 50-80% of rain actually gets into the soil and small rain amounts completely evaporate from soil and crop surfaces (about 2/10 inch evaporates under recent weather conditions during each irrigation). The best way to monitor irrigation is in the soil.



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Soil near 100% of its water holding forms a ball when squeezed and leaves the hand moist. Water is visible on the surface of the soil and the hand as a dark stain or shiny surface.



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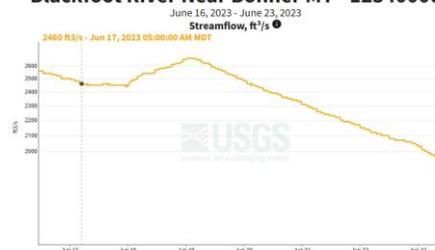
Soil near 50% of its water holding capacity may form a weak ball but leaves little moisture on the hand. Soil at 25% or less of its water holding capacity does not form a ball when squeezed. It feels and looks dry. If sandy or loamy, it crumbles easily, if high in clay it forms a hard lump. Call, text or email anytime if you have questions about evaluating your soil moisture content and irrigation options.

WEEKLY TIPS

STREAMFLOWS

The snowpack is gone. Now it's up to our aquifers, wetlands, irrigation return flows and rainfall to keep streams flowing. Blackfoot river flows are predicted to be below average for the rest of this season unless there's a lot of rain. The Blackfoot river flow at Bonner continued to drop quickly this week and is now less than half of average at **1,960 CFS**. The average for this date is 4,030 CFS. The highest flow on this date was 13,200 CFS in 1899. The lowest flow on this date was 865 CFS in 1941. Flow peaked this year on May 7 at 10,400 CFS.

Blackfoot River Near Bonner MT - 12340000



IRRIGATION SHIFTS THE EARTH'S AXIS - MOVES THE NORTH POLE

Scientists have known for years that the north pole changes slightly in a regular circular pattern about 10 feet in diameter. This 14-month seasonal "wobble" is caused by weather, ocean salinity and other factors. A recent study shows the pole is moving permanently in one direction – southeast towards Greenland's east coast. Part of this is caused by melting glaciers and ice sheets worldwide displacing water into the ocean. This changes the overall balance of the earth and shifts the pole. But a surprisingly large cause is from worldwide irrigation that removes water from aquifers and puts it in the oceans as runoff or transpiration+rainfall. From 1993 to 2010 irrigation moved 2 trillion metric tons of water from aquifers to the ocean – enough to raise sea level over ¼ inch. This has shifted the north pole about 1 ½ inches a year. So, we don't need to worry about the north pole showing up in the Blackfoot Watershed soon but it's amazing the many ways irrigation affects the entire earth.



[Irrigation may be shifting Earth's rotational axis \(sciencenews.org\)](https://www.sciencenews.org)

For further information contact Clancy Jandreau, Blackfoot Challenge Water Steward, 406-304-5423 or Barry Dutton, Professional Soil Scientist, 406-240-7798 barry@landandwaterconsulting.net

THE BLACKFOOT WATERSHED 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 watershed, 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.