

# BLACKFOOT CHALLENGE

## WEEKLY IRRIGATION REPORT

Friday July 7, 2023



The good news is that *perfect haying weather is predicted next week*. Blackfoot watershed croplands had little or no rain and warm temperatures last week and next week will be sunny and warmer. **Crop water use was about 1½ inch last week for most crops and will increase next week unless you cut your hay.** Blackfoot river flows continue to be half of average and are predicted to continue below average all season. The drought committee is gearing up as stream flows fall quickly. It seems certain that drought plans will be implemented this year. 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 - SUNNY AND HOT NEXT WEEK

Blackfoot croplands were warmer this week with highs in the 70s and 80s. Only a trace of rain fell at scattered locations! The forecast is for haying weather next week with sunny skies and little rain. Temperatures will be warmer with **highs in the 80s and lows in the 50s**. The 30-day day forecast predicts average rainfall and temperatures. The 90-day forecast predicts average rainfall and above average temperatures.



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

### CROP WATER USE - ALMOST AVERAGE, HIGHER NEXT WEEK

Crop water use was almost average this last week for the first time all season. **It was about 1½ inches for most crops** and will increase again next week due to warmer weather. For most crops it will be ¼ inch per day! However, many folks are cutting hay and crop water use decreases by 2/3 the week after cutting and by 1/3 the second week. By the third week after cutting crop water use is back up to its full potential.

<b>WATER USE IN INCHES</b>	<b>LAST 7 DAYS</b>	<b>NEXT 7 DAYS TOTAL<sup>1</sup></b>	<b>NEXT 7 DAYS DAILY AVE<sup>2</sup></b>	<b>SEASON TOTAL<sup>3</sup></b>
<b>HAY CROPS</b>	<b>1.5</b>	<b>1.7</b>	<b>.24</b>	<b>9.3</b>
<b>PASTURE</b>	<b>1.2</b>	<b>1.4</b>	<b>.20</b>	<b>8.2</b>
<b>SPRING GRAINS</b>	<b>1.7</b>	<b>1.9</b>	<b>.27</b>	<b>7.3</b>
<b>WINTER WHEAT</b>	<b>1.7</b>	<b>1.9</b>	<b>.27</b>	<b>10.5</b>
<b>LAWNS</b>	<b>1.4</b>	<b>1.6</b>	<b>.23</b>	<b>9.2</b>

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

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

<sup>3</sup>Beginning 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)

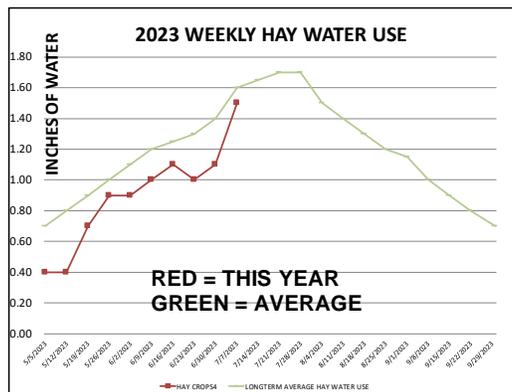
WEEK ENDING	RAIN <sup>1</sup>	2023 WEEKLY POTENTIAL CROP WATER USE <sup>2</sup>						AVERAGE WEEKLY CROP WATER USE <sup>3</sup>		
	RAIN	HAY CROPS <sup>4</sup>	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY 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	0.40	1.10	0.90	1.20	1.10	1.20	1.00	1.40	2.00	1.00
7/7/2023	0.01	1.50	1.20	1.70	1.60	1.70	1.40	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
<b>TOTAL</b>	<b>4.16</b>	<b>9.25</b>	<b>8.15</b>	<b>7.30</b>	<b>5.70</b>	<b>10.45</b>	<b>9.15</b>	<b>26.25</b>	<b>37.20</b>	<b>17.80</b>

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

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

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

<sup>4</sup> 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 1½ INCHES A WEEK

With no rain and high crop water use, most soils lost about 1½ inches of water this week. Soils will lose even more next week due to higher crop water use except in hayfields that are cut. Remember to irrigate as close to haying as possible and try to irrigate at least once after cutting to help the crop recover. As temperatures rise, more of the applied water evaporates from crop and soil surfaces and less gets into the soil. Expect to apply an extra ¼ inch or so this week to make up for this loss. As always, check your soil with sensors, probes or shovels to be sure you are adding enough water.



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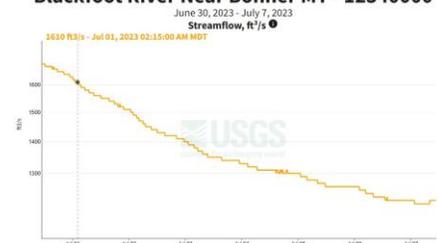
Soil near 50% of its water holding capacity may form a weak ball but leaves little moisture on the hand. Soil at 25% or less of its water holding capacity does not form a ball when squeezed. It feels and looks dry. If sandy or loamy, it crumbles easily, if high in clay it forms a hard lump. Call, text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

## WEEKLY TIPS

### STREAMFLOWS

Blackfoot watershed stream flows continued their steep downward trend this week. Flow today at Bonner is again half of average at **1,220 CFS**. The average for this date is 2,400 CFS. The highest flow on this date was 8,930 CFS in 1899. The lowest flow on this date was 587 CFS in 1977. Flow peaked this year on May 7 at 10,400 CFS. Stream flows for the rest of the season are predicted to be below average.

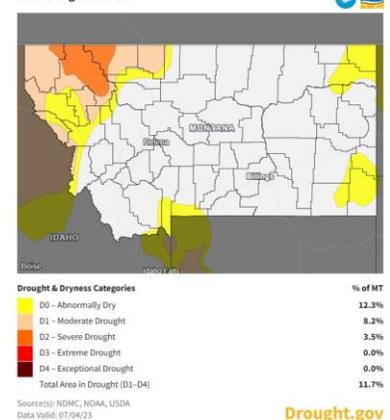
#### Blackfoot River Near Bonner MT - 12340000



### DROUGHT

I made a point of not using the word *drought* in June but now it seems unavoidable. The Drought Monitor does not yet list us even as *Abnormally Dry* and we have enjoyed a moist spring/early summer. However, conditions are changing rapidly due to falling stream flows and above average temperatures predicted for August and September combined with low stream flows.

#### U.S. Drought Monitor

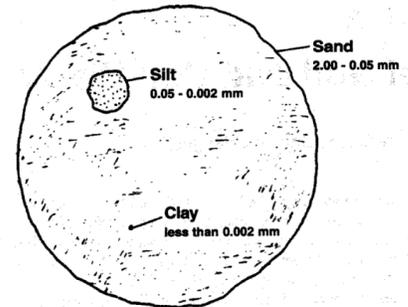


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## HOW MUCH ROCK, SAND, SILT AND CLAY IS IN YOUR SOIL?

Soil scientists talk about soil texture as the combination of rock, sand, silt and clay. This week I demonstrate how to visually determine the amount of these particles in your soil. Next week I will talk about how they make up soil textures using the USDA soil classification system.

- **Rocks** are everything over 2 millimeters in diameter and are called gravel, cobbles, stones and boulders.
- **Sand** particles are 2mm - 0.06mm and feel gritty when wet. (visible with the naked eye).
- **Silt** particles are 0.06 - 0.002mm and feel very smooth like flour when wet but not sticky. (microscope needed)
- **Clay** particles are smaller than 0.002mm and also feel smooth when wet. Clay also feels sticky and can be molded into ribbons between the thumb and fingers that stick out and hold their shape. (electron microscope needed)



### You can roughly determine the amount of rock, sand, silt and clay in your soil with a clear container like a mason jar (the larger and clearer the better):

Take a representative sample of your soil. Moist works best. Dry soils (especially clay) may require you to break them up or soak longer in the container. To break up soil clods, put in a cloth sack, or wrap in cloth and beat with a hammer.

If your soil has many rocks, put it in a pan or shallow box and bounce up and down or shake it until the rocks come to the surface. Pick or scrape rocks off the surface and save them to compare with the rest of the sample later. Save rocks in a similar container if available. Don't worry about getting all the rocks larger than 2mm, just most of the large rocks.

Fill your container ½ to ¾ full with your rock-picked soil. Fill the container to the top with water and shake until all the dirt clods break down (usually a few times over a few minutes for sandy and loamy soils but longer for soils with lots of clay). If your soil has lots of clay you may need to soak it and continue shaking occasionally for a day or more (breaking up clods with a cloth bag and hammer makes clay separate quicker).

**SAND TEST** Set a timer for 40 seconds. Shake up the container well and set it down. It takes 40 seconds for sand to settle out so mark the depth of settled sand on the side of your container at 40 seconds.

**SILT TEST** It takes 2 hours for silt to settle out so mark the depth of settled silt at 2 hours. The remaining particles in suspension after 2 hours are clay particles.

**CLAY TEST** The photo at right shows the jar at 2 hours (after the sand and silt have settled out and the clay is still in suspension in the water). To see the clay content, put your container in a location where the water can evaporate and you will have a visual measure of the sand, silt and clay content. You can compare this with the amount of rock you removed to get a general idea of rock content, remembering that some went into the jar and can likely be seen at the bottom.



This can allow you to compare topsoils and subsoils or soils from different fields. It also makes a great classroom demonstration and can be up-sized to fish bowls and small aquariums.

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For further information contact [Clancy Jandreau, Blackfoot Challenge Water Steward, 406-304-5423](mailto:Clancy.Jandreau@blackfootchallenge.com) or [Barry Dutton, Professional Soil Scientist, 406-240-7798 \[barry@landandwaterconsulting.net\]\(mailto:barry@landandwaterconsulting.net\)](mailto:Barry.Dutton@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.