

# BLACKFOOT CHALLENGE

## WEEKLY IRRIGATION REPORT

Friday May 17, 2019



A few warm sunny days caused a growth spurt this week and spike in crop water use. Cool temperatures and rain then slowed crop water use which will continue all week. Not much sprinkler irrigation has begun throughout the drainage. The end of this cool cycle will be a great time to fill up soils to their water holding capacities which will take 1-3 inches on most fields depending on rain amounts. Special information this week focuses on soil moisture sensors.

We will provide weekly summaries of weather, crop water use and soil moisture conditions as well as tips for irrigation, soil health and crop production. Suggestions for the entire irrigation season is presented on the last page of this report. Use them to look ahead and plan or to compare what you're doing now. If you would like other information please contact Jennifer Schoonen - Blackfoot River Steward (360-6445) or Barry Dutton – Soil and Irrigation Consultant (240-7798).



### WEATHER - COOL AND MOIST

This week had a few of the warmest and sunniest days yet with temperatures in the 70s. Cooler weather arrived Thursday and croplands throughout the drainage have had ¼ - ½ inch of rain since yesterday. Next week looks considerably cooler and wetter with daytime temperatures in the 50s and nights in the 30s with rain predicted all week.



### CROP WATER USE - UP A FEW DAYS - NOW DROPPING

Crop water use increased this week with some warm sunny days but cool weather has returned and water use dropped. Cool temperatures and rain will keep crop water use below average for most of the coming week. The table below provides a quick summary of crop water use last week and an estimate for next week. The table and chart on Page 2 summarize the entire irrigation season and compare it with average, hot and cool conditions so you can plan ahead.

| <b>WATER USE<br/>IN INCHES</b> | <b>LAST<br/>7 DAYS</b> | <b>NEXT 7 DAYS<br/>TOTAL<sup>1</sup></b> | <b>NEXT 7 DAYS<br/>DAILY AVE<sup>2</sup></b> | <b>SEASON<br/>TOTAL<sup>3</sup></b> |
|--------------------------------|------------------------|--|--|-------------------------------------|
| <b>HAY CROPS</b>               | <b>1.1</b>             | <b>1.2</b> (1.0 - 1.4)                   | <b>.16</b>                                   | <b>1.9</b>                          |
| <b>PASTURE</b>                 | <b>0.9</b>             | <b>0.9</b> (0.7 - 1.1)                   | <b>.13</b>                                   | <b>2.1</b>                          |
| <b>SPRING GRAINS</b>           | <b>0.1</b>             | <b>0.3</b> (0.2 - 0.4)                   | <b>.05</b>                                   | <b>0.3</b>                          |
| <b>WINTER WHEAT</b>            | <b>1.1</b>             | <b>1.3</b> (1.2 - 1.5)                   | <b>.17</b>                                   | <b>2.0</b>                          |
| <b>LAWNS</b>                   | <b>1.0</b>             | <b>1.1</b> (0.9 - 1.3)                   | <b>.15</b>                                   | <b>2.2</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

**BLACKFOOT 2019 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE** (INCHES OF WATER)

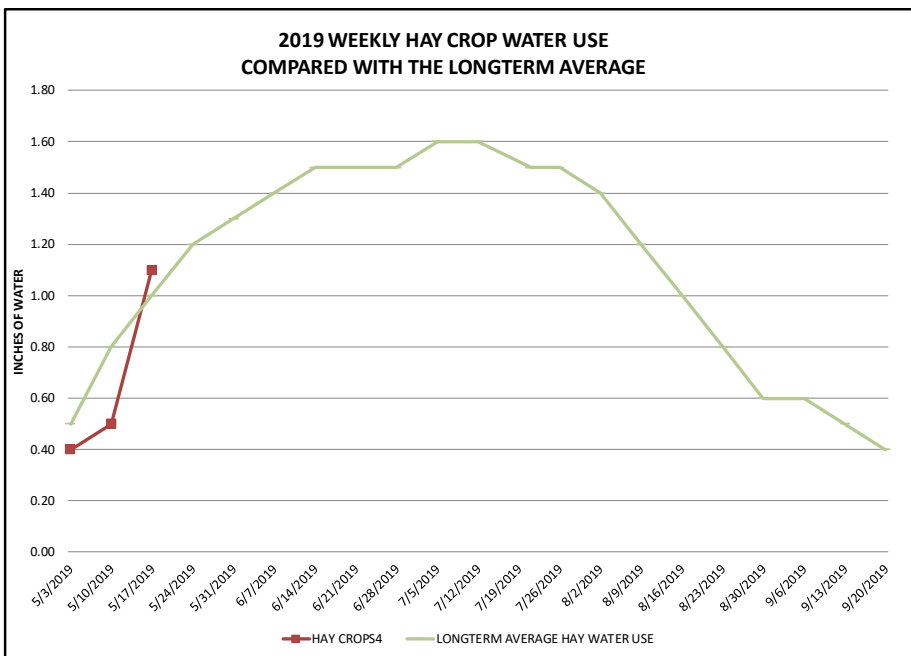
| WEEK ENDING  | RAIN <sup>1</sup> | 2019 WEEKLY POTENTIAL CROP WATER USE <sup>2</sup> |             |                         |                          |              |             | AVERAGE POTENTIAL CROP WATER USE <sup>3</sup> |                        |                         |
|--------------|-------------------|---|-------------|-------------------------|--------------------------|--------------|-------------|---|------------------------|-------------------------|
|              | 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 |
| 5/3/2019     | 0.30              | 0.40  | 0.50        | 0.10                    | 0.10                     | 0.40         | 0.50        | 0.50  | 0.80                   | 0.30                    |
| 5/10/2019    | 0.30              | 0.50  | 0.40        | 0.10                    | 0.10                     | 0.50         | 0.50        | 0.80  | 1.00                   | 0.50                    |
| 5/17/2019    | 0.40              | 1.10  | 0.90        | 0.10                    | 0.10                     | 1.10         | 1.00        | 1.00  | 1.10                   | 0.60                    |
| 5/24/2019    |                   |   |             |                         |                          |              |             | 1.20  | 1.30                   | 0.80                    |
| 5/31/2019    |                   |   |             |                         |                          |              |             | 1.30  | 1.40                   | 0.90                    |
| 6/7/2019     |                   |   |             |                         |                          |              |             | 1.40  | 1.50                   | 1.00                    |
| 6/14/2019    |                   |   |             |                         |                          |              |             | 1.50  | 1.70                   | 1.00                    |
| 6/21/2019    |                   |   |             |                         |                          |              |             | 1.50  | 1.90                   | 1.10                    |
| 6/28/2019    |                   |   |             |                         |                          |              |             | 1.50  | 2.00                   | 1.20                    |
| 7/5/2019     |                   |   |             |                         |                          |              |             | 1.60  | 2.10                   | 1.30                    |
| 7/12/2019    |                   |   |             |                         |                          |              |             | 1.60  | 2.00                   | 1.20                    |
| 7/21/2019    |                   |   |             |                         |                          |              |             | 1.50  | 2.00                   | 1.20                    |
| 7/26/2019    |                   |   |             |                         |                          |              |             | 1.50  | 2.20                   | 1.10                    |
| 8/2/2019     |                   |   |             |                         |                          |              |             | 1.40  | 1.70                   | 1.00                    |
| 8/9/2019     |                   |   |             |                         |                          |              |             | 1.20  | 1.50                   | 0.90                    |
| 8/16/2019    |                   |   |             |                         |                          |              |             | 1.00  | 1.30                   | 0.70                    |
| 8/23/2019    |                   |   |             |                         |                          |              |             | 0.80  | 1.00                   | 0.50                    |
| 8/30/2019    |                   |   |             |                         |                          |              |             | 0.60  | 0.80                   | 0.40                    |
| 9/6/2019     |                   |   |             |                         |                          |              |             | 0.60  | 0.70                   | 0.30                    |
| 9/13/2019    |                   |   |             |                         |                          |              |             | 0.50  | 0.70                   | 0.30                    |
| 9/20/2019    |                   |   |             |                         |                          |              |             | 0.40  | 0.60                   | 0.20                    |
| 9/30/2019    |                   |   |             |                         |                          |              |             | 0.40  | 0.60                   | 0.20                    |
| <b>TOTAL</b> | <b>2.50</b>       | <b>3.00</b>                                       | <b>3.00</b> | <b>0.40</b>             | <b>0.40</b>              | <b>3.10</b>  | <b>3.20</b> | <b>24.80</b>                                  | <b>31.40</b>           | <b>17.20</b>            |

<sup>1</sup> 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)

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

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

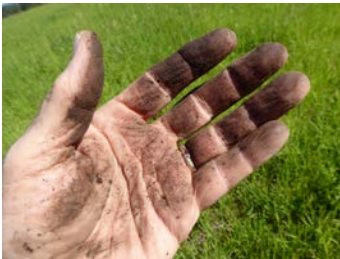
<sup>4</sup> Hay Crop water use drops approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third.





## SOIL MOISTURE - STILL HIGH

Soil moisture levels dropped this week by about an inch at many fields. However, rainfall returned about a quarter inch of effective rainfall to recharge some of this soil moisture. Most soils are filled up to over 75% of their water holding capacity throughout the 3-foot root zone. If you have other fires to put out, cool temperatures and rainfall should continue to let you put off irrigation. However, at the end of this week's cool and rainy period will be a great time to recharge soil moisture. Irrigating when it's cool and moist means more gets into the soil. By the end of the week, many irrigators can apply 1-3 inches on fields to boost soil moisture in the root zone to near full. Hopefully rainfall will provide some of this.



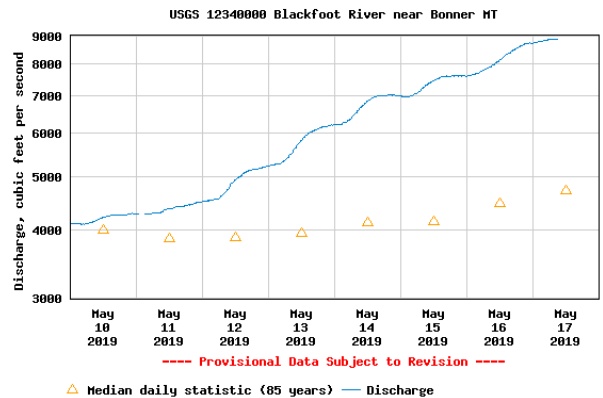
Soil near 100% of its water holding capacity forms a ball when squeezed and leaves the hand moist. Water is visible on the surface of the soil and the hand as a shiny surface. Bouncing the soil in the hand usually brings water to the

surface. Soil near 75% of its water holding capacity also forms a ball and leaves the hand moist but no actual water is visible on the hand or soil when bounced. Call anytime if you have questions about evaluating your soil moisture content and irrigation options.

## STREAMFLOWS

The Blackfoot river flow at Bonner increased significantly from 5,870 CFS last week to 8,870 CFS today. This is now above average for this date (5,320 CFS). The Highest flow on this date was 15,600 (1997) and the lowest was 1,120 CFS (1905).

Many streams are near bank-full but no major flooding is predicted unless things turn hotter and wetter than expected. There is still a significant mountain snowpack and anything could happen. Predictions for the next 30 days are for average temperatures and rainfall average which should produce a nice even melt and abundant irrigation water. The 90 days prediction says warmer and wetter than average.



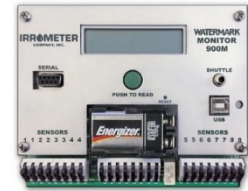
## SOIL MOISTURE SENSORS

Soil Moisture Sensors can determine soil moisture content instantly and document changes over time. Sensors placed in the upper root zone show the immediate boost in moisture with irrigation and the decline as crops use water. Deeper sensors reveal when irrigation has penetrated the entire root zone and filled up the soil to its full water holding capacity. Sensors have had mixed reviews in the past but recent improvements are making them more user-friendly. Most important is proper installation and calibration. Irrigators must know what the sensor reads when the soil is dry, when the

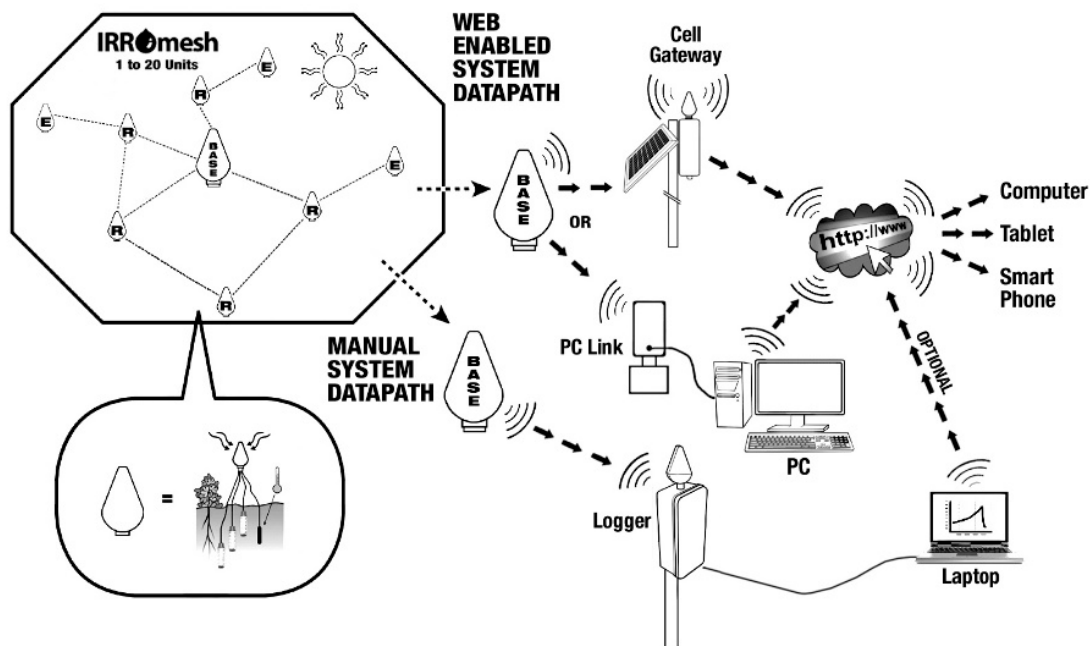
soil is full and how much water the full root zone contains (in inches – not gibberish). Many past sensor programs have failed to assist irrigators with this essential information.



A simple monitoring installation includes 2-3 soil moisture sensors throughout the root zone and a data recorder that allows instant readings and also captures trends over time. Costs are about \$750 per field for equipment. Data recorders are located for convenience in the field, at the pivot control or field access.



The next technological step is to connect your data recorders to cell links and the web for access on a smart phone. These systems are being used in some Montana locations but require significant additional expense and labor for installation, troubleshooting and maintenance. However, costs have been coming down and systems improving. As cell service improves these systems should be ready for easier use. Current installations are about \$1500 per site plus \$150 per year for a cell subscription. Costs should come down in the future with more widespread use.



## INTERESTED IN SOIL MOISTURE SENSORS?

The Blackfoot Challenge is considering a new and improved soil moisture sensor program for interested irrigators. This program could assist with equipment costs, installation and proper calibration of sensors as well as training in how to interpret and use results. Let us know if you might be interested. Our goal is to provide irrigators with a permanent useful option for soil moisture monitoring that doesn't require a shovel and could be upgraded as cell service improves. Eventually you will have sensors connected to your irrigation system and it will irrigate by itself.

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](mailto: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. Some years you better start up now.



### 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.