



BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

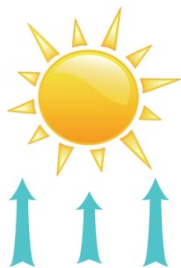
Friday June 13, 2014

Warm sunny weather this week boosted water use to about 1 ½ inches for most crops. Temperatures were normal and almost no rain fell this week across local croplands until a scattered shower last night. Although snowpack and streamflows are above normal, rainfall was less than half of normal since May 1 resulting in dry field conditions. Most flood and sprinkler systems are running throughout the drainage. Crop water use should be similar next week despite a forecast for cloudier conditions. The last page of this report is a condensed summary of recommendations for the entire season. Work towards these goals for best results and check out our irrigation guide for more details at: <http://blackfootchallenge.org/Articles/wp-content/uploads/2013/06/BFIrrigationGuideFinalv3.0.pdf>.



WEATHER - WARM WITH SCATTERED SHOWERS

Sunny and warm conditions this past week will give way to cloudier skies with scattered showers next week. Temperatures will continue to be seasonally warm. Most croplands across the drainage received only a trace of rain this week with a few sites getting up to ¼ inch last night. The 30 day forecast indicates below normal temperatures and above normal rainfall. The 90 day forecast indicates below normal temperatures and average rainfall.



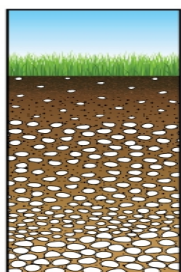
CROP WATER USE - HIGH

Crop water use continued to increase this last week due to slightly warmer temperatures, low humidity and intermittent wind. Crop water use will be high next week due to warmer temperatures and no rain. See the table and chart on Page 3 for more details.

| WATER USE IN INCHES | LAST 7 DAYS | NEXT 7 DAYS¹ | SEASON TOTAL² |
|--------------------------------------|--------------------|--------------------------------|---------------------------------|
| HAY CROPS | 1.5 | 1.5 (1.3 - 1.7) | 6.7 |
| PASTURE | 1.25 | 1.25 (1.2 - 1.5) | 5.9 |
| SPRING GRAINS (5-15 planting) | 1.25 | 1.5 (1.3 - 1.7) | 3.2 |
| WINTER WHEAT | 1.75 | 1.75 (1.5 - 2.0) | 7.5 |
| LAWNS | 1.4 | 1.4 (1.2 - 1.6) | 6.3 |

¹Expected water use (range if weather becomes cooler or hotter than expected)

²Beginning May 1 - season start date



SOIL MOISTURE - DROPPING FAST WITH HIGH CROP USE

Now is the period when soil moisture levels are dependent on irrigation. Little rainfall and high crop water use has exhausted natural soil moisture. Crop water use will continue at about 1.5 inches per week so irrigators must add more than this if they want to both meet crop use and boost soil moisture. Fill up your soil now while water is available and this stored moisture will give you flexibility later.

WEEKLY TIPS

Irrigators Get Along Better

Studies of past civilizations show that those which started around irrigation were more likely to succeed over long periods due to the ability to get along and work out problems. Irrigators had to learn to cooperate and negotiate through periods of changing conditions both throughout the year and over longer periods. Irrigation systems took cooperation to construct, maintain and manage. Perhaps one reason the Blackfoot Challenge has been so successful is that irrigation is such an important part of local history and culture. Interesting irrigation reading includes:

Brian Fagan. Elixer: A History of Water and Humankind. 2011
Cadillac Desert: The American West and its Disappearing Water. 1986.

NOW IS THE TIME TO POUR ON THE WATER!

Whether you practice careful irrigation scheduling all year, or have a more casual attitude towards irrigation - **now is the time to get the biggest bang for your efforts!** Now is the time to pour on the water in amounts that match the actual crop water use. For the next 4-6 weeks before cutting, alfalfa will use 1 ½ – 2 inches during hot weeks and 1 – 1 ½ inches during cool weeks. For maximum production, 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 in June.

No Drought in Sight - Depending on Your Point of View

I stand corrected that this is a matter of perspective. The snowpack and streamflow predictions look good which makes the of boaters and fish optimistic for 2014. However, the view of crops in local fields would suggest serious drought conditions unless irrigated. Soil moisture started out low and rainfall has been less than half of average since May 1. The good news is that irrigation water supplies should be adequate this season. The Blackfoot River at Bonner is flowing about 5280 CFS compared with an average of 5170 for this date. The record low for this date was 1130 CFS in 1987 and the record high 14,300 CFS in 1899.

Crop Water Use - What Affects It?

Many things affect how much water your crop uses. The most common are:

- Temperature – Hotter temps equals more water use
- Humidity – Lower humidity equals more water use
- Wind – Wind increases water use dramatically by removing water from leaf surfaces as it is transpired by crop plants facilitating additional transpiration. The highest crop water use for hay in western Montana was ½ inch in one day - recorded at Deer Lodge on a windy day.

Other factors include:

- Elevation – Higher elevation equals more water use due to lower pressure (must be weighed against cooler temperatures at higher elevations)
- Crop Health - stand density, vigor, diseases, insects, fertilizer
- Soil Moisture Content – crop water use decreases as soil moisture levels approach exhaustion

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

BLACKFOOT 2014 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

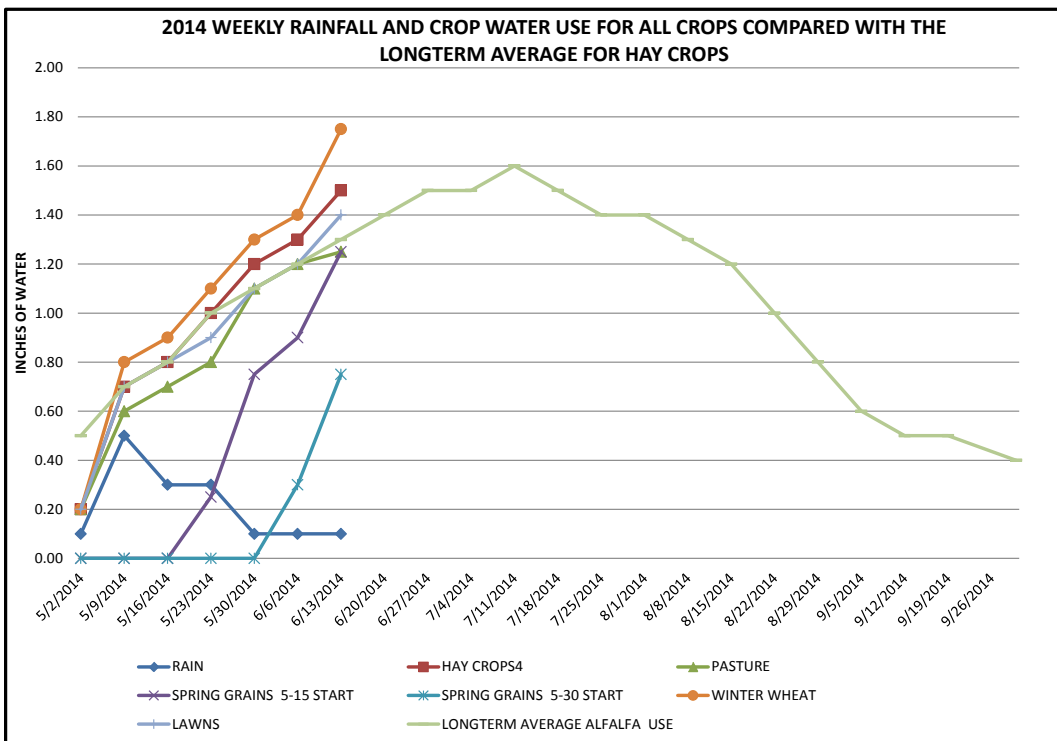
| | RAIN ¹ | 2013 WEEKLY POTENTIAL CROP WATER USE ² | | | | | | AVERAGE POTENTIAL CROP WATER USE ³ | | |
|--------------|-------------------|---|-------------|--------------------------|--------------------------|--------------|-------------|---|--------------------------------|---------------------------------|
| | | HAY CROPS ⁴ | PASTURE | SPRING GRAINS 5-15 START | SPRING GRAINS 5-30 START | WINTER WHEAT | LAWNS | LONGTERM AVERAGE ALFALFA USE | HOT WEEK ALFALFA HAY WATER USE | COOL WEEK ALFALFA HAY WATER USE |
| 5/2/2014 | 0.10 | 0.20 | 0.20 | 0.00 | 0.00 | 0.20 | 0.20 | 0.50 | 0.80 | 0.20 |
| 5/9/2014 | 0.50 | 0.70 | 0.60 | 0.00 | 0.00 | 0.80 | 0.70 | 0.70 | 0.90 | 0.30 |
| 5/16/2014 | 0.30 | 0.80 | 0.70 | 0.00 | 0.00 | 0.90 | 0.80 | 0.80 | 1.00 | 0.40 |
| 5/23/2014 | 0.30 | 1.00 | 0.80 | 0.25 | 0.00 | 1.10 | 0.90 | 1.00 | 1.10 | 0.60 |
| 5/30/2014 | 0.10 | 1.20 | 1.10 | 0.75 | 0.00 | 1.30 | 1.10 | 1.10 | 1.20 | 0.80 |
| 6/6/2014 | 0.10 | 1.30 | 1.20 | 0.90 | 0.30 | 1.40 | 1.20 | 1.20 | 1.30 | 0.90 |
| 6/13/2014 | 0.10 | 1.50 | 1.25 | 1.25 | 0.75 | 1.75 | 1.40 | 1.30 | 1.50 | 1.00 |
| 6/20/2014 | | | | | | | | 1.40 | 1.70 | 1.10 |
| 6/27/2014 | | | | | | | | 1.50 | 1.90 | 1.10 |
| 7/4/2014 | | | | | | | | 1.50 | 2.00 | 1.20 |
| 7/11/2014 | | | | | | | | 1.60 | 2.10 | 1.30 |
| 7/18/2014 | | | | | | | | 1.50 | 2.00 | 1.20 |
| 7/25/2014 | | | | | | | | 1.40 | 1.90 | 1.10 |
| 8/1/2014 | | | | | | | | 1.40 | 2.20 | 1.10 |
| 8/8/2014 | | | | | | | | 1.30 | 1.70 | 1.00 |
| 8/15/2014 | | | | | | | | 1.20 | 1.50 | 0.90 |
| 8/22/2014 | | | | | | | | 1.00 | 1.30 | 0.70 |
| 8/29/2014 | | | | | | | | 0.80 | 1.00 | 0.50 |
| 9/5/2014 | | | | | | | | 0.60 | 0.80 | 0.40 |
| 9/12/2014 | | | | | | | | 0.50 | 0.70 | 0.30 |
| 9/19/2014 | | | | | | | | 0.50 | 0.70 | 0.30 |
| 9/30/2014 | | | | | | | | 0.40 | 0.60 | 0.20 |
| TOTAL | 1.50 | 6.70 | 5.85 | 3.15 | 1.05 | 7.45 | 6.30 | 23.20 | 29.90 | 16.60 |

¹ Rainfall should be reduced to account for immediate evaporation from crop and soil surfaces (0.1-May and Sept, 0.15-June and August, 0.2-July)

² Maximum water use by healthy crops that are well-fertilized and irrigated, disease and insect-free.

³ Average water use for each crop each week based on historic data.

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



THE BLACKFOOT DRAINAGE IRRIGATION SEASON IN BRIEF

This is a summary of general activities and recommendations with more detail provided throughout our irrigation guide.

APRIL – GET READY AND PLAN YOUR IRRIGATION STRATEGY!

- Get your irrigation system ready – perform maintenance and test system.
- Evaluate weather conditions and predictions then plan for 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 (May 1) 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.
- Stop irrigating small grains at the milk to soft dough stage but be sure there are 1- 2 inches of soil moisture left at this stage to prevent kernels from shrinking.

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.



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.