



# BLACKFOOT CHALLENGE WEEKLY IRRIGATION REPORT

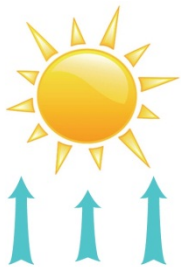
Friday September 9, 2016

This last week saw a distinct change in the weather to much cooler temperatures and significant rainfall across Blackfoot croplands. Most local croplands had ¼ to ½ inch of rain and a few sites a little more. Next week looks warmer and drier. Weekly potential crop water use was slightly above average last week at about ¾ inch and will be similar next week. River flows are on the rise but drought response and drought management plans are still in effect – call Jennifer with questions. The last page of this report is a summary of recommendations for the entire irrigation season.



## WEATHER - WARM AND DRY

Cool temperatures and rain dominated this last week with most croplands getting ¼ to ½ inch but some a little more. Warmer, drier weather is forecast for next week with high temperatures in the 60s and 70s. The 30 day forecast predicts normal temperatures and rainfall. The 90 day forecast says above normal temperatures and rainfall. This year is the hottest on record worldwide since reliable records started in the 1880s.



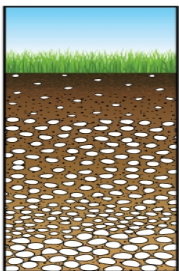
## CROP WATER USE - ABOVE NORMAL AGAIN NEXT WEEK

Crop water use will again be slightly above the seasonal normal again next week with warm temperatures and thunderstorms. Crop water use was above average throughout April, below average in May, bounced around average in June and stayed above average for most of July and August (chart page 3).

<b>WATER USE IN INCHES</b>	<b>LAST 7 DAYS</b>	<b>NEXT 7 DAYS<sup>1</sup></b>	<b>SEASON TOTAL<sup>2</sup></b>
<b>HAY CROPS</b>	<b>0.7</b>	<b>0.9</b> (0.8 - 1.1)	<b>25.5</b>
<b>PASTURE</b>	<b>0.6</b>	<b>0.7</b> (0.6 - 0.9)	<b>22.2</b>
<b>SPRING GRAINS</b>	<b>0.1</b>	<b>0.1</b> (0.0 - 0.2)	<b>20.1</b>
<b>WINTER WHEAT</b>	<b>0.1</b> (Harvested)	<b>0.1</b> (0.0 - 0.2)	<b>13.7</b>
<b>LAWNS</b>	<b>0.7</b>	<b>0.8</b> (0.7 - 1.0)	<b>24.0</b>

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

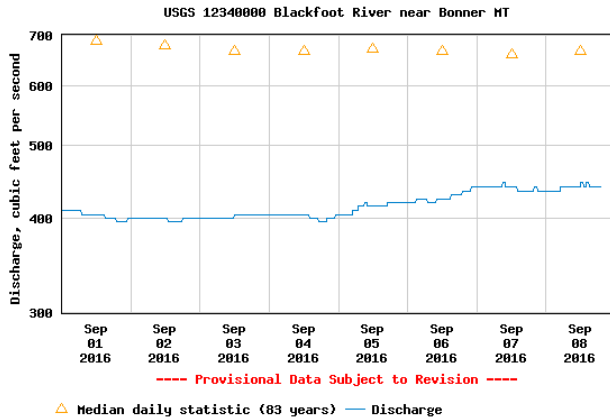
<sup>2</sup>Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but now include April



## SOIL MOISTURE - LOW UNLESS IRRIGATED

Soil moisture came up a bit in most fields but the 0.7 inches of crop water use this week ate up the 0.25 – 0.5 inches of rainfall pretty quick. Most folks are not irrigating much until water levels come up some more.

## WEEKLY TIPS



### **DROUGHT 2016**

Halleluya! The Blackfoot River flow at Bonner has begun an upward trend due to recent rainfall throughout the basin. It is still below 500 cfs - the main flow trigger in Blackfoot drought management but at least is going the right way. Today's flow is near 440 cfs compared with an average of about 670 cfs. The low flow for this date was near 329 cfs (1988) and the high was near 1340 cfs in 1899.

Predictions of normal temperatures and rainfall in the 30 day weather forecast suggests that drought conditions may improve. But right now the river is looking pretty small and I still wouldn't want to be a fish, raising a fish family with the future that's predicted.

### **SOIL HEALTH NOTES: THERE MAY BE MORE WORMS IN YOUR FUTURE**

Darwin estimated that there were 53,000 worms per acre in farmlands. English research revealed the numbers were actually 250,000 per acre in poor soils and 1,750,000 in good English farmland. Blackfoot farmlands are somewhere in the middle. Worms can consume 20-40 tons of soil per acre per year. With the increasing use of no-till methods and soil health principals, worms are an alternative for cycling organic matter and have many other benefits.

Worms:

- Stimulate soil microbial activity/nutrient cycling
- Increase water infiltration capacity
- Increase water holding capacity
- Increase aeration – soils need to breath
- Mix soil and provide the 'glue' of soil aggregates (dirt clods)
- Promote root growth down channels
- Bury plant residue from the surface
- Reduce bulk density/ reverse compaction

Can worms replace your compost pile, mechanical aerator, fertilizer dealer, manure spreader or other key resource? It has worked for some folks so is worth thinking about. Will everyone have a worm production pit next to the compost pile in the near future? Some no doubt will. Consider if worms can work into your operation easily and experiment.

There are a lot of fields with heavy clays and/or significant animal compaction that need aeration and density reduction. Plowing, aerating, green manuring and other common practices may also be solved by your friend the worm.

How is your worm population? Apply a weak mustard solution (an irritant – they prefer catsup) and worms will come to the surface. Compare this across different fields that are more or less productive.

## HISTORIC IRRIGATION GUIDES SUGGEST CLIMATE CHANGE?

Current estimates of crop water use in the Blackfoot Drainage are much higher than those of recent history. I started comparing my estimates of crop water use in the Blackfoot Drainage with historic information (NRCS Irrigation Guides) and other current sources (Agrimet). Here is an example which I will expand upon in our irrigation guide – currently under revision. The local estimate of how much water a local hay crop needs has increased from about 16 inches in the 1980s to over 24 inches now. Differences in calculation methods can account for only a small part of this change.

### Average Annual Hay Water Requirement in Inches (April1 - September 30)

Agriment Station – Deer Lodge 2016	27.6
Agrimet Station – Round Butte 2016	26.6
Blackfoot Challenge Irrigation Guide 2016	24.8
NRCS Montana Irrigation Guide Circa 1980 (Climactic Area 5)	15.8

## LATE SEASON IRRIGATION-IS IT WORTH IT?

Although we like to think that winter snow and spring rain will fill up our soils for the growing season, most local hay soils start the growing season only  $\frac{1}{4}$  -  $\frac{1}{2}$  full. Late fall irrigation is practiced by some irrigators as a way to boost spring moisture for next year's crop. This practice gets mixed reviews. Unless the field is fallow, crops will continue to remove soil moisture throughout the winter and early spring. This can dry out the surface soil so that by the start of the active growing season (April-May in the Blackfoot drainage) any added fall irrigation has been lost from the surface soil. However, if enough late fall irrigation is applied to fill up the **lower soil layers** (below 1 foot), this deeper soil moisture should be available for the next crop season since crops remove less soil from these deeper depths. Filling up these lower soil layers requires applying 4-6 inches.

You are probably better off waiting and doing a good job of irrigating next spring. Be aware of winter snowpack, spring snowmelt and weather predictions to decide how early to start. Early season irrigation will become increasingly important if the climate continues to warm and dry.

## IRRIGATION SYSTEM MAINTAINENCE

So you're beat from haying and sick of looking at that irrigation system - but now might be the time to knock off needed maintenance. It's much more pleasant to change sprinkler heads and check pressure regulators on August mornings instead of March mornings. Dig out those tests from John Heffernan and decide what improvements make sense this year. Contact Jennifer about the potential for additional testing. Remember to think about the entire system from *diversion* to inlet to *fish screen* to *ditch* to *pipe* to *pump* to *sprinklers* to *runoff*. Also - low summer stream flows may make work on diversions easier and less disruptive.

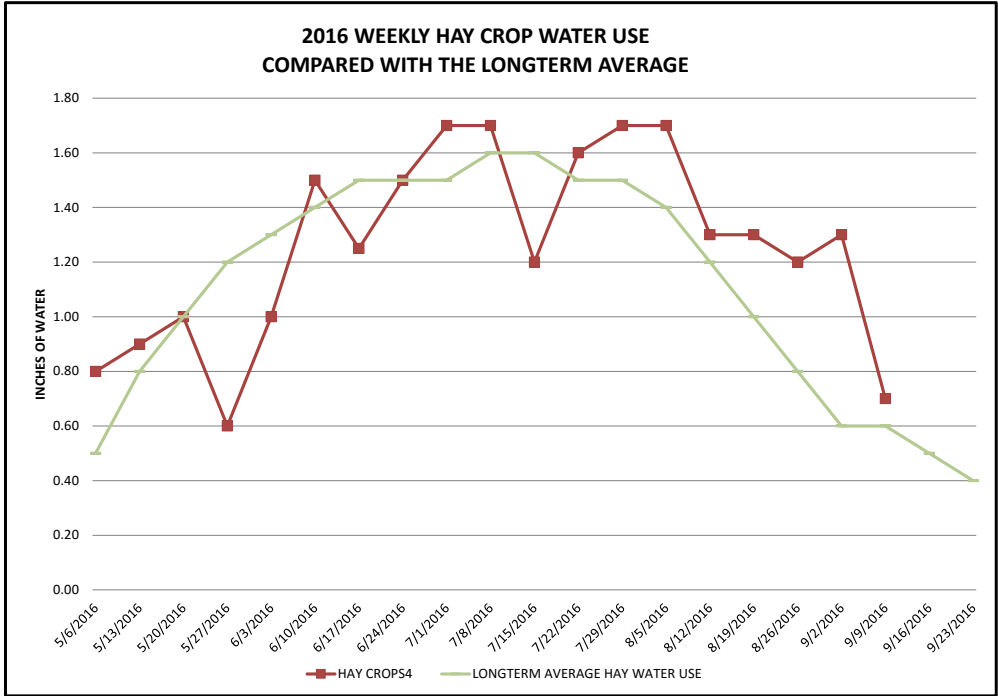
For further information contact Jennifer Schoonen, Blackfoot Challenge Water Steward, 406-360-6445 or Barry Dutton, Professional Soil Scientist, 406-240-7798 [barry@landandwaterconsulting.net](mailto:barry@landandwaterconsulting.net)

**BLACKFOOT 2016 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)**

	RAIN <sup>1</sup>	2016 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
5/6/2016	0.20	0.80	0.70	0.25	0.25	0.90	0.70	0.50	0.80	0.20
5/13/2016	0.30	0.90	0.80	0.25	0.25	1.10	0.80	0.80	1.00	0.50
5/20/2016	0.01	1.00	0.90	0.50	0.25	1.10	1.00	1.00	1.10	0.70
5/27/2016	1.00	0.60	0.50	0.30	0.25	0.70	0.60	1.20	1.20	0.80
6/3/2016	0.20	1.00	0.90	0.70	0.40	1.10	1.00	1.30	1.30	0.90
6/10/2016	0.10	1.50	1.40	1.25	0.70	1.60	1.50	1.40	1.50	1.00
6/17/2016	0.20	1.25	1.20	1.30	0.70	1.40	1.20	1.50	1.70	1.10
6/24/2016	0.10	1.50	1.40	1.60	1.20	1.50	1.50	1.50	1.90	1.10
7/1/2016	0.01	1.70	1.50	1.80	1.80	1.10	1.60	1.50	2.00	1.20
7/8/2016	0.01	1.70	1.60	1.80	1.80	0.50	1.50	1.60	2.10	1.30
7/15/2016	1.25	1.20	1.00	1.30	1.30	0.10	1.20	1.60	2.00	1.20
7/22/2016	0.10	1.60	1.40	1.90	2.00	0.10	1.50	1.50	1.90	1.20
7/29/2016	0.00	1.70	1.50	1.90	1.90	0.10	1.60	1.50	2.20	1.10
8/5/2016	0.00	1.70	1.50	1.90	1.90	0.10	1.60	1.40	1.70	1.00
8/12/2016	0.25	1.30	1.00	1.00	1.20	0.10	1.20	1.20	1.50	0.90
8/19/2016	0.01	1.30	1.00	0.75	0.50	0.10	1.20	1.00	1.30	0.70
8/26/2016	0.10	1.20	1.00	0.50	0.25	0.10	1.10	0.80	1.00	0.50
9/2/2016	0.25	1.30	1.00	0.25	0.10	0.10	1.20	0.60	0.80	0.40
9/9/2016	0.30	0.70	0.60	0.10	0.10	0.10	0.70	0.60	0.70	0.30
9/16/2016								0.50	0.70	0.30
9/23/2016								0.40	0.60	0.20
9/30/2016								0.40	0.60	0.20
<b>TOTAL</b>	<b>5.09</b>	<b>25.45</b>	<b>22.15</b>	<b>20.10</b>	<b>17.60</b>	<b>13.65</b>	<b>23.95</b>	<b>24.80</b>	<b>31.10</b>	<b>17.30</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 is reduced by approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third.

**CROP WATER WAS SLIGHTLY ABOVE NORMAL THIS WEEK (RED LINE)**



## 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 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.
- 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 and water availability. Irrigate new plantings as needed.
- Some folks irrigate for pasture following their one hay cutting. Irrigate according to pasture needs and with consideration for other water users.
- Reduce river withdrawals by rotating systems, reducing the amount area irrigated at one time and by delaying irrigation until streamflows recover.



### 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 and water availability. Irrigate new plantings as needed. Plan for higher temperatures, earlier springs and less water. Next year put some acres in lower water use crops including annual crops, alter rotations, reseed/inter-seed or come up with your own ideas to reduce overall ranch water use.