BLACKFOOT CHALLENGE WEEKLY IRRIGATION REPORT

Friday June 8, 2018

Rainfall continues to help irrigators with some receiving enough to again delay irrigation this week. However, most irrigators will start by this week. Showers over the weekend should turn into warm, sunny weather. This will boost crop water use to 1 – 1 ½ inches which is still slightly below average. Long-range forecasts still predict above average temperatures and below average rainfall for the rest of the season. Despite our great snowpack, warm temperatures and normal rainfall could still produce water shortages later in the season (see last year). Our suggestions for the entire irrigation season are presented on the last page of this report. Use these to look ahead and plan or to compare with what you're doing now. If you have questions or comment please contact Jennifer Schoonen - Blackfoot River Steward (360-6445) or Barry Dutton – Soil and Irrigation Consultant (240-7798).

WEATHER – SHOWERS THEN SUN/SHOWER MIX

Last Friday we had a deluge which brought ½ - 1 inch of rain to Blackfoot croplands. Some sites had significant hail. Since that storm most croplands had a trace to ¼ inch of rain. Next week the forecast begins with scattered showers over the weekend followed by mostly sunny and partly cloudy days. High temperatures should be in the 70s. The 30- and 90-day forecasts continue to suggest above normal temperatures and below normal rainfall.

CROP WATER USE – STILL BELOW AVERAGE

Crop water use was again below normal this week and is likely to remain slightly below normal next week (chart page 2). Crop growth and water use continue to be variable across the drainage with some spots taking off (lower drainage, sandy soils, recently tilled) and others barely getting started (upper drainage, shallow groundwater areas, clay soils). Adjust the figures below for your conditions as needed. The table and chart on Page 2 summarize the entire irrigation season and compare it with average, hot and cool conditions.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS[1]		SEASON TOTAL[2]
HAY CROPS	**1.2**	**1.3**	(1.2 – 1.5)	4.8
PASTURE	**1.0**	**1.1**	(0.9 – 1.3)	4.0
SPRING GRAINS	**0.8**	**1.0**	(0.8 – 1.1)	2.0
WINTER WHEAT	**1.3**	**1.4**	(1.2 – 1.5)	5.0
LAWNS	**1.1**	**1.2**	(1.0 – 1.4)	4.7

[1]Expected water use (range if weather becomes cooler or hotter than expected)
[2]Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but since include April

BLACKFOOT 2018 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

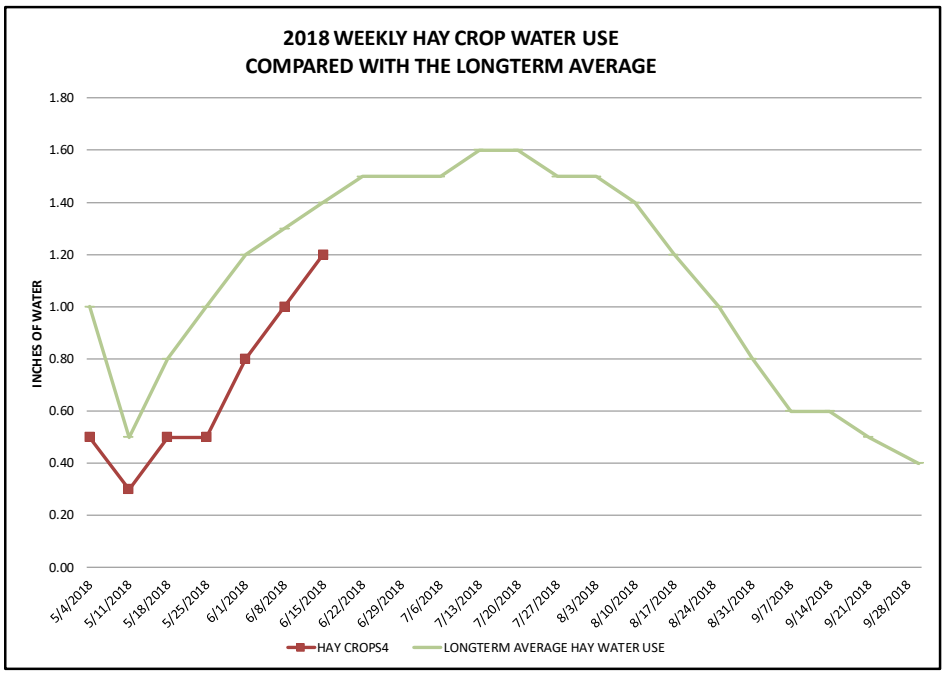
	RAIN[1]	2018 WEEKLY POTENTIAL CROP WATER USE[2]						AVERAGE POTENTIAL CROP WATER USE[3]		
WEEK ENDING	RAIN	HAY CROPS[4]	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
APRIL	1.50	0.50	0.40	0.10	0.10	0.50	0.50	1.00	1.50	0.50
5/4/2018	0.50	0.30	0.20	0.10	0.10	0.30	0.30	0.50	0.80	0.30
5/11/2018	0.50	0.50	0.40	0.10	0.10	0.50	0.50	0.80	1.00	0.50
5/18/2018	0.50	0.50	0.40	0.10	0.10	0.50	0.50	1.00	1.10	0.60
5/25/2018	0.25	0.80	0.70	0.30	0.10	0.80	0.80	1.20	1.30	0.80
6/1/2018	0.75	1.00	0.90	0.50	0.30	1.10	1.00	1.30	1.40	0.90
6/8/2018	0.20	1.20	1.00	0.80	0.50	1.30	1.10	1.40	1.50	1.00
6/15/2018								1.50	1.70	1.00
6/22/2018								1.50	1.90	1.10
6/29/2018								1.50	2.00	1.20
7/6/2018								1.60	2.10	1.30
7/13/2018								1.60	2.00	1.20
7/20/2018								1.50	2.00	1.20
7/27/2018								1.50	2.20	1.10
8/3/2018								1.40	1.70	1.00
8/10/2018								1.20	1.50	0.90
8/17/2018								1.00	1.30	0.70
8/25/2018								0.80	1.00	0.50
8/31/2018								0.60	0.80	0.40
9/7/2018								0.60	0.70	0.30
9/14/2018								0.50	0.70	0.30
9/21/2018								0.40	0.60	0.20
9/30/2018								0.40	0.60	0.20
TOTAL	**4.20**	**4.80**	**4.00**	**2.00**	**1.30**	**5.00**	**4.70**	**24.80**	**31.40**	**17.20**

[1] 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)

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

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

[4] 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 DUE TO RAIN BUT SHOULD DROP FAST THIS WEEK

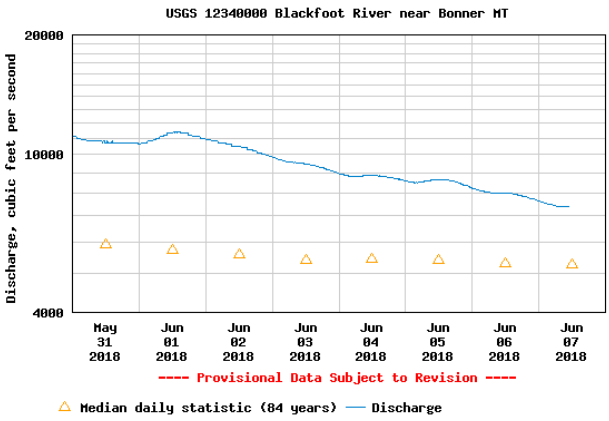
Soil moisture levels throughout the drainage have continued to be higher than normal due to rain and cool temperatures. The table on page 2 shows we had about 4.2 inches of rain this season (since April 1) and crops have used 4-5 inches. Remember that some of this rainfall evaporates and doesn't enter the soil for crop use. This 4.2 inches of rain means about 3.5 inches for crops. Due to this rain, many soils still have high soil moisture levels. However, rainfall has been variable and those the heavy rains missed should be irrigating now (or at least checking for dry surface soils).

It's ideal to keep your soil moisture above 50% of water holding capacity for best production. This is a great goal for our peak production period of June when you literally make the most hay. At 50% of water holding capacity the soil can be formed into a ball (top photo). The hand gets dirty and appears moist (bottom photo) but not shiny wet. Call if you have questions about your soil moisture or visit the irrigation guide on the Challenge website.

WEEKLY TIPS

Flooding, Stream flows and Water Outlook

Today the Blackfoot river flow is about 7,400 CFS at Bonner compared with 11,000 a week ago. The highest level ever recorded for this date was 14,100 (2011) and the lowest 1,340 (1987). The average flow is about 5,900. It looks like we have passed the flood peak unless it starts raining hard (heavy rains in June caused the 1941 flood).



The June 1 water supply forecast has good news for irrigators and other water uses in the Blackfoot. https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/waterproducts/basin/
The Blackfoot drainage snowpack is at 171% of normal compared with 122% last year. Reservoir storage is 118%. The predicted streamflow for June-September is about 110% of normal. These figures actually dropped significantly from last month. Water supply forecasters warn that if

temperatures remain warm and summer rains are scarce, we could face drought again this year. The main cause of potential drought this summer and our May flooding is *warmer temperatures* and not rainfall. It simply is getting hotter these days. May was the hottest month ever recorded in the US and over 8,700 daily temperature records were met or exceeded. We saw last year how quickly an above-average snowpack can turn into a drought when temperatures soar and rain is scarce.

Irrigation History – Blackfoot Irrigation and Water Rights

The oldest active Blackfoot drainage water right in the current DNRC system is granted to the Montana State Board of Land Commissioners with a date of 1858. There are a number of other water rights from 1858 all of which cite Ashby Creek as the water source. The records also include a 1793 water right granted to the Montana State Board of Land Commissioners but this date would appear to be a typo? I am currently looking into the origins of water use and irrigation in the Blackfoot drainage. If you think you know who first irrigated or obtained a water right or have early photos of local irrigation, please contact me.

Soil Health Monitoring for the Regular Guy

There is a lot of information out there about how to monitor soil health. Many tests have been developed in recent time but are not yet calibrated to traditional soil tests and crop performance. Some tests can be performed with little equipment while others require elaborate laboratory analysis. Here are three types of testing that you should consider.

Organic Matter

The most important factor of soil health is organic matter content. Organic matter is the fuel that runs the soil nutrient engine. Most irrigators are familiar with how to sample organic matter and interpret results. Organic matter gives topsoil its dark brown color. Topsoil thickness and darkness are good indicators of soil health which should be monitored over time. Your goal is to increase soil organic matter in both the surface and subsoil.

Microbes

Those with the time and money should consider microbial testing to provide baseline info and for future comparison of trends. You can also compare fields or treatments including fertilizer, irrigation, herbicides, crop choices. Soil microbiological activity may be measured by respiration (microbes exhale CO_2 just like us) or by counting the actual numbers of various microbe groups (bacteria, fungi, protozoa, nematodes, etc.). Sampling and testing is affected by moisture, temperature and other factors so its very important to do it right.

Soil Infiltration

Infiltration reflects several important soil health factors including organic matter content, aggregate stability, compaction and rooting depth. Soil infiltration can be easily measured by irrigators themselves without fancy equipment. You basically need an infiltration ring, a stopwatch and some water. The best rings are made with steel pipe by beveling the outside edge. Test at least three spots in a field and continue readings at each spot until you get consistent readings. This test works very well a day after irrigating when the surface soil is at field capacity but not saturated. We will provide test procedures in our revised irrigation guide later this year. You can also search the web for a method such as this one: https://www.youtube.com/watch?v=IqB4z7lGzsg .

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

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.

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. 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.