BLACKFOOT CHALLENGE WEEKLY IRRIGATION REPORT

Friday July 16, 2021

Hot, dry, smoky weather continues on Blackfoot croplands with temperatures in the 90s most days. Next week looks like more of the same. Crop water use this week reduced soil moisture levels by about 2 inches unless irrigated. Next week **potential** crop water use will again approach 2 inches but **actual** use will drop in many fields due to low soil moisture and harvest. Blackfoot River streamflows continue far below average and water temperature is rising to critical levels. The Blackfoot Challenge Drought Committee is now meeting regularly and it's likely drought plans will be implemented soon as river flows drop and water temperature rises.

WEATHER – HOT, DRY AND SMOKY AGAIN NEXT WEEK

Hot, sunny, smoky weather continues with little or no rain and this pattern will repeat again next week. Highs will approach 100F on Monday but otherwise will be in the 90s with lows in the 50s. Both the 30-day and 90-day forecasts continue to say **below average rainfall and above average temperatures.** The highest temp ever in Montana was 117F at Medicine Lake (1937) and Glendive (1893).

CROP WATER USE – ABOVE AVERAGE – Over ¼ INCH PER DAY

Hot temperatures and sunny skies continue to keep crop water use above average. **Most crops used almost 2 inches of water and will use about the same next week unless harvested.** If you cut your hay crop this week it will still use more than ½ inch of water. Although you remove most of the crop there are stems and small leaves low to the ground that still move water from the soil to the atmosphere. Cutting reduces water use by about 2/3 the first week and 1/3 the second week. The table below provides a quick summary of crop water use this last week and an estimate for next week. We also list season totals and compare them with past years in our annual reports available on the Challenge website.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS TOTAL[1]	NEXT 7 DAYS DAILY AVE[2]	SEASON TOTAL[3]
HAY CROPS	**1.9**	**1.9**	.27	13.5
PASTURE	**1.6**	**1.6**	.23	11.7
SPRING GRAINS	**2.0**	**2.0**	.29	11.9
WINTER WHEAT	**1.5**	**1.0**	.14	14.3
LAWNS	**1.9**	**1.9**	.27	13.6

[1]Expected water use over the next week (range if weather becomes cooler or hotter than expected)
[2]Expected average daily water use over the next week (compare this with your soil moisture content
[3]Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but since include April

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 2021 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

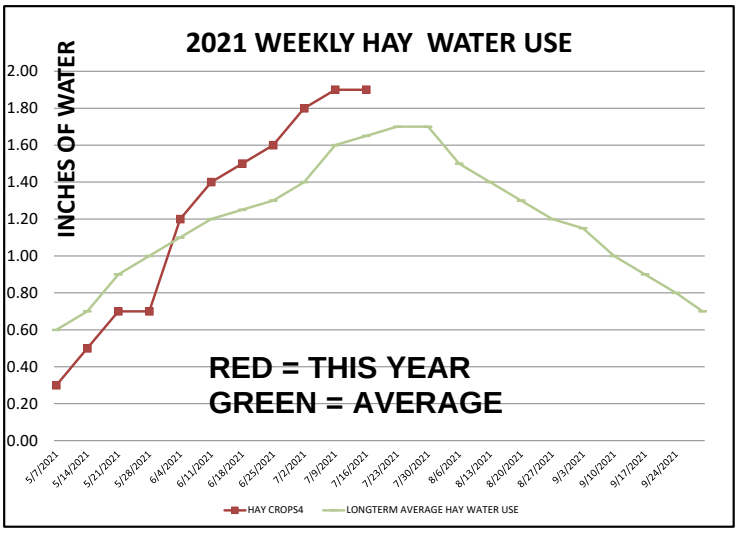
	RAIN[1]	2021 WEEKLY POTENTIAL CROP WATER USE[2]						AVERAGE WEEKLY CROP WATER USE[3]		
WEEK ENDING	RAIN	HAY CROPS[4]	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
5/7/2021	0.40	0.30	0.40	0.00	0.00	0.50	0.50	0.60	1.00	0.30
5/14/2021	0.20	0.50	0.50	0.10	0.00	0.70	0.70	0.70	1.10	0.40
5/21/2021	0.50	0.70	0.60	0.30	0.10	0.80	0.80	0.90	1.20	0.50
5/28/2021	2.00	0.70	0.60	0.60	0.20	0.80	0.70	1.00	1.30	0.50
6/4/2021	0.10	1.20	1.00	0.90	0.60	1.30	1.20	1.10	1.50	0.60
6/11/2021	0.10	1.40	1.20	1.10	0.80	1.50	1.30	1.20	1.70	0.70
6/18/2021	0.20	1.50	1.30	1.40	1.10	1.60	1.40	1.25	1.90	0.70
6/25/2021	0.20	1.60	1.40	1.60	1.40	1.70	1.50	1.30	2.00	0.80
7/2/2021	0.10	1.80	1.50	1.90	1.70	1.90	1.70	1.40	2.00	0.90
7/9/2021	0.01	1.90	1.60	2.00	2.00	2.00	1.90	1.60	2.10	1.00
7/16/2021	0.01	1.90	1.60	2.00	2.00	1.50	1.90	1.65	2.20	1.00
7/23/2021								1.70	2.20	1.00
7/30/2021								1.70	2.00	1.00
8/6/2021								1.50	1.80	0.90
8/13/2021								1.40	1.70	0.80
8/20/2021								1.30	1.60	0.80
8/27/2021								1.20	1.40	0.70
9/3/2021								1.15	1.40	0.70
9/10/2021								1.00	1.30	0.60
9/17/2021								0.90	1.20	0.50
9/24/2021								0.80	1.10	0.50
9/30/2021								0.70	1.00	0.40
TOTAL	**3.82**	**13.50**	**11.70**	**11.90**	**9.90**	**14.30**	**13.60**	**26.05**	**34.70**	**15.30**

[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) (This rainfall figure is an average across all Blackfoot croplands - use your own rain gauge for better accuracy)

[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.



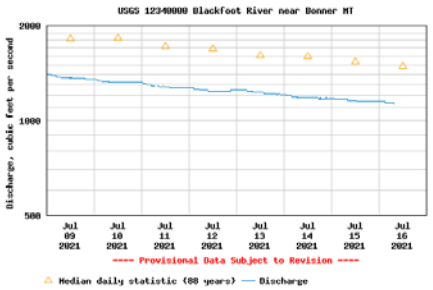
SOIL MOISTURE – DROPPED ABOUT 2 INCHES IF NOT IRRIGATED

Soil moisture dropped about 2 inches this week in fields not irrigated due to higher crop water use and almost no rain. This dried out surface soils and reduced subsoil moisture too - especially in sandier soils with low water holding capacities. Remember that Silty, Clayey and Loamy soils with good organic matter content can hold 2 inches of water per foot of soil. Sandy and rocky soils can hold up to 1.5 inches of water per foot but the rockiest only hold ¾ to 1 inch per foot.

Soil near 100% of its water holding forms a ball when squeezed and leaves the hand visibly moist. Water is visible on the surface of the soil and the hand is moistened. Soil near 50% of its water holding capacity also forms a ball but leaves little moisture on the hand.

WEEKLY TIPS

Streamflows – Still Below Average and Falling Fast



Blackfoot river flows continue to fall with more hot, dry weather. Today flow at Bonner is **1,130 CFS** compared with an average of 1,620 CFS. The highest flow recorded on this date was 6,160 CFS in 1899 while the lowest flow was 519 CFS in 1977. Streamflows will continue to drop this week with no predicted rain. Water temperatures hit 69F on Wednesday at Bonner.

Drought Options – Things You Can Do Now

Rotate Irrigation Systems During Low River Flows

Streamflows can be increased by reducing the amount of diverted irrigation water. Reduce the number of pivots, wheel lines, hand lines or surface diversions in use at one time and leave more water in the stream for other users.

Reduce Irrigated Acreage

You can produce a larger crop by irrigating a smaller area ***well*** than by irrigating a larger area ***poorly***. If you reduce your acreage, you may also be able to reduce your costs for other inputs such as fertilizer, herbicides, seed, fuel and labor. This choice is tricky since it requires you to predict the future or take the word of weathermen.

Concentrate Your Efforts on the First Cutting and Then Rest

Most irrigators in the Blackfoot Drainage harvest one cutting on hay crops and then pasture the field or leave it to go dormant. Even if you manage to get a second cutting or some pasture, the first cutting is where most of your production comes from so make your best effort here. Begin irrigating in May if needed and make a real effort throughout June when most of your production occurs and when crop water use is lower than in July and August due to lower temperatures. Be sure to irrigate at least once after cutting to aid plant recovery from cutting stress.

Apply More Water During Each Application
Each time you irrigate you lose one-tenth to one-half inch of water to evaporation from crop leaves and the soil surface. The gross irrigation amount is how much comes out of the sprinklers. The net irrigation amount is how much makes it into the soil for use by the crop. If you apply ½ inch twice instead of 1 inch once, you lose twice as much to evaporation.

Irrigation in Hot, Dry, Windy Weather?

Is it worth irrigating when it's hot and dry? How much of the applied water actually gets to the crop? Remember that ***the only water that produces yield is that which goes through the plant***. Water **on** the plant cools it but doesn't produce yield.

In hot, dry conditions you should check your soil moisture after each irrigation to make sure water actually reaches the soil in effective amounts. I have placed rain gauges above a mature alfalfa crop and at ground level to find it took ½ inch of irrigation before any water showed up at ground level.

COOL WEATHER AND LOW CROPS	**HOT, DRY WEATHER AND MATURE CROPS**
When crop plants are small and temperatures are cool (season start) most applied water soaks into the soil and is used by the crop. 	As the season warms and crops grow, more of the applied water is intercepted by leaves and evaporates from crop and soil surfaces. This cools the crop but does not produce yield. **If you apply ½ inch or less at a time, you may not get any water into the soil.** If you apply 1 inch, you may lose half or more to evaporation. 

Of course, if your crop needs water you will continue to irrigate in hot, dry weather but remember to monitor soil moisture and consider these options:

- Shut off during peak afternoon heat when water just evaporates from crop leaves
- Irrigate at night and early morning if possible
- Stagger start times to alternate the area irrigated during peak afternoon heat
- Irrigate a smaller area well instead of a large area poorly for best yield
- Switch to pasture which uses less water compared with hayfields since animals constantly remove part of the crop (less crop leaves = less interception = less water use)

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. 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.