

BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

Friday August 10, 2018



Doing more with less, one local irrigator harvested 4 ton/acre alfalfa while applying only 1 inch of water. The Nobel prize committee is therefore considering a new category for irrigators (details page 4). After record temperatures today, it will be slightly cooler but still warm and sunny next week. Water use remains above average for mature hay and pasture crops as well as small grains planted late (1 ½ - 2 inches per week). Long-range forecasts still predict above average temperatures and below to average rainfall for the rest of the season. General irrigation suggestions for the entire 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 - RECORD HOT THEN STILL WARM AND DRY

Hopefully today is the peak of the heat for 2018. Highs today were into the 90s on Blackfoot croplands and over 100 over much of Montana. There's a chance for clouds and wind Saturday then sun the rest of the week. Temperatures will be slightly cooler but still hot. The 30-day forecast suggests above normal temperatures and below normal rainfall. The 90-day forecast says above average temperatures and average rainfall. It looks like we have avoided drought for a welcome change.



CROP WATER USE - ABOVE AVERAGE - AGAIN!

It seems like mother nature is trying to make up for low crop water use early this season by cranking it up the past few weeks. Crop water use remained above-normal this week but should decline next week with slightly cooler temperatures. Water use for winter grains has dropped off and is now dropping for spring grains as crops mature. The table and chart on Page 2 summarize the entire irrigation season. So far, this year has above average crop water use.



WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS¹	SEASON TOTAL²
HAY CROPS	1.6	1.5 (1.3 – 1.6)	17.6
PASTURE	1.3	1.2 (1.0 – 1.4)	14.4
SPRING GRAINS	1.8	1.7 (1.4 – 1.8)	15.6
WINTER WHEAT	0.25	0.0 (0.0 – 0.2)	15.5
LAWNS	1.5	1.4 (1.2 – 1.6)	16.7
RAIN (Average across drainage croplands)	0	0	6.2
EFFECTIVE RAIN	0	0	4.8

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

²Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but since then we include April

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

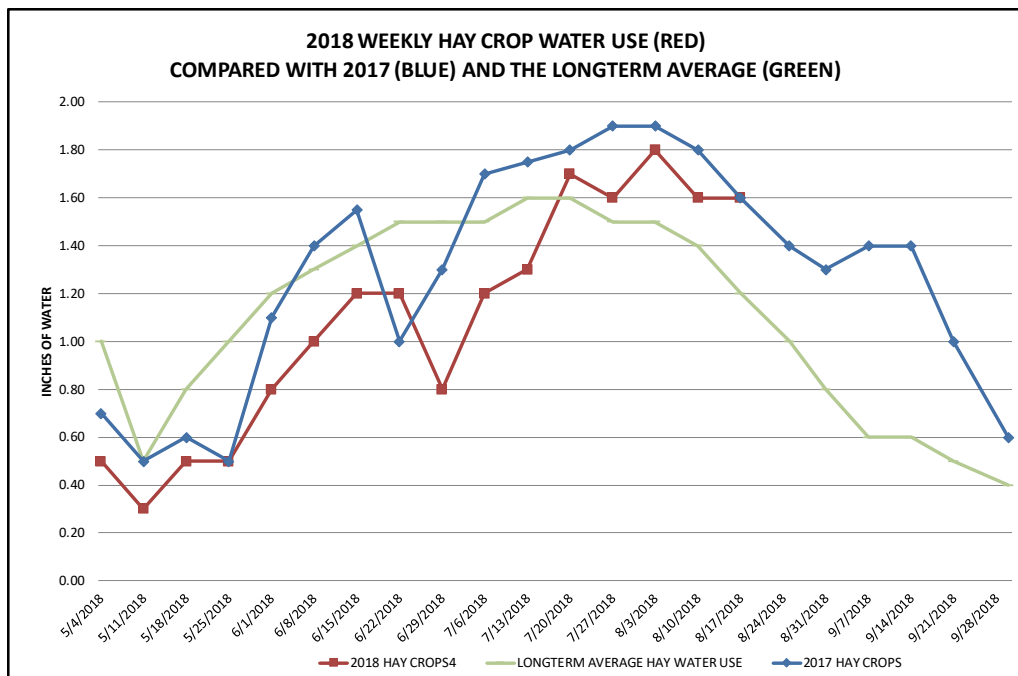
WEEK ENDING	RAIN ¹	2018 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE POTENTIAL CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
APRIL	1.50	0.50	0.40	0.10	0.10	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	0.50	1.20	1.00	0.90	0.70	1.30	1.10	1.50	1.70	1.00
6/22/2018	1.25	0.80	0.70	0.80	0.60	1.00	0.80	1.50	1.90	1.10
6/29/2018	0.25	1.20	1.00	1.20	0.90	1.30	1.10	1.50	2.00	1.20
7/6/2018	0.01	1.30	1.00	1.50	1.20	1.50	1.20	1.60	2.10	1.30
7/13/2018	0.01	1.70	1.30	2.00	1.80	1.80	1.60	1.60	2.00	1.20
7/20/2018	0.01	1.60	1.30	1.90	1.90	1.90	1.50	1.50	2.00	1.20
7/27/2018	0.01	1.80	1.50	2.00	2.00	1.00	1.70	1.50	2.20	1.10
8/3/2018	0.01	1.60	1.30	1.70	1.90	0.50	1.50	1.40	1.70	1.00
8/10/2018	0.01	1.60	1.30	1.60	1.80	0.25	1.50	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	6.26	17.60	14.40	15.60	14.10	15.55	16.70	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 - TAKES MORE WATER TO BOOST NOW

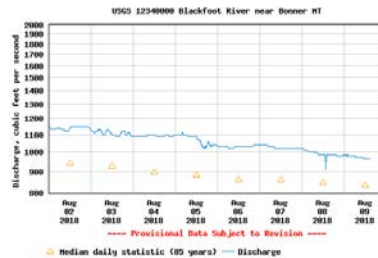
Soils continue to dry out fast after irrigation due to continued hot weather. It's now harder to boost soil moisture since more water is being lost to evaporation before it reaches the soil and crop. To boost soil moisture you now need to apply enough water to satisfy the crop water use (1-2 inches per week for mature crops) PLUS enough to account for evaporation before it reaches the soil (.25 – .50 inch) PLUS the amount you want to add to the soil (3-6 inches to fill up the top 3 feet of root zone). One advantage to irrigating after harvest is that the crop uses less water for about two weeks so it's easier to recharge soil moisture. There is also less crop to intercept irrigation and evaporate it before it gets to the soil. If you have water available and a vigorous stand – this is the year for a second cutting on some fields. Consider your forage

needs, your fertility and your time.

WEEKLY TIPS

Streamflows and Drought (or the new normal)

Blackfoot river flows continue a slow decline to about 965 CFS at Bonner today which is slightly above average (869 CFS). The highest level recorded for this date was 2,160 (1899) and the lowest 379 (1988). This steady decline will continue with hot weather predicted this week. Drought restrictions do not kick in until 700 CFS so it seems we are likely to avoid them this year.



Maintaining Even Streamflows With Coordinated Livestock Drinking Schedules

In an effort to even-out streamflows, UNTIL FURTHER NOTICE, all livestock in the Helmville area will only drink from streams between 5:00am and 10:30am. All livestock in the Ovando area will drink from 10:30am to 2:00pm and in the Clearwater area from 2:00pm to 7:00pm. Livestock in the Potomac area will be hauled to Missoula brew pubs whenever Blackfoot flows fall below 50 CFS. Does anyone read these weekly reports? This is one attempt to find out. Simply reply to this email with a 'yes' so we know you are out there. Or make a simple comment about what you like or don't, or want (we don't have a like button). Thanks for your interest! All responders will be entered to win a special prize so just hit reply to have a chance.



Barley-Oat Mix



Record Crops – Climate Change or Better Farmers?

In 40 years working throughout the Blackfoot Drainage I have not seen crops as good as this year. Early season rainfall and temperatures were ideal. Crop water needs on the best soils were satisfied by stored soil moisture and well-timed rainfall with little irrigation. By *best soils* I mostly mean silty and clayey soils with few rocks and high water holding capacities. However, some well-managed sandier and rockier soils with high organic matter contents also produced as well on first cutting. These soils just needed a little more water.

In the early 1980s the NRCS estimated the highest potential alfalfa yields in the Blackfoot drainage were 5 tons/acre on the best soils. In the late 1980s I worked with irrigators in Lake County that achieved 6 tons/acre but with a month longer growing season than the Blackfoot.

Over Six Ton/Acre Alfalfa with One Inch of Irrigation

But this year brought 4 tons/acre from a first cutting that had only 1 inch of irrigation. And it looks like the second cutting will be 2-2 ½ tons/acre with 6 inches of irrigation (photo at right). This is on our best local ag soil (silt loam surface with silty clay loam subsoil with few or no rocks). The water holding capacity of the 3-foot root zone is rated at 2 inches/foot for a total of 6 inches. The soil water holding capacity was full on the first of April from snowmelt and spring rain. Only one inch of irrigation was applied before the 4 ton/acre first cutting. There was probably some soil moisture left after cutting and 6 inches of additional irrigation was applied for what looks like a 2-2 ½ ton/acre second cutting.



These figures suggest that this irrigator is producing each ton of alfalfa with only about 3 inches of water. This is lower than the 4-5 inches per ton cited by most research in Montana and Idaho. So where is the extra water coming from? The most likely answers are that **plants are accessing soil moisture deeper than 3 feet** that simply is not there in most years and good management has **increased the soil organic matter content and Water Holding Capacity** of the soil.

DEEP ROOTING

Irrigators typically manage a 3-foot deep root zone for alfalfa and mixed hay. This is where most of the water is taken from. However, alfalfa can root beyond 10 feet and well-managed grasses beyond 5 feet. This is why we encourage deep irrigation to produce deep roots to have a larger 'pool' of water, biology and nutrients to draw from. The silty clay loam soil above holds about 2 inches of water per foot so:

- In 3 feet can hold 6 inches of water
- In 5 feet can hold 10 inches of water
- In 10 feet can hold 20 inches (unlikely 20 inches of water is ever there)

GOOD ORGANIC MATTER CONTENT

Increasing organic matter content increases water holding capacity. A typical silty clay loam soil will hold about 2 inches of water per foot of soil but you may be able to double this by increasing organic matter content. This is why we encourage cover crops, green manure crops, compost additions, no-till and other practices to increase organic matter.

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 DESIRED MATURITY, 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.