



BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

Friday July 21, 2017

It was another hot, dry week in the Blackfoot drainage with no change in the forecast next week. Only a few spots had a minimal shower that didn't contribute to soil moisture. Crop water use was at its highest last week and may be similar next. Mature hay crops and small grains used up to 2 inches of water while just-cut hayfields used only about 1/3 this amount. Blackfoot River flows continue to drop below average and water temperatures have soared. Anglers can expect to catch pre-cooked fish by August. Plan on drought restrictions soon. It seems we may need to start planning for a future where "drought conditions" are the norm. A condensed overview of the entire irrigation season is on the last page of this report so you can plan ahead. Please contact Jennifer Schoonen - Blackfoot River Steward (406-360-6445) for more information on this and other Challenge programs.



WEATHER - HOT AND SUNNY AGAIN

It was another week with only scattered rainstorms affecting small areas and contributing little to soil moisture. Next week is looking sunny and hot again (80s - 90s). The 30-day and 90-day forecasts both indicate above normal temperatures and normal rainfall.



CROP WATER USE - VERY HIGH - PEAKING

Crop water use is peaking for mature hay and spring grains. Water use will drop for small grains as it matures and for hay crops when they are cut. Crop water use for hay drops to 1/3 of the potential the first week after cutting and to 2/3 of the potential the second week. By three weeks after cutting, crop water use is back up to the full potential.

WATER USE IN INCHES¹	LAST 7 DAYS	NEXT 7 DAYS²	SEASON TOTAL³	DAILY FORECAST⁴
HAY CROPS	1.9	1.9 (1.7 - 2.0)	15.8	.27
PASTURE	1.6	1.6 (1.4 - 1.7)	14.4	.23
SPRING GRAINS	2.0	2.0 (1.8 - 2.1)	12.3	.29
WINTER WHEAT	1.0	1.0 (0.5 - 0.7)	14.8	.14
LAWNS	1.8	1.8 (1.4 - 1.9)	15.7	.27

¹Potential maximum water use for a well-irrigated crop without fertility, insect or disease restrictions

²Expected water use (range if weather becomes cooler or hotter than expected)

³April 1 – September 30 (note in 2010-13 we started our seasonal total on May 1 but now include April)

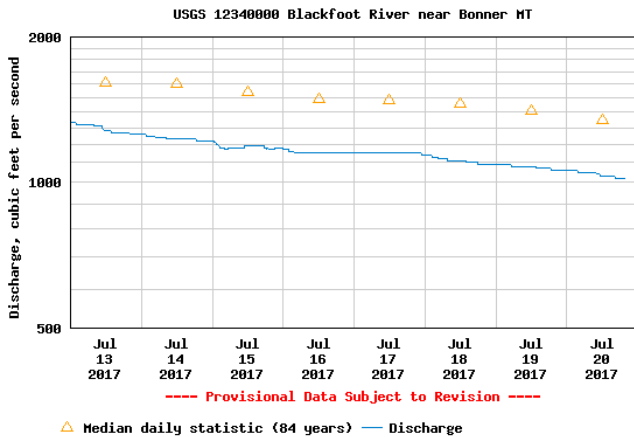
⁴Predicted average daily crop water use over the next week.

SOIL MOISTURE - IF IT LOOKS DRY IT IS!



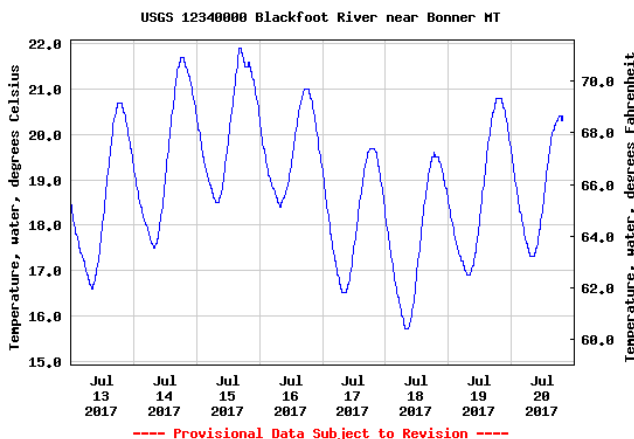
Soil moisture is now a matter of **“When did I last irrigate?”** You can use the daily estimate of crop water use to estimate how long your new application will last. Checking you soil moisture is not rocket science. If it looks dry, if it doesn’t form a ball when squeezed, if it doesn’t get your hand moist when squeezing - then it probably has little or no moisture. Soil near 50% of its water holding capacity forms a ball when squeezed but leaves only a little moisture on the hand (middle photo). Soil near 100% of its water holding capacity forms a ball and leaves your hand moist (right photo). Contact us if you need help evaluating soil moisture.

WEEKLY TIPS



WATER SUPPLY AND STREAMFLOW

Blackfoot River flows continue to fall rapidly and rising water temperatures are a concern. Current flow at Bonner is only **1,020 CFS** compared with the average for this date of **1,450 CFS**. The lowest flow on July 7 was 526 CFS in 1977 and the highest 5,150 CFS in 1899. It appears that drought restrictions may be implemented in the next couple weeks so start planning ahead.



WATER TEMPERATURES RISE

Recent temperatures in the Blackfoot River are raising concerns among fish and fish-lovers throughout the drainage. With no relief in the forecasts, expect fishing and irrigation restrictions soon.

DROUGHT 2017? 2018? 2019? 2020? 2021? 2022?

We have had six hot, dry years in a row with serious drought concerns during most of them. It now seems prudent to plan for a future where drought restrictions become the norm almost every year. This looked like a “normal” year for a change instead of the past five years of drought. However, temperatures soared and snows melted. Listed below are some ideas for conserving water during dry times. Not all of them will work for everyone.

- **Build Up Soil Moisture Before Cutting Hay and Return Quickly**
- **Stop Irrigating and let Soil Moisture Drop after Grain Harvest**
- **Reduce or Stop Irrigation on Grass Hay after Cutting - at least until cooler weather**
- **Irrigate on Cooler, Less-windy Days or At Night**
- **Stop Irrigating Until Cooler Weather**
- **Rotate Irrigation Systems to Reduce Total Withdrawal from River**
- **Apply More Water Per Irrigation to Get More into the Soil**

WHAT TO KEEP IRRIGATING - ALFALFA, NEW SEEDINGS, PASTURE

It's important to irrigate alfalfa after cutting to prevent plant deaths. New grass seedings should also be irrigated until crop plants cover the soil surface and develop good root systems. Pastures and harvested hayfields that will be pastured should be irrigated regularly. However, irrigation can be reduced to $\frac{1}{4}$ to $\frac{1}{2}$ of the weekly potential crop water use to keep plants alive but not produce maximum forage.

WHY DO CUT CROPS USE ANY WATER AT ALL?

It seems like cutting all the leaves off a plant would stop it from using water. After all, it's those little openings on the leaves (stoma) from which water is released (evapotranspired) to the atmosphere. A plant is essentially a bunch of tiny straws with one end in the soil (root) and the other in the air (stoma). It is the difference in vapor pressure between the soil atmosphere (higher) and the above-ground atmosphere (lower) that “sucks” water out of the soil. Moisture wants to move from the higher pressure to the lower and the plant acts like a wire across a battery. Moisture moves into the plant roots, up the plant vascular system and out the stoma to the air. When you cut your crop, you reduce the number of openings and the efficiency of moisture transfer, but you don't end it. Even stubble still leaves many connections (standing stalks) that only degrade over time. This is why fallow agriculture requires regular tillage or spraying to eliminate all plant connections between soil and air. In general, crop water use drops to about $\frac{1}{3}$ of potential the first week after cutting and $\frac{2}{3}$ of potential the second week. By the third week it is back up to full potential.

Pasture use less water than hay crops because some of the leave (with stoma) are constantly removed by grazing animals.

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 2017 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

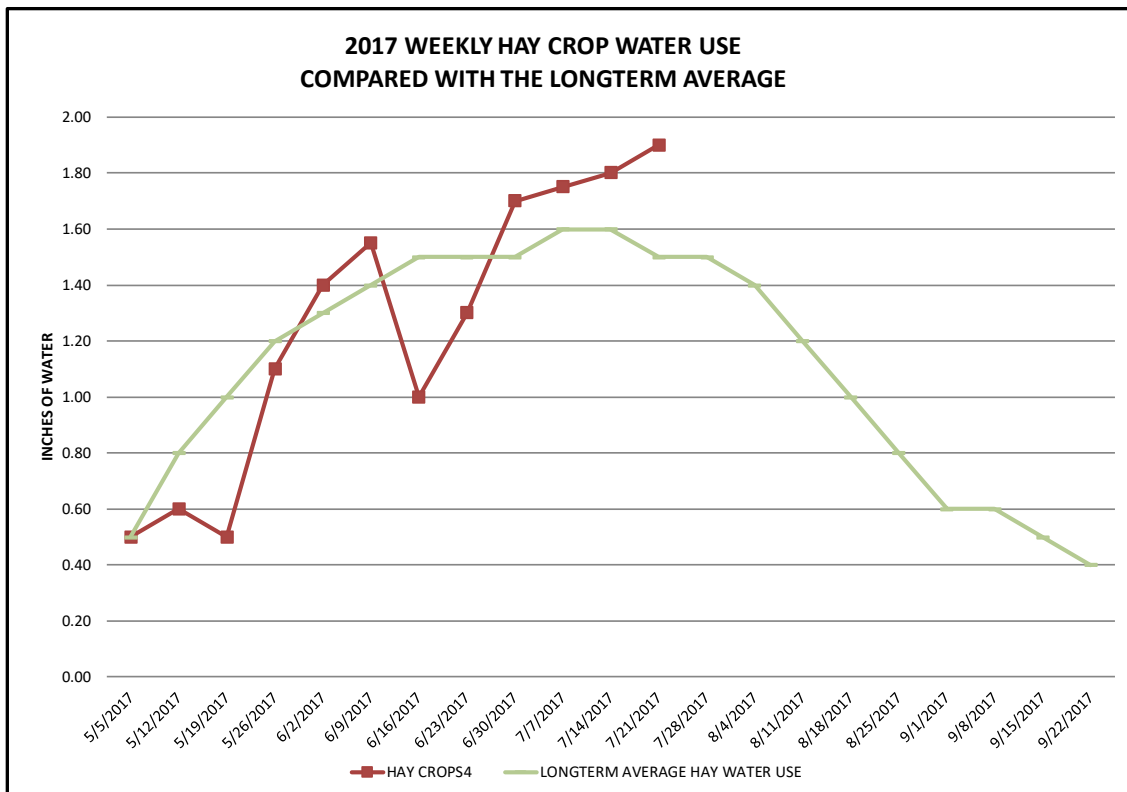
	RAIN ¹	2017 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE POTENTIAL CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
5/5/2017	0.02	0.50	0.40	0.10	0.10	0.50	0.50	0.50	0.80	0.20
5/12/2017	0.25	0.60	0.70	0.10	0.10	0.90	0.70	0.80	1.00	0.50
5/19/2017	1.00	0.50	0.60	0.10	0.10	0.60	0.50	1.00	1.10	0.60
5/26/2017	0.00	1.10	1.00	0.20	0.10	1.10	1.10	1.20	1.30	0.80
6/2/2017	0.25	1.40	1.30	0.60	0.20	1.50	1.40	1.30	1.40	0.90
6/9/2017	0.50	1.55	1.35	1.00	0.30	1.60	1.45	1.40	1.50	1.00
6/16/2017	1.50	1.00	0.90	1.20	0.60	1.20	1.00	1.50	1.70	1.00
6/23/2017	0.00	1.30	1.20	1.40	0.80	1.40	1.30	1.50	1.90	1.10
6/30/2017	0.25	1.70	1.60	1.80	1.20	1.80	1.70	1.50	2.00	1.20
7/7/2017	0.00	1.75	1.55	1.80	1.80	1.25	1.70	1.60	2.10	1.30
7/14/2017	0.00	1.80	1.60	1.90	1.90	1.00	1.75	1.60	2.00	1.20
7/21/2017	0.00	1.90	1.60	2.00	2.00	1.00	1.80	1.50	1.90	1.20
7/28/2017								1.50	2.20	1.10
8/4/2017								1.40	1.70	1.00
8/11/2017								1.20	1.50	0.90
8/18/2017								1.00	1.30	0.70
8/25/2017								0.80	1.00	0.50
9/1/2017								0.60	0.80	0.40
9/8/2017								0.60	0.70	0.30
9/15/2017								0.50	0.70	0.30
9/22/2017								0.40	0.60	0.20
9/29/2017								0.40	0.60	0.20
TOTAL	5.27	15.80	14.40	12.30	9.30	14.75	15.70	24.80	31.30	17.10

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.



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. 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.