



BLACKFOOT CHALLENGE WEEKLY IRRIGATION REPORT

Friday July 15, 2016

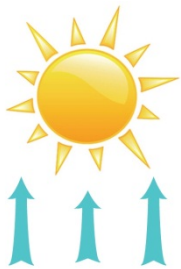
In four days last week we accumulated over three times our average monthly rainfall. Weekly crop water use fell from its highest levels this year to far below average. This was good news for those out of water but not necessarily for those with hay on the ground. Hot and dry weather is forecast for next week so crop water use will increase accordingly to about 1 1/2 inches. Drought conditions are closing in and drought management plans are expected to be needed soon. The last page of this report is a summary of recommendations for the entire irrigation season.



WEATHER - MUCH WARMER

The monsoon of last week has ended. The coming week will have much warmer temperatures reaching into the high 80s with little or no rain. The 30 and 90 forecasts continue to predict above normal temperatures. The 30 day forecast predicts below normal rainfall while the 90 day forecast says normal rainfall. I just spent two weeks in

Alaska where every long-term resident commented on the warmest weather they had ever experienced in what used to be a famously frigid state. Retreating glaciers, dry waterfalls, warmer seas and poorer fishing seemed to be the new normal. It's not just here in western Montana!



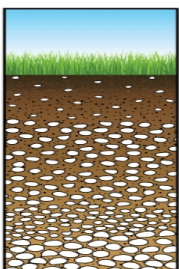
CROP WATER USE - INCREASING NEXT WEEK

The monsoon last week dropped crop water use to its lowest levels for over a month. Most crops used about 1 1/4 inch. Crop water use will increase significantly next week with hotter weather conditions to about 1 1/2 inches. Crop water use decreases with cutting by approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third. 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 (chart page 3).

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS¹	SEASON TOTAL²
HAY CROPS	1.2	1.4 (1.4 - 1.7)	14.7
PASTURE	1.0	1.2 (1.4 - 1.6)	13.2
SPRING GRAINS - EARLY PLANTED	1.3	1.6 (1.5 - 1.9)	11.8
WINTER WHEAT	0.1 (Harvested)	0.1 (1.2 - 1.5)	12.2
LAWNS	1.2	1.4 (1.4 - 1.7)	13.9

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 now include April

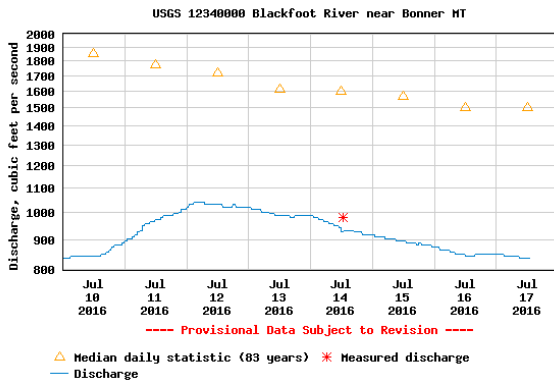


SOIL MOISTURE - STILL TIME TO FILL IT UP

That 1 – 1 1/2 inches of rain actually added to soil moisture. Even though half of it was intercepted by crop leaves and simply evaporated without reaching the soil, half made it to the soil for crop growth. Hopefully it did not affect your hay cutting and curing but only delayed it.

WEEKLY TIPS

DROUGHT 2016!



The Blackfoot River at Bonner saw a brief rise last week from an unusual rainfall event but has since dropped to about half of its average flow for this date. Today's flow is about 836 compared with an average of 1,620 cfs. The low flow for this date was 506 cfs in 1987 and the high was 5,650 cfs in 1899.

Low flows and predictions of hot dry weather in the 30 and 90 day weather forecasts suggest that drought plans will be implemented soon. The following pages review the details of the Blackfoot Drought Response.

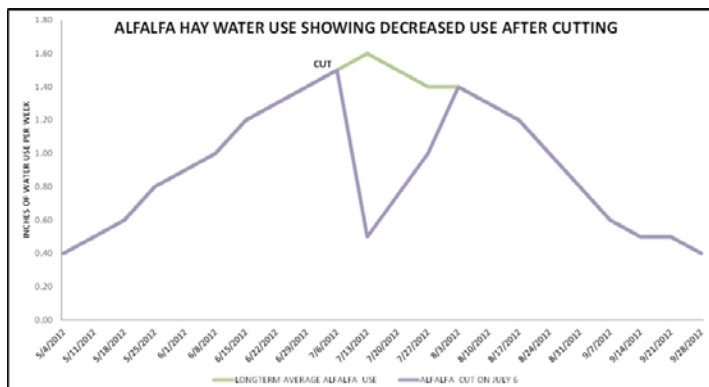
CROP WATER USE AND HAYING

Scientists have discovered that cutting your head off causes stress for plants just like it does for humans.

- If you plan to keep your current hay crop plants for next year you should water them once after cutting even if you don't plan a second cutting or pasture.
- If you plan to do something different next season you can turn off the pump or headgate and leave the streamflow for the fish.
- If you plan for fall pasture or a second cutting, irrigate as close to cutting as possible, leave enough time for the surface to dry, cut your hay then get back across the field as quickly as possible. Alfalfa is especially susceptible to harvest stress but grasses also recover much better with water.

CROP WATER USE DECREASES WITH CUTTING

Crop water use decreases with cutting by approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third. If you still have irrigation water, this is the best time to increase soil moisture while crop use is reduced. Since less gets used by the crop, more goes into soil storage. In a drought year like this, only those going for fall pasture or replanting are likely to irrigate after cutting.



WEEKLY TIPS – This week we review the *Blackfoot Drought Response Plan* as revised in April 2013. The Blackfoot River is at about 800 CFS now and dropping, while average flow is above 1600.

The purpose of the Blackfoot Drought Response Plan is to minimize the adverse impacts of drought on fisheries and to aid in the equitable distribution of water resources during low flow summers.

The Murphy Right

Murphy Rights are water rights for in-stream flows created under 1969 legislative authority held by Montana Fish, Wildlife, and Parks (MT FWP) to maintain 700 cubic feet per second (cfs) as a minimal instream flow needed to protect “blue-ribbon” fisheries in the Blackfoot River from severe low flows.

Shared Sacrifice

The Blackfoot Drought Response Plan is based on meaningful participation from water users junior and senior to the Murphy Right who voluntarily reduce their collective water use during drought periods in order to maintain critical in-stream flows. The plan seeks as a matter of equity to include junior users, senior users, small users, and large users throughout the entire watershed.

Blackfoot Drought Committee

The Blackfoot Drought Committee is charged with the oversight and implementation of the Blackfoot Drought Response Plan and is coordinated through the Blackfoot Challenge. Its membership is comprised of local landowners, irrigators, outfitters, state and federal agents, and members of various conservation organizations.

Drought Plan Implementation

The Blackfoot Drought Committee utilizes flow and temperature triggers to assess the need for and value of drought response measures. The Blackfoot Drought Committee also examines other factors such as time of year, water demand, climatic conditions, weather projections and resource conditions. While the Blackfoot Drought Response Plan is active, the Committee will provide assistance to water users in implementing their drought response/management plans.

Flow & Temperature Triggers

As flows near the 700 cubic feet per second (cfs) trigger, the Committee will:

Contact the roster of consumptive water users. Participants are asked to confirm their participation or non-participation in the Blackfoot Drought Response via “response cards”.

Contact the roster of non-consumptive water users and alert them to the potential need for angling restrictions. Implement outreach activities necessary to inform water users and the general public of drought conditions and the need for participation in the Drought Response.

When flows in the Blackfoot River fall to/or below 700 cfs, the Committee will:

Notify consumptive water users (primarily irrigators) that the Blackfoot Drought Response is active and request implementation of their voluntary drought management plans.

Convene and confirm participation by junior water users through response cards, personal communication, and field checks;

Make recommendations on a “call for water” on non-participating junior water users under the Murphy Right. MT FWP, in consultation with the Committee, may issue a “call for water” on non-participating junior water users. Junior water users who receive a “call for water” are ordered to cease water withdrawals;

Assess effectiveness of the Drought Response. If needed, the Committee may solicit additional voluntary reductions in water use from existing drought plan participants or from senior water users not already participating in the Drought Response.

Contact the roster of anglers to alert them of the potential need for angling restrictions if not already in place. Implement outreach activities to inform water users and the general public of drought conditions and the need for participation in the Drought Response.

If flows in the Blackfoot River are below 700 cfs and/or maximum daily water temperatures reach or exceed 73°F for three consecutive days at Bonner:

MT FWP will issue mandatory afternoon (2:00 pm – 5:00 am) fishing restrictions on the mainstem of the Blackfoot River.

As flows near the 600 cfs trigger, the Committee will convene to assess the effectiveness of the drought plan, review weather projections and examine water temperature conditions.

When flows in the Blackfoot River fall below 600 cfs, the Committee and MT FWP will:

Issue an Angler Alert

If flows in the Blackfoot River are below 600 cfs and maximum daily water temperatures reach or exceed 71°F for three consecutive days at Bonner:

MT FWP will issue mandatory afternoon (2:00 pm – 5:00 am) fishing restrictions on the mainstem of the Blackfoot River if such measures are not already in place;

If flows in the Blackfoot River are below 600 cfs and/or maximum daily water temperatures in the North Fork Blackfoot River and Monture Creek reach or exceed 60°F for three consecutive days:

MT FWP will issue mandatory afternoon (2:00 pm – 5:00 am) fishing restrictions on all critical bull trout streams. These include Gold Creek, Belmont Creek, Cottonwood Creek, Monture Creek, North Fork Blackfoot River, Copper Creek, Landers Fork, and Morrell Creek.

If flows in the Blackfoot River are below 600 cfs and/or maximum daily water temperatures in the North Fork Blackfoot River and Monture Creek reach or exceed 65°F for three consecutive days:

MT FWP will issue mandatory all day fishing restrictions on all critical bull trout streams.

As flows in the Blackfoot River near 500 cfs, the Committee will convene to assess the effectiveness of the drought plan, review weather projections and examine water temperature conditions.

When river flows decrease below 500 cfs, FWP will issue mandatory all day fishing restrictions on the mainstem Blackfoot River as well as on all critical bull trout streams if such measures are not already in place.

When river flows decrease to less than 500 cfs, FWP shall issue a Murphy Right call on the use of all water rights junior to the Murphy Right when, in FWP's judgment, the junior water rights owners have not implemented a drought plan offsetting the use of those junior water rights.

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

	RAIN ¹	2016 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	
5/6/2016	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								1.50	1.90	1.20	
7/29/2016								1.50	2.20	1.10	
8/5/2016								1.40	1.70	1.00	
8/12/2016								1.20	1.50	0.90	
8/19/2016								1.00	1.30	0.70	
8/26/2016								0.80	1.00	0.50	
9/2/2016								0.60	0.80	0.40	
9/9/2016								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	
TOTAL	4.08	14.65	13.15	11.80	9.65	12.85	13.85	24.80	31.10	17.30	

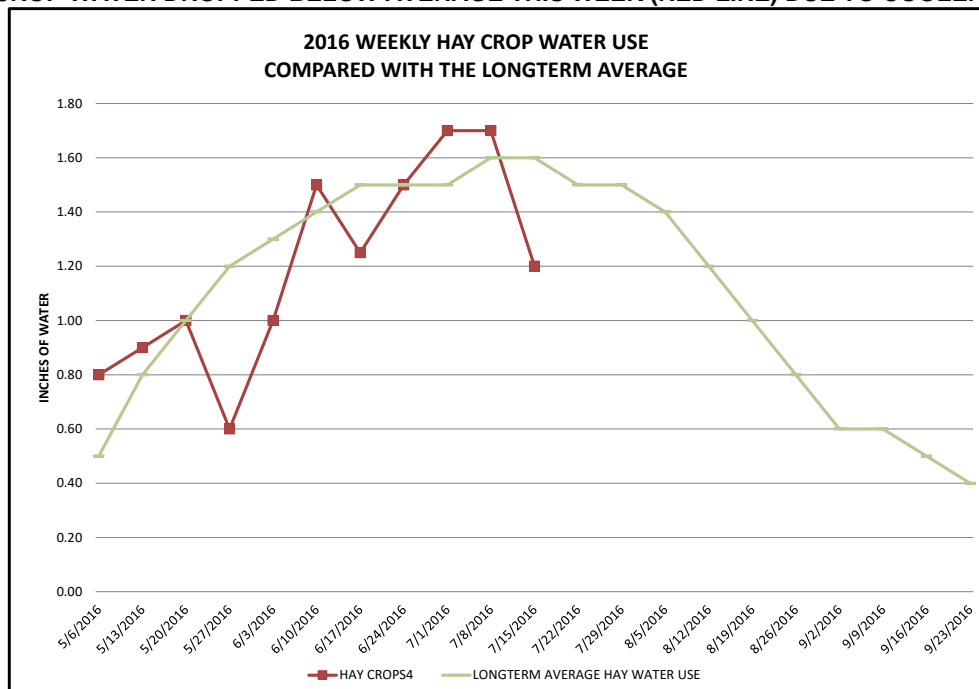
¹ Rainfall should be reduced to account for immediate evaporation from crop and soil surfaces (0.1-April,May and Sept, 0.15-June and August, 0.2-July)

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 is reduced by approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third.

CROP WATER DROPPED BELOW AVERAGE THIS WEEK (RED LINE) DUE TO COOLER, WETTER WEATHER



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.