

BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

Friday May 11, 2018



Floodwaters and high soil moisture levels have postponed the irrigation season for most folks. Cool moist weather kept plant growth and crop water use at a minimum throughout April. However, last year a similar moist spring and big snowpack turned quickly to drought so predictions seem unwise. The 30- and 90- day forecasts suggest above average temperatures and below average rainfall. Let's hope for the well-timed rain that boosted crops last year. We will provide weekly summaries of weather, crop water use and soil moisture conditions as well as tips for irrigation, soil health and crop production. If you would like other information please contact Jennifer Schoonen - Blackfoot River Steward (360-6445) or Barry Dutton – Soil and Irrigation Consultant (240-7798).

2018 is looking a lot like 2017 and 2011 when cool moist weather persisted through May. Most local cropland soils are recharged to 75 - 100% of their water holding capacities throughout the hay crop root zone (3 feet). This year it was hard find a sprinkler operating on the first of May whereas April has become the norm in recent years.

We again hope for fewer drought issues this year but are prepared to switch gears if needed. Our discussions will include soil health and how it relates to irrigation and crop production. Your questions and comments help focus our efforts so don't hesitate to call, message or email. A condensed overview of suggestions for the entire irrigation season is presented on the last page of this report. Use it to look ahead and plan or to compare what you're doing now.



CROP WATER USE - VERY LOW - READY TO EXPLODE

When it's cool, humid, rainy, snowy and calm - crop water use is low. It has been low all spring except for a few warm days. Crop water use was lower than average throughout April and should return to average this week. The table below provides a quick summary of crop water use this last week and an estimate for next week. The table and chart on Page 2 summarizes the entire irrigation season and compares it with average, hot and cool conditions.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS¹	SEASON TOTAL²
HAY CROPS	0.5	0.8 (0.6 – 1.0)	1.3
PASTURE	0.4	0.7 (0.6 - 1.0)	1.0
SPRING GRAINS	0.1	0.2 (0.1 - 0.3)	0.3
WINTER WHEAT	0.5	0.9 (0.7 – 1.1)	1.3
LAWNS	0.5	0.8 (0.6 – 1.0)	1.3

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 include April

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

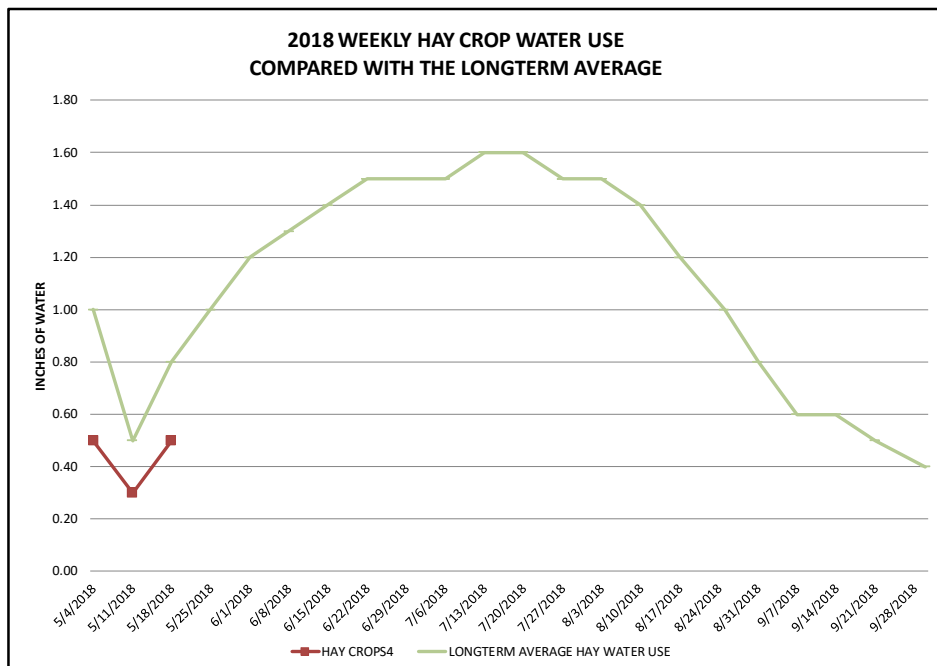
WEEK ENDING	RAIN ¹	2018 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE POTENTIAL CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
APRIL	1.50	0.50	0.40	0.10	0.10	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								1.00	1.10	0.60
5/25/2018								1.20	1.30	0.80
6/1/2018								1.30	1.40	0.90
6/8/2018								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	2.50	1.30	1.00	0.30	0.30	1.30	1.30	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.





WEATHER - A MIX OF SUN & CLOUDS, COOL & WARM

We begin this irrigation season moist and cool again with above average rainfall and snowpack. However, the 30- and 90-day forecasts indicate above normal temperatures and below normal rainfall so anything could happen. While we enjoyed a cool April, the highest temperature ever recorded on earth (reliably) happened in Pakistan (122.4 F). Blackfoot croplands had ½ to 1 ½ inches of rain last week and should get showers during a few days next week. Temperatures will warm up into the low 70s.



SOIL MOISTURE - TOO HIGH IN SOME FIELDS

Soil moisture levels throughout the drainage this week were the highest we've seen in the 8 years of this program. Most sites that have not yet been irrigated were close to 100% of their soil moisture holding capacity on May 1. This means all the small pores were filled with water (these are the pores that make up the soil water holding capacity). Some fields however, were flooded meaning the soil was saturated and all the large pores were also filled. Gravity will drain the water from these large pores as flood levels drop. Large pores usually hold and transfer the air that roots and soil organisms need to "breathe." Soils that are saturated cannot grow healthy roots or convert nutrients into usable forms for crops. Wet soils are also cold which further restricts crop growth. Roots and microbes need to breathe so the sooner soils drain excess water and warm up the sooner crops can flourish.



2018 conditions are most similar to the start of 2011 and 2017 when cool moist weather dominated the early growing seasons. Those years however did not have quite as high flood levels.

Soil near 100% of its water holding forms a ball when squeezed and leaves the hand moist. Water is visible on the surface of the soil and the hand as a shiny surface. Bouncing the soil in the only a little moisture on the hand (top photo). Soil near 100% of its water holding capacity forms a ball and leaves your hand moist (bottom photo). Call anytime if you have questions about evaluating your soil moisture content and irrigation options.

Use This Irrigation Information To:

- Compare weekly crop water use with how much you irrigate and what your goals are
- Learn your soil water holding capacity – mostly 1 - 2 inches per foot
- Know your critical crop periods – June for most crops
- Know dry soil from moist
- Know how deeply your irrigation penetrates - 1 inch only goes ½ to ¾ foot deep - apply 3-6 inches to fill up a dry soil
- Identify options for drought years – especially irrigate early while its available
- Apply the right amount of water at the right time to achieve your goals.

WEEKLY TIPS



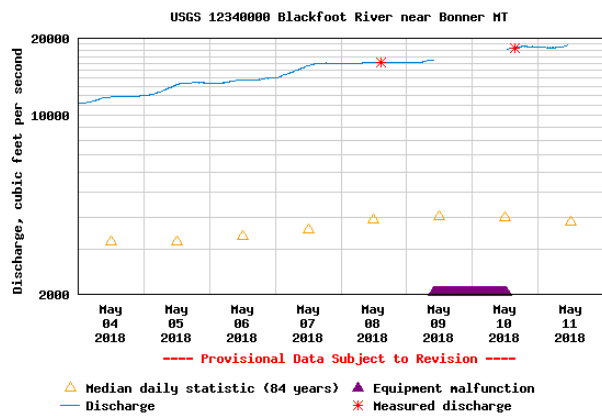
Water Supply and Streamflows

The May 1 water supply forecast had great news for irrigators. Snowpack in the Upper Clark Fork drainage (including the Blackfoot) is reported as 175% of normal. April precipitation was 136% of normal and some stations reported the most ever for this month. Reservoir storage is 104% of normal. Blackfoot river flows throughout May, June and July should remain above normal with plenty of water available throughout the main irrigation season. The photo at left shows the Blackfoot River bridge at Bonner during the 1908 flood.

Flooding 2018

Today the Blackfoot river flow is about 18,700 CFS at Bonner. This is over twice what it was on this date last year and 1 ½ times the highest flow ever recorded for this date (12,700 CFS in 1976). It is likely flows this year will exceed the highest recording for any date (19,200 CFS on June 10, 1964). The Blackfoot flow was higher during the 1908 flood but no flow record was made.

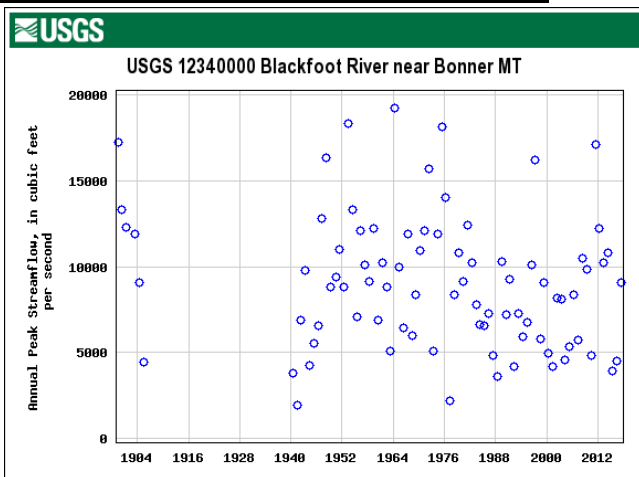
Recent Blackfoot Streamflows



Blackfoot/Clarkfork Confluence 5-1-2018



Peak Blackfoot Streamflows 1899-2017



Highest Blackfoot River Peak Flows

1899	17,200
1908	30,000?? estimate
1948	16,300
1964	19,200
1975	18,100
1997	16,200
2018	18,700 – so far

Average Peak Flow = 6,070 CFS
(72 year record)

Drought in 2018?

Drought didn't look very likely last year either and then things changed - so hold on and be ready for whatever. But so far, this might be the year to do those things that require a little more water or more later in the season.

Time to Keep Moisture Levels High. At the start of a normal irrigation season we encourage filling up soils to their moisture holding capacities. This year nature did it for us and now we just need to keep it up. Most folks have enough stored soil moisture for several weeks of crop water use. However, new seedlings need monitoring to ensure the surface soil remains moist during germination.

Don't get too complacent, crops are poised to grow quickly and use up available water when it warms up this week. If it is dry, warm and breezy, crops could use over an inch this week at some sites.

Roots

If you allow the soil to dry out and then only apply 1 inch at a time, you will only moisten the top 6-8 inches. This means your crop is looking for all its moisture and nutrients in this thin soil layer. Irrigate new crops deeply after they are established to moisten the entire root zone and lead your roots to deeper depths. Irrigating deeply at the start of the irrigation season to promote deep root growth is important but this year nature helped us out with this. Just remember to irrigate deeply later in the season, especially with new seedlings. High crop water use during hot weather can quickly dry soils out, especially sandy and rocky soils with low water holding capacities.

Soil health note: You can increase water holding capacity by increasing organic matter content. Some options include cover crops, no-till cropping, green manure crops, manure or other imported organics.

Diversity is Stability

One of the great principles of ecology is that "*Diversity is Stability*". Another way of saying it is "*Don't put all your eggs in one basket*". This goes for financial planning, menu planning, and many other things in life including crop choices. We often focus on growing one crop plant but soil health concerns are pointing at the benefits of diversity.

For modern agriculture and soil health concerns it means planting more than one species.

Even hay plantings can include 3-5 grasses and a variety of other plants.

One grass may do better in cooler years and another when it's warmer.

Plants can be added to your mix that only survive a short time but provide benefits like aeration, permeability and organic matter increase.

The more diverse your planting, the more diverse your soil microbiology and its ability to supply nutrients for crop growth.

Soil health note: Each week we will highlight crop options for increasing diversity and soil health. Let us know what crops you are experimenting with and how it's going.

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.