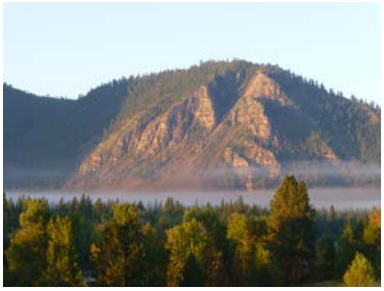
BLACKFOOT CHALLENGE
WEEKLY IRRIGATION REPORT
Friday June 11, 2021

Most Blackfoot croplands had only a trace of rain this week and cool temperatures. Next week looks hot and dry. Crop water use this week reduced soil moisture levels by about 1 inch unless irrigated. The snowpack dropped from 108% of average to 90%. Streamflows fell to only slightly above average and this trend should continue. There is plenty of water for early season irrigation and storage but predicted hot, dry weather could change that in July and August. The NOAA US Drought Monitor Map shows that all Blackfoot croplands are again not yet in drought conditions (only place in the state)!

WEATHER – COOL AND DRY THIS WEEK TO HOT AND DRY NEXT



Cool, dry weather last week reduced the 30-day rainfall to 130% of normal for the Blackfoot drainage. Next week will be hot and sunny with highs that may exceed 90F to start the week then drop to the 80s. Lows will be in the 40s and 50s. Both the 30-day and 90-day forecasts now say **below average rainfall and above average temperatures.**

CROP WATER USE – ABOUT AVERAGE LAST WEEK AND WAY ABOVE NEXT

Cool temperatures and a mix of sun and clouds increased crop water use to slightly above average for all crops. **Hay crops used about 1.4 inches of water but this will increase with hot, dry weather predicted for next week to about 1.7 inches.** Note that in these early season reports, we list a range of crop water use for spring grains planted at different dates. Crop water use will then even out as spring grains mature. The table below provides a quick summary of crop water use this last week and an estimate for next week.

WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS TOTAL[1]	NEXT 7 DAYS DAILY AVE[2]	SEASON TOTAL[3]
HAY CROPS	**1.4**	**1.7**	.24	4.8
PASTURE	**1.2**	**1.5**	.21	4.3
SPRING GRAINS	**0.8 – 1.1**	**1.0 – 1.6**	.14 -.23	3.0
WINTER WHEAT	**1.5**	**1.9**	.27	5.6
LAWNS	**1.3**	**1.6**	.23	5.2

[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)

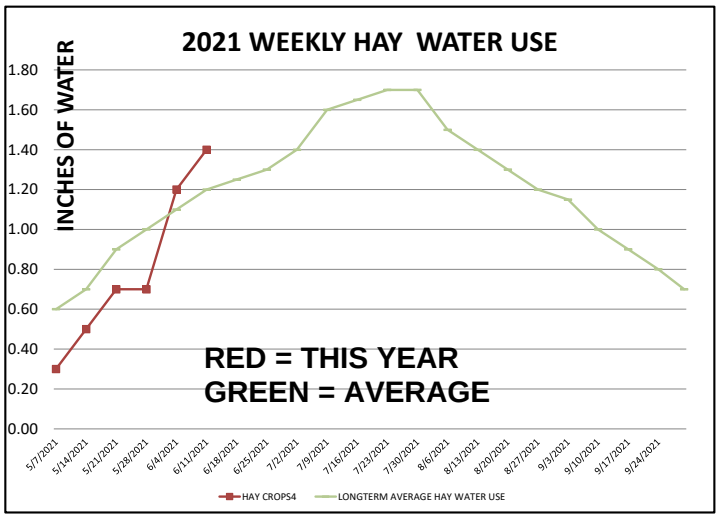
	RAIN[1]	2021 WEEKLY POTENTIAL CROP WATER USE[2]						AVERAGE WEEKLY CROP WATER USE[3]		
WEEK ENDING	RAIN	HAY CROPS[4]	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
5/7/2021	0.40	0.30	0.40	0.00	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								1.25	1.90	0.70
6/25/2021								1.30	2.00	0.80
7/2/2021								1.40	2.00	0.90
7/9/2021								1.60	2.10	1.00
7/16/2021								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	3.30	4.80	4.30	3.00	1.70	5.60	5.20	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 1 INCH IF NOT IRRIGATED

Soil moisture dropped about 1 inch this week in fields not irrigated due to almost no rain across most croplands. This dried out surface soils unless irrigated. **Now is the time to pour on the irrigation** – June is the most effective time to irrigate for maximum crop production. Hay crops yields are highest for the first cutting and local small grain crops produce most of their growth in June. Check soil moisture and keep it above 50% of Water Holding Capacity to get the best yields. 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 many 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. Call or email us if you have questions about evaluating your soil moisture content and irrigation options.

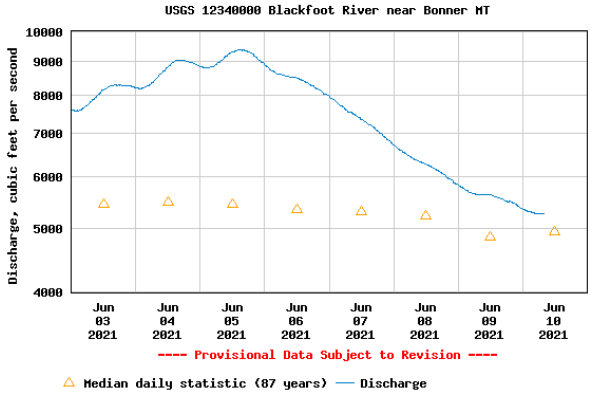
WEEKLY TIPS

Water Supply – Snowpack Drops But Remains Near Average!

The Blackfoot drainage snowpack dropped from 108% of average last week to 90% this week. Warm temperatures turned the snowpack into above average streamflows. Hot weather next week will continue to quickly reduce the snowpack. Blackfoot precipitation was at 130% of normal in the last 30 days, mainly due to the monsoon two weeks ago. Reservoir storage remains good. Blackfoot river flows should continue to be above normal for the next week or so but may drop with the hot, dry weather predicted for later in the season. Right now 80% of Montana is listed in drought condition. Over 30% of the state is listed as in severe or extreme drought, mainly in the northeast portion. We are the envy of drought managers everywhere.

Streamflows – Dropping To Near Average

The Blackfoot river flow at Bonner is flowing at about **5,200 CFS today** which is slightly above average for this date (5,500 CFS). The highest flow was 18,000 CFS in 1964 while the lowest flow was 1,320 CFS in 1987. Streamflows will continue to be high next week with warm temperatures and sunny skies.



Where Did Our Water Come From?

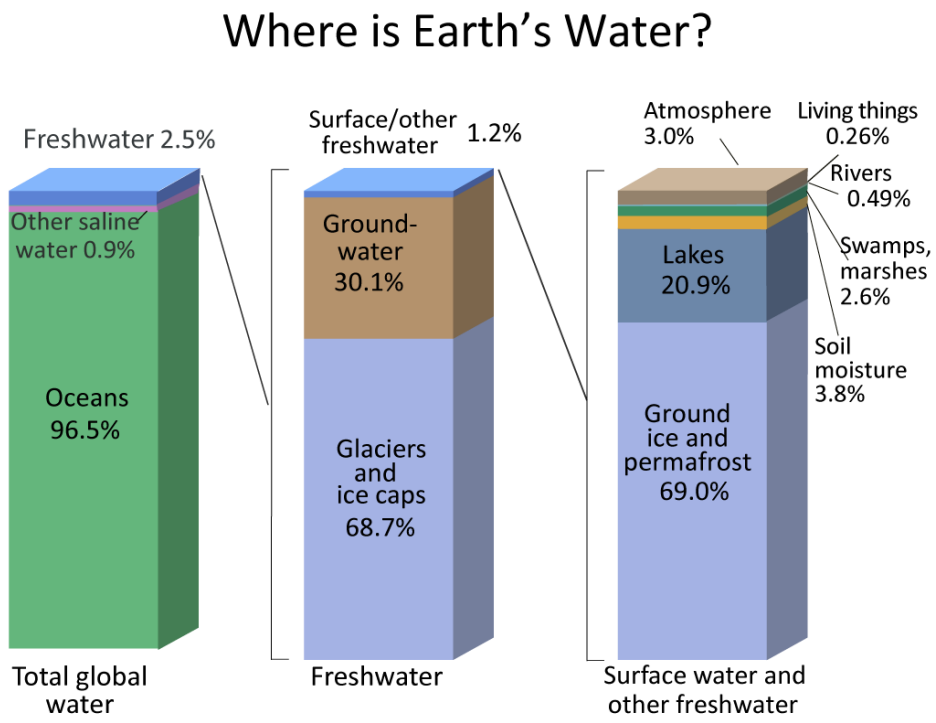
We may say our water came from the Blackfoot River or a well or even from a bunch of lawyers who successfully argued our water rights. But where did it come from originally? For years scientists have suggested that comets and asteroids carried most of our water to earth as ice. At times, the comet crowd seemed to prevail and at others the asteroid folks have had better data as a series of probes have supplied more meat to the arguments. Another theory is that a deep layer of rock in the earths crust called **ringwoodite** is the source of most of earths water. Water is released from this rock when volcanic activity brings ringwoodite to the surface. Think about the path your water traveled next time you turn on your pump. It likely came from both outer and inner space.

Where Is All The Water?

Most water on earth is in the oceans (97%). Only 2.5% of the earths water is freshwater and most of that is in glaciers and icecaps (69%). Groundwater makes up 30% of freshwater leaving only 1% as surface and other freshwater.

When you just look at that 1% of freshwater that includes surface and other freshwater, most of it is ground ice and permafrost (69%). Lakes contain 21%. Soil Moisture has 4%. Rivers contain 0.5%. The water contained in all plants and animals on earth is only 0.26% of all freshwater.

Soil moisture is about 0.001% of all water on earth (fresh and saline). Plants and animals contain about 0.0001% of all water on earth.



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources. (Numbers are rounded).

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.