# Musselshell Watershed Coalition
# 2018 Volunteer Salinity Monitoring Program

## Project Goals:

The goal of this monitoring project is to simultaneously collect credible, useful salinity data while also providing a method for education and outreach about water resources. Sedimentation/erosion and weeds have been raised as topics of concern and will be monitored alongside salinity. Salinity is addressed by using specific conductance meters, while sedimentation/erosion and weeds are addressed through photo point monitoring. This program serves to engage local water users and/or water managers in data collection to increase awareness about water quality, to produce locally collected data that can be used in public education efforts to foster stewardship and increase communication about water resources within the Musselshell River basin, and to collect photo documentation of bank condition changes through time, which could help MWC identify areas in need of shoreline or ecological restoration due to sedimentation/erosion and weeds.

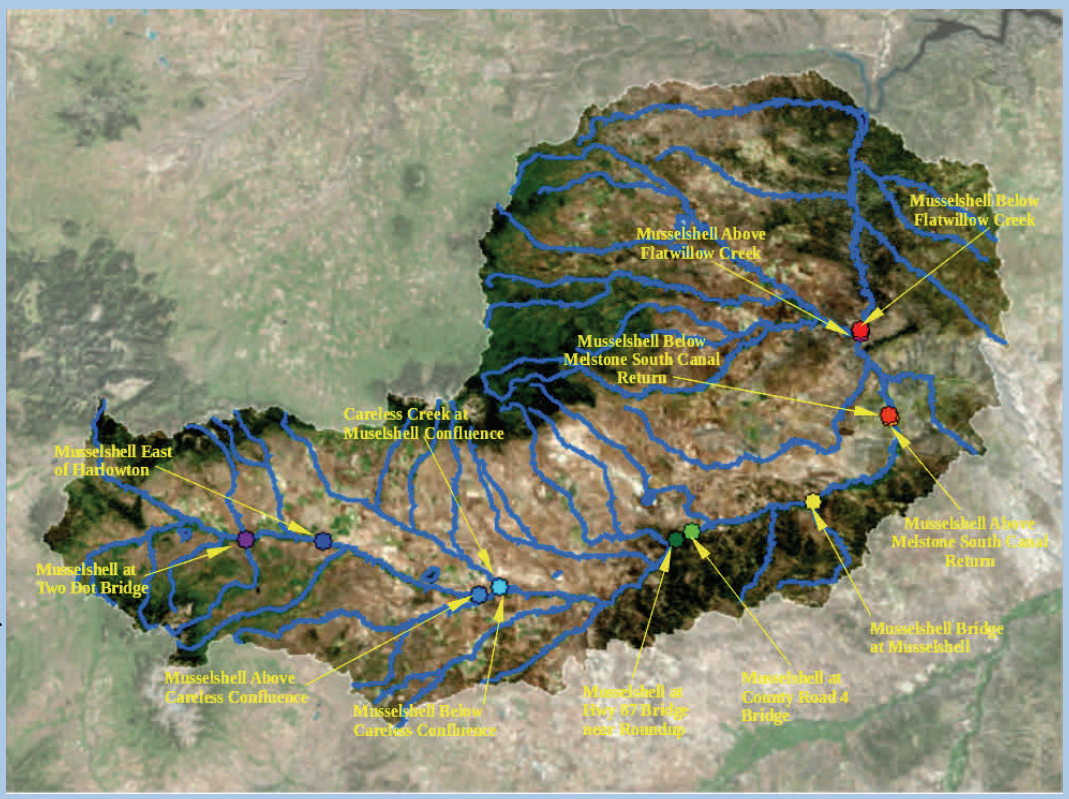
## Project Overview:

The Musselshell River is part of a unique combination of mountain and prairie stream watershed systems located in Central Montana. Originating in the Crazy, Castle, and Little Belt Mountains, the Musselshell flows over 300 miles from its source near Martinsdale, MT to its confluence with the Missouri at Fort Peck Reservoir. Late spring rainfall and snowmelt from the valley's bordering mountain ranges are responsible for the majority of the Musselshell's in-stream flows throughout the year. The 9,500 square mile drainage of the Musselshell encompasses a varied landscape including ponderosa pine woodlands, sagebrush dominated plateaus, short grass prairie, and a thin ribbon of riparian corridor characterized by cottonwood galleries and thickets of willow.

The valley's economy is centered on agriculture with dry-land farming and ranching operations representing the majority of agricultural production. Mineral extraction has also long been present in the valley, namely coal mining in the Bull Mountains south of Roundup, MT. Since the late 19th century, many significant alterations have been made to the Musselshell River floodplain. Most significantly, the now defunct "Milwaukee Road" railway running adjacent to the Musselshell for a large extent of its reach shortened the river's original channel length and prohibited it from accessing its floodplain. Historically, the Mussellshell was commonly dewatered during late summer months due to irrigation withdrawals.

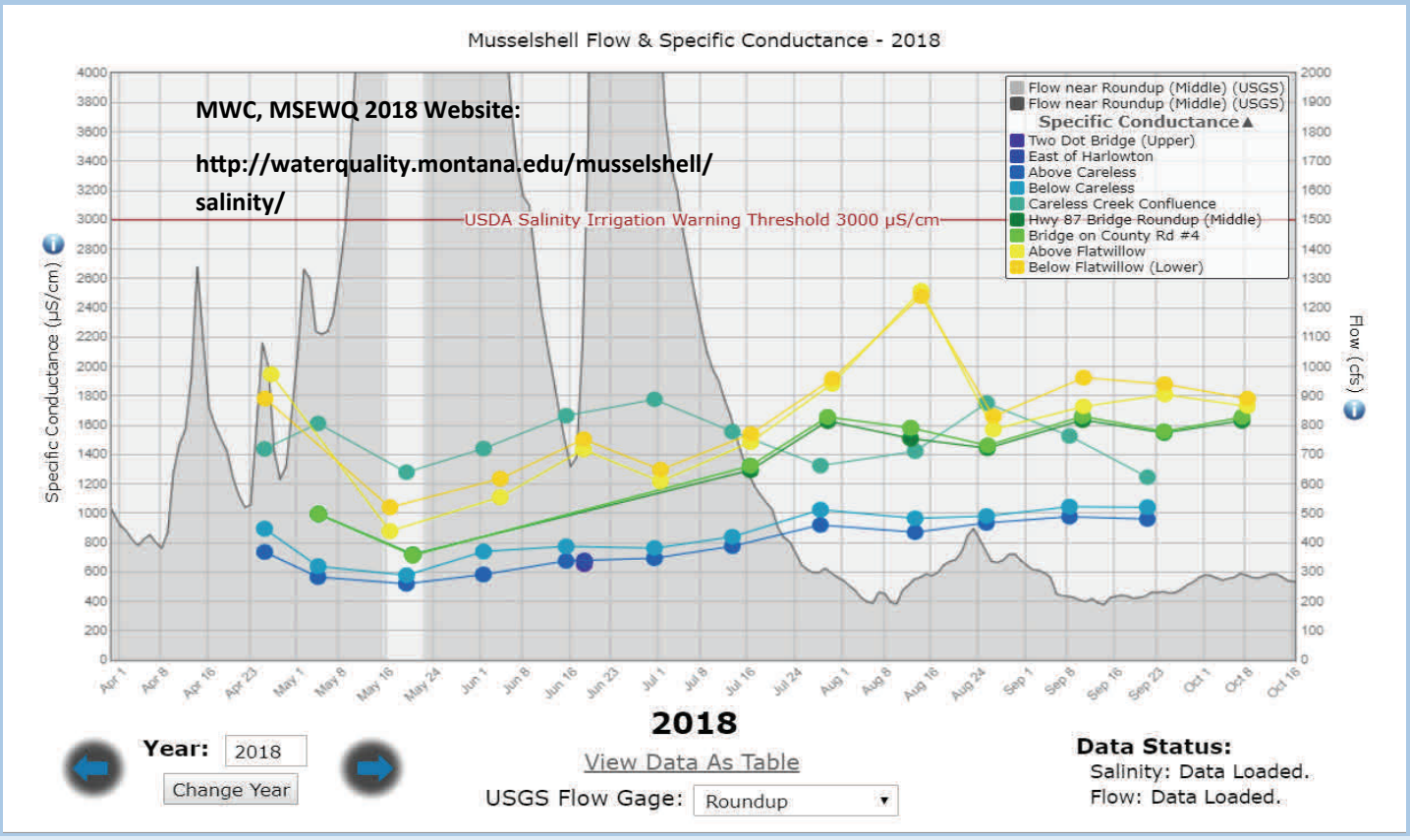
## Project Design:

Sampling was conducted on the Musselshell River and one of its tributaries from the confluence of its north and south forks to its confluence with Flatwillow Creek upstream from Fort Peck Reservoir. The tributary, Careless Creek, will be monitored at its confluence with the Musselshell. Most sample sites are laid out above and below major points of diversion and confluences, others are laid out above and below human developments. Twelve sites were monitored in total. The Musselshell River differs significantly from its upper to lower reaches, transitioning from a mountain to a prairie stream system, with the sites laid out to capture those differences. Proximity of sites to USGS gaging stations was also taken into account, such as the Mosby and Musselshell bridge stations.



# Musselshell Watershed Coalition 2018 Salinity Data Summary

Specific Conductance (SC) is the amount of electricity that water will conduct and is directly related to how much salt is suspended in the water. The USDA has designated 3000 µS/cm as the irrigation warning threshold. Water with a SC above this concentration may cause drought stress in crops and/or unpalatability of stock water.




**USDA NRCS** April 2018 Western Snowpack and Water Supply Conditions for Montana:
*"Streamflow prospects for the spring and summer months reflect the well above normal snowpack and are well above average for the April 1st through July 31st period. With cold and wet conditions forecasted to persist into spring, a close eye will be kept on the snowpack for potential implications for the runoff this spring and summer."*

The lowest SC measurement of 2018 (520 µS/cm) was recorded by Leon Hammond at the sampling site 'Above Careless Creek Confluence' on May 19th. This occurred shortly after the initial spring runoff event, when the fresh melt water from the mountains diluted the river's salinity.

*Did you know…*

Deionized (DI) water has all the salt removed and does not conduct electricity (SC = zero).

Snow and rain are nature's DI water!

The highest SC measurement of 2018 (2515 µS/cm) was recorded by Brynn Jolma at the sampling site 'Above Flatwillow Creek' on August 14th. This occurred during the lowest flows recorded at the Mosby gauging station this season. No readings along the Musselshell River exceeded 3000 µS/cm in 2018.

2018 was a very different year than 2017. With the water year being 123% of normal in March, we were expecting to have high flows throughout the irrigation season. We had a new member join the volunteer team this year, Brynn Jolma. Brynn is a Senior in the Winnett High School who is interested in science and was able to sample the sites farthest downstream in the Mosby area. Unfortunately for us (but good for her), she will be graduating and we will be needing a new volunteer to sample those sites. If you, or anyone you know would like to participate in the Salinity Program, let us know! - The spring started off with higher than average precipitation across the state, which, coupled with a large snow pack meant flooding. The high flows persisted throughout the majority of the summer, and made it difficult to sample at a few of the sites. The high flows also contributed to increased erosion throughout the whole Musselshell, which led to substantial deposition and channel migration. The photo-points that are taken in conjunction with the salinity measurements were able to show the banks being cuts and sandbars being created. Salinity levels never crossed the USDA Salinity Irrigation Warning Threshold of 3000 µS/cm, which might be due to the extended period of high flows diluting the river. Another speculation may be the number of high precipitation events and water input that occurred at the upper end of the river contributing more water from up-welling than run-off from fields.