

# Musselshell Watershed Coalition

## 2019 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 19<sup>th</sup> 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 Musselshell was commonly dewatered during late summer months due to irrigation withdrawals.

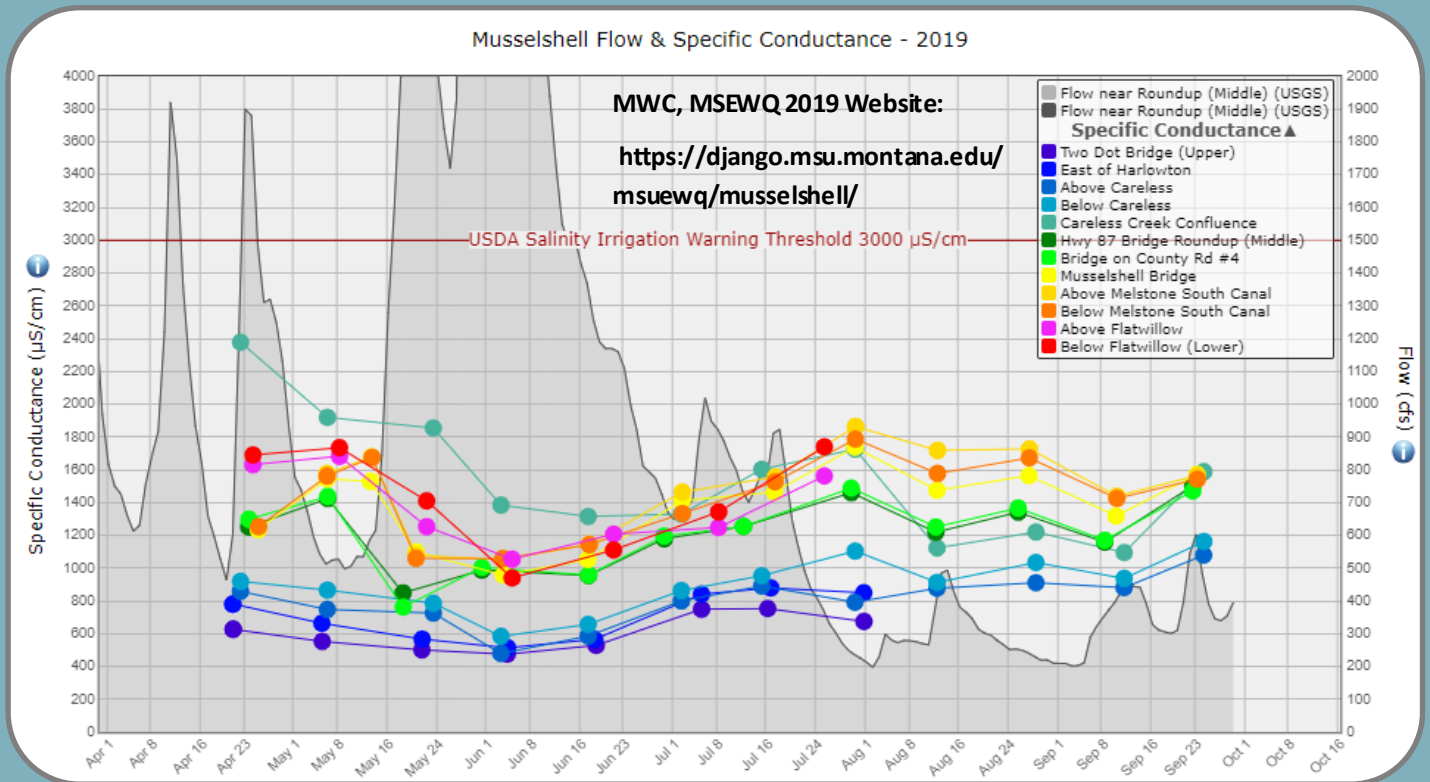
### Project Design:

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 2019 Salinity Data Summary

Specific Conductance (SC) is the amount of electricity that water will conduct and is directly related to how much salt is dissolved in the water. The USDA has designated 3000  $\mu\text{S}/\text{cm}$  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 2019 Western Snowpack and Water Supply Conditions for Montana:

“While it may not have seemed like an overtly dry March, largely due to all the snow left on the ground across the state from the cold and wet weather in February, it ended up being one of the driest on record at some SNOTEL sites. Fortunately, February ended up being such a big month that the snowpack totals on April 1st remain near to above normal, except in northern basins where snowpack for this date is below normal.”

The lowest specific conductance reading was taken at Two Dot in early June for a value of 476  $\mu\text{S}/\text{cm}$ . While this is not the lowest single data point since data collection began in 2015, the year has had the lowest average data in said timeframe.

### 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 conductance for the year was on Careless Creek at 2,378  $\mu\text{S}/\text{cm}$  taken in late April. Because the characteristics of the off-river site, mainly its modest flow rate compared to other sites, it is to be expected to see high variation. On-river, the highest SC reading was Below Flatwillow at 1,691  $\mu\text{S}/\text{cm}$  also taken in late April.

2019 was a great water year for the region. The Musselshell flows past Roundup remained higher than average throughout the season. Snow pack was average this year, suggesting that the surplus of water came from the consistent and intense summer storms. 2019 was also a great year for salinity. This was the lowest specific conductance year since the monitoring program's inception. The sites split into two distinct groups, the upper sites including and above 'Below Careless' were more constant and lower than the lower sites- 'HWY 87' and below. While this is to be expected, the degree, and the clear delineation between the two groups suggests there may be something happening between the Careless Creek Confluence, and Roundup. Future recommendations for this project include the creation of an additional point in this gap to better understand the trend, which has been relatively constant and apparent in all data collection years.

A variety of stakeholders and water users were spoken to with the goal of gauging support for the program. Many expressed appreciation for the project and the data it produces, using it for primarily irrigation and grant writing purposes. The current volunteers have expressed interest in continuing their role into the 2020 monitoring season.

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