Musselshell Watershed Coalition
2017 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.

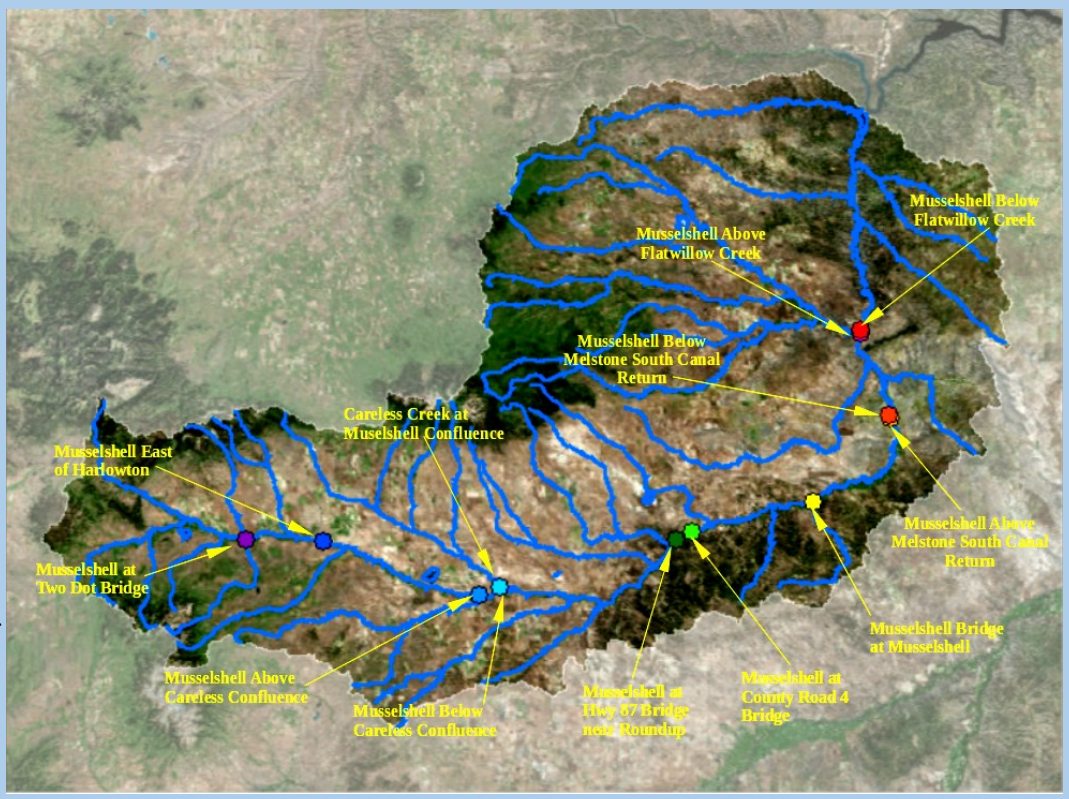
Project Overview:

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.

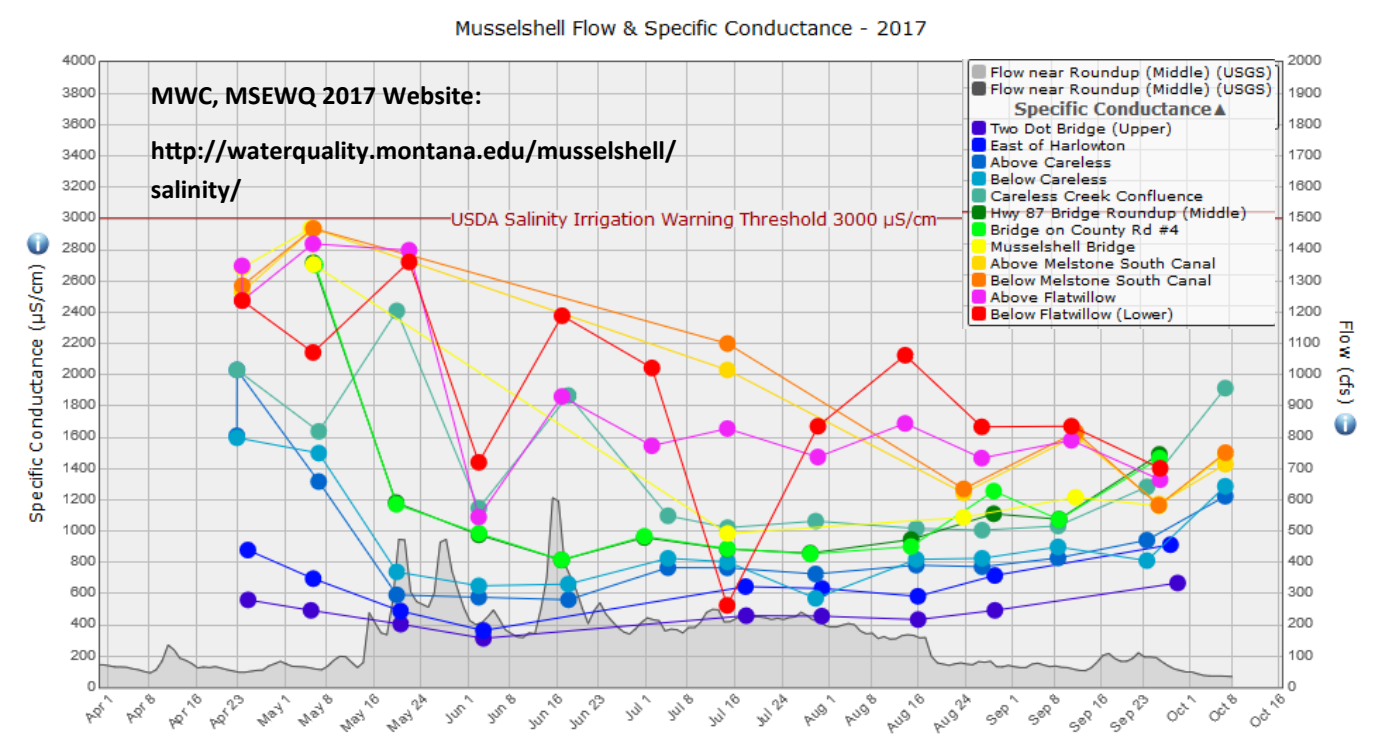
Project Design:

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 2017 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 2017 Western Snowpack and Water Supply Conditions for Montana:
"Wet weather increased snowpack percentages west of the Continental Divide since March 1. Lack of snowfall and low-elevation melt dropped percentages east of the Divide. Many areas are near to above normal for April 1, but some central and southwest areas are below normal for this date."

Just as in 2016, the lowest SC measurement of 2017 (387 µS/cm) was recorded by Craig Dalgarno at the Two Dot Bridge sampling site on April 29th. 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 2017 (2935 µS/cm) was recorded at the Above and Below Melstone South Canal site on April 29th. This occurred before the initial spring runoff events and associated salinity dilution. This year no readings along the Musselshell River exceeded 3000 µS/cm.

SC readings in the upper and middle reaches of the Musselshell River from Two Dot bridge to the bridge at Musselshell remained generally low throughout the sampling season, especially after the initial spring runoff/salinity dilution event. The lower reach sampling sites, from Above Melstone South Canal to Below Flatwillow, all saw higher readings and much more reading fluctuation throughout the season as compared to the upper and middle reaches. This pattern is similar to findings from past sampling seasons.

One notable event visible in the data of the lowest site at Flatwillow occurred between early July and the first week in August, when there was a major dip in the readings. With the time frame of this occurring considerably after the last run off sampling error could possibly be the cause. By mid-August, all of the readings had returned to the early July values once again and maintained a relatively constant value. The low salinity reservoir water that flowed down the river from releases at Deadman's Reservoir to the lower sampling sites could cause this balancing out, although it is difficult to say for certain at this point without more accurate local precipitation data, data from irrigators, and/or notes from water managers.