

## Summary

The Musselshell River stream assessment was conducted in May 2002 from the confluence of the North Fork and South Fork (Meagher-Wheatland County line) to where Flatwillow Creek enters the Musselshell River (Petroleum County near Mosby). The assessment was the combined effort of the Upper Musselshell, Lower Musselshell, Petroleum, and Garfield Conservation Districts. The Districts partnered with local landowners and State and Federal agencies to conduct a comprehensive assessment of the stream channel condition, riparian vegetation health, and water quality. This assessment will be used by the Conservation Districts and local landowners to help prioritize, plan, and implement future river projects.

The physical condition of the river channel varies from being very stable, with high flow events able to access the adjacent floodplain, to a channel that is incised with vertical eroding banks, where high flows are no longer able to access the floodplain. Floodplains that have been cut-off due to railroad and highway construction often have created some of the more unstable reaches along the Musselshell River. Some eroding banks have been rip-rapped primarily on the upper and middle reaches. Very little rip-rap was observed downstream from Melstone. There are specific channel sections where reestablishing the river into a previously abandoned channel or removing floodplain barriers may be a feasible restoration option.

In-channel structures such as irrigation diversions and bridges are common on both the upper and middle reaches of river; much less so downstream from Melstone. Several of these in-channel structures are having an adverse impact on the river, often creating channel instability and fish migration barriers. Site-specific evaluations should be made on these structures to determine if cost-effective modifications can be made that would reduce their impacts on river stability while still maintaining their intended purpose.

Riparian plant community health also varies all along the Musselshell River. Some riparian areas have good species and age diversity that provide excellent wildlife cover and bank stability. Other reaches of the Musselshell River have riparian zones that have either been heavily impacted by livestock or have been cleared for field development sometime in the past. Maintaining a healthy riparian zone adjacent to the channel is critical for long-term channel stability. There are simple and cost effective treatments available that can improve the riparian plant community and result in improved overall stability and function of the river corridor. There are sections of river where cropland or hay land fields are farmed to the very edge of the river channel. In these situations, a healthy riparian buffer will reduce bank erosion and improve overall channel stability.

Noxious weed infestations are a major issue in the Musselshell River stream corridor. There are extensive infestations of leafy spurge, spotted knapweed,

and Canada thistle upstream from Harlowton. Downstream from Harlowton, these same weeds are common, along with ever-increasing infestations of Russian Olive and Salt Cedar. There are a few cooperative landowner weed groups along the Musselshell River making some headway on noxious weeds. If there is ever a chance that noxious weeds will be effectively addressed, there needs to be an expansion of this multi-landowner cooperative effort throughout the Musselshell River Basin.

Field measurements, water quality samples, and flow estimates were collected along the Musselshell River mainstem at 12 sites and at the mouths of 11 tributary streams. The water samples were analyzed for salts (common ions), metals, and nutrients. Flow in the Musselshell River showed a generally decreasing trend from upstream to downstream while salt and nutrient concentrations tended to increase. The metals: aluminum, iron, and manganese, also appeared to follow an increasing downstream trend. Tributaries seemed to follow the same basic trends. Upper tributaries tended to have more flow and less salt and metal concentrations than the downstream tributaries. Nutrient concentrations for tributary streams were variable throughout the watershed. The water samples provided a good baseline of low-flow water quality conditions. However, it is recommended that future water quality monitoring will be necessary to be able to establish trends and identify potential sources (natural and/or human).

Overall, the Musselshell River stream assessment was successful at summarizing resource condition and concerns throughout the basin. It is intended to provide useful information for conservation districts, landowners and residents to initiate individual and cooperative projects that will provide long-term benefits to the river and the community.

## **Recommendations:**

Although each reach of the Musselshell River had unique resource concerns and channel characteristics, there were resource concerns that were common the entire length of the river. Most of these common concerns are tied to land management practices, not necessarily physical river characteristics.

Primarily, the following are the recommendations that apply watershed wide:

- 1. Increase the buffer area vegetated with native riparian species and river access to its historical flood plain.** This can be accomplished by moving feeding areas away from the creek, implementing grazing systems that consider riparian pastures and timing grazing to accomplish the specific goal of encouraging a wider, more productive riparian buffer along the Musselshell. Also, restore a buffer of native riparian vegetation between farmed or hayed fields and the Musselshell River.
- 2. Treat, Control and Eliminate noxious weeds that infest the riparian area along the Musselshell River.** In the upper reaches of the river the predominant concerns are leafy spurge and spotted knapweed. Salt cedar and Russian olive become a concern through the mid reaches and down to the lower reaches. All of these weeds replaced native species in the ecosystem and have lowered the river's potential to recover and stabilize.
- 3. Reduce impact on river from structures, irrigation diversions and rip-rap.** The Musselshell River is heavily impacted by irrigation structures, rip-rap to protect farmland, roads, and the railroad, bridges and other structures. As these structures are repaired or replaced, the designs should be updated and constructed in places where they do not impact the river. One possible change could be to utilize some of the hard rip-rap alternatives such as root wads and tree revetments. These were shown to be effective on the upper and middle reaches of the river. These practices could be used when possible and appropriate. It is also possible to change irrigation diversions to fish friendly diversions that allow fish passage. Some of the bridges had very minimal impact on the river and others had a large impact. Some of the bridges that are having an adverse impact on the flow of the river could be relocated, or modified to reduce their impacts on the river.