

Channel Maintenance Activities

Applicability

This Channel Maintenance Activities Best Management Practice (BMP) offers recommended strategies for activities that include debris and sediment removal and placing fill within the active river channel. The BMP was developed following visits with producers in 2011 and 2013. Practical and regulatory considerations are provided, as well. The information is for use by producers who anticipate or are considering channel maintenance work and for Conservation Districts responsible for issuing 310 permits.

Description

Dealing with the devastation and property damage caused by a major flood event such as occurred in 2011 on the Musselshell often creates a desire to clean accumulated sediment and debris from streambanks or channels. This need may seem especially important when working on other flood impacts such as avulsions (sudden channel changes), large scale bank erosion, irrigation structures, or river crossings. There are often apparently good reasons for altering the amount and extent of flood-deposited debris but a few cautions and recommendations have been developed based on the experiences of producers and resource professionals in the Musselshell River corridor. These recommended BMPs address the following issues:

- I. Woody Debris Removal***
- II. Sand and Gravel Excavation***
- III. Placing Fill Material***
- IV. Permit Requirements***

I. Woody Debris Removal

Woody debris is probably one of the most visible signs of recent flood activity. As streambanks erode and collapse, large and small trees fall into the channel and are washed down the channel until they accumulate on a gravel bar, against a bank, or other natural feature as floodwaters recede. Sometimes these debris-catching features are related to human activity such as bridges and other in-channel structures. Debris jams can serve a useful purpose such as protecting the bank from erosion or stopping side channels from enlarging. In some cases, they are benign such as debris caught on a point bar. Other times however, they threaten to damage structures or direct flow and water velocity in a direction leading to more erosion problems. Although removing wood may seem to be a straightforward approach to managing the stream channel, woody debris is an important component of the Musselshell River and should be left in place whenever possible.

The first step in determining if debris removal is warranted is to decide if the result will be worth the effort. Repeatedly removing wood that is not an immediate threat may create a perpetual maintenance issue that does not provide any benefit. In most cases, removing debris is not warranted.

Secondly, is the cost commensurate with the desired result? Large, costly equipment is often needed to effectively move large debris without causing excessive damage to the bank or channel. Accessing the river corridor with large equipment can make matters worse and not help the bottom line.

Lastly, what to do with the debris removed? Woody debris is a natural component of many larger river systems. The debris, in itself, has an aquatic ecological function in providing food and cover for many species of wildlife. As the debris breaks down into smaller pieces, more species of wildlife benefit, especially small (microscopic to visible size) organisms that make up a functioning, healthy aquatic food chain. As water and sediment flows around the debris, scour holes and other features provide overhead cover and feeding channels for fish. Without this woody debris, river channels in prairie streams can be fairly monotonous from a habitat perspective. One consideration, where feasible, is to leave all or some of the debris in place, or, if removed, to reposition it in the active channel in a less threatening nearby location.

In-Channel Placement: When repositioning woody debris, replicate the typical position of other debris with limbs downstream and the root end upstream. When rootwads (tree trunk and attached roots) are involved, they should be placed to avoid causing scour behind the rootwad against a bank. Cabling debris in place using duckbill anchors sometimes is needed and effective. In other situations, woody debris can be repositioned on open point bars at the elevation just below the tops of the point bars. They can be slightly buried or covered with rock to hold in position until river deposited sediment will help to anchor them in place. Intentionally placing debris to create scour holes and other aquatic habitat should only be undertaken by a qualified professional engineer working with knowledgeable fisheries experts due to the potential for failure or unintended consequences working in this dynamic, river environment.

Floodplain Placement: When it isn't feasible to keep debris in the channel, then the debris should be placed on the adjacent floodplain to help increase resistance to flood-caused scour. This also helps to prevent avulsions across meander necks. Debris can be used as a buffer between the channel and crop fields. Many producers have noted that debris and woody riparian buffers adjacent to the channel have helped to reduce sediment and debris accumulation on fields during floods. Debris should be scattered to form a low elevation buffer. Where failed avulsions are present, this also presents a good opportunity and location to situate surplus, large woody debris to help provide more resistance to future erosion and scour thereby preventing the failed avulsion from eventually succeeding.

II. Sand and Gravel Excavation

Floods mobilize large amounts of bedload sediment made up mostly of sand, silt, and gravel. Sediment is commonly scoured from the channel bed where the channel is steep (degradation or downcutting) and stored in the channel bed where the channel is relatively flat (aggradation). Sediment is stored on point bars and produced from cutbanks as the river meanders across the floodplain over time. Avulsions (rapid and extensive channel changes driven by large floods) tend to contribute significant quantities of sediment while providing little in the way of storage.

In most cases, sediment is a natural component of the river and needs to be left in-place to support a healthy functioning river. Occasionally, large sediment deposits from extreme flood events interfere with irrigation infrastructure and other in-channel structures and may need to be removed or relocated. Sand and gravel excavation need to meet several criteria in determining removal justification.

Will the removal cause further instability and erosion in the vicinity of the work site? Sediment that has filled in against formerly eroding banks should not be removed. Sand and gravel in banks and the streambed should never be mined as a source of road or fill gravel for that purpose alone. Nor should sediment that is holding woody debris in place. Material can sometimes be ‘borrowed’ from the tops of point bars or mid-channel bars particularly after large floods as these bars are often over steepened, higher than normal, and sometimes forces a river channel against a bank causing accelerated erosion. Bars that develop below tributaries are often another example of an acceptable limited borrow area. Sediment may sometimes be safely removed from areas where significant deposition has developed multiple channels. Where the channels interfere with irrigation or other infrastructure and no other fix is possible, the excavation should be limited to only that necessary to make the infrastructure functional. Avoid damage to native plant species, when present. Excavated material should then be located where it will not cause further problems or create floodplain restriction issues.

Because sediment tends to be deposited in areas of low energy, it is very likely that removal will just aggravate the problem, creating a repeated need for continued excavation. If that is the case, the situation should be carefully evaluated to determine other options such as relocating the infrastructure. As most instances of sand and gravel removal from the channel will be covered by a 310 or other permit, the regulatory permit applications are usually covered. When not a part of a larger permitted project, sand and gravel disturbance in the channel will require one or more permits. See **Section IV, Permit Requirements**.

III. Placing Fill Material

Nearly all instances of placing fill material in the stream channel will be part of a larger project requiring a permit of some nature. Instances of fill placement are usually part of most irrigation infrastructure, river crossing, and bank restoration or stabilization projects. Fill should be limited to no more than that necessary to accomplish the project. Placement of excess fill should not constrict flow through the channel and cause undesirable channel adjustments. Size of fill material should also be considered. It needs to be large enough and carefully placed to resist the erosive forces of water at the site unless it is intended to be temporary. Sand, gravel, and cobble excavated from the river usually won’t remain in place; if the river deposited it, it will move again.

IV. Permit Requirements

Prior to beginning any activity that physically alters or modifies the bed or banks of a perennially flowing stream, producers should use the joint application <http://dnrc.mt.gov/Permits/StreamPermitting/JointApplication.asp> to apply to the local Conservation District (CD) for a Natural Streambed and Land Preservation Act (310 Permit). This joint permit also serves to apply for a Federal Clean Water Act Dredge and Fill Permit (404 Permit) from the US Army

Corps of Engineers , and the Montana Department of Environmental Quality. See “A Guide to Stream Permitting in Montana” which is available at the local CD office or online at:

<http://dnrc.mt.gov/Permits/StreamPermitting/Guide.asp>.

Projects that alter or move irrigation system infrastructure in the Musselshell River watershed such as diversions, headgates, or pump sites also require filing a **Water Right Permit and Change Authorization** form with the Montana Department of Natural Resources and Conservation, Water Resources Regional Office in Lewistown, MT.

A **Floodplain Permit** may be needed for placement of fill associated with bank stabilization activity in areas mapped as within a designated 100-year floodplain if the fill will result in raising the 100-year flood elevation by more than 6 inches. An engineer is usually required to help make this determination and provide documentation to the floodplain administrator. Other activities associated with development (homes sites, structures, roads and bridges, dikes, elevated ditches, etc.) in a designated floodplain may also require a floodplain permit. Check with the local floodplain administer for more information and assistance.

For local permit contacts, please see the Musselshell River Permit Contacts Supplement available at the local conservation district office.