LOWER MUSSELSHELL TMDL PLANNING AREA DECISION DOCUMENT

December 28, 2001

FINAL

Montana Department of
ENVIRONMENTAL QUALITY

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INTRODUCTION

In November 2000, the Montana Department of Environmental Quality prepared a schedule for completing all necessary Total Daily Maximum Loads (TMDLs) for waters on the 1996 Montana 303(d) list. The schedule was developed pursuant to a federal judicial order. All necessary TMDLs for the Lower Musselshell TMDL Planning Area were scheduled to be completed by December 31, 2001. This planning area includes the mainstem of the Musselshell River (MT40C003_010) and three tributaries: Blood Creek (MT40C004_030), Lodgepole Creek (MT40C004_020) and Calf Creek (MT40C004_010). The planning area covers 1,672 square miles of which 706 square miles are in Garfield County, 653 square miles in Petroleum County, and 313 square miles in Fergus County.

A summary of both the 1996 and 2000 Montana 303(d) list for the Lower Musselshell TMDL Planning Area is provided in Table 1. See Table 2 for a summary of the beneficial-use determinations for Blood Creek, Calf Creek and Lodgepole Creek. Montana DEQ has determined that no TMDLs are required to be submitted to the Environmental Protection Agency for this planning area. This document explains the rationale for this determination.

In 1997, the legislature directed DEQ to use "sufficient, credible data" in making beneficial-use determinations. As a result of the new definition of sufficient, credible data, 486 water bodies (statewide) were dropped from the 2000 Montana 303(d) list. State law directs DEQ to reassess waters removed from the list "as soon as possible." DEQ has reassessed the streams in the Lower Musselshell TMDL Planning Area and concluded that none are impaired by pollutants as defined by the Federal Clean Water Act.

It is EPA's position that TMDLs are required only for *pollutants* that are causing or contributing to a water quality impairment. Pollutants are listed in Montana's Numeric Water Quality Standards (Circular WQB-7). EPA did not approve the Big Creek TMDL submitted by DEQ in December 2000 because the water quality restoration plan addressed flow alteration and, according to EPA, flow alteration is not a pollutant as defined by the Federal Clean Water Act. Other "pollution" impairments include habitat alterations and riparian degradation, bank erosion, channel incisement, dewatering and water level fluctuations.

The Montana 303(d) list of Impaired Water Bodies includes impairments caused by "pollutants" and "pollution." The Clean Water Act defines "pollution" as *"the man-induced alteration of the chemical, physical, biological, and radiological integrity of water*" (Section 509(19)).

TABLE 1. Summary of Information from Montana's 303(d) Lists.

Waterbody	1996 Causes	1996 Sources	2000 Causes	2000 Sources
Musselshell River MT40C003_010 ***C-3***	Siltation Flow alteration *Warm water fishery and Aquatic life partially supported on 47 miles*	Agriculture: Flow regulation/ modification, Irrigated crop production, Rangeland, Streambank modification/ destabilization	Other habitat alterations: Riparian degradation Flow alteration *Full support for recreation, partial support for warm water fishery and aquatic life on 74 miles*	Agriculture: Grazing-related sources, Flow regulation/ modification, Bank modification /destabilization, Hydromodification, Habitat modification (other than hydromodification)
Blood Creek MT40C004_030 ***C-3***	Other Habitat Alterations *Aquatic life partially supported on 2 miles*	Agriculture: Range land	Not listed--lacked sufficient credible data	
Lodgepole Creek MT40C004_020 ***C-3***	Flow alteration, Other habitat alterations, Thermal modifications *Warm water fishery and Aquatic life support <u>threatened</u> on 17 miles*	Agriculture: Irrigated crop production, Rangeland Construction: Highway/road/bridge construction	Not listed--lacked sufficient credible data	
Calf Creek MT40C004_010 ***C-3***	Flow alteration, Other habitat alterations, Thermal modifications *Warm water fishery and Aquatic life support <u>threatened</u> on 37 miles*	Agriculture: Irrigated crop production, Rangeland	Not listed--lacked sufficient credible data	

TABLE 2. Summary of Beneficial-Use Support Determinations for Blood Creek, Calf Creek, and Lodgepole Creek

Waterbody	Causes	Sources
Blood Creek MT40C004_030	Habitat alterations: Riparian degradation. *Warm water fishery and Aquatic life partially supported on 30.5 miles (Dovetail Road to Mouth)*	Grazing related sources, Natural sources
Lodgepole Creek MT40C004_020	Fully supports beneficial uses on 27 miles (*confluence of N.Fk. Lodgepole Cr. and M.Fk. Lodgepole Cr. to mouth*)	
Calf Creek MT40C004_010	Fully supports beneficial uses on 64 miles (*headwaters to mouth)*	

MUSSELSHELL RIVER (MT40C003_010)

Area Description

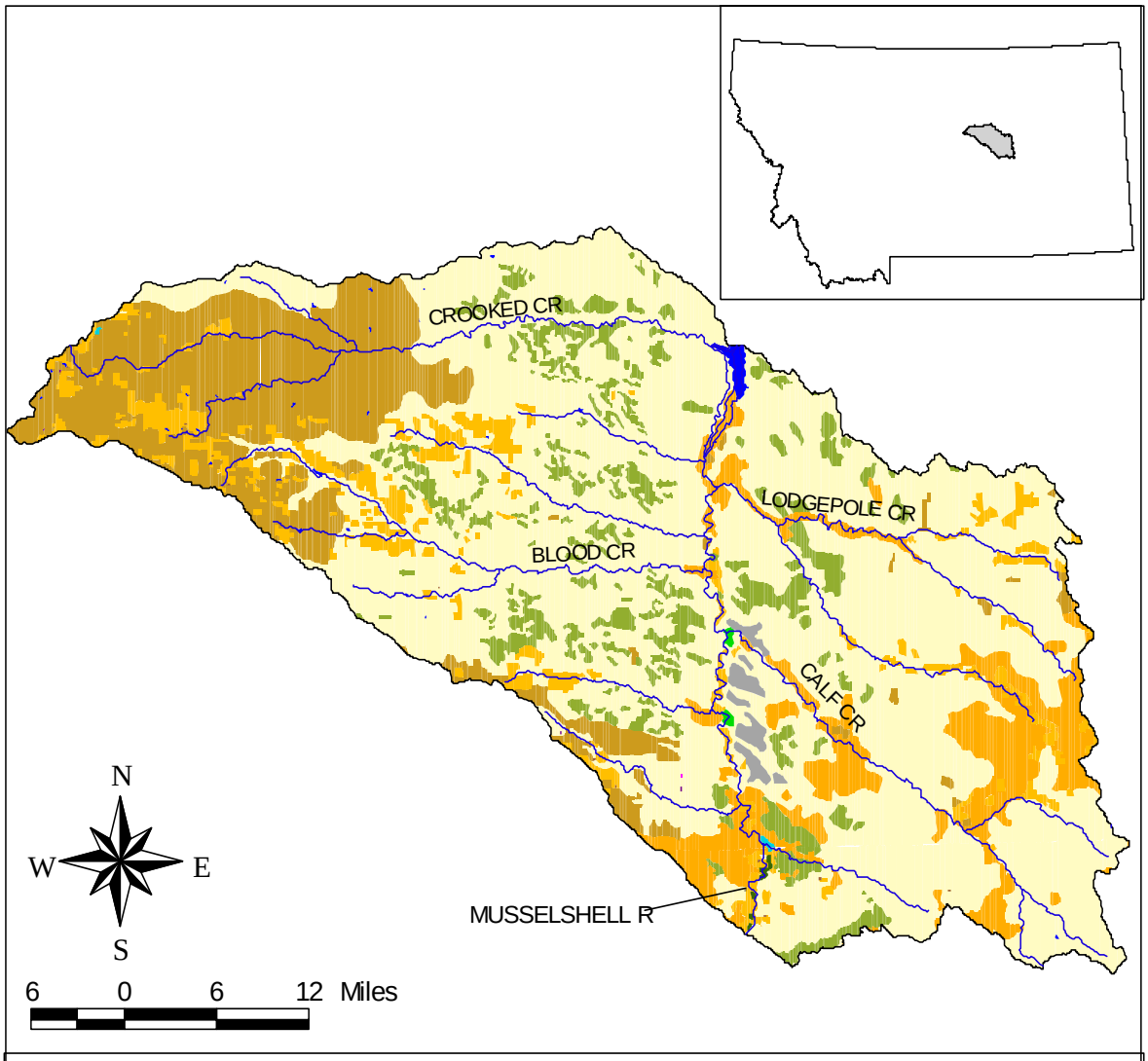
This area includes 74 miles of the Lower Musselshell River (MT40C003_010), which forms the county boundary between Petroleum and Garfield Counties, and about 185,000 acres of land known as the Musselshell Breaks (Figure 1). The river valley supports both irrigated and non-irrigated cropland and riparian vegetation. Drier hillsides are covered with ponderosa pine and juniper. Upland vegetation is range grasses and saltbush.

The upstream end of the area is eight miles south of Mosby, Montana. Land ownership includes 77,000 acres of federally owned land and 108,000 acres of nonfederal land. This area also includes two designated USDI Bureau of Land Management Wilderness Study Areas: Bridge Coulee, which covers 5,900 acres east of the Musselshell River and 15 miles north of Mosby; and Musselshell Breaks, which covers 8,650 acres east of the Musselshell River and five miles north of Mosby. To the north, the area adjoins the Charles M. Russell Wildlife Refuge managed by the Fish and Wildlife Service.

The terrain of the Lower Musselshell River is characterized by a wide river valley bounded on both sides by steep hills of shale and sandstone cut by deep coulees. The sandstone formations are Cretaceous Fox Hills and Hell Creek. The shale formations are Cretaceous Colorado and Bearpaw. Cat Creek anticline and Blood Creek syncline deform the formations. The irrigated ground along the river is composed mostly of Harlem and Havre silty clay loams, Havre loams, Havre/Glendive loams and Havre/Yamac loams. The soils are generally deep to moderately deep. Uplands bordering the river include 1,151 acres of cultivated cropland, 3,475 acres of non-cultivated cropland, 15,124 acres of forestland, 1,750 acres of pastureland and 127,157 acres of rangeland (Lindahl 1993). There are about 660 residents living in the area.

The warm water fishery is described in Table 3. These fish are those that are adapted to warm, turbid waters. The Blue Sucker is a species of special concern that is genetically pure in the Lower Musselshell and requires warm turbid water as spawning and rearing habitat.

Location Map of Lower Musselshell



1:250,000 Landuse

- BRUSH RANGELAND
- CROP/PASTURE
- DECIDUOUS FOREST
- EVERGREEN FOREST
- EXPOSED ROCK
- GRASS RANGELAND
- INDUSTRIAL
- MINES/QUARRIES
- MIXED FOREST
- MIXED RANGELAND
- OTHER AG
- RESERVOIR
- SLIVER POLYGON
- WETLAND
- Streams
- Watershed Boundary

Montana Department of Environmental Quality

1:250,000 USGS Land Use
Forsyth 1980: Roundup 1982:
Jordan 1982: Lewistown 1985

Figure 1
Lower Musselshell Land Use
Date: 11/6/2001

TABLE 3. Summary of Fisheries Information for Lower Musselshell (Montana Rivers Information System http://nris.state.mt.us/)

Species	Activity	Status
Channel Catfish	Resident, spawning, and rearing	Abundant
Flathead Chub	Resident	Abundant year round
Goldeye	Resident and spawning	Abundant
Sand Shiner	Resident	Abundant year round
Common Carp	Resident and spawning	Common
Longnose Dace	Resident	Common year round
Longnose Sucker	Resident and spawning	Common
River Carpsucker	Resident and spawning	Common
Sauger	Resident and spawning	Common
Shorthead Redhorse	Resident and spawning	Common
White Sucker	Resident and spawning	Common
Black Bullhead	Resident	Uncommon year round
Blue Sucker	Spawning and rearing	Uncommon
Emerald Shiner	Resident	Uncommon year round
Northern Pike	Spawning and rearing	Uncommon
Northern Redbelly Dace	Resident	Uncommon year round
Plains Minnow	Resident	Uncommon year round
Stonecat	Resident	Uncommon year round
Western Silvery Minnow	Resident and spawning	Uncommon year round
Yellow Perch	Resident	Uncommon year round
Freshwater Drum	Feeding run	Rare
Smallmouth Bass	Resident	Rare year round
Smallmouth Buffalo	Feeding run	Rare
Walleye	Spawning and rearing	Rare

Beneficial-use Support Determination

The entire Musselshell River has appeared on lists of streams impaired by nonpoint sources of pollution since 1986. The lists in the 1990s provided greater detail by dividing the river into stream segments. The 1996 Montana 303(d) list described the probable use support for the Lower Musselshell River as partially supporting a warm water fishery and aquatic life on 47 miles. Probable causes were flow alteration and siltation. Probable sources were agriculture, flow regulation/modification, irrigated crop production, rangeland, and streambank modification/destabilization.

The beneficial-use support determination reported in the 2000 Montana 303(d) list was based on sufficient credible data for 74 miles of the Lower Musselshell River extending from the confluence of Flat Willow Creek to Fort Peck Reservoir. This reach was determined to partially support a warm water fishery and aquatic life. Probable causes of impairment identified by the 2000 Montana 303(d) list are flow alterations and habitat alterations, specifically riparian degradation. Probable sources are agriculture, grazing-related sources, flow regulation/modification, bank modification/destabilization, hydromodification, and habitat modification (other than hydromodification).

U. S. Geological Survey has sampled water quantity and quality for more than 25 years at Station 0630500 at Mosby Bridge on the Musselshell River. Data includes daily sediment load from 1983-1995 as well as periodic sediment load, sieve analyses of bed materials, and water quality data from 1975-2000. Musselshell River carries an annual average sediment load of 35 tons per square mile of drainage area or an average daily load of 735 tons. The median particle size (d_{50}) of the bed material was determined 54 times between 1990 to 2000; the d_{50} ranged from medium to very coarse gravel (8mm to 32 mm). Record documents sediment transported by the Musselshell River through both drought and flood cycles in the Northwestern Great Plains Ecosystem. Climate and geology combine to send pulses of fine sediment into the river during snow melt in early spring and during thunderstorms in mid summer. At other times, the flow declines but still transports a sediment load that is typical for prairie rivers. The Lower Musselshell River is able to transport this load without creation of midchannel sandbars or aggradation of its channel. When the river empties into the Ft. Peck Reservoir, it drops its sediment load and forms a delta of fine sediments.

The Riparian and Wetland Research Program of the University of Montana gathered water-quality data along the Lower Musselshell River between 1999 and 2000. Water quality analyses were completed for nutrients, fecal coliform, total dissolved solids, total suspended solids, and flow. Conductivity, pH, and temperature were also measured at each of nine established water quality sites. Macroinvertebrate sampling and periphyton sampling were performed in August and early September of 1999 and 2000. The research team evaluated the Lower Musselshell River using the Rosgen stream classification and found it to be a Rosgen C4 stream type. A C4 stream type is a slightly entrenched, meandering, gravel-dominated, riffle/pool channel with a well-developed floodplain. Streambanks are generally composed of unconsolidated, heterogeneous, noncohesive, alluvial materials that are finer than the gravel-dominated bed material (Rosgen 1996).

The analyses of periphyton populations at six sites along the Lower Musselshell River in 1999 indicated no impairment and full support of aquatic life uses. In particular, the siltation index indicated that sediment was not a cause of impairment. Periphyton is considered an appropriate indicator of water quality because of the naturally high number of species and their ability to respond rapidly to both exposure and recovery from pollution events. Diatoms in particular are useful indicators of biological condition because they are ubiquitous and found in all stream systems. In addition, most periphyton can be accurately identified by experienced biologists, and tolerance or sensitivity to specific changes in environmental condition is known for many species.

The siltation index evaluates the percent of diatoms that are mobile. It is expressed as the relative abundance of *Navicula* + *Nitzschia* + *Surirella* (Bahls et al., 1992). These diatoms are able to crawl towards the surface if they are covered by silt; their abundance is thought to reflect the amount and frequency of siltation. The siltation index ranged from 32.84 to 49.26 percent for the Lower Musselshell River. The lowest value corresponded to the site with the steepest channel gradient and higher flows. Despite a sediment supply that is dominated by fine sediments, the Lower Musselshell River seems to have sufficient energy and streamflow to keep riffle areas relatively free of deposited sediment.

DEQ has assigned the Lower Musselshell River a water use classification of C-3, which means the quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture and industrial water supply. Waters classified as C-3 are suitable for bathing, swimming and recreation, growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers. The causes of pollution in the Lower Musselshell River are attributed to

flow alteration and riparian degradation. No pollutants are identified and, therefore, no TMDLs are necessary. However, in recognition of potential water quality impairments associated with "pollution," the Mosby/Musselshell River Group has prepared a water quality restoration plan that, when implemented, should have a positive influence on water quality and quantity. This plan is summarized below.

Summary of the Water Quality Restoration Plan

Summary of the Lower Musselshell River Water Quality Restoration Plan

***Waterbody Type*:**	River
***Pollution*:**	Flow Alteration Other Habitat Alteration: Riparian Degradation
***Impaired Uses*:**	Aquatic Life Support Warm Water Fisheries
***Size of Waterbody*:**	74 miles
***Size of Watershed*:**	1,672 miles^2
***Water Quality Standards*:**	State of Montana narrative standards for C-3 waters
Targets:	Improve overall annual irrigation efficiency by 18 percent or more by 2008. Reduce the amount of annual return flow to the river from irrigation water by 18 percent or more by 2008. Improve the cover and diversity of native riparian vegetation on 15 percent or more of stream corridor by 2008.
Voluntary Implementation:	**Irrigators/Landowners --** Implement BMPs by land smoothing at least 334 acres; converting flood systems to sprinklers on at least 200 acres; improving 1,600 feet of irrigation ditches, and installing 9,816 feet of gated pipe; upgrade management of irrigation water on at least 1,011 acres and install flow measuring devices; and utilize soil moisture monitoring methods on nine ranches. **Grazing Operations/Landowners** – Implement BMPs by installing at least 156,504 feet of cross fencing, 246,394 feet of stockwater pipeline with 68 off-site water facilities and developing grazing plans on at least 45,400 acres of rangeland.

References: Petroleum County Conservation District. 1998. *Musselshell River Priority Area Assessment and Monitoring Plan.* EQIP and Renewable Resource Grant and Loan Program Applications.

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BLOOD CREEK (MT40C004_030)

Area Description

Blood Creek (MT40C004_030) is a 59-mile long intermittent tributary to the Musselshell River in eastern Petroleum County. This area is part of the Missouri River Breaks of North Central Montana. Outcrops of Cretaceous Fox Hills Sandstone, Bearpaw Shale and the Hell Creek Formation are exposed in the steep hillsides. Scattered areas of ponderosa pine, rock outcrops, and bare soil badland formations are present at the confluence of Blood Creek with the Musselshell River. Native grasses and brush cover the majority of the area. Native rangeland is the major land use on the public lands administered by the Bureau of Land Management. Average yearly rainfall across the watershed during the past 30 years is about 13 inches (Prism Model).

The riparian habitat type commonly found along lower Blood Creek is Silver Sagebrush/Western Wheatgrass. This habitat type is one of the driest extremes of the riparian zone (Hansen et al., 1995). Other habitat types are Western Wheatgrass, Common Spikesedge, and Great Plains Cottonwood/Herbaceous. Trees and shrubs found in the riparian zone are cottonwood, juniper, peach leaf willow, sandbar willow and greasewood. Grasses and forbs found in the riparian zone are western wheatgrass, green needlegrass, Kentucky bluegrass, common cocklebur, and yellow sweetclover (RWRP Lotic Inventory Database, Site 9401008 - 9401018).

Beneficial-use Support Determination

Blood Creek was listed in the 1996 and 1998 Montana 303(d) lists. Each of these early lists indicated that the beneficial use of aquatic life was partially supported on two miles of stream. The probable cause was listed as other habitat alterations. The probable sources were listed as agriculture: rangeland. Blood Creek was initially listed from information provided in a 1994 BLM Water Quality Report. The report indicated that the riparian vegetation on the public lands along Blood Creek was not in proper functioning condition.

Blood Creek was reassessed in 2001 using a team of range, water and soil scientists from the Department of Environmental Quality, Bureau of Land Management, Riparian and Wetland

Research Program, Natural Resources Conservation Service, and Petroleum County Conservation District. The team evaluated the riparian habitat as functioning at risk with a static trend.

DEQ made a beneficial-use support determination in 2001. Blood Creek was found to partially support the beneficial uses of warm water fisheries and aquatic life on 30.5 miles. The cause of impairment is habitat alteration: riparian degradation. The source of impairment is grazing-related and natural. No pollutants have been identified; therefore, there are no necessary TMDLs for Blood Creek. http://nris.state.mt.us/wis/tmdlapp/detailsheets/MT40C004_030

Water Quality Restoration Plan

The Bureau of Land Management will address the issue of riparian degradation on Blood Creek in a watershed plan scheduled for completion in 2003. The final *Judith Valley Phillips Resource Management Plan Environmental Impact Statement* lists the objectives for managing riparian and wetland habitat as:

> (1) to improve or maintain riparian-wetland areas to proper functioning condition.
>
> (2) to achieve or maintain the desired plant community to provide wildlife habitat, increase waterfowl habitat by 30%, improve watershed conditions, and to comply with the nonpoint source water pollution section of the Clean Water Act.

The Bureau of Land Management implements riparian and wetland management of watersheds by developing new or revising existing allotment management plans (AMPs). The AMPs are designed to achieve the *Standards for Rangeland Health and Guidelines for Livestock Management* adopted by the Lewistown District (http://www.mt.blm.gov/lands/sandg.html#lfo).

LODGEPOLE CREEK (MT40C004_020)

Area Description

Lodgepole Creek (MT40C004_020) is a 27-mile long intermittent tributary to the Musselshell River in northwestern Garfield County. This area is part of the Missouri River Breaks of North Central Montana. The steep hillsides are composed of Cretaceous Fox Hills Sandstone, Bearpaw Shale and the Hell Creek Formation. Scattered areas of ponderosa pine, rock outcrops, and bare soil badland formations are present, with the majority of the area covered by native grasses and brush. The predominant form of riparian vegetation is perennial grass with smaller amounts of shrub and tree cover. Native rangeland and hayland are the major land uses. Average yearly rainfall across the watershed during the past 30 years is about 13 inches (Prism Model).

Beneficial-use Support Determination

Lodgepole Creek was listed in the 1992, 1994, 1996 and 1998 Montana 303(d) lists. Each of these early lists indicated that the beneficial uses of fishery and associated aquatic life were threatened. The probable causes were listed as flow alteration, thermal modifications, and other habitat alterations. The probable sources were listed as agriculture, construction, highway/road/bridge construction, irrigated crop production, and rangeland. The listing for Lodgepole Creek was carried over from list to list because no new data was available to the DEQ. Lodgepole Creek was initially listed from information provided in a Montana Department of Fish, Wildlife and Parks report titled

Northeast Montana Fisheries Study (MDFWP 1980). The report indicated the fishery was limited by temperature and flow regimes, but also stated that the primary sources were natural conditions.

Lodgepole Creek was reassessed by a cooperative effort between the Montana Department of Natural Resources and Conservation (DNRC) and the Garfield County Conservation District. In 1997, water chemistry and habitat observations were collected. A more extensive assessment, completed in 1999, evaluated data for water chemistry, periphyton and habitat. These data sets became available to DEQ after the 2000 303(d) list review was completed.

DEQ evaluated the 1980, 1997 and 1999 data and made a beneficial-use support determination. Lodgepole Creek was found to fully support the beneficial uses of fisheries and associated aquatic life. Flow and temperature data is limited to non-fixed station measurements in 1980, 1997 and 1999. Temperatures generally are within the range expected for intermittent prairie streams (32-80 °F).

The 1980 MDFWP fishery report indicated that the flow and temperature regime limiting the fishery was influenced primarily by natural conditions. Additional assessments nearly 20 years later and during a drought cycle indicate that the probable sources of agriculture, construction, highway/road/bridge construction, irrigated crop production, and rangeland have not resulted in an impairment to Lodgepole Creek. http://nris.state.mt.us/wis/tmdlapp/detailsheets/MT40C004_020

CALF CREEK (MT40C004_010)

Area Description

Calf Creek (MT40C004_010) is a 64-mile long intermittent tributary to the Musselshell River in western Garfield County. This area is part of the Missouri River Breaks of North Central Montana. The steep hillsides are composed of Cretaceous Fox Hills Sandstone, Bearpaw Shale and the Hell Creek Formation. The headwaters and uplands are composed of the Fort Union formation. Scattered areas of ponderosa pine, rock outcrops, and bare soil badland formations are present, with the majority of the area covered by native grasses and brush. The predominant form of riparian vegetation is perennial grass with smaller amounts of shrub and tree cover. Native rangeland and hayland are the major land uses. Average yearly rainfall across the watershed during the past 30 years is about 13 inches (Prism Model).

Beneficial-use Support Determination

Calf Creek was listed in the 1992, 1994, 1996 and 1998 Montana 303(d) lists. Each of these early lists indicated that the beneficial uses of fishery and associated aquatic life were threatened. The probable causes were listed as flow alteration, thermal modifications, and other habitat alterations. The probable sources were listed as agriculture, irrigated crop production, and rangeland. The listing for Calf Creek was carried over from list to list because no new data was available to the DEQ. Calf Creek was initially listed from information provided in a Montana Department of Fish, Wildlife and Parks report titled *Northeast Montana Fisheries Study* (MDFWP 1980). The report indicated the fishery was limited by temperature and flow regimes, but also stated that the primary sources were natural conditions.

Calf Creek was reassessed by a cooperative effort between the DNRC and the Garfield County Conservation District. In 1997, water chemistry and habitat observations were collected. A more extensive assessment, completed in 1999, evaluated data for water chemistry, periphyton and habitat. These data sets became available to DEQ after the 2000 303(d) list review was completed.

DEQ evaluated the 1980, 1997 and 1999 data and made a beneficial-use support determination. Calf Creek was found to fully support the beneficial uses of fisheries and associated aquatic life. Flow and temperature data is limited to non-fixed station measurements in 1980, 1997 and 1999. Temperatures generally are within the range expected for intermittent prairie streams (32-80 °F).

The 1980 MDFWP fishery report indicated that the flow and temperature regime limiting the fishery was influenced primarily by natural conditions. Additional assessments nearly 20 years later and during a drought cycle indicate that the probable sources of agriculture, irrigated crop production, and rangeland have not resulted in impairment to Calf Creek.
http://nris.state.mt.us/wis/tmdlapp/detailsheets/MT40C004_010

PUBLIC PARTICIPATION

Public participation in the review of the draft Lower Musselshell TMDL Planning Area Decision document is summarized in Appendix A.

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APPENDIX A
The Result of Public Participation in the Lower Musselshell TMDL Planning Area Decision Document

A public notice of availability of the draft Lower Musselshell TMDL Planning Area Decision Document and opportunity for providing comments was published on the DEQ home page http://www.deq.state.mt.us on November 28, 2001. A press release was posted on DEQ's Press Release Web Page announcing the availability of the decision document, the comment period and public meeting location and time. The press release was also posted on the listserve for watershed issues WASHED@listserv.montana.edu. In addition, a hardcopy of the press release was sent to the Lewistown News Argus, Winnett Times, Roundup Record-Tribune, and Jordan Tribune. The public meeting information was also posted on DEQ's Public Meetings Web Site.

A meeting to take public comment was held at the Petroleum County Courthouse at 1:00 p.m. on December 11, 2001. The Petroleum County Conservation District hosted the meeting. Twelve people attended. A 30-day public comment period ended December 28, 2001. One letter and one e-mail message was received during the comment period. A summary of the comments and responses follows.

COMMENT	RESPONSE
Rosgen classification of C-4 and Montana's water quality classification of C3 is very confusing	An explanation of the two systems was given at the public meeting.
When will the TMDL for riparian degradation on Blood Creek be completed?	The DEQ is not required to prepare a TMDL for riparian degradation. However, the BLM estimates that a plan to address this issue will be complete by 2003.
How will the long term monitoring be assured on the Lower Musselshell.	The Conservation Districts are encouraged to apply for 319 funding and other grants.
MFW&P did some fish sampling on the Lower Musselshell in August 2000. Sauger is probably not still common in the Lower Musselshell. In McMahon and Gardner 2001, it states in regard to the Musselshell, "No data are currently available on the status of sauger…Chronic dewatering limits its suitability as sauger habitat." This statement is accurate and chronic dewatering limits habitat suitability for other species too. Sauger is now a species of special concern.	McMahon and Gardner 2001 also quote the data given in the TMDL document. McMahon and Gardner 2001 estimate that sauger populations may have declined by 50 percent in the Lower Musselshell. They noted that there has been heavy fishing pressure as well as chronic dewatering issues. This document will be added to the list of references.