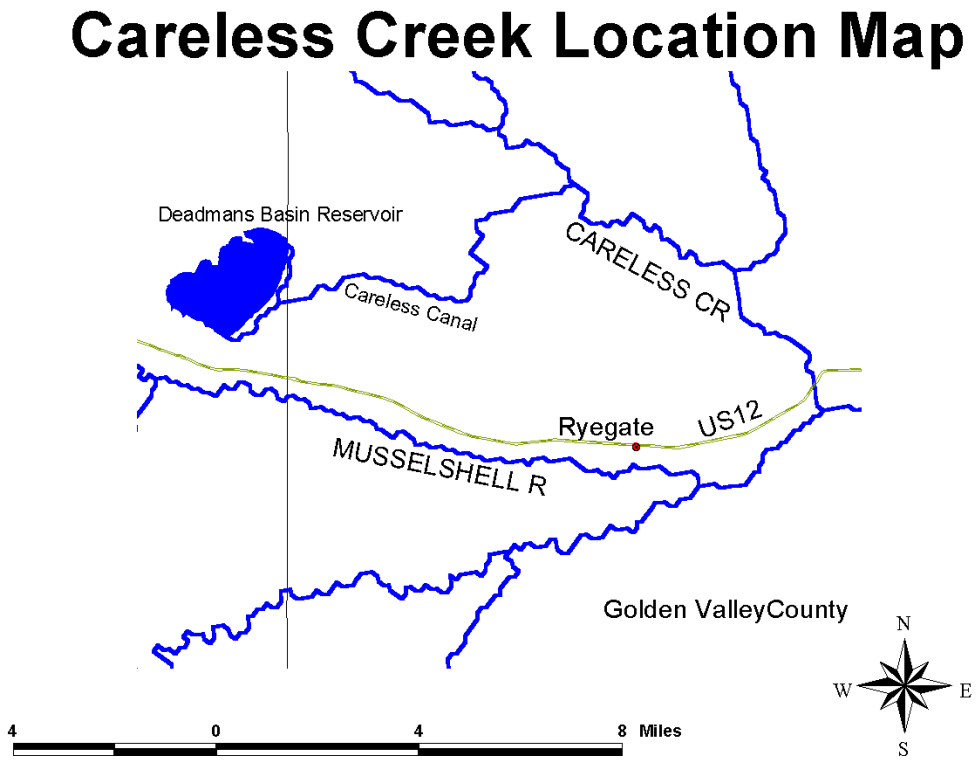
Careless Creek Water Quality Restoration Plan
February 22, 2001

Introduction

The waterbody addressed in this water quality restoration plan is the lower reach of Careless Creek (MT40A002_050) which is found in the Upper Musselshell hydrologic unit (HUC 10040201) and flows through Golden Valley County in central Montana. (See Location Map) Careless Creek is a part of the irrigation water delivery system of Deadman's Basin Reservoir. The reach is 15.5 miles long and extends from the confluence with the reservoir's Careless Canal to the Musselshell River. The water quality issues addressed in this plan are siltation, flow alteration, and riparian degradation. The major land uses in the Careless Creek watershed include irrigated agriculture and livestock grazing. About 90 percent of the watershed is privately owned with the remainder in state ownership.



The Careless Creek watershed effort is coordinated by a steering committee formed in 1992. The committee includes landowners, the Upper and Lower Musselshell Conservation Districts, Deadman's Basin Water User's Association, Deadman's Basin Cabin Owner's Association, Wheatland/Golden Valley Weed District, and several state and federal agencies. They established the *Musselshell River Basin and Careless Creek Coordinated Watershed Plan Golden Valley and Wheatland Counties* in 1998, and set the following goals for the watershed:

(1) Reduce artificial flows,
(2) Reduce streambank and channel erosion
(3) Establish voluntary BMPs throughout the watershed,
(4) Improve fisheries,
(5) Establish weed control,
(6) Reduce or eliminate artificial flows from Malloy Ditch into Careless Creek.

In the past, irrigation water release flows into Careless Creek from the Careless Canal have occasionally exceeded 250 cubic feet per second (cfs). This resulted in bank instability in Careless Creek and increased sediment load to the Musselshell. The background measurement of total suspended solids (TSS) delivered by Careless Canal is between 14-16 milligrams per liter (mg/l) at both high and low flows. Recent surveys found that 46 percent of the streambanks in Careless Creek were eroding and the TSS delivered to the Musselshell River was measured as high as 130–180 mg/l during the irrigation season.

Landowners have begun restoration projects and monitoring is underway on Careless Creek to implement the specific pollutant reductions proposed by the Careless Creek Steering Committee. The reduction of sediment by 25 percent within five years will be accomplished by stabilizing and restoring vegetation to a minimum of 54 percent of eroding streambanks, increasing the stream channel length by 4 percent, and reducing irrigation water release flows to a targeted goal of 100 cfs at the Careless Canal diversion and 80 cfs at the confluence of Careless Creek with the Musselshell River. In addition, best management practices (BMPs) will be installed to protect restoration projects and improve animal feeding operations. The infrastructure of the Deadman's Basin Irrigation System will be upgraded so the Barber Canal can accommodate larger release flows and thereby reduce flows through Careless Canal into Careless Creek. As a result of restoration activities, recent periphyton samples demonstrate that the aquatic life in Careless Creek approximates what is expected in a warm water prairie stream (8).

The Careless Creek project was awarded the CF Industries National Watershed Award in 2000 for developing model programs to protect local watersheds. The Conservation Fund honored the central Montana project for establishing a balance between agricultural production, water use and conservation. CF Industries, a North American cooperative, has been making these annual awards since 1996 in response to a recommendation by the national Forum on Nonpoint Source Pollution. The award recognizes effective, nonregulatory approaches for improving water quality.

Review Elements for Approving Water Quality Restoration Plans

For Careless Creek, the cause of the water quality concern falls under the category of nonpoint source pollution in contrast with water quality concerns related to point source discharges. The total maximum daily load (TMDL) for Careless Creek is made up of an allocation of voluntary management practices for each group that can have a positive effect on restoring water quality.

In the 1996 303(d) list of impaired waterbodies, the probable impaired uses are warm water fisheries, aquatic life support, and recreation and the water quality in Careless Creek did not support these uses. In the 1998 303(d) list, the same uses are listed as being partially supported by the water quality in Careless Creek. During the sufficient credible data review in 1999, the Department of Environmental Quality determined that the water quality of Careless Creek partially supports a warm water fisheries and aquatic life but fully supports recreation.

In the 1996 and 1998 303(d) list of impaired waterbodies, the probable causes listed for Careless Creek were nutrients, suspended solids, flow alteration, and other habitat alterations. During the sufficient credible data review in 1999, the Department of Environmental Quality determined that nutrients were not a cause of impairment for Careless Creek, that siltation rather than suspended solids best described the sediment issue, and that riparian degradation was the specific type of "other habitat alteration" to be addressed. Careless Creek had a low priority for TMDL development in the 1998 303(d) list. The 2000 303(d) list gives Careless Creek a high priority for TMDL development.

The following elements are used by the Environmental Protection Agency in evaluating the sufficiency of a TMDL submitted under the Clean Water Act:

- Stream Classification and Standards
- Water Quality Standards Target
- TMDL
- Significant Sources
- Technical Analysis
- Margin of Safety & Seasonal Variation
- Allocation
- Public Participation

Careless Creek Water Quality Restoration Plan

- Stream Classification and Standards

  The overall purpose of a water quality restoration plan is to achieve and maintain water quality standards established by a state or tribe. A particular plan will address issues related to waterbody use impairments or threats due to a specific pollutant or a number of pollutants.

  Careless Creek is classified as C-3, a warm water fisheries below the confluence with Swimming Woman Creek (ARM 17.30.610(5)(f). The reach of Careless Creek affected by this action is 15.5 miles long and extends from the confluence of the creek with the Deadman's Basin Careless Canal to the Musselshell River. (See Location Map.) The waterbody number of this reach is MT40A002_050 and it is found in the Upper Musselshell hydrologic unit, HUC 10040201. The beneficial uses of the water that are partially supported are aquatic life and warm water fisheries.

  This TMDL will address the narrative standard for sediment. "No increases are allowed above naturally occurring concentrations of sediment, settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife (ARM 17.30.629(f)."

  The beneficial uses adversely affected by flow alterations and riparian degradation are defined in the C-3 classification of Careless Creek which states that such waters are "suitable for bathing, swimming and recreation, growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers." (ARM 17.30.629 (1))

- Water Quality Standards Target

  A water quality restoration plan should have a target, which is quantifiable, relates to achieving the water quality standard, and can be used as a measure of success for restoration and protection efforts.

  The vegetation, on a minimum of 54 percent of eroding streambank will be stabilized and restored.

  Stream channel length will be increased by 4 percent by restoring an oxbow that was cut off from the main channel of Careless Creek several years ago.

  Recognizing that this is a targeted goal, the Deadman's Basin Water Users Association is committed to a water release policy restricting flows to no more than 100 cfs at the Careless Creek diversion and no more than 80 cfs at the confluence of Careless Creek and the Musselshell River.

These targets are based on studies completed by Aquoneering (1), the Bureau of Reclamation (3), and other technical advisors on the project, and are believed to be the appropriate level of treatment to result in a stable, natural channel.

- TMDL

A TMDL should be expressed in a manner that relates to the pollutant of concern and is linked to achieving the water quality standards target. In the case of Careless Creek, the management of irrigation release flows as well as restoration projects and the application of BMPs within the watershed are expected to achieve the water quality standards.

The reduction of sediment by 25 percent will be accomplished by stabilizing and restoring vegetation to a minimum of 54 percent of eroding streambanks, increasing the stream channel length by 4 percent, and reducing irrigation water release flows to a targeted goal of 100 cubic feet per second (cfs) at the Careless Canal diversion and 80 cfs at the confluence of Careless Creek with the Musselshell River.

- Significant Sources

A water quality restoration plan should identify the sources and causes related to the pollutant of concern. All significant sources should be considered in establishing the TMDL and developing control practices.

Erodible soils and the Cretaceous Bearpaw Shale in the watershed constitute a significant source of both sediments and nutrients. The C-3 classification for Careless Creek reflects the contribution of this natural source and indicates that the water is marginal for drinking, culinary and food processing purposes, agriculture and industrial water supply. This means that drinking water standards will not apply in setting the TMDL.

The pollutant of concern is sediment. The probable sources are pasture grazing of riparian vegetation, flow regulation, bank destabilization, and habitat modification. The significant sources are delivery of irrigation water from Deadman's Reservoir, livestock grazing, and the Malloy ditch draining Franklin Lake. The NRCS identified these sources in a watershed inventory completed in 1995 and an inventory of land use and vegetative cover completed in 1996 (5).

- Technical Analysis

An appropriate level of technical analysis should support a water quality restoration plan. The appropriate level of analysis is often dependent upon the complexity of the water quality problem, the certainty needed prior to embarking on control measures, and the data and information available to support TMDL development.

Study of the Deadman's Basin Reservoir Careless Creek Release System—A Nonpoint Source Pollution Reduction Project with Regard to Sediment Production (1) is a hydraulic and geomorphic analysis of Careless Creek. Water surface profiles were modeled in Careless Creek using the Corps of Engineers HEC-2 program with input of cross-section geometry from 19 locations and calibration at two observed flows of 65 and 150 cfs. This model was used to suggest the maximum flow that Careless Creek could sustain. The geomorphic analysis determined that the main source of sediment was from bank instability in Careless Creek. Therefore, the stabilization of eroding banks should have a significant effect on reducing sediment levels in Careless Creek.

The Bureau of Reclamation analyzed on-farm irrigation efficiency and water supply using the Hydrologic River Operations Study model (HYDROSS) in the Musselshell River Basin Management Study (3). The model suggested how increased on-farm irrigation efficiency and cooperation among the irrigation associations could reduce water demand and artificial flows. Decreased flow in Careless Creek should enhance the revegetation of stabilized banks.

Natural Resource Conservation Service personnel inventoried seventeen miles of creek channel in 1998. About 14,150 feet have been restored, 32,315 feet will be allowed to self-heal with low irrigation water flows, and 43,295 feet are actively eroding. Of the actively eroding banks, 35,106 feet are considered natural or human-related but not scheduled for restoration. The remaining 8,189 feet are designated critically eroding and are endangering irrigated haylands, roads or irrigation ditches.

- Margin of Safety & Seasonal Variation

The Clean Water Act requires that each TMDL take into consideration a margin of safety to address uncertainty within the TMDL as well as consider seasonal variation.

The following monitoring will provide a margin of safety for the Careless Creek Water Quality Restoration Plan by indicating how well the plan is being implemented and whether or not the plan should be modified to achieve success:

Water Quality Monitoring Sites

1) Electrical Conductivity (EC), Water Temperature, pH, and Flow Meters
   - Monitor flow rates at the inlet of Careless Canal and the mouth of Careless Creek.
   - EC, water temperature and pH will be monitored before, during and after irrigation season at three sites on Careless Creek. (April, July, October)

   Conducted by: Deadman's Basin Waterusers Association, Landowners, CD. (Monitoring will begin in 2001).

2) Bank Erosion Survey

- A bank erosion inventory will be conducted every five years to determine the active erosion and self-healing of the streambanks.

Conducted by: Landowners/NRCS

- Channel cross sections will be surveyed at 19 different sites. A resurvey of the cross sections sites will be completed every five years and following flood events. All surveys will include a photo plot and pebble counts. (See Map 2.) Additional photopoints, targeted by the steering committee, will be taken at the same time. Appropriate current and past photoplots will be properly cataloged and GPS coordinates taken.

Conducted by: NRCS/Deadman's Basin Waterusers Association, Landowners, CD

Items 1 and 2 will replace actual sediment sampling. These will be more beneficial and more accurate in measuring reduction in sediment sources over time.

Map 2 Location of Cross Sections

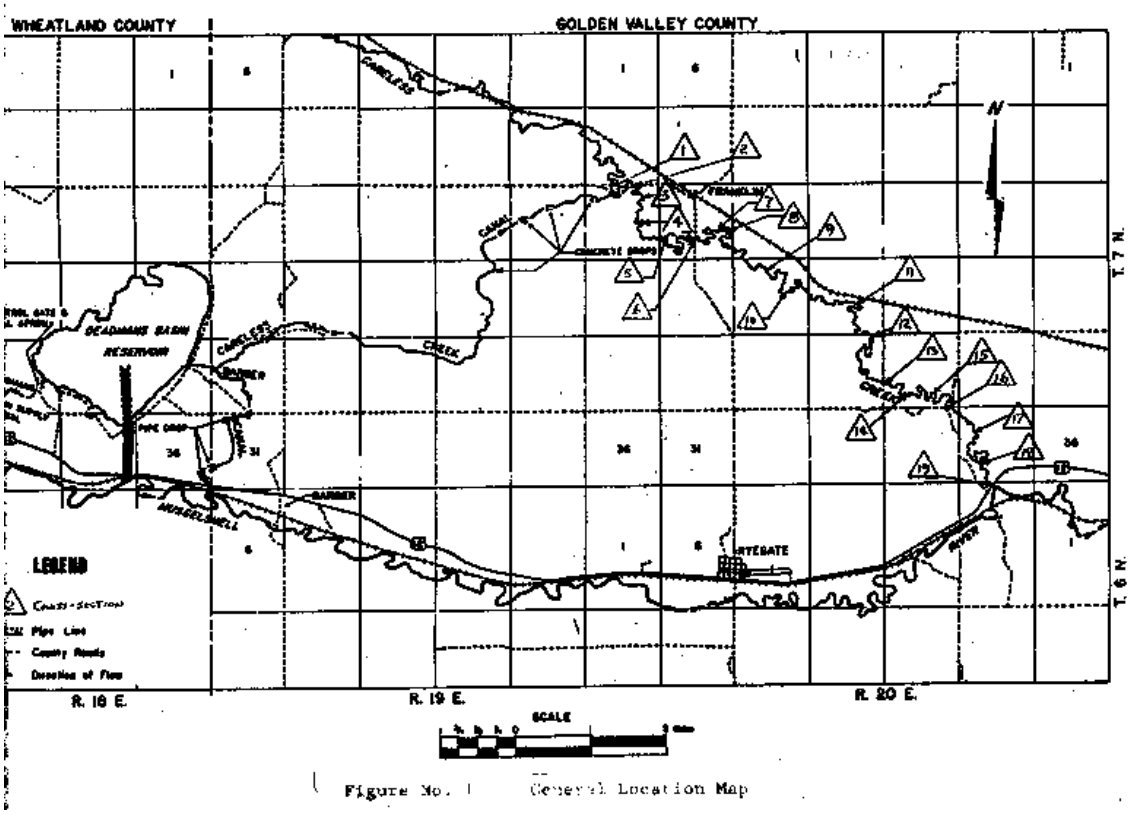


Figure No. 1 General Location Map

3) Macroinvertebrates

♦ DEQ's Rapid Bioassessment Protocol for aquatic insects will be implemented every five years at Careless Creek.

Conducted by: Conservation District, landowners, Deadman's Basin Waterusers Association, Landowners, CD, and DEQ.

4) Fish Monitoring

♦ Summary and documentation of species in Careless Creek every five years, at the same sampling location.

Conducted by: Fish, Wildlife, and Parks

The DNRC and water users association monitor water releases in the reservoirs and canals; while streamflow is monitored by USGS. The irrigation structures are inspected regularly and steps are taken to prevent loss of function or failure. (3)

An additional margin of safety is provided in two ways. The monitoring plan includes multiple parameters that assure that all problems are addressed in the creek. Every five years the steering committee has agreed to prepare a report that summarizes the monitoring data and evaluates the progress made in implementing the plan.

Seasonal variation is considered in the plan because:

High flow during dry weather, due to the demand for water delivery from the irrigation system, increases instability of eroding banks and sediment delivery to the Musselshell River.

♦ Allocation

Individual allocations of loads or management practices are developed to address the sources and causes that need to be controlled to achieve water quality standards. (See Map 3.)

Department of Natural Resources and Conservation – support current water management of reduced released flows to a targeted goal of 100 cfs at the Careless Canal diversion and 80 cfs at the confluence of Careless Creek with the Musselshell River by accomplishing the following actions: 1) Install permanent applicable measuring devices at the confluence of Careless Canal and Careless Creek and at the confluence of the Musselshell River and Careless Creek, to be in place by the next irrigation season. 2) Install a controlling headgate at the Careless Canal diversion. 3) Annually review the Deadman's delivery infrastructure.

Natural Resources Conservation Service –conduct watershed, land use and vegetative cover inventories. Provide engineering services and oversee restoration activities.

Department of Fish, Wildlife and Parks – monitor fishery status, provide funds for livestock access bridge and water gaps.

Deadman's Basin Water Users Association – manage and monitor flow rates in Careless Creek Canal and at the confluence of Careless Creek with the Musselshell River, upgrade the capacity of the Barber Canal to approximately 300 cfs, and commit to ongoing improvements of watershed management in the Musselshell River.

Lower Musselshell Conservation District – administer contracts for BMP and restoration activities, provide coordination for restoration activities, explore BMPs for measuring sediment delivery during high artificial flows, inform landowners and water users about plan implementation (7).

Landowners – implement BMPs for irrigation and livestock grazing. Assist in volunteer monitoring.

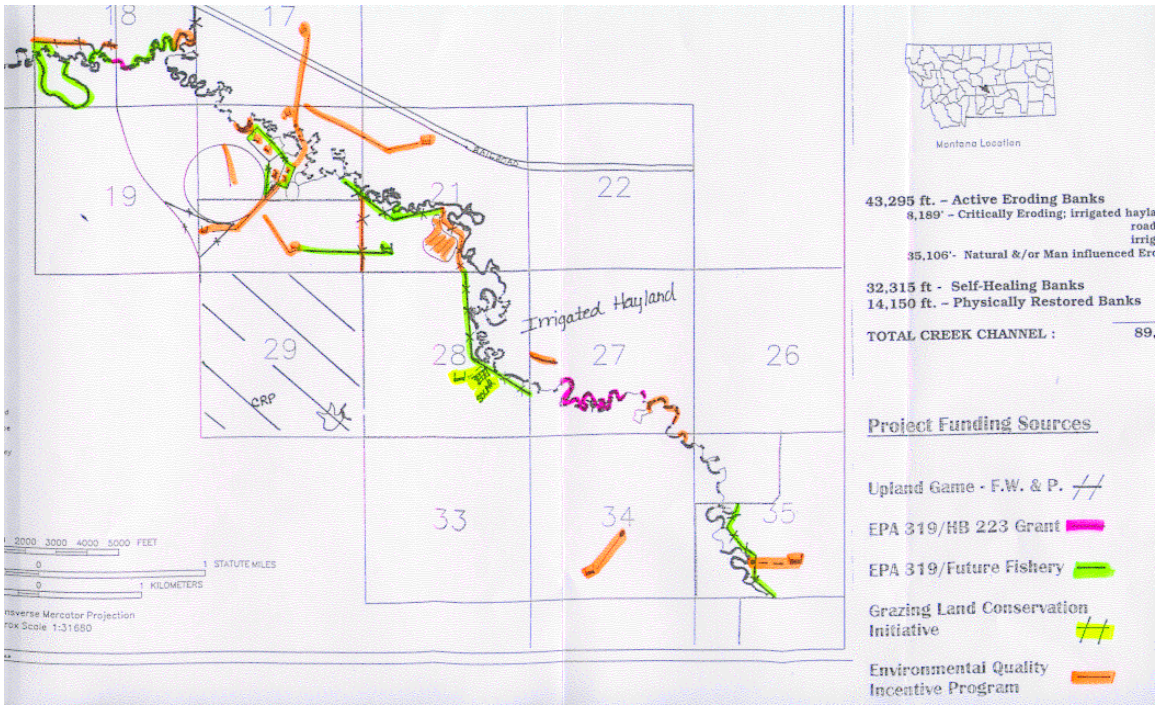
Careless Creek Steering Committee – annually review the flow rate management plan and the monitoring data. Every five years the steering committee will prepare a report that summarizes the monitoring data and evaluates the progress made in implementing the plan.

- Public Participation

The public should be informed of the restoration efforts and be given an opportunity to be involved and to review the TMDL and its recommendations.

A local steering committee sets goals and evaluates project success. The committee formed in 1992 and expanded after a "Know Your Watershed Workshop" was held in Harlowton in 1995. The committee includes landowners, the Upper and Lower Musselshell Conservation Districts, Deadman's Basin Water User's Association, Deadman's Basin Cabin Owners Association, Wheatland/Golden Valley Weed District, and several government agencies. (4)

Map 3 Location of Best Management Practices



In 1996, a "Know Your Watershed Workshop" follow-up was held for Careless Creek. In addition, an annual "Outdoor Classroom" involved school children in restoration projects (4). The Lower Musselshell Conservation District publishes a quarterly newsletter, *Musselshell Review*, to inform residents about stream restoration activity (6). Annual watershed gatherings are planned to review watershed activities in the Musselshell River basin.

For information specific to the water quality restoration plan, the Bureau of Reclamation included a discussion of TMDLs in the October 1997 *Musselshell River Basin Management Study* (3). A public meeting to present the TMDL and take public comment was held on January 17, 2001 at the USDA Service Center in Ryegate. (See Appendix A.)

Implementation of the Water Quality Restoration Plan

The components of the Careless Creek Water Quality Restoration Plan are either presently in place or funding has been acquired for implementation. The major sources of funds are DEQ's 319 Nonpoint Source Grants with matching money provided by landowners and NRCS's Environmental Quality Improvement Program supplemented by cost share from landowners.

Sediment levels have decreased in Careless Creek and streambanks, where restoration projects have been completed, are revegetating. A major project for sediment reduction was completed in 1999 by moving a livestock feeding operation away from the stream and implementing an agricultural waste control system. Landowners have built many structures to optimize the use and condition of 18,223 acres of range and riparian vegetation. These include well and spring developments, pipelines, water tanks, fencing, water gaps, bridge crossings, and pasture seeding. Monitoring will demonstrate if the impacts of siltation in Careless Creek are reduced by these actions and if the reduction target is still being achieved.

References

1) Aquoneering. February 1991. *Study of the Deadman's Basin Reservoir Careless Creek Release System—A Nonpoint Source Pollution Reduction Project with Regard to Sediment Production.* Laurel, MT.

2) Harrison, Doug & Williams, Connie. 1995. *Careless Creek Watershed Inventory.*

3) Bureau of Reclamation, etal. October 1997. *Musselshell River Basin Management Study.* Billings, MT.

4) Sellars, Alice & Milton, Bill. May 1998. *Musselshell River Basin and Careless Creek Watershed Coordinated Watershed Plan Golden Valley and Wheatland Counties*, Roundup, MT.

5) Sellers, Vickie. 1999. *Development of TMDL to Reduce Nonpoint Source Sediment Pollution in Careless, Creek, Montana*. NRCS. Harlowton, MT.

6) Lower Musselshell Conservation District. *Musselshell Review,* Roundup, MT.

7) Lower Musselshell Conservation District. April 1995. *Long Range Plan, Resource and Conservation Development.*

8) Bahls, Loren. 2000. *Support of Aquatic Life Uses in Careless Creek, Lodgepole Creek and SF Lodgepole Creek based on the composition and structure of benthic algae community.* Helena, MT.