

Lone Tree Creek TMDL Addressing Riparian Habitat Degradation, Flow Alteration and Nutrient Enrichment

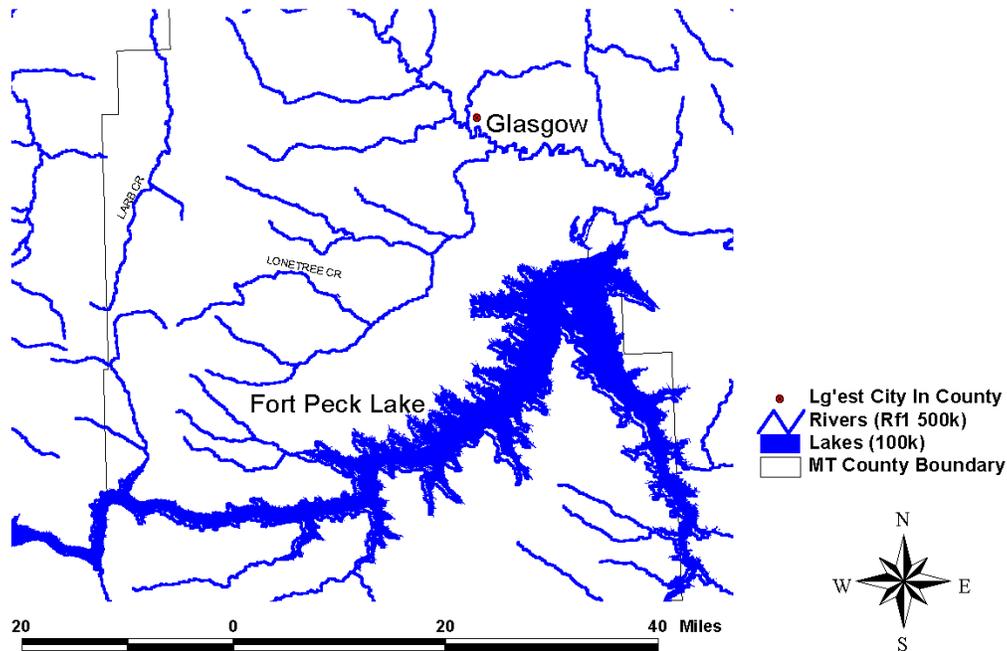
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Introduction

The waterbody addressed in this TMDL is Lone Tree Creek (MT400002_050) which is found in the Lower Milk hydrologic unit (HUC 10050012) and flows through southern Valley County in eastern Montana. (See Map 1.) The creek is 18.5 miles long and extends from the headwaters of Lone Tree Creek to its confluence with Willow Creek. The water quality issues addressed by this TMDL are riparian habitat degradation, flow alteration and nutrient enrichment. The probable sources of the impairment are listed as dam construction, grazing, and bank modification and destabilization.

MAP 1

Location Map



The major land use in the Lone Tree Creek watershed is livestock grazing with some hay and grain production. The area is also popular for big game and bird hunting. Water is retained in the Lone Tree--Willow Creek basin by a series of 57 detention reservoirs and three spreader dike systems built in the 1950s and 1960s. Most of these structures have been abandoned by decision of the 1987 Willow Creek Plan. The majority of the watershed is public land managed by the Bureau of Land Management with a minor portion in state and private ownership. (See Map 2.)

Management issues discussed in the *Missouri-Lone Tree Watershed Plan* (BLM 1997) address the objectives set out in the Judith, Valley, Phillips Resource Management Plan (BLM 1994). These include:

- Improvement of riparian areas to proper functioning condition
- Achieving a desired plant community (including age structure of woody species where there is potential)
- Leaving adequate residual cover to protect streambanks
- Off-road travel restrictions

The Montana 1998 303(d) list assigned a low priority for developing a TMDL for Lone Tree Creek as compared to the moderate priority assigned in the proposed 2000 303(d). The proposed 2000 303(d) list does not target this TMDL for completion in 2000/2002. The TMDL is contained in the *Missouri-Lone Tree Watershed Plan* (BLM 1997) and submittal does not disrupt the schedule for targeted TMDLs.

TMDL Review Elements

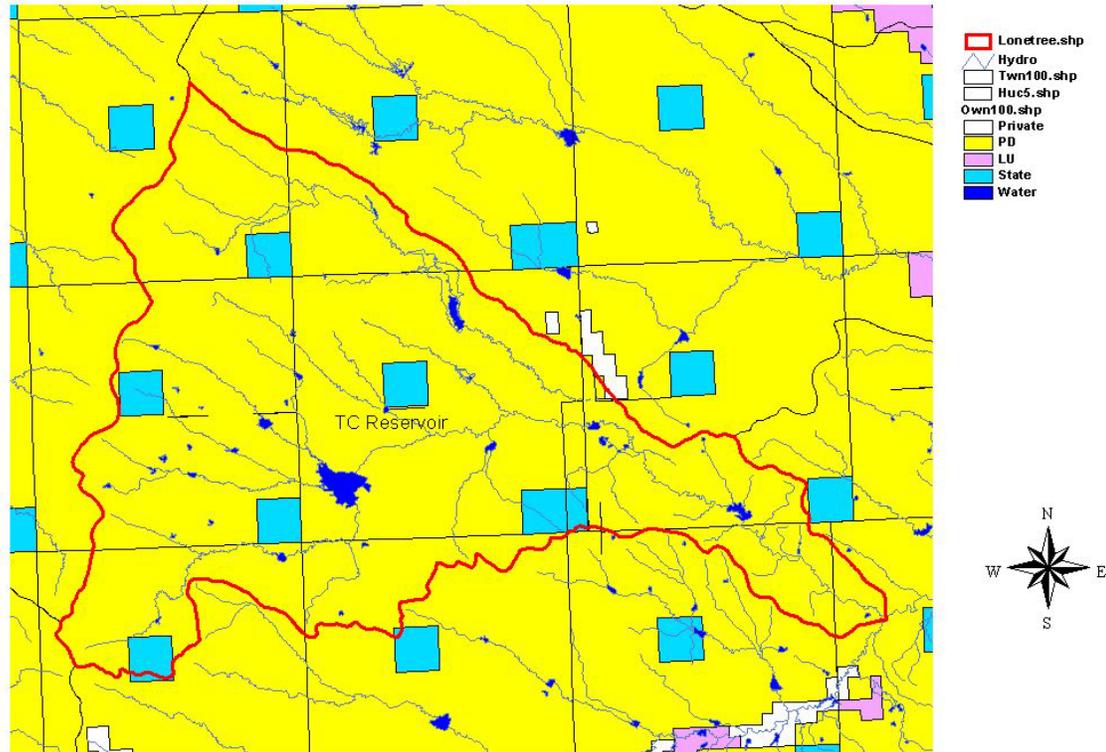
The following elements were used as review criteria in evaluating the sufficiency of the State submittal as a TMDL under the Clean Water Act. For a submittal to be approved as a TMDL, the following elements need to be addressed in some manner relevant to the water quality issue:

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

For Lone Tree Creek, the causes of the water quality impairment are attributable to nonpoint sources of pollution in contrast with water quality concerns related to point source discharges of pollutants. The TMDL for Lone Tree Creek is made up of a load allocation attributed to nonpoint sources and natural background. Load allocations are defined in EPA's regulation as best estimates of the acceptable loading which may range from reasonably accurate estimates to gross allotments (see 40 CFR 130.2). EPA has determined that the development of TMDLs to address nonpoint sources is appropriate (US EPA 1997).

Map 2 Land Uses

Lone Tree Watershed



Lone Tree Creek TMDL

- Stream Classification and Standards

The overall purpose of TMDLs is to obtain and maintain water quality standards established by a state or tribe. A particular TMDL will address the impairment of the beneficial uses of the water by a specific pollutant or a number of pollutants.

Lone Tree Creek is an intermittent stream classified as B-3, a warm water fishery (ARM 17.30.610(8)). The flow of water in the stream is discontinuous in all seasons except spring; however, pools of water remain most of the year. Lone Tree Creek is 18.5 miles long and extends from the headwaters of Lone Tree Creek to its confluence with Willow Creek. (See Map 2.) The waterbody number is MT400002_050 and it is found in the Lower Milk hydrologic unit, HUC 10050012. 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 nutrients. “State surface waters must be free from substances attributable to municipal, industrial, agricultural practices or other discharges that will create conditions which produce undesirable aquatic life.” (ARM 17.30.637(1)(e)).

The beneficial uses adversely affected by riparian habitat degradation, flow alterations and nutrients are defined in the B-3 classification of Lone Tree Creek which states that such waters are suitable for growth and propagation of non-salmonid fishes and associated aquatic life (ARM 17.30.625).

The Montana 1998 303(d) list indicated that siltation was a probable cause of pollution for Lone Tree Creek, but nutrient enrichment was not listed. The sufficient credible data review in 2000 verified that there was no exceedence of standards for siltation but that nutrient levels exceeded that recorded in reference stream data. USGS data from 1972 indicates a sediment yield of 500-acre feet per year in the watershed and estimates that is within the range expected for a watershed of this geology.

- Water Quality Standards Target

A TMDL 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.

At least 37 percent of the stream miles with riparian vegetation, which is rated as nonfunctioning or functioning at risk with an upward trend, will be stabilized and restored to proper functioning condition by the year 2010. The protocol for determining proper function and condition of the riparian vegetation can be found at the following Internet site--<http://www.rwrp.umt.edu>.

Stream flow will be restored to the original channel below Triple Crossing Reservoir to decrease active lateral cutting of channel banks. Channel length will be increased by a quarter mile and bank erosion stabilized by the year 2010. Representative channel cross-sections are monitored to measure lateral movement, aggradation and degradation of the stream.

Eighty percent of "ecological condition" on upland acreage will reach a late seral or "potential natural community" (Ross, Hunter 1976) by the year 2000 except where habitat requirements for certain wildlife species require lower seral status.

In order to minimize nuisance algal blooms, periphyton samples will demonstrate a pollution index of 2.00 or greater by the year 2010 (Bahls 1992).

- 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 Lone Tree Creek, the restoration projects and the application of BMPs within the watershed are expected to achieve the water quality standards.

The Lone Tree Creek riparian inventory mapped 6.6 (Appendix 3) miles of riparian habitat that is functioning at risk with an upward trend. The remainder is in proper functioning condition. The State of Montana's *Best Management Practices for Grazing* (DNRC 1999) will be used to return riparian habitat to "proper functioning condition" by the year 2010 by reducing amount of bare ground and streambank damage caused by livestock.

Active lateral cutting of channel banks below Triple Crossing Reservoir will stabilize and bank erosion will decrease by 50% after stream flow is returned to one-quarter mile of abandoned channel.

Based on nutrient concentrations which have been recorded for Total Kjeldahl Nitrogen (TKN) as high as 6 mg/l during the hot season, the average nutrient load will be reduced by 80 percent. TKN measures all the nitrogen in the water derived from ammonia and organic sources. The recommended concentration to reduce the growth of nuisance algae is 1 mg/l in the Northwestern Great Plains Ecoregion. This reduction will be accomplished by reducing bank erosion, improving the condition of riparian habitat and the upland vegetation, and will improve the periphyton pollution index.

- Significant Sources

A TMDL 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.

The pollutants of concern are nutrients that can result in nuisance algal blooms. The sources of the pollutants and the riparian habitat alteration are attributable to the erodibility and chemical composition of the Bear Paw Shales. The primary conditions that would accelerate natural erosion in the watershed are failure of water control structures and poor grazing management. Degradation of riparian habitat is also accelerated by the activity of beaver and other wildlife.

- Technical Analysis

An appropriate level of technical analysis should support a TMDL. 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.

Aerial photos from 1953 and 1981 were used to evaluate changes in vegetative cover and channel pattern. BLM professionals located photo points to document changes over time in upland and riparian vegetation and the stream channel. In addition, a BLM hydrologist installed channel cross-sections to measure lateral movement, aggradation and degradation of the stream.

Riparian health/function ratings of proper functioning condition (31%), functioning at risk with an upward trend (69%), and nonfunctioning (0%) were determined by BLM professionals and the Riparian and Wetland Resource Program of the University of Montana for riparian areas in the Missouri/Lone Tree Watershed. (See databases at <http://www.rwrp.umt.edu>.) The BLM monitors the implementation of allotment management plans annually and revises the plans as needed or every ten years (Judith Valley Phillips Resource Management Plan 1994). Healthy riparian areas protect banks during high flows, filter sediments, store water in the banks, reduce peak flow and prolong base flows, and generally reduce nonpoint source pollution.

Algal populations will be monitored by the use of sampling protocols developed by DEQ. Aquatic life in the plains streams in Montana tend to be nitrogen limited (Bahls 1992). Periphyton populations and pollution indices will be compared to those of reference streams that represent the Northwestern Great Plains Ecoregion: Larb Creek in Valley County and Little Dry Creek in Garfield County.

- 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.

Seasonal variation is considered because spring runoff and the occasional large summer storm or winter snowmelt are the only conditions that result in stream flow on Lone Tree Creek. The remainder of the year the stream does not flow but consists of a series of pools.

The BLM will evaluate the success of the TMDL through a monitoring plan that involves the grazing lessees and BLM professionals. The plan includes:

- Photodocumentation

- stream banks
 - riparian areas
 - upland range

- Stream Channel Morphology

- channel cross-sections to evaluate width/depth ratios
 - bank erosion pins to evaluate erosion rates

- Biological Monitoring

- riparian condition
 - macroinvertebrates
 - periphyton

The watershed plan provides a margin of safety by listing the steps that will be taken if the monitoring shows that the goals of the TMDL remain unmet. These steps are fencing riparian/wetland areas, reducing livestock numbers and use, and rehabilitating degraded riparian and wetland areas. In addition, the historical reference condition for TKN in Larb Creek (the reference stream nearest to Lone Tree Creek) is an average of 2 mg/l. The more conservative value of 1 mg/l, which was selected for this TMDL, takes into account the TKN values from several reference streams in the Northwestern Great Plains Ecoregion.

- Allocation

Individual allocations of loads or management practices should be developed to address the sources and causes that need to be controlled to achieve the TMDL. This allocation can be done by pollutant source category, on a subwatershed level.

Grazing permittees – implement BMPs to optimize the health of riparian and wetland areas, the utilization of upland range, and the management of animal waste. Assist in volunteer monitoring.

BLM – maintain allocation of 60 % of AUMs (animal unit months) for watershed protection and wildlife habitat. Implement regional standards and guidelines for management of rangelands (BLM 1997). Install fencing. Monitor stream channel changes and periphyton and macroinvertebrate populations. Return stream flow to the original channel below TC Reservoir. Evaluate implementation of watershed plan and modify plan as needed.

Department of Environmental Quality – reconsider the classification of Lone Tree Creek as a B-3 stream. The natural mineral content of the water may be too high to support beneficial use of the water for human consumption or irrigation. A C-3 classification may better define the natural water quality of this stream.

- 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.

In establishing the *Missouri-Lone Tree Watershed Plan*, the BLM hosted public tours and consulted with grazing permittees and representatives of conservation groups. On October 12, 2000, the Montana State University Agriculture & Extension News Service issued a press release to Internet and newspapers in Montana describing the implementation of the watershed plan.

A public notice of availability of the TMDL and opportunity for providing comments was published on the DEQ home page <http://www.deq.state.mt.us> on January 17, 2001. A meeting to take public comment was held at the Glasgow

City/County Library at 1:00 pm on Wednesday, January 31, 2001. Fifteen people attended the meeting. A 30-day public comment period ended February 16, 2001. See Appendix A for a summary of comments and responses.

TMDL Implementation

The components of the Lone Tree Creek TMDL, which addresses riparian habitat degradation, flow alteration and nutrient enrichment, are either presently in place or are planned for completion by the year 2010. The major sources of implementation funds for the restoration activities that have been completed are from grazing permittees and the BLM.

The health of the riparian vegetation is improving and the toes of the eroding channel banks are revegetating. The goal for ecological condition on upland acreage established by the RMP (BLM 1997) has been exceeded; 84% is in a late seral or potential natural community. Grazing permittees have hired range consultants to monitor upland and riparian conditions.

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