

Reimel Creek TMDL Implementation Evaluation



Riparian Vegetation on Reimel Creek, USFS 2012

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Steve Bullock, Governor
Tom Livers, Director DEQ



PREPARED BY

Planning, Protection and Assistance Division
Watershed Protection Section

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Montana Department of Environmental Quality
Water Quality Planning Bureau
1520 E. Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901

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ACRONYMS

Acronym	Definition
BAER	Burned Area Emergency Response
BMP	Best Management Practices
BNF	Bitterroot National Forest
CO	County
CWAIC	Clean Water Act Information Center (DEQ)
DEQ	Department of Environmental Quality (Montana)
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (US)
GIS	Geographic Information System
NFSR	National Forest System Road
OHV	Off-Highway Vehicle
TIE	TMDL Implementation Evaluation
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
WEPP	Washington Erosion Prediction Program
WQRP	Water Quality Restoration Plans

EXECUTIVE SUMMARY

The Water Quality Restoration Plan and Total Maximum Daily Loads (TMDL) for the Bitterroot Headwaters Planning Area (Mathieus, 2005) was completed on November 3, 2005 and approved by Environmental Protection Agency (EPA) on April 12, 2006. The document contains EPA-approved TMDLs for 17 pollutant/waterbody combinations in the Bitterroot Headwaters TMDL Planning Area. This included TMDLs for siltation and suspended solids in Reimel Creek with impaired beneficial uses of aquatic life and cold-water fisheries. The restoration plan also addresses other issues outside of the TMDL requirements, such as habitat alterations.

This Reimel Creek TMDL Implementation Evaluation (Evaluation) summarizes efforts to date that have been made to address the water quality issues identified in the 2005 TMDL document, specifically sediment within the Reimel Creek watershed. The TMDL document provides load allocations for two primary sources of sediment in Reimel Creek, forest roads and the fires of 2000 (**Appendix B**). Additional sediment targets for the Bitterroot headwaters were provided by DEQ in 2011 and have been included in this evaluation.

The Bitterroot National Forest (BNF) has done significant work in the Reimel Creek watershed to improve water quality and fish passage. These activities include revegetation, the relocation of forest road 727, replacement of culverts, installation of riparian fencing, monitoring, and modeling sediment load reductions using the Washington Erosion Prediction Program (WEPP). Details on these activities can be found in Section 2. Reimel Creek was selected for TMDL Implementation Evaluation based on the extent of work completed in the watershed and potential progress made towards supporting beneficial uses.

Based on the extent of restoration work done thus far, Department of Environmental Quality (DEQ) concludes that all reasonable land, soil, and water conservation practices have been implemented on land managed by the Bitterroot National Forest. Data collected in 2013 by DEQ with assistance from the BNF was analyzed against sediment targets for the Bitterroot Headwaters (DEQ, 2005) and indicates that water quality is improving but does not yet meet current targets. DEQ recommends continued monitoring of past activities to determine maintenance needs and to prevent future degradation, and a reassessment for sediment/siltation impairment in 2018.

1.0 BACKGROUND

The Reimel Creek watershed, (within hydrologic unit 170102050503) is approximately eight square miles and includes two main tributaries: Wallace Creek, and Diggins Creek. The watershed has an average elevation of 6,100 feet and is characterized by Douglas fir and mixed subalpine forest. The Bitterroot National Forest manages 96% of the land within the watershed with the remaining 4% held privately. Private lands are concentrated near the stream channel in the lower part of the watershed. Past land uses within the watershed include timber harvest, dispersed recreation, and grazing (Mathieus, 2005).

In 2000, forest fires burned extensively throughout the Bitterroot Headwaters, including the Reimel Creek watershed. Fifty-seven percent of the Reimel Creek watershed was burned, and nearly half of that was classified as severely burned. Several mudslide and debris flow events occurred between the fires and the date the TMDL (Mathieus, 2005) was completed.

The following impaired waterbodies are included within the boundaries of the Reimel Creek watershed within the East Fork of the Bitterroot River (**Appendix A**):

- Reimel Creek

Pollutants of concern include the following (**Appendix B**):

- Sediment

The pollutant sources include (Mathieus, 2005):

- Natural Background
- Fires of 2000
- Forest Roads

The Reimel Creek watershed was selected for a TMDL Implementation Evaluation due to the focused efforts of the Bitterroot National Forest to implement the recommendations of the TMDL document. Additionally DEQ is interested in documenting any measureable watershed-scale water quality changes as a result of the forest's efforts, to provide feedback on those efforts.

2.0 TMDL-RECOMMENDED ACTIVITIES

The TMDL document made only minor recommendations for restoration activities (**Table 2-1**) to address sediment loading within the Reimel Creek watershed. These recommendations were made based on the TMDL load allocations (**Appendix B**) and many of the restoration activities were completed prior to the TMDL being finalized.

Reimel Creek was initially listed due to sediment loading from cattle grazing. Improved range management practices and the construction of grazing enclosures that occurred prior to the completion of the 2005 TMDL document resulted in improved conditions. Because the existing management system was addressing grazing impacts on Reimel Creek, it was not incorporated into the TMDL, however, the actions put forth by the BNF to address impacts from grazing are noted.

Table 2-1. TMDL Recommended Activities

Activity or Site	Status*
Site-specific road restoration for USFS road 727	Completed
Pursue the replacement of single culvert on private land near the mouth of Reimel Creek with new fish friendly culvert	No contact has been made with the landowner
Monitor two new culverts on road 727 on Reimel Creek and Diggins Creek	Completed
Contact private landowner near mouth of Reimel Creek concerning irrigation pond that results in year-round isolation from the East Fork of the Bitterroot River, unless isolation is protecting native salmonid genetics	No contact has been made with the landowner
Monitor the success of riparian fencing and stream restoration in the portions of Reimel Creek that are impacted by grazing.	Completed

*Details of BNF activities are included in **Appendix C**.

Improvements in this watershed began in 1998, when twelve lengths of streambank were identified by the BNF as being in need of restoration. Streambanks at these sites were trampled and sheared off by livestock. The work consisted of laying back the streambank slope and installing root wads and logs at bankfull elevations to reduce the erosive force of the stream. In the following year 800 shrubs were planted along these reaches to introduce shade and stabilize banks through increased root mass. In 2001, 5,000 shrubs were planted along the stream from the forest boundary, upstream to the confluence with Wallace Creek, a distance of approximately 2.5 miles. These shrubs were planted in riparian areas where wildfires had burned conifers or where open meadows were lacking a shrub component. Extra shrubs left over from the project were planted in the vicinity of the relocated road but experienced 100% mortality within two years due to inhospitable conditions in dry sandy soil on a southwest facing site. Budget shortfalls and lack of available personnel prevented the BNF from replanting but, natural regeneration has begun on its own as grass was starting to come onto the site and stabilize.

Much of Reimel Creek drainage burned at moderate and high severity by wildfire in 2000. Some of the restoration work that followed was funded by BAER (Burned Area Emergency Restoration) to reduce the after-effects of the fire and to protect burned riparian areas from excessive erosion. Firelines constructed during the fire control efforts were rehabilitated by re-contouring, slashing, seeding, and fertilizing. Monitoring of the success of rehab is documented in the Forest Plan Monitoring Reports (2001-2008), prepared annually by the Bitterroot National Forest.

The large culvert on the mainstem of Reimel Creek that restricted fish passage was replaced following the 2000 fires with a culvert sized to pass a 100-year storm event. It is a stream simulation culvert with a gravel substrate installed inside the pipe. One culvert on Diggins Creek was replaced in 2001 and again in 2003, when the first culvert was found to be incorrectly installed and did not allow for fish passage.

The riparian area along Reimel Creek was fenced in 2001 to restrict or control livestock access in the riparian meadows. This fence protects approximately 2.5 miles of stream, from the forest boundary to the confluence with Wallace Creek. Total fence length measured approximately 5 miles with topography and vegetation providing additional protection. The fencing effort was monitored to assess its effectiveness and the Forest found that gates on roads were not closed after users passed through allowing unauthorized livestock use in the riparian meadows. To mitigate this, two cattle guards were installed on National Forest System Road (NFSR) 727 in 2005 and have reduced unwanted livestock access to the riparian area.

Two sections of the Reimel Creek road (NFSR 727) were relocated away from the stream and into the toe of the slope. The abandoned road sections were de-compacted, slashed, seeded and fertilized. Additional seeding and slashing was implemented in areas where monitoring indicated limited vegetation recovery. These sections of road are now separated by a 30 to 100-foot vegetated low gradient buffer and are no longer a source of sediment to the stream.

One contributing sediment source identified in the Bitterroot Headwaters TMDL was a crossing of an unnamed tributary to Reimel Creek, commonly called Coffee Gulch, with NFSR 73345, a gated road. The crossing on this site was hardened and seeded to reduce erosion in 2006 and again in 2008 when vegetation at the site had not sufficiently recovered. The crossing of NFSR 727 with Wallace Creek was not identified as contributing point in the TMDL but was graveled when the crossing was replaced and was estimated with WEPP modeling to reduce sediment contributions by 2.2 tons. On National Forest land, no other crossings were identified as sediment contributors in the TMDL.

3.0 INDICATORS OF PROGRESS

The extent of completed restoration work and how it compares to the TMDL load allocations represents a significant indicator of progress towards meeting TMDL targets. Forest roads were the only significant anthropogenic source of sediment in Reimel Creek at the time of the TMDL (Mathieus, 2005). A 65 percent (2.2 tons/year) reduction in the forest road sediment load was called for in the TMDL, with a final total load of 151 tons/year (excluding fires), with 1.2 tons/year from forest roads.

The results of WEPP modeling from the Bitterroot National Forest in 2012 following restoration activities indicated a 2.02 ton/year reduction in sediment at road crossing #2560.

3.1 MONITORING

In July 2013, DEQ and a BNF representative collected sediment data at two locations on Reimel Creek. Fine sediment data collected is summarized in **Table 3-1**. In 2011, DEQ published new sediment targets for the Idaho Batholith (DEQ, 2011). Data collected in 2013 is compared to the 2011 targets instead of those in the 2005 TMDL because DEQ recognizes these new targets as being more accurate. The data collected in 2013 indicates percent fine sediment has decreased at both sites (see **Figures 3-1 and 3-2**). These data suggest water quality is improving but that additional time is needed for the system to recover and meet current sediment targets.

Table 3-1. Reimel Creek Sediment Monitoring Results, 2013

Site Visit Code (Location)	Cumulative Percent Fine Sediment <2mm	2011 Idaho Batholith Sediment Target for Percent Fines <2mm	Cumulative Percent Fine Sediment <6mm	2011 Idaho Batholith Sediment Target for Percent Fines <6mm
Reimel Creek 2	3.08%	8%	11.80%	14%
Reimel Creek 1	14.67%		24.94%	

Shaded cells indicate site is exceeding the target.

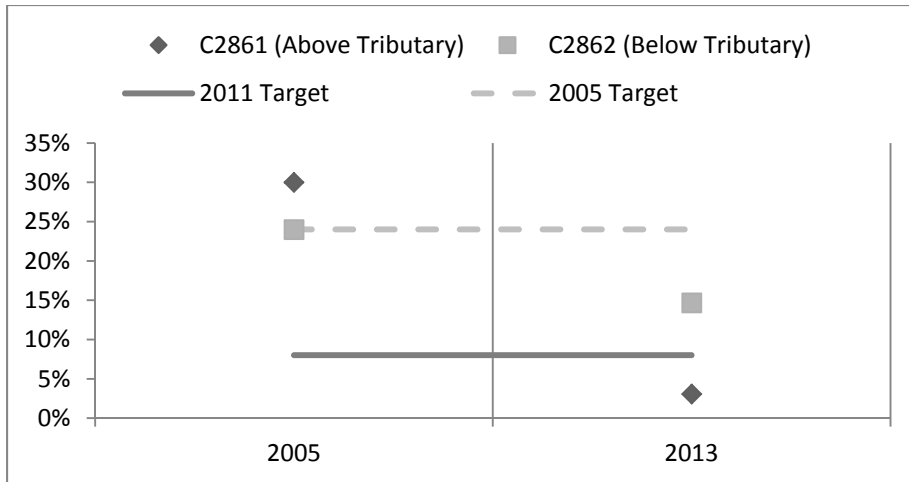


Figure 3-1. Cumulative Percent Fine Sediment <2mm, 2005 versus 2013

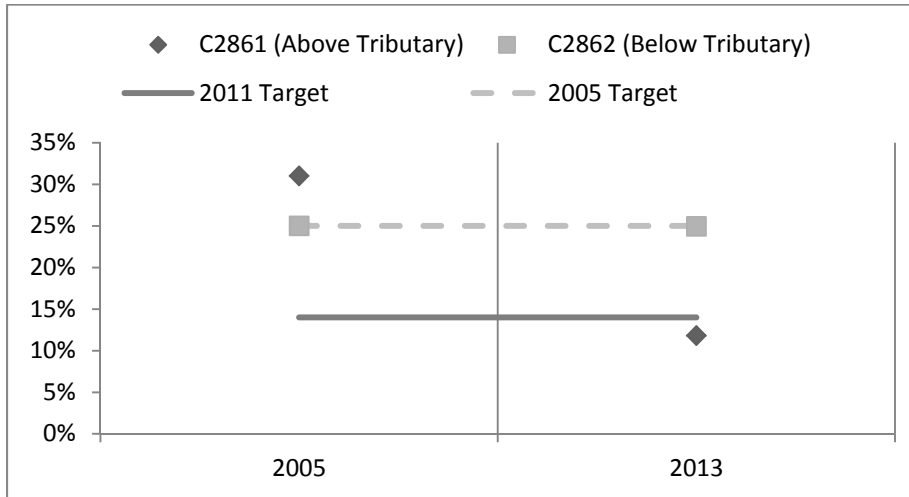


Figure 3-2. Cumulative Percent Fine Sediment <6mm, 2005 versus 2013

4.0 RECOMMENDATIONS FOR ADDITIONAL WORK

At this time there are no recommendations for additional activities outside of continued maintenance and monitoring of past work to ensure long term success.

5.0 CONCLUSIONS

This TMDL implementation evaluation concludes that all reasonable land, soil and water conservation practices have been implemented in the Reimel Creek watershed on National Forest Land and that water quality is improving. However, more time is needed to achieve water quality standards. DEQ recommends that an assessment be completed in 2018 (5 years from the 2013 assessment for this Evaluation) to determine if the system has sufficiently recovered and is meeting current water quality standards.

6.0 SOURCES OF INFORMATION

A variety of information sources were consulted during the preparation of the Reimel Creek TMDL Implementation Evaluation. Sources included BNF reports and personal communications. Detailed questions concerning the construction and content of the Reimel Creek TMDL Implementation Evaluation should be directed to Robert Ray, Section Supervisor, Montana DEQ Watershed Protection Section, (406) 444-5319, or rray@mt.gov.

7.0 REFERENCES

Mathieus, George. 2005. Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area . Helena, MT: Montana Department of Environmental Quality.

Montana DEQ. 2011. Bitterroot Temperature and Tributary Sediment Total Maximum Daily Loads and Framework Water Quality Improvement Plan. Helena, MT: Montana Dept. of Environmental Quality.

ADDITIONAL CONSULTED SOURCES

Willey, Marilyn. 2013 and 2016. Personal Communication.

APPENDIX A – REIMEL CREEK WATERSHED

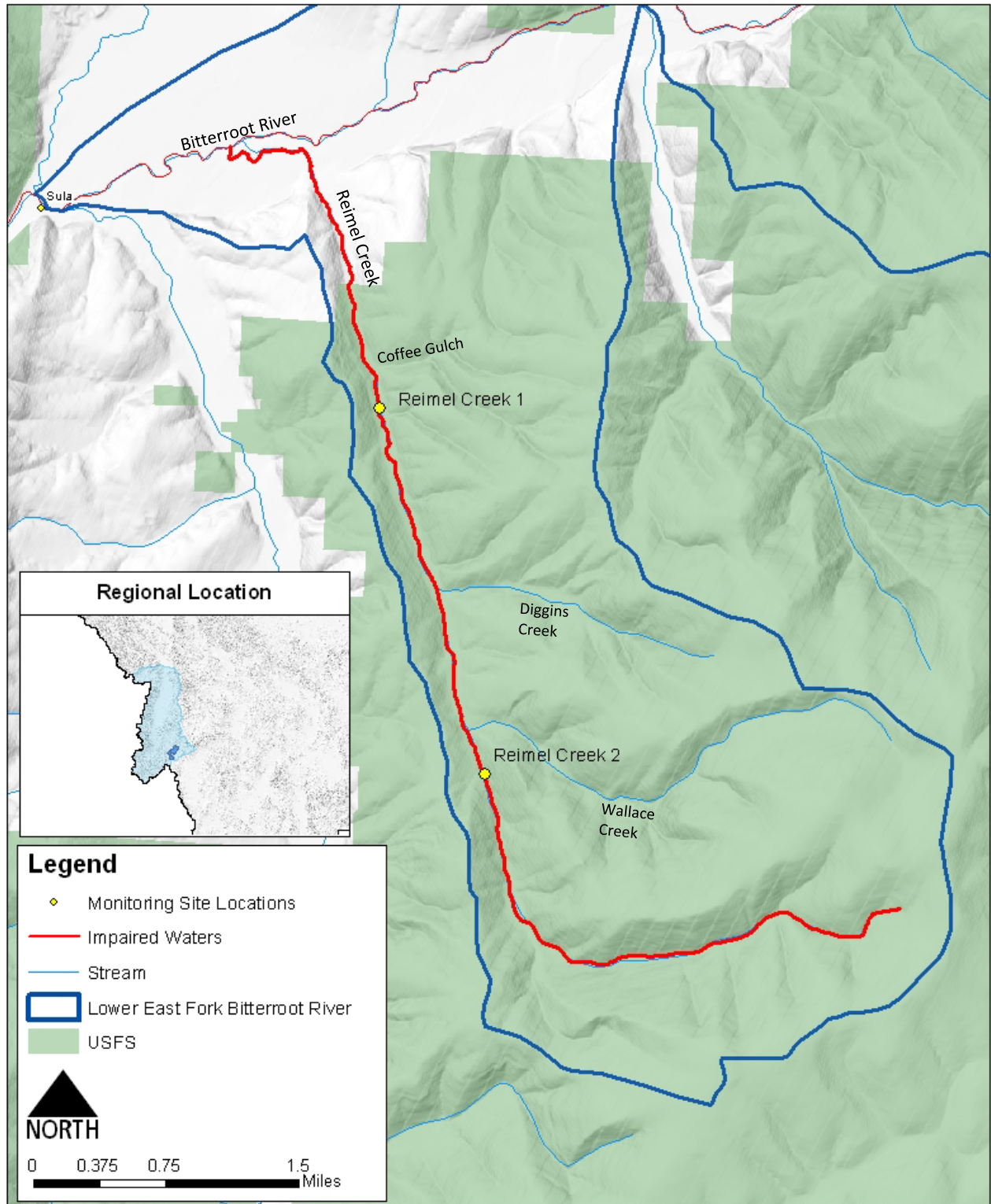


Figure B-1. Reimel Creek Watershed.

APPENDIX B – TMDL TABLES

Table C-1. (TMDL Table 4-15) Reimel Creek Sediment Source Assessment Results

Watershed Size (mi ²)	Background Sediment (tons/year)	Sediment from Timber Harvest ¹	Fires of 2000		Forest Roads			
			Area Burned (mi ²)	Sediment (tons/year)	Miles of Roads	# of Potential Crossings ²	Road Density (mi/mi ²)	Sediment from Forest Roads (tons/year)
9.2	150	0	5.2	1,686	6.4	13	0.7	3.4

¹ Sediment from overland flow only. Does not include sediment from other harvest related sources.

² Based on Geographic Information System (GIS) road and stream layers. Some crossings that appear on GIS layers do not actually exist on the ground.

Table C-2. (TMDL Table 4-16) Existing Loads and Allocation for Reimel Creek in Tons/Year

Forest Roads (existing)	Natural	Fires of 2000 (as of June 2001)	Timber Harvest	Total	Total Excluding Fires of 2000	Proposed Reduction in Human Loading (Roads)
3.4	150	1,686	0	1,839	153	65%

Table C-3. (TMDL Table 4-17) TMDL for Reimel Creek in Tons/Year

Est. Background Load including fires of 2000	Est. Background Load excluding fires of 2000	Est. Load From Forest Roads Following Reduction	TMDL with Fires	TMDL without Fires
1,836	150	1.2	1,837	151 (a 1% reduction in total load)

APPENDIX C – SUMMARY OF USFS ACTIVITIES

Table D-1. Summary of USFS Activities in Reimel Creek, 1999-2016

Year	Activity	Description/Purpose
1999	Restored streambanks at more than 12 sites	To address bank stability, improve variety of habitat, reduce sediment sources.
2000	Planted hundreds of willows along stabilized reaches	To return shrub component to banks lacking shade and stabilizing roots.
	High severity fire in the Riparian Zone	
	Dozer line rehab following fires	Dozer lines were re-shaped, seeded, fertilized and slashed. Monitoring has shown very good recovery.
2001	Constructed 5 miles of riparian fence from Wallace Creek downstream to Coffee Gulch	Improved condition due to exclusion of livestock. Seven years of annual monitoring found three years with moderate grazing within enclosure, with no grazing in the other four years. 2008 was the last year of livestock use.
2001	Planted 4,000 willows	Large planting effort to improve shade and cover in riparian area.
2001-2002	Relocated first sections of road 727	Section of the road that was on top of streambank was moved to the toe of the slope, old sections were de-compacted, seeded, mulched, and fertilized.
2002-2007	Riparian enclosure monitoring	Found that gates were often left open allowing livestock into enclosure.
2005	Installed cattle guards to replace gates	Improved effectiveness of enclosure.
	Reseeded and fertilized areas from previous projects on road 727 where vegetation recovery was insufficient.	Seeded and fertilized cut-slopes and previously disturbed areas.
	Relocated final sections of road 727, 1000 feet total	Relocated sections of road near old enclosure against toe of slope, old sections were de-compacted, seeded, mulched, and fertilized.
	<i>Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area completed.</i>	
2006	OHV trail stream crossing over Coffee Gulch was hardened and vegetated	Completion of work for TMDL site #2432.
	Planted shrubs in vicinity of old enclosure.	Monitoring showed 100% mortality in the following year due to poor soils and extreme southwestern exposure, however, grasses had begun to come onto the site and stabilize the soil.
2008	Augmented grassy vegetation hardened crossing over Coffee Gulch	Limited sediment transport.
Ongoing	No livestock use in Reimel Allotment since 2008, no timber harvest since 2002-2003 post fire salvage, continued road maintenance has occurred.	

APPENDIX D – CLEAN WATER ACT INFORMATION CENTER (CWAIC) SUMMARIES

Table E-1. 2014 Water Quality Information – Reimel Creek

Water Information					
Assessment Unit Identification Number	MT76H002_020	Water Type	RIVER		
Waterbody Name	Reimel Creek	Hydro Unit	17010205		
Size (Miles / Acres)	7.71	Basin	Columbia		
Ecoregion	Idaho Batholith	Watershed	Upper Clark Fork		
County	RAVALLI CO	Use Class	B-1		
TMDL Planning Area	Bitterroot Headwaters	Trophic Status and Trend			
Location	REIMEL CREEK, headwaters to mouth (East Fork Bitterroot River)				
Water Quality Category	4A				
Beneficial-Use Support Information					
Use Name	Fully Supporting	Not Supporting	Threatened	Insufficient Information	Not Assessed
Agriculture	✓		No		
Primary Contact Recreation	✓		No		
Drinking Water	✓		No		
Aquatic Life		✓	No		
Impairment Information					
Probable Cause	Probable Sources	Associated Uses	TMDL Completed		
Sedimentation/Siltation	Natural Sources, Agriculture	Aquatic Life	Yes		
Alteration in stream-side or littoral vegetative covers	Agriculture	Aquatic Life	Not applicable		