APPENDIX E - BANK EROSION ASSESSMENT

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E1.0 INTRODUCTION

This appendix presents an assessment of sediment loading due to streambank erosion in the Red Rock TMDL Planning Area (TPA) located primarily in Beaverhead County, with a small portion in Madison County. Sediment loads due to streambank erosion were estimated based on field data collected at 30 monitoring sites in summer 2018.

The streambank erosion assessment involved several procedures. First, each impaired segment was stratified into similar reaches using an aerial assessment performed in GIS. Streambank erosion data was then collected in the field at select monitoring sites. Based on this data, average amounts of sediment loading were determined for streams of different characteristics. Because only 30 sites were assessed in the Red Rock TPA, loading from reaches of similar stream type in the Madison TPA (DEQ 2020) was used to augment the dataset. The method for incorporating this additional data into loading estimates for the Red Rock TPA is described further in this appendix.

Sediment loads from field assessed monitoring sites were then extrapolated to the unassessed stream reaches and segments in each impaired watershed to estimate the amount of sediment load from bank erosion. Finally, the potential for reducing human influenced streambank erosion was evaluated by decreasing the level of loading to be similar to that at reaches with high-quality, intact riparian vegetation. Detailed methods describing each procedure, as well as results, are provided in the following sections.

E2.0 DATA COLLECTION

E2.1 AERIAL ASSESSMENT REACH STRATIFICATION

Prior to field data collection, an aerial assessment of streams in the Red Rock River TPA was conducted using GIS. Data layers were used to stratify streams into distinct reaches based on landscape and land-use factors following techniques described in *Watershed Stratification Methodology for TMDL Sediment and Habitat Investigations* (Montana Department of Environmental Quality, 2008).

The reach stratification process was completed for the mainstem segments of the following sediment-listed streams in the Red Rock TPA: Bean Creek, Big Sheep Creek, Corral Creek, East Fork Clover Creek, Fish Creek, Horse Prairie Creek, Jones Creek, Long Creek, Medicine Lodge Creek, Muddy Creek, O'Dell Creek, Peet Creek, Price Creek, Red Rock Creek, Sage Creek, Selway Creek, Tom Creek, and Trail Creek. It was also completed for the unlisted mainstem segments of Bloody Dick Creek and Hell Roaring Creek. Portions of these unlisted segments provided additional information as to conditions that would be expected in areas of high-quality riparian vegetation.

The aerial assessment reach stratification process involved dividing each stream into distinct reaches based on four watershed characteristics. A reach type is defined as a unique combination of EPA Ecoregion, valley gradient, Strahler stream order, and valley confinement, and is designated using the following naming convention based on the reach type identifiers provided in **Table E-1**:

Level III Ecoregion – Valley Gradient – Strahler Stream Order – Confinement

Table E-1. Reach Type Identifiers

Watershed Characteristic	Stratification Category	Reach Type Identifier
Level III Ecoregion	Middle Rockies	MR
Valley Gradient	0-2%	0
	2-4%	2
	4-10%	4
	> 10%	10
Strahler Stream Order	first order	1
	second order	2
	third order	3
	fourth order	4
	fifth order	5
Confinement	confined	C
	unconfined	U

For example, a reach identified as MR-0-3-U is in the Middle Rockies Level III Ecoregion, has a valley gradient of 0-2%, is a 3rd order stream, and is within an unconfined valley. All reaches evaluated in the Red Rock watershed were in the Middle Rockies Ecoregion.

Streambank erosion data was collected at 30 example monitoring sites at which reach surveys were conducted which were 500 or 1000 feet long based on bankfull width of the stream: the larger the bankfull width, the longer the monitored reach. In this assessment, a sampled reach was referred to as a "site". These monitoring sites included the 27 sites located within impaired watersheds, as well as an three additional sites located in Hell Roaring and Bloody Dick Creeks. **Table E-2** describes the distribution of sampled sites across different reach types. The sites sampled for the bank erosion assessment (**Table E-3**) overlapped with the sites sampled to determine if stream segments were meeting sediment targets, as described in **Appendix B**.

Table E-2. Stratified reach types within the Red Rock TPA, and the number of monitoring sites within each type

Level III Ecoregion	Valley Gradient	Strahler Stream Order	Confine-ment	Reach Type	Total Number of Reaches	Number of Monitoring Sites/Reaches
Middle Rockies	<2%	1	U	MR-0-1-U	5	1
			U	MR-0-2-U	15	1
		3	C	MR-0-3-C	4	-
			U	MR-0-3-U	44	8
		4	C	MR-0-4-C	2	0
			U	MR-0-4-U	42	11
		5	C	MR-0-5-C	2	-
			U	MR-0-5-U	34	5
			U	MR-0-6-U	1	-
	2-4%	1	U	MR-2-1-U	11	-
		2	C	MR-2-2-C	4	-
			U	MR-2-2-U	23	4
		3	C	MR-2-3-C	7	-
			U	MR-2-3-U	10	
	4-10%	1	C	MR-4-1-C	0	-

Table E-2. Stratified reach types within the Red Rock TPA, and the number of monitoring sites within each type

Level III Ecoregion	Valley Gradient	Strahler Stream Order	Confine-ment	Reach Type	Total Number of Reaches	Number of Monitoring Sites/Reaches
			U	MR-4-1-U	3	-
			U	MR-4-2-U	2	-
	>10%	1	C	MR-10-1-C	14	-
			U	MR-10-1-U	10	-
			U	MR-10-2-U	1	-
Totals:					**234**	**30**

E2.2 FIELD SURVEYS

Field data collection utilized the approach described the in *Longitudinal Field Methods for the Assessment of TMDL Sediment and Habitat Impairments* (Montana Department of Environmental Quality, 2007).

At each eroding bank, Bank Erosion Hazard Index (BEHI) measurements were performed and the Near Bank Stress (NBS) was estimated or determined based on field measurements (Rosgen,2001). Bank erosion severity was rated from "very low" to "extreme" based on the BEHI score, which was determined by the following six parameters: bank height, bankfull height, root depth, root density, bank angle, and surface protection. Near Bank Stress was rated from "very low" to "extreme" depending on the shape of the channel at the toe of the bank and the force of the water (i.e. "stream power") along the bank.

In addition, the source or underlying cause of streambank erosion was evaluated based on current or observed human disturbances within the riparian corridor adjacent to each bank, as well as historical land-use practices in the surrounding landscape. The following near-stream source categories were used: transportation (roads), grazing, cropland, mining, logging, irrigation, natural, and "other". Naturally eroding streambanks were considered those with no observed or known historic human impacts in the riparian zone, while the "other" category was chosen when streambank erosion resulted from a source not specifically identified in the list. If multiple sources were observed, then a percent of the total was estimated for each source at each bank.

Table E-3. Monitoring sites assessed in each watershed by reach type.

Reach Type	waterbody	Monitoring Sites
MR-0-2-U	Tom Creek	TOMC06-01a
MR-0-3-U	Hell Roaring Creek, Long Creek, Muddy Creek, O Dell Creek, Price Creek, Trail Creek	HELL14-01, LONG06-01b, LONG07-01b, MDDY01-04b, MDLG04-07-a, ODLL09-02b, PRIC05-02b, TRCC07a
MR-0-4-U	Bloody Dick Creek, Horse Prairie Creek, Muddy Creek, Red Rock Creek, Sage Creek, Selway Creek, Trail Creek	BLDK15-01a, BLDK17-01b, HRSP11-02b, MDDY02-01b, RRCR06-04b, RRCR06-06b, Sage16-04a, SECL06-08, SELC05-01a, SELC05-01b, TRLC08a
MR-0-5-U	Big Sheep Creek, Horse Prairie Creek, Medicine Lodge Creek, Sage Creek	BGSH04-02a, BGSH10-02b, HRSP12-01a , MDLG06-05b, SAGE19-02a

Table E-3. Monitoring sites assessed in each watershed by reach type.

Reach Type	waterbody	Monitoring Sites
MR-2-2-U	East Fork Clover Creek, Fish Creek, Tom Creek	ECLV 07-01, ECLV 07-02, FISH06-01a, TOMC05-01b
MR-0-1-U	Corral Creek	CRRL 05-01b

E3.0 SAMPLED REACHES-SEDIMENT LOAD CALCULATIONS

For each eroding streambank, the average annual sediment load was estimated based on the BANCS model, which incorporates the BEHI score and near bank stress (Rosgen, 2001; Rosgen, 2006). Annual retreat rates were estimated based on those measured from the Lamar River in Yellowstone National Park (Rosgen, 2001) (**Table E-4**).

Table E-4. Streambank erosion retreat rates (ft/year) from Lamar River, YNP were applied

BEHI	Near Bank Stress					
	very low	low	moderate	high	very high	extreme
very Low	0.002	0.004	0.009	0.021	0.050	0.12
low	0.02	0.04	0.10	0.24	0.57	1.37
moderate	0.10	0.17	0.28	0.47	0.79	1.33
high - very high	0.37	0.53	0.76	1.09	1.57	2.26
extreme	0.98	1.21	1.49	1.83	2.25	2.76

The annual sediment load in cubic feet was then calculated from the field data (annual retreat rate x mean bank height x bank length), converted into cubic yards, and finally converted into tons per year based on the bulk density of streambank material. The bulk density of streambank material was assumed to average 1.3 tons/cubic yard (USDI 1998). This process resulted in a sediment load from each eroding bank expressed in tons/year. The sum of loading across all banks gave a loading estimate for the site/reach. To standardize across the reaches, the sum of all loading at the site was multiplied by the necessary value to obtain the amount of sediment loading in a 1,000-foot reach. For instance, if only 500 feet were sampled, the value was multiplied by two.

To obtain an estimate of amount of natural bank erosion, at a bank, the total bank erosion was multiplied by the proportion of the surrounding riparian zone without obvious current or historical human impacts. This was summed across the reach to obtain an estimate of natural bank erosion for the reach.

Below are equations used to estimate total bank erosion and natural bank erosion rates:

$$Total\ Bank\ Erosion - Bank\ \left(\frac{Tons}{Yr}\right) = \frac{Length\ Eroding\ Bank\ (ft) * Retreat\left(\frac{ft}{yr}\right) * Bank\ Height\ (ft)}{27\ \frac{cubic\ yards}{cubic\ feet}} * 1.3\ \frac{Tons}{Cubic\ Yard}$$

$$Natural\ Bank\ Erosion\ \left(\frac{Tons}{Yr}\right) = Total\ Bank\ Erosion\ \left(\frac{Tons}{Yr}\right) * Proportion\ in\ Natural\ Conditions$$

Estimated bank erosion loading rates varied widely from two tons/year/1000 feet to 143 tons/year/1000 feet (**Table E-5**).

Based on the riparian assessment, the biggest cause of bank erosion was natural sources, followed by grazing-related activities, and historic sources (**Table E-6** and **E-7**). Historic sources refer to grazing or other activities that occurred in the past, but from which the banks appear to be recovering. At most reaches, road impacts and residential activities were estimated to contribute low amounts of bank erosion (**Table E-7**).

Table E-5. Estimated bank erosion loading rates by monitoring site

Stream	Site/ Reach ID	Reach Type	Monitoring Site Length (Feet)	Length of Eroding Bank (Feet)	Eroding Bank (% of Total Bank Length)	Estimated % of Eroded Bank in Natural Condition	Sediment Load (Tons/ Year)	Load per 1000 feet (Tons/ Yr)
Big Sheep Creek	BGSH04-02a	MR-0-5-U	1000	450	23%	17	72.3	72
Big Sheep Creek	BGSH10-02b	MR-0-5-U	1000	271	14%	0	17.5	18
Bloody Dick Creek	BLDK15-01a	MR-0-4-U	1000	245	12%	22	21.0	21
Bloody Dick Creek	BLDK17-01b	MR-0-4-U	1000	74	4%	37	5.0	5
Corral Creek	CRRL 05-01b	MR-0-1-U	500	470	47%	0	10.7	21
East Fork Clover Creek	ECLV 07-01	MR-2-2-U	500	112	11%	0	3.9	8
East Fork Clover Creek	ECLV 07-02	MR-2-2-U	500	42	4%	50	1.5	3
Fish Creek	FISH06-01a	MR-2-2-U	500	20	2%	0	0.3	1
Hell Roaring Creek	Hell 14-01	MR-0-3-U	1000	282	14%	38	20.2	20
Horse Prairie Creek	HRSP11-02b	MR-0-4-U	500	226	23%	49	11.6	23
Horse Prairie Creek	HRSP12-01a	MR-0-5-U	1000	605	30%	18	43.8	44

Table E-5. Estimated bank erosion loading rates by monitoring site

Stream	Site/ Reach ID	Reach Type	Monitoring Site Length (Feet)	Length of Eroding Bank (Feet)	Eroding Bank (% of Total Bank Length)	Estimated % of Eroded Bank in Natural Condition	Sediment Load (Tons/ Year)	Load per 1000 feet (Tons/ Yr)
Long Creek	LONG06-01b	MR-0-3-U	500	10	1%	20	0.5	1
Long Creek	LONG07-01b	MR-0-3-U	1000	111	6%	0	5.2	5
Muddy Creek	MDDY01-04b	MR-0-3-U	500	17	2%	0	0.9	2
Muddy Creek	MDDY02-01b	MR-0-4-U	500	102	10%	0	5.1	10
Medicine Lodge Creek	MDLG04-07-a	MR-0-3-U	500	163	16%	5	4.9	10
Medicine Lodge Creek	MDLG06-05b	MR-0-5-U	500	95	10%	24	14.8	30
O Dell Creek	ODLL09-02b	MR-0-3-U	1000	574	29%	0	153.6	154
Price Creek	PRIC05-02b	MR-0-3-U	500	136	14%	27	12.1	24
Red Rock Creek	RRCR06-04b	MR-0-4-U	1000	372	19%	0	31.2	31
Red Rock Creek	RRCR06-06b	MR-0-4-U	1000	21	1%	80	2.4	2
Sage Creek	Sage16-04a	MR-0-4-U	500	208	21%	72	12.0	24
Sage Creek	SAGE19-02a	MR-0-5-U	500	13	1%	0	1.8	4
Selway Creek	SECL06-08	MR-0-4-U	400	261	33%	63	11.3	28
Selway Creek	SELC05-01a	MR-0-4-U	500	244	24%	0	6.4	13
Selway Creek	SELC05-01b	MR-0-4-U	500	268	27%	0	5.9	12
Tom Creek	TOMC05-01b	MR-2-2-U	500	69	7%	87	3.6	7
Tom Creek	TOMC06-01a	MR-0-2-U	500	509	51%	6	22.7	45
Trail Creek	TRCC07a	MR-0-3-U	500	51	5%	39	1.3	3

Table E-5. Estimated bank erosion loading rates by monitoring site

Stream	Site/ Reach ID	Reach Type	Monitoring Site Length (Feet)	Length of Eroding Bank (Feet)	Eroding Bank (% of Total Bank Length)	Estimated % of Eroded Bank in Natural Condition	Sediment Load (Tons/ Year)	Load per 1000 feet (Tons/ Yr)
Trail Creek	TRLC08a	MR-0-4-U	500	148	15%	11	9.1	18

Table E-6. Estimated sediment load from banks by source at sampled reaches.

Stream	Reach ID	Reach Type	Sediment Load (Tons/Year)	Transportation		Grazing		Crop Activities		Irrigation		Natural		Other		Historic	
				%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr
Big Sheep Creek	BGSH04-02a	MR-0-5-U	72.3	2%	1.7	0%	0.0	0%	0	0%	0.0	17%	12.3	0%	0	81%	58.3
Big Sheep Creek	BGSH10-02b	MR-0-5-U	17.5	0%	0	19%	3.4	0%	0	81%	14.1	0%	0.0	0%	0	0%	0.0
Bloody Dick Creek	BLDK15-01a	MR-0-4-U	21.0	0%	0	78%	16.3	0%	0	0%	0.0	22%	4.7	0%	0	0%	0.0
Bloody Dick Creek	BLDK17-01b	MR-0-4-U	5.0	0%	0	57%	2.9	0%	0	0%	0.0	37%	1.9	0%	0	6%	0.3
Corral Creek	CRRL 05-01b	MR-0-1-U	10.7	0%	0	100%	10.7	0%	0	0%	0.0	0%	0.0	0%	0	0%	0.0
East Fork Clover Creek	ECLV 07-01	MR-2-2-U	3.9	0%	0	15%	0.6	0%	0	0%	0.0	0%	0.0	0%	0	85%	3.3
East Fork Clover Creek	ECLV 07-02	MR-2-2-U	1.5	0%	0	50%	0.8	0%		0%		50%	0.8	0%		0%	
Fish Creek	FISH06-01a	MR-2-2-U	0.3	0%	0	0%	0.0	0%	0	0%	0.0	0%	0.0	0%	0	100%	0.3
Hellroaring Creek	Hell 14-01	MR-0-3-U	20.2	0%	0	62%	12.6	0%	0	0%	0.0	38%	7.6	0%	0	0%	0.0

Table E-6. Estimated sediment load from banks by source at sampled reaches.

Stream	Reach ID	Reach Type	Sediment Load (Tons/Year)	Transportation		Grazing		Crop Activities		Irrigation		Natural		Other		Historic	
				%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr
Horse Prairie Creek	HRSP11-02b	MR-0-4-U	11.6	0%	0	0%	0.0	31%	3.6	20%	2.3	49%	5.7	0%	0	0%	0.0
Horse Prairie Creek	HRSP12-01a	MR-0-5-U	43.8	0%	0	16%	7.0	0%	0	0%	0.0	18%	7.8	0%	0	66%	28.9
Long Creek	LONG06-01b	MR-0-3-U	0.5	0%	0	0%	0.0	0%	0	0%	0.0	20%	0.1	0%	0	80%	0.4
Long Creek	LONG07-01b	MR-0-3-U	5.2	0%	0	42%	2.1	0%	0	0%	0.0	0%	0.0	0%	0	58%	3.0
Muddy Creek	MDDY01-04b	MR-0-3-U	0.9	0%	0	100%	0.9	0%	0	0%	0.0	0%	0.0	0%	0	0%	0.0
Muddy Creek	MDDY02-01b	MR-0-4-U	5.1	0%	0	100%	5.1	0%	0	0%	0.0	0%	0.0	0%	0	0%	0.0
Medicine Lodge Creek	MDLG04-07-a	MR-0-3-U	4.9	0%	0	79%	3.9	0%	0	0%	0.0	21%	1.0	0%	0	0%	0.0
Medicine Lodge Creek	MDLG06-05b	MR-0-5-U	14.8	0%	0	76%	11.2	0%	0	0%	0.0	24%	3.6	0%	0	0%	0.0
O'dell Spring Creek	ODLL09-02b	MR-0-3-U	153.6	0%	0	100%	153.6	0%	0	0%	0.0	0%	0.0	0%	0	0%	0.0
Price Creek	PRIC05-02b	MR-0-3-U	12.1	0%	0	73%	8.8	0%	0	0%	0.0	27%	3.2	0%	0	0%	0.0

Table E-6. Estimated sediment load from banks by source at sampled reaches.

Stream	Reach ID	Reach Type	Sediment Load (Tons/Year)	Transportation		Grazing		Crop Activities		Irrigation		Natural		Other		Historic	
				%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr
Red Rock Creek	RRCR06-04b	MR-0-4-U	31.2	0%	0	0%	0.0	0%	0	0%	0.0	0%	0.0	0%	0	100%	31.2
Red Rock Creek	RRCR06-06b	MR-0-4-U	2.4	0%	0	0%	0.0	0%	0	0%	0.0	80%	1.9	0%	0	20%	0.5
Sage Creek	Sage16-04a	MR-0-4-U	12.0	0%	0	12%	1.4	0%	0	0%	0.0	72%	8.7	0%	0	16%	1.9
Sage Creek	SAGE19-02a	MR-0-5-U	1.8	0%	0	0%	0.0	0%	0	0%	0.0	0%	0.0	100%	1.76	0%	0.0
Selway Creek	SECL06-08	MR-0-4-U	11.3	0%	0	37%	4.1	0%	0	0%	0.0	63%	7.2	0%	0	0%	0.0
Selway Creek	SELC05-01a	MR-0-4-U	6.4	0%	0	100%	6.4	0%	0	0%	0.0	0%	0.0	0%	0	0%	0.0
Selway Creek	SELC05-01b	MR-0-4-U	5.9	0%	0	100%	5.9	0%	0	0%	0.0	0%	0.0	0%	0	0%	0.0
Tom Creek	TOMC05-01b	MR-2-2-U	3.6	0%	0	3%	0.1	0%	0	0%	0.0	87%	3.1	0%	0	10%	0.4
Tom Creek	TOMC06-01a	MR-0-2-U	22.7	0%	0	0%	0.0	0%	0	0%	0.0	6%	1.4	0%	0	94%	21.3
Trail Creek	TRCC07a	MR-0-3-U	1.3	0%	0	61%	0.8	0%	0	0%	0.0	39%	0.5	0%	0	0%	0.0

Table E-6. Estimated sediment load from banks by source at sampled reaches.

Stream	Reach ID	Reach Type	Sediment Load (Tons/Year)	Transportation		Grazing		Crop Activities		Irrigation		Natural		Other		Historic	
				%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr
Trail Creek	TRLC08a	MR-0-4-U	9.1	0%	0	89%	8.1	0%	0	0%	0.0	11%	1.0	0%	0	0%	0.0

Table E-7. Summary of bank erosion sources at sampled reaches

Source	Sediment Load (Tons/Year)	Sediment Load (Percent)
Natural	71.6	14.0
Roads	1.7	0.3
Riparian Grazing	266.8	52.2
Other	1.7	0.3
Residential/Urban	0	0
Historic	150.0	29.3
Irrigation	16.5	3.2
Crop Activity	3.6	0.7
Total	**511.9**	**100**

E4.0 SEDIMENT LOAD EXTRAPOLATION

Sediment load extrapolations were performed for monitoring sites, stream reaches, and stream segments, which are defined as follows:

Monitoring Site/Reach *- A 500, 1,000, or 2,000 foot section of a stream reach where field monitoring was conducted (as in Table C-3)*

Stream Reach *-Subdivision of the stream segment based on Ecoregion, stream order, gradient and confinement as evaluated in GIS*

Stream Segment *-A group of stream reaches within the same sub drainage (e.g., "Antelope Creek"). The total loading from each impaired segment was determined by summing the loading for all reaches in the segment. Several non-impaired segments were also evaluated.*

Average annual sediment loads from monitoring reaches were extrapolated to the unsampled stream reaches with similar reach type characteristics and land use (**Table C-8**). Although a large number of reach types were estimated to be present in the Red Rock TPA, for extrapolation these were grouped together into broad types that were expected to have similar loading based on gradient, order, and land use characteristics. Gradient and stream order for all reaches was estimated in GIS using contour lines and the National Hydrography Stream network while the percent land use in natural condition was estimated using aerial photos as the percent of the stream bank with a 100-foot riparian buffer consisting of trees, grasslands, or shrubs.

E4.1 REACH TYPE SEDIMENT LOADS

Based on an exploratory analysis, sampled sites found to have >70% of the riparian zone in natural vegetation based on aerial surveys also had lower loading rates. This information was used, in part, to estimate average loading in unsampled low-gradient reaches based on land use information from aerial surveys (**Table C-8**).

Monitoring reaches are preferentially chosen in low-gradient portions of the stream because sediment dynamics in low-gradient streams are more responsive to changes in management. However, because very few sites were located in high-gradient or first order reaches during monitoring, this limited the ability to determine loading estimates. Therefore, loading estimates were based on a combination of data collected in the Red Rock Watershed and in the adjacent Madison Watershed as part of the Madison Sediment and Temperature TMDLs (DEQ ,2021). The Madison Watershed has similar physiographic, geologic, and soils characteristics to the Red Rock Watershed. Refer to Section **C4.2** and **Table E-9** for a description of how loading estimates were calculated for unsampled reaches.

Table E-8. Average reach loading rates for sampled reaches of different gradient, stream size, and riparian quality in the Red Rock Watershed.

Description	% of Riparian Zone in Natural Vegetation	Reach ID	Reach Type	Average Reach Type Load Per 1000 Feet (Tons/Year)	Average Reach Type Sediment Load per 1000 Feet (Tons/Year)
Low gradient streams (0-2% gradient), non first-order	≤70%	BGSH04-02a	MR-1-5-U	72.3	25.9
		BGSH10-02b	MR-1-5-U	17.5	
		HELL14-01	MR-0-3-U	16.1	
		HRSP11-02b	MR-1-4-U	23.2	
		HRSP12-01a	MR-1-5-U	43.8	
		LONG06-01b	MR-1-3-U	1.1	
		LONG07-01b	MR-1-3-U	5.2	
		MDDY01-04b	MR-1-3-U	1.9	
		MDDY02-01b	MR-1-4-U	10.3	
		MDLG04-07-a	MR-0-3-U	14.4	
		MDLG06-05b	MR-1-5-U	29.6	
		ODLL09-02b	MR-1-3-U	153.6	
		PRIC05-02b	MR-1-3-U	24.1	
		RRCR06-04b	MR-1-4-U	9.7	
		RRCR06-06b	MR-1-4-U	2.4	
		Sage16-04a	MR-0-4-U	24.0	
		SAGE19-02a	MR-1-5-U	3.5	
		TOMC06-01a	MR-1-2-U	45.5	
		TRCC07a	MR-0-3-U	2.5	
		TRLC08a	MR-1-4-U	18.3	
Low gradient streams (0-2% gradient), non first-order	>70%	BLDK15-01a	MR-1-4-U	21.0	15.78
		BLDK17-01b	MR-1-4-U	5.0	
		SECL06-08	MR-1-4-U	28.2	
		SELC05-01a	MR-1-4-U	12.9	
		SELC05-01b	MR-1-4-U	11.8	
Mid gradient streams (2-4% gradient), non first-order	≤ 70%	ECLV 07-01	MR-2-2-U	7.8	4.6
		ECLV 07-02	MR-2-2-U	3	
		FISH06-01a	MR-2-2-U	0.7	
		TOMC05-01b	MR-2-2-U	7.1	

Table E-8. Average reach loading rates for sampled reaches of different gradient, stream size, and riparian quality in the Red Rock Watershed.

Description	% of Riparian Zone in Natural Vegetation	Reach ID	Reach Type	Average Reach Type Load Per 1000 Feet (Tons/Year)	Average Reach Type Sediment Load per 1000 Feet (Tons/Year)
Mid gradient streams (2-4% gradient), non first-order	>70%	NA			
High gradient streams (4-10%)	0-100%	NA			
very high gradient streams (>10%)	0-100%	NA			
First order streams	≤ 70%	CRRL 05-01b	MR-0-1-U	21.0	21.4

E4.2 SEGMENT SEDIMENT LOADS

Stream segment sediment loads were estimated for all Red Rock River TPA stream segments impaired for sediment per Montana's 2020 Integrated Report, including Bean Creek, Big Sheep Creek, Corral Creek, East Fork Clover Creek, Fish Creek, Horse Prairie Creek, Jones Creek, Long Creek, Medicine Lodge Creek, Muddy Creek, O'Dell Creek, Peet Creek, Price Creek, Red Rock Creek, Sage Creek, Selway Creek, Tom Creek, and Trail Creek .

Sampled reaches in the Red Rock TPA generally had less bank erosion than sampled reaches of the same reach type in the Madison TPA, which was sampled as part of the Madison Sediment and Temperature TMDLs and Water Quality Improvement plan (DEQ, 2020). Field sampling data revealed that this was because the percentage of banks eroding in sampled streams of the Red Rock TPA was approximately 50% less in the Madison watershed. In general, the professional opinion of the field scientists after site visits was that the Red Rock watershed has less intensive grazing and other land-uses in the riparian zone compared to the Madison watershed. Nonetheless, the level of bank erosion is still high in areas, with opportunities to improve riparian quality and reduce erosion. In addition, the scientists conducting the field surveys noted that some reaches were inaccessible due to private property or other concerns, and that some of these appeared to have higher bank erosion than the surveyed reaches.

Using this knowledge, loading data from both the Red Rock watershed and nearby Madison watershed was used to estimate loading in unsampled streams of the Red Rock watershed. Low-gradient stream reaches (<2%) were assigned the loading value from the Red Rock field surveys, with an additional 25% added to the estimate to provide consideration of the fact that some reaches with high bank erosion were inaccessible. Because very few mid-gradient streams (2-4%) were sampled in the Red Rock watershed, the relative difference in loading between low gradient and mid gradient streams of different riparian quality from the Madison TPA surveys was applied to estimate loading rates for the Red Rock TPA. For high-gradient streams (4-10%), the adjusted values from the Madison TPA were used for low riparian condition (≤ 70% intact), while for high riparian condition (≥70%) they were modified to reflect a bank condition rating improvement by one category, such as from high to moderate erosion (**Table E-4**). This method was chosen because no high-quality, high gradient reaches were sampled as part of either assessment. Only one first order stream reach was sampled in the Red Rock watershed,

and the loading estimate was the same as the average from Madison watershed. Therefore, this value was used for the Red Rock TPA for reaches with low-quality riparian areas. For reaches with high-quality riparian areas, the improved bank condition rating method was also used, due to a lack of sample sites in either study area. Finally, very high (>10%) gradient streams in both the Madison watersheds and Red Rock watersheds generally had riparian zones with greater than 50% in natural variation, and moderate to high riparian quality. Therefore, the loading estimates from the Madison watershed were directly applied for the unsampled reaches in the Red Rock watershed. **Table E-9** gives a more detailed method and values used for each category of stream reach. **Tables E-11 to E-29** give estimated loads using these methods.

Table E-9. Loading rates used to estimate bank erosion in unsampled reaches.

Sampled Reaches			Assigned to	Unsampled Reaches			Method	Load (Tons/Yr/ 1000 Ft
Gradient	Order	Condition (based on aerial photos)		Gra-dient	Order	Condition (based on aerial photos)		
0-2%	Non 1st	High (> 70%) of riparian zone in natural condition	--->	0-2%	Non 1st	High	Red Rock high riparian quality sampled average + 25%	19.7
0-2%	Non 1st	Low (≤ 70%)of riparian zone in natural condition	--->	0-2%	Non 1st	Low	Red Rock low riparian quality, sampled average + 25%	34.0
>2-4%	Non 1st	High (> 70%) of riparian zone in natural condition	--->	>2-4%	Non 1st	High	Madison high quality sampled average, adjusted for lower loading rates in Red Rock	15.3
>2-4%	Non 1st	Low (≤ 70%)of riparian zone in natural condition	--->	>2-4%	Non 1st	Low	Madison low-quality sampled average, adjusted for loading rates in Red Rock	20.6
>4-10%	Non 1st	High (> 70%) of riparian zone in natural condition	--->	>4-10%	Non 1st	High	Madison low-quality sampled average, adjusted for lower loading rates in Red Rock and potential improved bank condition rating	11.3
>4-10%	Non 1st	Low (≤ 70%)of riparian zone in natural condition	--->	>4-10%	Non 1st	Low	Madison low-quality sampled average, adjusted for lower loading rates in Red Rock	14.0

Table E-9. Loading rates used to estimate bank erosion in unsampled reaches.

Sampled Reaches			Assigned to	Unsampled Reaches				Load (Tons/Yr/ 1000 Ft
Gradient	Order	Condition (based on aerial photos)		Gra-dient	Order	Condition (based on aerial photos)	Method	
> 10%	Non 1st	All land uses	--->	> 10%	Non 1st	All	Madison sampled average, all riparian qualities	12.5
Any	1st, except for > 10% gradient	High (> 70%) of riparian zone in natural condition	--->	Any	1st	High	Red Rock low-quality sampled value, adjusted for potential improved bank condition rating	10.6
Any	1st, except for > 10% gradient	Low (≤ 70%)of riparian zone in natural condition; supplement with Madison data	-->	Any	1st	Low	Red Rock low quality sampled value	21

E4.2.1 Bean Creek Sediment Loads

A total of 9 reaches were delineated for the Bean Creek mainstem(**Table E-10**). Those near the headwaters were high gradient reaches with a riparian zone in > 70 % natural vegetation, which were assigned a low loading rate. Conversely, low-gradient reaches near the mouth had low % natural vegetation and higher loading estimates.

Table E-10. Estimated annual bank sediment loads for Bean Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Bean Creek	BEAN 01-01	MR-10-1-C	2215	1	>10	100	12.5	NA	12.5	27.7	-112.027	44.554	-112.029	44.552
Bean Creek	BEAN 02-01	MR-10-1-U	2872	1	>10	90	12.5	NA	12.5	35.9	-112.023	44.561	-112.025	44.558
Bean Creek	BEAN 03-01	MR-4-1-U	2397	1	4-<10	90	10.6	NA	10.6	25.4	-112.020	44.567	-112.021	44.564
Bean Creek	BEAN 03-02	MR-4-1-U	748	1	4-<10	30	21	NA	21	15.7	-112.021	44.569	-112.020	44.568
Bean Creek	BEAN 04-01	MR-10-2-U	5670	2	>10	10	12.5	NA	12.5	70.9	-112.027	44.584	-112.025	44.576
Bean Creek	BEAN 05-01	MR-10-2-U	2309	2	>10	0	12.5	NA	12.5	28.9	-112.032	44.589	-112.030	44.586
Bean Creek	BEAN 06-01	MR-0-2-U	7231	2	<2	0	34	NA	34	245.9	-112.034	44.607	-112.036	44.598
Bean Creek	BEAN 06-02	MR-0-2-U	5788	2	<2	0	34	NA	34	196.8	-112.023	44.620	-112.028	44.613
Bean Creek	BEAN 06-03	MR-0-2-U	4795	2	<2	0	34	NA	34	163.0	-112.020	44.633	-112.021	44.628
									Total:	**810**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.2 Big Sheep Sediment Loads

A total of eight reaches were delineated for the Big Sheep Creek mainstem(**Table E-11**). These were further divided into subreaches based on land use. All of the delineated reaches had gradients less than 2%. Those near the headwaters exhibited natural vegetation > 70% with low loading rates and the percent natural vegetation decreased to near 0% near the mouth, with high loading rates.

Table E-11. Estimated annual bank sediment loads for Big Sheep Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated *					
Big Sheep Creek	BGSH 01-01	MR-0-5-U	4068	5	<2	75	19.7	NA	19.7	80.1	-112.792	44.638	-112.796	44.636
Big Sheep Creek	BGSH 02-01	MR-0-5-C	2866	5	<2	55	34	NA	34	97.4	-112.779	44.655	-112.780	44.652
Big Sheep Creek	BGSH 02-01	MR-0-5-C	5382	5	<2	60	34	NA	34	183.0	-112.780	44.648	-112.785	44.642
Big Sheep Creek	BGSH 02-01	MR-0-5-C	2647	5	<2	60	34	NA	34	90.0	-112.770	44.659	-112.775	44.658
Big Sheep Creek	BGSH 03-01	MR-0-5-U	14341	5	<2	90	19.7	NA	19.7	282.5	-112.741	44.673	-112.758	44.667
Big Sheep Creek	BGSH 03-02	MR-0-5-U	2156	5	<2	75	19.7	NA	19.7	42.5	-112.729	44.682	-112.731	44.681
Big Sheep Creek	BGSH 03-02	MR-0-5-U	4274	5	<2	80	19.7	NA	19.7	84.2	-112.733	44.678	-112.737	44.676
Big Sheep Creek	BGSH 03-02	MR-0-5-U	792	5	<2	95	19.7	NA	19.7	15.6	-112.731	44.679	-112.732	44.678
Big Sheep Creek	BGSH 03-03	MR-0-5-U	973	5	<2	10	34	NA	34	33.1	-112.724	44.690	-112.724	44.689

Table E-11. Estimated annual bank sediment loads for Big Sheep Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated *					
Big Sheep Creek	BGSH 03-03	MR-0-5-U	2222	5	<2	20	34	NA	34	75.6	-112.724	44.688	-112.727	44.686
Big Sheep Creek	BGSH 03-03	MR-0-5-U	1108	5	<2	75	19.7	NA	19.7	21.8	-112.727	44.684	-112.728	44.683
Big Sheep Creek	BGSH 04-01	MR-0-5-U	5928	5	<2	0	34	NA	34	201.5	-112.716	44.703	-112.720	44.697
Big Sheep Creek	BGSH 04-02	MR-0-5-U	2339	5	<2	0	34	72	72	168.4	-112.698	44.717	-112.702	44.715
Big Sheep Creek	BGSH 04-02	MR-0-5-U	2051	5	<2	0	34	72	72	147.7	-112.710	44.709	-112.711	44.706
Big Sheep Creek	BGSH 04-02	MR-0-5-U	2140	5	<2	0	34	72	72	154.1	-112.704	44.713	-112.707	44.711
Big Sheep Creek	BGSH 04-02	MR-0-5-U	1006	5	<2	10	34	72	72	72.4	-112.714	44.705	-112.715	44.704
Big Sheep Creek	BGSH 04-03	MR-0-5-U	1194	5	<2	0	34	NA	34	40.6	-112.695	44.719	-112.697	44.718
Big Sheep Creek	BGSH 04-04	MR-0-5-U	2465	5	<2	10	34	NA	34	83.8	-112.692	44.724	-112.693	44.721
Big Sheep Creek	BGSH 05-01	MR-0-5-U	1699	5	<2	50	34	NA	34	57.8	-112.799	44.631	-112.799	44.634
Big Sheep Creek	BGSH 05-02	MR-0-5-U	5854	5	<2	30	34	NA	34	199.0	-112.801	44.620	-112.800	44.631
Big Sheep Creek	BGSH 05-03	MR-0-5-U	6286	5	<2	40	34	NA	34	213.7	-112.801	44.609	-112.801	44.620

Table E-11. Estimated annual bank sediment loads for Big Sheep Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated *					
Big Sheep Creek	BGSH 05-04	MR-0-5-U	2664	5	<2	30	34	NA	34	90.6	-112.804	44.602	-112.801	44.609
Big Sheep Creek	BGSH 05-05	MR-0-5-U	2539	5	<2	75	34	NA	34	86.3	-112.806	44.598	-112.804	44.602
Big Sheep Creek	BGSH 05-06	MR-0-5-U	5042	5	<2	30	34	NA	34	171.4	-112.800	44.588	-112.806	44.598
Big Sheep Creek	BGSH 05-07	MR-0-5-U	1746	5	<2	10	34	NA	34	59.4	-112.798	44.584	-112.800	44.588
Big Sheep Creek	BGSH 05-08	MR-0-5-U	1966	5	<2	0	34	NA	34	66.8	-112.798	44.579	-112.798	44.584
Big Sheep Creek	BGSH 05-09	MR-0-5-U	1007	5	<2	5	34	NA	34	34.2	-112.799	44.577	-112.798	44.579
Big Sheep Creek	BGSH 05-10	MR-0-5-U	13506	5	<2	10	34	NA	34	459.2	-112.796	44.546	-112.799	44.577
Big Sheep Creek	BGSH 05-11	MR-0-5-U	2140	5	<2	50	34	NA	34	72.8	-112.801	44.545	-112.796	44.546
									Total:	**1932**				

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.3 Bloody Dick Creek Sediment Loads

A total of twenty-two reaches were delineated for the Bloody Dick Creek mainstem (**Table E-10**). These were further divided into subreaches based on land use. High-gradient reaches predominated near the headwaters, while low-gradient reaches predominated near the mouth. The majority of reaches had > 70% of the riparian zone in natural condition and low estimated loading rates. Bloody Dick Creek was not determined to be impaired for sediment, but data is presented for reference purposes.

Table E-12. Estimated annual bank sediment loads for Bloody Dick Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Bloody Dick Creek	BLDK 01-01	MR-10-1-U	2440	1	>10	100	12.5	NA	12.5	30.5	-113.562	45.134	-113.558	45.136
Bloody Dick Creek	BLDK 02-01	MR-4-1-U	4586	1	4-<10	100	10.6	NA	10.6	48.6	-113.554	45.138	-113.548	45.143
Bloody Dick Creek	BLDK 03-01	MR-2-1-U	528	1	2-<4	80	10.6	NA	10.6	5.6	-113.538	45.145	-113.537	45.145
Bloody Dick Creek	BLDK 03-01	MR-2-1-U	1420	1	2-<4	100	10.6	NA	10.6	15.0	-113.536	45.146	-113.533	45.146
Bloody Dick Creek	BLDK 03-01	MR-2-1-U	1155	1	2-<4	100	10.6	NA	10.6	12.2	-113.542	45.145	-113.540	45.145
Bloody Dick Creek	BLDK 04-01	MR-4-1-U	1935	1	4-<10	100	10.6	NA	10.6	20.5	-113.531	45.146	-113.527	45.146
Bloody Dick Creek	BLDK 05-01	MR-2-1-U	525	1	2-<4	70	10.6	NA	21	11.0	-113.519	45.150	-113.518	45.150
Bloody Dick Creek	BLDK 05-01	MR-2-1-U	1927	1	2-<4	80	10.6	NA	10.6	20.4	-113.524	45.147	-113.521	45.148
Bloody Dick Creek	BLDK 05-01	MR-2-1-U	627	1	2-<4	90	10.6	NA	10.6	6.6	-113.517	45.151	-113.516	45.151
Bloody Dick Creek	BLDK 06-01	MR-4-1-C	4141	1	4-<10	80	10.6	NA	10.6	43.9	-113.515	45.152	-113.510	45.156
Bloody Dick Creek	BLDK 07-01	MR-2-1-U	4639	1	2-<4	100	10.6	NA	10.6	49.2	-113.504	45.158	-113.496	45.158
Bloody Dick Creek	BLDK 08-01	MR-2-2-U	1559	2	2-<4	60	20.6	NA	20.6	32.1	-113.483	45.149	-113.481	45.148

Table E-12. Estimated annual bank sediment loads for Bloody Dick Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Bloody Dick Creek	BLDK 08-01	MR-2-2-U	2858	2	2-<4	75	15.3	NA	15.3	43.7	-113.492	45.153	-113.488	45.151
Bloody Dick Creek	BLDK 08-01	MR-2-2-U	917	2	2-<4	75	15.3	NA	15.3	14.0	-113.479	45.147	-113.478	45.146
Bloody Dick Creek	BLDK 09-01	MR-0-2-U	1287	2	<2	30	34	NA	34	43.8	-113.478	45.145	-113.476	45.144
Bloody Dick Creek	BLDK 09-01	MR-0-2-U	2445	2	<2	80	19.7	NA	19.7	48.2	-113.475	45.143	-113.473	45.139
Bloody Dick Creek	BLDK 10-01	MR-0-3-U	4448	3	<2	90	19.7	NA	19.7	87.6	-113.471	45.137	-113.468	45.132
Bloody Dick Creek	BLDK 11-01	MR-0-3-C	3692	3	<2	90	19.7	NA	19.7	72.7	-113.466	45.129	-113.463	45.125
Bloody Dick Creek	BLDK 12-01	MR-0-3-U	846	3	<2	70	34	NA	34	28.8	-113.458	45.120	-113.457	45.120
Bloody Dick Creek	BLDK 12-01	MR-0-3-U	606	3	<2	80	19.7	NA	19.7	11.9	-113.459	45.122	-113.459	45.121
Bloody Dick Creek	BLDK 12-01	MR-0-3-U	1941	3	<2	90	19.7	NA	19.7	38.2	-113.450	45.115	-113.449	45.114
Bloody Dick Creek	BLDK 12-01	MR-0-3-U	2786	3	<2	100	19.7	NA	19.7	54.9	-113.456	45.119	-113.453	45.117
Bloody Dick Creek	BLDK 13-01	MR-0-3-C	2154	3	<2	100	19.7	NA	19.7	42.4	-113.448	45.112	-113.447	45.109
Bloody Dick Creek	BLDK 13-02	MR-0-3-C	2519	3	<2	80	19.7	NA	19.7	49.6	-113.447	45.107	-113.443	45.106

Table E-12. Estimated annual bank sediment loads for Bloody Dick Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Bloody Dick Creek	BLDK 13-03	MR-0-3-C	730	3	<2	70	34	NA	34	24.8	-113.433	45.103	-113.432	45.103
Bloody Dick Creek	BLDK 13-03	MR-0-3-C	1987	3	<2	95	19.7	NA	19.7	39.1	-113.440	45.103	-113.436	45.103
Bloody Dick Creek	BLDK 14-01	MR-0-3-U	782	3	<2	40	34	NA	34	26.6	-113.422	45.090	-113.422	45.089
Bloody Dick Creek	BLDK 14-01	MR-0-3-U	4261	3	<2	60	34	NA	34	144.9	-113.426	45.098	-113.424	45.094
Bloody Dick Creek	BLDK 14-01	MR-0-3-U	2095	3	<2	75	19.7	NA	19.7	41.3	-113.422	45.088	-113.422	45.086
Bloody Dick Creek	BLDK 14-01	MR-0-3-U	2133	3	<2	95	19.7	NA	19.7	42.0	-113.431	45.102	-113.428	45.100
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	1082	4	<2	10	34	21	21	22.7	-113.423	45.058	-113.423	45.057
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	815	4	<2	20	34	21	21	17.1	-113.420	45.053	-113.418	45.053
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	1753	4	<2	40	34	21	21	36.8	-113.423	45.056	-113.421	45.054
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	6053	4	<2	55	34	21	21	127.1	-113.420	45.084	-113.424	45.076
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	3527	4	<2	75	19.7	NA	19.7	74.1	-113.425	45.071	-113.423	45.067
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	2749	4	<2	80	19.7	NA	19.7	57.7	-113.424	45.064	-113.424	45.061

Table E-12. Estimated annual bank sediment loads for Bloody Dick Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Bloody Dick Creek	BLDK 15-01	MR-0-4-U	7229	4	<2	100	19.7	NA	19.7	151.8	-113.418	45.052	-113.413	45.045
Bloody Dick Creek	BLDK 16-01	MR-0-4-U	1623	4	<2	75	19.7	NA	19.7	32.0	-113.407	45.038	-113.405	45.037
Bloody Dick Creek	BLDK 16-02	MR-0-4-U	1563	4	<2	0	34	NA	34	53.1	-113.396	45.019	-113.395	45.017
Bloody Dick Creek	BLDK 16-02	MR-0-4-U	4912	4	<2	20	34	NA	34	167.0	-113.402	45.029	-113.399	45.025
Bloody Dick Creek	BLDK 16-02	MR-0-4-U	2912	4	<2	20	34	NA	34	99.0	-113.404	45.035	-113.403	45.032
Bloody Dick Creek	BLDK 16-02	MR-0-4-U	1397	4	<2	75	19.7	NA	19.7	27.5	-113.394	45.015	-113.393	45.014
Bloody Dick Creek	BLDK 16-03	MR-0-4-U	1743	4	<2	0	34	NA	34	59.3	-113.391	45.013	-113.389	45.013
Bloody Dick Creek	BLDK 16-03	MR-0-4-U	7974	4	<2	65	34	NA	34	271.1	-113.361	45.002	-113.353	44.997
Bloody Dick Creek	BLDK 16-03	MR-0-4-U	2512	4	<2	80	19.7	NA	19.7	49.5	-113.373	45.009	-113.370	45.007
Bloody Dick Creek	BLDK 16-03	MR-0-4-U	4183	4	<2	80	19.7	NA	19.7	82.4	-113.386	45.012	-113.380	45.010
Bloody Dick Creek	BLDK 16-03	MR-0-4-U	2498	4	<2	80	19.7	NA	19.7	49.2	-113.367	45.005	-113.364	45.004
Bloody Dick Creek	BLDK 16-04	MR-0-4-U	7270	4	<2	80	19.7	NA	19.7	143.2	-113.343	44.994	-113.332	44.994

Table E-12. Estimated annual bank sediment loads for Bloody Dick Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Bloody Dick Creek	BLDK 17-01	MR-0-4-U	21243	4	<2	0	34	5	5	106.2	-113.295	45.005	-113.265	45.008
Bloody Dick Creek	BLDK 17-01	MR-0-4-U	3784	4	<2	35	34	5	5	18.9	-113.321	44.993	-113.316	44.994
Bloody Dick Creek	BLDK 17-01	MR-0-4-U	6601	4	<2	80	19.7	5	5	33.0	-113.311	44.996	-113.303	45.000
Bloody Dick Creek	BLDK 18-01	MR-0-5-U	879	5	<2	90	19.7	NA	19.7	17.3	-113.231	45.014	-113.229	45.014
Bloody Dick Creek	BLDK 18-01	MR-0-5-U	1834	5	<2	100	19.7	NA	19.7	36.1	-113.236	45.013	-113.233	45.014
									Total:	**2865**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.4 Corral Creek Sediment Loads

A total of eight reaches were delineated in the Corral Creek mainstem, including high-gradient headwater reaches and low-gradient reaches near the mouth (**Table E-13**). All reaches had ≤ 70% of the riparian zone in natural vegetation, with low-gradient reaches having higher loading rates.

Table E-13. Estimated annual bank sediment loads for Corral Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Corral Creek	CRRL 01-01	MR-10-1-C	3374	1	>10	60	12.5	NA	12.5	42.2	-111.586	44.585	-111.586	44.580
Corral Creek	CRRL 01-02	MR-10-1-C	3256	1	>10	50	12.5	NA	12.5	40.7	-111.586	44.593	-111.585	44.590
Corral Creek	CRRL 02-01	MR-4-1-U	2410	1	4-<10	30	21	NA	21	50.6	-111.585	44.599	-111.585	44.596
Corral Creek	CRRL 03-01	MR-4-1-U	886	1	4-<10	0	21	NA	21	18.6	-111.585	44.601	-111.585	44.601
Corral Creek	CRRL 04-01	MR-2-1-U	1017	1	2-<4	0	21	NA	21	21.4	-111.588	44.603	-111.587	44.602
Corral Creek	CRRL 05-01	MR-0-1-U	1332	1	<2	0	21	21	21	28.0	-111.589	44.606	-111.589	44.605
Corral Creek	CRRL 05-02	MR-0-1-U	1672	1	<2	0	21	NA	21	35.1	-111.592	44.609	-111.591	44.608
Corral Creek	CRRL 05-03	MR-0-1-U	4147	1	<2	0	21	NA	21	87.1	-111.601	44.614	-111.597	44.613
Corral Creek	CRRL 06-01	MR-0-2-U	4558	2	<2	0	34	NA	34	155.0	-111.610	44.614	-111.606	44.614
									Total:	**478**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.5 East Fork Clover Creek Sediment Loads

A total of eight reaches were delineated in the East Fork Clover Creek mainstem(**Table E-14).** The reaches were all mid and high-gradient reaches. Sampled reaches were typically covered in grass and had low estimated bank erosion, and loading estimates in unsampled reaches were low due to intact riparian vegetation based on aerial photos. However, localized areas of high bank erosion were still observed during surveys.

Table E-14. Estimated annual bank sediment loads for East Fork Clover Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assess-ed	Estimated *					
East Fork Clover Creek	ECLV 01-01	MR-10-1-C	2054	1	>10	80	12.5	NA	12.5	25.7	-112.181	44.756	-112.180	44.759
East Fork Clover Creek	ECLV 01-02	MR-10-1-C	1647	1	>10	90	12.5	NA	12.5	20.6	-112.184	44.753	-112.181	44.754
East Fork Clover Creek	ECLV 02-01	MR-4-1-C	3283	1	4-<10	80	10.6	NA	10.6	34.8	-112.188	44.746	-112.187	44.750
East Fork Clover Creek	ECLV 03-01	MR-4-1-U	1814	1	4-<10	60	21	NA	21	38.1	-112.194	44.743	-112.191	44.745
East Fork Clover Creek	ECLV 03-02	MR-4-1-U	3811	1	4-<10	50	21	NA	21	80.0	-112.206	44.741	-112.200	44.744
East Fork Clover Creek	ECLV 04-01	MR-4-1-C	2339	1	4-<10	50	21	NA	21	49.1	-112.213	44.740	-112.210	44.740
East Fork Clover Creek	ECLV 05-01	MR-4-2-C	2288	2	4-<10	50	14	NA	14	32.0	-112.221	44.737	-112.217	44.738
East Fork Clover Creek	ECLV 06-01	MR-4-2-C	2892	2	4-<10	50	14	NA	14	40.5	-112.228	44.732	-112.225	44.735

Table E-14. Estimated annual bank sediment loads for East Fork Clover Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated *					
East Fork Clover Creek	ECLV 07-01	MR-2-2-U	7280	2	2-<4	50	20.6	8	8	58.2	-112.247	44.720	-112.239	44.728
East Fork Clover Creek	ECLV 07-02	MR-2-2-U	3103	2	2-<4	30	20.6	3	3	9.3	-112.253	44.713	-112.251	44.717
									Total:	**388**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.6 Fish Creek Sediment Loads

A total of eight reaches were delineated in the Fish Creek mainstem (**Table E-15).** The reaches were primarily first order and high-gradient reaches with ≤ 70% of the riparian zone in natural vegetation. Overall, estimates of loading from bank erosion were low or moderate in these reaches due to high-gradients and small stream size.

Table C-15. Estimated annual bank sediment loads for Fish Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Lat-itude	Downstream Longitude	Downstream Lat-itude
							Extrapolated	Field-Assessed	Estimated*					
Fish Creek	FISH 01-01	MR-4-1-U	3514	1	4-<10	10	21	NA	21	73.8	-111.941	44.754	-111.941	44.758
Fish Creek	FISH 01-02	MR-4-1-U	1116	1	4-<10	40	21	NA	21	23.4	-111.940	44.751	-111.941	44.752
Fish Creek	FISH 02-01	MR-4-1-C	2842	1	4-<10	40	21	NA	21	59.7	-111.953	44.744	-111.949	44.746
Fish Creek	FISH 03-01	MR-2-1-U	4068	1	2-<4	20	21	NA	21	85.4	-111.964	44.741	-111.960	44.745

Table C-15. Estimated annual bank sediment loads for Fish Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Fish Creek	FISH 03-02	MR-2-1-U	4270	1	2-<4	10	21	NA	21	89.7	-111.961	44.733	-111.966	44.737
Fish Creek	FISH 04-01	MR-0-1-U	3436	1	<2	10	21	NA	21	72.2	-111.954	44.728	-111.957	44.731
Fish Creek	FISH 05-01	MR-0-2-U	3680	2	<2	10	34	NA	34	125.1	-111.947	44.721	-111.950	44.725
Fish Creek	FISH 06-01	MR-2-2-U	13748	2	2-<4	85	15.3	NA	15.3	210.3	-111.919	44.703	-111.938	44.708
Fish Creek	FISH 06-01	MR-2-2-U	2857	2	2-<4	40	20.6	1	1	2.9	-111.909	44.700	-111.914	44.702
									Total:	**742.5**	**Tons/Yr**			

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.7 Hell Roaring Creek Sediment Loads

A total of 16 reaches were delineated in the Hell Roaring Creek mainstem (**Table E-16**). These consisted of a variety or reach types, most with a relatively high percentage (>70%) of the riparian zone in natural vegetation. However, reaches closest to the mouth had a lower percentage of the riparian zone in natural vegetation and greater bank erosion estimates.

Table E-16. Estimated annual bank sediment loads for Hell Roaring Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Hell Roaring Creek	HELL 01-01	MR-10-1-C	2560	1	>10	100	12.5	NA	12.5	32.0	-111.480	44.547	-111.477	44.549

Table E-16. Estimated annual bank sediment loads for Hell Roaring Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Hell Roaring Creek	HELL 02-01	MR-4-2-C	7416	2	4-<10	100	11.3	NA	11.3	83.8	-111.507	44.547	-111.494	44.546
Hell Roaring Creek	HELL 03-01	MR-4-2-U	2640	2	4-<10	80	11.3	NA	11.3	29.8	-111.515	44.548	-111.511	44.547
Hell Roaring Creek	HELL 04-01	MR-2-3-C	1058	3	2-<4	80	15.3	20	15.3	16.2	-111.518	44.548	-111.517	44.548
Hell Roaring Creek	HELL 04-02	MR-2-3-C	2280	3	2-<4	90	15.3	NA	15.3	34.9	-111.525	44.550	-111.522	44.549
Hell Roaring Creek	HELL 05-01	MR-4-3-C	2108	3	4-<10	90	11.3	NA	11.3	29.5	-111.531	44.552	-111.528	44.551
Hell Roaring Creek	HELL 06-01	MR-2-3-U	2945	3	2-<4	90	15.3	NA	15.3	45.1	-111.535	44.558	-111.534	44.555
Hell Roaring Creek	HELL 07-01	MR-2-3-C	1865	3	2-<4	90	15.3	NA	15.3	28.5	-111.539	44.562	-111.537	44.560
Hell Roaring Creek	HELL 08-01	MR-4-3-C	4711	3	4-<10	100	11.3	NA	11.3	66.0	-111.550	44.567	-111.544	44.565
Hell Roaring Creek	HELL 09-01	MR-2-3-U	2037	3	2-<4	90	15.3	NA	15.3	31.2	-111.555	44.570	-111.553	44.568
Hell Roaring Creek	HELL 10-01	MR-2-3-C	1492	3	2-<4	90	15.3	NA	15.3	22.8	-111.557	44.573	-111.556	44.572

Table E-16. Estimated annual bank sediment loads for Hell Roaring Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Hell Roaring Creek	HELL 11-01	MR-4-3-C	2052	3	4-<10	90	11.3	NA	11.3	28.7	-111.559	44.578	-111.559	44.575
Hell Roaring Creek	HELL 12-01	MR-2-3-C	3239	3	2-<4	80	15.3	NA	15.3	49.6	-111.560	44.586	-111.561	44.582
Hell Roaring Creek	HELL 13-01	MR-4-3-C	3035	3	4-<10	100	11.3	NA	11.3	42.5	-111.556	44.592	-111.558	44.589
Hell Roaring Creek	HELL 14-01	MR-0-3-U	10322	3	<2	10	34	20	20	206.4	-111.556	44.592	-111.550	44.603
Hell Roaring Creek	HELL 15-01	MR-0-3-U	4475	3	<2	0	34	NA	34	152.1	-111.556	44.613	-111.555	44.614
									Total:	**867**	**Tons/Yr**			

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.8 Horse Prairie Creek Sediment Loads

A total of eighteen reaches were delineated for the Horse Prairie Creek mainstem (**Table E-17**). This table does not include Trail Creek, Medicine Lodge Creek, or Selway Creek drainages, which were assessed separately. These were further divided into subreaches based on land use. The reaches near the headwaters were high-gradient reaches with > 70% in natural vegetation. Those near the mouth exhibited lower gradients with a percentage of natural vegetation low or near 0 %. Most of the bank erosion occurred in these lower gradient reaches near the mouth. Overall, estimates of loading from bank erosion were high for much of Horse Prairie Creek.

Table E-17. Estimated annual bank sediment loads for Horse Prairie Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Horse Prairie Crk	HRSP 01-01	MR-10-1-C	512	1	>10	50	12.5	NA	12.5	6.4	-113.141	44.782	-113.142	44.782
Horse Prairie Crk	HRSP 01-01	MR-10-1-C	1054	1	>10	100	12.5	NA	12.5	13.2	-113.143	44.782	-113.144	44.783
Horse Prairie Crk	HRSP 02-01	MR-10-1-U	1314	1	>10	90	12.5	NA	12.5	16.4	-113.145	44.784	-113.145	44.786
Horse Prairie Crk	HRSP 03-01	MR-10-1-C	2853	1	>10	0	12.5	NA	12.5	35.7	-113.145	44.788	-113.145	44.791
Horse Prairie Crk	HRSP 04-01	MR-4-1-U	413	1	4-<10	50	21	NA	21	8.7	-113.153	44.798	-113.154	44.798
Horse Prairie Crk	HRSP 04-01	MR-4-1-U	1402	1	4-<10	70	21	NA	21	29.4	-113.148	44.798	-113.151	44.798
Horse Prairie Crk	HRSP 04-01	MR-4-1-U	1785	1	4-<10	85	10.6	NA	10.6	18.9	-113.155	44.797	-113.158	44.796
Horse Prairie Crk	HRSP 04-01	MR-4-1-U	1158	1	4-<10	100	10.6	NA	10.6	12.3	-113.146	44.795	-113.147	44.796
Horse Prairie Crk	HRSP 05-01	MR-4-1-C	2962	1	4-<10	80	10.6	NA	10.6	31.4	-113.161	44.795	-113.166	44.795
Horse Prairie Crk	HRSP 05-02	MR-4-1-C	1537	1	4-<10	50	21	NA	21	32.3	-113.172	44.797	-113.174	44.798
Horse Prairie Crk	HRSP 06-01	MR-4-2-U	1031	2	4-<10	40	14	NA	14	14.4	-113.175	44.800	-113.176	44.801
Horse Prairie Crk	HRSP 06-01	MR-4-2-U	2604	2	4-<10	75	11.3	NA	11.3	29.4	-113.177	44.802	-113.180	44.805
Horse Prairie Crk	HRSP 06-01	MR-4-2-U	1640	2	4-<10	80	11.3	NA	11.3	18.5	-113.184	44.806	-113.186	44.808

Table E-17. Estimated annual bank sediment loads for Horse Prairie Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Horse Prairie Crk	HRSP 07-01	MR-2-2-U	1583	2	2-<4	40	20.6	NA	20.6	32.6	-113.188	44.810	-113.190	44.811
Horse Prairie Crk	HRSP 08-01	MR-2-2-C	2270	2	2-<4	10	20.6	NA	20.6	46.8	-113.192	44.812	-113.194	44.815
Horse Prairie Crk	HRSP 08-01	MR-2-2-C	926	2	2-<4	20	20.6	NA	20.6	19.1	-113.202	44.818	-113.204	44.818
Horse Prairie Crk	HRSP 08-01	MR-2-2-C	1405	2	2-<4	50	20.6	NA	20.6	28.9	-113.198	44.817	-113.200	44.818
Horse Prairie Crk	HRSP 09-01	MR-2-2-U	5873	2	2-<4	10	20.6	NA	20.6	121.0	-113.205	44.818	-113.215	44.818
Horse Prairie Crk	HRSP 09-02	MR-2-2-U	1545	2	2-<4	0	20.6	NA	20.6	31.8	-113.227	44.826	-113.229	44.828
Horse Prairie Crk	HRSP 09-02	MR-2-2-U	881	2	2-<4	5	20.6	NA	20.6	18.2	-113.225	44.825	-113.226	44.825
Horse Prairie Crk	HRSP 09-02	MR-2-2-U	833	2	2-<4	20	20.6	NA	20.6	17.2	-113.223	44.823	-113.224	44.824
Horse Prairie Crk	HRSP 09-03	MR-2-2-U	2542	2	2-<4	0	20.6	NA	20.6	52.4	-113.231	44.829	-113.233	44.833
Horse Prairie Crk	HRSP 09-03	MR-2-2-U	5200	2	2-<4	5	20.6	NA	20.6	107.1	-113.236	44.845	-113.239	44.852
Horse Prairie Crk	HRSP 09-03	MR-2-2-U	3639	2	2-<4	30	20.6	NA	20.6	75.0	-113.232	44.836	-113.234	44.841
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	3428	3	<2	0	34	NA	34	116.5	-113.267	44.877	-113.270	44.881
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	22	3	<2	0	34	NA	34	0.7	-113.265	44.876	-113.265	44.876

Table E-17. Estimated annual bank sediment loads for Horse Prairie Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	864	3	<2	0	34	NA	34	29.4	-113.265	44.876	-113.266	44.877
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	3821	3	<2	5	34	NA	34	129.9	-113.244	44.857	-113.248	44.861
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	4879	3	<2	10	34	NA	34	165.9	-113.254	44.864	-113.257	44.869
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	544	3	<2	10	34	NA	34	18.5	-113.262	44.873	-113.262	44.874
Horse Prairie Crk	HRSP 10-01	MR-0-3-U	1012	3	<2	10	34	NA	34	34.4	-113.263	44.874	-113.264	44.876
Horse Prairie Crk	HRSP 11-01	MR-0-4-U	14624	4	<2	5	34	NA	34	497.2	-113.271	44.885	-113.273	44.898
Horse Prairie Crk	HRSP 11-02	MR-0-4-U	23787	4	<2	0	34	23	23	547.1	-113.279	44.925	-113.273	44.946
Horse Prairie Crk	HRSP 11-02	MR-0-4-U	4426	4	<2	0	34	23	23	101.8	-113.275	44.916	-113.276	44.921
Horse Prairie Crk	HRSP 11-02	MR-0-4-U	18950	4	<2	0	34	23	23	435.9	-113.258	44.965	-113.249	44.986
Horse Prairie Crk	HRSP 11-03	MR-0-4-U	6983	4	<2	0	34	NA	34	237.4	-113.239	45.005	-113.233	45.009
Horse Prairie Crk	HRSP 12-01	MR-0-5-U	5686	5	<2	20	34	44	44	250.2	-112.951	44.991	-112.948	44.987
Horse Prairie Crk	HRSP 12-01	MR-0-5-U	8994	5	<2	30	34	44	44	395.8	-112.970	45.003	-112.960	44.997
Horse Prairie Crk	HRSP 12-01	MR-0-5-U	93306	5	<2	40	34	44	44	4105.4	-113.228	45.014	-113.098	45.023

Table E-17. Estimated annual bank sediment loads for Horse Prairie Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Horse Prairie Crk	HRSP 13-01	MR-0-6-U	12642	6	<2	0	34	NA	34	429.8	-112.947	44.980	-112.927	44.976
* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used									**Total:**	**8313**	**Tons/Yr**			

E4.2.9 Jones Creek Sediment Loads

A total of six reaches were delineated for the Jones Creek mainstem (**Table E-18**). These were further divided into subreaches based on land use. The reaches near the headwaters were primarily high-gradient reaches with > 70% in natural vegetation and low estimated bank erosion. Those near the mouth exhibited lower gradients with a percentage of natural vegetation low or near 0 %. Larger estimate of bank erosion occurred in these lower gradient reaches near the mouth.

Table E-18. Estimated sediment loads for Jones Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Jones Creek	JNES 01-01	MR-10-1-C	3677	1	>10	90	12.5	NA	12.5	46.0	-111.983	44.551	-111.985	44.546
Jones Creek	JNES 02-01	MR-4-1-U	2233	1	4-<10	80	10.6	NA	10.6	23.7	-111.982	44.557	-111.983	44.554
Jones Creek	JNES 03-01	MR-4-2-U	6264	2	4-<10	90	11.3	NA	11.3	70.8	-111.968	44.570	-111.974	44.562
Jones Creek	JNES 04-01	MR-2-2-U	1912	2	2-<4	80	15.3	NA	15.3	29.3	-111.969	44.575	-111.968	44.572
Jones Creek	JNES 04-02	MR-2-2-U	2426	2	2-<4	60	20.6	NA	20.6	50.0	-111.970	44.581	-111.969	44.578
Jones Creek	JNES 04-03	MR-2-2-U	2383	2	2-<4	20	20.6	NA	20.6	49.1	-111.972	44.586	-111.971	44.584

Table E-18. Estimated sediment loads for Jones Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated *					
Jones Creek	JNES 05-01	MR-4-2-U	1428	2	4-<10	0	14	NA	14	20.0	-111.974	44.589	-111.973	44.587
Jones Creek	JNES 05-02	MR-4-2-U	1077	2	4-<10	0	14	NA	14	15.1	-111.976	44.591	-111.975	44.590
Jones Creek	JNES 06-01	MR-0-2-U	8384	2	<2	0	34	NA	34	285.0	-111.992	44.603	-111.986	44.598
Jones Creek	JNES 06-02	MR-0-2-U	1609	2	<2	0	34	NA	34	54.7	-111.995	44.606	-111.993	44.604
Jones Creek	JNES 06-03	MR-0-2-U	3076	2	<2	0	34	NA	34	104.6	-111.993	44.612	-111.995	44.609
Jones Creek	JNES 06-04	MR-0-2-U	4849	2	<2	0	34	NA	34	164.9	-111.992	44.621	-111.991	44.616
Jones Creek	JNES 06-05	MR-0-2-U	4668	2	<2	0	34	NA	34	158.7	-111.988	44.629	-111.990	44.624
									Total:	**1071**	**Tons/Yr**			

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.10 Long Creek Sediment Loads

A total of eight reaches were delineated in the Long Creek mainstem (**Table E-19**). Most reaches had less than 70% of the reach in natural vegetation. Reaches near the mouth had the lowest percentage of the riparian zone natural vegetation and highest estimated loads from bank erosion.

Table E-19. Estimated sediment loads for Long Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Long Creek	LONG 01-01	MR-10-1-U	4346	1	>10	70	12.5	NA	12.5	54.3	-111.979	44.790	-111.974	44.794
Long Creek	LONG 02-01	MR-4-1-U	2856	1	4-<10	40	21	NA	21	60.0	-111.982	44.783	-111.981	44.786
Long Creek	LONG 03-01	MR-2-1-U	7546	1	2-<4	40	21	NA	21	158.5	-111.984	44.763	-111.981	44.773
Long Creek	LONG 04-01	MR-0-1-U	10195	1	<2	30	21	NA	21	214.1	-112.008	44.754	-111.997	44.756
Long Creek	LONG 05-01	MR-0-2-U	2011	2	<2	20	34	NA	34	68.4	-112.011	44.750	-112.010	44.752
Long Creek	LONG 06-01	MR-0-3-U	24119	3	<2	10	34	1	1	24.1	-112.057	44.724	-112.033	44.734
Long Creek	LONG 06-02	MR-0-3-U	19133	3	<2	10	34	NA	34	650.5	-112.096	44.700	-112.078	44.713
Long Creek	LONG 07-01	MR-0-3-U	55496	3	<2	30	34	5	5	277.5	-112.110	44.635	-112.105	44.662
* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used									**Total:**	**1507**	**Tons/Yr**			

E4.2.11 Medicine Lodge Creek Sediment Loads

A total of 33 reaches were delineated in the Medicine Lodge Creek mainstem (**Table E-20**). Reaches were further divided into subreaches based on land use. Reaches near the mouth had the lowest percentage of the riparian zone natural vegetation and highest estimated loads from bank erosion. Overall, Medicine Lodge Creek estimates of bank erosion were high.

Table E-20. Estimated sediment loads for Medicine Lodge Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Medicine Lodge Crk	MDLG 01-01	MR-10-1-U	445	1	>10	0	12.5	NA	12.5	5.6	-112.990	44.657	-112.989	44.658
Medicine Lodge Crk	MDLG 01-01	MR-10-1-U	1487	1	>10	20	12.5	NA	12.5	18.6	-112.989	44.658	-112.987	44.660
Medicine Lodge Crk	MDLG 01-01	MR-10-1-U	1456	1	>10	30	12.5	NA	12.5	18.2	-112.991	44.654	-112.991	44.656
Medicine Lodge Crk	MDLG 01-01	MR-10-1-U	352	1	>10	40	12.5	NA	12.5	4.4	-112.990	44.653	-112.991	44.653
Medicine Lodge Crk	MDLG 02-01	MR-2-1-U	2093	1	2-<4	80	10.6	NA	10.6	22.2	-112.986	44.661	-112.987	44.663
Medicine Lodge Crk	MDLG 03-01	MR-2-2-U	3375	2	2-<4	80	15.3	NA	15.3	51.6	-112.988	44.666	-112.989	44.671
Medicine Lodge Crk	MDLG 04-01	MR-0-3-U	7506	3	<2	50	34	NA	34	255.2	-112.992	44.674	-112.994	44.684
Medicine Lodge Crk	MDLG 04-02	MR-0-3-U	1154	3	<2	50	34	NA	34	39.2	-113.003	44.692	-113.004	44.693
Medicine Lodge Crk	MDLG 04-03	MR-0-3-U	13996	3	<2	10	34	NA	34	475.9	-113.005	44.695	-113.019	44.710
Medicine Lodge Crk	MDLG 04-04	MR-0-3-U	6069	3	<2	80	19.7	NA	19.7	119.6	-113.034	44.721	-113.037	44.727
Medicine Lodge Crk	MDLG 04-05	MR-0-3-U	3426	3	<2	0	34	NA	34	116.5	-113.038	44.735	-113.036	44.739
Medicine Lodge Crk	MDLG 04-06	MR-0-3-U	1251	3	<2	60	34	NA	34	42.5	-113.038	44.743	-113.036	44.743
Medicine Lodge Crk	MDLG 04-06	MR-0-3-U	4691	3	<2	80	19.7	NA	19.7	92.4	-113.035	44.745	-113.036	44.751

Table E-20. Estimated sediment loads for Medicine Lodge Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	542	3	<2	0	34	14.4	14.4	7.8	-113.028	44.765	-113.028	44.765
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	439	3	<2	10	34	14.4	14.4	6.3	-113.029	44.761	-113.028	44.762
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	639	3	<2	20	34	14.4	14.4	9.2	-113.024	44.769	-113.023	44.770
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	1276	3	<2	40	34	14.4	14.4	18.4	-113.022	44.770	-113.021	44.771
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	739	3	<2	60	34	14.4	14.4	10.6	-113.032	44.758	-113.032	44.758
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	520	3	<2	60	34	14.4	14.4	7.5	-113.033	44.757	-113.033	44.757
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	520	3	<2	80	19.7	NA	19.7	10.2	-113.020	44.773	-113.019	44.773
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	1009	3	<2	80	19.7	NA	19.7	19.9	-113.031	44.759	-113.031	44.761
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	1692	3	<2	90	19.7	NA	19.7	33.3	-113.028	44.766	-113.026	44.767
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	175	3	<2	90	19.7	NA	19.7	3.5	-113.029	44.761	-113.029	44.761
Medicine Lodge Crk	MDLG 04-07	MR-0-3-U	929	3	<2	0	34	14.4	14.4	13.4	-113.028	44.762	-113.028	44.763
Medicine Lodge Crk	MDLG 04-08	MR-0-3-U	1420	3	<2	0	34	NA	34	48.3	-113.017	44.775	-113.017	44.777
Medicine Lodge Crk	MDLG 04-08	MR-0-3-U	797	3	<2	0	34	NA	34	27.1	-113.019	44.774	-113.018	44.774

Table E-20. Estimated sediment loads for Medicine Lodge Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Medicine Lodge Crk	MDLG 04-09	MR-0-3-U	1401	3	<2	0	34	NA	34	47.6	-113.017	44.780	-113.018	44.782
Medicine Lodge Crk	MDLG 04-09	MR-0-3-U	806	3	<2	0	34	NA	34	27.4	-113.018	44.784	-113.018	44.785
Medicine Lodge Crk	MDLG 04-09	MR-0-3-U	385	3	<2	0	34	NA	34	13.1	-113.016	44.779	-113.016	44.780
Medicine Lodge Crk	MDLG 04-10	MR-0-3-U	1115	3	<2	0	34	NA	34	37.9	-113.015	44.791	-113.015	44.792
Medicine Lodge Crk	MDLG 04-10	MR-0-3-U	415	3	<2	60	34	NA	34	14.1	-113.017	44.787	-113.017	44.787
Medicine Lodge Crk	MDLG 04-10	MR-0-3-U	769	3	<2	75	19.7	NA	19.7	15.1	-113.016	44.789	-113.016	44.790
Medicine Lodge Crk	MDLG 04-10	MR-0-3-U	616	3	<2	80	19.7	NA	19.7	12.1	-113.018	44.786	-113.017	44.786
Medicine Lodge Crk	MDLG 04-10	MR-0-3-U	560	3	<2	80	19.7	NA	19.7	11.0	-113.017	44.788	-113.017	44.789
Medicine Lodge Crk	MDLG 04-11	MR-0-3-U	2993	3	<2	0	34	NA	34	101.7	-113.012	44.798	-113.009	44.801
Medicine Lodge Crk	MDLG 04-11	MR-0-3-U	1560	3	<2	0	34	NA	34	53.0	-113.014	44.794	-113.014	44.796
Medicine Lodge Crk	MDLG 04-11	MR-0-3-U	339	3	<2	0	34	NA	34	11.5	-113.013	44.798	-113.013	44.798
Medicine Lodge Crk	MDLG 05-01	MR-0-4-U	2320	4	<2	0	34	NA	34	78.9	-113.006	44.804	-113.006	44.807
Medicine Lodge Crk	MDLG 05-01	MR-0-4-U	11142	4	<2	10	34	NA	34	378.8	-113.000	44.817	-112.993	44.829

Table E-20. Estimated sediment loads for Medicine Lodge Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Medicine Lodge Crk	MDLG 05-01	MR-0-4-U	2973	4	<2	10	34	NA	34	101.1	-113.005	44.810	-113.002	44.814
Medicine Lodge Crk	MDLG 06-01	MR-0-5-U	12564	5	<2	0	34	NA	34	427.2	-112.997	44.839	-113.005	44.852
Medicine Lodge Crk	MDLG 06-02	MR-0-5-U	5113	5	<2	0	34	NA	34	173.9	-113.004	44.863	-113.007	44.868
Medicine Lodge Crk	MDLG 06-03	MR-0-5-U	2717	5	<2	0	34	NA	34	92.4	-113.009	44.874	-113.013	44.875
Medicine Lodge Crk	MDLG 06-04	MR-0-5-U	1434	5	<2	0	34	NA	34	48.8	-113.017	44.877	-113.019	44.877
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	4283	5	<2	0	34	29.6	29.6	126.8	-113.031	44.897	-113.029	44.901
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	855	5	<2	0	34	29.6	29.6	25.3	-113.021	44.878	-113.022	44.878
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	655	5	<2	0	34	29.6	29.6	19.4	-113.032	44.896	-113.031	44.897
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	14257	5	<2	10	34	29.6	29.6	422.0	-113.027	44.904	-113.025	44.915
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	3532	5	<2	10	34	29.6	29.6	104.6	-113.023	44.879	-113.028	44.880
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	3630	5	<2	10	34	29.6	29.6	107.5	-113.034	44.889	-113.033	44.892
Medicine Lodge Crk	MDLG 06-05	MR-0-5-U	3940	5	<2	20	34	29.6	29.6	116.6	-113.029	44.882	-113.033	44.886
Medicine Lodge Crk	MDLG 06-06	MR-0-5-U	988	5	<2	20	34	NA	34	33.6	-113.019	44.932	-113.019	44.933

Table E-20. Estimated sediment loads for Medicine Lodge Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Medicine Lodge Crk	MDLG 06-06	MR-0-5-U	961	5	<2	30	34	NA	34	32.7	-113.021	44.928	-113.020	44.928
Medicine Lodge Crk	MDLG 06-06	MR-0-5-U	762	5	<2	70	34	NA	34	25.9	-113.020	44.930	-113.020	44.931
Medicine Lodge Crk	MDLG 06-06	MR-0-5-U	488	5	<2	70	34	NA	34	16.6	-113.021	44.929	-113.020	44.930
Medicine Lodge Crk	MDLG 06-07	MR-0-5-U	8646	5	<2	20	34	NA	34	293.9	-113.018	44.934	-113.017	44.941
Medicine Lodge Crk	MDLG 06-08	MR-0-5-U	5574	5	<2	0	34	NA	34	189.5	-113.015	44.949	-113.013	44.954
Medicine Lodge Crk	MDLG 06-09	MR-0-5-U	3054	5	<2	0	34	NA	34	103.8	-113.010	44.960	-113.009	44.963
Medicine Lodge Crk	MDLG 06-10	MR-0-5-U	1462	5	<2	0	34	NA	34	49.7	-113.006	44.965	-113.005	44.966
Medicine Lodge Crk	MDLG 06-11	MR-0-5-U	1080	5	<2	70	34	NA	34	36.7	-113.004	44.967	-113.005	44.969
Medicine Lodge Crk	MDLG 06-12	MR-0-5-U	4147	5	<2	70	34	NA	34	141.0	-113.004	44.970	-113.001	44.974
Medicine Lodge Crk	MDLG 06-13	MR-0-5-U	2596	5	<2	30	34	NA	34	88.3	-112.997	44.976	-112.995	44.979
Medicine Lodge Crk	MDLG 06-14	MR-0-5-U	1515	5	<2	0	34	NA	34	51.5	-112.993	44.981	-112.991	44.981
Medicine Lodge Crk	MDLG 06-15	MR-0-5-U	1111	5	<2	0	34	NA	34	37.8	-112.989	44.982	-112.987	44.982
Medicine Lodge Crk	MDLG 06-16	MR-0-5-U	1887	5	<2	70	34	NA	34	64.2	-112.986	44.983	-112.984	44.984

Table E-20. Estimated sediment loads for Medicine Lodge Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Medicine Lodge Crk	MDLG 06-17	MR-0-5-U	4204	5	<2	0	34	NA	34	142.9	-112.981	44.986	-112.974	44.987
Medicine Lodge Crk	MDLG 06-18	MR-0-5-U	2994	5	<2	0	34	NA	34	101.8	-112.966	44.985	-112.961	44.984
Medicine Lodge Crk	MDLG 06-18	MR-0-5-U	2350	5	<2	0	34	NA	34	79.9	-112.955	44.982	-112.951	44.981
									Total:	**5535**	**Tons/Yr**			

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.12 Muddy Creek Sediment Loads

A total of seven reaches were delineated in the Medicine Lodge Creek mainstem (**Table E-21**). Reaches were further divided into subreaches based on land use. All reaches were low-gradient reaches. Reaches near the mouth had the lowest percentage of the riparian zone in natural vegetation (< 70%) and the highest estimated loads from bank erosion.

Table E-21. Estimated sediment loads for Muddy Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Muddy Creek	MDDY 01-01	MR-0-3-U	2189	3	<2	40	34	NA	34	74.4	-112.868	44.714	-112.869	44.716
Muddy Creek	MDDY 01-01	MR-0-3-U	576	3	<2	50	34	NA	34	19.6	-112.871	44.721	-112.871	44.722
Muddy Creek	MDDY 01-01	MR-0-3-U	427	3	<2	75	19.7	NA	19.7	8.4	-112.872	44.722	-112.872	44.722

Table E-21. Estimated sediment loads for Muddy Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Muddy Creek	MDDY 01-01	MR-0-3-U	2128	3	<2	80	19.7	NA	19.7	41.9	-112.872	44.725	-112.874	44.727
Muddy Creek	MDDY 01-01	MR-0-3-U	1567	3	<2	80	19.7	NA	19.7	30.9	-112.870	44.718	-112.871	44.719
Muddy Creek	MDDY 01-01	MR-0-3-U	584	3	<2	85	19.7	NA	19.7	11.5	-112.872	44.723	-112.872	44.724
Muddy Creek	MDDY 01-01	MR-0-3-U	362	3	<2	90	19.7	NA	19.7	7.1	-112.875	44.730	-112.875	44.730
Muddy Creek	MDDY 01-02	MR-0-3-U	1009	3	<2	85	19.7	NA	19.7	19.9	-112.868	44.712	-112.868	44.713
Muddy Creek	MDDY 01-03	MR-0-3-U	950	3	<2	40	34	NA	34	32.3	-112.860	44.703	-112.862	44.704
Muddy Creek	MDDY 01-03	MR-0-3-U	4668	3	<2	90	19.7	NA	19.7	92.0	-112.863	44.704	-112.867	44.708
Muddy Creek	MDDY 01-04	MR-0-3-U	1177	3	<2	0	34	2	2	2.4	-112.858	44.701	-112.859	44.702
Muddy Creek	MDDY 01-04	MR-0-3-U	6968	3	<2	65	34	2	2	13.9	-112.849	44.683	-112.855	44.689
Muddy Creek	MDDY 01-04	MR-0-3-U	1682	3	<2	80	19.7	2	2	3.4	-112.857	44.697	-112.857	44.699
Muddy Creek	MDDY 02-01	MR-0-4-U	12526	4	<2	20	34	10	10	125.3	-112.833	44.661	-112.847	44.667
Muddy Creek	MDDY 02-01	MR-0-4-U	1180	4	<2	20	34	10	10	11.8	-112.847	44.680	-112.848	44.682
Muddy Creek	MDDY 02-02	MR-0-4-U	3053	4	<2	20	34	NA	34	103.8	-112.829	44.654	-112.830	44.657

Table E-21. Estimated sediment loads for Muddy Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Muddy Creek	MDDY 02-03	MR-0-4-U	7590	4	<2	20	34	NA	34	258.0	-112.815	44.642	-112.821	44.646
Muddy Creek	MDDY 02-03	MR-0-4-U	1131	4	<2	20	34	NA	34	38.4	-112.827	44.650	-112.827	44.652
Muddy Creek	MDDY 02-03	MR-0-4-U	3055	4	<2	20	34	NA	34	103.9	-112.799	44.635	-112.803	44.636
Muddy Creek	MDDY 02-03	MR-0-4-U	4323	4	<2	30	34	NA	34	147.0	-112.806	44.637	-112.810	44.640
Muddy Creek	MDDY 02-03	MR-0-4-U	1339	4	<2	40	34	NA	34	45.5	-112.828	44.652	-112.829	44.653
									Total:	**1191.4**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.13 Nicholia Creek Sediment Loads

A total of thirty-six reaches were delineated in Nicholia Creek (**Table E-22**), a major tributary to Big Sheep Creek. Reaches were further divided into subreaches based on land use. Reaches near the mouth had the lowest percentage of the riparian zone in natural vegetation (< 70%) and the highest estimated loads from bank erosion.

Table E-22. Estimated sediment loads for Nicholia Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapo-lated	Field-Assessed	Estimated*					
Nicholia Creek	NCHL 01-01	MR-10-1-C	2177	1	>10	100	12.5	NA	12.5	27.2	-112.847	44.361	-112.848	44.364

Table E-22. Estimated sediment loads for Nicholia Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Nicholia Creek	NCHL 02-01	MR-10-1-U	2615	1	>10	100	12.5	NA	12.5	32.7	-112.847	44.367	-112.844	44.369
Nicholia Creek	NCHL 03-01	MR-4-1-C	2309	1	4-<10	100	10.6	NA	10.6	24.5	-112.846	44.372	-112.847	44.375
Nicholia Creek	NCHL 03-01	MR-4-1-C	1631	1	4-<10	100	10.6	NA	10.6	17.3	-112.847	44.378	-112.848	44.380
Nicholia Creek	NCHL 04-01	MR-10-1-U	1505	1	>10	95	12.5	NA	12.5	18.8	-112.849	44.382	-112.848	44.384
Nicholia Creek	NCHL 05-01	MR-4-1-U	218	1	4-<10	60	21	NA	21	4.6	-112.850	44.390	-112.850	44.390
Nicholia Creek	NCHL 05-01	MR-4-1-U	1585	1	4-<10	90	10.6	NA	10.6	16.8	-112.850	44.385	-112.850	44.387
Nicholia Creek	NCHL 05-01	MR-4-1-U	1531	1	4-<10	90	10.6	NA	10.6	16.2	-112.851	44.390	-112.852	44.392
Nicholia Creek	NCHL 06-01	MR-4-1-C	1204	1	4-<10	40	21	NA	21	25.3	-112.854	44.397	-112.855	44.398
Nicholia Creek	NCHL 06-01	MR-4-1-C	801	1	4-<10	50	21	NA	21	16.8	-112.852	44.394	-112.853	44.395
Nicholia Creek	NCHL 06-01	MR-4-1-C	2296	1	4-<10	65	21	NA	21	48.2	-112.856	44.399	-112.858	44.402
Nicholia Creek	NCHL 06-01	MR-4-1-C	610	1	4-<10	75	10.6	NA	10.6	6.5	-112.853	44.396	-112.854	44.396
Nicholia Creek	NCHL 07-01	MR-2-1-U	422	1	2-<4	75	10.6	NA	10.6	4.5	-112.866	44.413	-112.867	44.414
Nicholia Creek	NCHL 07-01	MR-2-1-U	1995	1	2-<4	80	10.6	NA	10.6	21.1	-112.860	44.404	-112.861	44.407
Nicholia Creek	NCHL 07-01	MR-2-1-U	879	1	2-<4	80	10.6	NA	10.6	9.3	-112.865	44.412	-112.865	44.413
Nicholia Creek	NCHL 07-01	MR-2-1-U	1278	1	2-<4	85	10.6	NA	10.6	13.5	-112.863	44.409	-112.863	44.410
Nicholia Creek	NCHL 08-01	MR-4-2-U	853	2	4-<10	75	11.3	NA	11.3	9.6	-112.867	44.414	-112.868	44.415
Nicholia Creek	NCHL 08-01	MR-4-2-U	670	2	4-<10	95	11.3	NA	11.3	7.6	-112.869	44.416	-112.869	44.416
Nicholia Creek	NCHL 08-02	MR-4-2-U	1871	2	4-<10	60	14	NA	14	26.2	-112.872	44.418	-112.875	44.419
Nicholia Creek	NCHL 08-02	MR-4-2-U	1066	2	4-<10	90	11.3	NA	11.3	12.0	-112.870	44.416	-112.872	44.417

Table E-22. Estimated sediment loads for Nicholia Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Nicholia Creek	NCHL 08-03	MR-4-2-U	1184	2	4-<10	40	14	NA	14	16.6	-112.877	44.421	-112.879	44.422
Nicholia Creek	NCHL 08-03	MR-4-2-U	1316	2	4-<10	50	14	NA	14	18.4	-112.881	44.422	-112.883	44.423
Nicholia Creek	NCHL 09-01	MR-0-2-U	1550	2	<2	60	34	NA	34	52.7	-112.885	44.423	-112.886	44.423
Nicholia Creek	NCHL 09-01	MR-0-2-U	1290	2	<2	80	19.7	NA	19.7	25.4	-112.887	44.424	-112.889	44.424
Nicholia Creek	NCHL 09-02	MR-0-2-U	891	2	<2	80	19.7	NA	19.7	17.5	-112.890	44.425	-112.891	44.426
Nicholia Creek	NCHL 09-03	MR-0-2-U	1415	2	<2	80	19.7	NA	19.7	27.9	-112.894	44.429	-112.895	44.430
Nicholia Creek	NCHL 09-03	MR-0-2-U	1139	2	<2	80	19.7	NA	19.7	22.4	-112.892	44.427	-112.893	44.428
Nicholia Creek	NCHL 09-03	MR-0-2-U	1361	2	<2	90	19.7	NA	19.7	26.8	-112.896	44.431	-112.897	44.432
Nicholia Creek	NCHL 10-01	MR-0-2-C	1705	2	<2	40	34	NA	34	58.0	-112.899	44.434	-112.900	44.436
Nicholia Creek	NCHL 10-01	MR-0-2-C	625	2	<2	75	19.7	NA	19.7	12.3	-112.898	44.433	-112.898	44.434
Nicholia Creek	NCHL 11-01	MR-2-2-C	825	2	2-<4	30	20.6	NA	20.6	17.0	-112.903	44.437	-112.904	44.437
Nicholia Creek	NCHL 12-01	MR-2-2-U	1262	2	2-<4	80	15.3	NA	15.3	19.3	-112.905	44.438	-112.906	44.439
Nicholia Creek	NCHL 13-01	MR-2-2-C	1168	2	2-<4	0	20.6	NA	20.6	24.1	-112.912	44.451	-112.913	44.452
Nicholia Creek	NCHL 13-01	MR-2-2-C	962	2	2-<4	50	20.6	NA	20.6	19.8	-112.906	44.441	-112.906	44.442
Nicholia Creek	NCHL 13-01	MR-2-2-C	2411	2	2-<4	60	20.6	NA	20.6	49.7	-112.908	44.445	-112.910	44.448
Nicholia Creek	NCHL 13-01	MR-2-2-C	489	2	2-<4	70	20.6	NA	20.6	10.1	-112.907	44.443	-112.908	44.444
Nicholia Creek	NCHL 13-01	MR-2-2-C	402	2	2-<4	75	15.3	NA	15.3	6.2	-112.907	44.444	-112.907	44.445
Nicholia Creek	NCHL 14-01	MR-2-2-U	1324	2	2-<4	25	20.6	NA	20.6	27.3	-112.913	44.453	-112.912	44.455
Nicholia Creek	NCHL 15-01	MR-2-2-C	2224	2	2-<4	50	20.6	NA	20.6	45.8	-112.912	44.457	-112.912	44.459
Nicholia Creek	NCHL 16-01	MR-2-2-U	1083	2	2-<4	65	20.6	NA	20.6	22.3	-112.911	44.462	-112.911	44.464

Table E-22. Estimated sediment loads for Nicholia Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Nicholia Creek	NCHL 16-02	MR-2-2-U	3830	2	2-<4	80	15.3	NA	15.3	58.6	-112.910	44.465	-112.908	44.469
Nicholia Creek	NCHL 17-01	MR-2-3-U	3323	3	2-<4	75	15.3	NA	15.3	50.8	-112.906	44.474	-112.904	44.478
Nicholia Creek	NCHL 17-02	MR-2-3-U	1188	3	2-<4	75	15.3	NA	15.3	18.2	-112.904	44.482	-112.902	44.483
Nicholia Creek	NCHL 17-03	MR-2-3-U	1716	3	2-<4	70	20.6	NA	20.6	35.3	-112.902	44.484	-112.902	44.486
Nicholia Creek	NCHL 17-03	MR-2-3-U	1697	3	2-<4	70	20.6	NA	20.6	35.0	-112.901	44.488	-112.900	44.489
Nicholia Creek	NCHL 17-04	MR-2-3-U	2232	3	2-<4	0	20.6	NA	20.6	46.0	-112.898	44.493	-112.895	44.495
Nicholia Creek	NCHL 17-04	MR-2-3-U	983	3	2-<4	0	20.6	NA	20.6	20.2	-112.899	44.491	-112.898	44.492
Nicholia Creek	NCHL 18-01	MR-0-3-U	7007	3	<2	0	34	NA	34	238.2	-112.892	44.496	-112.887	44.501
Nicholia Creek	NCHL 18-02	MR-0-3-U	2819	3	<2	10	34	NA	34	95.8	-112.884	44.510	-112.882	44.514
Nicholia Creek	NCHL 18-02	MR-0-3-U	1714	3	<2	50	34	NA	34	58.3	-112.880	44.517	-112.879	44.519
Nicholia Creek	NCHL 18-03	MR-0-3-U	678	3	<2	70	34	NA	34	23.0	-112.878	44.521	-112.878	44.522
Nicholia Creek	NCHL 18-03	MR-0-3-U	1263	3	<2	90	34	NA	34	42.9	-112.877	44.522	-112.875	44.523
Nicholia Creek	NCHL 18-04	MR-0-3-U	1012	3	<2	10	34	NA	34	34.4	-112.866	44.531	-112.865	44.532
Nicholia Creek	NCHL 18-04	MR-0-3-U	1393	3	<2	70	34	NA	34	47.4	-112.870	44.528	-112.868	44.530
Nicholia Creek	NCHL 18-04	MR-0-3-U	586	3	<2	70	34	NA	34	19.9	-112.871	44.527	-112.870	44.528
Nicholia Creek	NCHL 18-04	MR-0-3-U	1436	3	<2	75	19.7	NA	19.7	28.3	-112.874	44.524	-112.872	44.526
Nicholia Creek	NCHL 18-05	MR-0-3-U	623	3	<2	10	34	NA	34	21.2	-112.864	44.533	-112.864	44.534
Nicholia Creek	NCHL 18-06	MR-0-3-U	2737	3	<2	30	34	NA	34	93.1	-112.863	44.535	-112.860	44.538
Nicholia Creek	NCHL 18-06	MR-0-3-U	1529	3	<2	100	19.7	NA	19.7	30.1	-112.855	44.539	-112.853	44.540
Nicholia Creek	NCHL 18-07	MR-0-3-U	1068	3	<2	40	34	NA	34	36.3	-112.850	44.541	-112.850	44.542

Table E-22. Estimated sediment loads for Nicholia Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimated*					
Nicholia Creek	NCHL 18-08	MR-0-3-U	1096	3	<2	0	34	NA	34	37.2	-112.831	44.544	-112.830	44.545
Nicholia Creek	NCHL 18-08	MR-0-3-U	2775	3	<2	50	34	NA	34	94.3	-112.850	44.544	-112.845	44.545
Nicholia Creek	NCHL 18-08	MR-0-3-U	3045	3	<2	70	34	NA	34	103.5	-112.841	44.544	-112.837	44.543
Nicholia Creek	NCHL 18-09	MR-0-3-U	1085	3	<2	10	34	NA	34	36.9	-112.828	44.545	-112.827	44.547
Nicholia Creek	NCHL 19-01	MR-0-3-C	1150	3	<2	30	34	NA	34	39.1	-112.827	44.548	-112.827	44.549
Nicholia Creek	NCHL 19-01	MR-0-3-C	584	3	<2	30	34	NA	34	19.8	-112.825	44.550	-112.825	44.551
Nicholia Creek	NCHL 20-01	MR-0-4-C	353	4	<2	40	34	NA	34	12.0	-112.824	44.552	-112.824	44.552
									Total:	**2254.4**	**Tons/Yr**			

E4.2.14 O'Dell Creek Sediment Loads

A total of fourteen reaches were delineated in the O'Dell Creek mainstem (**Table E-23**). High-gradient reaches near the headwaters had > 70% of the reach in natural vegetation and low estimated bank erosion. Low-gradient reaches near the mouth had a low percentage in natural vegetation and high estimated bank erosion. One reach near the mouth was field-assessed, and bank erosion rates were extremely high. This reach accounted for a large proportion of the estimated total load.

Table E-23. Estimated sediment loads for O'Dell Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimat-ed*					
O'Dell Creek	ODLL 01-01	MR-10-1-C	4284	1	>10	90	12.5	NA	12.5	53.6	-111.841	44.540	-111.846	44.545
O'Dell Creek	ODLL 02-01	MR-4-1-U	6153	1	4-<10	80	10.6	NA	10.6	65.2	-111.822	44.537	-111.831	44.539
O'Dell Creek	ODLL 03-01	MR-4-2-U	10178	2	4-<10	80	11.3	NA	11.3	115.0	-111.789	44.541	-111.805	44.534
O'Dell Creek	ODLL 04-01	MR-2-3-U	5025	3	2-<4	80	15.3	NA	15.3	76.9	-111.783	44.553	-111.786	44.548

Table E-23. Estimated sediment loads for O'Dell Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimat-ed*					
O'Dell Creek	ODLL 05-01	MR-2-3-C	2312	3	2-<4	60	20.6	NA	20.6	47.6	-111.780	44.558	-111.781	44.555
O'Dell Creek	ODLL 05-02	MR-2-3-C	589	3	2-<4	20	20.6	NA	20.6	12.1	-111.780	44.560	-111.780	44.559
O'Dell Creek	ODLL 06-01	MR-4-3-C	4088	3	4-<10	40	14	NA	14	57.2	-111.780	44.568	-111.776	44.564
O'Dell Creek	ODLL 07-01	MR-2-3-U	4587	3	2-<4	20	20.6	NA	20.6	94.5	-111.780	44.579	-111.781	44.574
O'Dell Creek	ODLL 08-01	MR-2-3-U	1646	3	2-<4	20	20.6	NA	20.6	33.9	-111.781	44.582	-111.781	44.581
O'Dell Creek	ODLL 08-02	MR-2-3-U	2823	3	2-<4	0	20.6	NA	20.6	58.2	-111.783	44.588	-111.782	44.585
O'Dell Creek	ODLL 09-01	MR-0-3-U	2498	3	<2	0	34	NA	34	84.9	-111.789	44.593	-111.786	44.591
O'Dell Creek	ODLL 09-02	MR-0-3-U	18070	3	<2	0	34	153	153	2764.8	-111.804	44.611	-111.801	44.601
O'Dell Creek	ODLL 09-03	MR-0-3-U	11532	3	<2	0	34	NA	34	392.1	-111.810	44.621	-111.807	44.618
O'Dell Creek	ODLL 09-04	MR-0-3-U	8839	3	<2	0	34	NA	34	300.5	-111.810	44.621	-111.814	44.629
									Total:	**4156**	**Tons/Yr**			

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.15 Peet Creek Sediment Loads

A total of 14 reaches were delineated in Peet Creek mainstem (**Table E-24**). These spanned a range of stream types but generally had high estimated loading from bank erosion due to ≤ 70% of natural vegetation present in the riparian zone.

Table E-23. Estimated sediment loads for Peet Creek.

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimat-ed*					
Peet Creek	PEET 01-01	MR-10-1-U	2227	1	>10	70	12.5	NA	12.5	27.8	-112.084	44.535	-112.087	44.532
Peet Creek	PEET 02-01	MR-10-1-U	2683	1	4-<10	20	21	NA	21	56.3	-112.081	44.541	-112.082	44.537
Peet Creek	PEET 02-02	MR-10-1-U	1293	1	4-<10	20	21	NA	21	27.2	-112.080	44.545	-112.080	44.543
Peet Creek	PEET 02-03	MR-10-1-U	3989	1	4-<10	30	21	NA	21	83.8	-112.078	44.554	-112.078	44.549
Peet Creek	PEET 03-01	MR-4-2-U	3626	2	4-<10	10	14	NA	14	50.8	-112.074	44.563	-112.078	44.559
Peet Creek	PEET 04-01	MR-2-2-U	5606	2	2-<4	10	20.6	NA	20.6	115.5	-112.068	44.577	-112.072	44.570
Peet Creek	PEET 05-01	MR-4-3-C	1851	3	4-<10	60	14	NA	14	25.9	-112.065	44.584	-112.066	44.582
Peet Creek	PEET 06-01	MR-2-3-U	992	3	2-<4	0	20.6	NA	20.6	20.4	-112.064	44.587	-112.065	44.585
Peet Creek	PEET 07-01	MR-0-3-U	2298	3	<2	0	34	NA	34	78.1	-112.064	44.593	-112.064	44.590
Peet Creek	PEET 07-02	MR-0-3-U	3416	3	<2	0	34	NA	34	116.2	-112.060	44.599	-112.064	44.597
Peet Creek	PEET 07-03	MR-0-3-U	2587	3	<2	0	34	NA	34	88.0	-112.061	44.610	-112.060	44.607
Peet Creek	PEET 07-04	MR-0-3-U	2525	3	<2	0	34	NA	34	85.8	-112.069	44.612	-112.065	44.611

Table E-23. Estimated sediment loads for Peet Creek.

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimat-ed*					
Peet Creek	PEET 07-05	MR-0-3-U	8480	3	<2	0	34	NA	34	288.3	-112.095	44.617	-112.082	44.613
Peet Creek	PEET 07-06	MR-0-3-U	9041	3	<2	0	34	NA	34	307.4	-112.107	44.633	-112.102	44.625
									Total:	**1371.5**	**Tons/Yr**			

* If reach was sampled, actual field loading value was used; otherwise extrapolated value was used

E4.2.16 Price Creek Sediment Loads

A total of 15 stream reaches were delineated in Price Creek mainstem (**Table E-25**). Reaches varied in gradient from high gradient reaches in the headwaters to low gradients near the mouth. Most of the reaches had ≤ 70% of the riparian zone in natural condition and high sediment loads from bank erosion.

Table E-25. Estimated sediment loads for Price Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimat-ed*					
Price Creek	PRIC 01-01	MR-4-1-U	2479	1	4-<10	70	21	NA	21	52.0	-112.098	44.533	-112.096	44.530
Price Creek	PRIC 01-02	MR-4-1-U	2253	1	4-<10	70	21	NA	21	47.3	-112.105	44.536	-112.102	44.535
Price Creek	PRIC 02-01	MR-10-1-U	3517	1	>10	60	12.5	NA	12.5	44.0	-112.110	44.545	-112.108	44.540
Price Creek	PRIC 02-02	MR-10-1-U	1744	1	>10	60	12.5	NA	12.5	21.8	-112.113	44.549	-112.111	44.547
Price Creek	PRIC 03-01	MR-4-1-U	2182	1	4-<10	80	10.6	NA	10.6	23.1	-112.120	44.553	-112.117	44.551
Price Creek	PRIC 03-02	MR-4-1-U	1920	1	4-<10	50	21	NA	21	40.3	-112.123	44.557	-112.121	44.555

Table E-25. Estimated sediment loads for Price Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assessed	Estimat-ed*					
Price Creek	PRIC 04-01	MR-2-2-U	3371	2	2-<4	50	20.6	NA	20.6	69.4	-112.125	44.566	-112.124	44.562
Price Creek	PRIC 04-02	MR-2-2-U	2643	2	2-<4	50	20.6	NA	20.6	54.4	-112.124	44.573	-112.125	44.569
Price Creek	PRIC 05-01	MR-2-3-U	4625	3	2-<4	50	20.6	NA	20.6	95.3	-112.127	44.584	-112.126	44.578
Price Creek	PRIC 05-02	MR-2-3-U	4245	3	2-<4	50	20.6	NA	24	87.4	-112.130	44.594	-112.128	44.589
Price Creek	PRIC 06-01	MR-0-3-U	509	3	<2	30	20.6	NA	20.6	10.5	-112.130	44.596	-112.130	44.595
Price Creek	PRIC 06-02	MR-0-3-U	1473	3	<2	0	34	NA	34	50.1	-112.128	44.599	-112.130	44.598
Price Creek	PRIC 06-03	MR-0-3-U	1436	3	<2	0	34	NA	34	48.8	-112.130	44.603	-112.129	44.601
Price Creek	PRIC 06-04	MR-0-3-U	6348	3	<2	0	34	NA	34	215.8	-112.134	44.615	-112.133	44.609
Price Creek	PRIC 06-05	MR-0-3-U	16802	3	<2	0	34	NA	34	571.3	-112.149	44.639	-112.148	44.625
									Total:	**1446**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.17 Red Rock Creek Sediment Loads

A total of 22 stream reaches were delineated in Red Rock Creek mainstem (**Table E-26**). Most reaches were low gradient reaches with ≤ 70% of the riparian zone in natural vegetation and high estimated loading from bank erosion.

Table E-26. Estimated sediment loads for Red Rock Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Red Rock Creek	RRCR 01-01	MR-10-1-U	2399	1	>10	60	21	NA	21	50.4	-111.538	44.609	-111.534	44.608
Red Rock Creek	RRCR 02-01	MR-2-1-U	1551	1	2-<4	30	21	NA	21	32.6	-111.543	44.611	-111.541	44.609
Red Rock Creek	RRCR 02-02	MR-2-1-U	927	1	2-<4	30	21	NA	21	19.5	-111.545	44.613	-111.544	44.612
Red Rock Creek	RRCR 03-01	MR-10-2-U	1772	2	>10	10	12.5	NA	12.5	22.1	-111.549	44.615	-111.547	44.614
Red Rock Creek	RRCR 04-01	MR-0-2-U	285	2	<2	0	34	NA	34	9.7	-111.552	44.617	-111.552	44.617
Red Rock Creek	RRCR 05-01	MR-0-3-U	6941	3	<2	0	34	NA	34	236.0	-111.564	44.618	-111.559	44.618
Red Rock Creek	RRCR 05-02	MR-0-3-U	2911	3	<2	0	34	NA	34	99.0	-111.569	44.617	-111.566	44.618
Red Rock Creek	RRCR 05-03	MR-0-3-U	998	3	<2	0	34	NA	34	33.9	-111.570	44.616	-111.569	44.617
Red Rock Creek	RRCR 05-04	MR-0-3-U	2235	3	<2	0	34	NA	34	76.0	-111.574	44.615	-111.571	44.614
Red Rock Creek	RRCR 06-01	MR-0-4-U	3155	4	<2	20	34	NA	34	107.3	-111.580	44.617	-111.577	44.615
Red Rock Creek	RRCR 06-02	MR-0-4-U	4782	4	<2	0	34	NA	34	162.6	-111.585	44.621	-111.583	44.620
Red Rock Creek	RRCR 06-03	MR-0-4-U	2365	4	<2	0	34	NA	34	80.4	-111.589	44.620	-111.587	44.622
Red Rock Creek	RRCR 06-04	MR-0-4-U	14881	4	<2	0	34	31	31	461.3	-111.610	44.614	-111.603	44.621
Red Rock Creek	RRCR 06-05	MR-0-4-U	7498	4	<2	0	34	NA	34	254.9	-111.625	44.616	-111.617	44.613
Red Rock Creek	RRCR 06-06	MR-0-4-U	5615	4	<2	0	34	2.4	2.4	13.5	-111.635	44.616	-111.629	44.615

Table E-26. Estimated sediment loads for Red Rock Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Red Rock Creek	RRCR 06-07	MR-0-4-U	11506	4	<2	0	34	NA	34	391.2	-111.656	44.617	-111.645	44.619
Red Rock Creek	RRCR 06-08	MR-0-4-U	8473	4	<2	10	34	NA	34	288.1	-111.667	44.619	-111.664	44.617
Red Rock Creek	RRCR 06-09	MR-0-4-U	18301	4	<2	0	34	NA	34	622.2	-111.700	44.613	-111.684	44.619
* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used									**Total:**	**2940**	**Tons/Yr**			

E4.2.18 Sage Creek Sediment Loads

A total of 36 reaches were delineated in the Sage Creek mainstem (**Table C-27**). These were further divided into subreaches based on land use. High gradient reaches were typically present in the headwaters, with lower gradient reaches present near the mouth. Reaches varied greatly in riparian condition, with many reaches having good riparian conditions and low rates of bank erosion. However, over half of the reaches had ≤70% of the riparian zone in good riparian buffer and high estimated bank erosion.

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 01-01	MR-10-1-U	379	1	>10	0	12.5	NA	12.5	4.7	-112.721	44.948	-112.720	44.948
Sage Creek	SAGE 01-01	MR-10-1-U	1816	1	>10	50	12.5	NA	12.5	22.7	-112.726	44.951	-112.723	44.950
Sage Creek	SAGE 02-01	MR-10-1-C	738	1	>10	0	12.5	NA	12.5	9.2	-112.719	44.946	-112.719	44.945

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 02-01	MR-10-1-C	89	1	>10	0	12.5	NA	12.5	1.1	-112.720	44.946	-112.719	44.946
Sage Creek	SAGE 02-01	MR-10-1-C	156	1	>10	30	12.5	NA	12.5	2.0	-112.720	44.946	-112.720	44.946
Sage Creek	SAGE 02-01	MR-10-1-C	391	1	>10	80	12.5	NA	12.5	4.9	-112.720	44.947	-112.720	44.947
Sage Creek	SAGE 03-01	MR-4-1-C	254	1	4-<10	35	21	NA	21	5.3	-112.716	44.942	-112.716	44.942
Sage Creek	SAGE 03-01	MR-4-1-C	404	1	4-<10	40	21	NA	21	8.5	-112.715	44.942	-112.715	44.942
Sage Creek	SAGE 03-01	MR-4-1-C	277	1	4-<10	60	21	NA	21	5.8	-112.718	44.943	-112.717	44.943
Sage Creek	SAGE 03-01	MR-4-1-C	199	1	4-<10	85	10.6	NA	10.6	2.1	-112.717	44.943	-112.716	44.943
Sage Creek	SAGE 03-01	MR-4-1-C	339	1	4-<10	90	10.6	NA	10.6	3.6	-112.719	44.944	-112.718	44.943
Sage Creek	SAGE 03-02	MR-4-1-C	1425	1	4-<10	55	21	NA	21	29.9	-112.714	44.942	-112.712	44.940
Sage Creek	SAGE 03-03	MR-4-1-C	3465	1	4-<10	21	21	NA	21	72.8	-112.711	44.938	-112.705	44.937
Sage Creek	SAGE 04-01	MR-4-1-U	2138	1	4-<10	40	21	NA	21	44.9	-112.698	44.934	-112.694	44.932
Sage Creek	SAGE 04-01	MR-4-1-U	924	1	4-<10	40	21	NA	21	19.4	-112.691	44.930	-112.690	44.930
Sage Creek	SAGE 04-01	MR-4-1-U	538	1	4-<10	55	21	NA	21	11.3	-112.699	44.935	-112.698	44.934

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 05-01	MR-4-1-C	2874	1	4-<10	30	21	NA	21	60.3	-112.684	44.926	-112.680	44.923
Sage Creek	SAGE 05-01	MR-4-1-C	1732	1	4-<10	80	10.6	NA	10.6	18.4	-112.688	44.929	-112.686	44.928
Sage Creek	SAGE 06-01	MR-4-2-C	259	2	4-<10	20	14	NA	14	3.6	-112.674	44.922	-112.673	44.922
Sage Creek	SAGE 06-01	MR-4-2-C	514	2	4-<10	75	11.3	NA	11.3	5.8	-112.675	44.922	-112.674	44.922
Sage Creek	SAGE 06-02	MR-4-2-C	1571	2	4-<10	30	14	NA	14	22.0	-112.673	44.922	-112.671	44.920
Sage Creek	SAGE 07-01	MR-2-2-C	1422	2	2-<4	65	20.6	NA	20.6	29.3	-112.670	44.918	-112.670	44.916
Sage Creek	SAGE 08-01	MR-2-2-U	1270	2	2-<4	50	20.6	NA	20.6	26.2	-112.670	44.915	-112.668	44.913
Sage Creek	SAGE 08-01	MR-2-2-U	1379	2	2-<4	70	20.6	NA	20.6	28.4	-112.667	44.912	-112.665	44.912
Sage Creek	SAGE 09-01	MR-2-2-C	744	2	2-<4	10	20.6	NA	20.6	15.3	-112.660	44.910	-112.659	44.909
Sage Creek	SAGE 09-01	MR-2-2-C	925	2	2-<4	70	20.6	NA	20.6	19.1	-112.663	44.911	-112.661	44.910
Sage Creek	SAGE 10-01	MR-2-2-U	1623	2	2-<4	70	20.6	NA	20.6	33.4	-112.658	44.909	-112.657	44.907
Sage Creek	SAGE 10-02	MR-2-2-U	1261	2	2-<4	0	20.6	NA	20.6	26.0	-112.652	44.902	-112.651	44.901
Sage Creek	SAGE 10-02	MR-2-2-U	878	2	2-<4	20	20.6	NA	20.6	18.1	-112.655	44.905	-112.654	44.904
Sage Creek	SAGE 10-02	MR-2-2-U	559	2	2-<4	20	20.6	NA	20.6	11.5	-112.653	44.903	-112.652	44.903

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 10-03	MR-2-2-U	1256	2	2-<4	0	20.6	NA	20.6	25.9	-112.633	44.891	-112.632	44.890
Sage Creek	SAGE 10-03	MR-2-2-U	6002	2	2-<4	30	20.6	NA	20.6	123.6	-112.649	44.900	-112.641	44.896
Sage Creek	SAGE 10-03	MR-2-2-U	1942	2	2-<4	40	20.6	NA	20.6	40.0	-112.630	44.889	-112.627	44.888
Sage Creek	SAGE 10-03	MR-2-2-U	825	2	2-<4	65	20.6	NA	20.6	17.0	-112.617	44.888	-112.616	44.888
Sage Creek	SAGE 10-03	MR-2-2-U	1624	2	2-<4	95	15.3	NA	15.3	24.8	-112.623	44.888	-112.620	44.888
Sage Creek	SAGE 10-04	MR-2-2-U	859	2	2-<4	0	20.6	NA	20.6	17.7	-112.614	44.889	-112.613	44.888
Sage Creek	SAGE 10-04	MR-2-2-U	797	2	2-<4	0	20.6	NA	20.6	16.4	-112.609	44.889	-112.607	44.889
Sage Creek	SAGE 10-04	MR-2-2-U	2559	2	2-<4	0	20.6	NA	20.6	52.7	-112.606	44.889	-112.602	44.890
Sage Creek	SAGE 10-04	MR-2-2-U	2019	2	2-<4	10	20.6	NA	20.6	41.6	-112.583	44.886	-112.581	44.885
Sage Creek	SAGE 10-04	MR-2-2-U	902	2	2-<4	25	20.6	NA	20.6	18.6	-112.592	44.889	-112.590	44.888
Sage Creek	SAGE 10-04	MR-2-2-U	1682	2	2-<4	40	20.6	NA	20.6	34.7	-112.588	44.888	-112.586	44.887
Sage Creek	SAGE 10-04	MR-2-2-U	2049	2	2-<4	65	20.6	NA	20.6	42.2	-112.597	44.889	-112.594	44.889
Sage Creek	SAGE 10-04	MR-2-2-U	652	2	2-<4	90	15.3	NA	15.3	10.0	-112.611	44.888	-112.610	44.889
Sage Creek	SAGE 10-04	MR-2-2-U	542	2	2-<4	90	15.3	NA	15.3	8.3	-112.579	44.884	-112.579	44.884

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 11-01	MR-0-3-U	4501	3	<2	90	19.7	NA	19.7	88.7	-112.578	44.883	-112.574	44.880
Sage Creek	SAGE 12-01	MR-0-4-U	1117	4	<2	0	34	NA	34	38.0	-112.572	44.876	-112.571	44.875
Sage Creek	SAGE 12-01	MR-0-4-U	1073	4	<2	40	34	NA	34	36.5	-112.572	44.875	-112.572	44.873
Sage Creek	SAGE 12-01	MR-0-4-U	583	4	<2	50	34	NA	34	19.8	-112.564	44.867	-112.564	44.867
Sage Creek	SAGE 12-01	MR-0-4-U	1262	4	<2	60	34	NA	34	42.9	-112.568	44.869	-112.566	44.868
Sage Creek	SAGE 12-01	MR-0-4-U	2718	4	<2	65	34	NA	34	92.4	-112.561	44.864	-112.559	44.862
Sage Creek	SAGE 12-01	MR-0-4-U	2552	4	<2	80	19.7	NA	19.7	50.3	-112.571	44.873	-112.568	44.871
Sage Creek	SAGE 12-01	MR-0-4-U	1260	4	<2	90	19.7	NA	19.7	24.8	-112.563	44.866	-112.562	44.865
Sage Creek	SAGE 13-01	MR-0-4-C	1154	4	<2	50	34	NA	34	39.2	-112.557	44.859	-112.557	44.858
Sage Creek	SAGE 14-01	MR-0-4-U	1837	4	<2	40	34	NA	34	62.5	-112.557	44.857	-112.557	44.855
Sage Creek	SAGE 14-02	MR-0-4-U	2699	4	<2	50	34	NA	34	91.8	-112.558	44.853	-112.558	44.850
Sage Creek	SAGE 15-01	MR-0-4-C	1480	4	<2	0	34	NA	34	50.3	-112.559	44.847	-112.560	44.846
Sage Creek	SAGE 15-01	MR-0-4-C	924	4	<2	80	19.7	NA	19.7	18.2	-112.560	44.844	-112.559	44.843
Sage Creek	SAGE 16-01	MR-0-4-U	9760	4	<2	50	34	NA	34	331.8	-112.559	44.842	-112.556	44.833

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 16-02	MR-0-4-U	5466	4	<2	40	34	NA	34	185.8	-112.555	44.826	-112.553	44.822
Sage Creek	SAGE 16-03	MR-0-4-U	1242	4	<2	50	34	NA	34	42.2	-112.554	44.817	-112.554	44.815
Sage Creek	SAGE 16-03	MR-0-4-U	1032	4	<2	70	34	NA	34	35.1	-112.553	44.811	-112.554	44.810
Sage Creek	SAGE 16-03	MR-0-4-U	1097	4	<2	90	19.7	NA	19.7	21.6	-112.553	44.813	-112.554	44.812
Sage Creek	SAGE 16-04	MR-0-4-U	1951	4	<2	20	34	24	24	46.8	-112.557	44.801	-112.557	44.798
Sage Creek	SAGE 16-04	MR-0-4-U	4268	4	<2	20	34	24	24	102.4	-112.555	44.796	-112.553	44.793
Sage Creek	SAGE 16-04	MR-0-4-U	1160	4	<2	20	34	24	24	27.8	-112.550	44.792	-112.550	44.791
Sage Creek	SAGE 16-04	MR-0-4-U	5954	4	<2	40	34	24	24	142.9	-112.554	44.810	-112.556	44.805
Sage Creek	SAGE 16-04	MR-0-4-U	278	4	<2	50	34	24	24	6.7	-112.545	44.781	-112.545	44.781
Sage Creek	SAGE 16-04	MR-0-4-U	4243	4	<2	70	34	24	24	101.8	-112.547	44.786	-112.547	44.783
Sage Creek	SAGE 16-04	MR-0-4-U	2151	4	<2	70	34	24	24	51.6	-112.544	44.779	-112.544	44.777
Sage Creek	SAGE 16-04	MR-0-4-U	3210	4	<2	75	19.7	NA	19.7	63.2	-112.549	44.789	-112.548	44.788
Sage Creek	SAGE 16-04	MR-0-4-U	1016	4	<2	80	19.7	NA	19.7	20.0	-112.545	44.781	-112.545	44.779
Sage Creek	SAGE 16-05	MR-0-4-U	1669	4	<2	0	34	NA	34	56.7	-112.544	44.768	-112.546	44.767

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 16-05	MR-0-4-U	5242	4	<2	80	19.7	NA	19.7	103.3	-112.544	44.776	-112.543	44.771
Sage Creek	SAGE 16-05	MR-0-4-U	414	4	<2	80	19.7	NA	19.7	8.2	-112.547	44.766	-112.547	44.765
Sage Creek	SAGE 17-01	MR-0-5-U	2189	5	<2	50	34	NA	34	74.4	-112.550	44.761	-112.552	44.761
Sage Creek	SAGE 17-01	MR-0-5-U	2080	5	<2	60	34	NA	34	70.7	-112.553	44.760	-112.554	44.757
Sage Creek	SAGE 17-01	MR-0-5-U	2141	5	<2	70	34	NA	34	72.8	-112.548	44.764	-112.549	44.762
Sage Creek	SAGE 17-01	MR-0-5-U	1564	5	<2	70	34	NA	34	53.2	-112.556	44.757	-112.557	44.755
Sage Creek	SAGE 17-01	MR-0-5-U	419	5	<2	80	19.7	NA	19.7	8.3	-112.548	44.765	-112.548	44.764
Sage Creek	SAGE 17-02	MR-0-5-U	1389	5	<2	0	34	NA	34	47.2	-112.558	44.752	-112.558	44.751
Sage Creek	SAGE 17-02	MR-0-5-U	1622	5	<2	40	34	NA	34	55.1	-112.556	44.754	-112.558	44.753
Sage Creek	SAGE 17-03	MR-0-5-U	15785	5	<2	40	34	NA	34	536.7	-112.559	44.749	-112.564	44.739
Sage Creek	SAGE 17-04	MR-0-5-U	742	5	<2	0	34	NA	34	25.2	-112.578	44.738	-112.578	44.738
Sage Creek	SAGE 17-05	MR-0-5-U	1756	5	<2	50	34	NA	34	59.7	-112.588	44.738	-112.591	44.738
Sage Creek	SAGE 17-05	MR-0-5-U	3757	5	<2	60	34	NA	34	127.8	-112.579	44.738	-112.581	44.737
Sage Creek	SAGE 17-05	MR-0-5-U	1097	5	<2	95	19.7	NA	19.7	21.6	-112.584	44.738	-112.586	44.738

Table E-27. Estimated sediment loads for Sage Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Sage Creek	SAGE 18-01	MR-0-5-C	2205	5	<2	60	34	NA	34	75.0	-112.594	44.738	-112.598	44.737
Sage Creek	SAGE 19-01	MR-0-5-U	886	5	<2	40	34	NA	34	30.1	-112.602	44.738	-112.603	44.738
Sage Creek	SAGE 19-01	MR-0-5-U	3390	5	<2	75	19.7	NA	19.7	66.8	-112.604	44.738	-112.608	44.738
Sage Creek	SAGE 19-01	MR-0-5-U	6717	5	<2	90	19.7	NA	19.7	132.3	-112.612	44.738	-112.619	44.737
Sage Creek	SAGE 19-02	MR-0-5-U	8694	5	<2	0	34	3.5	3.5	30.4	-112.702	44.755	-112.708	44.763
Sage Creek	SAGE 19-02	MR-0-5-U	8834	5	<2	0	34	3.5	3.5	30.9	-112.627	44.738	-112.636	44.735
Sage Creek	SAGE 19-02	MR-0-5-U	9167	5	<2	0	34	3.5	3.5	32.1	-112.648	44.735	-112.663	44.733
Sage Creek	SAGE 19-02	MR-0-5-U	8574	5	<2	0	34	3.5	3.5	30.0	-112.676	44.739	-112.688	44.744
Sage Creek	SAGE 19-02	MR-0-5-U	1168	5	<2	40	34	3.5	3.5	4.1	-112.699	44.752	-112.700	44.754
									Total:	**4627**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.19 Selway Creek Sediment Loads

A total of 14 reaches were delineated in Selway Creek mainstem. Reaches were further divided into subreaches based on land-use. The high-gradient headwater reaches generally had > 70% of the riparian zone in natural condition and low estimates of bank erosion (**Table E-28**). The lower gradient reaches near the mouth varied in condition, with some having good riparian condition and low estimated bank erosion, and some having poor riparian condition and high bank erosion.

Table E-28. Estimated sediment loads for Selway Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapo-lated	Field-Assessed	Estimated*					
Selway Creek	SLWY 01-01	MR-10-1-U	2473	1	>10	100	12.5	NA	12.5	30.9	-113.358	45.162	-113.356	45.159
Selway Creek	SLWY 02-01	MR-4-2-C	1243	2	4-<10	90	11.3	NA	11.3	14.0	-113.365	45.162	-113.362	45.162
Selway Creek	SLWY 03-01	MR-4-2-U	1829	2	4-<10	95	11.3	NA	11.3	20.7	-113.375	45.164	-113.372	45.165
Selway Creek	SLWY 03-01	MR-4-2-U	928	2	4-<10	95	11.3	NA	11.3	10.5	-113.368	45.162	-113.366	45.161
Selway Creek	SLWY 03-01	MR-4-2-U	540	2	4-<10	100	11.3	NA	11.3	6.1	-113.369	45.163	-113.369	45.162
Selway Creek	SLWY 04-01	MR-2-2-U	1335	2	2-<4	85	15.3	NA	15.3	20.4	-113.378	45.162	-113.376	45.163
Selway Creek	SLWY 04-01	MR-2-2-U	1237	2	2-<4	90	15.3	NA	15.3	18.9	-113.382	45.161	-113.380	45.161
Selway Creek	SLWY 04-02	MR-2-2-U	3342	2	2-<4	75	15.3	NA	15.3	51.1	-113.394	45.158	-113.388	45.160
Selway Creek	SLWY 05-01	MR-2-3-U	2121	3	2-<4	75	15.3	12	15.7	33.3	-113.395	45.151	-113.395	45.153
Selway Creek	SLWY 05-01	MR-2-3-U	881	3	2-<4	85	15.3	12	15.7	13.8	-113.394	45.156	-113.394	45.157
Selway Creek	SLWY 06-01	MR-0-4-U	6045	4	<2	70	34	NA	34	205.5	-113.402	45.138	-113.396	45.144
Selway Creek	SLWY 06-02	MR-0-4-U	943	4	<2	20	34	NA	34	32.1	-113.405	45.135	-113.405	45.136
Selway Creek	SLWY 06-02	MR-0-4-U	880	4	<2	100	19.7	NA	19.7	17.3	-113.404	45.137	-113.403	45.137
Selway Creek	SLWY 06-03	MR-0-4-U	1273	4	<2	0	34	NA	34	43.3	-113.407	45.132	-113.406	45.134

Table E-28. Estimated sediment loads for Selway Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapo-lated	Field-Assessed	Estimated*					
Selway Creek	SLWY 06-03	MR-0-4-U	606	4	<2	0	34	NA	34	20.6	-113.406	45.131	-113.406	45.132
Selway Creek	SLWY 06-03	MR-0-4-U	1054	4	<2	40	34	NA	34	35.9	-113.406	45.129	-113.406	45.130
Selway Creek	SLWY 06-04	MR-0-4-U	4170	4	<2	50	34	NA	34	141.8	-113.416	45.119	-113.410	45.122
Selway Creek	SLWY 06-04	MR-0-4-U	809	4	<2	50	34	NA	34	27.5	-113.417	45.118	-113.416	45.118
Selway Creek	SLWY 06-04	MR-0-4-U	1127	4	<2	50	34	NA	34	38.3	-113.406	45.126	-113.406	45.128
Selway Creek	SLWY 06-04	MR-0-4-U	1276	4	<2	95	19.7	NA	19.7	25.1	-113.421	45.116	-113.419	45.117
Selway Creek	SLWY 06-05	MR-0-4-U	2807	4	<2	60	34	NA	34	95.4	-113.422	45.110	-113.422	45.113
Selway Creek	SLWY 06-06	MR-0-4-U	1919	4	<2	65	34	NA	34	65.3	-113.419	45.105	-113.421	45.107
Selway Creek	SLWY 06-07	MR-0-4-U	1600	4	<2	75	19.7	NA	19.7	31.5	-113.418	45.101	-113.419	45.103
Selway Creek	SLWY 06-07	MR-0-4-U	759	4	<2	90	19.7	NA	19.7	15.0	-113.418	45.099	-113.418	45.100
Selway Creek	SLWY 06-08	MR-0-4-U	6495	4	<2	70	34	28.2	28.2	220.8	-113.420	45.084	-113.417	45.091
									Total:	**1235**	**Tons/Yr**			

* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used

E4.2.20 Tom Creek Sediment Loads

A total of 7 reaches were delineated in the mainstem of Tom Creek (**Table E-29**). Many of these were high or mid-gradient reaches with a < 70% of the riparian zone in good natural condition. Loading rates were estimated to relatively high for reaches in this subwatershed. However most reaches hadmid or high gradients, which have lower loading rates overall.

Table E-29. Estimated sediment loads for Tom Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Tom Creek	TOMC 01-01	MR-10-1-C	5133	1	>10	70	12.5	NA	12.5	64.2	-111.621	44.558	-111.614	44.554
Tom Creek	TOMC 02-01	MR-4-1-C	2236	1	4-<10	50	21	NA	21	47.0	-111.624	44.563	-111.621	44.561
Tom Creek	TOMC 03-01	MR-4-2-C	5750	2	4-<10	50	14	NA	14	80.5	-111.639	44.573	-111.633	44.566
Tom Creek	TOMC 04-01	MR-4-2-U	800	2	4-<10	50	14	NA	14	11.2	-111.640	44.575	-111.639	44.574
Tom Creek	TOMC 04-02	MR-4-2-U	964	2	4-<10	30	14	NA	14	13.5	-111.642	44.577	-111.641	44.576
Tom Creek	TOMC 05-01	MR-2-2-U	10175	2	2-<4	10	20.6	NA	20.6	209.6	-111.671	44.590	-111.656	44.584
Tom Creek	TOMC 06-01	MR-0-2-U	9815	2	<2	0	34	45.5	45.5	446.6	-111.690	44.605	-111.682	44.596
* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used										**872**	**Tons/Yr**			

E4.2.21 Trail Creek Sediment Loads

A total of 13 reaches were delineated in the mainstem of Trail Creek (**Table E-29**). Reaches were further divided into subreaches based on land-use. The high-gradient headwater reaches generally had > 70% of the riparian zone in natural condition and low estimates of bank erosion (**Table E-30**). The lower gradient reaches near the mouth varied in condition, with some having good riparian condition and low estimated bank erosion, and some having poor riparian condition and high bank erosion.

Table E-30. Estimated sediment loads for Trail Creek

Stream	Reach ID	Reach Type	Length (ft)	Order	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons/Yr)	Upstream Longitude	Upstream Latitude	Downstream Longitude	Downstream Latitude
							Extrapolated	Field-Assessed	Estimated*					
Trail Creek	TRLC 01-01	MR-10-1-C	1648	1	>10	95	12.5	NA	12.5	20.6	-113.441	44.996	-113.440	44.994
Trail Creek	TRLC 01-02	MR-10-1-C	1120	1	>10	65	12.5	NA	12.5	14	-113.441	44.989	-113.440	44.988
Trail Creek	TRLC 01-02	MR-10-1-C	1086	1	>10	90	12.5	NA	12.5	13.6	-113.440	44.992	-113.441	44.990
Trail Creek	TRLC 02-01	MR-4-1-C	911	1	4-<10	0	21	NA	21	19.1	-113.441	44.983	-113.442	44.982
Trail Creek	TRLC 02-01	MR-4-1-C	1331	1	4-<10	50	21	NA	21	27.9	-113.440	44.986	-113.441	44.984
Trail Creek	TRLC 02-01	MR-4-1-C	2675	1	4-<10	80	10.6	NA	10.6	28.4	-113.442	44.980	-113.442	44.977
Trail Creek	TRLC 02-01	MR-4-1-C	658	1	4-<10	80	10.6	NA	10.6	7.0	-113.440	44.974	-113.439	44.973
Trail Creek	TRLC 03-01	MR-2-1-U	4146	1	2-<4	50	21	NA	21	87.1	-113.434	44.969	-113.428	44.965
Trail Creek	TRLC 03-01	MR-2-1-U	277	1	2-<4	75	10.6	NA	10.6	2.9	-113.438	44.972	-113.438	44.972
Trail Creek	TRLC 03-01	MR-2-1-U	1283	1	2-<4	80	10.6	NA	10.6	13.6	-113.438	44.972	-113.436	44.970
Trail Creek	TRLC 04-01	MR-2-2-C	635	2	2-<4	50	20.6	NA	20.6	13.1	-113.421	44.963	-113.420	44.963
Trail Creek	TRLC 04-01	MR-2-2-C	1288	2	2-<4	85	15.3	NA	15.3	19.7	-113.419	44.963	-113.417	44.962
Trail Creek	TRLC 05-01	MR-2-2-U	1478	2	2-<4	70	20.6	NA	20.6	30.4	-113.410	44.961	-113.407	44.960
Trail Creek	TRLC 05-01	MR-2-2-U	1305	2	2-<4	75	15.3	NA	15.3	20.0	-113.414	44.962	-113.412	44.962
Trail Creek	TRLC 06-01	MR-0-2-U	1830	2	<2	30	20.6	NA	20.6	37.7	-113.396	44.958	-113.393	44.956

Table E-30. Estimated sediment loads for Trail Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-stream Lat-itude
							Extrapo-lated	Field-Assess-ed	Estimat-ed*					
Trail Creek	TRLC 06-01	MR-0-2-U	2431	2	<2	75	15.3	NA	15.3	37.2	-113.405	44.960	-113.400	44.959
Trail Creek	TRLC 07-01	MR-0-3-U	4146	3	<2	30	34	2.5	2.5	10.4	-113.375	44.951	-113.369	44.953
Trail Creek	TRLC 07-01	MR-0-3-U	3911	3	<2	30	34	2.5	2.5	9.8	-113.387	44.955	-113.381	44.952
Trail Creek	TRLC 07-01	MR-0-3-U	889	3	<2	50	34	2.5	2.5	2.2	-113.390	44.955	-113.388	44.956
Trail Creek	TRLC 07-01	MR-0-3-U	909	3	<2	50	34	2.5	2.5	2.3	-113.365	44.957	-113.364	44.958
Trail Creek	TRLC 07-01	MR-0-3-U	690	3	<2	50	34	2.5	2.5	1.7	-113.361	44.958	-113.360	44.958
Trail Creek	TRLC 07-01	MR-0-3-U	710	3	<2	75	19.7	NA	19.7	14.0	-113.363	44.958	-113.362	44.958
Trail Creek	TRLC 08-01	MR-0-4-U	503	4	<2	60	34	18.3	18.3	9.2	-113.359	44.958	-113.359	44.958
Trail Creek	TRLC 08-01	MR-0-4-U	1585	4	<2	75	19.7	NA	19.7	31.2	-113.358	44.958	-113.356	44.958
Trail Creek	TRLC 08-01	MR-0-4-U	604	4	<2	85	19.7	NA	19.7	11.9	-113.354	44.958	-113.353	44.957
Trail Creek	TRLC 08-01	MR-0-4-U	584	4	<2	85	19.7	NA	19.7	11.5	-113.353	44.957	-113.352	44.957
Trail Creek	TRLC 08-02	MR-0-4-U	786	4	<2	40	34	NA	34	26.7	-113.351	44.957	-113.350	44.957
Trail Creek	TRLC 08-03	MR-0-4-U	2012	4	<2	85	19.7	NA	19.7	39.6	-113.349	44.956	-113.348	44.956
Trail Creek	TRLC 08-04	MR-0-4-U	578	4	<2	40	34	NA	34	19.6	-113.345	44.957	-113.345	44.957
Trail Creek	TRLC 08-04	MR-0-4-U	594	4	<2	45	34	NA	34	20.2	-113.341	44.958	-113.341	44.959
Trail Creek	TRLC 08-04	MR-0-4-U	1209	4	<2	75	34	NA	19.7	23.8	-113.344	44.958	-113.343	44.958

Table E-30. Estimated sediment loads for Trail Creek

Stream	Reach ID	Reach Type	Length (ft)	Ord-er	Gradient Class	% Natural Veg	Load Per 1000 Feet (Tons/Yr/1000 Feet)			Total Load (Tons /Yr)	Up-stream Long-itude	Up-stream Lat-itude	Down-stream Long-itude	Down-strea m Lat-itude
							Extrapo-lated	Field-Assess-ed	Estimat-ed*					
Trail Creek	TRLC 08-05	MR-0-4-U	18103	4	<2	10	34	NA	34	615.5	-113.309	44.980	-113.289	44.991
Trail Creek	TRLC 08-05	MR-0-4-U	3454	4	<2	30	34	NA	34	117.4	-113.334	44.964	-113.329	44.965
Trail Creek	TRLC 08-05	MR-0-4-U	1335	4	<2	30	34	NA	34	45.4	-113.319	44.970	-113.319	44.971
Trail Creek	TRLC 08-05	MR-0-4-U	746	4	<2	40	34	NA	34	25.4	-113.318	44.973	-113.317	44.974
Trail Creek	TRLC 08-05	MR-0-4-U	2719	4	<2	40	34	NA	34	92.5	-113.248	45.005	-113.243	45.005
Trail Creek	TRLC 08-05	MR-0-4-U	1554	4	<2	50	34	NA	34	52.8	-113.324	44.967	-113.322	44.969
Trail Creek	TRLC 08-05	MR-0-4-U	4147	4	<2	50	34	NA	34	141.0	-113.261	45.000	-113.255	45.003
Trail Creek	TRLC 08-05	MR-0-4-U	2834	4	<2	55	34	NA	34	96.4	-113.339	44.960	-113.336	44.962
Trail Creek	TRLC 08-05	MR-0-4-U	326	4	<2	60	34	NA	34	11.1	-113.340	44.960	-113.340	44.960
Trail Creek	TRLC 08-05	MR-0-4-U	159	4	<2	60	34	NA	34	5.4	-113.341	44.959	-113.341	44.960
Trail Creek	TRLC 08-05	MR-0-4-U	3279	4	<2	80	19.7	NA	19.7	64.6	-113.316	44.974	-113.313	44.977
* If reach was sampled, actual field assessed value was used; otherwise extrapolated value was used									**Total:**	**1894**	**Tons/Yr**			

E4.3 BMP SEDIMENT LOADS

The sediment load if BMPs were implemented was estimated as the value for reaches with high riparian condition (>70% in natural condition) (**Table E-31**). For reaches with already high riparian condition, no change was made in the estimated load. No reduction in load with BMPs was estimated for very high (10%) gradient reaches. These reaches tended to have riparian zones in high condition, and riparian conditions have less effect on bank condition. Also, they comprised a low percentage of reaches in the Red Rock TPA.

The drainages with the highest estimated percent reduction in sediment load due to BMP's (>30%) include Blaine Spring Creek, Elk Creek, Moore Creek, Red Canyon Creek, and South Meadow Creek (**Tables E-30** and **E-31**). However, this is an estimate based primarily on our aerial assessment of the riparian zone and may vary due to already-implemented BMPs are other local conditions not documented from aerial photos.

Table E-31. Stream characteristics used to estimate BMP Loads at unsampled reaches

Gradient	Order	Riparian Condition	BMP Action	Pre-BMP Load (Tons/Yr/1000 Ft)	Post-BMP Load (Tons/Yr/1000 Ft)
0-2%	Non 1st	High, > 70% Riparian Zone in Natural Condition	NONE	19.7	19.7
0-2%	Non 1st	Low, ≤ 70% Riparian Zone in Natural Condition	Change to value at reaches with riparian zone in high condition	34.0	19.7
>2-4%	Non 1st	High, > 70% Riparian Zone in Natural Condition	NONE	15.3	15.3
>2-4%	Non 1st	Low, ≤ 70% Riparian Zone in Natural Condition	Change to value at reaches with riparian zone in high condition	20.6	15.3
>4-10%	Non 1st	High, > 70% Riparian Zone in Natural Condition	NONE	14.0	14.0
>4-10%	Non 1st	Low, ≤ 70% Riparian Zone in Natural Condition	Change to loading rates from reaches in Madison watershed, after changing bank erosion from extreme to very high, very high to high, and from high to moderate	14.0	11.3
> 10%	Non 1st	Any	NONE; very little influence of riparian condition on loading rates	12.5	12.5
Any	1st	High, > 70% Riparian Zone in Natural Condition	NONE	21	21
Any	1st	Low, ≤ 70% Riparian Zone in Natural Condition	Change to loading rates from Red Rock and Madison Watershed (4 sites), after changing bank erosion from extreme to very high, very high to high, and from high to moderate	21	10.6

Table E-31. Estimated Percent Reduction in Bank Erosion with BMPs implemented.

Subbasin	Existing Load (Tons/Yr)	BMP Load Estimated Load (Tons/Yr)	% Reduction
Medicine Lodge Creek	5535	3114	44%
Horse Prairie Creek*	16977	9863	42%
Red Rock Creek*	3418	2005	41%
Tom Creek	872	521	40%
Peet Creek	1371	833	39%
Long Creek	1507	918	39%
Corral Creek	478	292	39%
Muddy Creek	1191	740	38%
Price Creek	1446	910	37%
Selway Creek	1235	801	35%
East Fork Clover Creek	388	252	35%
Big Sheep Creek*	5463	3279	40%
Fish Creek	742	489	34%
Jones Creek	1071	723	32%
Bean Creek	810	547	32%
Trail Creek	1894	1292	32%
O' Dell Creek	4156	2978	28%
Sage Creek	4627	3846	17%
Total	**50841**	**32179**	**37%**

* includes tributaries

E5.0 REFERENCES

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