APPENDIX I - TOTAL MAXIMUM DAILY LOADS

I1.0 SEDIMENT

I1.1 OVERVIEW

A percent reduction based on average yearly loading was used as the primary approach for expressing the sediment TMDLs within this document because there is uncertainty associated with the loads derived from the source assessment, and using the estimated sediment loads alone creates a rigid perception that the loads are absolutely conclusive. However, in this appendix the TMDL is expressed using daily loads to satisfy an additional EPA required TMDL element. Daily loads should not be considered absolutely conclusive and may be refined in the future as part of the adaptive management process. The TMDLs may not be feasible at all locations within the watershed but if the allocations are followed, sediment loads are expected to be reduced to a degree that the sediment targets are met and beneficial uses are no longer impaired. It is not expected that daily loads will drive implementation activities.

I1.2 APPROACH

The preferred approach for calculating daily sediment loads is to use a nearby water quality gage with a long-term dataset for flow and suspended sediment. Within the entire Bitterroot River watershed, there are several USGS gage stations with extensive discharge datasets but no gage stations with daily suspended sediment measurements. The USGS station on Skalkaho Creek near Hamilton, MT (12346500) was selected to represent the daily variability in mean daily discharge because it has the longest period of record for the Bitterroot tributaries. The mean daily discharge values from 55 years of record (1948 - 2003) at the gage Skalkaho Creek near Hamilton, MT were used to calculate daily sediment values for TMDLs in the tributaries of the Bitterroot River watershed.

Using the mean of daily mean discharge values from the gage, a daily percentage relative to the mean annual discharge was calculated for each day (**Table I-1**). For each TMDL, the daily percentages in **Table I-1** were multiplied by the total average annual load associated with the TMDL percent reductions in **Section 5.7** to calculate the daily load. The TMDLs expressed as an average annual load, which are discussed in **Section 5.7** are provided in **Table I-2**. For instance, the total allowable annual sediment load for the Lick Creek is 166 tons. To determine the TMDL for January 1, 166 tons is multiplied by 0.29% which provides a daily load for Lick Creek on January 1st of 0.48 tons. The daily loads are a composite of the allocations, but as allocations are not feasible on a daily basis, they are not contained within this appendix. If desired, daily allocations may be obtained by applying allocations provided in **Section 5.6** to the daily load.

Table I-1. USGS Stream Gage 12346500 (Skalkaho Creek near Hamilton, MT) – Percent of Mean Annual Discharge Based on Mean of Daily Mean Discharge Values for each Day of Record (Calculation Period 1948-12-01 -> 2003-09-30)

Day of month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.29%	0.28%	0.27%	0.34%	1.03%	4.20%	2.73%	0.92%	0.59%	0.46%	0.41%	0.35%
2	0.29%	0.28%	0.26%	0.35%	1.05%	4.29%	2.64%	0.90%	0.58%	0.46%	0.40%	0.36%
3	0.29%	0.28%	0.26%	0.34%	1.10%	4.46%	2.53%	0.88%	0.55%	0.46%	0.40%	0.36%
4	0.29%	0.28%	0.26%	0.35%	1.17%	4.51%	2.47%	0.88%	0.54%	0.45%	0.40%	0.35%
5	0.29%	0.28%	0.26%	0.37%	1.24%	4.52%	2.40%	0.86%	0.54%	0.45%	0.40%	0.35%
6	0.29%	0.27%	0.27%	0.39%	1.30%	4.66%	2.28%	0.84%	0.54%	0.45%	0.40%	0.34%
7	0.29%	0.27%	0.27%	0.41%	1.42%	4.70%	2.18%	0.82%	0.53%	0.46%	0.40%	0.33%
8	0.29%	0.27%	0.27%	0.41%	1.54%	4.66%	2.08%	0.79%	0.54%	0.45%	0.39%	0.32%
9	0.29%	0.28%	0.27%	0.42%	1.64%	4.63%	1.97%	0.78%	0.51%	0.43%	0.39%	0.32%
10	0.29%	0.28%	0.27%	0.45%	1.78%	4.52%	1.89%	0.77%	0.51%	0.45%	0.39%	0.32%
11	0.28%	0.28%	0.27%	0.46%	1.96%	4.40%	1.79%	0.75%	0.51%	0.46%	0.39%	0.33%
12	0.29%	0.28%	0.27%	0.47%	2.10%	4.38%	1.71%	0.74%	0.53%	0.48%	0.39%	0.33%
13	0.29%	0.28%	0.27%	0.50%	2.20%	4.41%	1.63%	0.73%	0.51%	0.47%	0.38%	0.33%
14	0.29%	0.28%	0.27%	0.52%	2.34%	4.37%	1.55%	0.73%	0.51%	0.46%	0.37%	0.33%
15	0.29%	0.27%	0.27%	0.53%	2.46%	4.35%	1.49%	0.71%	0.53%	0.46%	0.38%	0.33%
16	0.32%	0.27%	0.28%	0.54%	2.57%	4.33%	1.43%	0.70%	0.51%	0.45%	0.37%	0.32%
17	0.30%	0.27%	0.28%	0.54%	2.65%	4.35%	1.37%	0.68%	0.50%	0.43%	0.36%	0.32%
18	0.29%	0.27%	0.28%	0.57%	2.71%	4.27%	1.33%	0.67%	0.50%	0.43%	0.36%	0.32%
19	0.29%	0.27%	0.28%	0.58%	2.76%	4.20%	1.29%	0.68%	0.49%	0.42%	0.36%	0.32%
20	0.28%	0.27%	0.28%	0.63%	2.95%	4.03%	1.24%	0.68%	0.50%	0.43%	0.36%	0.30%
21	0.28%	0.27%	0.28%	0.62%	3.01%	3.93%	1.20%	0.65%	0.50%	0.43%	0.36%	0.32%
22	0.27%	0.27%	0.28%	0.63%	3.09%	3.76%	1.15%	0.65%	0.50%	0.43%	0.36%	0.32%
23	0.27%	0.26%	0.29%	0.68%	3.21%	3.64%	1.12%	0.67%	0.49%	0.43%	0.36%	0.30%
24	0.27%	0.27%	0.29%	0.75%	3.37%	3.58%	1.09%	0.65%	0.48%	0.42%	0.37%	0.30%
25	0.28%	0.26%	0.29%	0.79%	3.53%	3.49%	1.07%	0.63%	0.47%	0.42%	0.37%	0.30%
26	0.28%	0.26%	0.29%	0.82%	3.64%	3.27%	1.03%	0.63%	0.47%	0.42%	0.37%	0.29%
27	0.28%	0.26%	0.29%	0.86%	3.85%	3.10%	1.01%	0.62%	0.46%	0.41%	0.36%	0.30%
28	0.27%	0.27%	0.30%	0.89%	4.00%	2.98%	0.99%	0.61%	0.46%	0.42%	0.35%	0.30%
29	0.27%	0.30%	0.30%	0.91%	4.12%	2.91%	0.97%	0.60%	0.45%	0.42%	0.35%	0.29%
30	0.27%	0.00%	0.32%	0.96%	4.18%	2.83%	0.97%	0.60%	0.45%	0.41%	0.35%	0.30%
31	0.28%	0.00%	0.33%	0.00%	4.17%	0.00%	0.96%	0.60%	0.00%	0.41%	0.00%	0.29%

Table I-2. TMDLs expressed as an average annual load and can be used in conjunction with the values in Table I-1 to compute daily loads.

Stream Segment	Waterbody ID	TMDL Expressed as Average Annual Load (tons/year)
Ambrose Creek	MT76H004_120	887
Bass Creek	MT76H004_010	527
Lick Creek	MT76H004_170	166
Lolo Creek (headwaters to Sheldon Creek)	MT76H005_013	2094
Lolo Creek (Mormon Creek to Mouth)	MT76H005_011	4690
Lolo Creek (Sheldon Creek to Mormon Creek)	MT76H005_012	176
McClain Creek	MT76H004_150	171
Miller Creek	MT76H004_130	1538
Muddy Spring Creek	MT76H004_180	15
North Burnt Fork Creek	MT76H004_200	2830
Rye Creek	MT76H004_190	1724
Sleeping Child Creek	MT76H004_090	2306
Sweathouse Creek	MT76H004_210	705
Threemile Creek	MT76H004_140	3034
Willow Creek	MT76H004_110	1654