APPENDIX D - 2007 SEDIMENT AND HABITAT DATA COLLECTION METHODS AND DATA SUMMARY – BITTERROOT TPA

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

D1.0 INTRODUCTION

This appendix includes a summary of the field protocols and results from stream channel and habitat data collected in the Bitterroot TPA during the summer of 2007 to facilitate sediment TMDL development. It is an excerpt from the Bitterroot TPA Base Parameter Report (PBS&J 2009), which is on file at DEQ and also contains site visit notes and summary statistics by monitoring site and reach type. During the field assessment, stream channel and habitat data was collected at a total of 32 monitoring sites on 23 streams (**Figure D-1**) following protocols established in *Longitudinal Field Methodology for the Assessment of Sediment and Habitat Impairments* (MTDEQ 2007a). Reach type as identified in this appendix and the Bitterroot TPA Base Parameter Report will differ from reach types in **Section 5 of the TMDL document**, as a result of ecoregion reassignment **(See Section 5.3.1.2 in the TMDL document)**; with streams originating within the Idaho Batholith ecoregion that were assessed in the 2007 DEQ field effort considered to be Idaho Batholith, and reaches located on streams that are split between Northern Rockies and Middle Rockies ecoregions assigned an ecoregion based on where the majority of the stream is located. Reach type was not modified in this appendix or the original report, and is provided without edits here to demonstrate the original sampling rationale.

D1.1 AERIAL ASSESSMENT DATABASE

Prior to field data collection, each 303(d) listed stream segment was broken into several stream reaches based on Ecoregion, valley gradient, Strahler stream order and confinement through the use of GIS data layers and color aerial imagery. Stream reaches were delineated following the methodology outlined in *A Watershed Stratification Approach for TMDL Sediment and Habitat Impairment Verification* (MTDEQ 2007b). Stream reach data was then compiled into an Aerial Assessment Database, which included a total of 915 stream reaches on 23 stream segments in the Bitterroot TPA. With three categories of Level III Ecoregion, the Bitterroot TPA has a total of 72 possible combinations of Ecoregion, gradient, Strahler stream order and confinement. These 72 possible combinations will be referred to as "**reach types**" in this report.

Reach Type - *Unique combination of Ecoregion, gradient, Strahler stream order and confinement*

Out of the 72 possible reach types in the Bitterroot TPA, a total of 45 reach types were identified during the aerial assessment process. Sediment and habitat monitoring site assessments were performed within 11 of the 45 identified reach types.

D1.1.1 Reach Types

A total of 11 distinct reach types were assessed in the Bitterroot TPA in 2007, with a total of 32 monitoring sites. Reach types were identified based on a unique combination of Ecoregion, valley gradient, Strahler stream order and confinement as determined through GIS analysis (**Table D-1**). Twenty-five of the monitoring sites occurred within the Middle Rockies Ecoregion, which comprised the majority of the TPA. Within the Middle Rockies, the majority of the assessments were performed at sites with valley gradients <2%, with a total of 18 sites on 2nd, 3rd and 4th order streams. Due to the extent of the dataset for low gradient streams in the Middle Rockies Ecoregion; data from these reach types is likely to be the most robust. Specific monitoring sites assessed in each reach type are presented in **Table D-2. Figure D-1** presents each monitoring site and Ecoregion in the Bitterroot TPA.

Table D-1. Reach Types Assessed in the Bitterroot TPA.

Level III Ecoregion	Gradient	Strahler Stream Order	Confinement	Reach Type	Rosgen Stream Type (Potential)	Number of Monitoring Sites
Idaho Batholith	0-<2%	4	U/M	IB-0-4-U/M	B3/4c	1
	2 to <4%	3	U/M	IB-2-3-U/M	B4	1
Middle Rockies	0-<2%	2	U/M	MR-0-2-U/M	B3, B3c, C4, E4	3
		3	U/M	MR-0-3-U/M	B3c, C3, C4, E4	10
		4	U/M	MR-0-4-U/M	B3, B3c, C3, C4	5
	2 to <4%	1	U/M	MR-2-1-U/M	B4	1
		2	U/M	MR-2-2-U/M	B3, B3c, B4, C3b, E4b	5
		3	U/M	MR-2-3-U/M	B4	1
	>4%	2	U/M	MR-4-2-U/M	B4, E4b	1
Northern Rockies	0-<2%	4	U/M	NR-0-4-U/M	B4c, C3, C4	3
	2 to <4%	3	U/M	NR-2-3-U/M	B3	1

Table D-2. Monitoring Sites in Assessed Reach Types.

Level III Ecoregion	Reach Type	Reach ID
Idaho Batholith	IB-0-4-U/M	RYEC-28
	IB-2-3-U/M	NFRC-22
Middle Rockies	MR-0-2-U/M	KOOT-52, MILR-21, MILL-50
	MR-0-3-U/M	AMBR-30, BEAR-30, LOST-43, MILR-33, NBEAR-08, NBFC-11, NBFC-15, SWEA-29, TINC-31/32, WILL-38
	MR-0-4-U/M	RYEC-36, SKAL-33, SKAL-48, SLEE-43, THRE-35
	MR-2-1-U/M	MILR-11
	MR-2-2-U/M	BASS-24, BASS-27, BLOD-49, LICK-19, MILL-43
	MR-2-3-U/M	WILL-28
	MR-4-2-U/M	MCCL-15
Northern Rockies	NR-0-4-U/M	LOLO-26, LOLO-34, LOLO-56
	NR-2-3-U/M	SFLO-43

D1.1.1.1 Idaho Batholith

The Idaho Batholith Ecoregion covers much of the western side of the Bitterroot TPA and included 2 monitoring sites. This Ecoregion encompasses the Bitterroot Mountains in the Selway-Bitterroot Wilderness Area on the west side of the Bitterroot River as well as the majority of the Rye Creek watershed on the east side of the Bitterroot River. No assessments were performed in this Ecoregion on

the west side of the Bitterroot River since most of the area is in designated wilderness. Note that the two sites in the Rye Creek watershed are likely influenced by the large forest fires in 2000.

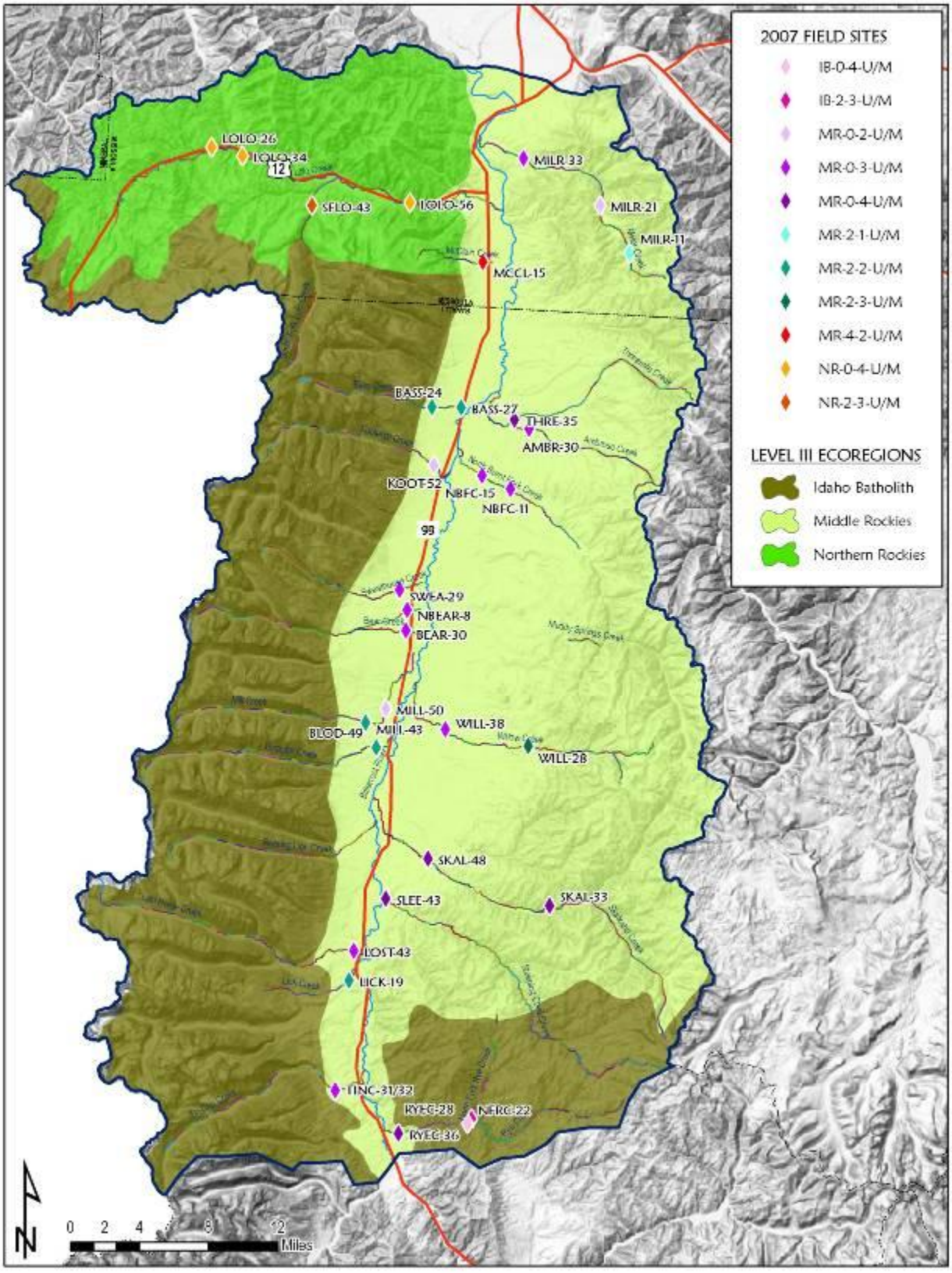
D1.1.1.2 Middle Rockies

The Middle Rockies Ecoregion includes the Sapphire Mountains on the east side of the Bitterroot River as well as valley bottom areas along the west side of the Bitterroot River. There were 25 monitoring sites in the Middle Rockies Ecoregion, the majority of which were located in low gradient valley bottom areas.

D1.1.1.3 Northern Rockies

The Northern Rockies Ecoregion covers much of the Lolo Creek watershed in the northern portion of the Bitterroot TPA and to the west of the Bitterroot River. There were 4 monitoring sites in this Ecoregion, all of which were located in the Lolo Creek watershed.

Figure D-1. 2007 Bitterroot TPA Sediment and Habitat Monitoring Sites



D2.0 FIELD DATA COLLECTION METHODOLOGY

The following sections include descriptions for the various field methodologies that were employed for the stream assessments. The methods follow standard DEQ protocols for sediment and habitat assessments, as presented in the document, Longitudinal Field Methodology for the Assessment of TMDL Sediment and Habitat Impairments (MT DEQ 2007a). All field forms used in the study are standard forms used by DEQ for sediment and habitat assessments.

D2.1 Survey Site Delineation

Stream survey sites were delineated beginning at riffle crests at the downstream ends of reaches. Survey sites were measured in the upstream direction at pre-determined lengths based on the bankfull width at the selected downstream riffle. Survey lengths of 500 feet were used for bankfull widths less than 10 feet; survey lengths of 1,000 feet were used for bankfull widths between 10 feet and 50 feet; and survey lengths of 2,000 feet were used for bankfull widths greater than 50 feet. Each survey site was divided into five equally sized study cells. The GPS locations of the downstream and upstream ends of the survey site were recorded and digital photographs were taken.

D2.2 Field Determination of Bankfull

All members of the field crew participated in determining the bankfull elevation. Indicators that were used to estimate the bankfull channel elevation included scour lines, changes in vegetation types, tops of point bars, changes in slope, changes in particle size and distribution, stained rocks and inundation features. Multiple locations and indicators were examined, and bankfull elevation estimates and their corresponding indicators were recorded. Final determination of the appropriate bankfull elevation was determined by the team leader, and informed by the team experience and notes from the field form.

D2.3 Channel Cross-sections

Channel cross-section measurements were performed at the first riffle in each cell using a line level and a measuring rod. Cross-sections were conducted in each cell containing a riffle feature. At each cross-section, depth measurements at bankfull were collected to a tenth of a foot across the channel at regular intervals. These intervals varied depending on channel width, following protocol in item 15, Section 2.3 of the Longitudinal Field Methodology for the Assessment of TMDL Sediment and Habitat Impairments (MT DEQ 2007a). The thalweg depth was recorded at the deepest point of the channel independent of the regularly spaced intervals. At each cross-section, GPS coordinates were recorded and photos were taken from the middle of the channel and across the channel, showing the tape across the stream.

D2.4 Floodprone Width Measurements

The floodprone elevation was determined by multiplying the maximum depth value by two (Rosgen 1996). The floodprone width was then determined by stringing a tape from the bankfull channel margin on both right and left banks until the tape (pulled tight and “flat”) touched ground at the floodprone elevation. The total floodprone width was calculated by adding the bankfull channel width to the distances on either end of the channel to the floodprone elevation. When dense vegetation or other features prevented a direct line of tape from being strung, best professional judgment was used to determine the floodprone width.

D2.5 Channel Bed Morphology

The length of the survey site occupied by pools and riffles was identified. Beginning from the downstream end of the survey site, the upstream and downstream stations of "dominant" riffle and pool stream features were recorded. Features were considered "dominant" when occupying over 50% of the stream width. Pools and riffles were measured from head crest or riffle crest, respectively, until the end of that feature (defined as the tail crest for pools). Stream features were identified per standard field method criteria (MT DEQ 2007a).

D2.6 Residual Pool Depth

At each pool encountered, the maximum depth and the depth of the pool tail crest at its deepest point was measured (MT DEQ 2007a). No pool tail crest depth was recorded for dammed pools. The difference between the maximum depth and the tail crest depth is considered the residual pool depth.

D2.7 Pool Habitat Quality

Qualitative assessments of each pool feature were undertaken, including the pool type, size, formative feature, and cover type, along with the depth of any undercut bank associated with the pool.

D2.8 Fine Sediment in Pool Tail-outs

A measurement of the percent of fine sediment in pool tail-outs was taken using the grid toss method at the first and second scour pool of each cell. Grid toss readings were focused in those pool tail-out gravels that appeared to be suitable or potentially suitable for trout spawning. Measurements were taken within the "arc" just upstream of the pool tail crest, following the methodology in Section 2.8 of Longitudinal Field Methodology for the Assessment of TMDL Sediment and Habitat Impairments (MT DEQ 2007a). Three measurements were taken across the channel with specific attention given to measurements in gravels determined to be of appropriate size for salmonid spawning. The potential for spawning was recorded as Yes (Y), No (N), or Questionable (Q) at each measurement site.

D2.9 Fine Sediment in Riffles

Using the same grid toss method as used in pools, measurements of fine sediment in riffles were performed. Grid tosses were performed before the pebble counts to avoid disturbances to fine sediments.

D2.10 Woody Debris Quantification

The amount of large woody debris (LWD) was recorded along the entire assessment reach. Large pieces of woody debris located within the bankfull channel and which were relatively stable as to influence the channel form were counted as either single, aggregate or willow bunch. Further description of these categories is provided in Section 2.10 of Longitudinal Field Methodology for the Assessment of TMDL Sediment and Habitat Impairments (MT DEQ 2007a).

D2.11 Riffle Pebble Count

One Wolman pebble count (Wolman 1954) was performed at the first riffle encountered in cells 1, 3 and 5, providing a minimum of 300 particle sizes measured within each assessment reach. Particle sizes were measured along their intermediate length axis (b-axis) and results were grouped into size categories. The pebble count was performed from bankfull to bankfull using the "heel to toe" method, measuring particle size at the tip of the boot at each step. More specific details of the pebble count methodology

can be found in Section 2.11 of Longitudinal Field Methodology for the Assessment of TMDL Sediment and Habitat Impairments (MT DEQ 2007a).

D2.12 Riffle Stability Index

In streams that had well-developed point bars, a Riffle Stability Index (RSI) evaluation was performed to determine the average size of the largest recently deposited particle. For streams in which well-developed point bars were present, a total of three RSI measurements were conducted, which consisted of intermediate axis (b-axis) measurements of 15 particles determined to be among the largest size group of recently deposited particles and which occur on over 10% of the point bar. During post-field data processing, the geometric mean of the dominant bar particle size measurements was calculated and the result was compared to the cumulative particle distribution from the riffle pebble count in an adjacent or nearby riffle.

D2.13 Riparian Greenline Assessment

Along each monitoring site, an assessment of riparian vegetation cover was performed. Vegetation types were recorded at 10 to 20-foot intervals, depending on the bankfull channel width. The riparian greenline assessment included the general vegetation community type of the groundcover, understory and overstory on both banks. The ground cover vegetation (<1.5 feet tall) was described using the following categories: wetland, grasses or forbs, bare/disturbed ground, rock, or riprap. The understory (1.5 to 15 feet tall) and overstory (>15 feet tall) vegetation were described using the following categories: coniferous, deciduous, or mixed coniferous and deciduous. At 50-foot intervals, a riparian buffer width was estimated on either side of the bank. This width corresponded to the belt of vegetation buffering the stream from adjacent land uses.

D2.14 Streambank Erosion Assessment

An assessment of all actively/visually eroding and slowly eroding/undercut/vegetated streambanks was conducted along each survey site. This assessment consisted of the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) estimation, which are used to quantify sediment loads from bank erosion. The results of this assessment are reported in the companion document entitled Streambank Erosion Source Assessment Bitterroot TMDL Planning Area **(Appendix E)**.

D2.15 Water Surface Slope

Water surface slope measurements were estimated using a clinometer.

D2.16 Field Notes

At the completion of data collection at each survey site, field notes were collected by the field leader with inputs from the entire field team. The following four categories contributed to field notes, which served to provide an overall context for the condition of the stream channel relative to surrounding and historical lands-uses:

- Description of human impacts and their severity
- Description of stream channel conditions
- Description of streambank erosion conditions
- Description of riparian vegetation conditions

D3.0 DATA SUMMARY

Table D-3 presents sediment and habitat data for each individual reach sampled following the aforementioned assessment procedures.

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
25th percentile	RYEC-28	14.0	1.4	13	21	4	5	0.8	18	45	65	0
75th percentile	RYEC-28	18.1	2.1	17	32	22	8	1.5			73	5
minimum	RYEC-28	12.9	1.2	9	12	2	4	0.6			48	0
maximum	RYEC-28	18.4	3.0	17	35	31	10	1.8			75	25
median	RYEC-28	16.2	1.5	16	29	16	6	1.1			70	0
mean	RYEC-28	15.9	1.8	14	26	15	7	1.1			66	6
25th percentile	NFRC-22	14.7	1.3	10	20	13		0.6	19	110	60	0
75th percentile	NFRC-22	15.6	2.5	19	29	26		0.9			78	3
minimum	NFRC-22	9.7	1.2	8	16	0		0.4			58	0
maximum	NFRC-22	21.9	2.7	24	34	29		1.0			85	5
median	NFRC-22	15.3	1.6	13	23	15		0.7			75	0
mean	NFRC-22	15.4	1.9	15	24	17		0.7			71	2
25th percentile	MILR-21	31.2	3.5	12	27	6	12	0.7	13	42	3	0
75th percentile	MILR-21	38.7	4.5	13	35	22	27	1.4			10	0
minimum	MILR-21	14.8	3.5	11	25	4	0	0.5			0	0
maximum	MILR-21	45.5	4.6	13	41	29	43	1.7			13	0
median	MILR-21	31.3	3.9	13	30	14	19	1.0			8	0
mean	MILR-21	32.3	4.0	12	32	15	20	1.0			7	0
25th percentile	AMBR-30	7.9	3.2	54	69	43	80	0.6	14	2	45	0
75th percentile	AMBR-30	10.2	6.7	61	80	71	100	0.8			55	0
minimum	AMBR-30	7.7	2.1	54	64	37	43	0.5			15	0
maximum	AMBR-30	13.2	7.3	67	86	84	100	0.8			65	5
median	AMBR-30	8.6	5.0	54	74	51	93	0.7			50	0
mean	AMBR-30	9.5	4.9	58	75	57	87	0.7			46	1

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
25th percentile	MILR-33	10.1	4.1	12	22	20			0	0	8	0
75th percentile	MILR-33	56.8	15.5	17	28	27					30	15
minimum	MILR-33	10.0	3.7	9	16	12					8	0
maximum	MILR-33	91.3	25.6	17	30	35					38	25
median	MILR-33	48.0	5.1	16	27	22					18	15
mean	MILR-33	43.3	10.8	14	24	24					20	11
25th percentile	NBFC-11	23.3	1.6	9	10	0	1	1.0	6	84	50	28
75th percentile	NBFC-11	29.8	3.5	11	13	0	10	1.9			60	35
minimum	NBFC-11	16.6	1.3	9	9	0	0	0.8			50	5
maximum	NBFC-11	49.5	8.9	11	15	0	27	2.0			63	38
median	NBFC-11	23.7	1.9	10	11	0	4	1.3			53	35
mean	NBFC-11	28.6	3.4	10	12	0	8	1.4			55	28
25th percentile	NBFC-15	14.1	2.6	13	16	0	0	0.7	8	14	0	15
75th percentile	NBFC-15	21.6	3.1	16	20	2	2	1.4			5	25
minimum	NBFC-15	11.5	1.6	13	13	0	0	0.5			0	10
maximum	NBFC-15	29.1	5.3	18	20	4	6	1.6			8	43
median	NBFC-15	18.7	2.7	14	19	0	0	0.8			0	18
mean	NBFC-15	19.0	3.1	15	18	1	1	1.0			3	22
25th percentile	WILL-38	16.9	5.5	24	33	12	29	0.6	5	2	3	0
75th percentile	WILL-38	18.5	6.9	39	59	59	39	1.0			10	0
minimum	WILL-38	13.2	3.8	23	29	6	20	0.4			0	0
maximum	WILL-38	19.0	8.5	52	80	100	41	1.5			15	0
median	WILL-38	18.2	6.3	25	38	20	37	0.9			10	0
mean	WILL-38	17.2	6.2	33	49	37	33	0.9			8	0
25th percentile	RYEC-36	12.5	1.2	20	25	4	12	1.1	6	99	58	3
75th percentile	RYEC-36	15.4	1.6	24	30	29	21	1.4			63	5
minimum	RYEC-36	11.0	1.1	19	24	2	6	0.9			28	0

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
maximum	RYEC-36	17.6	2.0	26	35	98	31	1.9			75	15
median	RYEC-36	15.3	1.5	22	25	10	17	1.3			63	3
mean	RYEC-36	14.4	1.5	22	28	27	17	1.3			57	5
25th percentile	SKAL-33	23.0	1.8	3	5	2	2	0.8	7	87	85	0
75th percentile	SKAL-33	25.2	3.2	5	8	6	6	1.5			90	0
minimum	SKAL-33	16.5	1.7	3	3	0	0	0.5			75	0
maximum	SKAL-33	27.5	3.3	7	8	10	22	1.9			98	0
median	SKAL-33	23.9	3.1	3	8	4	4	1.0			85	0
mean	SKAL-33	23.2	2.6	4	6	4	6	1.1			87	0
25th percentile	SKAL-48	35.7	1.5	7	8	0	0	1.8	4	31	33	0
75th percentile	SKAL-48	41.5	2.8	11	14	2	2	3.0			55	5
minimum	SKAL-48	27.4	1.2	4	6	0	0	1.3			33	0
maximum	SKAL-48	42.7	3.1	14	17	4	27	3.4			73	8
median	SKAL-48	41.3	2.0	9	11	0	2	2.4			45	0
mean	SKAL-48	37.7	2.1	9	11	1	5	2.4			48	3
25th percentile	SLEE-43	24.1	1.4	5	11	4		0.8	4	37	43	0
75th percentile	SLEE-43	25.4	1.6	7	13	8		1.8			45	0
minimum	SLEE-43	17.7	1.1	4	11	2		0.6			10	0
maximum	SLEE-43	27.1	3.0	7	15	24		3.1			48	8
median	SLEE-43	24.6	1.6	7	11	6		1.2			43	0
mean	SLEE-43	23.8	1.8	6	12	8		1.5			38	2
25th percentile	THRE-35	6.7	1.9	24	57	31	93	0.6	14	26	58	18
75th percentile	THRE-35	7.6	4.1	33	63	78	100	1.0			70	28
minimum	THRE-35	6.5	1.4	21	56	18	63	0.5			53	10
maximum	THRE-35	7.9	4.3	40	68	100	100	1.5			70	40
median	THRE-35	7.1	3.1	26	57	41	100	0.7			63	23
mean	THRE-35	7.1	2.9	29	61	49	94	0.9			63	24
25th	MILR-11	8.6	3.6	9	25	12	5	0.4	28	108	75	0

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
percentile												
75th percentile	MILR-11	9.9	9.8	13	31	20	10	0.8			100	0
minimum	MILR-11	6.2	3.0	6	19	2	2	0.4			65	0
maximum	MILR-11	15.3	10.0	14	31	73	49	1.0			100	0
median	MILR-11	9.8	5.0	12	30	16	8	0.6			90	0
mean	MILR-11	10.0	6.3	10	27	21	11	0.6			86	0
25th percentile	WILL-28	14.4	2.4	9	20	10	11	1.0	13	332	88	0
75th percentile	WILL-28	14.8	4.3	12	22	16	30	1.5			93	0
minimum	WILL-28	12.3	2.1	9	19	4	2	0.7			85	0
maximum	WILL-28	21.4	8.5	13	22	29	41	1.7			95	3
median	WILL-28	14.4	4.1	10	21	10	20	1.1			90	0
mean	WILL-28	15.5	4.3	11	21	14	20	1.2			90	1
25th percentile	KOOT-52	41.9	1.2	6	11	4	10	1.1	7	113	38	0
75th percentile	KOOT-52	45.5	1.4	10	16	12	15	1.8			58	0
minimum	KOOT-52	40.1	1.1	6	9	0	8	0.6			25	0
maximum	KOOT-52	47.3	1.5	13	18	67	18	3.3			58	0
median	KOOT-52	43.7	1.3	6	13	10	12	1.6			43	0
mean	KOOT-52	43.7	1.3	9	13	14	13	1.6			44	0
25th percentile	MILL-50	28.9	2.9	12	22	3	2	2.0	8	7	30	0
75th percentile	MILL-50	43.0	6.1	12	23	6	8	3.6			53	15
minimum	MILL-50	21.9	1.3	11	22	0	0	1.5			10	0
maximum	MILL-50	50.0	7.7	13	23	10	24	4.0			58	15
median	MILL-50	36.0	4.5	12	22	5	4	2.5			35	3
mean	MILL-50	36.0	4.5	12	22	5	7	2.7			37	7
25th percentile	BEAR-30	25.3	3.9	14	18	2	4	1.7	8	25	23	0
75th percentile	BEAR-30	31.7	6.1	24	29	6	10	2.0			33	0
minimum	BEAR-30	25.3	3.5	5	10	0	2	1.3			13	0
maximum	BEAR-30	35.6	7.6	25	31	12	16	2.4			53	5
median	BEAR-30	27.9	4.8	23	27	2	8	1.8			30	0

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
mean	BEAR-30	29.2	5.2	17	23	4	8	1.9			30	1
25th percentile	NBEAR-08	15.8	6.0	7	11	0	4	1.5	9	21	63	0
75th percentile	NBEAR-08	23.3	11.1	9	19	6	6	1.8			83	3
minimum	NBEAR-08	14.9	3.2	4	8	0	0	0.5			60	0
maximum	NBEAR-08	30.0	13.2	9	24	20	8	2.2			88	5
median	NBEAR-08	18.5	9.6	9	14	2	4	1.6			80	3
mean	NBEAR-08	20.5	8.6	7	15	6	5	1.5			75	2
25th percentile	LOST-43	115.1	3.0	7	11		0	1.9	6	109	15	0
75th percentile	LOST-43	115.1	3.0	7	11		4	3.3			53	0
minimum	LOST-43	115.1	3.0	7	11		0	0.9			10	0
maximum	LOST-43	115.1	3.0	7	11		8	3.5			58	0
median	LOST-43	115.1	3.0	7	11		0	2.2			18	0
mean	LOST-43	115.1	3.0	7	11		2	2.4			31	0
25th percentile	SWEA-29	22.8	2.3	11	19	4	4	1.2	8	19	3	10
75th percentile	SWEA-29	25.7	3.2	13	23	10	15	2.0			15	23
minimum	SWEA-29	21.3	1.4	10	17	0	0	0.7			0	10
maximum	SWEA-29	28.7	4.8	14	24	20	22	2.2			33	28
median	SWEA-29	24.6	3.0	12	21	4	10	1.7			10	18
mean	SWEA-29	24.6	2.9	12	21	8	10	1.6			12	18
25th percentile	TINC-31/32	26.4	1.9	1	2	0	0	1.1	6	43	45	0
75th percentile	TINC-31/32	31.5	2.9	2	4	2	15	1.9			45	3
minimum	TINC-31/32	23.8	1.7	1	2	0	0	1.0			30	0
maximum	TINC-31/32	33.6	3.0	2	5	2	31	2.4			48	3
median	TINC-31/32	29.0	2.4	2	3	0	0	1.4			45	0
mean	TINC-31/32	28.9	2.4	2	3	1	10	1.5			43	1
25th percentile	BASS-24	15.2	1.8	3	7	0	2	0.8	14	60	28	0
75th percentile	BASS-24	17.9	2.0	3	8	6	5	1.4			45	0

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
minimum	BASS-24	11.5	1.3	2	6	0	2	0.4			23	0
maximum	BASS-24	20.8	2.4	4	9	20	8	2.3			73	3
median	BASS-24	17.9	1.9	3	7	2	2	1.1			28	0
mean	BASS-24	16.7	1.9	3	7	5	4	1.1			39	1
25th percentile	BASS-27	12.3	1.6	12	15	4	6	0.5	15	30	50	0
75th percentile	BASS-27	34.6	2.0	18	22	14	33	0.7			75	0
minimum	BASS-27	9.4	1.6	7	11	4	4	0.3			28	0
maximum	BASS-27	55.0	3.0	19	24	33	37	1.2			80	3
median	BASS-27	14.4	1.9	16	19	12	22	0.6			68	0
mean	BASS-27	25.2	2.0	14	18	14	20	0.7			60	1
25th percentile	BLOD-49	26.0	1.4	3	8	0	6	1.2	7	2	45	0
75th percentile	BLOD-49	41.9	2.4	9	13	6	17	1.9			70	0
minimum	BLOD-49	24.8	1.2	3	7	0	0	1.2			30	0
maximum	BLOD-49	51.1	4.2	16	18	10	22	2.6			73	0
median	BLOD-49	31.2	1.5	3	8	0	12	1.8			58	0
mean	BLOD-49	35.0	2.1	7	11	3	12	1.7			55	0
25th percentile	LICK-19	7.4	9.6	18	34	10	2	0.6	28	222	55	0
75th percentile	LICK-19	11.3	16.2	23	42	22	8	1.0			80	0
minimum	LICK-19	4.8	5.1	14	28	4	0	0.4			40	0
maximum	LICK-19	20.8	20.2	24	44	63	16	1.4			95	0
median	LICK-19	10.0	11.4	23	40	16	3	0.9			75	0
mean	LICK-19	10.9	12.5	20	37	22	5	0.8			69	0
25th percentile	MILL-43	23.6	6.8	2	5	2		0.6	7	60	38	0
75th percentile	MILL-43	29.1	10.6	3	8	6		1.0			48	0
minimum	MILL-43	22.7	6.3	1	4	0		0.5			33	0
maximum	MILL-43	35.5	12.0	4	8	12		1.7			50	0
median	MILL-43	27.8	7.6	3	7	2		0.6			48	0
mean	MILL-43	27.7	8.7	3	6	4		0.8			43	0

Table D-3. Individual Assessment Reach Data 2007.

Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
25th percentile	MCCL-15	5.1	6.1	30	44	24	12	0.5	40	28	55	0
75th percentile	MCCL-15	6.7	7.2	39	52	47	45	0.7			75	10
minimum	MCCL-15	4.6	3.4	22	44	18	0	0.4			40	0
maximum	MCCL-15	11.3	9.8	40	60	84	82	0.9			75	15
median	MCCL-15	5.3	7.0	38	45	45	29	0.7			60	5
mean	MCCL-15	6.6	6.7	33	50	43	31	0.6			61	6
25th percentile	LOLO-26	27.6	1.3	5	18	4	26	0.8	3	9	50	0
75th percentile	LOLO-26	36.1	2.2	7	23	8	38	1.4			80	0
minimum	LOLO-26	21.8	1.3	3	14	0	6	0.6			40	0
maximum	LOLO-26	36.5	2.4	7	23	14	73	1.9			85	5
median	LOLO-26	28.5	1.6	6	23	6	36	1.1			70	0
mean	LOLO-26	30.1	1.8	5	20	6	35	1.2			65	1
25th percentile	LOLO-34	29.1	2.8	2	12	0	20	1.5	2	31	75	5
75th percentile	LOLO-34	31.8	5.0	2	14	12	41	1.8			85	15
minimum	LOLO-34	23.5	2.6	2	10	0	6	1.0			75	3
maximum	LOLO-34	36.7	5.8	3	14	18	73	1.9			95	30
median	LOLO-34	31.1	4.5	2	14	4	28	1.8			78	8
mean	LOLO-34	30.4	4.1	2	13	7	31	1.6			82	12
25th percentile	LOLO-56	38.9	3.0	6	14	2	8	0.9	3	18	73	13
75th percentile	LOLO-56	43.6	4.6	12	20	8	18	1.8			98	20
minimum	LOLO-56	33.2	2.8	1	8	0	4	0.6			73	3
maximum	LOLO-56	49.9	4.8	13	20	14	59	2.5			98	33
median	LOLO-56	39.4	3.7	11	20	6	10	1.4			88	15
mean	LOLO-56	41.0	3.8	8	16	6	17	1.4			86	17
25th percentile	SFLO-43	24.4	1.3	2	4	0	5	0.6	5	37	55	0
75th percentile	SFLO-43	26.8	1.6	3	7	2	13	1.2			75	3
minimum	SFLO-43	21.7	1.3	1	3	0	0	0.6			50	0
maximum	SFLO-43	31.8	1.9	4	8	2	22	1.9			78	13

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Statistic	Reach ID	Width / Depth Ratio	Entrenchment Ratio	Riffle Pebble Count Percent <2mm	Riffle Pebble Count Percent <6mm	Riffle Grid Toss Percent <6mm *	Pool Tail-out Grid Toss Percent <6mm *	Mean Residual Pool Depth *	Number of Pools per 1000 Feet	Total Number of LWD per 1000 Feet	Percent Understory Shrub Cover	Percent Bare/Disturbed Ground
median	SFLO-43	25.4	1.3	3	6	0	7	0.9			70	0
mean	SFLO-43	26.0	1.5	3	6	1	9	1.0			66	3

* Riffle grid toss, pool tail-out grid toss and residual pool depth measurements include all data.

D4.0 REFERENCES

MTDEQ. 2007a. Longitudinal Field Methodology for the Assessment of Sediment and Habitat Impairments. Montana Department of Environmental Quality, Helena, Montana.

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