

Welcome to the Montana Stream Mitigation Procedure calculation Spreadsheet (MTSMP)

The Next 4 worksheets are designed to assist with the calculations for the MTSMP.

The last worksheet (convert) allows you calculate ft² to acres or acres to ft²

Gray boxes contain equations or information that should not be changed

The worksheets follow the same order as in Section II of the MTSMP and the case samples. The Debit worksheet will be applied to the entire impact area*. For mitigation, choose the appropriate worksheet(s) [Mitigation Banking, In-Lieu Fee and/or Permittee-Responsible]. Once the information have been added, the spreadsheets will run the calculations and add the results to the summary table.

DEBIT WORKSHEET		PMC WORKSHEETS	
<u>Impact Area</u>	The term 'area' is used to bind the resource being proposed for impacts by the type of impact (example: dam, impoundment, piping)	<u>Mitigation Reach:</u>	The term 'reach' refers to the portion of a river/stream that is being proposed for mitigation that has like improvement factors
<u>Sum of factors (SF_i):</u>	Summation of all factors used to determine impacts (Stream type, stream status, existing condition, duration, dominant impact and collective impact length)	<u>Sum of Factors (SF_m):</u>	For each reach a summation of factors (Net improvement, stream status, Type of Protection, mitigation timing, comparative stream order, and location)
<u>Linear feet impact (LF_i)</u>	Actual linear foot for each area by type of impact.	<u>Linear Feet (LF_m):</u>	Actual linear foot for each reach by type of mitigation.
<u>R x LL:</u>	Factors x linear feet of impact	<u>Reach Multiplier (RM):</u>	Multiplier for mitigation being completed on one bank or both banks of the reach.
<u>Total Debits:</u>	Combining all areas' debit scores into one overall project score.	<u>M x L x RM:</u>	Factors x Linear feet x Reach multiplier
		<u>Total (proposed) credits:</u>	Summation of all proposed reach scores into one overall mitigation score.

Point of Contact. Questions regarding use of this policy for specific projects must be addressed to the Project Manager handling the action. Other general inquiries or comments regarding this document may be addressed to:

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 Subject: MTSMP

OR

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* For bank stabilization projects; impact includes the entire length of the bank being protected not just the footprint of the structures or revetments.

Debits Tables

Table I.1 Adverse Impacts (debit) Factors and Worksheet.

FACTORS	MULTIPLIERS					
Stream Type (Pg 6)	Ephemeral 0.2		Intermittent 0.3		Perennial 0.6	
Stream Status (Pg 6)	All Others 0.25		High Resource Value 0.75			
Existing Condition (Pg 7)	Impaired 0.25		Somewhat Impaired 0.75		Fully Functional 1.5	
Dominant Impact (Pg 7)	Bank Stabilization* See table 1.2 below	Morphologic 1.5	Channelization 2.0	Impound 2.0	Pipe 2.2	Fill 2.5
Cumulative Impact (Pg 7)	* For projects impacting up to 1,000 linear feet, multiply 0.0005 x linear feet of stream impacted by the total length of all impact areas. * For projects impacting 1,001-3,000 linear feet, multiply 0.001 x linear feet of stream impacted by the total length of all impact areas. * For projects impacting over 3,000 linear feet, multiply 0.002 x linear feet of stream impacted by the total length of all impact areas.					
Location of Mitigation (Pg 8)	Same Order 0.0		1 Order Difference 0.10		2 or more Order Difference 0.2	
Comparative Stream order of Mitigation Site (Pg 8)	On-site 0.0		Off-site 0.10		Outside 0.2	
Legal Protection on Mitigation Site (Pg 8)	Covenants 0.15	Deed Restriction 0.10	Conservation Easement 0.05		Fee Title 0.00	
Mitigation Timing (Pg 8)	Prior to Impacts 1.0		Concurrent with Impacts 1.25		After Impacts 1.5	

Table I.2 Bank Stabilization Multipliers

Multiplier	Description For Bank Stabilization (Dominant Impact)
0.2	Vegetation and or soil lifts established at the base flow elevation combined with either a rock toe and/or wood at or below base flow elevation
0.4	Rock riprap with incorporation of willow cuttings or other native vegetation
0.6	Rock riprap with no incorporation of vegetation on bank or any type of vanes/barbs/weirs/hard points that project into the channel
0.8	Combinations of bank riprap with vanes/barbs/weirs/hard points
1.0	Vertical or nearly vertical retaining walls constructed of gabion baskets, hand-placed stone, masonry, concrete, steel, wood, or other materials

Table I.3 Debits Worksheet

Factor	Impact Area 1	Impact Area 2	Impact Area 3	Impact Area 4	Impact Area 5	Impact Area 6
Stream Type	0.00	0.00	0.00	0.00	0.00	0.00
Stream Status	0.00	0.00	0.00	0.00	0.00	0.00
Existing Condition	0.00	0.00	0.00	0.00	0.00	0.00
Dominant Impact	0.00	0.00	0.00	0.00	0.00	0.00
Cumulative Impact	0.00					
Location of Mitigation	0.00	0.00	0.00	0.00	0.00	0.00
Comparative Stream Order of Mitigation Site	0.00	0.00	0.00	0.00	0.00	0.00
Type of Legal Protection for Mitigation Site	0.00	0.00	0.00	0.00	0.00	0.00
Sum of Factors (SF _i)	0.00	0.00	0.00	0.00	0.00	0.00
Linear Feet Impact* (LF _i)	0.00	0.00	0.00	0.00	0.00	0.00
Mitigation Timing	0.00	0.00	0.00	0.10	0.00	0.00
SF _i X LF _i X Mitigation Timing	0.00	0.00	0.00	0.00	0.00	0.00

$$\text{Total Debits} = \Sigma (\text{SF}_i \times \text{LF}_i \times \text{Mitigation Timing}) = \boxed{0.00}$$

*For bank stabilization projects, impacts include the entire length of the bank being protected not just the footprint of the structure or rev

Riparian Mitigation Credits Tables

Table I.4 Factors with Multiplier reference table

	FACTORS (see page 9 for definitions)	MULTIPLIERS
a	Buffer Width	Width of Riparian Buffer Preserved ÷ 100
b	Remove Disturbance to Riparian Buffer	0.5
c	Fence around Buffer	0.5
d	Re-vegetate Riparian Buffer	1.0 x % of buffer re-vegetated
e	Micro Topography in Floodplain	0.5
f	Addition of Woody Debris in Floodplain	0.5
g	Management of Invasive Species	0.5
h	Removal of Riprap Below Ordinary High Water	1.0 X % of Riprap removed
i	Removal of Floodplain Fill (Berms or Impervious Materials)	1.0 X % of fill removed
j	Restoration of Channel Morphology	1 (both sides will earn 1 as a multiplier)

Table I.5 Stream and Riparian Credit Factors Worksheet

	FACTORS	Reach 1/Side A	Reach 1/Side B	Reach 2/Side A	Reach 2/Side B
a	Buffer Width	0.00	0.00	0.00	0.00
b	Remove Disturbance to Riparian Buffer	0.00	0.00	0.00	0.00
c	Fence around Buffer	0.00	0.00	0.00	0.00
d	Re-vegetate Riparian Buffer	0.00	0.00	0.00	0.00
e	Micro Topography in Floodplain	0.00	0.00	0.00	0.00
f	Addition of Woody Debris in Floodplain	0.00	0.00	0.00	0.00
g	Management of Invasive Species	0.00	0.00	0.00	0.00
h	Removal of Riprap below ordinary High Water	0.00	0.00	0.00	0.00
i	Removal of Floodplain Fill (Berms or Impervious Materials)	0.00	0.00	0.00	0.00
j	Restoration of Channel Morphology	0.00	0.00	0.00	0.00
Total Sum of Factors (SF _m) a-j		0.00	0.00	0.00	0.00
Linear Feet Impact* (LF _m)		0.00	0.00	0.00	0.00
SF _m x LF _m		0.00	0.00	0.00	0.00

Total Riparian Credits = Σ (SF_m x LF_m x RM) = =

0.00

Mitigation Summary Worksheet

Project Name:
Corps #

	Debits	Linear Ft	Total Debits
A	0.00	0.00	= Stream and Riparian Debits
	Credit	Linear Ft	Total Credits
B	0.00	0.00	=Stream and Riparian Credits

TRUE	Proposed Stream and Riparian Credits \geq Debits ($B \geq A$)
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