



Omaha District

## MONTANA STREAM MITIGATION PROCEDURE (MTSMP)

- January 2013 -

**1. Applicability.** The practice of using compensatory mitigation to ensure minimal individual and cumulative adverse impacts is an important component of the U.S. Army Corps of Engineers (Corps) Regulatory Program. The Corps considers the need for compensatory mitigation when evaluating potential individual and cumulative adverse impacts that may be authorized by Department of the Army (DA) Permits, including Nationwide and Individual Permits. This document describes the compensatory Stream Mitigation Procedure used for DA authorizations within the state of Montana (MTSMP). It describes the method for quantifying the adverse impacts (debit) and the acceptable compensatory mitigation (credit) for projects adversely affecting streams. It is applicable to Corps regulatory actions requiring compensatory mitigation for a permitted projects' adverse ecological effects where more rigorous, detailed functional assessment techniques, such as the hydrogeomorphic methodology, are not considered practical or necessary. The following points are noted:

- This MTSMP does not affect sequencing (e.g., avoidance, minimization, or reduction), any requirements of the 404(b)(1) Guidelines, 33 CFR 332.1(c), or other applicable documentation. Such requirements must be evaluated during consideration of permit applications and pre-construction notifications.
- Projects that result in more than 300 linear feet of stream impact will usually require compensatory mitigation. Projects impacting less than 300 linear feet of stream will require compensatory mitigation on a case-by-case basis. Stream impacts upstream and downstream from the proposed project will be evaluated, regardless of property ownership, to determine if cumulative impacts warrant compensatory mitigation for projects impacting less than 300 linear feet of stream channel. Projects placing a stream channel into a culvert for 150 linear feet or more will require compensatory mitigation. Compensatory mitigation for impacts to ephemeral, intermittent, and perennial streams can be evaluated under this MTSMP.  

- When impacts are proposed for both streams and wetlands, this MTSMP will be used to calculate mitigation for the stream impacts. The Wetland Compensatory Mitigation Ratios, Montana Regulatory Program (April 2005), will be used to calculate wetland mitigation on an acreage basis for wetland impacts. Some projects may require both stream and wetland mitigation to offset adverse impacts.
- When this MTSMP is used as a method for determining available credits in the establishment of a mitigation bank or in-lieu fee program (ILF), the Corps will consult with the Interagency Review Team (IRT) with the goal of achieving a consensus of the IRT regarding the factors, elements, and design of the mitigation banking instrument.
- In addition to the DA compensatory mitigation requirements set forth in this document, other federal, state, tribal, or local agencies within Montana may require additional or separate mitigation under their own authorities.
- Other available functional assessment or credit determination methods may be used to quantify stream debits and credits in place of this procedure if they use a watershed approach, as long as prior approval has been obtained from the Corps.
- Separate and/or additional procedures may be applied to special resources or resource management areas, including areas such as the Upper Yellowstone River Special Area Management Plan, Indian Reservations, Wild and Scenic Rivers, National Parks, National Monuments, etc.

**2. Purpose.** The intent of the MTSMP is to comply with the requirements for mitigation found in 33 CFR Parts 320 and 332 and to provide a method for calculating compensatory mitigation debits and credits that will provide predictability and consistency for applicants. This MTSMP is not intended for use as project design criteria.

Nothing in this MTSMP should be interpreted as a promise or guarantee that if a project follows the procedure described herein, it will be assured approval by the Corps. Following the guidelines herein does not confer any absolute guarantee of mitigation acceptability. Site specifics of a particular project may warrant alternative or

additional mitigation requirements.

**3. Adverse Impacts Area.** The area of adverse impacts as used in this document includes stream areas impacted by filling, excavating, flooding, draining, clearing, channelizing, straightening, shortening, canalizing, incising/entrenching, culverting, piping, or other adverse actions that effect the physical, chemical, and/or biological characteristics of a stream. For bank stabilization projects, impacts include the entire length of the bank being protected not just the footprint of the structure or revetment. For example, an array of bendway weirs or barbs may only have a collective footprint of 200 linear feet, but they may be preventing erosion of 600 linear feet of stream bank. In that case, the impact length would be 600 linear feet.

**4. Mitigation Sequencing.** The Council on Environmental Quality has defined at 40 CFR Part 1508.20 that *mitigation* includes:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- **Compensating for the impact by replacing or providing [adequate] substitute resources or environments.**

**5. Mitigation Categories.** In general, there are four major categories available to an applicant to implement compensatory mitigation. The Corps will rely on 33 CFR 332.3 when considering appropriate mitigation. The first option for an applicant is to obtain credits from an established mitigation bank (if available). The second option is to obtain credits from an approved ILF. The third option is permittee-responsible mitigation which can be broken down into three sub-categories. The fourth option is a combination of some or all of the above options that collectively satisfy the mitigation requirements.

1. Mitigation Bank Credits: The applicant may elect to procure credits from an established stream mitigation bank as long as impacts are within the bank's service area and the bank has appropriate credits available.

Benefits for considering a mitigation bank include utilizing timing schedule 1 or 2 (0.0 or 0.02 modifier), which ultimately results in lower debits incurred, and the bank assumes responsibility for the entire mitigation obligation upon acceptance of the fee and adequate notification to the Corps.

2. ILF Credits: The applicant may procure credits from an ILF sponsor who will commit to providing the compensatory mitigation. The ILF sponsor assumes responsibility for the entire mitigation obligation upon acceptance of the fee and adequate notification to the Corps.

3. Permittee-Responsible Mitigation: The applicant may elect to prepare their own mitigation proposal or hire a consultant to prepare a mitigation plan which must be approved by the Corps. The three sub-categories of permittee-responsible mitigation are spelled out in detail within 33 CFR Section 332.2 (b)(4-6). (Permittee retains all the responsibilities for the mitigation obligations)

- Permittee-responsible mitigation under a watershed approach.
- Permittee-responsible mitigation through on-site and in-kind mitigation.
- Permittee-responsible mitigation through off-site and/or out-of-kind mitigation.

4. Combination of Above: With case-specific Corps' approval, the above options may be combined to satisfy a compensatory mitigation obligation.

**6. Mitigation Activities (not all inclusive).** Compensatory mitigation for adversely impacted streams can include a combination of in-stream and riparian restoration or improvement. Activities that constitute restoration or improvement include, but are not limited to: restoration of in-stream flow through acquisition of water leases,



establishment of natural buffers to filter pollutants and provide detritus, shading, and large woody debris and allow room for lateral channel migration; preservation of wildlife corridors/crossings; impoundment removal; livestock exclusion; road crossing improvements; removal of invasive vegetation and restoration of appropriate native vegetation communities; removal of previously placed bank stabilization; removal of abandoned infrastructure; stream channel restoration of pattern, profile, and dimensions; in-stream habitat recovery; and reconnection of a stream with its floodplain. All restoration and/or enhancement measures should be designed with the goal of improving biological and morphological integrity, habitat, and water quality using the most passive, least invasive techniques available and appropriate.



**7. Location.** When practicable and environmentally sound, mitigation accomplished by any approved method should be at or near the project impact site and within the same local watershed. Distant or out-of-watershed compensatory mitigation may not be acceptable and will be approved on a case-by-case basis. Project impacts occurring on Indian Reservations should be offset with compensatory mitigation located in the watershed and within the Reservation boundary.

**8. Timing.** When it is practicable and feasible, mitigation should be completed prior to or concurrent with the adverse impacts. The preferred method is to complete mitigation prior to the commencement of the impacts. However, it is recognized that because of equipment utilization or other limitations, it may be necessary to perform the mitigation concurrent with the overall project. This is usually acceptable provided the time lag between the impacts and mitigation is minimized and the mitigation is completed within one growing season following commencement of the adverse impacts. Rationale should be provided for schedules showing less than 100% completion of the approved mitigation concurrent with completion of the permitted project. In the event compensatory mitigation occurs after project impacts, it is likely that additional mitigation will be needed to offset temporal losses of aquatic functions, services, and area.

**9. Maintenance.** Mitigation areas should be designed to be naturally sustaining following the completion of the mitigation work. Documentation should be provided to show sufficient hydrology is available since plans requiring an energy subsidy (pumping, intensive management, etc.) will normally not be approved. The goal is to achieve a self sustaining, natural state that does not depend upon maintenance. Proposed mitigation plans that require regular maintenance or other ongoing human inputs or management will generally be discouraged. Management and maintenance of the project will be subject to the requirements found in 33 CFR 332.7.

**10. Mitigation Bank and ILF Development.** Proposals for development of mitigation banks and ILF should be in compliance with 33 CFR 332.8. Proposals that include use of credits from a mitigation bank or ILF must normally comply with the requirements of this MTSMP as well as any conditions or restrictions applicable to the bank or ILF. To locate a bank or ILF in Montana, visit the Regulatory In-lieu Fee & Banking Information Tracking System (RIBITS) link on the Omaha District website at: <https://rsgisias.crrel.usace.army.mil/ribits/f?p=107:2:3234285039422058>, or contact the Montana Regulatory Program at phone (406) 441-1375.

**11. Stream Mitigation Costs.** All costs are the responsibility of the permittee (whether conducting the work or purchasing credits from a Corps approved bank or ILF). Financial assurances in the form of a bond or other similar binding document may be applied to assure funds will be available to complete mitigation (33 CFR 332.3n). For mitigation banks and ILF, actual cost per credit is determined by the sponsor and the client.

**12. Point of Contact.** Copies of this document will be made available on the Montana Regulatory Office website at: <http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/Montana.aspx>. Questions regarding use of this policy for specific projects must be addressed to the Project Manager handling the permit action. Other general inquiries or comments regarding this document may be addressed to:  
Todd Tillinger, Montana Regulatory Office, Subject: MTSMP, U.S. Army Corps of Engineers, Omaha District  
10 West 15<sup>th</sup> Street, Suite 2200, Helena, Montana, 59626-9705.

This document is subject to periodic review and modification.

This January 2013 version supersedes all previous versions.



## DEBIT AND CREDIT COMPUTATION TABLES

### I. Using the Equations and Data Forms

When compensatory mitigation is required, it will be determined by using the following equations. These calculations are not intended to represent an exact scientific method. Rather, they are intended to establish a clear, understandable, and consistent method to quantify stream debits and credits.

For a mitigation proposal to be acceptable, the **Proposed Mitigation Credits must be equal to or greater than the Impact Debits (Debits).**

**Note:** A spreadsheet is available to aid in the calculations for this procedure at:

<http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/Montana/Mitigation.aspx>

### IA. Adverse Impact (Debit) Tables

**Table I.1 Adverse Impacts (debit) Factors and Worksheet.** (Factors are defined in Section II)

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 I.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						
Stream Status						
Existing Condition						
Dominant Impact						
Cumulative Impact						
Location of Mitigation						
Comparative Stream Order of Mitigation Site						
Type of Legal Protection for Mitigation Site						
Sum of Factors ( $SF_i$ )						
Linear Feet Impact* ( $LF_i$ )						
Mitigation Timing						
$SF_i \times LF_i \times$ Mitigation Timing						

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

$$\text{Total Debits} = \Sigma (SF_i \times LF_i \times \text{Mitigation Timing}) = \underline{\hspace{10cm}}$$

## IB. Mitigation Credit 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 (SFm) a-j		0.00	0.00	0.00	0.00
Linear Feet Impact* (LF <sub>m</sub> )		0.00	0.00	0.00	0.00
SF <sub>m</sub> x LF <sub>m</sub>		0.00	0.00	0.00	0.00

$$\text{Total Riparian Credits} = \sum (\text{SFm} \times \text{LFm} \times \text{RM}) =$$

0.00

Note: Riparian areas set aside for mitigation credit are expected to remain permanently available for erosion by the stream, and the areas set aside will not be artificially stabilized or disconnected from their floodplain. Mitigation areas will be protected with either a real estate instrument or a permit condition or other means in accordance with 33 CFR 332. Protection through a permit condition is only acceptable when the applicant is the property owner. A site will not be accepted for mitigation credit without protection.

**Table I.6 Stream and Riparian Mitigation Summary Worksheet**

	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 or FALSE	Proposed Stream and Riparian Credits $\geq$ Debits (B $\geq$ A)
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## **II. Definition of Factors Used in Tables**

### **II.1 Adverse Impact (Debit) Factors**

#### **Stream Type**

Ephemeral streams are those that have a defined channel or multiple channels (bed and banks) but only have a discharge during or immediately after a precipitation event or snow melt.

Intermittent streams have a defined channel or channels that do not flow year round, but does have a discharge beyond periods of precipitation or snow melt.

Perennial streams have a defined channel or channels that flow all year except perhaps during periods of prolonged drought or human diversion or dewatering.

#### **Stream Status**

High Resource Value: These are stream and riverine systems that provide functions of recognized importance. **For purposes of this MTSMP primary waters include:**

- Waters receiving designation under the Wild and Scenic Rivers Act:  
<http://www.rivers.gov/rivers/mapping-gis.php>
- Waters fully supporting all beneficial uses: Water Quality Category 1 and 2. See the most current version of the Montana Department of Environmental Quality (DEQ) Integrated Water Quality Report. See Montana's Water Quality Assessment Data Base: County: Stream/Lake: Full Report at: <http://cwaic.mt.gov/query.aspx>
- Waters with outstanding Fisheries Resource Value as reported on the Montana Fisheries Information System. See Montana Fisheries Information System: County: Select water body from list: Fisheries Resource Values: <http://fwp.mt.gov/fishing/mFish/>
- Waters within Federal or State protected areas such as National Parks, State or Local Parks, designated Natural Areas or Wildlife Refuges, etc.
- Listed species critical habitat or core areas. For piping plover critical habitat see <http://www.fws.gov/mountain-prairie/species/birds/pipingplover/>. For Bull trout critical habitat see <http://www.fws.gov/pacific/bulltrout/CriticalHabitat.html>. For Bull trout core area waters see <http://www.nris.mt.us/interactive.asp>. See Montana Fisheries Information System: Fish Species: Bull Trout: Partial Report: Bull trout core/nodal water body list.



**Existing Condition** is a reflection of the functional state of a stream before any project impacts that would occur from an applicant's proposed project. This is a measure of the stream's natural stability and resilience relative to the physical, chemical and biological integrity of the system. Montana DEQ's impaired waters database (303(d) list: <http://cwaic.mt.gov/>) can be consulted to help determine the existing condition of many Montana streams.

#### Fully Functional

For this MTSMP, a fully functional stream is one that has not been channelized; has no culverts, pipes, impoundments, riprap or other manmade alterations within 0.5 river miles upstream or downstream; and riparian buffer is intact.

### Somewhat Impaired

For this MTSMP, a stream is considered somewhat impaired if less than 50% vegetated riparian buffer of deep-rooted or mat of vegetation is present, and/or culverts, pipes, impoundments, or other in-stream manmade structures occur within 0.5 miles upstream or downstream.

### Impaired

For this MTSMP, a stream is considered impaired if the reach has been channelized; has extensive human-induced sedimentation; and has little or no riparian vegetated buffer with deep-rooted vegetation and/or culverts, pipes, impoundments, or other in-stream manmade structures occur within 0.1 mile upstream or downstream.

**Dominant Impact** is the type of impact proposed that will diminish the functional integrity of the riparian system. Nine main categories of impact:

Fill refers to completely obstructing a stream channel with the placement of dredged or fill material.

Pipe refers to the routing or diversion of a stream through a pipe, culvert, tunnel, or other wholly enclosed conveyance for a distance greater than 150 feet.

Impound refers to activities which dam a stream or otherwise convert it to a pond or lake. Installation of a sediment control structure that modifies the stream to facilitate sediment control and/or storm water management is considered impoundment. Impoundment structures with headgates or other control structures that pass some flow are still impoundment structures.

Channelization refers to stream channel relocations that do not incorporate natural stream channel design principles into the design and construction of the new channel.

Morphologic refers to alterations of channel dimensions that disrupt the streams ability to transport water and bedload material.

Bank stabilization refers to the hardening of a bank in order to artificially arrest bank erosion and is broken down into the following categories for this procedure:

- 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.
- Rock riprap with incorporation of willow cuttings.
- Rock riprap with no incorporation of vegetation on bank.
- Combinations of bank riprap with vanes/barbs/weirs/hard points.
- Retaining Walls. Vertical or nearly vertical retaining walls constructed of gabion baskets, hand-placed stone, masonry, concrete, steel, wood, or other materials.

**Cumulative Impact** refers to the total linear feet of stream impacted by the project (use the appropriate multiplier x total length of impact areas). This factor is intended to capture the effect that more than one action may have on an aquatic resource (i.e., riprap may be proposed along several separate reaches of the same stream and the factor will result in an increase in debit responsibility).

 **Mitigation Timing** refers to the relative time when the mitigation will be performed in relation to when adverse impacts to aquatic resources will occur. All credit withdrawals associated with mitigation banks must be able to meet interim success criteria commensurate with the level of credit withdrawal. Related terms include:

#### **Schedule 1**

Permittee-Responsible Mitigation: all mitigation is done prior to the adverse impacts and success criteria have been met.

Mitigation Banks: bank is certified and has available credits.

#### **Schedule 2**

Permittee-Responsible Mitigation/ILF: mitigation is concurrent with the adverse impacts.

### Schedule 3

Permittee-Responsible Mitigation/ILF: 50% of the mitigation is done concurrent with the impacts and the remainder is done after the impacts.



**Location** is the relative proximity of the mitigation site to the impact site. For stream mitigation banks, the service area will be defined for the bank after an assessment of the banking proposal.

**On-site** means within ½ mile up or downstream of the impact, but still on the stream that is adversely impacted by an applicant's proposed project or within the primary service area of a mitigation bank.

**Off-site** means greater than ½ mile from the impact site. It must be within the watershed (8-digit HUC as mapped by USGS) or within the secondary service area of a mitigation bank.

**Outside Watershed** means the mitigation site is not within the same local or 8-digit HUC watershed as the adverse impacts, but still within the same Major Montana Watershed Basin (MMWB). See map on last page.  
**NOTE:** Mitigation outside the impacted stream's MMWB will not be acceptable.

**Comparative Stream Order** is the stream order of the mitigation site compared to the stream order of the impacted site. Stream order refers to the origin and location of a stream proceeding from the highest, uppermost headwater areas of a watershed to the lowermost streams. Stream order information is as follows:

**First Order** streams are those channels that are above the junction with another first order stream. Often these are referred as headwaters for a system.

**Second Order** streams are those channels that are formed by and begin at the junction of two first order streams.

**Third Order** streams are those channels that are formed by and begin at the junction of two second order streams.

**Greater Than Third Order** are those that include all fourth order or larger streams, each formed by the combining of another stream of equal or greater magnitude than third order.



**Type of Legal Protection** refers to the legally binding mechanism applied to ensure that land and aquatic resources offered for mitigation has long-term protection. Long-term protection may be provided through real estate instruments such as conservation easements held by entities such as federal, tribal, state, or local resource agencies, non-profit conservation organizations, or private land managers; the transfer of title to such entities; or by restrictive covenants. For government property, long-term protection may be provided through federal facility management plans or integrated natural resources management plans (33 CFR 332.7).

Five different types of restrictions are recognized, with varying levels of protection.

**Covenants** applies when there is a covenant enacted and enforced by a developer or property owner association for a given subdivision.

**Deed Restriction** applies when a private individual or property owners association attaches a restrictive covenant to the property deed. That entity holds a conservation easement on a mitigation site. A conservation easement granted to a qualified, experienced, non-profit conservation easement or government agency. The mitigation site is protected by a conservation easement held by a private individual or entity.

**Conservation Easement** applies when a qualified, experienced, non-profit conservation organization or a government agency holds a conservation easement for the mitigation site. The easement is enforceable by the easement holder.

**Fee Title** applies when a transfer of complete ownership to a qualified, experienced, non-profit conservation organization or government agency that will manage the area as a natural-functioning stream or wetland corridor.



## II.2. Credit Factors for Stream and Riparian Credits

**Buffer Width** is calculated by dividing the width of the riparian buffer by 100.

**Remove Disturbance to Riparian Buffer** credit can be generated by eliminating grazing, mowing, or agricultural activities that remove or prevent the establishment of riparian vegetation, compact soils, or leave a site vulnerable to accelerated erosion.

**Fence Around Buffer** credit can be generated with the addition of a physical barrier to prevent animals from grazing and adding nutrients to the stream channel.

**Re-Vegetate Riparian Buffer** credit can be generated by planting native riparian plants via seed, root stock, dormant cuttings, or combinations.

**Micro-topography in Floodplain** credit can be generated by adding “roughness” to a site that has been graded previously or to leave an area proposed for disturbance “rough” post disturbance.

**Addition of Woody Debris in Floodplain** credit can be generated by obtaining woody debris from an off channel source and placing it along the riparian area/floodplain to provide habitat in the floodplain, refugia during high flows, and channel complexity when it is reintroduced into the channel as a result of overbank flooding.

**Management of Invasive Species** credit can be generated by implementing appropriate techniques to reduce the spreading of invasive species specific to each particular mitigation site.

**Removal of Riprap** credit can be generated by removing riprap from out of the channel, below ordinary high water, and disposing of it in an upland location.

**Removal of Floodplain Fill-** credit can be generated by the removal of berms or other obstructions that prevent the stream channel from activating its floodplain and/or to remove impervious materials such as roads or parking lots which impair floodplain functions.

**Removal of Fish Passage Barriers and Other Habitat or Water Quality Improvements-** Credit for the restoration of in-stream flow through the acquisition of water leases, removal of fish barriers, including culverts and culvert upgrades, the placement of in-stream habitat features, specific measures to reduce or eliminate pollutants, and the addition of fish screens on intakes or headgates will be determined on a case by case basis.

Check all of the applicable factors from Table I.5 and add them to get the sum of factors for each side of the stream channel and multiply sum of factors by the length of stream mitigation.