Omaha District

MONTANA STREAM MITIGATION PROCEDURE (MTSMP)
- May 2010 -

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This document is subject to periodic review and modification. The policies and regulations regarding mitigation can change and it is possible that new guidance will result in periodic modifications to this Stream Mitigation Procedure.

GENERAL INFORMATION

1. Applicability. The practice of using compensatory mitigation to ensure minimal adverse individual and cumulative adverse effects is an important component of the Corps Regulatory Program. The Corps considers mitigation when evaluating potential individual and cumulative adverse impacts that may be authorized by Department of Army Permits, including Nationwide and Individual Permits. This document defines the compensatory Stream Mitigation Procedure within the state of Montana (MTSMP). It describes the method for quantifying the adverse impacts (debits) and the acceptable compensatory mitigation (credits) in relation to a project that would result in more than minimal adverse impacts to a stream. It is applicable to Corps regulatory actions requiring compensatory mitigation for adverse ecological effects where more rigorous, detailed functional assessment techniques such as the Hydrogeomorphic (HGM) methodology, are not considered practical or necessary. The following points are noted.

- All types of stream systems (ephemeral, intermittent or perennial) can be evaluated under this MTSMP. Impacts to streams are calculated based upon the type of impact in combination with overall linear footage, ultimately defined as "debits".

- For impacts to streams where impacts extend to adjacent or neighboring wetlands, this MTSMP will be used to calculate mitigation for the stream and the Helena Regulatory Office-Montana Ratios (2005) will be used to calculate wetland mitigation on an acreage basis for the wetland impacts. Some projects may require both stream and wetland mitigation to offset adverse impacts. Functional assessment tools could be applied on a case-by-case basis for wetlands.

- This MTSMP can be used to compensate for the loss of riffle-pool complexes, a type of Special Aquatic Site found in streams.

- Not all projects will require mitigation, as noted herein (Section 3 on Page 3 of General Information and as described in more detail in Appendix D).

- This MTSMP does not affect sequencing (e.g., avoidance, minimization, reduction) or any requirements of the 404(b)(1) Guidelines or other applicable documentation. Such requirements shall be evaluated during consideration of permit applications.

- This MTSMP was developed in coordination with State and Federal agencies to enhance its effectiveness and acceptability. When this MTSMP is used in the establishment of a mitigation bank, the Army Corps of Engineers (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 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 stream mitigation options can be considered in place of this procedure if they make sense in the watershed context, 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 such as the Upper Yellowstone River's Special Area Management Plan (SAMP).

2. Purpose. The intent of this MTSMP is to provide a basic written framework that will provide predictability and consistency for the development, review, and approval of compensatory stream mitigation plans. **This procedure does not change the need or type of mitigation required.** A key element of this MTSMP is the establishment of a method for calculating compensatory mitigation debits and credits. While this method is not intended for use as project design criteria, appropriate application of the method should minimize uncertainty in the development and approval of mitigation plans and allow expeditious review of applications.

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

3. Projects Not Requiring Mitigation. Due to minimal or no adverse impacts to aquatic resources, no compensatory mitigation may be necessary for certain types and/or sizes of projects. Projects less than 150 linear feet will not normally require compensatory mitigation, nor will approved stream restoration projects of any length. Projects between 150 and 300 feet in length will require mitigation on a case-specific basis. Projects that result in more than 300 linear feet of impact will usually require compensatory mitigation. Section 323.4 of the Federal Clean Water Act (33 CFR Parts 320-330) lists specific types of activities that are exempt from regulation. A more comprehensive discussion of projects not requiring mitigation is provided in Appendix D. Also listed are descriptions of activities that are regulated, but because of their minimal or nominal impact to aquatic resources, will not require mitigation.

4. Corps Regulatory Policy on Stream Mitigation. This MTSMP was developed from other Corps District and ERDC procedures that have been in effect for several years. The intent for this MTSMP is to comply with the requirements for mitigation found in 33 CFR Parts 320 and 332. In case of conflict, the above mentioned ruling shall override this document.

If a discrepancy is discovered and it appears in conflict with any relevant Corps regulation or policy, users should immediately notify the Corps of the discrepancy and the Corps will review relevant policy, obtain clarification, and modify the MTSMP as necessary.

5. 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, or other adverse actions. For bank stabilization projects, impacts include the entire length of the bank being protected not just the footprint of the structure or revetment. Other categories of effects such as aesthetic, cultural, historic, health, etc., are included in the Corps assessment of the project, but are not addressed by this document, which is limited to physical, chemical, and biological impacts to stream channels. For the purposes of this section, the terms 'effects' or 'impacts' includes:

- Direct effects, which are caused by the action and occur at the same time and place.
- Indirect effects, which are caused by the action that are later in time or farther removed in distance, but are still reasonably foreseeable.

6. Mitigation.

6.1. Objectives. 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**.

Resource and regulatory agencies have adopted this definition to apply in a sequential manner. Applicants must first demonstrate they have avoided, minimized and have reduced potential adverse impacts to the aquatic resource before compensatory mitigation is considered.

The goal of compensatory mitigation shall be the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. The Corps will assess the likelihood for ecological success and the location of the mitigation relative to the impact site and the significance within the watershed.

6.2. 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: stream channel restoration; stream relocations; in-stream habitat recovery; impoundment removal; livestock exclusion; road crossing improvements; establishment of natural buffers; acquisition of wildlife corridors/crossings; creation of flood plains; removal of invasive vegetation and restoration of appropriate vegetation communities; and other improvements.

In some cases, riparian preservation or enhancement may be the most effective or appropriate means of stream mitigation. All restoration and/or enhancement measures should be designed with the goal of improving biological and morphological integrity, habitat, and water quality.

6.2.1. Stream Channel Restoration.

A number of factors can change the natural stability and function of streams including changes in stream flow, sediment regime, land use within the watershed, and direct anthropogenic disturbances such as channelization, culverts, bridges and loss of bank stabilizing riparian vegetation (Rosgen, 1996). Restoration of natural stream function and stable form may require careful study by experts trained in stream geomorphology. It may involve;

- Changing channel width,
- Bank stabilization measures,
- Flow modification,
- Grade control,
- Stream routing changes to increase/decrease sinuosity and/or
- Other measures to appropriately handle stream energy and reconnect the stream with its floodplain.

It may entail basic changes to the stream's dimension, pattern and profile, consistency with stream type and valley slope, to re-establish stability. Reference reach data from a stream or stream(s) of the same target stream type (Rosgen, 1996) and from the same ecoregion should serve as a template for the design of the dimensions, pattern, profile, bed material and erosional processes of the stream targeted for restoration. It is important to develop restoration plans in consultation with appropriate resource and regulatory agencies.

If buffers are not possible on an otherwise acceptable mitigation project, the Net Improvement Factor score will be adjusted accordingly on a pro-rated basis.

6.2.2. Stream Relocations.
This refers to relocating a stream to allow a project authorized under Section 404 of the Clean Water Act to be constructed in the stream's former location. In some cases the Corps may allow credit for some stream relocations. To qualify for mitigation credit, relocated streams need to reflect the dimension, pattern and profile of natural, referenced stable conditions and have at least a 50' native riparian buffer from each bank of the stream. Protection of the relocated stream and buffers through appropriate long term mechanisms (permit conditions, restrictive covenants, deed restrictions, conservation easements or transfer in fee title to a conservation entity) is required to obtain stream relocation credits.

No mitigation credit can be generated for relocated streams that do not meet the above criteria, projects that rely on extensive use of bank stabilization or artificial grade control for stability, or projects that do not incorporate natural channel design and/or stream simulation principles.

6.2.3 Bank Modifications.
Bank stabilization can be accomplished using a variety of techniques. Techniques utilizing natural materials that mimic appropriate stream morphology and in-stream features that allow a "natural" rate of bank erosion are preferred over those requiring the use of concrete, stone, rubble or other materials (bank stabilization) that may result in "locking" a naturally meandering channel into an inflexible pattern.

Structures such as vanes, barbs, stone revetments, bendway weirs, root wad complexes, drop structures, check dams or engineered log jams that incorporate significant amounts of rock or other non-native or inappropriate materials into their composition and that are intended to reduce energy at the bank interface may not be compatible with a maintaining a changing but balanced morphology. Installation of these types of bank stabilization features may be more acceptable in some stream types such as Rosgen "a" or "b" channels than others such as Rosgen "c" or "e" channels. See page 42.

Bank stabilization intended to halt or severely reduce bank erosion is an adverse effect on alluvial rivers. It is important to note that localized bank stabilization along an unstable channel might not address a more complex systemic instability problem. Bank stability based upon establishing proper channel morphology, erosional and deposition rates, meander patterns, and riparian vegetation should be emphasized. Measures that emphasize bank shaping/sloping, use of vegetation and riparian management are encouraged and will receive more credit. Specific performance standards can and may be developed for any given project.

6.2.4. In-Stream Habitat Recovery.
In-stream habitat recovery is controlled by factors such as stream flow, channel structure, vegetative cover, water quality and condition of riparian corridors. Generally, to improve in-stream habitat, proposals including work such as riparian management, restoration of appropriate native vegetation, restoration of pool and riffle habitat, and restoration of woody debris in channels where appropriate are encouraged.

For the purposes of this program, most man-made structures such as vanes, weirs, etc. are generally considered less desirable because periodic maintenance is often involved. Project designs should mimic natural features to the greatest extent practicable. Stable stream channels normally provide adequate habitat and caution is needed to ensure that proposed fish habitat structures such as rock/log vanes, cross-vanes, check dams and weir structures do not upset natural stream processes or improve one type of habitat at the expense of another. In-stream structure proposals shall require a full morphological analysis to ensure that they do not alter the appropriate dimension, pattern, and profile for the stream type.

In addition, differing stream types may be incompatible with certain prescribed habitat structures (Rosgen, 1996). Where man-made structures are deemed beneficial, periodic maintenance may be necessary and should be incorporated into project's long term plans. As previously stated, not every channel restoration is suitable for vanes, grade control, or other structures.

6.2.5. Impoundment Removal.
Beaver dams are sometimes key beneficial ecological components of stream and river systems, but dams constructed by people tend to have long-term adverse effects. Removal of dams constructed by people for a variety of reasons is another acceptable form of stream restoration. Dams constructed by people may adversely affect and fragment stream systems by altering or preventing the movement of aquatic organisms, water, sediment, organic matter, and nutrients. This can result in physical and biological alterations in tailwaters, downstream riparian zones, and upstream of the impoundment. Dam removal and subsequent channel restoration, if done properly, can restore a stream to its natural condition. However, without sufficient evaluation, dam removal may result in bed and bank instability and increased sediment loads. These impacts will occur until the stream reaches a state of dynamic equilibrium.

Important elements to consider when doing dam removal include restoring fish passage, sediment contamination, re-vegetating the reservoir area, and long term monitoring of sediment transfer, water quality, stream channel morphology and general aquatic ecology.

6.2.6. *Livestock Exclusion*.
Where a documented problem exists, fencing and reduced grazing may be measures that can be used to manage livestock along streams thereby avoiding bank degradation, sedimentation, and water quality problems. Livestock management is normally accomplished by fencing stream corridors and can include the construction of stream crossings with controlled access and stable, protected stream banks. Tank systems that provide off-stream livestock water is another management feature that would provide stream mitigation.

Highest credits will be given for total exclusion of livestock in areas that are highly impacted. Measures credited for mitigation purposes must be maintained with long term protection, or as long as there is active livestock use on adjacent lands.

6.2.7. Road Crossing Improvements.
To generate stream mitigation credit, natural channel design and stream simulation principles should be used when designing new or improved road, path, and railroad crossings. Crossing improvements can, when constructed properly, provide improvements to natural flow regimes by preventing scour and ponding and by connecting natural floodplains. Measures considered improvements include, but are not limited to: removal of culverts and bridges or replacing them with one that allows formation and creation of proper dimension/pattern/profiles; providing relief culverts or bridges in road beds that would otherwise act as floodplain restrictions; and resetting or resizing culverts which block aquatic organism passage and interfere with stream processes. It should be noted that removal of culverts could also result in instability of the stream channel.

6.2.8. Establishment of Buffers.
Natural buffers provide functions such as surface run-off filtration, bank stabilization, stream shade, wildlife corridors, and contribution of woody debris and detritus. Buffer enhancement can be accomplished by re-vegetating with appropriate native riparian species and/or removal of exotic undesireables such as Russian olive, tamarisk, and possibly reed canary grass. Streams typically require additional buffer protection in comparison to wetlands. For purposes of getting buffer enhancement credit, buffer widths should be a minimum width of 50 feet or more depending on

slope. Buffer zones can include aquatic and/or upland resources that can be preserved as is or enhanced for additional credits. One function buffers set aside for credit are intended to provide is to serve as sacrificial zones available for erosion or sloughing. Erosion of buffer areas is expected and will generally be acceptable.

6.2.9. Acquisition of Wildlife Corridors/Crossings.
Acquisition, creation or restoration of critical wildlife corridors or crossings that would develop or connect corridors between streams and riparian areas could also be considered and accepted as mitigation.

6.2.10. Creation of Floodplains.
In some instances, natural or anthropogenic activities have severed or can result in severing the floodplain from the active stream channel. The result can be channel incisement, increased bed and bank erosion, lowering of the water table, reduced productivity in the riparian area and similar effects. Measures that result in re-establishment/creation and/or hydrologic re-connection of the floodplain in relation to a bankfull discharge are normally considered beneficial and will receive credit under this program. The floodplain may be upland, wetland or a combination thereof.

6.2.11. Other Improvements.
The Corps, in consultation with other resource and regulatory agencies, will determine on a case-by-case basis the net benefit to the watershed of mitigation actions that do not involve direct manipulation of a length of stream and/or its riparian buffers. These may include actions such as retrofitting storm water detention facilities, construction of off-channel storm water detention facilities in areas where runoff is accelerating stream bank erosion and other watershed protection practices.

6.3. Mitigation Area.
In general, the adverse impacts and compensatory mitigation are geographically distinct areas. The aquatic area in which the adverse effects occur will generally not be given credits as part of the compensatory mitigation area. For example, an impoundment of a riverine system with a resulting increase in open surface water area or wetland fringe is not considered compensatory mitigation for the adverse impacts to the impounded riverine system. Incorporation of a mitigating design feature such as a riparian planting bench in a revetment is an example of an exception to this general rule.

A compensatory mitigation area may not be given credits under more than one mitigation category nor credited more than once under any category. However, it is acceptable to subdivide a given area into sub- areas and calculate credits for each sub-area separately. For example, a restored aquatic area donated to a conservancy organization may be credited as either restoration or preservation but not both. An aquatic area that is enhanced by improving hydrology and by buffering should be given one net enhancement credit calculation, not separate credits for both types of enhancement. An aquatic area that contains some restoration and some enhancement could be subdivided into a restoration area component and an enhancement area component, or the entire area could be combined together and given one net enhancement/restoration credit calculation. Whether or not an area is subdivided or combined for the purpose of credit calculations is a case-by-case decision based on what is reasonable and appropriate for the given mitigation proposal.

6.4. Buffer Zones.
Buffers adjacent to aquatic areas help maintain the biological, chemical and physical integrity. The relative importance of such buffers will depend upon a number of variables including the buffer width and condition, adjacent land uses and wildlife habitat requirements. Vegetated riparian buffers often provide the only filtering of surface runoff before it enters into streams. Buffer zones

may be comprised of uplands, with or without aquatic components but the goal should be to provide a buffer that contains a mixture of riparian and upland areas. Buffer areas do not need to be jurisdictional to be included in the mitigation.

6.5. Restoration/Enhancement.
Restored and enhanced mitigation sites must be protected long-term by permit conditions, easements, deed restrictions, or similar legal encumbrances. More credit can be awarded for projects providing longer-term and more robust protections. Proposed restoration/enhancement plans must include the following additional information.

- An explanation of what functions are being restored/enhanced and to what degree.
- A narrative description of how the restoration/enhancement will be accomplished.
- A narrative description of how the buffer will protect specific functions and/or resources.

6.6. Lakes, Ponds, and Impoundments.
Mitigation using lakes, ponds, and impoundments may be allowed as compensation for impacts to similar water bodies. Mitigation using lakes, ponds, or impoundments will generally not be acceptable as compensatory mitigation for adverse impacts to wetlands or riverine systems.

6.7. Location.
When practicable and environmentally sound, mitigation should be at or near the project impact site and within the same local watershed. Mitigation that fails to meet this standard will result in a lower credit calculation due to the kind and location factors. Distant or out-of-watershed compensatory mitigation may not be acceptable and must be approved on a case-by-case basis. Project impacts occurring on Indian Reservations should be offset in the watershed and within the Reservation boundary.

6.8 Timing.
When practicable and feasible, mitigation should be completed prior to or concurrent with the adverse impacts. Sometimes this may be a requirement of the Corps permit or of a related Section 401 Water Quality Certification. The preferred method is to complete mitigation prior to the commencement of the impacts. However, it is recognized that because of equipment utilization 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. A temporal lag factor is already included in the credit calculations to help account for the time lag in functional replacement which is considered minimal. Lag time in mitigation project construction is inherent and may be acceptable for In-Lieu Fee programs and some umbrella mitigation banks due to the nature of those mitigation alternatives.

6.9. Maintenance
Mitigation areas should be designed to be naturally sustaining following the completion of the mitigation. Diligence should be taken to show hydrology is adequately considered since plans requiring an energy subsidy (pumping, intensive management, etc.) will normally not be acceptable. The goal is to achieve a natural state that does not depend upon maintenance. Proposed mitigation plans that require extensive maintenance or other substantial 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.

6.10. Consultation
To minimize delays and objections during the permit review process, applicants are encouraged to seek the advice of resource and regulatory agencies during the planning and design of mitigation plans. For complex mitigation projects, such consultation may improve the likelihood of mitigation success and reduce permit-processing time.

***7.* Mitigation Options.** In general, there are four major categories available to an applicant to implement compensatory mitigation (wetland or stream). The Corps will reply on 33 CFR 332.3 when considering appropriate mitigation. The first option for an applicant is to purchase credits from an appropriate mitigation bank or from umbrella mitigation (if available). The second option is to purchase credits from an approved in-lieu-fee sponsor. The third option is permittee-responsible mitigation which can be broken down into 3 sub-categories. The fourth option is a combination of some or all of the above options that collectively satisfy the mitigation requirements.

A. Mitigation Bank Credits: The applicant may elect to purchase 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. The bank and its available credits must be pre-approved by the Corps and the Interagency Review Team (IRT).

Benefits for considering a bank include utilizing timing schedule 1 or 2 (0.1 or 0.08 modifier) and the bank assumes responsibility for the entire mitigation obligation upon acceptance of the fee and adequate notification to the Corps. Note that umbrella mitigation banks provide after-the-fact credits if they have not yet begun construction. See page 23.

B. In-Lieu Fee credits: The applicant may elect to pay a fee to an ILF sponsor who will construct the mitigation site concurrent or after impacts have occurred. The ILF plan and its available credits must be pre-approved by the Corps and the ILF's IRT.

Fees will be calculated based on a pre-certified credit basis and timing schedule 3, 4, or 5 (0.05, 0.02, and 0 modifiers). The ILF sponsor assumes responsibility for the entire mitigation obligation upon acceptance of the fee and adequate notification to the Corps. Upon collection of sufficient fees within a given watershed, the ILF sponsor will complete a stream mitigation project that satisfies the assumed mitigation obligation.

C. 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. These 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

D. Combination of above: With Corps' approval, the above options may be combined to satisfy a compensatory mitigation obligation.

8. Variance/Approval. In unusual instances, it may be determined by the Corps that the calculated mitigation is not appropriate (too high or too low) based upon 404(b)(1) Guidelines, analysis or public interest review factors, threatened and endangered species concerns, or hazardous waste cleanup. In the event it is determined that calculated mitigation is inappropriate for the identified adverse impacts, the Corps will consult with relevant agencies and determine an appropriate level of mitigation. The calculated mitigation will still be used as a baseline and rationale for a variance will be documented in writing in the Corps records.

9. Mitigation Banking. Proposals for mitigation banks should be in compliance with 33 CFR 332.8. Proposals that include use of credits from a mitigation bank must normally comply with the requirements of this MTSMP as well as any conditions or restrictions applicable to the bank. To locate a bank in Montana visit the Regional Internet Bank Information Tracking System (RIBITS) link on the Omaha District website https://www.nwo.usace.army.mil/html/op-r/mitbnk.htm, or contact the Montana Regulatory Program at phone (406) 441-1375.

10. Stream Mitigation Costs. Costs for mitigation are dependent upon a combination of relatively specific costs for design, construction, monitoring and contingencies, and maintenance. All costs are the responsibility of the applicant (whether conducting the work or purchasing credits from a Corps approved bank). Financial assurances in the form of a bond or other similar binding document can and may be applied to assure funds will be available to complete mitigation (33 CFR 332.3n).

Other less readily definable costs associated with banks and an ILF program include those for securing real estate instruments (easement, fee title, title search, covenants, enforcement protection, administration, etc.) and overall management of an ILF program. For mitigation banks, actual cost per credit is determined by the sponsor and the client.

11. Point of Contact. Copies of this document will be made available on the Montana Regulatory Office website at: http://www.nwo.usace.army.mil/html/od-rmt/mthome.htm. 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
U. S. Army Corps of Engineers, Omaha District
10 West 15th Street, Suite 2200 Helena, Montana, 59626
Subject: MTSMP

This May 2010 version supersedes all previous versions.

DEBIT AND CREDIT COMPUTATIONS

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, it is intended to establish a clear, understandable, and consistent method for use by applicants and regulators

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

The Debits and PMC are each a summation of factors and multipliers.

Note: Subscript i indicates "impacts" and Subscript m indicates "mitigation"

DEBIT WORKSHEET		**PMC WORKSHEETS**	
Impact Area	The term 'area' is used to bind the resource being proposed for impacts by the type of impact (example: dam, impoundment, piping)	Mitigation Reach:	The term 'reach' refers to the portion of a channel that is being proposed for mitigation that has the same improvement factors
Sum of factors (SF_i):	Summation of all factors used to determine impacts (Stream type, stream status, existing condition, duration, dominant impact and collective impact length)	Sum of Factors (SF_m):	For each reach a summation of factors (Net improvement, stream status, Type of Protection, mitigation timing, comparative stream order, and location)
Linear feet impact (LF_i)	Actual linear foot for each area by type of impact.	Linear Feet (LF_m):	Actual linear foot for each reach by type of mitigation.
SF_i x LF_i	Sum of Factors x linear feet of impact	Reach Multiplier (RM):	Multiplier for mitigation being completed on one bank (0.75) or both banks (1.25) of the reach.
Total Debits:	Combining all areas' debit scores into one overall project score.	SF_m x LF_m x RM:	Sum of Factors x Linear feet x Reach multiplier
		Total (proposed) credits:	Summation of all proposed reach scores into one overall mitigation score.

It would be helpful to have Section II (factor definitions) readily available when going through the tables.

Note: A spreadsheet (MTSMP_Calcbook2010.xls) containing the equations is available to aid in the calculations for this procedure.

STEP 1: For each project (designated assessment) area, record the appropriate multiplier for each of the factors in Table I.1. This may take a combination of off-site and field work to complete.

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 18)	Ephemeral 0.2	Intermittent 0.3	>2nd Order Perennial 0.6	1st or 2nd Order Perennial 0.8					
Stream Status (Pg 18)	Tertiary 0.1	Secondary 0.3	Primary 0.6						
Existing Condition (Pg 19)	Impaired 0.1	Somewhat Impaired 0.75	Fully Functional 1.5						
Duration (Pg 19)	Temporary (<12 months) 0.0	Short Term (12-24 months) 0.1	Permanent (>24 months) 0.3						
Dominant Impact (Pg 20)	Shade Clear 0.05	Utility Crossing 0.15	Bank Stabilization* See table I.2 below	Culvert 0.3	Detention /Weir 0.75	Morphologic 1.5	Impound 2.0	Pipe 2.2	Fill 2.5
Collective Impact (Pg 21)	0.0005 x linear feet of stream impacted by this dominant impact.								

Note: The collective impact factor for the overall project must be used in each reach column on the Total Debits Worksheet below.

Table I.2 Bank Stabilization Multipliers

Multiplier	Description For Bank Stabilization (Dominant Impact)
0.1	Vegetation only. (End result is a living herbaceous, woody, or mixed plant community. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.2	Vegetation combined with dead woody material. (End result is a living herbaceous, woody, or mixed plant community with a less than 50% dead wood component in the toe and/or bank. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.3	Vegetation above the Ordinary High Water Mark (OHWM) combined with either a rock Toe or 50%+ dead wood at or below OHWM. (End result is a living herbaceous, woody, or mixed plant community above the OHWM and rock or dead wood at or below the OHWM. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.4	Rock riprap above and below the OHWM, and any type of vanes/barbs/weirs/hard points that project into the channel. (End result is little or no vegetation on bank for rock riprap revetments, or an eroding bankline protected by one or more vanes/barbs/weirs/hard points/etc.)
0.5	Log Cribs, or combinations of bank riprap with vanes/barbs/weirs/hard points. (Log crib structures filled with soil, plants, and/or rock extending below and/or above the OHWM, or projects using vanes/barbs/weirs/hard points that also include a rock riprap revetment or toe along the bank)
0.7	Retaining Walls. (Vertical or nearly vertical retaining walls constructed of gabion baskets, hand-placed stone, masonry, concrete, steel, wood, or other materials.)

STEP 2: Take the multipliers from Table I.1 and record for each project area. Calculate SF_i, LF_i, and SF_i x LF_i to determine total debits.

Table I.3 Total 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						
	Duration						
	Dominant Impact						
	Collective Impact						
Sum of Factors (SF_i)							
Linear Feet Impact* (LF_i)							
SF_i X LF_i							

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

Total Debits = Σ (SF_i X LF_i) = _____

Note: Some projects (including maintenance) or parts of projects less than 300 ft in length may not require compensatory mitigation; in those cases where mitigation is not required by the Corps, those impacts should not be included on the Total Debits Worksheet.

IB. Mitigation Credit Tables

IB.1 Riparian zone Credits.

Riparian areas set aside for mitigation credit are expected to remain available for erosion by the stream, and that the areas set aside will not be artificially stabilized or protected from flooding. Densely vegetated riparian zones are essential to stream system function, channel stability and maintenance of water quality and in-stream habitat. Credits may be obtained for enhancing buffers by re-vegetating riparian zones adjacent to the stream or by removing invasive species which would allow for a more appropriate native species community. Note that streams which are recognizably unstable and require major stream channel or bank restoration are not considered candidate streams for solely buffer enhancement credit. To qualify for enhancement credit, all buffers and their associated streams and banks must have long-term protection through restrictive covenants, conservation easements or transfer in fee title to a conservation entity. Steps below help to determine the amount of credits that could be obtained from enhancing riparian zone within the buffer. In areas covered by a Special Area Management Plan, there may be separate and/or additional mitigation requirements or procedures.

STEP 3: Use the table I.4 to determine the minimum width for your proposed riparian zone credit using existing adjacent land use and percent slope. See calculation worksheet for conversion of ft² to acres (43,560 ft² = 1 acre).

Table 1.4 Minimum Stream Riparian Zone widths for Mitigation

Land Use (in feet)	Less than 5% slope (1x)	5% - 20% slope (2x)	21% -40% slope (3x)	Greater than 40% slope (4x)
Residential	50	100	150	200
Agricultural - Grazing lands/ non cultivated	50	100	150	200
Recreational	75	150	225	300
Institutional / Agricultural-cultivated	75	150	225	300
Industrial	100	200	300	400
Landfill	100	200	300	400
Other Categories (including use of reference reach data)	Case-by-case	Case-by-case	Case-by-case	Case-by-case

Note: Slope is measured from top of bank perpendicular away from the stream for a distance of 200 feet. In most instances slope may be averaged for the length of stream to be buffered. However, in situations where stream segments have definitively different slopes it may be appropriate to calculate average slopes for each stream segment.

STEP 4: Determine Stream Status for each reach that will be buffered by using the definitions in Section II (page 18). Buffer width and stream status now determined.

Table I.5 Net Improvement For Riparian Buffers

Stream Status (Pg 18)	**Buffer Width (1side)**	**91-100% Area* to be restored**	**61-90% Area* to be restored**	**33-60% Area* to be Restored**	**1-32% Area* to be restored**	**No Restoration Needed****
Primary	4x min width	1.0	0.9	0.8	0.7	0.6
	3x min. width	0.8	0.7	0.6	0.5	0.4
	2x min. width	0.6	0.55	0.5	0.4	0.3
	Minimum Width	0.4	0.3	0.25	0.2	0.15
Secondary	4x min width	0.95	0.85	0.75	0.65	0.55
	3x min. width	0.75	0.65	0.55	0.45	0.35
	2x min. width	0.55	0.45	0.4	0.35	0.25
	Minimum Width	0.3	0.25	0.2	0.15	0.1
Tertiary	4x min width	0.8	0.7	0.6	0.5	0.4
	3x min. width	0.65	0.6	0.5	0.4	0.3
	2x min. width	0.5	0.45	0.4	0.3	0.2
	Minimum Width	0.25	0.2	0.15	0.1	0.05

***** 'Area' refers to the total riparian buffer width being used in the proposed mitigation (restored and protected).

****** "No Restoration Needed" refers to areas of buffer that have an established riparian corridor or will mature into native riparian area without active restoration. To be eligible for credits, long-term protection of restored and/or intact, naturally forested riparian zones through restrictive covenants, conservation easements or transfer in fee title to a conservation entity is required.

STEP 5: Determine the percentage of area to be restored for each side of the stream reaches independently utilizing Table 1.5. This multiplier will be used for the Net Improvement Factor in Table I.6.

NOTE: Credits may not be given for riparian widths deemed excessive to providing benefits to the aquatic system. If both sides of the stream are owned or could reasonably be obtained by the applicant, buffering of both sides of the stream is recommended. Streams that are unstable and require major stream channel or bank restoration is not considered candidate streams for solely buffer enhancement credit.

STEP 6: Use net improvements previously calculated in Step 5 to insert in the table I.6 below. Net improvements should be calculated independently for each side of a single reach of stream. Finish determining the multipliers for each factor.

Table I.6 Riparian Credit Factors Worksheet

FACTORS	**MULTIPLIERS**				
Net Improvement (Pg 21)	Riparian Buffer Enhancement **(step 5)** (Calculate value from above Net Improvement table) 0.05 – 1.0				
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.12	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	Same Order 0.2	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg 23)	On-site 0.2	Off-site 0.1	Outside 0.0		

*Use this option to calculate credits when no restoration of buffer necessary

STEP 7: Take the multiplier data from Table I.6 and record for each reach. Calculate SF_m, LF_m and RM then SF_m x LF_m x RM to determine total riparian credits in Table I.7. (It doesn't matter which bank side is A or B as long as it's consistent throughout the procedure.)

Table I.7 Total Riparian Credits Worksheet

FACTORS			**Mitigation Reach 1**	**Mitigation Reach 2**	**Mitigation Reach 3**	**Mitigation Reach 4**	**Mitigation Reach 5**
	Net Improvement	Stream Side A					
	Net Improvement	Stream Side B					
	Type of Protection						
	Mitigation Timing						
	Comparative Stream Order						
	Location						
Sum of Factors (SF_m)							
Linear Feet Impact* (LF_m)							
Reach Multiplier (RM) Buffer 1 side = 0.75 Buffer both sides = 1.25							
SF_m x LF_m x RM							

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

IC. Stream Restoration Credits

STEP 8: Determine correct multiplier for each of the factors in Table I.8 for each reach

Table I.8 Stream Restoration Credit Factors Worksheet

FACTORS	MULTIPLIERS				
Net Improvement (Pg 21)	Minimal 1.2	Moderate 1.8	Substantial 2.5		
Stream Status (Pg 18)	Tertiary 0.05	Secondary 0.2	Primary 0.3		
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.1	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	Same Order 0.2	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg 23)	On-site 0.2	Off-site 0.1	Outside 0.0		

STEP 9: Take the multiplier data from Table I.8 and record for each reach. Calculate SF_m, LF_m then SF_m x LF_m to determine stream credits.

Table I.9 Stream Restoration Credit Worksheet

Factors	Mitigation Reach 1	Mitigation Reach 2	Mitigation Reach 3	Mitigation Reach 4	Mitigation Reach 5
Net Improvement					
Stream Status					
Type of Protection					
Mitigation Timing					
Comparative Stream Order					
Location					
Sum of Factors (SF_m)					
Linear Feet (LF_m)					
SF_m x LF_m =					

Total Stream Credits = Σ (SF_m x LF_m) = _____

STEP 10: Using the Table I.10 record debits and credits and determine if PMC ≥ Debits

Table I.10 Stream and Riparian Mitigation Summary Worksheet

		Total Debits	Debits	Linear Ft
	A			
		Mitigation Banking Credit Summary	**Credit**	**Linear Ft**
	B	Riparian zone/Buffer Enhancement		
	C	Stream Restoration		
	D	Total Proposed Bank Mitigation = B + C		
		In-Lieu Fee Credit Summary	**Credit**	**Linear Ft**
	E	Riparian zone/Buffer Enhancement		
	F	Stream Restoration		
	G	Total Proposed ILF Mitigation = E + F		
		Permittee-responsible Credit Summary	**Credit**	**Linear Ft**
	H	Riparian zone/Buffer Enhancement		
	I	Stream Restoration		
	J	Total Proposed Permittee-responsible Mitigation = H + I		
		Credit Grand Totals	**Credit**	**Linear Ft**
	K	Total Riparian Enhancement Mitigation = B+E H		
	L	Total Stream Restoration Mitigation = C + F + I		
	M	Total Proposed Mitigation = D + G + J		

Proposed Mitigation Credits $\geq$ Debits ($M \geq A$)	True or False

II. Definition of Factors Used in Tables and Data forms.

II.1 Adverse Impact (Debit) Factors

Stream Type. For purposes of this MTSMP, three major categories of streams are defined, ephemeral, intermittent, and perennial.

Ephemeral streams are those that have a defined channel (bed and bank) but only have a discharge during or after a precipitation event. Flow is not sustained by groundwater at any time of year. The flow consists of runoff from recent precipitation or snowmelt events and flow for only a short time afterwards. The bed of the stream is above the groundwater at all seasons.

Intermittent streams have a defined channel that does not flow year round, but does have a discharge beyond periods of precipitation. The stream flows steadily when the groundwater is above the level of the streambed but it becomes a losing stream in the dry season, when the groundwater sinks below the streambed. For the purposes of this MTSMP, an intermittent stream includes that portion of a perennial stream that goes underground through a reach where there is a large mass of alluvial material and resurfaces again downstream within a defined channel.

Perennial streams have a defined channel that flows all year except perhaps during periods of prolonged drought or human diversion or dewatering. The groundwater remains above the level of the streambed and may be the only source of water for the stream when there is no precipitation or surface runoff.

Comparative Stream Order. The stream order of the mitigation site is 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 (ephemeral, intermittent or perennial) 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 (ephemeral, intermittent or perennial) channels that are formed by and begin at the junction of two first order streams.
Third Order streams are those (ephemeral, intermittent or perennial) 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.

Stream Status. These are stream and riverine systems (including associated tributaries) that provide functions of recognized importance. They may be systems that also have a high social, cultural, or economic value component.

Primary Waters**:** These areas provide important contributions to biodiversity on an ecosystem scale or high levels of function contributing to landscape or human values. Impacts to these areas should be rigorously avoided or at least minimized. Compensation for impacts in these areas should emphasize replacement nearby and in the same immediate 8-digit watershed. Designated primary Priority Categories include:

- Waters receiving designation under the Wild and Scenic Rivers Act
- Waters fully supporting all beneficial uses: Water Quality Category 1 and 2. See Montana Department of Environmental Quality's (DEQ) 2004 Integrated Water Quality Report. See Montana's Water Quality Assessment Data Base: County: Stream/Lake: Full Report
- 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

• 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 Bull trout core area waters see http://www.nris.state.mt.us/interactive.html. See Montana Fisheries Information System: Fish Species: Bull Trout: Partial Report: Bull trout core/nodal water body list.

Secondary Waters: Any first and second order perennial tributaries flowing directly into Primary Waters listed above.

Tertiary Waters: These areas include all other streams.

Existing Condition is a reflection 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's 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 means the physical geomorphology of the reach is stable and is representative of an appropriate stream hydrograph for the topographical setting and watershed characteristics. The biological community is diverse and unimpaired by excessive anthropogenic inputs.

For this MTSMP, a fully functional stream is one that has not been channelized; has no culverts, pipes, impoundments, rip rap or other manmade alterations within 0.5 river miles upstream or downstream; has an appropriate entrenchment ratio and width/depth ratio at bank full discharge for its stream type relative to unimpaired stream condition based on reference reach data; shows little evidence of human-induced sedimentation; and has an appropriately wide and vegetated riparian buffer of deep-rooted vegetation relative to a stream's appropriate meander width.

Somewhat Impaired means the stability and resilience of the stream or river reach has been compromised, to a limited degree, through partial loss of one or more of the integrity functions (chemical, physical, biological). System recovery has a moderate probability of occurring naturally. A stream is considered moderately impaired if the entrenchment ratio and/or width/depth ratio at bank full discharge is inappropriate for the stream type relative to unimpaired stream condition based on reference reach data; human-induced sedimentation is moderate; a moderately vegetated riparian buffer of deep-rooted or mat of vegetation is present (minimum of 25 feet); and/or culverts, pipes, impoundments, or other in-stream manmade structures occur within 0.5 miles upstream or downstream.

Impaired means that there is a high loss of system stability and resilience characterized by loss of one or more integrity functions. Recovery is unlikely to occur naturally.

For this MTSMP, a stream is considered impaired if the reach has been channelized or if the entrenchment ratio and/or width/depth ratio at bank full discharge is inappropriate for the stream type relative to unimpaired stream condition based on reference reach data and the stream has degraded to a less desirable type (e.g., Rosgen type "G" or "F"); has extensive human-induced sedimentation; has little or no riparian vegetated buffer with deep-rooted vegetation (<25'); and/or culverts, pipes, impoundments, or other in-stream manmade structures occur within 0.1 mile upstream or downstream.

Duration is the amount of time the adverse impacts are expected to last.

Temporary means impacts limited to construction and will not be noticeable within 12 months after construction is completed.

Short Term means impacts will remain evident after 12 months but not evident after 24 months.

Permanent means project impacts will occur for greater than 24 months and/or are intended to be permanent (most types of construction activities).

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

Fill means placement of dredged or fill material in a stream channel.

Pipe means to route or divert a stream through a pipe, culvert, tunnel, or other wholly enclosed conveyance for a distance greater than 300 feet.

Impound means to dam a stream or otherwise convert it to a lentic state. 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.

Morphologic means to channelize, dredge, fill, or otherwise alter the established or appropriate natural dimensions, depths, plan, patterns, profile, or limits of a stream channel or corridor.

Detention means to place a weir in a stream to slow or to divert water when bankfull is reached. The structure should be designed to pass flows below OHWM and aquatic organisms.

Culvert means to route a stream through pipes, tunnels, or other enclosed structures for less than 300 feet. If longer than 300 feet, the impact is considered a piping project. Culverts should be designed to pass fish and other forms of aquatic life indigenous to the waterway while allowing natural stream processes to occur unimpeded. Culverts must not cause more than minimal changes to the hydraulic flow characteristics of the stream, increase flooding, or degrade water quality. Improperly designed culverts will be assigned a higher Dominant Impact Factor. See (i) of Appendix D (Projects Not Requiring Mitigation) for an explanation of culvert projects for which compensatory mitigation is not typically required.

Bank stabilization is broken down into 6 categories for this Procedure.

- Vegetation only. (End result is a living herbaceous, woody, or mixed plant community. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
- Vegetation combined with dead woody material. (End result is a living herbaceous, woody, or mixed plant community with a less than 50% dead wood component in the toe and/or bank. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
- Vegetation above the Ordinary High Water Mark (OHWM) combined with either a rock Toe or 50%+ dead wood at or below OHWM. (End result is a living herbaceous, woody, or mixed plant community above the OHWM and rock or dead wood at or below the OHWM. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
- Rock riprap above and below the OHWM and any type of vanes/barbs/weirs/hard points that project into the channel. (End result is little or no vegetation on bank for rock riprap revetments, or an eroding bankline protected by one or more vanes/barbs/weirs/hard points/etc.)
- Log Cribs, or combinations of bank riprap with vanes/barbs/weirs/hard points. (Log crib structures filled with soil, plants, and/or rock extending below and/or above the OHWM, or projects using vanes/barbs/weirs/hard points that also include a rock riprap revetment or toe along the bank)
- Retaining Walls. (Vertical or nearly vertical retaining walls constructed of gabion baskets, hand-placed stone, masonry, concrete, steel, wood, or other materials.)

See (h) of Appendix D (Projects Not Requiring Mitigation) for an explanation of bank stabilization projects for which compensatory mitigation is not typically required.

Utility Crossing means open cut construction or other pipeline/utility line installation methods that require disturbance of the streambed and that require reestablishment of pre-project contours after installation. Utility lines plowed through a channel and riparian area or bored under a stream will not require mitigation if the disturbed areas are reclaimed.

Clearing and Shading means activities, such as stream bank vegetation clearing that reduce or eliminate the diversity, quantity, quality and functions of the vegetation within the riparian habitat zone. Bridge

ends protected by riprap that also shade the bank will use bank stabilization (multiplier 0.4) as the Dominant Impact category.

Collective Impact is the total linear feet of stream impacted by the project (0.0005 x length of stream impacted). This factor is intended to capture the effect that more than one action may have on an aquatic resource (i.e., rip rap may be proposed along several separate reaches of the same stream and the factor will result in an increase in debit responsibility).

II.2. Credit Factors

NOTE: In cases where no actual riparian or stream work is being completed but exclusion of livestock is considered appropriate, using Table 1.5 start with the far right column to determine the appropriate width and record on Table 1.6 and proceed.

Net Improvement for Riparian Enhancement is a measure of the functional lift attributed to the restoration and perpetual protection of streamside buffers and is calculated using the Tables I.3- I.6 of the Stream Debit and Credit Computation Section. There are tables that determine the minimum required buffer width and a credit value matrix for different combinations of vegetative restoration and buffer widths. To get this credit one can re-vegetate riparian zones with appropriate native species after removing invasive species (such as Russian olive, tamarisk, reed canary, etc), allowing more appropriate native communities to develop. Helping to naturalize a riparian zone improves the stream and its functions.

Net Improvement for Stream Channel Restoration is a measure of restored stream channel function. Restored streams have proper morphology relative to the physical characteristics of the watershed. Improvements in stream structure and habitat elements relate directly to improvements in stream functions.

Substantial stream channel restoration actions include the following:

- Removing stream impoundments and/or pipes or culverts to restore a stream reach to a stable, proper functioning channel configuration.
- Restoring appropriate bankfull discharge width, stream sinuosity, entrenchment ratio, length and width/depth ratio to a referenced morphologic pattern.
- Building a new, morphologically stable channel at a higher elevation to connect a previously incised channel to the floodplain.
- Creating or re-connecting floodplains adjacent to streams artificially disconnected from their floodplain.
- Where relocation of an incised stream is impracticable, modifying the existing channel and re-establishing a floodplain in situ, but not at the abandoned/disconnected floodplain.
- Construction of off-channel storm water detention facilities in areas where runoff is accelerating to replicate pre-development hydrographs.
- Implementing restoration activities that will improve water quality or reduce sedimentation in streams designated as Primary Waters under Stream Status in adverse Impact factors of this Section.
- Removing a dike, levee or berm to re-connect the floodplain to the stream channel to allow overbank flows to freely access the floodplain.
- Reconnecting abandoned side channels, secondary channels, or meanders that were artificially cutoff or blocked.
- Removing rock riprap and stabilizing disturbed surfaces with biodegradable erosion control fabric and vegetation.

Moderate stream channel restoration actions include:

- Restoring stability in highly eroded areas or areas with artificially accelerated erosion, using non-rigid methods such as vegetative stabilization, root wads with a relatively small percentage of rock, re-sloping and reshaping banks and creating a vegetated floodplain bench.
- Restoring natural channel features (i.e., riffle/run/pool/glide habitat) using morphology appropriate to target stream type, but not a complete channel reconstruction/relocation. This cannot come at the expense of natural appropriate channel functions, such as trading spawning and rearing habitat for large fish holding water or vice versa.
- Where relocation of an incised stream is not practicable and modifying the existing channel to create a stable stream channel is impracticable due to belt width constraints (limited land width available to form the meanders necessary for C or E stream types), modifying the existing channel and floodplain at its current elevation to create a stable channel. This converts the stream to a new stream type at the existing elevation of the channel but without an active floodplain.
- Routing a stream around an existing impoundment by creating a morphologically stable and appropriate stream channel.
- Constructing fish ladders or other fish passage features, where appropriate.
- Replacing inappropriately sized or installed culverts with a bridge or culvert large enough to span the bankfull channel width.
- Removing check dams, weirs, car bodies and other foreign and artificial in-stream structures and debris where these structures are contributing to bank erosion or scour or blocking stream processes and aquatic organism movements and any time in general when foreign materials/junk is removed. These areas must remain unprotected.
- Livestock exclusion with riparian vegetation restoration (see Section 6.2.6 of General Information).

Minimal stream channel restoration actions include:

- If it is documented that accelerated erosion is evident, restoring stream bank stability by hardening or stabilizing the existing channel in place. This is the least desirable option biologically and aesthetically. It should only be allowed when there are insurmountable constraints to using other restoration solutions, as may be the case in urban settings. Some proposals undertaken by this methodology may be considered to have adverse aquatic impacts and require compensatory mitigation.
- Incorporation of a bankfull planting bench into a rock riprap project, where such a bench does not constrict or reduce the appropriate natural channel width.
- Culverting floodplains at existing road crossings to facilitate flood flows.
- Replacing inappropriately sized/designed culverts to a larger size and/or configuration.
- Livestock exclusion without riparian restoration, livestock water gaps (see Section 6.2.6 of General Information).

NOTE: No mitigation credit is provided for constructed channels that do not incorporate the principles of natural channel design.

Type of Protection means 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.

Permit Conditions means the mitigation site does not have any legal encumbrance protecting it other than special conditions associated with a Corps permit. This alternative may not be acceptable in all cases. Typical Right-of-Ways (ROWs) would fall under this category.

Covenants means covenants enacted and enforced by a developer or property owner association for a given subdivision.

Deed Restriction means 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 means 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 means 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.

Mitigation Timing means 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 (all mitigation complete and success criteria met prior to impacts)
Permittee responsible mitigation: all mitigation is done prior to the adverse impacts.
Mitigation Banks: Banks is certified and has available credits.

Schedule 2 (mitigation started but not completed prior to impacts)
Permittee responsible mitigation: the majority (75% or greater) of the mitigation is completed prior to the impacts and the remainder is completed concurrent with or after the impacts.
Mitigation Banks: only pre-certified credits available. This includes pre-certified credits obtained through Umbrella Agreements.

Schedule 3 (mitigation started and concurrent with impacts with both completed at the same time)
Permittee responsible mitigation: mitigation is concurrent with the adverse impacts.
In Lieu Fee: mitigation is concurrent with the adverse impacts.

Schedule 4 (mitigation 50-70% completed concurrent with impacts)
Permittee responsible mitigation: 50-75% of the mitigation is done concurrent with the impacts and the remainder is done after the impacts.
In Lieu Fee: 50-75% of the mitigation is done concurrent with the impacts and the remainder is done after the impacts

Schedule 5 (mitigation plan provided and satisfies section 332 of Regulations)
Permittee responsible mitigation: less than 50% of the mitigation is done before adverse impacts occur.
In Lieu Fee: less than 50% of the mitigation is done before adverse impacts occur.

Location is the relative proximity of the mitigation site to the impact site. For stream mitigation banks, 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.

Off-site means greater than ½ mile from the impact site. It can still be on the adversely impacted stream, but does not have to be, but it must be within the watershed (8-digit HUC as mapped by USGS).

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 Montana Major Watershed Basins (MMWB) will not be acceptable (Stream Restoration Credit Factors).

III. Sample Cases

Sample Case #1: All Mitigation On-Site

This project will involve permanent fill of 30 linear feet of first order perennial stream in a tertiary priority category for construction of a dam, thus impounding 500 linear feet of this stream. Existing condition of the stream is entrenched banks with moderately vegetated buffer and an impoundment occurs 0.25 miles upstream (somewhat impaired). In addition, this project contains a residential development that involves permanent piping of 150 feet of a perennial stream in a tertiary priority category that has not channelization or contains rip rap within 0.5 miles (fully-functional).

Proposed mitigation includes riparian buffer mitigation that will consist of enhancement of a single side of 2,000 feet of Reach 1 and both sides of 1,000 feet of Reach 2. The buffers to be enhanced are adjacent to a perennial stream of the same order as the impact stream. The buffer proposed will be 100 feet in width, have a 6% slope, require 50% of the area to be re-vegetated (to be performed concurrent with the adverse impacts), are located in a tertiary priority category, and will be protected by deed restrictions overseen by a property owners association.

Included with the proposed will be stream mitigation that will remove 350 linear feet of piping on-site, restore the stream to a "day-lighted" condition and establish appropriate geomorphology based on a referenced, stable channel. The piped stream to be restored is perennial, in a tertiary priority category, and will be restored prior to the adverse impacts and subsequently protected by deed restrictions overseen by a property owners association. The stream restoration plan was coordinated with appropriate resource and regulatory agencies and deemed acceptable.

Adverse Impact (debit) worksheet: Work sheet example for Area 1 of this sample case.

Table L1 Adverse Impacts (debit) Factors and Worksheet. (Factors are defined in Section II)

FACTORS	MULTIPLIERS								
Stream Type (Pg18)	Ephemeral 0.2	Intermittent 0.3	>2nd Order Perennial 0.6	1st or 2nd Order Perennial 0.8					
Stream Status (Pg18)	Tertiary 0.1		Secondary 0.3		Primary 0.6				
Existing Condition (Pg19)	Impaired 0.1		Somewhat Impaired 0.75		Fully Functional 1.5				
Duration (Pg19)	Temporary (<12 months) 0.0		Short Term (12-24 months) 0.1		Permanent (>24 months) 0.3				
Dominant Impact (Pg20)	Shade Clear 0.05	Utility Crossing 0.15	Bank Stabilization* See table L2 below	Culvert 0.3	Detention /Weir 0.75	Morphologic 1.5	Impound 2.0	Pipe 2.2	Fill 2.5
Collective Impact (Pg21)	0.0005 x linear feet of stream impacted by this dominant impact 30 linear feet x 0.0005 = 0.015								

$SF_i = 0.8 + 0.1 + 0.75 + 0.3 + 2.5 + 0.015 = 4.465$

$LF_i = 30$ linear feet

$SF_i \times LF_i = 4.465 * 30 = 133.95$

DEBITS:	**Impact Area 1** (Dam)	**Impact Area** 2 (Impoundment)	**Impact Area** 3 (Piping)
Stream Type	0.8	0.8	0.8
Stream Status	0.1	0.1	0.1
Existing Condition	0.75	0.75	1.5
Duration	0.3	0.3	0.3
Dominant Impact	2.5	2.0	2.2
Collective Impact	0.015	0.25	0.1
Sum of Factors (SF_i)	4.465	4.2	5.0
Linear Feet Impact (LF_i)	30	500	150
$SF_i \times LF_i$	133.95	2,100.0	750

Total Debits = Σ ($SF_i \times LF_i$) = 2,984.0

Proposed mitigation (credit) worksheets

Minimum buffer width for the mitigation area is calculated by multiplying the minimum width for residential (50 feet) by 2 to account for a 6% slope, yielding a minimum of a 100-foot wide riparian buffer to attain mitigation credit. Thus, the proposed 100-foot buffers satisfy the minimum buffer width.

Work sheet example for Reach 1of this sample case.

Table 1.4 Minimum Stream Riparian Zone widths for Mitigation

Land Use (in feet)	Less than 5% slope (1x)	5% - 20% slope (2x)	21% -40% slope (3x)	Greater than 40% slope (4x)
Residential	50	100	150	200
Agricultural - Grazing lands/ non cultivated	50	100	150	200
Recreational	75	150	225	300
Institutional / Agricultural-cultivated	75	150	225	300
Industrial	100	200	300	400
Landfill	100	200	300	400
Other Categories (including use of reference reach data)	Case-by-case	Case-by-case	Case-by-case	Case-by-case

Note: Slope is measured from top of bank perpendicular away from the stream for a distance of 200 feet. In most instances slope may be averaged for the length of stream to be buffered. However, in situations where stream segments have definitively different slopes it may be appropriate to calculate average slopes for each stream segment.

Table I.5 NET IMPROVEMENT FOR RIPARIAN BUFFERS

Stream Status (Pg 18)	Buffer Width (1side)	91-100% Area to be restored	61-90% Area to be restored	33-60% Area to be Restored	1-32% Area to be restored	No Restoration Needed*
Primary	4x min width	1.0	0.9	0.8	0.7	0.6
	3x min. width	0.8	0.7	0.6	0.5	0.4
	2x min. width	0.6	0.55	0.5	0.4	0.3
	Minimum Width	0.4	0.3	0.25	0.2	0.15
Secondary	4x min width	0.95	0.85	0.75	0.65	0.55
	3x min. width	0.75	0.65	0.55	0.45	0.35
	2x min. width	0.55	0.45	0.4	0.35	0.25
	Minimum Width	0.3	0.25	0.2	0.15	0.1
Tertiary	4x min width	0.8	0.7	0.6	0.5	0.4
	3x min. width	0.65	0.6	0.5	0.4	0.3
	2x min. width	0.5	0.45	0.4	0.3	0.2
	Minimum Width	0.25	0.2	0.15	0.1	0.05

As mentioned in the proposed mitigation – "50% of the area to be re-vegetated (to be performed concurrent with the adverse impacts), are located in a tertiary priority category, and will be protected by deed restrictions overseen by a property owners association."

Table I.6 Riparian Credit Factors Worksheet

FACTORS	MULTIPLIERS				
Net Improvement (Pg 21)	Riparian Buffer Enhancement **(step 5)** (Calculate value from above Net Improvement table) 0.15 0.05 – 1.0				
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.12	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	Same Order 0.2	1 Order Difference 0.01		2 or more Order Difference 0.0	
Location (Pg 23)	On-site 0.2	Off-site 0.1		Outside 0.0	

*Use this option to calculate credits when no restoration of buffer necessary

Schedule 3: Mitigation will be completed concurrent with impacts

SF_m = 0.15 + 0.12 + 0.05 + 0.2 + 0.2 = 0.72

LF_m = 2,000 ft in Reach 1

RM = [buffer 1 side = 0.75]

SF_m x LF_m x RM = 0.72 x 2,000 x 0.75 = 1,080

(Reach 1 data on next page)

Table I.7 Total Riparian Credits Worksheet

FACTORS			Mitigation Reach 1	Mitigation Reach 2	Mitigation Reach 3	Mitigation Reach 4	Mitigation Reach 5
	Net Improvement	Stream Side A	0.15	0.15			
	Net Improvement	Stream Side B	NA	0.15			
	Type of Protection		0.12	0.12			
	Mitigation Timing		0.05	0.05			
	Comparative Stream Order		0.2	0.2			
	Location		0.2	0.2			
Sum of Factors (SF_i)			0.72	0.87			
Linear Feet Impact* (LF_i)			2,000.0	1,000			
Reach Multiplier (RM) Buffer 1 side = 0.75 Buffer both sides = 1.25			0.75	1.25			
SF_m x LF_m x RM			1,080	1,087.5			

Total Riparian Credits = Σ (SF_m x LF_m x RM) = 2,167.5

Table I.8 Stream Restoration Credit Factors Worksheet

FACTORS	MULTIPLIERS				
Net Improvement (Pg21)	Minimal 1.2	Moderate 1.8	Substantial 2.5		
Stream Status (Pg 18)	Tertiary 0.05	Secondary 0.2	Primary 0.3		
Type of Protection (Pg22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.1	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg18)	Same Order 0.2	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg23)	On-site 0.2	Off-site 0.1	Outside 0.0		

Schedule 1:
All mitigation will be completed prior to the adverse impacts

SF_m = 2.5 + 0.05 + 0.1+ 0.1+ 0.2 + 0.2= 3.15
LF_m = 350 ft
SF_m x LF_m = 3.15 * 350 = 1,102.5

Table I.9 Stream Restoration Credit Worksheet

Factors	Mitigation Reach 1	Mitigation Reach 2	Mitigation Reach 3	Mitigation Reach 4	Mitigation Reach 5
Net Improvement	2.5				
Stream Status	0.05				
Type of Protection	0.1				
Mitigation Timing	0.1				
Comparative Stream Order	0.2				
Location	0.2				
Sum of Factors SF_m =	3.15				
Linear Feet LF_m =	350				
SF_m x LF_m =	1,102.5				

Total Stream Credits = Σ (SF_m x LF_m) = 1,102.5

SUMMARY OF MITIGATION CREDITS

Category	Credits
Riparian Buffer Enhancement	2,167.5
Stream Restoration	1,102.5

Total Credits = 3,270.0

PMC ≥ Debits: (3,270.0 ≥ 2,984.0)

The Total Proposed Mitigation Credits (3,270.0) are greater than the Debits (2,984.0). Therefore, the quantity and mix of mitigation is acceptable. The Project Manager must also review the other aspects of the mitigation plan to assure that it is generally in compliance with the policies and guidelines for mitigation.

End of Sample case #1

Sample Case #2: On-site Mitigation Combined With Mitigation Bank Credits

For this sample case, let us assume that the impacts are the same as in the previous case sample. Thus, we need 2,984.0 mitigation credits. Also, assume the same riparian buffer enhancement that generates a total of 2,167.5 credits. However, instead of 350 linear feet of stream restoration, assume only 150 linear feet of stream restoration are proposed and the remaining credits will be obtained from a Mitigation Bank. Similar to the previous example we can calculate the following:

Proposed Riparian Buffer Enhancement = 2,167.5
Proposed Stream Restoration (SF_m x LF_m)
= 3.15 X 150 = 472.5
Total Proposed Non-Bank Mitigation Credits = 2,640.0

The additional credits needed are:
Total Mitigation Credits Required = 2,984.0
Total Proposed Non-Bank Credits = 2,640
Additional Credits Needed = 344.0

In order for the credits to be equal to or greater than debits, the applicant must obtain at least 344.0 credits from a mitigation bank.

The number of linear feet required from the bank to obtain these credits will depend on the approved banking documents and must be calculated by the bank operator. The calculation of bank linear feet used should be submitted with both the project mitigation proposal and the regular accounting summary for the Mitigation Bank.

This sample uses the actual data forms

Date: __March 17, 2010_____

Investigators: ___Klynn Ward_____

Project Name: ___Sample 3_ - Bank Stabilization_____Corps file No#_____

Brief Project Description:

A continuous 2,400 linear feet bank stabilization to protect a residence, outbuildings, and valuable irrigated cropland
* 375 linear feet of rock riprap revetment up to the high bank elevation along the bank in front of the residence and outbuildings;
* 525 linear feet of rock toe up to the ordinary high water mark (OHWM) with bank sloping & vegetation above the OHWM;
* 1,200 linear feet of bank protected by nothing but a series of 11 rock barbs on 100-foot spacing. Each rock barb is 40 feet long, angles 25 degrees upstream, and is submerged at normal and high flows; and
* 300 linear feet of bank sloping and heavy riparian plantings with no rock.

Stream is a large 3rd order perennial stream and a Primary water (outstanding fisheries resource). Existing condition is fully functional. Work occurs along the left bank only. Duration: this is intended to be a permanent bank stabilization project.

Mitigation Debit Tables

Adverse Impacts (debit) Factors and Worksheet. Factors are defined in Section II of the MTSMP.

FACTORS	**MULTIPLIERS**								
Stream Type (Pg 18)	Ephemeral 0.2	Intermittent 0.3	**>2nd Order Perennial 0.6**	1st or 2nd Order Perennial 0.8					
Stream Status (Pg 18)	Tertiary 0.1	Secondary 0.3	**Primary 0.6**						
Existing Condition (Pg 19)	Impaired 0.1	Somewhat Impaired 0.75	**Fully Functional 1.5**						
Duration (Pg 19)	Temporary (<12 months) 0.0	Short Term (12-24 months) 0.1	**Permanent (>24 months) 0.3**						
Dominant Impact (Pg 20)	Shade Clear 0.05	Utility Crossing 0.15	Bank Stabilization* See table I.2 below	Culvert 0.3	Detention /Weir 0.75	Morphologic 1.5	Impound 2.0	Pipe 2.2	Fill 2.5
Collective Impact (Pg 21)	0.0005 x linear feet of stream impacted by this dominant impact (see chart for each reach's numbers)								

Note: The cumulative impact factor for the overall project must be used in each reach column on the Total Debits Worksheet below.

Table I.2 Bank Stabilization Multipliers

Multiplier	Description For Bank Stabilization (Dominant Impact)
0.1	Vegetation only. (End result is a living herbaceous, woody, or mixed plant community. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.2	Vegetation combined with dead woody material. (End result is a living herbaceous, woody, or mixed plant community with a less than 50% dead wood component in the toe and/or bank. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.3	Vegetation above the Ordinary High Water Mark (OHWM) combined with either a rock Toe or 50%+ dead wood at or below OHWM. (End result is a living herbaceous, woody, or mixed plant community above the OHWM and rock or dead wood at or below the OHWM. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.4	Rock riprap above and below the OHWM, and any type of vanes/barbs/weirs/hard points that project into the channel. (End result is little or no vegetation on bank for rock riprap revetments, or an eroding bankline protected by one or more vanes/barbs/weirs/hard points/etc.)
0.5	Log Cribs, or combinations of bank riprap with vanes/barbs/weirs/hard points. (Log crib structures filled with soil, plants, and/or rock extending below and/or above the OHWM, or projects using vanes/barbs/weirs/hard points that also include a rock riprap revetment or toe along the bank)
0.7	Retaining Walls. (Vertical or nearly vertical retaining walls constructed of gabion baskets, hand-placed stone, masonry, concrete, steel, wood, or other materials.)

Total Debits Worksheet

Factor		Impact Area 1 riprap	Impact Area 2 – Rock toe	Impact Area 3- Barbs	Impact Area 4- plantings	Impact Area 5	Impact Area 6
	Stream Type	0.6	0.6	0.6	0.6		
	Stream Status	0.6	0.6	0.6	0.6		
	Existing Condition	1.5	1.5	1.5	1.5		
	Duration	0.3	0.3	0.3	0.3		
	Dominant Impact	0.4	0.3	0.4	0.1		
	Collective Impact	0.2	0.3	0.6	0.2		
Sum of Factors (SF_i)		3.6	3.6	4.0	3.3		
Linear Feet Impact* (LF_i)		375.0	525.0	1,200.0	300.0		
SF_i X LF_i		1,350.0	1,890.0	4,800.0	990.0		

Note: Some projects (including maintenance) that are less than 300 ft in length may not require compensatory mitigation.

Total Debits = Σ (SF_i X LF_i) = ___9,030.0_____

Mitigation Credit Tables

Brief Mitigation Description:

Proposed mitigation includes riparian zone mitigation that will consist of enhancement of both side of 3,050 feet of Reach 1 and one bank only of 1,500 feet of Reach 2. The riparian zone to be enhanced is adjacent to a perennial stream of the same order as the impact stream. Land use surrounding the proposed mitigation is grazing lands. The riparian zone proposed will be 100 feet in width, have a 4% slope. Work to be performed on Reach 1 after impacts occur and Reach 2 concurrent with the adverse impacts and both reaches will be protected by conservation easement overseen by a chapter of a local non-profit organization.

Included with the proposed will be stream mitigation that will remove a 250 linear feet of culvert and remove 950 linear feet of piping ¾ miles upstream of impact site but within the same HUC-8 watershed. The intent is to restore both streams to a "day-lighted" condition and establish appropriate geomorphology based on a referenced, stable channel. Both the culverted and day-lighted streams to be restored are perennial, in a tertiary priority category, and will be restored prior to the adverse impacts and subsequently protected by conservation easement overseen by a chapter of a local non-profit organization.

The stream restoration plan was coordinated with appropriate resource and regulatory agencies and deemed acceptable. All necessary permits were obtained.

Riparian Zone

The Corps will determine the maximum credit width which is typically limited by the flood plain or channel migration which ever more appropriate.

Use the table below to determine the minimum width for your proposed riparian credit area using existing adjacent land use and percent slope.

Minimum Stream Riparian Zone Widths For Mitigation

Land Use	**Less than 5% slope (1x)**	**5% - 20% slope (2x)**	**21% -40% slope (3x)**	**Greater than 40% slope (4x)**
Residential	50	100	150	200
Agricultural - Grazing lands/ non cultivated	50	100	150	200
Recreational	75	150	225	300
Institutional / Agricultural-cultivated	75	150	225	300
Industrial	100	200	300	400
Landfill	100	200	300	400
Other Categories (including use of reference reach data)	Case-by-case	Case-by-case	Case-by-case	Case-by-case

Note: Slope is measured from top of bank perpendicular away from the stream for a distance of 200 feet. In most instances slope may be averaged for the length of stream to be buffered. However, in situations where stream segments have definitively different slopes it may be appropriate to calculate average slopes for each stream segment.

Calculate the Net Improvement Factor for each side of the stream independently utilizing the table below. Definition for "Area to be restored" is in Section II.

Net Improvement For Riparian Zone

Stream Status (Pg 18)	**Buffer Width (1side)**	**91-100% Area to be restored**	**61-90% Area to be restored**	**33-60% Area to be Restored**	**1-32% Area to be restored**	**No Restoration Needed***
Primary	4x min width	1.0	0.9	0.8	0.7	0.6
	3x min. width	0.8	0.7	0.6	0.5	0.4
	2x min. width	0.6	0.55	0.5	0.4	0.3
	Minimum Width	0.4	0.3	0.25	0.2	0.15
Secondary	4x min width	0.95	0.85	0.75	0.65	0.55
	3x min. width	0.75	0.65	0.55	0.45	0.35
	2x min. width	0.55	0.45	0.4	0.35	0.25
	Minimum Width	0.3	0.25	0.2	0.15	0.1
Tertiary	4x min width	0.8	0.7	0.6	0.5	0.4
	3x min. width	0.65	0.6	0.5	0.4	0.3
	2x min. width	0.5	0.45	0.4	0.3	0.2
	Minimum Width	0.25	0.2	0.15	0.1	0.05

***** "No Restoration Needed" refers to areas of buffer that have an established riparian corridor or will mature into native riparian area without active restoration. To be eligible for credits, long-term protection of restored and/or intact, naturally forested riparian zones through restrictive covenants, conservation easements or transfer in fee title to a conservation entity is required.

NOTE: Credits may not be given for riparian widths deemed excessive to providing benefits to the aquatic system. If both sides of the stream are owned or could reasonably be obtained by the applicant, buffering of both sides of the stream is recommended. Streams that are unstable and require major stream channel or bank restoration is not considered candidate streams for solely buffer enhancement credit.

RIPARIAN CREDIT FACTORS

FACTORS	**MULTIPLIERS**				
Net Improvement (Pg 21)	Riparian Buffer Enhancement (step 4) (Calculate value from above Net Improvement table) 0.05 – 1.0				
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.12	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	Same Order 0.2	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg 23)	On-site 0.2	Off-site 0.1	Outside 0.0		

*Use this option to calculate credits when no restoration of buffer necessary

Stream Restoration Credit Worksheet

FACTORS			Mitigation Reach 1	Mitigation Reach 2	Mitigation Reach 3	Mitigation Reach 4	Mitigation Reach 5
	Net Improvement	Stream Side A	0.4	0.4			
	Net Improvement	Stream Side B	0.4	NA			
	Type of Protection		0.15	0.15			
	Mitigation Timing		0.05	0.05			
	Comparative Stream Order		0.2	0.2			
	Location		0.1	0.1			
Sum of Factors (SF_m)			1.3	0.9			
Linear Feet Impact* (LF_m)			3,050.0	1,500.0			
Reach Multiplier (RM) Buffer 1 side = 0.75 Buffer both sides = 1.25			1.25	0.75			
SF_m x LF_m x RM			4,956.3	1,012.5			

Total Riparian Credits = Σ (SF_m x LF_m x RM) = ___5,968.8_____

Mitigation Credit Tables
Stream Channel

FACTORS	MULTIPLIERS				
Net Improvement (Pg 21)	Minimal 1.2	**Moderate 1.8**	Substantial 2.5		
Stream Status (Pg 18)	Tertiary 0.05	Secondary 0.2	**Primary 0.3**		
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.1	**Conservation Easement 0.15**	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	**Same Order 0.2**	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg 23)	On-site 0.2	**Off-site 0.1**	Outside 0.0		

Factors	Mitigation Reach 1	Mitigation Reach 2	Mitigation Reach 3	Mitigation Reach 4	Mitigation Reach 5
Net Improvement	1.8	1.8			
Stream Status	0.3	0.3			
Type of Protection	0.15	0.15			
Mitigation Timing	0	0.05			
Comparative Stream Order	0.2	.2			
Location	0.1	0.1			
Sum of Factors (SF_m)	2.55	2.6			
Linear Feet Impact (LF_m)	250	950			
SF_m x LF_m =	637.5	2,470.0			

Total Stream Credits = Σ (SF_m x LF_m) = __3,107.5_____

Overall Summary Worksheet

Date: __March 17, 2010_____

Investigators: ___Klynn Ward_____

Project Name: ___Sample 3_ - Bank Stabilization_____Corps file No#_____

Total Debits			Debits	Linear Ft
	A		9030.0	2,400.0
Mitigation Banking Credit Summary			Credit	Linear Ft
	B	Riparian zone/Buffer Enhancement	0	0
	C	Stream Restoration	0	0
	D	Total Proposed Bank Mitigation = B + C	0	0
In-Lieu Fee Credit Summary			Credit	Linear Ft
	E	Riparian zone/Buffer Enhancement	0	0
	F	Stream Restoration	0	0
	G	Total Proposed ILF Mitigation = E + F	0	0
Permittee-responsible Credit Summary			Credit	Linear Ft
	H	Riparian zone/Buffer Enhancement	5,968.8	4,550.0
	I	Stream Restoration	3,107.5	1,200.0
	J	Total Proposed Permittee-responsible Mitigation = H + I	9,076.3	5,750.0
Credit Grand Totals			Credit	Linear Ft
	K	Total Riparian Enhancement Mitigation = B+E H	5,968.8	4,550.0
	L	Total Stream Restoration Mitigation = C + F + I	3,107.5	1,200.0
	M	Total Proposed Mitigation = D + G + J	9,076.3	5,750.0

Proposed Mitigation Credits ≥ Debits (M ≥ A)	True

Appendix A
- Data Requirements –
Baseline/monitoring/success criteria, contingency

General Requirements for submittal of mitigation projects are found at 33 CFR 332.4(c). In addition, the following is a useful guide for applicants.

1. *Baseline*. The baseline information pertains primarily to the conditions of the site proposed for development by an applicant as compared to the baseline conditions for the site selected for mitigation. Applicants are encouraged to provide more than one copy of a proposal to expedite agency notification. Proposals will be reviewed and the applicant will be advised if additional information is required to make the proposal adequate for consideration. Other information may be needed as part of the General Permit Notification process or Individual Permit process.

2. Monitoring and Contingency. In addition to the requirements for monitoring found in 33 CFR 332.4(c) and 33 CFR 332.6 and those for contingency found in 33 CFR 332.4 (c) and 33 CFR 332.7, monitoring and contingency plans and reports could include any of the following items or additional data, on a case-by-case basis.

- Scaled plans, including cross sections, longitudinal profiles, plan-view channel dimensions, and aerial photos.
- Names, addresses, and phone numbers for all parties responsible for mitigation and monitoring.
- A description of the existing vegetative communities to be affected by the proposed mitigation, with wetland delineation and identification of pool and riffle complexes, if applicable.
- A listing and definition of measurable mitigation success factors with quantifiable criteria for determining success.
- Description of the equipment, materials, and methods to be used.
- Identification and descriptions of reference stream reaches.
- Hydrologic monitoring on the applicant's project reach and proposed mitigation reach.
- Photographic documentation of the impacted stream and mitigation reach.
- Monitoring of the physical, biological and/or chemical characteristics of the adversely impacted and/or the mitigation site to assess the recovery of resources and functions.

3. Stream Monitoring. Monitoring is generally conducted to determine whether the enhancement/restoration has accomplished the desired effect on the ecosystem. In addition to the requirements for monitoring found in 33 CFR 332.4(c) and 33 CFR 332.6 both physical and biological monitoring may be required for major restoration projects. **For most restoration projects, both pre (baseline) and post construction surveys are required.** Monitoring should include a reference reach that would act as control data. Reference reach data collected for the restoration design may also be used as the reference for monitoring success. The reference reach is generally a stream of the same stream type (Rosgen, 1996), similar size, located in the same ecoregion and preferably the same or neighboring watersheds, and that is stable and relatively undisturbed. In some cases, the reference reach could be located on the same stream either above or below the impacted area being restored. Monitoring should be conducted annually on a case-by-case basis after completion of the enhancement/restoration activity and will require at least 5 years, longer if tree establishment is involved. It is likely that monitoring after at least one bankfull event will be required. Monitoring requirements for projects will be tailored to the size of the project and may include both physical and biological elements on a case-by-case basis. Methods for stream restoration monitoring are described in Rosgen, 1996 and The Federal Stream Restoration Working Group, 1998.

A. *Physical Monitoring*. The types of measurements and monitoring that will typically be required include, but are not limited to, flow characteristics, channel cross-sections, longitudinal profiles, substrate and sediment characteristics, other morphological characteristics (dimension, pattern and profile), channel stability (vertical and lateral), water temperature, dissolved oxygen, and turbidity. It is important that selected monitoring variables are sensitive enough to show change and can be measured.

Data sheets for determining stream type and dimension, pattern and profile are included in Appendix D. Other physical parameters that should be monitored include frequency and diversity of pool and riffle complexes, spawning substrates, undercut banks, and large woody debris within the stream channel.

B. *Biological Monitoring*. Biological surveys are useful tools in determining the success of a restoration project. Biological surveys of stream fauna such as fish and macro-invertebrates should be used on projects that target, either directly or indirectly, in-stream habitat restoration. One acceptable method for biological monitoring in streams is the index of biological integrity (IBI). Biological surveys of flora should be made when buffers are being enhanced and when bioengineering techniques are being used for bank stabilization. Vegetation monitoring, which will be required for most riparian restoration and bioengineered bank stabilization projects, includes measurement of vegetation survival and growth (density, height, diameter at breast height, or other biomass measure). Biological monitoring may also include counting numbers of redds, conducting fish surveys (visual and/or electro-fishing), or conducting macro-invertebrate studies.

4. *Ecological Performance Standards*. In addition to the requirements of 33 CFR 332.5, performance standards should be established that specifically address the goals of a given restoration project and can easily be measureable. **It is critical that performance standards selected for various monitoring measures are appropriate for demonstrating attainment of projected restoration goals.** For stream systems, this may entail bringing an actively aggrading or degrading system into a state of dynamic equilibrium whereby the monitoring data will indicate stream channel stability and improved biological integrity. Performance standards and restoration goals should be identified early in the process and the Corps should concur prior to doing the mitigation project. The final amount of credit awarded is based on monitoring results, not predicted credits.

5. *Drawings.* Mitigation plans should include drawings in conformance with the following.
Drawings must be on 8.5 x 11 inch paper and must be clear, readable, and reproducible on standard, non- color office copiers. For large or complex projects, plans should also be submitted on paper sized no smaller than 11 x 17 inch and no greater than 30 x 42 inch. Each drawing sheet should include:

- an unused margin of no less than ¼ inch;
- title block with applicant's name, project title, site location, drawing date, application or file number, and sheet number;
- all significant dimensions clearly indicated and annotated;
- a directional arrow indicating north;
- an appropriate graphic scale (when reasonable);
- a clear, legible plan view indicating area sizes and length (e.g. square feet, acres, linear feet) for all mitigation sites.
- Legal description (section, township, range)

6. Location maps for the proposed activity must be included. Two maps are desired. A County road map (or Google Earth map) and a US Geological Quadrangle map are preferred as sources. The location maps must show roads leading to the site and must include the name or number of these roads. Each map must include a title block. Identification of the project's latitude and longitude is desired.

7. Plan views of the proposed mitigation must be included. These drawings must show the general and specific site location and character of all proposed activities, including the relationship of all proposed work to Waters of the United States in the vicinity of the project.

8. For ground disturbing mitigation work, cross section views must be submitted depicting the existing ground contours and the proposed finished contours. All aquatic areas within the project boundaries (avoided, impacted, or mitigated) must be shown. Mitigation areas must be shown (enhancements, creations, restorations, etc.) as well as an appropriate legend.

9. A summary table with the quantity of each category of impacted area and each category of mitigation must be shown.

10. Show the ordinary high water line (bankfull) of affected and adjacent open surface water bodies.

11. Show the base flow and flood prone area of the affected stream.

12. If the plan involves dredging in Federal navigable waters (Missouri River, Yellowstone River from Emigrant downstream or the Kootenai River from Jennings upstream) the drawings must include:

- The method of dredging;
- The site and plans for disposal of the dredged material;
- A description of the type, composition and quantity of the material to be dredged.

13. If the plan includes discharge of dredged or fill material into Waters of the United States or transportation of dredged material, the drawings must include:

- The source of the material;
- A description of the type, composition and quantity of the material;
- The method of transportation and disposal of the material;
- The location of the disposal site.

14. For large or complex mitigation projects involving creation, restoration, enhancement (other than by buffering), or a combination thereof, topographic drawings showing the contours and elevations of the completed mitigation area may be required. The drawings should show types of plantings, locations of plantings, and all other structures and work that are a significant part of the mitigation.

15. Distribution for Projects Requiring an Individual Permit. Generally, proposals with bound or voluminous information will not be distributed via public notice mailings in order to minimize reproduction and mailing costs (executive summary will need to be provided for the public notice).

For projects with proposals that are fully shown on a few pages, the Corps Project Manager may include the proposal with the public notice for the permit application. When the proposal is distributed via public notice it must be clearly labeled as the mitigation proposal. One complete original along with at least one copy of the proposal should be submitted when it is to be distributed via the public notice.

Applicant may be requested to provide a sufficient number of copies (usually eight) for reviewing agencies if the proposal includes material that is bound, voluminous, on paper larger than 8.5 x 11 inch size, not reproducible in black and white, or which for other reasons cannot readily be distributed by means of the regular public notice mailing.

Appendix B
- Glossary and References -

The definitions found in 33 CFR 332.2 are hereby incorporated by reference. The following definitions are in addition to those found in 33 CFR 332.2.

Adverse effects as used in this MTSMP means any adverse ecological effect on Waters of the United States including all filling, excavating, flooding, draining, clearing, or similar changes impacting U. S. Waters. Other categories of effects such as aesthetic, cultural, historic, health, etc., are not addressed by this MTSMP. See also the definition of "effects" in this glossary.

Aquatic site means any Water of the United States, including special aquatic sites such as wetlands.

Bank erosion is a process that is an integral component of a streams overall stability and character. The rates of erosion and where it occurs depends upon the hydrology, geology, vegetation and land use at any one point in time. The benefits of bank erosion includes the introduction of materials from which point bars are created or extended, that in turn provides substrate for riparian vegetation establishment, habitat creation, and maintenance of morphological characteristics. Bank erosion can also be viewed as a process that needs correction before it results in damages to adjoining property. In some instances, anthropogenic actions result in accelerated rates of bank erosion that can exceed the streams sediment transport capacity and cause local deposition or stream aggradations over a given reach.

Bank Stabilization: Activities involving work where the desired end result is the prevention, reduction, or elimination of bank erosion. Bank stabilization includes activities such as the placement of riprap revetments, retaining walls, barbs, vanes, weirs, root wads, bank sloping, or vegetation planting. Bank stabilization can be a component of other types of work, such as stabilization of the channel at bridge crossings or stabilization performed as part of a channel relocation project.

Bankfull Discharge is the discharge that is most effective at moving sediment, forming or removing bars, forming or changing bends and meanders, and doing work that results in the average morphologic characteristics of channels. The bankfull stage is the point at which water begins to overflow onto a floodplain and is commonly referred to as the discharge with a frequency of occurrence of between 1.5-1.7 years. Bankfull may not be at the top of the stream bank in incised or entrenched stream (Dunne and Leopold, 1978).

Biological Integrity involves the natural state of living organisms using aquatic systems. Biological functions include shelter, food production, breeding sites, and migration pathways.

Braided stream system means a multiple-thread channel system with a very low stream gradient (<.005) and individual channels with highly variable bank full width. These streams have extensive, well-vegetated floodplains and associated wetlands (Rosgen, D.A. (1996) Applied River Morphology).

Channel Features as found in natural streams are sequences of riffles and pools or steps and pools that maintain channel slope and stability and provide diverse aquatic habitat.

Chemical Integrity involves the natural composition and properties of inanimate substances within aquatic systems. Chemical functions include nutrient cycling, particulates retention, organic carbon export, removal and sequestration of elements and compounds, water quality improvement.

Council on Environmental Quality (CEQ) has defined at 40 CFR Part 1508.8 that the words *impacts* and *effects* are synonymous and that *effects* includes ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Further, the CEQ stated that *effects* include:

- Direct effects, which are caused by the action and occur at the same time and place.
- Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

- Cumulative effects which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions.

Entrenchment Ratio is an index value used to describe the degree of vertical containment of a river channel. It is the ratio of the width of the flood-prone area to the surface width of the bankfull channel. The flood-prone area width is measured at the elevation that corresponds to twice the maximum depth of the bankfull channel as taken from the established bankfull stage (Rosgen, D.A. (1996) Applied River Morphology).

Ephemeral streams include those streams that flow only in direct response to rainfall or snowmelt and whose bed is above the groundwater table at all times. To be jurisdictional under Section 404, an ephemeral stream will need to have a defined bed and bank (ordinary high water mark) as compared to a vegetated "swale" or low feature on the landscape that may itself periodically transport surface waters. These stream courses are usually located in the uppermost, headwater portions of a watershed.

Flood-prone Area Width is the width of the flood-prone area as measured in the field at an elevation twice-maximum depth at bankfull. Maximum depth is the difference between the bankfull stage and thalweg elevations in a riffle section (Rosgen, D.A. (1996) Applied River Morphology).

Intermittent streams are streams that have a defined bed and bank and do not flow continuously all year round, but beyond periods of rainfall and with greater frequency than similarly located ephemeral streams. Their streambed is located in a zone of groundwater fluctuation, thus the stream may gain water from or lose water to groundwater. For this MTSMP, intermittent streams also include those reaches of a stream that lack surface flows, even though there is perennial surface flow both up and downstream.

Mean Depth at Bankfull is the mean depth of the stream channel cross-section at bankfull stage as measured in a riffle section.

Mitigate as defined by 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 effected 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 substitute resources or environments.

MOA stands for Memorandum of Agreement.

NTIS stands for National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. 703-487-4650 or 487-4780.

NWP stands for US Army Corps of Engineers Nationwide Permit.

Ordinary High Water Mark (OHWM) refers to the highest level reached by a body of water that has been maintained for a sufficient period of time to leave evidence on the landscape. It may be indicated by destruction of terrestrial vegetation, the presence of marks on trees or debris deposits. It is usually the point at which natural vegetation shifts from predominately hydrophytic (water-dependent) species to terrestrial species

Perennial streams are streams that flow most of the year in a channel with a defined bed and bank and whose channel bed remains below the groundwater table at all times of the year. A perennial stream, or reaches thereof, will go dry only during prolonged periods of drought.

Physical Integrity involves the natural contiguity of aquatic systems. Physical functions include flood attenuation, storm surge reduction, groundwater exchange, commercial and recreational navigation, and cultural uses such as swimming.

Pools are located on the outside bends of meanders between riffles. The pool has a flat slope and is much deeper than the average depth of the stream. Deep pools are found at the bottom of each step.

Riffles are bed features with gravel or larger size particles where the water depth is relatively shallow and the slope is steeper than the average slope of the channel. At low flows, water moves faster over riffles, which provides oxygen to the stream. Riffles are found entering and exiting meanders and control the streambed elevation because of a concentration of the larger rock found naturally in an alluvial channel.

Riverine, as used in this MTSMP, means rivers, streams, and similar natural flowing water bodies together with their associated adjacent wetlands and riparian zones.

Sinuosity of a stream is defined as the ratio of channel length/valley length. In addition to slope, the degree of sinuosity is related to channel dimensions, sediment load, stream flow, and the bed and bank materials.

Special aquatic sites means wetlands, mud flats, vegetated shallows, coral reefs, riffle and pool complexes, sanctuaries, and refuges as defined at 40 CFR 230.40 thru 230.45.

Stable Stream is one that maintains its dimension, pattern, and profile over time such that the stream does not degrade or aggrade. Naturally stable streams must be able to transport the sediment load supplied by the watershed. Instability occurs when scouring causes the channel to incise (degrade) or when excessive deposition causes the channel bed to rise (aggrade) (Dunn and Leopold, 1978).

Steps are vertical drops often formed by large boulders or downed trees. Deep pools are found at the bottom of each step. Step/pool sequences are found in higher gradient streams.

Stream stability is morphologically defined as the ability of the stream to maintain, over time, its dimension, pattern, and profile in such a manner that it is neither aggrading nor degrading and is able to transport without adverse consequence the flows and detritus of its watershed (Rosgen 1996).

Stream restoration means actions taken to correct previous alterations that have destroyed, diminished, or impaired the character and function of stream systems. Restoration is the process of converting an unstable, altered, or degraded stream corridor to its natural or referenced stable condition, considering recent and future watershed conditions.

Stream Order refers to a systematic process for describing the degree of branching of a stream network within a watershed. The order of any stream segment is determined by starting at the headwaters and labeling each unbranched tributary as order one (first order stream). Where two first-order streams come together, a second-order stream is designated. When two second-order streams merge, a third-order stream is created. The junction of any two streams of equal order results in a stream of the next higher order.

Stream Pattern describes the view of a stream channel as seen from above. Streams are rarely straight; they tend to follow a sinuous path across a floodplain.

Stream Profile refers to the longitudinal slope of the stream. At the watershed scale, channel slope generally decreases in the downstream direction with commensurate increases in stream flow and decreases in sediment size. Channel slope is inversely related to sinuosity, so steep streams have low sinuosity and flat streams have high sinuosity.

Stream Type as used in this document refers to the "Rosgen Stream Classification System" (Rosgen, D.A. (1996) Applied River Morphology), which categorizes streams based on channel morphology so that consistent, reproducible and quantitative descriptions can be made.

Thalweg is a line connecting the lowest or deepest points along a streambed channel.

Threshold means the level, point, or value above which something is true or will take place and below which it is not true or will not take place. For the purposes of this MTSMP, the thresholds given herein are considered to be the level of adverse impacts caused by the proposed project above which the project fails to meet the conditions, limitations, restrictions, or other requirements specified in relevant laws or regulations.

Width/Depth Ratio is an index value that indicates the shape of the channel cross-section. It is the ratio of the bankfull width divided by the mean depth at a bankfull discharge.

REFERENCES:

Environmental Protection Agency. Watershed Assessment of River Stability & Sediment Supply (WARSSS) http://www.epa.gov/warsss/pla/navchart.htm

Dunne, T. and L.B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman and Col, San Francisco, CA. 818 pp.

Rosgen, D.L. 1996. Applied River Morphology. Wildland Hydrology Book, Pagosa Springs, Colorado.

The Federal Interagency Stream Restoration Working Group. 1999. Stream Corridor Restoration: Principles, Processes and Practices. National Technical Information Service, Springfield, Virginia, Government Printing Office Item No. 0120-A.

US Army Corps of Engineers and Environmental Protection Agency. May 2008. Compensatory Mitigation for Losses of Aquatic Resources; Final Rule. 33 CFR Parts 325 and 332.

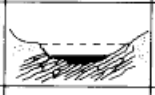
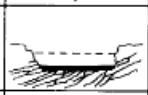
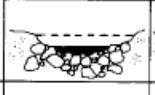
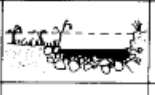
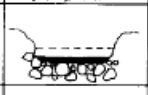
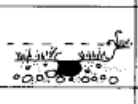
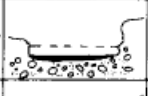
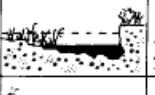
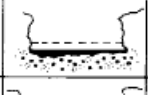
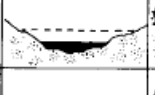
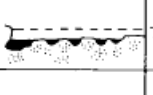
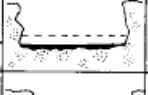
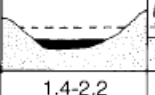
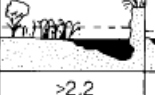
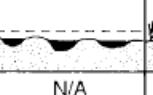
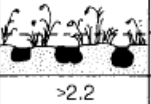
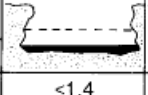
United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). 1996. Stream bank and shoreline protection. Engineering field handbook, Part 650, Chapter 16.

ACROYMNS

IRT	Interagency Review Team
MMWB	Montana Major Watershed Basins
MTSMP	Montana Stream Mitigation Procedure
MT-DEQ	Montana Department of Environmental Quality
PMC	Proposed Mitigation Credits
RIBITS	Regional Internet Bank Information Tracking System
ROW	Right-of-Way
SAMP	Special Area Management Plan
WARSSS	Watershed Assessment of River Stability & Sediment Supply

Appendix C

- Rosgen Stream Classification Table –

Dominant Bed Material	A	B	C	D	DA	E	F	G
1 BEDROCK								
2 BOULDER								
3 COBBLE								
4 GRAVEL								
5 SAND								
6 SILT/CLAY								
ENTRH.	<1.4	1.4-2.2	>2.2	N/A	>2.2	>2.2	<1.4	<1.4
SIN.	<1.2	>1.2	>1.4	<1.1	1.1-1.6	>1.5	>1.4	>1.2
W/D	<12	>12	>12	>40	<40	<12	<12	<12
SLOPE	.04-.099	.02-.039	<.02	<.04	<.005	<.02	<.02	.02-.039

(From "The Reference Reach Field Book", courtesy of David Rosgen and Wildland Hydrology

Appendix D
- Projects Not Requiring Mitigation -

Some work in streams and associated aquatic areas will not require compensatory mitigation.

Due to minimal or no adverse impacts to aquatic resources, no compensatory mitigation may be necessary for certain types and/or sizes of projects. Projects less than 150 linear feet will not normally require compensatory mitigation, nor will approved stream restoration projects of any length. Projects between 150 and 300 feet in length will require mitigation on a case-specific basis. Projects that result in more than 300 linear feet of impact will usually require compensatory mitigation.

If projects do not require a Corps permit because there is no discharge of dredged or fill material or because the work is exempt under Section 404, no compensatory mitigation is needed because there is no Corps permit. Other activities that require a Corps permit will sometimes require compensatory mitigation, depending on the location, scale and type of the impact.

No Placement of Dredged or Fill Material:
Compensatory mitigation is not normally required for projects involving only driven piling or floating structures within the ordinary high water mark (OHWM) of streams. These projects do not involve fill in waters of the U.S., and only require Corps permits if constructed in Section 10 waters. If projects involve only excavation in Section 10 waters, compensatory mitigation requirements for those projects will be evaluated on a case-specific basis.

Exemptions – No Compensatory Mitigation Required:
Corps of Engineer regulations at 33 CFR Parts 320-330, January 12, 1987, part 323.4 identifies discharges not requiring permits under Section 404 of the Clean Water Act. It specifically states that any discharge of dredged or fill material that may result from any of the following activities does not require a permit under Section 404. An abbreviated list of exempt activities is:

(a) Normal farming, silviculture and ranching activities such as plowing, seeding, cultivating, minor drainage, and harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices, as defined in paragraph (a)(2)(iii) of the above mentioned regulation.

(b) Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design.

(c) Construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance (but not construction) of drainage ditches, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant and functionally related to irrigation ditches are included in this exemption.

(d) Construction of temporary sedimentation basins on a construction site which does not include placement of fill materials into waters of the U.S.

(e) Any activity with respect to which a state has an approved program under section 208(b)(4) of the CWA, which meets the requirements of sections 208(b) (4) (B), and (C).

(f) Construction or maintenance of farm roads, forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained in accordance with best management practices (BMP's) to assure that flow and circulation patterns and chemical and biological characteristics of waters of the U.S. are not impaired, that the reach of the waters of the U.S. is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized.

Other Activities – Compensatory Mitigation Possibly Required:
Other types of applicant-sponsored projects that would be located in a stream **might not** require mitigation because of the potential for minimal or no adverse impact to the aquatic environment. Examples of projects that may not require mitigation include the following.

(a) Aids to Navigation. The placement of aids to navigation, mooring buoys, temporary recreational structures and regulatory markers which are approved by and installed in accordance with the requirements of the U.S. Coast Guard.

(b) Structures in Artificial Canals. Structures constructed in artificial canals.

(c) Maintenance. The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure, or fill, or of any currently serviceable structure of fill authorized by Nationwide Permit 3 provided the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit and cumulative adverse impacts are minimal.

(d) Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Habitat Improvement Activities. Fish and wildlife harvesting devices and activities such as pound nets, duck blinds, small fish attraction devices, fish screens, fish ladders, temporary fish barriers, fish habitat structures, and similar structures and devices whose use is to manage fish and/or wildlife resources.

(e) Scientific Measuring Devices. Devices whose purpose is to measure and record scientific data such as staff gages, water recording devices, water quality testing and improvement devices and similar structures.

(f) Survey Activities. Survey activities include core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, soil survey and sampling, and historic resources surveys. **NOTE**: does not include discharges associate with test wells for oil and gas exploration.

(g) Utility Line Discharges. Utility lines include outfall and intake structures, or any pipe or pipeline for the transportation of any gaseous, liquid, liquefiable, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. Activities that result in a discharge of dredged or fill material into a stream, including backfill, are regulated, however, if the work is done when flow is absent in ephemeral or intermittent channels, mitigation beyond necessary bank reclamation will generally not be required. Mitigation will not usually be required for operations utilizing a cable plow. Original contours and substrate should be re-established and replaced.

(h) Bank Stabilization. Bank stabilization usually requires the placement of fill materials below the ordinary high water mark of a stream; therefore, the activity is regulated. Bank stabilization that includes only sloping and re-vegetating of the bank with appropriate native vegetation may not require a 404 permit since there might not be a discharge of fill material. Bank stabilization by bank sloping and re-vegetating that require a rock toe to anchor erosion control mediums will not normally need compensatory mitigation if local stream source rock is used. Bank or Shoreline Stabilization Projects of 150 feet or less in length will normally not require migration. **This is a cumulative length, which includes existing bank stabilization up or downstream on the same bank.** Bank Stabilization Projects between 150 and 300 feet in length will require mitigation on a case-specific basis. Projects that result in more than 300 linear feet of impact will usually require compensatory mitigation. Bank stabilization of any length that is proposed directly across the channel from existing bank stabilization will usually require compensatory mitigation except for very small stabilization projects or utility and transportation projects as defined in "g" and "i" of this appendix). Compensatory mitigation might not be required for projects addressing anthropogenically accelerated stream bank erosion beyond the applicant's control. Bank or shoreline stabilization on lacustrine systems will sometimes require compensatory mitigation under this MTSMP.

(i) Linear Transportation Crossings – Culverts and Bridges. Road, trail, path, and railroad crossings that completely span the ordinary high water channel (including abutment fills and riprap) and are not located in wetlands do not require 404 authorization. Projects that clear span the ordinary high water channel (including abutments) and do not involve more than 150 linear feet of riprap or other fills (combined for both banks, such as 75 feet on one bank and 75 feet on the opposite bank), will not normally require compensatory mitigation. Culverts less than 150 feet long on ephemeral and intermittent channels and culverts less than 75 feet long on perennial channels will not typically require mitigation.

Note regarding Culvert Replacements: If the project involves replacement of an existing culvert, provided the culvert length as measured along the flowline is not increased more than 50% over the original overall length, no additional stream mitigation will be required if the following conditions are met:

a. The diameter, span, or cross sectional area of a culvert is enlarged;

b. Aquatic organism passage is provided where it was previously compromised;

c. Natural stream functions such as passage of flood flows, sediment movement, and woody debris transport are restored;

d. The culvert is replaced with a bridge or open-bottom structure that provides a larger waterway that passes aquatic life and allows the full range of stream functions.

(j) Minor Discharges. Minor discharges (less than 25 cubic yards) of dredged or fill materials, that do not result in the direct or indirect loss of more than 1/10 acre of wetland, pool and riffle complex or other special aquatic site will normally not require mitigation. However, compensatory mitigation will be required if these minor discharges are used for the purpose of stream diversion or blocking of channel access. In these cases the adverse impact (debit) calculation will include the overall length of stream or channel affected by the channel plug or diversion structure.

(k) Minor Dredging. Dredging (excavation) of no more than 25 cubic yards of material from below the plane of the ordinary high water mark will usually not require mitigation. However, compensatory mitigation will be required if the minor dredging is done for the purpose of stream diversion, blocking of channel access, or dewatering of natural aquatic areas. In these cases the adverse impact (debit) calculation will include the overall length of stream or channel affected by the dredging.

(l) Stream Restoration Activities. Projects designed to improve stream function and services by improving the physical, chemical or biological characteristics of a stream will not require mitigation. Such projects will be evaluated on a case-by-case basis. Project proposals must include documentation that supports the need for restoration activities and describes how the proposed strategies will achieve restoration goals.

(m) Boat Ramps. Construction of boat ramps in streams might not require mitigation provided the ramp is not located in a wetland, riffle-pool complex, or other special aquatic site. Riprap cannot exceed limits described in "h" of this appendix. Mitigation will be required if clearing of riparian vegetation exceeds 150 linear feet of stream bank.

Appendix E
– Conservation & Restrictive Considerations -

1. Conservation considerations. All property used for mitigation credits (e.g. all created, restored, enhanced, and preserved sites and buffers) must be protected by suitable conservation restrictions. Depending upon the circumstances, as discussed below, suitable conservation restrictions may include deed restrictive covenants, conservation easement, or transfer in fee title. In some cases, ownership by a suitable conservancy organization or government agency may suffice. Below are a few of the typical considerations:

• In order for covenants or easements to be considered acceptable, they should be in accordance with the most recent edition of the samples maintained by the Corps. The samples are subject to change without notice. Electronic or printed copies may be obtained directly from the Corps upon request.

A**ny changes to a model document, including additional exceptions or modifications of standard wording, must be approved by the Office of Counsel prior to execution or recording**, and are subject to approval on a case-by-case basis (for example, exceptions approved in one case may not be suitable for another). **An applicant must clearly identify all proposed changes, including those necessary to customize the model, when the conservation restriction document is submitted for preliminary approval; if all changes are not clearly identified, the document may be returned to the applicant without approval.** When Office of Counsel approval of changes is required, Regulatory Division personnel will compare the proposed conservation restriction document against the model document and ensure that **all** changes are identified before submitting for Office of Counsel approval.

• Covenants, easements, and transfers in fee title must be duly executed and recorded with the appropriate local entity responsible for maintaining the public register of real property transactions.

• If protected areas are sold or conveyed to another entity the protected area must be clearly defined in appropriate documents utilized for that transaction. The restrictive covenants option is intended primarily for smaller tracts. In particular, where the relatively small size of the protected area makes it unlikely that a conservancy group would accept an easement, or where the costs involved in establishing easements is not determined to be a reasonable requirement to impose on the permittee.

• In general, preservation of large tracts should be by means of easement or transfer in fee title to a conservation entity and not covenants. Determinations regarding this issue will be made on a case-by-case basis. By inserting suitable conditions in the permit, the Corps will reserve the right to review the draft language for covenants and easements. Typically, a 30 to 45 day review period will be reserved for this purpose.

• To the maximum extent practicable, preserved areas should be placed in the undivided control of a single owner such as a property owners association, a conservancy organization, or any suitable owner with responsibility for enforcement of the preservation agreement. Subdividing preservation areas into individual lots for residential developments is strongly discouraged. Such subdividing makes enforcement of the preservation agreement burdensome on the government. Experience has shown that subdividing mitigation into lots lowers the likelihood of success for the mitigation.
Note: In the case of a permit for a subdivision, the permit will include a condition that the conservation restrictions are included in the developer's or owner's own general scheme of restrictions for the subdivision.

• Applicants and permittees will be made aware of the model conservation restrictions documents in use at the time. Models are subject to periodic review and will be updated as necessary. The current model for restrictive covenants for Montana can be found in Appendix G.

• Conservation Easements vs. Restrictive Covenants. For mitigation banks, conservation easements with third-party rights of enforcement or transfer in fee title to a conservation entity will be the protective mechanism; **any exception to this policy must be pre-approved by the Corps of Engineers.** For permitting situations not involving mitigation banks, conservation easements or restrictive covenants, or both, may be used. However, if the applicant does not own the property on which they propose to place conservation restrictions, then a conservation easement will normally be required. In order to "own the property," the applicant must be the same legal entity as the landowner. If the applicant is an individual, and the landowner is a corporation, then they are not the same. Exceptions allowing the use of restrictive covenants where the applicant does not own the property on which the restrictions are to be placed must be pre-approved by the Corps' Office of Counsel.

2. Record of Approval and Recording. Approval by the Office of Counsel of a conservation restriction document will be indicated by the attorney's initials on the approved version. The approved copy will be part of the official file. In addition, the official file will include the copy thereafter recorded by the applicant. All conservation restriction documents must be recorded and filed prior to either the issuance of the permit or to the transfer of the file from the project manager handling the permit to the clerical staff for filing. All permits requiring conservation restrictions as mitigation will be tracked by entry in the database. The database entry will indicate the geographic location of the conservation restrictions. Standard special conditions will be added to the permit to ensure that are legally recorded in a timely manner. Compliance with these conditions shall be the obligation of the project manager until the condition is satisfied.

3. Changes to Conservation Restriction Documents after Recording. "Changes" include amendments, trades, corrections, or any other modifications of a recorded document. Because the conservation restrictions are legal documents, **no change may be processed or agreed to without being pre-approved by the Office of Counsel**. This Office of Counsel approval is separate and apart from any permitting process. Applicants will be informed up front to expect that the restrictions are permanent and that changes should NOT be anticipated; even where provision for changes is made in the recorded document, changes are the exception, not the rule. Applicants desiring any change must submit a copy of the recorded document in question in advance to the project manager and Office of Counsel. The determination of whether and how a change may be made to a recorded conservation restriction will be made by the Office of Counsel based upon the language in the recorded document, applicable policy, and coordination with the Regulatory Division

4. Enforcement. The Corps Regulatory staff will promptly notify the Office of Counsel of violations of conservation restrictions of which they become aware. The resolution of all such violations will be coordinated and concurred with by the Office of Counsel.

5. Database Requirements. All permits requiring conservation restrictions as mitigation will be tracked by entry in the Corps' database. The database tracking system will include the type of mitigation (e.g. preservation, restoration), the quantity of each type of mitigation, the status of the restrictions (e.g. pending, approved, recorded), and the geographic location (geocode) of the area to be placed under conservation restrictions using either point or polygon data.

Appendix F

- Restrictive Covenants/Model -

The statutory authority of the U.S. Army Corps of Engineers includes the issuance of permits under Section 404 of the Clean Water Act (33 U.S.C. 1344), and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Section 404 covers the discharge of dredged or fill material into wetlands or other waters of the United States. Section 10 prohibits the unauthorized obstruction or alteration of any navigable water of the United States. In some cases, both Sections 404 and 10 will apply.

Prospective permittees under Section 404 may be required to perform what is known as "compensatory mitigation" in return for unavoidable impacts to wetlands or other waters of the United States by the activities or work covered by a permit. A "conservation easement" is used to place permanent "conservation restrictions" on property containing aquatic resources. The conservation restrictions contained in conservation easements significantly limit the property's future use. The easement is conveyed to a third party, or "holder," which is typically a land trust, not-for-profit conservation organization, or governmental entity (the Corps of Engineers will not be a holder). Other alternatives for compensatory stream mitigation include protecting riparian areas through deed restrictions (Declaration of Restrictive Covenants – see example), proponent implemented stream restoration, commercial mitigation banks or in-lieu fee mitigation programs.

Conservation easements may have tax advantages for the landowner. Circumstances will vary, and it is up to the individual landowner to determine the appropriate tax treatment or deductibility. The Corps of Engineers makes no representation whatsoever as to the appropriate tax treatment for a particular conservation easement.

Conservation easements are also used to place conservation restrictions on areas approved as "mitigation banks." A mitigation bank is a site where aquatic resources are restored, enhanced, created and/or preserved for the purpose of providing compensatory mitigation. The bank obtains credits for these activities, which it then offers for sale to prospective permittees.
The purpose of the following model restrictive covenant (deed restriction) is to allow permit applicants to insert specific information into a prepared legal document. Changes necessary to customize the model, such as the identification of parties or real property, or the selection of other italicized provisions, will generally be approved without extended review. Additional changes or alternatives to the model proposed by the permit applicant may result in a more extended regulatory and legal review, and are subject to approval on a case-by-case basis. ANY proposed changes, including those necessary to customize the model, must be clearly identified when the permit applicant submits the proposed restrictive covenant for preliminary approval; if all changes are not clearly identified, the document may be returned to the applicant without approval. ALL restrictive covenants must be approved in writing by the Corps of Engineers before recording.

For explanation of other aspects of these compensatory mitigation alternatives, and of Corps of Engineers permitting in general, please contact the Helena Regulatory Office at10 West 15th Street, Helena, Montana 59626 or call (406) 441-1375.

MODEL DEED RESTRICTION:

COVENANT OF DEDICATION

(PERMITTEE) now stipulates to the following statements of fact, and further agrees to restrict the use and title of the realty described in Attachment 1 to this document (hereinafter referred to as the "Land") in accordance with the terms and conditions set forth herein.

STIPULATIONS OF FACT

1. That (PERMITTEE) is the applicant for Department of the Army permit number (NUMBER) to place fill material in the waters of the United States (WUS) located in (LEGAL DESCRIPTION); and that the U.S. Army Corps of Engineers has regulatory jurisdiction over the discharge of dredged or fill material into said waters pursuant to Section 404 of the Clean Water (33 USC 1344).

2. That (PERMITTEE) is the owner in fee of the real estate described in Attach 1.

3. That (PERMITTEE) and the Omaha District of the U.S. Army Corps of Engineers have reached an agreement whereby (PERMITTEE) will be permitted to discharge fill material in WUS in accordance with the terms and conditions of Department of the Army permit number (NUMBER); and that in consideration for said discharge of fill material into WUS, (PERMITTEE) will provide mitigation for the adverse environmental effects resulting from the placement of fill material in WUS by dedicating the realty described in Attachment 1 for perpetual use as a conservancy area in accordance with the terms and conditions of this document and the above-mentioned permit.

4. That the above-mentioned dedication shall consist of the execution of this document by all parties necessary to restrict the use and title of the land; and that this document shall be recorded in the Office of the Register of Deeds for (COUNTY), (STATE).

5. That upon receipt of a certified copy of this document, as recorded in the Office of the County Register of Deeds for (COUNTY), (STATE), the District Engineer of the Omaha District of the U.S. Army Corps of Engineers will issue a validated permit, number (NUMBER) to (PERMITTEE); and that said permit shall be issued in consideration for the execution of this Covenant.

6. That the terms and conditions of this Covenant of Dedication shall, as of the date of execution of this document, bind (PERMITTEE) to the extent of his legal and/or equitable interest in the land; and that this Covenant shall run with the land and be binding on (PERMITTEE) and its successors and assigns forever.

7. That the terms and conditions of this Covenant shall be both implicitly and explicitly included in any transfer, conveyance, or encumbrance of the Land or any part thereof, and that any instrument of transfer, conveyance, or encumbrance affecting all or any part of the Land shall set forth the terms and conditions of this document either by reference to this document or set forth in full text.

DEED AND USE RESTRICTIONS

(PERMITTEE) hereby warrants that he is the owner in fee of the realty described in Attachment 1; and that the Land is hereby dedicated in perpetuity for use as a conservancy area.

(PERMITTEE) hereby agrees to restrict the use and title of the Land as follows:

1. There shall be no construction or placement of buildings or mobile homes, fences, signs, billboards or other advertising material, or other structures, whether temporary or permanent, on the land.

2. There shall be no filling, draining, excavating, dredging, mining, drilling or removal of topsoil, loam, peat, sand, gravel, rock, minerals or other materials.

3. There shall be no building of roads or paths for vehicular travel or any change in the topography of the land. Wooden boardwalks for pedestrians are permitted.

4. There shall be no removal, destruction, or cutting of trees or plants, spraying with biocides, insecticides, or pesticides, grazing of animals, farming, tilling of soil, or other agricultural activity. Management activities are acceptable upon approval from the Corps.

5. There shall be no operation of snowmobiles, dune buggies, motorcycles, all-terrain vehicles or any other type of motorized vehicle on the land.

6. This Covenant of Dedication may be changed, modified or revoked only upon written approval of the District Engineer of the Omaha District of the U.S. Army Corps of Engineers. To be effective, such approval

must be witnessed, authenticated, and recorded pursuant to the law of the State of (STATE).

7. This Covenant is made in perpetuity such that the present owner and its heirs and assigns forever shall be bound by the terms and conditions set forth herein.

8. It is expressly understood and agreed that these restrictive covenants do not grant or convey to members of the public any rights of ownership, entry or use of the Property. These restrictive covenants are created solely for the protection of the Property, and for the consideration and values set forth above, the PERMITTEE(S) reserve(s) the ownership of the fee simple estate and all rights appertaining thereto, including without limitation the rights to exclude others and to use the property for all purposes not inconsistent with these restrictive covenants.

9. The Corps and its/their authorized agents shall have the right to enter and go upon the lands of the permittee to inspect the Property and take actions necessary to verify compliance with these restrictive covenants.

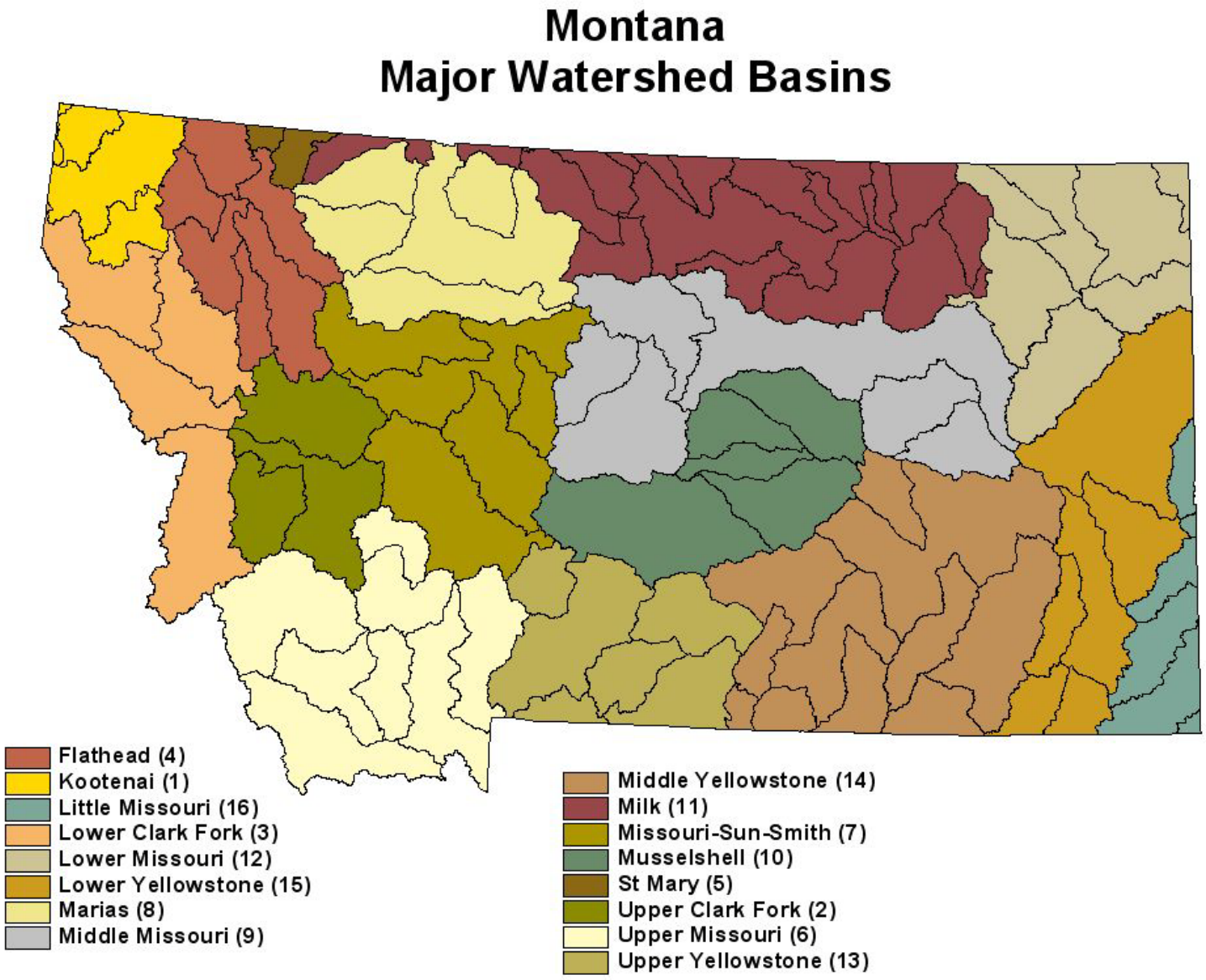
10. The Permittee grant(s) to the Corps, the U.S. Department of Justice, a discretionary right to enforce these restrictive covenants in a judicial action against any person(s) or other entity(ies) violating or attempting to violate these restrictive covenants; provided, however, that no violation of these restrictive covenants shall result in a forfeiture or reversion of title. In any enforcement action, an enforcing agency shall be entitled to a complete restoration for any violation, as well as any other judicial remedy such as civil penalties. Nothing herein shall limit the right of the Corps to modify, suspend, or revoke the Permit.

By:
(PERMITTEE)

Executed before me this _____day of ,_____ 20__, by (PERMITTEE) who is personally known to me.

_____
Notary Public My commission expires_____

NOTARY PUBLIC FOR MONTANA
My Commission Expires:


Montana
Major Watershed Basins
Flathead (4)
Kootenai (1)
Little Missouri (16)
Lower Clark Fork (3)
Lower Missouri (12)
Lower Yellowstone (15)
Marias (8)
Middle Missouri (9)
Middle Yellowstone (14)
Milk (11)
Missouri-Sun-Smith (7)
Musselshell (10)
St Mary (5)
Upper Clark Fork (2)
Upper Missouri (6)
Upper Yellowstone (13)

Appendix H

IV. Data Forms

Investigators: _____Date:_____

Project Name: _____Corps file No#_____

Brief Project Description:

Mitigation Debit Tables (Factors are defined in Section II of the MTSMP)

Adverse Impacts (debit) Factors and Worksheet.

FACTORS	**MULTIPLIERS**								
Stream Type (Pg 18)	Ephemeral 0.2	Intermittent 0.3	>2nd Order Perennial 0.6	1st or 2nd Order Perennial 0.8					
Stream Status (Pg 18)	Tertiary 0.1		Secondary 0.3				Primary 0.6		
Existing Condition (Pg 19)	Impaired 0.1		Somewhat Impaired 0.75				Fully Functional 1.5		
Duration (Pg 19)	Temporary (<12 months) 0.0		Short Term (12-24 months) 0.1				Permanent (>24 months) 0.3		
Dominant Impact (Pg 20)	Shade Clear 0.05	Utility Crossing 0.15	Bank Stabilization* See table I.2	Culvert 0.3	Detention /Weir 0.75	Morphologic 1.5	Impound 2.0	Pipe 2.2	Fill 2.5
Collective Impact (Pg 21)	0.0005* linear feet of stream impacted by this dominant impact								

Bank Stabilization Multipliers

Multiplier	Description For Bank Stabilization (Dominant Impact)
0.1	Vegetation only. (End result is a living herbaceous, woody, or mixed plant community. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.2	Vegetation combined with dead woody material. (End result is a living herbaceous, woody, or mixed plant community with a less than 50% dead wood component in the toe and/or bank. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.3	Vegetation above the Ordinary High Water Mark (OHWM) combined with either a rock Toe or 50%+ dead wood at or below OHWM. (End result is a living herbaceous, woody, or mixed plant community above the OHWM and rock or dead wood at or below the OHWM. Coir logs, fabric, or other soft temporary protection is acceptable with no additional debits needed.)
0.4	Rock riprap above and below the OHWM, and any type of vanes/barbs/weirs/hard points that project into the channel. (End result is little or no vegetation on bank for rock riprap revetments, or an eroding bankline protected by one or more vanes/barbs/weirs/hard points/etc.)
0.5	Log Cribs, or combinations of bank riprap with vanes/barbs/weirs/hard points. (Log crib structures filled with soil, plants, and/or rock extending below and/or above the OHWM, or projects using vanes/barbs/weirs/hard points that also include a rock riprap revetment or toe along the bank)
0.7	Retaining Walls. (Vertical or nearly vertical retaining walls constructed of gabion baskets, hand-placed stone, masonry, concrete, steel, wood, or other materials.)

Note: The cumulative impact factor for the overall project must be used in each reach column on the Total Debits Worksheet below.

Total 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						
Duration						
Dominant Impact						
Collective Impact						
Sum of Factors (SF_i)						
Linear Feet Impact (LF_i)						
SF_i X LF_i						

Note: Some projects (including maintenance) that are less than 300 ft in length may not require compensatory mitigation.

Total Debits = Σ (SF_i X LF_i) = _____

Brief Mitigation Description:

Riparian Zone

The Corps will determine the maximum credit width which is typically limited by the flood plain or channel migration which ever more appropriate.

Use the table below to determine the minimum width for your proposed riparian credit area using existing adjacent land use and percent slope.

Land Use	**Less than 5% slope (1x)**	**5% - 20% slope (2x)**	**21% -40% slope (3x)**	**Greater than 40% slope (4x)**
Residential	50	100	150	200
Agricultural - Grazing lands/ non cultivated	50	100	150	200
Recreational	75	150	225	300
Institutional / Agricultural-cultivated	75	150	225	300
Industrial	100	200	300	400
Landfill	100	200	300	400
Other Categories (including use of reference reach data)	Case-by-case	Case-by-case	Case-by-case	Case-by-case

Calculate the Net Improvement Factor for each side of the stream independently utilizing the table below. Definition for "Area to be restored" is in Section II.

Table I.4 Net Improvement For Riparian Buffers

Stream Status (Pg 18)	**Buffer Width (1side)**	**91-100% Area to be restored**	**61-90% Area to be restored**	**33-60% Area to be Restored**	**1-32% Area to be restored**	**No Restoration Needed***
Primary	4x min width	1.0	0.9	0.8	0.7	0.6
	3x min. width	0.8	0.7	0.6	0.5	0.4
	2x min. width	0.6	0.55	0.5	0.4	0.3
	Minimum Width	0.4	0.3	0.25	0.2	0.15
Secondary	4x min width	0.95	0.85	0.75	0.65	0.55
	3x min. width	0.75	0.65	0.55	0.45	0.35
	2x min. width	0.55	0.45	0.4	0.35	0.25
	Minimum Width	0.3	0.25	0.2	0.15	0.1
Tertiary	4x min width	0.8	0.7	0.6	0.5	0.4
	3x min. width	0.65	0.6	0.5	0.4	0.3
	2x min. width	0.5	0.45	0.4	0.3	0.2
	Minimum Width	0.25	0.2	0.15	0.1	0.05

***** "No Restoration Needed" refers to areas of buffer that have an established riparian corridor or will mature into native riparian area without active restoration. To be eligible for credits, long-term protection of restored and/or intact, naturally forested riparian zones through restrictive covenants, conservation easements or transfer in fee title to a conservation entity is required.

NOTE: Credits may not be given for riparian widths deemed excessive to providing benefits to the aquatic system. If both sides of the stream are owned or could reasonably be obtained by the applicant, buffering of both sides of the stream is recommended. Streams that are unstable and require major stream channel or bank restoration is not considered candidate streams for solely buffer enhancement credit.

Use net improvements previously calculated in Step 4 to insert in the table below. Net improvements should be calculated independently for each side of a single reach of stream. In cases where only a single side of a reach is buffered, a reach multiplier of 0.75 is used. In cases where both sides of a reach are buffered, a reach multiplier of 1.25 is used.

Riparian Credit Factors

FACTORS	**MULTIPLIERS**				
Net Improvement (Pg 21)	Riparian Buffer Enhancement (step 4) (Calculate value from above Net Improvement table) 0.05 – 1.0				
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.12	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	Same Order 0.2	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg 23)	On-site 0.2	Off-site 0.1	Outside 0.0		

*Use this option to calculate credits when no restoration of buffer necessary

Riparian Credit Worksheet

FACTORS			**Mitigation Reach 1**	**Mitigation Reach 2**	**Mitigation Reach 3**	**Mitigation Reach 4**	**Mitigation Reach 5**
	Net Improvement	Stream Side A					
	Net Improvement	Stream Side B					
	Type of Protection						
	Mitigation Timing						
	Comparative Stream Order						
	Location						
Sum of Factors (SF_i)							
Linear Feet Impact (LF_i)							
Reach Multiplier (RM) Buffer 1 side = 0.75 Buffer both sides = 1.25							
SF_m x LF_m x RM							

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

Mitigation Credit Tables
Stream Channel

Stream Restoration Credit Factors

FACTORS	MULTIPLIERS				
Net Improvement (Pg 21)	Minimal 1.2	Moderate 1.8	Substantial 2.5		
Stream Status (Pg 18)	Tertiary 0.05	Secondary 0.2	Primary 0.3		
Type of Protection (Pg 22)	Permit Condition 0.03	Covenants 0.05	Deed Restriction 0.1	Conservation Easement 0.15	Fee Title 0.2
Mitigation Timing (Pg 23)	Schedule 5* 0.0	Schedule 4 0.02	Schedule 3 0.05	Schedule 2 0.08	Schedule 1 0.1
Comparative Stream Order (Pg 18)	Same Order 0.2	1 Order Difference 0.01	2 or more Order Difference 0.0		
Location (Pg 23)	On-site 0.2	Off-site 0.1	Outside 0.0		

Stream Restoration Credit Worksheet

Factors	Mitigation Reach 1	Mitigation Reach 2	Mitigation Reach 3	Mitigation Reach 4	Mitigation Reach 5
Net Improvement					
Stream Status					
Type of Protection					
Mitigation Timing					
Comparative Stream Order					
Location					
Sum of Factors SF_m=					
Linear Feet LF_m =					
SF_m x LF_m =					

Total Stream Credits = Σ (SF_m x LF_m) == _____

Overall Summary Worksheet

Date: _____

Investigators: _____

Project Name: _____Corps file No#_____

Total Debits			Debits	Linear Ft
	A			
Mitigation Banking Credit Summary			**Credit**	**Linear Ft**
	B	Riparian zone/Buffer Enhancement		
	C	Stream Restoration		
	D	Total Proposed Bank Mitigation = B + C		
In-Lieu Fee Credit Summary			**Credit**	**Linear Ft**
	E	Riparian zone/Buffer Enhancement		
	F	Stream Restoration		
	G	Total Proposed ILF Mitigation = E + F		
Permittee-responsible Credit Summary			**Credit**	**Linear Ft**
	H	Riparian zone/Buffer Enhancement		
	I	Stream Restoration		
	J	Total Proposed Permittee-responsible Mitigation = H + I		
Credit Grand Totals			**Credit**	**Linear Ft**
	K	Total Riparian Enhancement Mitigation = B+E H		
	L	Total Stream Restoration Mitigation = C + F + I		
	M	Total Proposed Mitigation = D + G + J		

Proposed Mitigation Credits $\geq$ Debits (M $\geq$ A)	True or False