US Army Corps of Engineers®

Regulatory Program

Illinois Stream Mitigation Guidance

Stream Mitigation Method for Processing Section 404 Clean Water Act Permit Applications in the State of Illinois

Photo of Ten Mile Creek, DeWitt County, Illinois. Courtesy of Randy Sauer, IDNR.

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1.0 Introduction

This document is specifically designed to address typical impacts and mitigation proposals considered in the context of processing Clean Water Act Section 404 permit applications and provide information for Section 401 state water quality certification. Stream mitigation generally means the manipulation of the physical, chemical, and/or biological characteristics of a stream with the goal of restoring or replacing functional capacity that may be impacted by authorized activities. Stream mitigation involves the restoration, creation, enhancement, or preservation of streams and their associated habitat. Stream mitigation generally occurs at mitigation banks, through in-lieu fee programs, or involves permitee-responsible actions. In turn, these activities are aimed at compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved during project design. Mitigation may be required to offset losses to perennial, intermittent, and ephemeral streams that are considered waters of the United States. This method uses the best available information and applies scientific concepts to assist regulatory and resource agency staff in determining adverse impacts and the appropriate mitigation credits. Guidance for this approach was developed in cooperation with State and Federal agencies responsible for stream management in Illinois.

This guidance is applicable to regulatory actions requiring compensatory mitigation for adverse ecological effects where more rigorous, detailed studies such as the Hydrogeomorphic Methodology (HGM) are not considered practical or necessary. This method is a rapid protocol and has been established to provide a consistent rationale to make stream credit determinations for projects within the State of Illinois. This method will be required when assessing mitigation for impacts and in determining credits for stream mitigation banks, in-lieu fee programs, and for permittee-responsible sites. In some cases, the evaluation of the permit application may reveal the proposed stream compensation measures are not practical or ecologically desirable. **All determinations involving projects requiring stream mitigation will be made on a case-by-case basis at the discretion of the reviewing Corps district.** As additional experience and information is gained, this method will be subject to future review and modification.

Stream mitigation guidance described in this document is designed to supplement mitigation plan requirements in the Mitigation Rule released on April 10, 2008 (Compensatory Mitigation for Losses of Aquatic Resources). Specifically, this method addresses the requirements for making a determination of credits identified in Section 332.4 (c)(6) of the Mitigation Rule. This method is considered a part of an overall mitigation plan and does not replace any other mitigation plan requirements or components identified in the Mitigation Rule.

When applying this method to stream mitigation banks or in-lieu-fee programs the reviewing Corps district will consult with the Interagency Review Team (IRT) to reach a consensus to meet the goals and objectives of the proposed mitigation bank or in-lieu-fee program.

2.0 Adverse Impact Factors

Adverse impacts determine the amount of mitigation credits required to offset stream losses within the permit area. Adverse impacts are totaled and annotated in the worksheet for impacts occurring within ***each independent stream reach***. An independent stream reach is the entire reach of tributary that is the same order (i.e. from the point of confluence where two lower order streams meet to form the tributary, downstream to the point such tributary enters a higher order stream). The Adverse Impact Worksheet is located in Appendix A-1.

Stream Types are classified and rated into one of the following:

Ephemeral / Intermittent Streams have flowing water only during and for a short duration after precipitation events in a typical year. Streambeds are generally located above the water table. Groundwater is not a primary source of water for the stream; however, at certain times of the year may provide a limited source for stream flow. Runoff from precipitation is the primary source of water for stream flow. These streams typically support few aquatic organisms. When aquatic organisms are found they typically have a very short aquatic life stage. These streams are typically 1st order and some 2nd order streams or streams that transition from ephemeral to intermittent. Given the unique flow patterns and habitat considerations of these streams, they are assessed differently from other types of waters.

Intermittent Streams with Seasonal Pools have flowing water during certain times of the year with groundwater influencing stream flow. During dry periods, intermittent streams may not have flowing water but retain seasonal pools. Runoff from rainfall is a supplemental source of water for stream flow. The biological community of intermittent streams is composed of species that are aquatic during a part of their life cycle or move to perennial water sources.

Perennial Streams have flowing water year-round during a typical year. The water table is located above the streambed for most of the year. Groundwater is a primary source of water for stream flow. Runoff from precipitation is a supplemental source of water for stream flow. Perennial streams support a diverse aquatic community of organisms year round and are typically the streams that support fisheries.

Priority Waters is a rating factor used to determine the importance of the stream that would be impacted or used for mitigation. Priority waters are influenced by the quality of the aquatic habitat potentially subject to be impacted or used for mitigation. The priority waters factor will influence the amount of stream credits required or generated. Waters listed in the Illinois Section 303(d) Impaired Waters List will score a higher priority http://www.epa.state.il.us/water/tmdl/303d-list.html. As new technology and new assessment information is available, a stream may increase to a higher category. Priority waters are divided into three categories:

Primary streams provide important contributions to biodiversity on an ecosystem scale or high levels of function contributing to landscape or human values. Impacts to these streams should be rigorously avoided or minimized. If a primary stream must be impacted, compensation for impacts should emphasize replacement nearby and in the same immediate 8-digit hydrological unit code (HUC) watershed. Designated primary priority areas include:

- National Wild and Scenic Rivers/Study Rivers/Riverways.
- Outstanding National Resource Waters.
- Outstanding State Resource Waters – pursuant to 35 Ill. Adm. Code 303.206.
- Waters with listed Federal or State Endangered and Threatened species.
- Designated Illinois Natural Areas Inventory sites
- Biologically Significant Streams*
- Streams receiving a Class A rating for diversity or integrity*
- Significant Mussel Beds**
- District Designated Waters

* These streams are designated in the 2008 Illinois Department of Natural Resources publication

Integrating Multiple Taxa in a Biological Stream Rating System (Illinois Biological Stream Rating System).

** These areas are determined in coordination with the USFWS and the IDNR.

Secondary priority areas include:

- Waters listed in the Illinois Section 303(d) Impaired Waters List for aquatic life use of indigenous aquatic life use
- Waters located within lands under public ownership or holdings
- Streams with a Class B rating for diversity or integrity (Illinois Biological Stream Rating System)
- Streams adjacent to an approved mitigation bank or mitigation site
- Stream and river reaches within 1.0 mile upstream or downstream of primary priority reaches.
- Streams designated as enhanced for dissolved oxygen under 35 Ill. Adm. Code 302.206

Tertiary areas include all other freshwater systems not ranked as primary or secondary priority.

Existing Condition is the state of the physical, chemical, and biological health of a stream at the time of assessment. Existing condition may be compared to the least disturbed condition of similar streams in the region. This is a measure of the stability and functional state of a stream and the stability of the riparian buffer before project impacts.

In this stream mitigation method, the procedure for assessing Existing Condition considers biological significance, integrity, or diversity of the valley segment or nearby valley segments, water quality, and geomorphic (hydrologic, channel) conditions of the subject stream reach. Existing local watershed plans/assessments should be consulted to aid in determination of Existing Condition. Information including biological surveys, channel topography or cross-sections, and aerial photography should also be reviewed and used to assess Existing Condition of the subject reach and may be required as part of an approved mitigation plan. Biological conditions for Ephemeral/Intermittent streams typically do not require assessment for placement in the following categories.

Overall Existing Condition is divided into three categories: Fully Functional, Moderately Functional, or Functionally Impaired.

Fully Functional describes those streams that 1) support aquatic communities that are of high diversity or integrity, 2) have unaltered planform (i.e. are not channelized), unobstructed floodplain access (e.g. are not leveed), have no base-level disruption or impoundment, and have no artificial constriction, and 3) meet water quality standards (i.e. are not listed in the Illinois Section 303(d) Impaired Waters List). A fully functional stream should represent a least-disturbed condition and therefore would exhibit characteristics used for establishing performance standards for restoration and mitigation projects.

A stream reach is considered fully functional if it has all of the following characteristics:

- Has not been channelized, leveed, impounded, or artificially constricted.
- Is not listed on the Illinois Section 303(d) Impaired Waters List.
- Has no stream impact (see Activities for a list of impacts) within 0.5 mile upstream or

downstream of the proposed stream impact or mitigation site.

and has one of the following characteristics

- Scores A or B for either Diversity or Integrity (Illinois Biological Stream Rating System).
- Has a riparian buffer of deep-rooted native vegetation that is greater than 50 feet wide on both sides of the stream.

Streams that support aquatic species listed as endangered, threatened, or rare by the U.S. Fish and Wildlife Service (USFWS) or Illinois Department of Natural Resources (IDNR) (http://dnr.state.il.us/espb/datelist.htm) or are listed as a Biologically Significant (Illinois Department of Natural Resources 2008) may be considered Fully Functional regardless of the function status of other parameters.

The Corps, at its discretion, may designate the largest streams within an Ecological Drainage Unit or 8-digit HUC as fully functional, regardless of whether they meet the criteria above, based on the stream's recreational, commercial, or water supply values. Conversely, Ephemeral/Intermittent streams will not receive a Fully Functional rating.

Streams that do not have a Biological Stream Rating will be assumed to have full biological function or assume the function status of the nearest rated valley segment within the 12-digit Hydrologic Unit.

Moderately Functional describes those streams that show a limited degree of disturbance to geomorphic and hydrologic conditions (i.e. alteration of forms and processes) but support high to moderate biologic diversity or integrity (at least C rating in both categories*) and meet water quality standards (i.e. are not in the Illinois Section 303(d) Impaired Waters List).

A stream reach is considered moderately functional if it has any of the following characteristics:

- Has been channelized but shows evidence of self-recovery (e.g. bar or riffle-pool formation), and has not been leveed, impounded, or artificially constricted and no impact within 0.5 miles upstream or downstream.
- Has one stream impact with less than 100 feet of impacted section within 0.5 miles upstream or downstream, including culverts, pipes, or other manmade modifications.
- Has a narrow riparian buffer of deep-rooted native vegetation (25 to 50 feet wide on both sides of the stream).

and has one of the following characteristics

- Scores C or higher for Diversity or Integrity (Illinois Biological Stream Rating System).
- Is <u>not</u> listed in the Illinois Section 303(d) Impaired Waters List and not otherwise degraded.

Ephemeral/Intermittent streams will be considered Moderately Functional unless they meet the physical qualifications for Functionally Impaired streams.

Functionally Impaired describes those streams that have been degraded in one or more parameters and lacks resilience characterized by loss of one or more integrity functions. Recovery is unlikely to occur naturally unless substantial rehabilitation/restoration is undertaken.

A stream reach is considered functionally impaired if it has any of the following characteristics:

- Has been channelized and shows no evidence of self-recovery, or is leveed, impounded, or artificially constricted.
- Shows bank failure related to incision and not meandering (e.g. both banks failing).
- Shows evidence of sedimentation that contributes to degradation of physical habitat or water quality (e.g. listed in the Illinois Section 303(d) Impaired Waters List).
- Is openly grazed on one or both sides of the stream.
- The stream has little to no (0-25 feet) riparian buffer of deep-rooted vegetation on either side of the stream.
- The stream has one or more stream impacts within 0.5 miles upstream and downstream of the proposed stream impact, including culverts, pipes, or other manmade modifications.

Assessment of Existing Condition is separated into 3 categories: biological quality, water quality, and geomorphic condition. The categories and functionality division are proposed not necessarily to develop a scoring procedure but to document which functions will potentially be lost during impacts. For each impacted reach, parameters may be assessed separately and then all parameters are considered to establish Existing Condition based on the functionality descriptions above.

Biological quality is assessed either by consulting the Illinois Biological Stream Rating System (IDNR 2008) or by more recent documentation of aquatic species present in the stream. In streams that are not rated or have not been sampled recently, results from an alternative assessment of biological quality may be used as a surrogate if needed or determined to be required as a part of the approved mitigation plan. In terms of biological quality, a reach is considered fully functional if it is rated Biologically Significant, is rated A or B in diversity or integrity, or threatened or endangered species are present. A reach is considered moderately functional if it is rated C for diversity and integrity and functionally impaired if rated D or E in either diversity or integrity. In cases where there is discrepancy between ratings for diversity and integrity, the higher letter grade will be used to establish Existing Condition. For example, if a segment is rated B for diversity and D for integrity, the diversity rating would take precedence (Fully Functional). Biological quality is usually not assessed in Ephemeral/Intermittent streams.

Water quality will be assessed by consulting the most recent Illinois Section 303(d) Impaired Waters List. In terms of water quality, a reach is considered fully functional if it does not appear in the Illinois 303(d) Impaired Waters List, moderately functional if is not in the Section 303(d) List but is otherwise moderately functional in one of the other parameters, and functionally impaired if the reach appears in the Illinois Section 303(d) List.

Geomorphic condition assessment consists of two components: hydrologic condition and channel condition.

Hydrologic condition component will be assessed by consulting topographic maps and recent aerial photos and by field inspection. A reach is considered fully functional if it is not channelized, leveed, impounded, or artificially constricted. A stream is considered moderately functional if it is channelized, but is not leveed, impounded, or artificially constricted. Functionally impaired streams are leveed, impounded, or artificially constricted regardless of planform alteration.

Channel condition component is assessed by a combination of map, aerial photo, and field inspection. Where the reach is assessed as fully functional in the hydrologic component and there are no impacts within 0.5 miles upstream or downstream of the reach the channel condition is considered fully

functional. Where fully functional hydrologically with an impact within 0.5 miles upstream or downstream or where there is moderate hydrologic function, no impacts within 0.5 miles, and the channel shows evidence of gradual recovery (e.g. development of bars, pools, and riffles) the reach is considered moderately functional. Where the reach is assessed as moderately functional hydrologically with presence of impact w/in 0.5 mi upstream and downstream or functionally impaired in the hydrologic component the channel condition is considered impaired.

Duration is the amount of time adverse impacts are expected to last. Duration will be factored in the following categories:

Temporary impacts will occur within a period of less than 180 days.

Short Term impacts will remain evident after 180 days and will not exist after two years.

Permanent impacts will be greater than 2 years.

Activity is the type of impact proposed that will diminish the functional integrity of the stream system. It is the dominant impact at the site. Ten categories of impacts are used.

Armor means to riprap, bulkhead, or use other rigid methods to contain stream channels, leaving stream bed unaltered.

Below Grade (embedded) Culvert means to route a stream through pipes, box culverts, or other enclosed structures (≤100 linear feet of stream to be impacted per crossing). Below grade culverts should be designed to pass bankfull flow. The culvert bottom, including head-walls and toe-walls would be designed to be embedded to a depth of no less than 12-inches below the streambed. Improperly designed culverts will be evaluated under the activity for "piping". Culverts should be designed to allow fish passage and other aquatic life movement.

Clearing means the clearing or removal of streambank vegetation or other activities that reduce or eliminate the quality and function of vegetation within riparian habitat. Clearing does not include soil disturbance or changing elevation. Impacts associated with clearing may not be directly regulated, but may be considered indirect impacts within the scope of permit area. The value for clearing may be added to the primary activity if determined appropriate by the reviewing Corps district.

Detention means to temporarily slow flow in a channel. Areas that are temporarily flooded due to detention structures must be designed to pass flow below bankfull stage. Impacts to the stream channel where the structure is located are considered as a "fill" activity.

Fill means the permanent fill of a stream channel including the relocation of a stream channel (even if a new stream channel is constructed) or other fill activities.

Impoundment means conversion of streams to open water through the construction of a dam or other detention/control structure. Channel impacts where the structure is located is considered a "fill" activity and the inundation will be considered as an impoundment.

Morphologic Disturbance means to alter the established or natural dimensions, depths, or limits of a stream corridor through straightening, widening, entrenchment, or channelization.

Pipe means to route a stream through pipes, box culverts, or other enclosed structures.

Utility crossings mean pipeline/utility line installation that requires temporary disturbance of the streambed. **Bridge footings** requiring fill in waters of the United States are also considered in this activity. This activity also includes drilled shafts, column/pier placement, cofferdams for footing/pier placement, temporary crossings and workpads.

Cumulative Impact is a scaling factor used in the adverse impact table to address the scope of impacts. Cumulative impact refers to the total linear feet impacted by the project (0.0003 x length of stream impacted).

Linear Feet means the length of stream impacted by a project that will require mitigation.

3.0 Stream Restoration Factors

Stream restoration projects typically are intended to improve or restore environmental conditions in the stream and adjacent corridor (Copeland, et al., 2001). Restoration of natural stream stability requires careful study in stream hydrology, biological habitat, and hydraulics. Stream restoration does not necessarily require returning a system to a predisturbance condition, as this is seldom feasible (Copeland, et al., 2001).

Successful stream channel design or uncovering what restoration technique best fits a given situation is highly dependent on regional and local factors. Stream restoration must account for any potential adjustments in channel form and function that may occur within the watershed as a result of the restoration project. Mitigation objectives, site selection, baseline information, alternatives, data analysis, watershed conditions, and other feasibility actions must be considered during permit review as components of a mitigation plan prior to the application of this method. It is important to develop stream mitigation plans in consultation with resource and regulatory agencies and use existing watershed assessments, TMDL implementation plans, or other available planning documents to make determinations on the appropriate restoration method.

Stream restoration factors determine the amount of in-stream mitigation credits generated to offset stream losses for a mitigation project. Stream restoration is totaled using the factors listed in this section of the guidance document. The Stream Restoration Worksheet is located in Appendix A-2.

Net Benefit is an evaluation of the proposed mitigation relative to the restoration, enhancement, creation, and preservation of the chemical, biological, and physical integrity of waters of the United States. Excellent, Good, Moderate, and Minimal stream restoration activities are covered under these guidelines and described below. Net benefits address functional objectives such as hydrologic balance, sediment transport, water quality and biological support in the context of the existing conditions prior to mitigation activities. The Corps will determine on a case-by-case basis the net benefit of the proposed in-stream mitigation action. Each mitigation proposal will be evaluated to ensure compliance with the Mitigation Rule.

Excellent Net Benefits are those which address key multiple functions of a stream on a large scale. For example, re-meandering a previously straightened stretch of stream would restore channel length, decrease gradient, increase flow diversity and improve instream habitat in the stretch of channel segment

directly affected. Furthermore, this practice would likely reduce headcutting above the project area and attenuate flooding downstream. "Excellent Net Benefits" are those which accrue to all or significant parts of a stream's watershed and are consistent with a watershed plan and baseline information. Examples of practices which accrue excellent net benefits include (but are not limited to):

- Creating floodplains adjacent to stream with appropriately low width/depth ratios at bankfull discharge and native vegetation.
- Removing structures (low head dams, levees, dikes etc.) from the stream channel or its 100 year floodplain that fragment aquatic habitat and/or interfere with natural hydro- logic functions (e.g. flooding, recharge, connectivity to floodplain etc).
- Restoring stream channel to its former location *or* restoring sinuosity, channel dimensions (width/depth ratio), and bankfull width of a degraded steam reach to appropriate design based on reference reach or other appropriate standards.
- Building a new, stable channel at higher elevation and connecting it to its natural floodplain.
- Creating or reconnecting floodplains adjacent to streams artificially disconnected from their floodplain.
- Reconnecting artificially cut off or abandoned oxbows, side channels or meanders where functionally appropriate.

"Excellent Net Benefit" does *not* include the relocation of a stream channel to accommodate a project in the stream's former location.

Good Net Benefits address multiple functional objectives but on a smaller, reach specific scale. For example, a streambank stabilization project employing bio-engineering materials such as live cuttings or fascines would provide bank protection against shear stress, reduce sediment input locally and provide aquatic habitat for small fishes and invertebrates. However, these benefits would be localized and not system-wide. Examples of practices which accrue good net benefits include (but are not limited to):

- Most streambank stabilization projects which employ bio-engineering (i.e. vegetative) techniques to restore bank stability in actively eroding areas. Includes re-shaping banks *if* native vegetation is successfully planted following construction.
- Stream restoration methods utilizing rock/riprap materials to modify flow characteristics and enhance channel stability/aquatic habitat. Includes bendway weirs, stream barbs, Newbury weirs, constructed riffles etc but *not* rock armoring of streambanks alone.
- Replacement of inappropriately designed culverts (undersized or impassable by fish) with open span bridges or structural arch culverts
- Fish ladders, baffles or similar structures to allow passage of fish where previously difficult or impossible.
- "Daylighting" of piped or culverted stream segments into an appropriately designed open channel.
- Localized (< 1000 LF) re-shaping or terracing of streambanks to restore natural channel dimensions and induce native vegetative growth.
- Construction of pools, riffles and runs in an existing channel.
- Routing stream around an existing impoundment into a morphologically stable reach.

- Creation of instream fish habitat using Lunker structures, tree revetments, boulder placement, root wads, etc.
- Removal of culverts, weirs, pipes and other minor instream structures.

Moderate Net Benefits accrue from practices that address a single functional objective regardless of scale. For instance, application of riprap on eroding streambanks offers only streambank stability as a benefit (unless combined with other techniques). Even if applied on a significant length of stream, such practices do not markedly enhance the stream's physical, chemical, and biological processes. Examples of practices which accrue moderate net benefits include (but are not limited to):

- Linear applications of rock/riprap such as Longitudinal Peak Stone Toe Protection (LPSTP) on or along eroded streambanks.
- Replacement of undersized culverts with appropriately sized closed culverts.
- Removal of culverts, weirs, pipes and other minor instream structures.
- Removal or re-alignment of natural debris or manmade instream structures to prevent scour and/or bank erosion.

Minimal Net Benefits offer little or no enhancement of functional objectives. For instance, a stream relocated to a new location to accommodate construction of an authorized project must incorporate natural channel design features relative to a reference reach (dimensions, plan form, profile) and incorporate appropriate additional measures (grade control, instream habitat, riparian plantings etc) to receive minimal credits. "Minimal" refers to situations wherein a project could impair the stream's functions without further compensatory measures.

Streambank repair is the stabilization of localized lateral streambank erosion using bioengineering techniques such as fascines, branch packing, brush mattresses, live cribwalls, tree revetments, or coir fiber logs, supplemented with use of erosion control matting and live staking for long term stability. Streambank stabilization alone may not constitute a high rating for channel restoration. Linear credit for installation of streambank stabilization measures will be based on 3X the length of the appropriate size structure (i.e., 600' for a 200' tree revetment).

Structure removal refers to removal of existing pipes, culverts, dams, wiers, and other manmade structures that alter a stream's geomorphology or flow. A series of grade control structures may be needed to reconstruct the channel profile to avoid headcutting, slope failure, and to not restrict fish passage. The proposed structural removal will be assigned a net benefit depending on the ecological lift associated with the specific action. The net benefit selected for a specific structural removal must be supported by information necessary to document ecological lift. Selection of an appropriate net benefit is at the sole discretion of the reviewing Corps district. Credit for removal of manmade structures will be based on total length of stream impacted directly or indirectly by the structure (i.e., dam fill plus length of impounded stream; culvert fill plus upstream and downstream areas where aggradation/degradation can be attributed to the culvert).

4.0 Riparian Factors

Riparian buffer factors determine the amount of riparian mitigation credits generated to offset stream losses for a mitigation project. Riparian buffer credit is totaled using the factors listed in this section of the guidance document. The Riparian Buffer Worksheet is located in Appendix A-3.

Riparian Buffer Creation / Enhancement means implementing restoration within a stream riparian buffer zone to improve water quality and/or ecological function. Riparian creation should strive to mimic the composition, density and structure of a reference reach. Buffer enhancement may include increasing or improving upland and/or wetland habitat within or adjacent to riverine systems. For the purpose of this guidance, riparian buffer creation is considered if 51-100% of the area would require planting of vegetation to restore streambank stability and improve habitat. An area will be considered as riparian buffer enhancement if 10-50% of the area would require planting of vegetation to restore streambank stability and improve habitat.

Riparian Buffer Preservation means the conservation, in its naturally occurring or present condition, of a riparian buffer to prevent its destruction, degradation, or alteration in any manner not authorized by the governing authority. For the purposes of this guidance, an area will be considered as riparian buffer preservation if less than 10% of the area would require planting of vegetation to restore streambank stability and improve habitat.

Requirements for Minimum Buffer Width (MBW) for all Illinois streams is 25 feet. The MBW for which mitigation credit will be earned is 50 feet on one side of the stream, measured from the top of the streambank perpendicular to the channel.

Table 1 provides appropriate values for the riparian creation and restoration, enhancement, and preservation for use on the riparian worksheet (Appendix A-3). Note buffers on each side of the bank of a given reach generate mitigation credit separately (Stream Side A and Stream Side B).

Table 1. Riparian Buffer Width Table.

Buffer width (on one side of the stream) Equal to or greater than	% Buffer that needs planting		
	Buffer Creation and Restoration Exotic Removal and (51-100%)Planting	Buffer Enhancement Exotic Removal and (10-50%)Planting	Buffer Preservation (<10%)Planting
300 feet	2.4	0.95	0.65
275 feet	2.3	0.9	0.625
250 feet	2.2	0.85	0.6
225 feet	2.1	0.825	0.55
200 feet	2.0	0.8	0.5
175 feet	1.8	0.75	0.45
150 feet	1.6	0.7	0.4
125 feet	1.4	0.65	0.35
100 feet	1.2	0.6	0.3
75 feet	0.8	0.4	0.2
50 feet Minimum Buffer Width (MBW) for credit	0.4	0.2	0.1
25 feet required	0	0	0

Streams that are unstable and require major stream channel or bank restoration are not considered candidate streams solely for buffer enhancement credit.

Supplemental Buffer Credit allows additional mitigation credit to be generated if proposed riparian mitigation activities include minimum width buffers on **both** sides of a stream reach.

Temporal Lag is a factor to compensate for the time required for a mitigation area to fully replace functions lost at the impact site. Different systems will require different times to reach a commensurate level of functional capacity that existed at the impacted site. For example, a forested buffer would have a greater temporal lag than a grass buffer strip.

5.0 Common Mitigation Factors

These factors are common and apply to both the Stream Restoration and Riparian Buffer Restoration worksheets.

Monitoring and Adaptive Management plans are intended to measure the level of success of the mitigation work. Monitoring plans also provide information to implement the appropriate corrective measures to reduce the likelihood of mitigation failure. Monitoring is a required component of all mitigation plans. The final Mitigation Rule published on April 10, 2008, states that the submission of monitoring reports to assess the development and condition of mitigation projects is required, but the content and level of detail for those reports must be commensurate with the scale and scope of the compensatory mitigation project as well as the compensatory mitigation project type (33 CFR 332.6(a)(1)). All proposed mitigation monitoring must be in compliance with the final Mitigation Rule and consistent with Regulatory Guidance Letter 08-03, dated October 10, 2008.

This stream assessment method allows for differing levels of monitoring credit associated with approved mitigation projects. Monitoring requirements are typically based on performance standards and may vary from one project to another. A more comprehensive monitoring protocol may be required for mitigation involving extensive stream restoration, in sensitive watersheds or critical habitat, in significant state waters, or if the permit action involves a threatened or endangered species. Likewise, the level of monitoring needed may depend on project siting or local conditions within a watershed. A more in-depth monitoring protocol may be needed for mitigation projects located in highly developing watersheds or in watersheds strongly influenced by certain activities such as coal mining or intensive agriculture or animal farming practices.

The level of credit allowed for mitigation monitoring will be determined by the reviewing Corps district. Mitigation credit is dependent on local factors as well as any special permit conditions. Level I, Level II, and Level III credits will be considered for riparian and stream restoration mitigation. These levels also apply to monitoring for mitigation banks and in-lieu-fee projects.

Control/Protection is an appropriate real estate instrument, approved in advance by the Corps, that will be required to protect the mitigation work in perpetuity. Selection of the instruments that may be appropriate for the subject property may vary depending on the situation.

> **Deed restriction** means a provision in a deed limiting the use of the property and prohibiting certain uses. The district approves mitigation areas and requires deed restrictions to protect and preserve mitigation sites. If the applicant can demonstrate that the mitigation activity will occur within a right-of-way easement or on public lands and the land classification will offer protection and preservation of the site, such as associated with highway projects or in national parks, the credit may be considered the same as a deed restriction.

Restrictive covenant means a legal document whereby an owner of real property imposes perpetual limitations or affirmative obligations on the real property.

Conservation easement means a legally binding recorded instrument approved by the district to protect and preserve mitigation sites by giving protection and enforcement rights by real estate interest to a third party.

Conservancy means transferring fee title to a qualified, experienced, non-profit conservation organization or government agency. Non-profit organization means an entity recognized and operating under the rules of the Internal Revenue Services for non-profit purposes.

Mitigation Construction Timing addresses temporal aspects of the mitigation plan**.** No additional credits are generated for this factor if the mitigation action in a reach is primarily riparian buffer preservation [<10% of buffer area would require planting of vegetation) (Table 1)]. For all other mitigation projects, the following guidelines apply for construction timing:

Non-Banks:
Schedule 1: A majority of the mitigation will be completed after the impacts occur.
Schedule 2: A majority of the mitigation is completed concurrent with the impacts
Schedule 3: All mitigation is completed before the impacts occur.
Banks: Release of credits will be determined by the IRT on a case-by-case basis.

Mitigation Factor will be determined at the discretion of the reviewing Corps district and based upon the needs of the watershed, best available science, public interest comments, and resource agency input.

In most cases, a mitigation factor of 0.5 will be applied for 1) impacts not within a mitigation bank service area, but proposing to go to a bank, 2) permittee constructed mitigation proposed outside of 12-digit Hydrologic Unit Code (HUC) watershed in which the impacts occurred, or 3) changes that provide a net loss in functional quality of the stream corridor (i.e. providing out-of-kind riparian replacement by impacting an existing high quality riparian corridor and replacing with grass buffer strips).

A mitigation factor of 1.0 will be applied for 1) impacts within a mitigation bank service area and proposing to go to a bank, 2) permittee constructed mitigation proposed within the 12-digit HUC watershed in which the impacts occurred, or 3) providing similar or in-kind functional replacement that existed in the impacted stream corridor.

Mitigation factors for in-lieu fee mitigation will be determined by each individual District.

Mitigation should be selected on a stream within two stream orders as the impacted stream.

6.0 References

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APPENDIX A

A-1: Adverse Impact Worksheet
A-2: Stream Restoration Worksheet
A-3: Riparian Worksheet

A.1. ADVERSE IMPACT WORKSHEET

Stream Type Impacted	Ephemeral / Intermittent 0.1			Intermittent with Seasonal Pools 0.4			Perennial 0.8		
Priority Waters	Tertiary 0.1			Secondary 0.4			Primary 0.8		
Existing Condition	Functionally Impaired 0.2			Moderately Functional 0.6			Fully Functional 1.2		
Duration	Temporary 0.05			Short Term 0.1			Permanent 0.3		
Activity	Clearing + 0.05	Utility Crossing/Bridge Footing 0.15	Below Grade Culvert 0.3	Armor 0.5	Detention 0.75	Morphological Disturbance 1.5	Impoundment 2.0	Pipe 2.2	Fill 2.5
Cumulative Impact	0.0003 x total linear feet of stream impacted per reach								

Factor	Stream Reach 1	Stream Reach 2	Stream Reach 3	Stream Reach 4	Stream Reach 5
Stream Type Impacted					
Priority Waters					
Existing Condition					
Duration					
Activity					
Cumulative Impact					
Sum of Factors	M =				
Linear Feet of Stream Impacted in Reach	LF=				
M X LF					

Total Mitigation Credits Required = (M X LF) = _____

+Clearing may be added to the primary impact value if determined appropriate by the reviewing Corps District.

A.2. STREAM RESTORATION WORKSHEET

Priority Waters	Tertiary 0.05		Secondary 0.2	Primary 0.4
Net Benefit	Minimal 1.0	Moderate 1.5	Good 2.0	Excellent 3.5
Monitoring	Level I 0.05		Level II 0.3	Level III 0.5
Site Protection	Deed Restriction 0.1		Conservation Easement / Title Transfer 0.4	
Mitigation Construction Timing	Schedule 1 0		Schedule 2 0.1	Schedule 3 0.3
Mitigation Factor	In HUC 12 watershed or bank service Area: 1.0 Out of kind, or HUC 12 watershed, or bank service Area: 0.5			

Factors	Stream Reach 1	Stream Reach 2	Stream Reach 3	Stream Reach 4	Stream Reach 5
Priority Waters					
Net Benefit					
Monitoring					
Site Protection					
Mitigation Construction Timing					
Sum Factors (M)=					
Stream length in Reach (do not count each bank separately) (LF)=					
Credits (C) = M X LF					
Mitigation Factor (MF) x (C)					
Total Credits Generated					

Total Channel Restoration/Relocation Credits Generated = _____

A.3. RIPARIAN WORKSHEET

Priority Waters	Tertiary 0.05	Secondary 0.2	Primary 0.4	
Net Benefit (for each side of stream	Riparian Creation, Enhancement, Restoration, and Preservation Factors (select values from Table 1) (MBW = Minimum Buffer Width = 50')			
Supplemental Buffer Credit	Condition : MBW restored or protected on both streambanks To calculate:(Buffer Credit Stream Side A + Buffer Credit Stream Side B) / 2			
Monitoring	Level I 0.10	Level II 0.20	Level III 0.25	
Site Protection	Deed Restriction 0.1		Conservation Easement / Title Transfer 0.4	
Mitigation Construction Timing	Schedule 1 0		Schedule 2 0.1	Schedule 3 0.3
Temporal Lag (Years)	Over 20 -0.3	10 to 20 -0.2	5 to 10 -0.1	0 to 5 0
Mitigation Factor	In HUC 12 watershed or bank service Area: 1.0 Out of kind, HUC 12 watershed, or bank service Area: 0.5			

Factors		Stream Reach 1	Stream Reach 2	Stream Reach 3	Stream Reach 4	Stream Reach 5
Priority Area						
Buffer credit	Stream Side A					
	Stream Side B					
Supplemental Buffer Credit Met (Buffer on both sides)						
Monitoring						
Site Protection						
Mitigation Construction Timing						
Temporal Lag						
Sum Factors (M)=						
Linear Feet of Stream Buffer (LF)= (don't count each bank separately)						
Credits (C) =M X LF						
Mitigation Factor (MF) x (C)						
Total Credits Generated						

Total Riparian Restoration Credits Generated = _____