Department of the Army
Savannah District, Corps of Engineers
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Standard Operating Procedure
Compensatory Mitigation
WETLANDS, OPENWATER & STREAMS

Table of Contents

1. Applicability. This Standard Operating Procedure (SOP) is applicable to regulatory actions requiring compensatory mitigation for adverse impacts to 10 acres or less of wetland or other open waters, and/or 5000 linear feet or less of intermittent and/or perennial stream (Definitions, 65 FR Vol. 47, Page 12898). This SOP may be used as a guide in determining compensatory mitigation requirements for projects with impacts greater than the above wetland and stream limits, or for enforcement actions, however, higher than calculated credit requirements would likely be applicable to larger impacts. In instances where it is unclear whether the jurisdictional area proposed to be impacted is a wetland, a stream, or other waters, the US Army Corps of Engineers (USACE) will make the final determination. This SOP does not address mitigation for categories of effects other than ecological (e.g., historic, cultural, aesthetic). Types of mitigation other than compensation (e.g., avoidance, minimization, reduction) are not addressed by this SOP. As an alternative to proposing a site specific mitigation plan, you may consider purchasing the required mitigation credits from a wetland or stream mitigation bank. For impacts in areas not serviced by approved wetland or stream banks, wetland or stream in-lieu-fee banking, as appropriate, may be proposed.

When this SOP is used in the establishment of a Mitigation Bank, the USACE will consult with the Mitigation Bank Review Team (MBRT), with the goal of achieving a consensus of the MBRT regarding the factors, elements, and design of the Mitigation Bank Plan. Once a mitigation bank receives final approval using a dated version of this SOP, that version would remain valid for that bank unless the bank is amended or substantially modified. In other words, an approved bank cannot use a later version of this SOP to possibly generate more credit, unless the Banking Instrument (BI) for the approved bank is amended for use a later version of the SOP, and this amendment of the BI is approved by the MBRT.

Also, note that this document is subject to periodic review and modification, and consultation with the local USACE office is necessary to ensure utilization of the latest approved version. However, once a project is permitted using a dated version of this SOP, that version would remain applicable to the project, unless the project is substantially modified. With regard to approved mitigation banks, the version of the SOP used to calculate credits generated by the bank would remain applicable to that bank for the purpose of re-calculating credits associated with proposed minor modifications to the bank. If a substantial modification is proposed for an approved mitigation bank, the last approved version may be required for use in re-calculating credits. Regardless of which version of the SOP might have been used to calculate credits for an approved mitigation bank, permit applicants intending to purchase mitigation bank credits are required to use the latest approved version of the SOP when calculating credit requirements. All decisions on which version of this SOP are applicable to any given situation will be made by the USACE, and are final.

2. Purpose. The intent of this SOP is to provide a basic written framework, which will provides predictability and consistency for the development, review, and approval of compensatory mitigation plans. A key element of this SOP is the establishment of a method for calculating mitigation 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. However, nothing in this SOP should be interpreted as a promise or guarantee that a project which satisfies the criteria or guidelines given herein will be assured of a permit. The District Engineer (DE) has a responsibility to consider each project on a case by case basis and may determine in any specific situation that authorization should be denied, modified, suspended, or revoked. This SOP does not obviate or modify any requirements given in the 404(b)(1) Guidelines or other applicable documents regarding avoidance, sequencing, minimization, etc. Such requirements shall be evaluated during consideration of permit applications.

3. Other Guidance.

3.1. *Mitigation Thresholds.* Projects impacting less than 0.1 acre of wetland or open water and/or less than 100 linear feet of stream will be required to provide mitigation on a case-by-case basis. Projects impacting greater than 0.1 acre of wetlands or open water and/or more than 100 linear feet of stream will usually have to at least satisfy the requirements of this SOP.

3.2 *Minimal Impacts.* Permit applicants with projects impacting more than 0.1 and less than 1.0 acres of wetland and/or more than 100 and less than 300 linear feet of stream may choose to use the following abbreviated methodology for calculating mitigation credit requirements:

- Multiply the acres of impact by 8 to arrive at the required number of wetland mitigation credits (eg, 0.5 acres of wetland impact x 8 = 4 wetland credits).
- Multiply the linear feet of stream impact by 6.5 to arrive at the required number of stream mitigation credits (eg, 100 linear feet of stream x 6.5 = 650 stream credits).

3.3 *Regulatory Guidance Letter 02-02.* On December 24, 2002, the USACE issued Regulatory Guidance Letter 02-02 (RGL 02-02). Guidance provided in RGL 02-02 is applicable to all compensatory mitigation proposals associated with permit applications submitted for approval after it's date of issuance. If a discrepancy is discovered between this SOP and RGL 02-02, or any other relevant guidance, the applicant should notify the USACE of the discrepancy and request clarification before incorporating any such guidance into a proposed mitigation plan.

3.4 *National Research Council's (NRC) Mitigation Guidelines.* In its comprehensive report entitled *"Compensating for Wetland Losses Under the Clean Water Act,"* the National Research Council (NRC) provided ten guidelines to aid in planning and implementing successful mitigation projects ("Operational Guidelines for Creating or Restoring Wetlands that are Ecologically Self-Sustaining"; NRC, 2001). Please note that these guidelines also pertain to restoration and enhancement of other aquatic resource systems, such as streams. Each of the ten guidelines can generally be described as A) basic requirement for mitigation success, or B) guide for mitigation site selection. A copy of the NRC Mitigation Guidelines is enclosed. The NRC Guidelines are referenced throughout this document.

4. Mitigation Plans. The following information will typically be required for consideration of a mitigation proposal. Proposals will be reviewed and the applicant will be advised if additional information will be required to make the proposal adequate for consideration. See attached Mitigation Plan Checklist for more details.

- Plans and detailed information regarding the work for which the mitigation is required.
- Drawings in accordance with the requirements given in this SOP.
- A narrative discussion of the key elements of the proposed mitigation plan.
- A narrative description of any proposed functional assessment methodology (HGM, WRAP, etc.).
- A proposed monitoring plan and a plan for documenting baseline conditions of the mitigation site.
- Names, addresses, and phone numbers for all parties responsible for mitigation and monitoring.
- A description of the existing conditions of all areas to be affected by the proposed mitigation.
- A description of the existing vegetative communities to be affected by the proposed mitigation.
- Native vegetation proposed for planting and/or allowances for natural regeneration.
- Plans for control of exotic invasive vegetation.
- Elevation(s) and slope(s) of the proposed mitigation area to ensure they conform with required elevation and hydrologic requirements, if practicable, for target plant species.
- Source of water supply and connections to existing waters and proximity to uplands.
- Stream or other open water geomorphology and features such as riffles and pools, bends, etc.
- An erosion and sedimentation control plan.
- A schedule showing earliest start and latest completion dates for all significant activities.
- A listing of measurable success factors with quantifiable criteria for determining success.
- Definitions for all success factors and other significant terms used in the plan.
- Description of the equipment, materials, and methods required for execution of the plan.
- A management plan, if necessary, for any maintenance of the mitigation.
- A contingency plan, in the event that the mitigation fails to meet success factors.
- Copy of deed to property showing owner(s) of property.
- List of all easements and right-of-ways on the property.

5. General Guidelines. Mitigation must be designed in accordance with the following guidelines.

5.1. *Adverse Effects Area.* The area of adverse effects as used in this document includes aquatic areas impacted by filling, excavating, flooding, draining, clearing, or other adverse ecological effects. Impacts to wetlands and other open waters will be calculated in acres and impacts to streams will be calculated in linear feet as measured along the centerline of the channel. Other categories of effects such as aesthetic, cultural, historic, health, etc., are not addressed by this document. As explained in Attachments A and C, direct effects are caused by the action and occur at the same time and place; and indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

5.2. *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, if a pond is excavated in wetlands with a resulting wetland fringe, the wetland fringe is generally not considered compensation for the excavation impacts. Similarly, 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. Certain exceptions may be allowed on a case-by-case basis. For example, a temporary construction impact (e.g., cofferdams, access roads, staging areas) might be mitigated by restoration or preservation of the area, depending on the nature, severity, and duration of the impacts.

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 contains some restoration (e.g., plugging canals in a drained wetland) and some enhancement (e.g., plugging shallow ditches in an impaired wetland) could either be subdivided into a restoration area component and an enhancement area component, or the entire area could be lumped together and given one net enhancement/restoration credit calculation. Whether or not an area is subdivided or lumped for the purpose of credit calculations is a case-by-case decision based on what is reasonable and appropriate for the given mitigation proposal. All decisions on whether a proposed mitigation action would be considered restoration, enhancement or a combination of both, will be made by the USACE, and these decisions are final.

5.3 *Restrictive Covenants (RC)*. In most cases, mitigation sites must be perpetually protected by a Declaration of Covenants and Restrictions, whereby the owner of the property places permanent conservation restrictions on identified mitigation property. The restrictive covenant restricts development and requires that the land be managed for its conservation values. The draft model and instructions for use with the Declaration of Covenants and Restrictions is located on the USACE, Savannah District, web site located at www.sas.usace.army.mil. The web site should be viewed in order to assure that the latest version is used. Select the yellow box titled, "Permitting Info." Under the bold paragraph titled, "Savannah District Regulatory Publications," scroll down to find the Declaration of Covenants and Restrictions draft and instructions. The restrictive covenant is prepared by an attorney for the property owner in consultation with the environmental consultant. Property owners should make allowances for any foreseeable circumstances (e.g., utility lines, power lines, road crossings, ditch maintenance, etc.) that may conflict with recording a restrictive covenant on mitigation property. Once a property is protected by restrictive covenant, further impacts to that property are strongly discouraged by the USACE. The procedure for modifying a restrictive covenant is also located on the above web site.

5.4. *Conservation Easement (CE).* In addition to the restrictive covenant requirement, additional credit may be obtained by the granting of a conservation easement by the owner of the property, to a qualified third party grantee. The grantee must be a holder as defined by the Georgia Uniform Conservation Easement Act, O.C.G.A. § 44-10-1 et seq. In addition, the conservation easement is required to have certain language and meet the standards set out in the guidance. The guidance on conservation easements accepted for credit is located on the Savannah District web site under the file titled, "Conservation Easements." The conservation easement is prepared by the attorney for the owner of the property in consultation with the grantee and reviewed by the USACE.

5.5 *Government/Public Protection (GPP).* In addition to the restrictive covenant requirement, extra credit may be given if the property is conveyed to and/or held or managed by a governmental/public entity and the property is further protected for its conservation and environmental functions by legislation, resolution, environmental designation or zoning for the benefit of the public and the citizens of Georgia. The governmental entity may be an agency or department of the United States charged with protection and management of the environment; a state agency or department charged with protection and management of the environment such as the Department of Natural Resources; an authority created by the legislature such as a Greenway Authority; or property held by a county and/or municipality where the property qualifies for and is listed as a Community Greenspace Program property, or is designated for use by the public as a park or greenway and is used only for passive recreational/educational purposes; and property held by an accredited university in Georgia for the stated purpose of environmental management, education and training.

5.6 *Buffers.* In most circumstances, wetland, open water and stream mitigation areas must include the establishment and maintenance of buffers to ensure that the overall mitigation project performs as expected. Buffers are upland or riparian areas that separate aquatic resources from developed areas and agricultural lands. Buffers typically consist of native plant communities (i.e., indigenous species) that reflect the local landscape and ecology. Buffers enhance or provide a variety of aquatic habitat functions including habitat for wildlife and other organisms, runoff filtration, moderation of water temperature changes, and detritus for aquatic food webs.

5.6.1 *Upland Buffer*. Upland buffers serve to enhance aquatic functions and increases the overall ecological functioning of wetland and open water mitigation areas. Upland buffers are necessary for wetlands or open water mitigation areas that perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. Therefore, unless it can be demonstrated that an upland buffer is not necessary or practicable, wetland and openwater mitigation plans must include a minimum 25' wide upland buffer on at least 95% of the jurisdictional boundary of the mitigation area (i.e., verified wetland/upland boundary on the mitigation area). Mitigation areas will generally not be considered acceptable if they do not include a minimum 25' upland buffer. This required 25' minimum width upland buffer receives no mitigation credit. Only the area of a proposed upland buffer in excess of the minimum 25', which meets the width required at *Attachment B*, "Minimum Upland Buffer Widths for Mitigation Credit," will receive consideration for mitigation credit. Portions of buffers may be excluded from calculation of credits if they have been compromised or are of questionable protection value due to shape, condition, location, excessive width, excessive proportion of the total mitigation area, or other factors. Wetlands or other aquatic areas cannot be used as buffers on wetlands or open waters. Wetland buffer credit can be calculated using the Upland Buffer Worksheet.

5.6.2 *Riparian Buffer.* Riparian Buffers serve to enhance aquatic functions and increases the overall ecological functioning of stream mitigation. Riparian Buffers are necessary for streams that: 1) perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and 2) are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. Therefore, in most cases stream restoration plans must include a vegetated buffer. Riparian buffers that do not meet the appropriate minimum width requirements cannot be included in calculating credits (*Attachment D*, Riparian Enhancement and Preservation). Wetlands or other aquatic areas used to generate wetland mitigation credits cannot be used to generate stream buffer credits (i.e., multiple mitigation cannot be generated from one area).

5.7. *No Net Loss.* To assist in meeting the national policies of "no net loss" of wetlands and/or aquatic function, at least 50% of the wetland mitigation credits required for an authorized project must be generated from mitigation activities that result in a net gain in acres and/or aquatic function (i.e., wetland restoration, enhancement or creation), and at least 50% of the stream mitigation credits required for an authorized project must be from stream and/or riparian restoration. Wetland and stream bank credits are considered functional replacement. Conversely, no more than 50% of the wetland mitigation credits required for an authorized project can be generated from wetland preservation and/or upland buffering, and no more that 50% of the stream mitigation credits required for an authorized project can be generated from riparian buffer and/or stream preservation. In-lieu-fee bank credits are considered preservation. On a case-by-case basis, 100% of the wetland and/or stream mitigation credits required for an authorized project may be in the form of in-lieu-fee banking, but only if no commercial mitigation bank services the project area and site specific mitigation would be impractical.

5.8. *Goals and Objectives.* Compensatory mitigation plans should discuss environmental goals and objectives, the aquatic resource type(s), e.g., hydrogeomorphic (HGM) regional wetland subclass, Rosgen stream type, Cowardin classification, and functions that will be impacted by the authorized work, and the aquatic resource type(s) and functions proposed at the compensatory mitigation site(s). For example, for impacts to tidal fringe wetlands the mitigation goal may be to replace lost finfish and shellfish habitat, lost estuarine habitat, or lost water quality functions associated with tidal backwater flooding. The objective statement should describe the amount, i.e., acres, linear feet, or functional changes, of aquatic habitat that the authorized work will impact and the amount of compensatory mitigation needed to offset those impacts, by aquatic resource type.

5.9. *Site Selection (See NRC # B 1-5).* Compensatory mitigation plans should describe the factors considered during the site selection process and plan formulation including, but not limited to:

5.9.1 *Location.* Mitigation is required to be, when practicable, in areas adjacent or contiguous to the discharge site (on-site compensatory mitigation). On-site mitigation generally compensates for locally important functions, e.g., local flood control functions or unusual wildlife habitat. However, off-site mitigation may be used when there is no practicable opportunity for on-site mitigation, or when off-site mitigation provides more watershed benefit than on-site mitigation, e.g., is of greater ecological importance to the region of impact. Off-site mitigation will be in the same geographic area, i.e., in close proximity to the authorized impacts and, to the extent practicable, in the same watershed. The following factors that should be considered when choosing between on-site or off-site compensatory mitigation: likelihood for success; ecological sustainability; practicability of long-term monitoring and maintenance or operation and maintenance; and relative costs of mitigation alternatives. See NRC # A 1-4.

5.9.2. *Watershed Considerations.* Mitigation plans should describe how the site chosen for a mitigation project contributes to the specific aquatic resource needs of the impacted watershed. A compensatory mitigation project generally should be located in the same "State of Georgia Hydrologic Map Cataloging Unit (i.e., 8-Digit Unit)" as the impact site. The further removed geographically that the mitigation is, the greater is the need to demonstrate that the proposed mitigation will reasonably offset authorized impacts. For guidance on service areas for mitigation banks, see *Attachment E* "Mitigation Bank Service Areas."

5.9.3. *Practicability.* The mitigation plan should describe site selection in terms of cost, existing technology, and logistics.

5.9.4. *Air Traffic.* Compensatory mitigation projects that have the potential to attract waterfowl and other bird species that might pose a threat to aircraft will be sited consistent with the Federal Aviation Administration Advisory Circular on Hazardous Wildlife Attractants on or near Airports (AC No: 150/5200-33, *5/1/97).*

5.10. *Scheduling.* In most cases, mitigation should be completed concurrent with authorized impacts to the extent practicable. Advance or concurrent mitigation can reduce temporal losses of aquatic functions and facilitate compliance. 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. In general, when impacts to aquatic resources are authorized to proceed before an approved mitigation plan can be initiated, the permittee will be required to secure the mitigation site and record a restrictive covenant.

5.11. *Maintenance.* Mitigation plans which require perpetual or long-term human intervention will usually not be acceptable. Mitigation areas should be designed to be naturally sustaining following the completion of the mitigation. Hydrology must be 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. Plans with maintenance will be discouraged. See NRC # A2 and 3.

5.12. *Pre-project 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. Furthermore, developers should typically seek advice from consultants on complicated mitigation projects.

5.13. *Lakes, Ponds, and Impoundments.* Mitigation using lakes, ponds, and impoundments may be allowed as compensation for impacts to similar waterbodies. Mitigation using lakes, ponds, or impoundments will generally not be acceptable as compensatory mitigation for adverse impacts to wetlands. Additionally mitigation using wetlands, lakes, ponds, or impoundments will generally not be acceptable as compensatory mitigation for adverse impacts to riverine systems. It is understood that open surface waterbodies provide some valuable public interest factors such as storm water storage, fisheries habitat, or ground water recharge. Therefore, in recognition of this fact, the adverse effect factors for flooding and impounding have been adjusted relative to other factors.

6. Monitoring and Contingency Plans. The applicant will normally be required to monitor the mitigation area for success and to provide written reports describing the findings of the monitoring efforts. Such reports will normally involve photographic documentation, information on survival rates of planted vegetation, and information on the monitored hydrology. Because of the many variables involved, no specific standards are set forth as a part of this policy. Instead, a monitoring plan should be submitted as a part of the mitigation proposal for review. Monitoring efforts should usually include periodic reviews in the first year and annually thereafter (See NRC # A5). For major mitigation projects, the plan should include contingency measures specifying remediation procedures which will be followed should the success criteria or scheduled performance criteria not be fully satisfied. Monitoring and contingency plans typically address the following items, as applicable:

- A narrative discussion of the key elements of the proposed monitoring and contingencies plan.
- Names of party(s) responsible for the monitoring and contingencies plan.
- A description of the baseline conditions (e.g., soils, hydrology, vegetation, and wildlife).
- A schedule for monitoring activities and reporting.
- A listing of measurable success factors with quantifiable criteria for determining success.
- Definitions for success factors and other terms used in the plan.
- Descriptions of equipment, materials, and methods to be used.
- Proposed protective measures (e.g., restrictive covenants or conservation easements).
- Vegetation monitoring and contingency plan.
- Hydrological monitoring and contingency plan.
- Designation of reference site.
- For stream mitigation, monitoring of physical parameters.

7. Performance Standards. Compensatory mitigation plans will contain written performance standards for assessing whether mitigation is achieving planned goals. Performance standards will become part of individual permits as special conditions and be used for performance monitoring. Project performance evaluations will be performed by the USACE, as specified in the permits or special conditions, based upon monitoring reports. Adaptive management activities may be required to adjust to unforeseen or changing circumstances, and responsible parties may be required to adjust mitigation projects or rectify deficiencies. The project performance evaluations will be used to determine whether the environmental benefits or "credit(s)" for the entire project equal or exceed the environmental impact(s) or "debit(s)" of authorized activities. Performance standards for compensatory mitigation sites will be based on quantitative or qualitative characteristics that can be practicably measured. The performance standards will be indicators that demonstrate that the mitigation is developing or has developed into the desired habitat. Performance standards will vary by geographic region and aquatic habitat type, and may be developed through interagency coordination at the regional level. Performance standards for wetlands can be derived from the criteria in the 1987 Corps of Engineers Wetlands Delineation Manual, such as the duration of soil saturation required to meet the wetland hydrology criterion, or variables and associated functional capacity indices in hydrogeomorphic assessment method regional guidebooks. Performance standards may also be based on reference sites.

8. Drawings. Mitigation plans should include drawings in conformance with the following.

a. Drawings must be provided on 8.5 x 11" paper. For larger mitigation projects, 11 x 17" or larger drawings should be submitted, in addition to 8.5 x 11" drawings. Generally, all drawings should have a scale no smaller than 1"=200'. Drawings must be clear, readable, and reproducible on standard, non-color office copiers. Each drawing sheet should include the following:

- An unused margin of no less than ½".
- An appropriate graphic scale (when reasonable).
- All significant dimensions clearly indicated and annotated.
- Title block with applicant's name, project title, site location, drawing date, and sheet number.
- A directional arrow indicating north.
- A clear, legible plan view indicating area sizes (e.g., square feet, acres) for all mitigation sites.

b. Location maps for the proposed activity must be included. Two maps are desired. A County road 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. The project latitude and longitude should be annotated on the maps. Each map should include a title block.

c. 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.

d. For ground-disturbing mitigation work, cross section views must be submitted depicting the existing ground contours and the proposed finished contours.

e. **All** aquatic areas within the project boundaries (avoided, impacted, or mitigated) must be shown.

f. Each restoration, enhancement, preservation, creation and upland buffer area must be shown.

g. A legend must be shown identifying cross-hatching, shading, or other marking techniques used.

h. A summary table with the quantity of each category of impact and mitigation must be provided.

i. Show the ordinary high water line of affected and adjacent non-tidal open surface waterbodies.

j. Show the mean high tide line and spring high tide line of affected and adjacent tidal waterbodies.

k. For mitigation plans with more than ten acres of wetland restoration, enhancement, creation and upland buffer, or a combination thereof, certified 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 structures and work that are a significant part of the mitigation.

9. Mitigation Banking. Proposals to establish mitigation banks will be processed in accordance with "Guidelines on the Establishment and Operation of Wetland Mitigation Banks in Georgia." Proposals which include use of credits from a mitigation bank must normally comply with the requirements given in this SOP as well as any conditions or restrictions applicable to the bank. Guidance on the appropriate use of mitigation bank credits is contained in the document titled "Addendum 1 - Guidelines on the Establishment and Operation of Wetland Mitigation Banks in Georgia," dated January 16, 1996. This document is available on the Savannah District web site.

10. Point of Contact. Copies of this document are available at Savannah District's Regulatory Office. Questions regarding use of this policy for specific projects must be addressed to the Project Manager handling the action. Other inquiries or comments regarding this document should be addressed to:

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11. Authorizing Signature. By the signature given below, this draft SOP is authorized for use.

Mirian Magwood
Chief, Regulatory Branch

ATTACHMENTS:

A. Wetland Mitigation Definition of Factors
B. Wetland/Openwater Mitigation Worksheets
C. Stream Mitigation Definition of Factors
D. Stream Mitigation Worksheets
E. Draft Wetland and Stream Mitigation Bank Service Areas
F. Incorporation of the National Research Council's Mitigation Guidelines into the CWA Section 404 Program
G. Mitigation Plan Checklist and Supplement

WETLANDS AND OPEN WATERS
Compensatory Mitigation
Definitions of Factors

Adverse effects as used in this section of the SOP means any adverse ecological effect on wetlands or areas of open water. Those effects, or impacts, include filling, excavating, flooding, draining, clearing, or similar changes affecting wetlands or open water areas. Other categories of effects such as aesthetic, cultural, historic, health, etc., are not addressed by this SOP.

Aquatic site means wetlands and other open water areas (streams not included in this section).

Control means the entity responsible for enforcing preservation requirements. Related terms are:
- Restrictive Covenant (RC). (0.1 credit factor)
- RC and Conservation Easement (CE) or Government/Public Protection (GPP). (0.1 credit factor)
- RC and CE and GPP. (0.5 credit factor)

Credit Schedule means the timing of mitigation in relation to adverse impacts to aquatic sites. Mitigation schedules are reviewed and approved on a case-by-case basis. Related terms include:
FOR NON-BANKS:
- Schedule 1. Mitigation is done prior to the adverse impacts. (0.4 credit factor)
- Schedule 2. The majority of the mitigation is done prior to the impacts and the remainder is done concurrent with, or after the impacts. (0.3 credit factor)
- Schedule 3. The mitigation is constructed concurrent with the impacts. (0.2 credit factor)
- Schedule 4. The majority of the mitigation is done concurrent with the impacts, and the remainder is done after the impacts. (0.1 credit factor)
- Schedule 5. The mitigation is done after the impacts. (0 credit factor)

FOR MITIGATION BANKS:
- Schedule 1. No credits may be withdrawn prior to final determination of success.
- Schedule 2. No more than 5% of the total credits are released upon recording a restrictive covenant over the bank site and at least 25% of the total credits are held until final determination of success.
- Schedule 3. No more than 10% of the total credits are released upon recording a restrictive covenant over the bank site and at least 20% of the total credits are held until final determination of success.
- Schedule 4. No more than 15% of the total credits are released upon recording a restrictive covenant over the bank site and at least 20% of the total credits are held until final determination of success.

Degree of Threat is an assessment of the level of imminent risk of loss or damage to a system. None (0 credit factor); Low (0.1 credit factor); Moderate (0.3 credit factor); High (0.5 credit factor).

Dominant Effect categories are defined as follows:
- Shading means to shelter or screen by intercepting radiated light or heat. (0.5 impact factor)
- Clear means to mechanically remove vegetation (mechanized landclearing). (1.0 impact factor)
- Flood means to periodically and temporarily cover an aquatic area with water. (1.2 impact factor)
- Draining means ditching, channelization, or excavation that results in the removal of water from an aquatic area causing the area, or a portion of the aquatic area, to change over time to a non-aquatic area or to a different type of aquatic area. (1.4 impact factor)
- Impound means to create a permanent lake or pond by obstructing the flow of a riverine system. (1.6 impact factor)
- Dredge means to dig, gather, pull out, or excavate from US waters. (1.8 impact factor)
- Fill material means any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a waterbody. (2.0 impact factor)

Duration means the length of time the adverse impacts are expected to last. Impact factors range from 0.1 (< 1 year) to 2.0 (7+ years).

WETLANDS AND OPEN WATERS
Compensatory Mitigation
Definitions of Factors

Effect is defined by Webster to mean something that inevitably follows an antecedent (as a cause or agent). The 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. Mitigation for other categories of effects (e.g., historic, cultural, aesthetic) is not addressed in this SOP. The CEQ stated that effects include: direct effects which are caused by the action and occur at the same time and place; and indirect effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Existing Conditions categories are defined as follows. This SOP is limited to evaluation of compensatory mitigation plans for adverse ecological effects.

- Class 1 means fully functional. For example: Mixed species hardwood forest with 40-year old or older dominant canopy trees, and no evidence of hydrologic alteration (2.0 impact factor).
- Class 2 means adverse impacts to aquatic function are minor and would fully recover without assistance. For example: Mixed species hardwood forest with 20 to 40-year old dominant canopy trees, and no evidence of hydrologic alteration (1.5 impact factor).
- Class 3 means adverse impacts to aquatic functions are minor and would not fully recover without some minor enhancement activity. For example: Mixed species 10 to 20-year old hardwoods with evidence of minor hydrologic alteration (i.e., few shallow ditches) (1.0 impact factor).
- Class 4 means major adverse impacts to aquatic function and substantial enhancement would be necessary to regain lost aquatic functions. For example: Clear-cut/cutover 0 to 10-year old stand dominated by early successional tree species (i.e., gums, maples, willows, etc.), and lacking many indigenous mast producing hardwood species. In addition, these areas may have extensive hydrologic alteration (i.e., network of drainage ditches and canals) (0.5 impact factor).
- Class 5 means most aquatic function has been lost. For example: Intensively managed pine plantations or farmed wetlands. (0.1 impact factor).

Hydrology, as used in this SOP, means the properties, distribution, and circulation of water on the surface of the land, in the soil, and underlying rocks. Related terms include:

- Mechanical hydrology means the employment of mechanical methods (e.g., pumps) to supply water to an area thereby causing an ecologically significant change in the hydrology of the area. (0 credit factor)
- Created hydrology means the permanent manipulation of the topography resulting in an ecologically significant change in the hydrology of the area. (0.1 credit factor)
- Natural hydrology means the area's hydrology, as it existed prior to the actions of modern man. Hydrology which has been restored to its natural state qualifies as natural hydrology. Examples of such restoration include effectively filling ditches that drain the area or removing berms that prevent inundation. (0.3 credit factor)

Kind is a factor used to compare the relative functions and values of the mitigation site to the impacted site. For Mitigation Banks the Kind Category will almost always be Category 1 (In Kind), because banks are encouraged to target restoration or enhancement of forested riverine systems, and these are the types of wetlands that receive the most impact. For Non-Banks, kind is as follows:

- Category 1 is In-kind. In-kind Mitigation means the replacement of the impacted aquatic site with one of the same hydrologic regime and plant community type (same species composition). (0.6 credit factor)
- Category 2 is Out-of-kind. Out-of-kind Mitigation means the replacement of an impacted aquatic site with one of a different hydrologic regime and plant community type (different species composition). For example, if a wooded swamp habitat is filled or altered and the mitigation consists of grading an area and planting it in freshwater emergent marsh species. (0.2 credit factor)

WETLANDS AND OPEN WATERS
Compensatory Mitigation
Definitions of Factors

Lost Kind categories are based on functional values. Habitat types that are not categorized below will be evaluated and assigned a category ranking by the Project Manager on a case-by-case basis.

- Kind A - Riverine forested wetlands; intertidal wetlands. (2.0 impact factor)
- Kind B - Non-riverine forested wetlands; freshwater areas adjacent to tidal areas. (1.5 impact factor)
- Kind C - Pine flatwood wetlands. (1.0 impact factor)
- Kind D - Lakes and impoundments. (0.5 impact factor)
- Kind E - Naturalized borrow pits. (0.1 impact factor)

Maintenance means any long term or perpetual manipulation or action after completion of the monitoring period that is necessary to achieve the mitigation goal. Remedial or planned work during the monitoring period is not considered maintenance, but is rather just a part of the mitigation work.

- None -- The mitigation area is expected to continue developing into the preferred habitat without any human intervention after the monitoring period is complete. (0.3 credit factor).
- Low -- Minimal level maintenance including removal of unwanted species. (0.2 credit factor).
- Moderate -- Maintenance including some replanting of the desired vegetation. (0.1 credit factor).
- High -- Maintenance includes significant replanting, addition of soils, hydrology manipulation, or other similar actions. (0 credit factor)

Monitoring and Contingencies (M and C Plans) means the actions which will be undertaken during the mitigation project to measure the level of success of the mitigation work and to correct problems or failures observed. Contingencies means the actions that will be employed to correct deficiencies or failures found during the monitoring period and to achieve the specified success criteria. Monitoring means the collection of field data to measure the success of a mitigation effort. It usually includes analysis of the data, and submittal of a comprehensive report containing the data, analyses, and a narrative discussion of the findings and conclusions. Proposals for Mitigation Banks and Establishment (Creation) sites must include an Excellent M and C Plan.

- Minimum Level Monitoring and Contingencies Plans: (0.1 credit factor)
  - At least 5 years of monitoring (unless approved otherwise)
  - Vegetation survival monitoring (including a commitment to replant if success is not achieved)
- Moderate Level Monitoring and Contingencies Plans: (0.2 credit factor)
  - At least 5 years of monitoring
  - Vegetation survival monitoring (including a commitment to replant if success is not achieved)
  - Basic hydrological monitoring
  - Collection of suitable baseline data
- Substantial Level Monitoring and Contingencies Plans: (0.3 credit factor)
  - At least 5 years of monitoring
  - Vegetation survival monitoring (including a commitment to replant if success is not achieved)
  - Extensive hydrological monitoring
  - Collection of suitable baseline data
  - Reference site comparison monitoring
- Excellent Level Monitoring and Contingencies Plans: (0.4 credit factor)
  - At least 7 years of monitoring
  - Vegetation survival monitoring (including a commitment to replant if success is not achieved)
  - Extensive hydrological monitoring
  - Collection of suitable baseline data
  - Reference site comparison monitoring
  - For mitigation banks, submission of an annual status report until all credits are sold

WETLANDS AND OPEN WATERS
Compensatory Mitigation
Definitions of Factors

Net Improvement is the level of enhancement and/or restoration of the functions of an aquatic site being used for mitigation. There are two Net Improvement credit factors. Vegetative Net Improvment can range from 0.1 to 1.4 and Hydrologic Net Improvement can range from 0.1 to 1.4. For larger mitigation sites and for mitigation banks, a functional assessment (i.e., HGM, RAP, etc.) will normally be required to provide justification in support of the selected Vegetative and Hydrologic Net Improvement factors. The USACE will make final decisions with regard to appropriate net improvements factors.

Preventability is an evaluation of the degree to which the adverse effects could be prevented. This factor is intended primarily for Nationwide Permit mitigation. Individual Permits must also satisfy the 404(b)(1) guidelines regarding avoidance, minimization, etc. Preventability levels are as follows:

- High means there may be practicable, less damaging alternatives that satisfy the purpose of the project. In the case of existing violations the presumption will be that there was high preventability unless demonstrated otherwise. (2.0 impact factor)
- Moderate means there may be alternatives but it is unclear if they satisfy the project purpose or if they are practicable. (1.0 impact factor)
- Low means there are no known alternatives which satisfy the purpose, are practicable, and are less damaging. (0.5 impact factor)

Rarity Ranking categories are determined based on information furnished by the US Fish and Wildlife Service and/or the Georgia Department of Natural Resources or other available data. The USACE will assign a rarity ranking on a case-by-case basis with consideration of any comments provided by resource agencies. Categories are defined as follows.

- Rare means that the designated category is seldom occurring and is marked by some special quality. (2.0 impact factor)
- Uncommon means that the designated category is not ordinarily encountered or is of exceptional quality. (0.5 impact factor)
- Common means that the designated category is frequently occurring or widespread in distribution. (0.1 impact factor)

Upland Buffer Credit is based on the acreage of suitable upland buffer and the percentage of the total jurisdictional boundary on the mitigation area (interface between upland and aquatic site present, with upland present to serve as a buffer) that is protected by the buffer. Only the area (acres) of upland buffer in excess of the minimum 25' can be used to calculate upland buffer credit. Categories are:

- More than 95% of the total jurisdictional boundary of the aquatic site is protected by a suitable upland buffer. (1.0 credit factor)
- From 68% to 95% of the jurisdictional boundary protected by upland buffer. (0.8 credit factor)
- From 50% to 67% of the jurisdictional boundary protected by upland buffer. (0.6 credit factor)
- From 33% to 49% of the jurisdictional boundary protected by upland buffer. (0.3 credit factor)
- Less than 33% of the jurisdictional boundary protected by upland buffer. (0.1)

Upland Buffer Enhancement Credit is based on the acreage of the buffered aquatic site and the percentage of the total jurisdictional boundary of the aquatic site (interface between upland and aquatic site present, with upland present to serve as a buffer) protected by a suitable upland buffer. Categories are:

- More than 95% of the jurisdictional boundary protected by upland buffer. (0.15 credit factor)
- From 50% to 95% of the jurisdictional boundary protected by upland buffer. (0.1 credit factor)
- Less than 50% of the jurisdictional boundary protected by upland buffer. (0.05 credit factor)

Vegetation means the plant material within a defined area. Related terms used in this SOP include:

- N.A.-- Not Applicable and vegetation adjustment is not part of the mitigation plan. (0 credit factor).
- Natural revegetation involves no planting. (0.1 credit factor).
- Planted means using transplanted, or nursery stock vegetation. (0.4 credit factor).

WETLANDS AND OPEN WATERS
Compensatory Mitigation
Definitions of Factors

Wetland Enhancement is the manipulation of the physical, chemical, or biological characteristics of a wetland (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present. Enhancement is undertaken for specified purposes such as water quality improvement, flood water retention, or wildlife habitat. Enhancement results in a change in wetland function(s) and can lead to a decline in other wetland functions, but does not result in a gain in wetland acres. This term includes activities commonly associated with enhancement, management, manipulation, and directed alteration. Proposed enhancement mitigation plans must include an explanation of what values or functions are being enhanced and to what degree, and a narrative description of how the enhancement will be accomplished. The plan must also include a narrative description of how a functional assessment methodology (i.e., reference site, HGM, WRAP, etc.) would be used to document that identified values and/or functions are enhanced to the degree proposed.

Wetland Establishment (Creation) is the manipulation of the physical, chemical, or biological characteristics present to develop a wetland on an upland or deepwater site, where a wetland did not previously exist. Establishment results in a gain in wetland acres. In designing creation mitigation, the selection of high quality upland habitat for conversion will generally not be acceptable. For example, a cutover area or former agricultural field would be ecologically preferable to a mature forested area as a candidate for alteration. Mature forested areas will generally not be approved as suitable creation areas. Proposals for establishment mitigation must include an explanation of what values or functions are to be established and to what degree, and a narrative description of how the establishment will be accomplished. The plan must also include a narrative description of how a functional assessment methodology (i.e., reference site, HGM, WRAP, etc.) would be used to document that identified values and/or functions are established to the degree proposed.

Wetland Preservation is the permanent perpetual protection of existing wetlands, or other open water aquatic resources may be an acceptable form of mitigation when these areas are preserved in conjunction with establishment (creation), restoration, and enhancement activities. Preserved resources should augment the functions of newly established, restored, or enhanced aquatic resources. In **exceptional circumstances**, the preservation of existing wetlands or other aquatic resources may be authorized as the sole basis for generating credits as mitigation projects. Natural wetlands provide numerous ecological benefits that restored wetlands cannot provide immediately and may provide more practicable long-term ecological benefits. If preservation alone is proposed as mitigation, it must be demonstrated that the wetlands or other aquatic resources perform important physical, chemical or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. The existence of a demonstrable threat will be based on clear evidence of destructive land use changes that are consistent with local and regional (i.e., watershed) land use trends, and that are not the consequence of actions under the control of the party proposing the preservation.

Wetland Restoration is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former or degraded wetland. There are two categories of restoration as follows: (a) Re-establishment, which results in rebuilding a former wetland and results in a gain in wetland acres and (b) Rehabilitation, which results in a gain in wetland function but does not result in a gain in wetland acres. Proposals for restoration mitigation must include an explanation of what values or functions are being restored and to what degree, and a narrative description of how the restoration will be accomplished. The plan must also include a narrative description of how a functional assessment methodology (i.e., reference site, HGM, WRAP, etc.) would be used to document that identified values and/or functions are restored to the degree proposed.

WETLANDS AND OPEN WATERS MITIGATION WORKSHEETS

ADVERSE IMPACT FACTORS

Factor	Options						
Dominant Effect	Fill 2.0	Dredge 1.8	Impound 1.6	Drain 1.4	Flood 1.2	Clear 1.0	Shade 0.5
Duration of Effects	7+ years 2.0	5-7 years 1.5	3-5 years 1.0	1-3 years 0.5	< 1 year 0.1		
Existing Condition	Class 1 2.0	Class 2 1.5	Class 3 1.0	Class 4 0.5	Class 5 0.1		
Lost Kind	Kind A 2.0	Kind B 1.5	Kind C 1.0	Kind D 0.5	Kind E 0.1		
Preventability	High 2.0	Moderate 1.0	Low 0.5	None 0			
Rarity Ranking	Rare 2.0	Uncommon 0.5	Common 0.1				

† These factors are determined on a case-by-case basis.

REQUIRED MITIGATION CREDITS WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Dominant Effect						
Duration of Effect						
Existing Condition						
Lost Kind						
Preventability						
Rarity Ranking						
Sum of r Factors	R_1 =	R_2 =	R_3 =	R_4 =	R_5 =	R_6 =
Impacted Area	AA_1 =	AA_2 =	AA_3 =	AA_4 =	AA_5 =	AA_6 =
R × AA =						

Total Required Credits = $\sum$ (R × AA) =

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

ESTABLISHMENT (CREATION) MITIGATION FACTORS

Factor	Options				
Credit Schedule	Schedule 5 0	Schedule 4 0.1	Schedule 3 0.2	Schedule 2 0.3	Schedule 1 0.4
Hydrology	N. A. 0	Mechanical 0	Created 0.1	Natural 0.4	
Kind	Category 2 0.2	Category 1 0.6			
Maintenance	High 0	Moderate 0.1	Low 0.2	None 0.3	
Monitoring and Contingencies Plan	N/A 0	Minimum 0.1	Moderate 0.2	Substantial 0.3	Excellent 0.4
Control	RC 0.1	RC + CE or GPP 0.3	RC + CE + GPP 0.5		
Vegetation	N/A 0	Natural 0.1	Planted 0.4		

PROPOSED ESTABLISHMENT (CREATION) MITIGATION WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5
Credit Schedule					
Hydrology					
Kind					
Maintenance					
Monitoring and Contingencies Plan					
Control					
Vegetation					
Sum of m Factors	M_1 =	M_2 =	M_3 =	M_4 =	M_5 =
Mitigation Area	A_1 =	A_2 =	A_3 =	A_4 =	A_5 =
M x A =					

Total Creation Credits = $\sum (M \times A)$ = ______

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

RESTORATION/ENHANCEMENT MITIGATION FACTORS

Factor	Options				
Net Improvement Vegetation	Minimal Enhancement 0.1 ------------------------------ to ------------------------------ Complete Restoration 1.4				
Net Improvement Hydrology	Minimal Enhancement 0.1 ------------------------------ to ------------------------------ Complete Restoration 1.4				
Credit Schedule	Schedule 5 0	Schedule 4 0.1	Schedule 3 0.2	Schedule 2 0.3	Schedule 1 0.4
Kind	Category 2 0.2	Category 1 0.6			
Maintenance	High 0	Moderate 0.1	Low 0.2	None 0.3	
Monitoring and Contingencies Plan	N/A 0	Minimum 0.1	Moderate 0.2	Substantial 0.3	Excellent 0.4
Control	RC 0.1	RC + CE or GPP 0.3	RC + CE + GPP 0.5		

PROPOSED RESTORATION/ENHANCEMENT MITIGATION WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5
Net Improvement Vegetation					
Net Improvement Hydrology					
Credit Schedule					
Kind					
Maintenance					
Monitoring and Contingencies Plan					
Control					
Sum of m Factors	M_1 =	M_2 =	M_3 =	M_4 =	M_5 =
Mitigation Area	A_1 =	A_2 =	A_3 =	A_4 =	A_5 =
M × A =					

Total Restoration/Enhancement Credits = $\sum$ (M × A) = ______

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

PRESERVATION MITIGATION FACTORS

Factor	**Options**			
Degree of Threat	None 0	Low 0.1	Moderate 0.3	High 0.5
Kind	Category 2 0.2	Category 1 0.6		
Control	RC 0.1	RC + CE or GPP 0.3	RC + CE + GPP 0.5	

PROPOSED PRESERVATION MITIGATION WORKSHEET

Factor	**Area 1**	**Area 2**	**Area 3**	**Area 4**	**Area 5**
Degree of Threat					
Kind					
Control					
Sum of m Factors	M_1=	M_2=	M_3=	M_4=	M_5=
Mitigation Area	A_1=	A_2=	A_3=	A_4=	A_5=
M x A =					

Total Preservation Credits = $\sum$ (M x A) = ______

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

MINIMUM UPLAND BUFFER WIDTHS FOR MITIGATION CREDIT †

Adjacent Land Use Category	Minimum Width
Single Family Residential	50 feet
Multi-Family	75 feet
Commercial	75 feet
Industrial	100 feet
Landfill	100 feet
Other Categories	case-by-case

† widths are based on linear, constant elevation measurement

BUFFER MITIGATION FACTORS

Factors	Options				
Upland Buffer Factor (U1)	>95% 1.0	68% to 95% 0.8	50% to 67% 0.6	33% to 49% 0.3	<33% 0.1
Buffer Enhancement Factor (U2)	>95% 0.15	50% to 95% 0.1	<50% 0.05		

UPLAND BUFFER CREDIT WORKSHEET

	Area 1	Area 2	Area 3	Area 4	Area 5
Total Jurisdictional Boundary (B1)*					
Buffered Jurisdictional Boundary (B2)*					
(B2 ÷ B1) x 100 = % Buffered					
Acres of Upland Buffer (A1)					
Upland Buffer Factor (U1)					
A1 x U1 = C1					
Aquatic Mitigation Area Acres (A2)					
Buffer Enhancement Factor (U2)					
A2 x U2 = C2					
C1 + C2 = D	D_1=	D_2=	D_3=	D_4=	D_5=

Total Buffer Credit = $\sum D_{1-5}$= ____________

* B1 = Total linear feet of jurisdictional boundary of each proposed restoration, enhancement, preservation and/or creation area.
* B2 = Total linear feet of jurisdictional boundary proposed to be buffered for each restoration, enhancement, preservation and/or creation area.

WETLANDS AND OPEN WATERS
MITIGATION WORKSHEETS

Mitigation Summary Worksheet For Permit Application #________________________

I. Required Mitigation

A.	Total Required Mitigation Credits =

II. Mitigation Credit Summary

		Credits	Acres
B.	Mitigation Bank		
C.	Restoration and/or Enhancement		
D.	Creation		
E.	Functional Replacement Mitigation = B + C + D		
F.	Upland Buffer		
G.	Preservation		
H.	Total Proposed Non-Bank Mitigation = E + F + G		

The following criteria must be satisfied for the mitigation proposal to meet minimum SOP requirements:

1. Total Proposed Mitigation (Row H) must be greater than or equal to Total Required Mitigation Credits (Row A).

2. Functional Replacement Mitigation (Row E) must be at least 50% of Row A.

3. Preservation Mitigation (Row G) can be up to, but not more than 50% of Row A, if no Upland Buffer Credits are proposed. If Upland Buffer Credits are proposed, then Preservation Mitigation may be reduced to 30% of the Total Required Mitigation Credits.

4. Upland Buffer (Row F) cannot exceed 20% of the Total Required Mitigation (Row A). The following table provides examples of how Preservation and Upland Buffer Mitigation can be used in combination:

Total Required Mitigation Credits	Functional Replacement Credits	Preservation Credits	Upland Buffer Credits
100	50	50	0
100	50	40	10
100	50	30	20

Compensatory Stream Mitigation
Definitions of Factors

Net benefit is an evaluation of the proposed mitigation action's ability to restore and sustain the chemical, biological, and physical integrity of the Nation's waters. Six stream restoration methods are covered under this SOP – stream channel restoration/relocation, removal of culverts/dams or other instream structures that block flow or fish movement, streambank repair, riparian restoration, riparian habitat improvement, and riparian preservation. The USACE will determine, on a case-by-case basis, the net benefit for actions that do not involve direct manipulation of a length of stream and/or its riparian buffers, such as returning natural flows to relict channels dewatered by drainage canals, retrofitting stormwater detention facilities, construction of off-channel stormwater detention facilities in areas where runoff is accelerating streambank erosion, measures to reduce septic tank leakage, paving of dirt roads, contaminant reduction, stormwater surcharge reduction and other watershed protection practices. (Note: Off-channel stormwater detention facilities should not be placed in jurisdictional wetlands, forested floodplains, or riparian buffer zones.) Stream mitigation within 100' of a culvert, dam, or other man-made impact to waters of the United States generally will generate only minimal restoration or preservation credit due to impacts associated with these structures.

- **Stream Channel Restoration and Relocation**: **Stream Channel Restoration** refers to actions to convert an incised, unstable stream channel to a natural stable condition, considering recent and future watershed conditions. Stream channel restoration will be appropriate for streams described below under Existing Conditions as Fully Impaired, and with Corps' discretion, on streams described under Existing Conditions as Somewhat Impaired. Restoration or relocation of a stream that is considered Fully Functional will not be considered for mitigation credit.
- **Stream Relocation** means to move an existing stream channel and reconstruct it, in a new location to allow an authorized project to be constructed in the stream's former location. Only Priority 1 restoration is acceptable for stream relocation projects. Note: Fill of the original channel for a stream relocation is considered an impact and shall be included in calculations for required mitigation credit (Worksheet 1).

  Design of a restored or relocated channel should be based on a reference reach and include restoration of appropriate pattern, profile, and dimension, as well as transport of water and sediment produced by the stream's upstream watershed. This SOP provides for four levels of stream restoration or relocation:
  - **Priority 1 Restoration/Relocation** involves excavation of a stable Rosgen Class C or E stream channel, on previous floodplain, to replace an entrenched Rosgen Class G or F stream channel.
  - **Priority 2 Restoration** involves establishment of a stable Rosgen Class C or E stream channel and floodplain, at the current or higher (but not original) channel elevation, to replace an entrenched Rosgen Class G or F stream channel.
  - **Priority 3 Restoration** involves converting to a new stream type without an active floodplain but containing a floodprone area (example, Rosgen Class G to B stream, or Rosgen Class F to Bc).
  - **Priority 4 Restoration** involves stabilization of an incised stream channel in place using instream structures and bioengineering. Typical instream structures for bank stability include crossvanes, J-hook vanes, other rock vanes, single and double wing deflectors, and root wads that divert the thalwag from the streambank and/or absorb water energy. Bioengineering techniques include 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.

All proposed stream channel restoration/relocation mitigation plans shall include:
(1) geomorphic data describing the existing stream, the reference reach upon which design criteria are based, and the proposed stream design (Table 2).
(2) a conceptual design showing proposed stream pattern in the landscape; a final design showing proposed pattern, profile, and dimension should be provided the Corps and other reviewing agencies before construction;
(3) a minimum 25-foot riparian buffer on both banks along the length of the project. Additional mitigation credit may be generated if buffers on one or both banks meet or exceed minimum buffer width, as defined in this SOP.

Compensatory Stream Mitigation
Definitions of Factors

- **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 does not constitute Priority 4 Stream Channel Restoration. Credit for installation of streambank stabilization measures to stabilize localized lateral erosion will be based on 3X the length of the appropriate size structure (e.g., 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 flows. A series of crossvanes or other appropriate grade control structures may be needed to reconstruct the channel profile and avoid a headcut if channel elevation above the location where the structure is to be removed is greater than channel elevation below the structure. Where dams are proposed to be removed, it generally is best to remove the dam to the level of sediment behind the dam and then to construct a series of crossvanes to develop a stable slope. To prevent disruption of fish movements, elevation drop from one crossvane to the next shall be no more than 0.5' (i.e., at least 4 crossvanes will be needed to develop a stable slope when channel elevation above and below a culvert to be removed drops 1.5'). The proposed structural removal will be assigned a credit factor of from 4.0 to 8.0, depending on the ecological lift associated with the specific action. The credit factor selected for a specific structural removal must be supported by information necessary to document ecological lift. Selection of an appropriate credit factor is at the sole discretion of the USACE. 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).

- **Riparian Restoration, Preservation, and Habitat Improvement:** Riparian restoration, preservation, or habitat improvement, will not be allowed on Fully Impaired streams, as described in Existing Condition below.
  - **Riparian restoration** is the reestablishment of well-established stands of deep-rooted native vegetation (trees, shrubs, and herbaceous species) in areas adjacent to riverine systems.
  - **Riparian preservation** is the conservation of already well-vegetated buffers adjacent to riverine systems. Riparian buffer preservation may account for no more than 50% of the credits generated by a mitigation bank or required to mitigate for a single and complete project. If the mitigation plan for a single and complete project combines riparian buffer preservation with purchase of bank credits, non-bank buffer preservation may account for no more than 50% of the required credits.
  - **Riparian habitat improvement** is implementation of activities to improve the biological function of an existing buffer. Riparian habitat improvement may include planting of understory species, planting of desirable canopy trees, and/or timber stand improvement. Riparian habitat improvement is applicable only in buffers that already support well-established stands of deep-rooted native vegetation; activities proposed for riparian habitat improvement must be approved by the USACE.

Table 1. Riparian Buffer Mitigation Activities

		71-100% of the Proposed Buffer will be Planted (Extensive Restoration)	41-70% of the Proposed Buffer will be Planted (Substantial Restoration)	10-40% of the Proposed Buffer will be Planted (Moderate Restoration)	Riparian Habitat Improvement	The buffer does not Require Planting (Preservation)
Minimum Buffer Width on One Side of Stream) (MBW = 50' + 2'/% slope)	4X MBW	2.0	1.6	0.8	0.4	0.3
	3X MBW	1.5	1.2	0.6	0.3	0.2
	2X MBW	1.0	0.8	0.4	0.2	0.1
	1X MBW	0.3	0.2	0.1	0	0

Compensatory Stream Mitigation
Definitions of Factors

Control means the entity empowered or responsible for enforcing the mitigation requirements.

Dominant Impact:

- **Fill** means permanent fill of a stream channel due to construction of dams or wiers, relocation of a stream channel (even if a new stream channel is constructed), or other fill activities.
- **Pipe** means to route a stream for 100' or more through pipes, box culverts, or other enclosed structures.
- **Morphologic change** means to channelize, dredge, construct an armored ford, or otherwise alter the established or natural dimensions, depths, or limits of a stream corridor.
- **Impound** means to convert a stream to a lentic state with a dam or other retention/control structure that is not designed to pass normal flows below bankfull stage. Impact to the stream channel where the structure is located is considered fill, as defined above.
- **Stream Crossing** means to route a stream through pipes, culverts, or other structures where less than 100' of stream will be impacted per crossing.
- **Detention** means to temporarily slow flows ($\leq$ 72 hours) in a channel when bankfull is reached. Areas that are temporarily flooded due to detention structures must be designed to pass flows below bankfull stage.
- **Bank armor** means to riprap, bulkhead, or use other rigid methods to contain stream channels.
- **Utility crossing** means pipeline/utility line installation methods that require disturbance of the streambed.
- **Shading and clearing** means activities, such as bridging or streambank vegetation clearing, that reduce or eliminate the quality and functions of vegetation within riparian habitat without disturbing the existing topography or soil. Although these impacts may not be directly regulated, mitigation for these impacts may be required if the impact occurs as a result of, or in association with, an activity requiring a permit.

Duration: Duration is the amount of time the adverse impacts to a stream reach are expected to last.

- **Temporary** means impacts will occur within a period of less than 1 year and recovery of system integrity will follow cessation of the permitted activity.
- **Recurrent** means repeated impacts of short duration (such as with on-channel 24-hour stormwater detention).
- **Permanent** means project impacts will occur for more than one year. This will also be used in cases where the impact will occur during spawning or growth periods for Federal and State protected species.

Existing Condition: The functional state of a stream reach before any project impacts or mitigation actions occur.

- **Fully Functional** means that the physical geomorphology of the reach is stable and the biological community likely is diverse. For the purposes of this SOP, a stream generally will be considered fully functional if it meets one or more of the following five criteria:
  1. the reach is not entrenched (entrenchment ratio >2.2, excluding Rosgen Class A and B streams).
  2. the reach supports aquatic species listed as endangered, threatened, or rare by the U.S. Fish and Wildlife Service (USFWS) or Georgia Department of Natural Resources (GADNR) (refer to USFWS Georgia Field Office or GADNR web page),
  3. the stream is a State designated primary trout stream (refer to GADNR web site),
  4. the reach supports a diverse biological community (IBI Category classification of Good or Excellent, based on standardized IBI methodology).
  5. the stream is a GADNR Stream Team reference reach (refer to GADNR Fisheries).

  The Corps, at its discretion, may designate the largest streams within an 8-digit HUC as fully functional, regardless of whether they meet the criteria above, based on these streams' recreational, commercial, and water supply values.

- **Somewhat Impaired** means that stability and resilience of the stream or river reach has been compromised, to a limited degree, but the system has a moderate probability of recovering naturally. For purposes of this SOP, a stream is considered somewhat impaired if none of the five criteria listed above for a fully functional stream are met but the stream meets one of the following four criteria:

1. the stream reach is moderately entrenched (entrenchment ratio of 1.4-2.2, excluding Rosgen Class A and B streams)
2. the channel is dominated by sand, gravel, cobble, boulders, or bedrock, rather than silt and clay
3. bank erosion, excluding undercut banks often found in stable streams at bends, is localized
4. the stream reach supports a moderately diverse biological community (IBI Category classification of Fair).

- **Fully Impaired** means that there is a high loss of system stability and resilience. Recovery is unlikely to occur naturally without further bank erosion and/or aggradation, unless restoration is undertaken. For purposes of this SOP, a stream is considered fully impaired if none of the nine criteria listed above for fully functional or somewhat impaired streams is met. Common indicators of a fully impaired reach include a high entrenchment ratio (<1.4, excluding Rosgen Class A streams, which are naturally entrenched); low sinuosity (<1.2, excluding Rosgen Class A streams, which are naturally relatively straight); low biodiversity (IBI or IWB Category classification of Poor or Very Poor); extensive human-induced sedimentation; extensive bank erosion on both sides of riffle reaches; significant erosion of point bars or deposition of mid-channel bars within the reach; and/or extensive culverting, piping, or impoundment within the reach.

Geomorphic Definitions:

- **Bankfull Discharge** is the flow 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 (Dunne and Leopold 1978). The bankfull stage is the point at which water begins to overflow onto a floodplain (may not coincide with the top of the visible bank in entrenched streams). On average, bankfull discharge occurs approximately every 1.5 years
- **Dimension** refers to the stream's width, depth, and cross-sectional area at bankfull.
- **Entrenchment Ratio** is an index value that describes the degree of vertical containment of a river channel. It is calculated as the width of the flood-prone area divided by bankfull width.
- **Reference Reach/Condition** – A stable stream reach generally located in the same physiographic ecoregion, climatic region, and valley type as the project that serves as the blueprint for the dimension, pattern, and profile of the channel to be restored.
- **Pattern**: Stream pattern describes the shape of a stream as seen from above, and includes factors such as sinuosity, meander length, radius of curvature, and beltwidth.
- **Stable Stream**: A naturally stable stream channel 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 water and the sediment load supplied by the watershed.
- **Profile**: The profile of a stream refers to its longitudinal slope, including factors such as water surface slope, pool-to-pool spacing, and pool and riffle slopes.

Minimum Buffer Width: The **minimum buffer width** (MBW) for which mitigation credit will be earned is 50 feet on one side of the stream, measured from the top of the stream bank perpendicular to the channel. If topography within a proposed stream buffer has more than a 2% slope, 2 additional feet of buffer are required for every additional percent of slope (e.g., minimum buffer width with a +10% slope is 70'). Buffer slope will be determined in 50'-increments beginning at the stream bank. No additional buffer width will be required for negative slopes. For the reach being buffered, degree of slope will be determined at 100' intervals and averaged to obtain a mean degree of slope for calculating minimum buffer width. This mean degree of slope will be used to calculate the minimum buffer width for the entire segment of stream being buffered.

Mitigation Timing: No credits are generated for this factor if the proposed mitigation in a reach is primarily riparian buffer preservation or Riparian Habitat Improvement.

- **Non-Banks**: ***Schedule 1***: All mitigation is completed before the impacts occur.
  Schedule 2: The mitigation is completed concurrent with the impacts.
  Schedule 3: The mitigation will be completed after the impacts occur.
- **Banks:** Use Schedule 2 (Note: release of credits will be based on a release schedule).

Monitoring and Contingencies: Monitoring and contingency plans are actions that will be undertaken during the mitigation project to measure the level of success of the mitigation work and to correct problems or failures. All projects shall include contingency actions that will achieve specified success criteria if deficiencies or failures are found during the monitoring period. Monitoring is a required component of all mitigation plans. Mitigation Banks are required to develop an *Excellent M and C Plan*.

- **Minimum Level Restoration M&C**:
  -- **Riparian preservation/Riparian Habitat Improvement**: Collection of basic information on vegetation in the buffer and stability of the banks being buffered, following protocols provided by the Corps, unless another protocol is approved in advance. Information shall be collected on the following two factors at 0-, 3-, and 5-years after the mitigation is approved:
    a. an evaluation of bank stability throughout the reach .
    b. species composition, average species height and average species diameter at breast height (dbh) of woody vegetation within the buffer.

  -- **Riparian restoration**: Collection of basic information on vegetation in the buffer and stability of the banks being buffered. Information shall be collected on the following three factors before planting and annually for 5 years after planting (remediation and continued monitoring will be required if success criteria are not met after 5 years).
    a. an evaluation of bank stability throughout the reach.
    b. species composition, average species height and average species dbh of woody vegetation within the buffer.
    c. survival and growth (height and dbh or other biomass measure) of planted vegetation.

  -- **Stream channel restoration, streambank stabilization and stream relocation**: Collection of baseline data on stream stability and water quality in streams before and after mitigation is implemented. Information shall be collected on the following four factors before mitigation activities are implemented and at 1-, 3-, and 5-years after mitigation activities are implemented (remediation and continued monitoring will be required if success criteria are not met after 5 years):
    a. an evaluation of bank stability throughout the reach.
    b. longitudinal and cross-sectional profiles of the restored, relocated, or stabilized reach.
    c. mean depth, width, entrenchment ratio, maximum depth at bankfull, bank height ratio, substrate characteristics, and other geomorphic data, as indicated on Table 2.
    d. surveying fish populations in the restored reach.

- **Moderate Level Restoration M&C Plans:**
  -- **Riparian preservation/Riparian Habitat Improvement:** Conducting all features under Minimum M&C, plus surveying bird, mammal, reptile, and amphibian life in the buffer and fish populations in the buffered reach at 0-, 3-, and 5-years after the mitigation is approved.
  -- **Riparian restoration**: Conducting all features under Minimum M&C, plus surveying bird, mammal, reptile, and amphibian life in the buffer and fish populations in the buffered reach at 0-, 3-, and 5-years after planting.
  -- **Stream channel restoration/streambank stabilization and stream relocation**: Conducting all features under Minimum M&C, plus surveying freshwater mussels and snails, crawfish, and other macroinvertebrates in the restored channel before mitigation activities are implemented and at 1-, 2-, and 5-years after mitigation activities are implemented.
- **Substantial Level Restoration M&C**: Conducting all features listed under Moderate M&C, plus simultaneous collection of these data in a suitable reference site. Substantial M&C Credit cannot be generated for Riparian Buffer Preservation or Habitat Improvement.
- **Excellent Level Restoration M&C**: Conducting all features listed under Substantial M&C at Year 7. For all banks, excellent level of M&C is required and an annual status report must be submitted until all credits are sold. Substantial M&C Credit cannot be generated for Riparian Buffer Preservation or Habitat Improvement.

Compensatory Stream Mitigation
Definitions of Factors

- **Priority Area**:
- **Primary Priority**:
  - -- Reaches with species listed as endangered, threatened, or candidate by FWS or GADNR
  - -- Primary trout streams
  - -- Streams identified by the GADNR Stream Team as having an excellent or good IBI score
  - -- Waters adjacent to other Corps' approved mitigation sites/banks or other protected lands
  - -- National Estuarine Research Reserves
  - -- Reaches in approved greenway corridors
  - -- Wild and Scenic Rivers
  - -- Outstanding Resource Waters
  - -- Essential Fish Habitat
- **Secondary Priority**:
  - -- Waters with species listed as Species of concern by FWS or rare/uncommon by GADNR
  - -- Secondary trout streams
  - -- State Heritage Trust Preserves
  - -- Anadromous fish spawning habitat
  - -- Designated shellfish grounds
- **Tertiary Priority**:
  - -- All other areas

Scaling Factor: The Scaling Factor is based on the cumulative length of stream, in feet, that will be affected by a given dominant impact.

Simon's Channel Evolution Stages:

Stage I Stable stream connected to floodplain
Stage II Disturbance
Stage III Degradation; stream begins to entrench
Stage IV Continued degradation and widening; significant bank erosion on both banks
Stage V Stream continues to widen and form a floodplain; aggradation of sediment to form point bars
Stage VI Quasi-stable stream with new, but lower, floodplain

System Credit: Bonus mitigation credit may be generated if proposed riparian mitigation activities include minimum width buffers on both sides of a stream reach and legal protection of a fully buffered stream channel. Condition 1 must be met to receive System Protection Credit for Condition 2.

Table 2. Geormorphic measurements for stream restoration and relocation projects.

	Current Condition	Reference Reach Measurements			Designed Stream
		Mean	High	Low	
Drainage Area (square miles)					
Stream Type (Rosgen)					
W_{bkf} (Bankfull width in feet)					
D_{bkf} (Bankfull mean depth in feet)					
W_{fpa} (Width of floodprone area)					
A_{bkf} (Xsect. Area) = W_{bkf} X D_{bkf}					
W_{bkf} /D_{bkf} ratio					
W_{fpa}/W_{bkf} (Entrenchment ratio)					
D_{max} (Max. depth at bankfull)					
D_{maxtob} (Max depth at top of bank)					
D_{max}/$_{Dbkf}$ (Max depth ratio)					
D_{maxtob}/D_{max} (Bank ht ratio)					
Lm (Meander length in feet)					
Rc (Radius of Curvature in feet)					
W_{blt} (Belt width in feet)					
K (Sinuosity)					
Lm/W_{bkf} (Meander length ratio)					
Rc/W_{bkf} (Radius of Curve ratio)					
W_{blt}/W_{bkf} (Meander width ratio)					
S_{val} (Valley slope)					
S_{chan} (Channel slope)					
S_{rif} (Riffle slope)					
S_{pool} (Pool slope)					
S_{run} (Run slope)					
S_{glide} (Glide slope)					
S_{rif}/S_{chan} (Riffle slope ratio)					
S_{pool}/S_{chan} (Pool slope ratio)					
S_{run}/S_{chan} (Run slope ratio)					
S_{glide}/S_{chan} (Glide slope ratio)					
$D_{maxpool}$ (Max Pool depth in feet)					
W_{pool} (Width of pool in feet)					
L_{pool} (Length of pool in feet)					
Lps (Pool-pool spacing in feet)					
A_{pool} (Pool area) = W_{pool} X L_{poo}					
$D_{maxpool}$/D_{bkf} (Max pool depth ratio)					
A_{pool}/A_{bkf} (Pool area ratio)					
W_{pool}/W_{bkf} (Pool width ratio)					
L_{pool}/L_{bkf} (Pool length ratio)					
Lps/W_{bkf} (Pool-pool spacing ratio)					
D16 (mm)					
D35 (mm)					
D50 (mm)					
D84 (mm)					
D95 (mm)					

WORKSHEET 1: ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Intermittent 0.1			Perennial Stream > 15' in width 0.4			Perennial Stream ≤ 15' in width 0.8		
Priority Area	Tertiary 0.5			Secondary 0.8			Primary 1.5		
Existing Condition	Fully Impaired 0.25			Somewhat Impaired 0.5			Fully Functional 1.0		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.2		
Dominant Impact	Shade/ Clear 0.05	Utility X-ing 0.4	Bank Armor 0.7	Deten-tion 1.5	Stream Crossing (≤ 100') 1.7	Impound 2.7	Morpho-logic Change 2.7	Pipe >100' 3.0	Fill 3.0
Scaling Factor (Based on # linear feet impacted)	< 100' impact 0	100-200' impact 0.05	201-500' impact 0.1	501-1000' impact 0.2	> 1000' impact 0.4 for each 1000' feet of impact (round impacts to the nearest 1000') (example: 2,200' of impact – scaling factor = 0.8; 2,800' of impact – scaling factor – 1.2)				

Reaches to Be Impacted	Reach 1	Reach 2	Reach 3	Reach 4
	Complete the Following for Each Reach to Be Impacted			
Simon Channel Evolution Stage				
Rosgen Stream Type/D50				
Criteria for Selecting Existing Condition for Each Reach				
Bankfull Width and Depth	Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)				

Factors	Reach 1	Reach 2	Reach 3	Reach 4
Stream Type Impacted				
Priority Area				
Existing Condition				
Duration				
Dominant Impact				
Scaling Factor				
Sum of Factors M =				
Feet Stream in Reach Impacted LF =				
M X LF =				

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

WORKSHEET 2: STREAM CHANNEL RESTORATION, STREAM RELOCATION, AND STREAMBANK RESTORATION WORKSHEET

<table>
<tr><td rowspan="3">Net Benefit</td><td colspan="60">All proposals must include at least a 25’ riparian buffer on both banks
Buffers ≥50’ +2’/%slope also may generate riparian credit (use ~~see~~ buffer worksheet)</td></tr>
<tr><td colspan="12">Streambank Stabilization</td><td colspan="12">Structure Removal</td><td colspan="36">Stream Channel Restoration and Stream Relocation</td></tr>
<tr><td colspan="12">2.0</td><td colspan="12">4.0 to 8.0</td><td colspan="12">Priority 4
1.0</td><td colspan="12">Priority 3
4.0</td><td colspan="12">Priority 1 or 2
8.0</td></tr>
<tr><td>Monitoring/ Contingency</td><td colspan="15">Minimal (Required)
0</td><td colspan="15">Moderate
0.3</td><td colspan="15">Substantial
0.4</td><td colspan="15">Excellent
1.0</td></tr>
<tr><td>Priority Area</td><td colspan="20">Tertiary
0.05</td><td colspan="20">Secondary
0.2</td><td colspan="20">Primary
1.0</td></tr>
<tr><td>Control</td><td colspan="20">RC on restored channel and 25’ buffer (Required)
0.1</td><td colspan="20">Required RC + CE or GPP
0.3</td><td colspan="20">Required RC + CE + GPP
0.5</td></tr>
<tr><td>Mitigation Timing</td><td colspan="20">Schedule 3
0</td><td colspan="20">Schedule 2 (Use for all banks)
0.1</td><td colspan="20">Schedule 1
0.5</td></tr>
</table>

<table>
<tr><th>Factors</th><th>Reach 1</th><th>Reach 2</th><th>Reach 3</th><th>Reach 4</th></tr>
<tr><td></td><td colspan="4">Submit Representative Photographs a Completed Table 2 and Conceptual Restoration Design for Each Restored or Relocated Reach; Submit Photographs of Each Bank Where Streambank Stabilization will be Conducted</td></tr>
<tr><td>Net Benefit</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Monitoring/Contingency (at least minimal M&C required)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Priority Area</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Control (at least a RC required)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Mitigation Timing</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sum of Factors M =</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Feet Stream in Reach (do not count each bank separately) LF =</td><td></td><td></td><td></td><td></td></tr>
<tr><td>M X LF =</td><td></td><td></td><td></td><td></td></tr>
</table>

Total Channel Restoration/Relocation Credits Generated = (M X LF) = ____________

WORKSHEET 3: RIPARIAN RESTORATION AND PRESERVATION WORKSHEET

Net Benefit - select value for each stream side	Riparian Restoration/Habitat Improvement/Preservation Factors – MBW = Minimum Buffer Width = 50’+2’/% slope Select Values from Table 1			
System Credit Condition 1	Condition 1: MWB restored or protected on both streambanks To Calculate Value: Average of the Net Benefit values for Stream Side A and Stream Side B			
System Credit Condition 2	RC Placed on Channel 0.05		RC and CE Placed on Channel 0.1	
M&C - select value for each stream side	Mimimal (Required) 0	Moderate 0.2	Substantial 0.25	Excellent 0.3
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 0.7	
Control	RC on restored channel and 25’ buffer (Required) 0.1	Required RC + CE or GPP 0.3	Required RC + CE + GPP 0.5	
Mitigation Timing - select value for each stream side	Schedule 3 0	Schedule 2 (Use for all banks) 0.05	Schedule 1 0.15	

Riparian Reaches		**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
		Complete the Following for Each Riparian Reach			
Simon Channel Evolution Stage					
Rosgen Stream Type/D50					
Criteria for Selecting Existing Condition for Each Reach					
Bankfull Width and Depth		Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)					
Factors		**Reach 1**	**Reach 2**	**Reach 3**	**Reach 4**
Net Benefit	Stream Side A				
	Stream Side B				
System Credit: Condition 1 Met					
System Credit: Condition 2 met (applicable only if Condition 1 met)					
M&C (at least minimal M&C required)	Stream Side A				
	Stream Side B				
Priority Area					
*Control (at least a RC required)					
*Mitigation Timing (none for riparian preservation)	Stream Side A				
	Stream Side B				
Sum of Factors M =					
Linear Feet of Stream Buffered (do not count each bank separately) LF =					
M X LF =					

Total Riparian Restoration Credits Generated = (M X LF) = __________________

MITIGATION BANK SERVICE AREAS

The attached "Service Area Maps" were developed by the Georgia Mitigation Bank Review Team (MBRT), and are based on the "State of Georgia Hydrologic Unit Map, Cataloging Units (i.e., 8-Digit Units)." The maps are intended to assist in the development and expeditious approval of proposed commercial wetland and stream mitigation banks. Although the MBRT strongly recommends the service areas depicted by these maps, their use is not mandatory. For bank sponsors proposing alternative service areas, adequate information must be provided to document how the unique aquatic and/or ecological functions of the bank would offset impacts to similar wetlands/streams located in the alternative service area.

These maps are to be used as follows:

1. Determine which of the primary service areas would include the location of the proposed bank. Within this primary service area, SOP credits generated by the bank could be used, in accordance with established policies and procedures, to mitigate projects authorized by both Nationwide Permits (NWPs) and Individual Permits (IPs); and for resolution of enforcement actions.

2. For a bank's corresponding secondary service area, credits could only be used to mitigate projects authorized by NWPs and for resolution of enforcement actions.

Incorporating the National Research Council's Mitigation Guidelines
Into the Clean Water Act Section 404 Program

BACKGROUND

In its comprehensive report entitled *"Compensating for Wetland Losses Under the Clean Water Act,"* the National Research Council (NRC) provided ten guidelines to aid in planning and implementing successful mitigation projects ("Operational Guidelines for Creating or Restoring Wetlands that are Ecologically Self-Sustaining"; NRC, 2001). Please note that these guidelines also pertain to restoration and enhancement of other aquatic resource systems, such as streams. Each of the ten guidelines can generally be described as A) basic requirement for mitigation success, or B) guide for mitigation site selection. The following sections include both the original text of the NRC guidelines, in italics, as well as a discussion of how applicants and field staff can incorporate these guidelines into the development and review of mitigation projects.

A. **Basic Requirements for Success**

When considering mitigation sites it is important to note that wetland mitigation is not a precise, exact science and predictable results are not always obtainable. Having an adaptive management attitude is a necessity. One should incorporate experimentation into the mitigation plan when possible. This may mean using experimental plots within a mitigation site with different controls, replication, different treatments, inputs, etc., to determine if specific mitigation efforts are effectively meeting the desired goals. This requires detailed planning, effective implementation of the mitigation project, close monitoring (both short and long term) of the implemented plans and finally adjusting to intermediate results with an adaptive attitude and additional modifications to obtain long range wetland and watershed goals. In addition, researchers have found that restoration is the most likely type of mitigation to result in successful and sustainable aquatic resource replacement. Moreover, numerous studies in a variety of landscapes and watershed types have shown that of all factors contributing to mitigation success, attaining and maintaining appropriate hydrological conditions is the most important. The following NRC guidelines should be considered basic requirements for mitigation success.

A 1. **Whenever possible, choose wetland restoration over creation**.

Select sites where wetlands previously existed or where nearby wetlands still exist. Restoration of wetlands has been observed to be more feasible and sustainable than creation of wetlands. In restored sites the proper substrate may be present, seed sources may be on-site or nearby, and the appropriate hydrological conditions may exist or may be more easily restored.

The US Army Corps of Engineers (USACE) and Environmental Protection Agency (USEPA) Mitigation Memorandum of Agreement states that, "because the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, restoration should be the first option considered" (Fed. Regist. 60(Nov. 28):58605). The Florida Department of Environmental Regulation (FDER 1991a) recommends an emphasis on restoration first, then enhancement, and, finally, creation as a last resort. Morgan and Roberts (1999) recommend encouraging the use of more restoration and less creation.

The applicant proposes the type of mitigation. However, the USACE and other agencies will evaluate proposals based on the ease of completion and the likelihood of success. Therefore, pure wetland creation will be evaluated using very stringent criteria before being approved for use as compensatory mitigation for project impacts. Some projects may include creation as part of an overall mitigation effort that involves restoration, enhancement, and/or preservation (e.g., as in a proposed mitigation bank). In these cases, evaluation will be based on the entire proposal and its location in the watershed.

A 2. **Avoid over-engineered structures in the wetland's design**

Design the system for minimal maintenance. Set initial conditions and let the system develop. Natural systems should be planned to accommodate biological systems. The system of plants, animals, microbes, substrate, and water flows should be developed for self-maintenance and self-design. Whenever possible, avoid manipulating wetland processes using approaches that require continual maintenance. Avoid hydraulic control structures and other engineered structures that are vulnerable to chronic failure and require maintenance and replacement. If necessary to design in structures, such as to prevent erosion until the wetland has developed soil stability, do so using natural features, such as large woody debris. Be aware that more specific habitat designs and planting will be required where rare and endangered species are among the specific restoration targets.

Whenever feasible, use natural recruitment sources for more resilient vegetation establishment. Some systems, especially estuarine wetlands, are rapidly colonized, and natural recruitment is often equivalent or superior to plantings (Dawe et al. 2000). Try to take advantage of native seed banks, and use soil and plant material salvage whenever possible. Consider planting mature plants as supplemental rather than required, with the decision depending on early results from natural recruitment and invasive species occurrence. Evaluate on-site and nearby seed banks to ascertain their viability and response to hydrological conditions. When plant introduction is necessary to promote soil stability and prevent invasive species, the vegetation selected must be appropriate to the site rather than forced to fit external pressures for an ancillary purpose (e.g., preferred wildlife food source or habitat).

The use of over-engineered structures and maintenance intensive plans for mitigation is not recommended and will be evaluated using very stringent criteria. If these types of plans are ultimately approved, they must include a comprehensive remedial plan and financial assurances [note that all mitigation projects should have remedial plans and financial assurances], along with a non-wasting endowment to insure that proper maintenance occurs.

It should also be noted that aggressive soil and planting plans using introduced plants and soil from outside sources must be closely monitored to prevent invasive plant takeovers and monotypic plant communities. Such failures can be minimized by undertaking both short-term and long-term monitoring, and having contingency plans in place.

A.3. **Restore or develop naturally variable hydrological conditions**.

Promote naturally variable hydrology, with emphasis on enabling fluctuations in water flow and level, and duration and frequency of change, representative of other comparable wetlands in the same landscape setting. Preferably, natural hydrology should be allowed to become reestablished rather than finessed through active engineering devices to mimic a natural hydroperiod. When restoration is not an option, favor the use of passive devices that have a higher likelihood to sustain the desired hydroperiod over long term. Try to avoid designing a system dependent on water-control structures or other artificial infrastructure that must be maintained in perpetuity in order for wetland hydrology to meet the specified design. In situations where direct (in-kind) replacement is desired, candidate mitigation sites should have the same basic hydrological attributes as the impacted site.

Hydrology should be inspected during flood seasons and heavy rains, and the annual and extreme-event flooding histories of the site should be reviewed as closely as possible. For larger mitigation projects, a detailed hydrological study of the site should be undertaken, including a determination of the potential interaction of groundwater with the proposed wetland. Without flooding or saturated soils, for at least part of the growing *season, a wetland will not develop. Similarly, a site that is too wet will not support the desired biodiversity. The tidal cycle and stages are important to the hydrology of coastal wetlands.*

Natural hydrology is the most important factor in the development of successful mitigation. Wetlands and other waters are very dynamic, and dependent on natural seasonal and yearly variations that are unlikely to be sustainable in a controlled hydrologic environment. Artificial structures and mechanisms should be used only temporarily. Complex engineering and solely artificial mechanisms to maintain water flow normally will not be acceptable in a mitigation proposal. In those sites where an artificial water source (irrigation) has been used to attempt to simulate natural hydrology there are several problems that lead to reduced likelihood of success. First, artificial irrigation does not provide the dynamic and variable nature of water flow normally found in wetlands or riparian systems. Second, the lack of seasonal flows limits the transport of organic matter into and out of the wetland or riparian system. Without any inflow, the net result of artificial irrigation is transport of organic material out of the system. Third, depending on the timing, the use of flood or sprinkler systems on newly created or restoration sites often promotes the germination and growth of exotic plant species.

Note that this changes the USACE' past policy of accepting artificial irrigation as the sole source of hydrology for mitigation projects. If permitted at all, these projects will require substantial financial assurances and a higher mitigation ratio to offset their risk of failure. Applicants must weigh the potential investment costs of acquiring land suitable for restoration versus creation projects in upland environments that will likely involve higher long-term costs and greater risks of mitigation site failure.

The USACE may approve exceptions dealing with hydrologic manipulations, on a case-by-case basis in highly unusual circumstances. It should be noted, however, that even minor engineering or hydraulic manipulation requiring long-term maintenance will only be approved after the applicant posts a non-wasting endowment, performance bond, or other financial assurance.

A.4. **Consider complications associated with creation or restoration in seriously degraded or disturbed sites**

A seriously degraded wetland, surrounded by an extensively developed landscape, may achieve its maximal function only as an impaired system that requires active management to support natural processes and native species (NRC 1992). It should be recognized, however, that the functional performance of some degraded sites may be optimized by mitigation, and these considerations should be included if the goal of the mitigation is water- or sediment-quality improvement, promotion of rare or endangered species, or other objectives best served by locating a wetland in a disturbed landscape position. Disturbance that is intense, unnatural, or rare can promote extensive invasion by exotic species or at least delay the natural rates of redevelopment. Reintroducing natural hydrology with minimal excavation of soils often promotes alternative pathways of wetland development. It is often advantageous to preserve the integrity of native soils and to avoid deep grading of substrates that may destroy natural belowground processes and facilitate exotic species colonization (Zedler 1996).

When considering restoration options it is necessary to determine the spatial and temporal scale of the damage: is the damage limited to the water body itself, or is it a predominant characteristic of the watershed or the surrounding landscape? On-site damage may be restorable, whereas regional-scale damage may be more difficult, or impossible, to reverse or obtain historic conditions. Alternate goals may be necessary in order to determine specific goals of the restoration project. Those desired wetland mitigation goals will depend on the resources needed, the level of degradation and realistic mitigation targets as reflected by the watershed and surrounding landscape. This issue points to the importance of evaluating mitigation plans from a broader watershed perspective.

A.5. **Conduct early monitoring as part of adaptive management**

Develop a thorough monitoring plan as part of an adaptive management program that provides early indication of potential problems and direction for correction actions. The monitoring of wetland structure, processes, and function from the onset of wetland restoration or creation can indicate potential problems. Process monitoring (e.g., water-level fluctuations, sediment accretion and erosion, plant flowering, and bird nesting) is particularly important because it will likely identify the source of a problem and how it can be remedied. Monitoring and control of nonindigenous species should be a part of any effective adaptive management program. Assessment of wetland performance must be integrated with adaptive management. Both require understanding the processes that drive the structure and characteristics of a developing wetland. Simply documenting the structure (vegetation, sediments, fauna, and nutrients) will not provide the knowledge and guidance required to make adaptive "corrections" when adverse conditions are discovered. Although wetland development may take years to decades, process-based monitoring might provide more sensitive early indicators of whether a mitigation site is proceeding along an appropriate trajectory.

There are many factors that may positively or negatively influence aquatic resources and the functions they provide, such as urbanization, farming or grazing. Wetlands and other aquatic resources are often subject to a wide range and frequency of events such as floods, fires and ice storms. As with all natural systems, some things are beyond control. Well-crafted mitigation plans, however, recognize the likelihood of these events and attempt to plan for them, primarily through monitoring and adaptive management. In addition, it is important to realize the mobile nature of wetlands and streams. They change over time and over the landscape in response to internal and external forces.

Monitoring and adaptive management should be used to evaluate and adjust maintenance (e.g., predator control, irrigation), and design remedial actions. Adaptive management should consider changes in ecological patterns and processes, including biodiversity of the mitigation project as it evolves or goes through successional stages. Trends in the surrounding area must also be taken into account (i.e., landscape/watershed context). Being proactive helps ensure the ultimate success of the mitigation, and improvement of the greater landscape. One proactive methodology is incorporation of experimentation into the mitigation plan when possible, such as using experimental plots within a mitigation site with different controls, replication, different treatments, inputs, etc., to determine if specific mitigation efforts are meeting the desired goals.

B. **Mitigation Site Selection**

The selection of an appropriate site to construct a mitigation project is one of the most important, yet often under-evaluated, aspects of mitigation planning. In many instances, the choice of the mitigation site has been completed by the applicant based solely on economic considerations with minimal concern for the underlying physical and ecological characteristics of the site. While economic factors are important in determining the practicability of site selection, current technology and the following NRC guidelines should also factor into the selection of a mitigation site.

B.1. **Consider the hydrogeomorphic and ecological landscape and climate**

Whenever possible, locate the mitigation site in a setting of comparable landscape position and hydrogeomorphic class. Do not generate atypical "hydrogeomorphic hybrids"; instead, duplicate the features of reference wetlands or enhance connectivity with natural upland landscape elements (Gwin et al. 1999).

Regulatory agency personnel should provide a landscape setting characterization of both the wetland to be developed and, using comparable descriptors, the proposed mitigation site. Consider conducting a cumulative impact analysis at the landscape level based on templates for wetland development (Bedford 1999). Landscapes have natural patterns that maximize the value and function of individual habitats. For example, isolated *wetlands function in ways that are quite different from wetlands adjacent to rivers. A forested wetland island, created in an otherwise grassy or agricultural landscape, will support species that are different from those in a forested wetland in a large forest tract. For wildlife and fisheries enhancement, determine if the wetland site is along ecological corridors such as migratory flyways or spawning runs. Constraints also include landscape factors. Shoreline and coastal wetlands adjacent to heavy wave action have historically high erosion rates or highly erodible soils, and often-heavy boat wakes. Placement of wetlands in these locations may require shoreline armoring and other protective engineered structures that are contrary to the mitigation goals and at cross-purposes to the desired functions*

Even though catastrophic events cannot be prevented, a fundamental factor in mitigation plan design should be how well the site will respond to natural disturbances that are likely to occur. Floods, droughts, muskrats, geese, and storms are expected natural disturbances and should be accommodated in mitigation designs rather than feared. Natural ecosystems generally recover rapidly from natural disturbances to which they are adapted. The design should aim to restore a series of natural processes at the mitigation sites to ensure that resilience will have been achieved.

Watershed management requires thinking in terms of multiple spatial scales: the specific wetland or stream itself, the watershed that influences the wetland/stream, and the greater landscape. The landscape in which a wetland or water exists, defines its hydrogeologic setting. The hydrogeologic setting in turn controls surface and sub-surface flows of water, while a variety of hydrogeologic settings results in biological and functional diversity of aquatic resources.

There are three aspects of watershed management that the applicant must address in a mitigation plan: hydrogeomorphic considerations, the ecological landscape, and climate. It should be noted that the overall goal of compensatory mitigation is to replace the functions being lost (functional equivalency) due to a permitted Section 404 activity. By evaluating the hydrogeomorphic setting, ecological landscape and climate, one can determine which attributes can be manipulated (i.e. hydrology, topography, soil, vegetation or fauna) to restore, create or enhance viable aquatic functions.

Hydrogeomorphic considerations refers to the source of water and the geomorphic setting of the area. For example, a riverine wetland receives water from upstream sources in a linear manner, whereas vernal pools exist as relatively closed depressions underlain by an impermeable layer that allows rainfall runoff from a small watershed to fill the pool during specific times of year. Applicants should strive to replicate the hydrogeomorphic regime of the impacted water to increase the potential that the mitigation site mimics the functions lost. Only as a last resort, should applicants prepare plans for constructing wetlands using artificial water sources or placing wetlands into non-appropriate areas of the landscape. In such cases, there should be a contingency plan to prepare for unanticipated events or failures.

Ecological landscape describes the location and setting of the wetland/water in the surrounding landscape. For example, attempting to place mitigation in a dissimilar ecological complex than that of the impacted water is expected to result in a wetland/water unlikely to replicate the functions of the wetland/water that was lost. In all cases, the applicant should evaluate the historical ecological landscape of the mitigation site; for example, if there had been large areas of forested wetland in an agricultural area, then replacement of a forested wetland may be appropriate given other factors that should be considered. In most cases, applicants should plan for a mitigation area that fits best within the ecological landscape of the watershed or region of the mitigation site. Applicants should also consider constructing mitigation sites with more than one type of wetland/water regime, if appropriate, to provide for landscape diversity.

Climate also affects mitigation and is clearly beyond the control of the applicant. Therefore, the mitigation site should be sited in an area supported by the normal rainfall, subsurface and/or groundwater in the region. Climate considerations also can impact other hydrologic issues, sediment transport factors and other factors affecting attainment of desired functions. While climate cannot be manipulated, applicants need to account for it in mitigation plans, including local and regional variability and extremes.

B. 2. **Adopt a dynamic landscape perspective**

Consider both current and future watershed hydrology and wetland location. Take into account surrounding land use and future plans for the land. Select sites that are, and will continue to be, resistant to disturbance from the surrounding landscape, such as preserving large buffers and connectivity to other wetlands. Build on existing wetland and upland systems. If possible, locate the mitigation site to take advantage of refuges, buffers, green spaces, and other preserved elements of the landscape. Design a system that utilizes natural processes and energies, such as the potential energy of streams as natural subsidies to the system. Flooding rivers and tides transport great quantities of water, nutrients, and organic matter in relatively short time periods, subsidizing the wetlands open to these flows as well as the adjacent rivers, lakes, and estuaries.

Applicants should consider both current and expected future hydrology (including effects of any proposed manipulations), sediment transport, locations of water resources, and overall watershed functional goals before choosing a mitigation site. This is extremely critical in watersheds that are rapidly urbanizing; changing infiltration rates can modify runoff profiles substantially, with associated changes in sediment transport, flooding frequency, and water quality. More importantly, this factor encourages applicants to plan for long-term survival by placing mitigation in areas that will remain as open space and not be severely impacted by clearly predictable development. Consideration of the landscape perspective requires evaluation of buffers and connectivity (both hydrologic- and habitat-related). Buffers are particularly important to insure that changing conditions are ameliorated, especially in watersheds that have been, or are in the process of being, heavily developed. In addition, because wetlands are so dynamic, adequate buffers and open space upland areas are vital to allowing for wetlands to "breath" (expand and/or decrease in size and function) and migrate within the landscape, particularly in watersheds under natural and/or man-made pressures.

B.3. **Pay attention to subsurface conditions, including soil and sediment geochemistry and physics, groundwater quantity and quality, and infaunal communities**.

Inspect and characterize the soils in some detail to determine their permeability, texture, and stratigraphy. Highly permeable soils are not likely to support a wetland unless water inflow rates or water tables are high. Characterize the general chemical structure and variability of soils, surface water, groundwater, and tides. Even if the wetland is being created or restored primarily for wildlife enhancement, chemicals in the soil and water may be significant, either for wetland productivity or bioaccumulation of toxic materials. At a minimum, these should include chemical attributes that control critical geochemical or biological processes, such as pH, redox, nutrients (nitrogen and phosphorus species), organic content and suspended matter.

Knowledge of the physical and chemical properties of the soil and water at the mitigation site is also critical to choice of location. For example, to mitigate for a saline wetland, without knowing the properties of the soil and water sources at the mitigation site, it is unlikely that such a wetland is restorable or creatable. Certain plants are capable of tolerating some chemicals and actually thrive in those environments, while others plants have low tolerances and quickly diminish when subjected to water containing certain chemicals, promoting monotypic plant communities. Planning for outside influences that may negatively affect the mitigation project can make a big difference as to the success of the mitigation efforts and meeting watershed objectives.

B.4. **Pay particular attention to appropriate planting elevation, depth, soil type, and seasonal timing.**

When the introduction of species is necessary, select appropriate genotypes. Genetic differences within species can affect wetland restoration outcomes, as found by Seliskar (1995), who planted cordgrass (Spartina alterniflora) from Georgia, Delaware, and Massachusetts into a tidal wetland restoration site in Delaware.

Different genotypes displayed differences in stem density, stem height, belowground biomass, rooting depth, decomposition rate, and carbohydrate allocation. Beneath the plantings, there were differences in edaphic chlorophyll and invertebrates.

Many sites are deemed compliant once the vegetation community becomes established. If a site is still being irrigated or recently stopped being irrigated, the vegetation might not survive. In other cases, plants that are dependent on surface-water input might not have developed deep root systems. When the surface-water input is stopped, the plants decline and eventually die, leaving the mitigation site in poor condition after the USACE has certified the project as compliant.

A successful mitigation plan needs to consider soil type and source, base elevation and water depth, plant adaptability and tolerances, and the timing of water input. When possible: a) use local plant stock already genetically adapted to the local environment; b) use stock known to be generally free from invasive or non-native species; c) use soil banks predetermined to have desirable seed sources; d) choose soil with desirable characteristics (e.g., high clay composition and low silt and sand composition for compaction purposes); e) determine \final bottom elevations to insure that targeted water regimes are met and the planned plant community can tolerate the water depth, frequency of inundation and quality of water sources.

It is particularly helpful to examine reference wetlands and/or waters near the mitigation area, in order to identify typical characteristics of sustainable waters in a particular watershed or region. This allows one to determine the likelihood of certain attributes developing in a proposed mitigation site. It should be emphasized that wetland restoration is much more likely to achieve desired results than wetland creation, as evidence of a previously existing wetland or other aquatic resource is a strong indicator of what will return, given the proper circumstances Historical data for a particular site, if available, can also help establish management goals and monitoring objectives. Creating wetlands from uplands has proven to be difficult and often requires extensive maintenance.

B.5. **Provide appropriately heterogeneous topography**

The need to promote specific hydroperiods to support specific wetland plants and animals means that appropriate elevations and topographic variations must be present in restoration and creation sites. Slight differences in topography (e.g., micro- and meso-scale variations and presence and absence of drainage connections) can alter the timing, frequency, amplitude, and duration of inundation. In the case of some less-studied, restored wetland types, there is little scientific or technical information on natural microtopography (e.g., what causes strings and flarks in patterned fens or how hummocks in fens control local nutrient dynamics and species assemblages and subsurface hydrology are poorly known). In all cases, but especially those with minimal scientific and technical background, the proposed development wetland or appropriate example(s) of the target wetland type should provide a model template for incorporating microtopography.

Plan for elevations that are appropriate to plant and animal communities that are reflected in adjacent or close-by natural systems. In tidal systems, be aware of local variations in tidal flooding regime (e.g., due to freshwater flow and local controls on circulation) that might affect flooding duration and frequency.

While manipulations of natural water supply may not be possible or desirable, changes in topography are possible and should be incorporated in the design of a restored or created wetland/water when needed. Varying the depths of the substrate of the mitigation area ensures a heterogeneous topography, decreasing the likelihood of homogenous plant communities. Rather than plan on one water level or one elevation of the substrate, in hopes of establishing a specific plant community, it is best to vary the depth of the bottom stratum. This will increase the likelihood of success for a more diverse targeted plant community and desired functions.

US Army Corps of Engineers

United States Army Corps of Engineers
Regulatory Branch
Washington, D.C. 20314

United States Environmental Protection Agency
Wetlands and Aquatic Resources Regulatory Branch
Washington, D.C. 20460

MEMORANDUM TO THE FIELD

SUBJECT: Model Compensatory Mitigation Plan Checklist for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

We are pleased, as part of the implementation of the National Wetlands Mitigation Action Plan, to enclose a model compensatory mitigation plan checklist with a supporting supplement. The checklist and supplement should serve as a technical guide for permit applicants preparing compensatory mitigation plans to offset impacts to aquatic resources authorized under the Clean Water Act Section 404 and the Rivers and Harbors Act Section 10 programs.

The purpose of the checklist is to identify the types and extent of information that agency personnel need to assess the likelihood of success of a mitigation proposal. The checklist provides a basic framework that will improve predictability and consistency in the development of mitigation plans for permit applicants. This checklist should be included, along with the National Research Council's Guidelines for Self-Sustaining Mitigation sent under separate cover, in each Corps Districts' Mitigation and Monitoring Guidelines currently under development or revision. This checklist can be adapted to account for specific environmental conditions in different regions of the U.S.

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MULTI-AGENCY COMPENSATORY MITIGATION PLAN CHECKLIST[1]

- ☐ Mitigation Goals and Objectives
  - Describe functions lost at impact site
  - Describe functions to be gained at mitigation site
  - Describe overall watershed improvements to be gained

- ☐ Baseline Information for Impact and Proposed Mitigation Sites
  - Provide data on physical attributes of sites (soils, vegetation, hydrology)
  - Describe historic and existing land uses and resources impacted
  - Describe reference site attributes if available

- ☐ Mitigation Site Selection and Justification
  - Describe process of selecting proposed site
  - Likelihood of success, future land use compatibility, etc.

- ☐ Mitigation Work Plan
  - Location
  - Construction Plan
  - Describe planned hydrology, vegetation, soils, buffers, etc.

- ☐ Performance Standards
  - Identify success criteria
  - Compare functions lost and gained at impact and mitigation sites
  - Describe soils, vegetation and hydrology parameter changes

- ☐ Site Protection and Maintenance
  - List parties and responsibilities
  - Provide evidence of legal protective measures
  - Maintenance plan and schedule

- ☐ Monitoring Plan
  - Provide monitoring schedule, identify party (ies) and responsibilities
  - Specify data to be collected, including assessment tools and methodologies

- ☐ Adaptive Management Plan
  - Identify party (ies) and responsibilities
  - Remedial measures (financial assurances, management plan, etc.)

- ☐ Financial Assurances
  - Identify party (ies) responsible for assurances
  - Specify type of assurance, contents and schedule

[1] Refer to "Supplement: Compensatory Mitigation Plan Checklist" for further explanation of specific checklist items.

SUPPLEMENT: COMPENSATORY MITIGATION PLAN CHECKLIST

This document is intended as a technical guide for Clean Water Act (CWA) Section 404 permit applicants[2] preparing compensatory mitigation plans. Compensatory mitigation is required to offset impacts that cannot be avoided and minimized to the extent practicable. The purpose of this document is to identify the types and extent of information that agency personnel need to assess the likelihood of success of a mitigation proposal. Success is generally defined as: a healthy sustainable wetland/water that – to the extent practicable – compensates for the lost functions of the impacted water in an appropriate landscape/watershed position. This checklist provides a basic framework that will improve predictability and consistency in the development of mitigation plans for permit applicants. Although every mitigation plan may not need to include each specific item, applicants should address as many as possible and indicate, when appropriate, why a particular item was not included (For example, permit applicants who will be using a mitigation bank would not be expected to include detailed information regarding the proposed mitigation bank site since that information is included in the bank's enabling instrument). This checklist can be adapted to account for specific environmental conditions in different regions of the U.S.

1. Mitigation Goals and Objectives

Impact Site

a. Describe and quantify the aquatic resource type and functions that will be impacted at the proposed impact site. Include temporary and permanent impacts to the aquatic environment.

b. Describe aquatic resource concerns in the watershed (e.g. flooding, water quality, habitat) and how the impact site contributes to overall watershed/regional functions. Identify watershed or other regional plans that describe aquatic resource objectives.

Mitigation Site

c. Describe and quantify the aquatic resource type and functions for which the mitigation project is intended to compensate.

d. Describe the contribution to overall watershed/regional functions that the mitigation site(s) is intended to provide.

2. Baseline Information - for proposed impact site, proposed mitigation site & if applicable, proposed reference site(s).

a. Location

1. Coordinates (preferably using DGPS) & written location description (including block, lot, township, county, Hydrologic Unit Code (HUC) number, as appropriate and pertinent.
2. Maps (e.g., site map with delineation (verified by the Corps), map of vicinity, map identifying location within the watershed, NWI map, NRCS soils map, zoning or planning maps; indicate area of proposed fill on site map).
3. Aerial/Satellite photos.

b. Classification – Hydrogeomorphic as well as Cowardin classification, Rosgen stream type, NRCS classification, as appropriate.

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[2] The checklist may be used in other federal or state programs as well; however, additional information may be needed to satisfy specific program requirements. For example, Attachment A indicates additional information needed by the Natural Resources Conservation Service (NRCS) to satisfy the Swampbuster provisions of the Food Security Act.

c. Quantify wetland resources (acreage) or stream resources (linear feet) by type(s).
d. Assessment method(s) used to quantify impacts to aquatic resource functions (e.g., HGM, IBI, WRAP, etc.); explain findings. The same method should be used at both impact and mitigation sites.
e. Existing hydrology
  1. Water budget. Include water source(s) (precipitation, surface runoff, groundwater, stream) and losses(s). Provide budgets for both wet and dry years.
  2. Hydroperiod (seasonal depth, duration, and timing of inundation and/or saturation), percent open water.
  3. Historical hydrology of mitigation site if different than present conditions
  4. Contributing drainage area (acres).
  5. Results of water quality analyses (e.g., data on surface water, groundwater, and tides for such attributes as pH, redox, nutrients, organic content, suspended matter, DO, heavy metals).
f. Existing vegetation
  1. List of species on site, indicating dominants.
  2. Species characteristics such as densities, general age and health, and native/non-native/invasive status.
  3. Percent vegetative cover; community structure (canopy stratification).
  4. Map showing location of plant communities.
g. Existing soils
  1. Soil profile description (e.g., soil survey classification and series) and/or stream substrate (locate soil samples on site map).
  2. Results of standard soils analyses, including percent organic matter, structure, texture, permeability.
h. Existing wildlife usage (indicate possible threatened and endangered species habitat).
i. Historic and current land use; note prior converted cropland.
j. Current owner(s)
k. Watershed context/surrounding land use.
  1. Impairment status and impairment type (e.g., 303(d) list) of aquatic resources.
  2. Description of watershed land uses (percent ag, forested, wetland, developed).
  3. Size/Width of natural buffers (describe, show on map).
  4. Description of landscape connectivity: proximity and connectivity of existing aquatic resources and natural upland areas (show on map).
  5. Relative amount of aquatic resource area that the impact site represents for the watershed and/or region (i.e., by individual type and overall resources).

3. Mitigation Site Selection & Justification

a. Site-specific objectives: Description of mitigation type(s)[3] , acreage(s) and proposed compensation ratios.
b. Watershed/regional objectives: Description of how the mitigation project will compensate for the functions identified in the Mitigation Goals section 1(c).
c. Description of how the mitigation project will contribute to aquatic resource functions within the watershed or region (or sustain/protect existing watershed functions) identified in the Mitigation

[3] That is, restoration, enhancement, creation or preservation: see Regulatory Guidance Letter (RGL) 02-2, Mitigation RGL, for definitions for these terms.

Goals section 1(d). How will the planned mitigation project contribute to landscape connectivity?

d. Likely future adjacent land uses and compatibility (show on map or aerial photo).

e. Description of site selection practicability in terms of cost, existing technology, and logistics.

f. If the proposed mitigation is off-site and/or out-of-kind, explain why on-site or in-kind options[4] are not practicable or environmentally preferable.

g. Existing and proposed mitigation site deed restrictions, easements and rights-of-way. Demonstrate how the existence of any such restriction will be addressed, particularly in the context of incompatible uses.

h. Explanation of how the design is sustainable and self-maintaining. Show by means of a water budget that there is sufficient water available to sustain long-term wetland or stream hydrology. Provide evidence that a legally defensible, adequate and reliable source of water exists.

i. USFWS and/or NOAA Fisheries Listed Species Clearance Letter or Biological Opinion.

j. SHPO Cultural Resource Clearance Letter.

4. Mitigation Work Plan

a. Maps marking boundaries of proposed mitigation types; include DGPS coordinates.

b. Timing of mitigation: before, concurrent or after authorized impacts; if mitigation is not in advance or concurrent with impacts, explain why it is not practicable and describe other measures to compensate for the consequences of temporal losses.

c. Grading plan

1. Indicate existing and proposed elevations and slopes.
2. Describe plans for establishing appropriate microtopography. Reference wetland(s) can provide design templates.

d. Description of construction methods (e.g., equipment to be used)

e. Construction schedule (expected start and end dates of each construction phase, expected date for as-built plan).

f. Planned hydrology

1. Source of water.
2. Connection(s) to existing waters.
3. Hydroperiod (seasonal depth, duration, and timing of inundation and saturation), percent open water, water velocity.
4. Potential interaction with groundwater.
5. Existing monitoring data, if applicable; indicate location of monitoring wells and stream gauges on site map.
6. Stream or other open water geomorphic features (e.g., riffles, pools, bends, deflectors).
7. Structures requiring maintenance (show on map) Explain structure maintenance in section 6(c).

g. Planned vegetation

1. Native plant species composition (e.g., list of acceptable native hydrophytic vegetation).
2. Source of native plant species (e.g. salvaged from impact site, local source, seed bank) stock type (bare root, potted, seed) and plant age(s)/size(s).
3. Plant zonation/location map (refer to grading plan to ensure plants will have an acceptable hydrological environment).

[4] See Federal Guidance on the Use of Off-Site and Out-of-Kind Compensatory Mitigation under Section 404 of the CWA.

4. Plant spatial structure – quantities/densities, % cover, community structure (e.g., canopy stratification).
5. Expected natural regeneration from existing seed bank, plantings, and natural recruitment.

h. Planned soils
1. Soil profile
2. Source of soils (e.g., existing soil, imported impact site hydric soil), target soil characteristics (organic content, structure, texture, permeability), soil amendments (e.g., organic material or topsoil).
3. Erosion and soil compaction control measures.

i. Planned habitat features (identify large woody debris, rock mounds, etc. on map).

j. Planned buffer (identify on map).
1. Evaluation of the buffer's expected contribution to aquatic resource functions.
2. Physical characteristics (location, dimensions, native plant composition, spatial and vertical structure.

k. Other planned features, such as interpretive signs, trails, fence(s), etc.

5. Performance Standards

a. Identify clear, precise, quantifiable parameters that can be used to evaluate the status of desired functions. These may include hydrological, vegetative, faunal and soil measures. (e.g., plant richness, percent exotic/invasive species, water inundation/saturation levels). Describe how performance standards will be used to verify that objectives identified in 3(b) and 3(c) have been attained.

b. Set target values or ranges for the parameters identified. Ideally, these targets should be set to mimic the trends and eventually approximate the values of a reference wetland(s).

6. Site Protection and Maintenance

a. Long-term legal protection instrument (e.g. conservation easement, deed restriction, transfer of title).

b. Party(ies) responsible and their role (e.g. site owner, easement owner, maintenance implementation). If more than one party, identify primary party.

c. Maintenance plan and schedule (e.g. measures to control predation/grazing of mitigation plantings, temporary irrigation for plant establishment, replacement planting, structure maintenance/repair, etc.).

d. Invasive species control plan (plant and animal).

7. Monitoring Plan

a. Party(ies) responsible for monitoring. If more than one, identify primary party.

b. Data to be collected and reported, how often and for what duration (identify proposed monitoring stations, including transect locations on map).

c. Assessment tools and/or methods to be used for data collection monitoring the progress towards attainment of performance standard targets.

d. Format for reporting monitoring data and assessing mitigation status.

e. Monitoring schedule

8. Adaptive Management Plan

a. Party(ies) responsible for adaptive management.

b. Identification of potential challenges (e.g., flooding, drought, invasive species, seriously degraded site, extensively developed landscape) that pose a risk to project success. Discuss how the design accommodates these challenges.
c. Discussion of potential remedial measures in the event mitigation does not meet performance standards in a timely manner.
d. Description of procedures to allow for modifications of performance standards if mitigation projects are meeting mitigation goals, but in unanticipated ways.

9. Financial Assurances

a. For each of the following, identify party(ies) responsible to establish and manage the financial assurance, the specific type of financial instrument, the method used to estimate assurance amount, the date of establishment, and the release and forfeiture conditions:
    1. Construction phase
    2. Maintenance
    3. Monitoring
    4. Remedial measures
    5. Project success
b. Types of assurances (e.g., performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, etc.).
c. Schedule by which financial assurance will be reviewed and adjusted to reflect current economic factors.

ATTACHMENT A
NATURAL RESOURCES CONSERVATION SERVICE (NRCS) PROGRAM REQUIREMENTS[5]

- ☐ NRCS conservation practice standards and specifications
- ☐ NRCS Environmental Evaluation
- ☐ Mitigation agreement
- ☐ Federal/State/Local required permits
- ☐ Compatible use statement:
  - Allowable uses (e.g. hunting, fishing)
  - Prohibited uses (e.g. grazing, silviculture)
  - Uses approved by compatible use permit
- ☐ Copy of recorded easement
- ☐ Subordination waiver on any existing liens on mitigation site
- ☐ Statement of landowner's tax liability
- ☐ Copy of Warrantee Deed from landowner's attorney (no encumbrances, if so list)
- ☐ Copy of certified wetland determination:
  - NRCS-CPA-026 Highly Erodible Land and Wetland Conservation Certification
  - Wetland label map
- ☐ Copy of FSA Good Faith Waiver
- ☐ Copy of easement(s) ingress/egress granted to USDA employees for gaining legal access to mitigation site
- ☐ Copy of NRCS-CPA-38 Request for Certified Wetland Determination/Delineation

[5] For a complete list of the program requirements needed by NRCS to satisfy the Swampbuster provisions of the Food Security Act see the National Food Security Act Manual.