Compensatory Mitigation Policy

Wetlands Section
Water Management Division
Environmental Protection Agency (EPA) Region 4

Executive Summary

- Compensatory mitigation is defined as the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after an appropriate and practicable avoidance and minimization has been achieved.

- The permit applicant should complete a mitigation analysis, similar to an alternatives analysis, which addresses the reasonable and practicable alternatives for compensatory mitigation of a specific project.

- All public notices for projects proposed for authorization under Section 404 should be accompanied by a detailed compensatory mitigation plan.

- The preference for siting mitigation is in a geomorphic position in the landscape which will, at a minimum, replicate the geomorphic setting, hydrology and landscape context of the impact site. The mitigation site should be located inside the United States Geological Survey (USGS) 11-digit Hydrologic Unit (HUC), and as close to the project as feasible.

- Existing Standard Operating Procedures (SOPs), agreements, and other methodologies should be used for guidance where available. Where such SOPs are not currently available, EPA Region 4 recommends that the Federal, State, and local resource agencies which form the review teams for mitigation projects and mitigation banks develop written agreements or guidelines for mitigation banks and projects within their respective states.

- The preference for compensatory mitigation is "in-kind."

- Restoration is the preferred mitigation option, followed by enhancement, creation, and preservation, respectively.

- Regardless of the mitigation option chosen, the mitigation site should be protected and preserved in perpetuity. Ultimately, the choice of protective mechanism will depend on site-specific facts, but all methods should serve the same purpose: to protect the mitigation lands in perpetuity as wetlands.

- Both wetland and riparian buffers should be incorporated as a component of compensatory mitigation. Buffers should be a minimum width of 50 feet on each side of the wetland/waterbody. In appropriate circumstances, EPA Region 4 will consider compensatory mitigation credits for wetland buffers and upland inclusions.

- To determine the appropriateness of any compensatory mitigation proposal, the impacts to the proposed project site should be assessed. The assessment methodology used on the proposed impact site must also be used to assess the proposed mitigation site to allow comparison of the results. If hydrogeomorphic (HGM) Regional Guidebooks, IBI models, and State or local level agreements are unavailable, then predetermined compensatory mitigation ratios are used as a guide. The following are general compensatory mitigation ratios by mitigation type, which can assist in identification of an appropriate mitigation ratio, subject to case by-case functional analysis of the impact and mitigation sites.

Restoration	2:1	
Enhancement	4:1	
Creation	6:1	
Preservation	10:1 to 60:1,	depending upon the relative functions performed by the impact site versus the mitigation site. Preservation should typically be provided only in combination with restoration, enhancement or creation.

- In-kind mitigation for streams should be based on the principles of fluvial geomorphology and consider referenced, stable stream conditions.

- The application of riparian buffers alone as a mitigation activity will be considered on a case-by-case basis.

- Stream mitigation requirements and policies are still evolving at a state and regional level. However, impacts to streams will require stream mitigation of some type. Determinations of appropriate compensatory mitigation activities for stream impacts will be made on a case-by-case basis until applicable policies and guidelines are developed.

- This policy document is intended to support our review of mitigation proposals in the regulatory and enforcement settings. The document will be made available internally and externally to the public on the EPA Region 4 Wetlands Web site (http://www.epa.gov/region4/water/wetlands/legal/mitigation).

Compensatory Mitigation Policy
EPA Region 4

I. Purpose and Scope

This document establishes Regional policy on the use of compensatory mitigation to replace functions lost due to unavoidable alterations of wetlands and other special aquatic sites, associated with projects reviewed by the U.S. Environmental Protection Agency (EPA) Region 4, under the Clean Water Act (CWA), the National Environmental Policy Act (NEPA), Superfund, and other appropriate EPA programs. This policy will guide EPA Region 4 personnel in meeting the purpose, goals, and requirements of the CWA and Section 404(b)(1) Guidelines (Guidelines). This policy will also advise other agencies and the public on EPA Region 4's position on compensatory mitigation. In establishing this policy, EPA Region 4 seeks to ensure that compensatory mitigation requirements under the Guidelines will be more consistently applied and will result in more ecologically successful mitigation.

II. Statutory and Policy Considerations

The Guidelines, as clarified by the "Memorandum of Agreement between the EPA and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines" (February 6, 1990) (Mitigation MOA), require permit review to be conducted in a sequential manner. First, the applicant must show that there is no less environmentally damaging practicable alternative to the proposed project. Second, the proposed discharge must not violate state water quality standards or toxic effluent standards, or jeopardize an endangered species or a marine sanctuary. Third, the proposed discharge must not cause or contribute to significant degradation of the Nation's waters. Finally, the Guidelines require all appropriate and practicable measures be taken to minimize potential harm to the aquatic ecosystem. If the first three steps of the Guidelines are not satisfactorily completed, then minimization of the impacts using compensatory mitigation is inappropriate. After completing the first three steps of the Guidelines, any remaining unavoidable wetland impacts must be appropriately minimized to the maximum extent practicable. Compensatory mitigation is required for unavoidable adverse impacts which remain after all appropriate and practicable minimization has been achieved. Mitigation projects cannot serve to alter the normal mitigation sequencing requirements of the § 404 permit review process as clarified by the MOA nor to eliminate obligations of the permittee under that process (e.g., "buying down impacts"). This Regional policy addresses only compensatory rnitigation. Thus, it is presumed that avoidance and minimization of impacts associated with the proposed project have been completely addressed prior to addressing the points herein.

All mitigation proposals, including mitigation banking and in-lieu-fee proposals, must demonstrate full

compliance with all applicable Federal statutes and regulations. The statutes, regulations, directives, and policies listed below should all be considered in the development or review of mitigation proposals.

A. Clean Water Act [33 United States Code (U.S.C). § 1344]

B. Clean Water Act Section 404 Permit Regulations [33 Code of Federal Regulations (C.F.R.) §320]

C. Section 404(b)(1) Guidelines [40 C.F.R. §230]; including interpretations of the Guidelines in the Memorandum of Agreement between EPA and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act, Section 404(b)(1) Guidelines [February 6, 1990]

D. EPA/Department of the Army August 23, 1993 Memorandum to the Field on Establishment and Use of Wetland Mitigation Banks in the Clean Water Act Section 404 Regulatory Program

E. 1995 Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks [60 Federal Register (FR) 12286-12293]

F. Executive Order 11990 (Protection of the Nation's Wetlands) [42 C.F.R. §26961]

G. Executive Order 11988 (Floodplain Management) [42 C.F.R. §26951]

H. Clean Water Act Section 401 (State Certification) EPA Region 4 stresses the importance of the State Water Quality Certification Program under Section 401 of the Clean Water Act. A strong State program provides vital protection to the wetlands and water quality of the State, and complements the Federal Section 404 perniitting program.

I. Clean Water Act Section 303(d).

J. 1993 President's Wetlands Plan, which includes the interim goal of "no overall net loss" of wetlands, and the long-term goal of increasing the quality and quantity of the nation's wetlands.

K. 1998 Clean Water Action Plan (CWAP), which outlines EPA's and other agencies' goals for increases in wetlands acreage.

L. 1993 Government Performance and Results Act (GPRA).

M. Various Corps of Engineers Regulatory Guidance Letters.

This policy is not intended to set forth requirements in addition to those of the Clean Water Act and regulations promulgated thereunder, or any other applicable statute. Nothing herein shall be deemed to expand or restrict the authorities of EPA Region 4. The policy does not create or alter any legal rights, requirements or benefits, nor is it intended to address all factual scenarios that may arise on

a case-by-case basis.

III. General Considerations

The goal of compensatory mitigation is the replacement or replication of the aquatic ecosystem's ecological functions which are lost or degraded by a project's permitted impacts. For the purposes of Section 404, compensatory mitigation is defined as the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization have been achieved. EPA is working with the States in Region 4 to develop tracking methods which will provide accurate, usable, and timely data on the type and amount of permitted wetlands impacts and the type and amount of compensatory rnitigation for each permitted project.

A. Mitigation Alternatives

The permit applicant should complete a mitigation analysis, similar to an alternatives analysis, which addresses the reasonable and practicable alternatives for compensatory mitigation of a specific project. The analysis should provide a justification for the compensatory mitigation alternative chosen, based upon ecological benefits and the nature of the impacts to be mitigated. Determination of the appropriate type of mitigation should be made on a case-by-case basis, based upon the condition and needs of the watershed in which the impacts are proposed and the nature of the impacts.

B. Background Information

To facilitate review of permit applications, all public notices for projects proposed for authorization under Section 404 should be accompanied by a detailed compensatory mitigation plan. The mitigation plan should include: a functional assessment of the aquatic resource being impacted (or at a minimum, a detailed description of the geomorphic setting, water source, hydrodynamics, and structural characteristics of the wetland); detailed mitigation site information, such as drawings/plans of the proposed mitigation along with a narrative describing how wetland structural characteristics (soils, hydrology, vegetation) will be established; and appropriate monitoring and performance criteria to determine the success of the mitigation (Streever 1999). Also, at least one reference wetland should be identified and described in detail in the mitigation plan. The reference wetland should be similar enough to the "target" ecosystem for the mitigation area to be utilized for comparison purposes (or reference) during the planning, construction, and monitoring phases. Reference sites are useful in determining success or progress in a mitigation area, especially during atypical years (such as drought or high water years, when the mitigation area may not meet specific success criteria). It may be appropriate to use more than one reference area, to include similar wetlands in various stages of succession. Multi-use projects (including banks or any other mitigation projects which are intended as compensation for more

than one impact, project, or permit) should be required to obtain agency concurrence on a mitigation banking instrument (MBI) or similar document that outlines the objectives and administration of the bank, as described in the 1995 Mitigation Banking Guidance (60 FR 57605).

C. Siting Mitigation

The preference for siting mitigation is in a geomorphic position in the landscape which will replicate the geomorphic setting, hydrology and landscape context of the impact site. The mitigation site should be located inside the USGS 11-digit Hydrologic Unit (HUC), and as close to the project as possible in order to replace the ecological functions of the impacted wetland/aquatic site, and to increase opportunities to address water quality issues in the watershed where the impacts occurred. However, in situations where areas adjacent to potential mitigation sites could adversely affect the success of the mitigation site (e.g., parking lots, construction sites, industrial facilities, etc.) by contributing point and/or non-point source pollution or fragmenting habitat, then alternate locations will be considered where geomorphic setting, hydrology, and landscape context can be replicated (Cole 1999, Zedler 1999). If a mitigation site is approved outside of the 11-digit HUC in which the project site is located, higher mitigation ratios may be required. Note: EPA will generally defer to states which have identified their own "watersheds" which may not entirely coincide with the 11-digit HUCs, but are based on geomorphological, physiographical, or ecoregional divisions and established to maximize replacement/restoration of wetland functions within a target watershed.

D. Standard Operating Procedures and State-level Agreements

Where available and approved by the Federal and State agencies involved in wetland and stream protection and restoration, Standard Operating Procedures (SOPs) are a valuable tool for determining adequate compensatory mitigation for lost functions to wetlands, streams, and other aquatic ecosystems. These SOPs and methodologies should be used for guidance concerning relatively small impacts (less than 10 acres). For larger impacts, the use of a reference-based functional assessment (such as HGM or IBI) is recommended.

Where HGM, IBI, and State/District SOPs are not currently available, EPA Region 4 recommends that the Federal, State, and local resource agencies which form the review teams for mitigation projects and mitigation banks develop written guidelines for assessment of mitigation banks and projects within their respective states. The guidelines should be consistent with the 1995 Mitigation Banking Guidance (60 FR 58605). These documents may form a basis for consistency in review and approval of projects, and provide guidance for applicants and the general public. The development of agreements between agencies, with consistent requirements that provide for functional replacement of wetlands and streams, will strengthen aquatic ecosystem protection in the states subject to the agreements.

IV. Wetlands Mitigation

As stated in the February 6, 1990 Mitigation MOA, "appropriate" mitigation is based solely on the replication of functions and values of the aquatic resources to be impacted. Functions are defined as the normal or characteristic activities that take place in wetland ecosystems. Value of wetland functions is defined as the benefits, goods and services received

from wetlands. In accounting for functions, the use of a reference-based wetland functional assessment method which documents and compares the functions lost at the impact site with those gained at the mitigation site, to determine the appropriateness of mitigation is recommended (e.g., HGM and/or IBI). Functions lost at the impact site should be documented for a determination of significant degradation and as a template for any proposed compensatory mitigation.

A. In-kind vs Out-of-kind

The preference for compensatory mitigation is "in-kind." Implicit in the definition of in-kind mitigation (see Glossary) is the recognition that to replace functions lost due to unavoidable impacts, similar geomorphic settings, water sources, and hydrodynamics should be in place at the mitigation site. Further, wetland structural characteristics (i.e., vegetation, soils, micro topography, coarse woody debris, etc.) must be accounted for in the site specific plan. Without these, full functional replacement is not likely to be achieved. This requires adequate site selection to assure that the basic elements are in place. In addition, mitigation sites should be placed in the appropriate landscape context (landscape profile) so as to maintain the pattern of wetland diversity in the watershed (Gain et al. 1999). "Out-of-kind" replacement is not preferable since, by definition, wetland-specific functions are not replaced and landscape distributions of wetlands are disrupted, which may have serious ecological ramifications. Under rare circumstances, out-of-kind replacement may be acceptable if the resource agencies agree, based upon a consensus decision, that replacing the impacted wetland subclass with another wetland subclass is environmentally preferable. The decision to allow out-of-kind compensation should be made on a case-by-case basis and, if approved, will generally require a higher mitigation ratio than in-kind mitigation. For impacts to impoundments or other human-altered aquatic ecosystems (such as farm ponds, borrow pits, etc.), it may be preferable to require out-of-kind mitigation. Mitigation requirements for impacts to these type of systems will be determined on a case-by-case basis.

B. Mitigation Options

Restoration is EPA Region 4's preferred mitigation option. In a regulatory sense, restoration is normally considered taking an area that was formerly wetlands and returning it to Section 404 jurisdiction. Thus, at a minimum, any restored site must meet the criteria outlined in the 1987 COE wetland delineation manual for a jurisdictional wetland (or the CWA definition of a water of the United States). However, the restoration action should be designed to go well beyond jurisdictional criteria and must meet defined performance criteria developed to reflect the replacement of aquatic ecosystem functions lost due to the proposed project. **Enhancement** is the second preference for mitigation.

EPA does not consider enhancement to occur unless a suite of functions are enhanced (rather than only one). Also, EPA does not view the conversion of one wetland type to another as enhancement (i.e., conversion of a forested wetland to an herbaceous marsh). As with wetland restoration, it is important to establish a baseline condition for a wetland prior to any action, and then establish measurable performance criteria to quantify the

level of enhancement. Generally, **creation** of a wetland or other aquatic resource where one did not formerly exist is difficult, potentially damaging to significant upland resources, and not recommended. Well-designed and constructed wetland creation sites can provide some important lost wetland functions. However, due to the problematic nature of wetland creation and the risk of failure, EPA prefers wetland restoration or enhancement. **Preservation** does not typically replace lost wetland functions and leads to an overall net loss of wetlands. Thus it is best suited when used in conjunction with restoration or enhancement that replaces wetland functions and contributes to the net gain of wetlands. A wetland preservation area located adjacent to a restoration or enhancement area can contribute to the success of these areas. The use of preservation, as the sole basis for mitigation, may only be acceptable under rare and exceptional circumstances, taking into account the physical and biological functions performed and the demonstrable threat of anthropogenic degradation. The existence of a demonstrable threat must be based on clear evidence of destructive land use changes which are consistent with local and regional land use trends and are not the consequence of actions under the control of the applicant. Examples of appropriate preservation projects include preservation of important wildlife corridors or greenways between other preserved areas, preservation of properties which support Federally protected species or provide exceptional wildlife habitat, and areas in pristine ecological condition.

Notable preservation mitigation projects that have been utilized by EPA Region 4 include Sandy Island in South Carolina, Walker Ranch in Florida, the regionally-significant mitigation projects associated with Central Florida Beltway (Hankinson, 1992), and The Nature Conservancy's Altamaha River Project in Georgia. Each of these projects represents a large and major preservation project that has accomplished the goals of the Clean Water Act while meeting the specific goal of the management agencies that accepted or will accept the preserved wetlands. These projects are considered outstanding examples by the Region for preservation mitigation based on the following conditions. First, a specific agency or group had a preservation and/or management plan for the area to be preserved, Secondly, the site(s) consisted of a large tract of land that was located in the watershed for the projects proposed for mitigation, thirdly, there were significant resources at risk or that would be protected by preservation, and lastly, the project was acceptable to the applicant and there was agreement by the applicant to include management, enhancement and in some cases restoration of wetlands as part of the management plan. EPA Region 4 will continue to support these types of preservation projects when they meet the goal of the Agency for wetland protection and the Region will work with applicants and other agencies which propose these types of preservation projects in the future.

Regardless of the mitigation option chosen, the mitigation site should be protected and preserved in perpetuity, preferably through fee-simple transfer to a third party, such as a State or local government agency, or a conservancy organization. Conservation easements and deed restrictions (or restrictive covenants) are also an acceptable method of preservation. Deed restrictions are generally more suitable for smaller, more isolated mitigation areas, but may be used on larger tracts in appropriate circumstances. Both restrictive covenants and conservation easements should include language which restricts activities allowed on the mitigation property

to those which do not harm the integrity of the mitigation site, or which provide a benefit to the mitigation site or to the public, such as educational activities (e.g. construction of educational signs and boardwalks). Ultimately, the choice of protective mechanism win depend on the site specific facts, but the method should serve the same purpose: to protect the mitigation lands in perpetuity as wetlands.

C. Upland Buffers and Inclusions

Land use in areas adjacent to wetlands and streams can affect the physical, chemical, and biological processes that take place in these aquatic ecosystems. For instance, these transition areas, or buffers, are of great importance to many wetland-dependent species, and in riverine systems serve a critical role in moderating water temperature and maintaining species diversity as part of a habitat corridor. Buffers may provide important habitat for Federally protected species or other unique or rare wildlife. Buffers are also capable of removing and/or retaining sediment, nutrients, and metals from runoff to wetlands and stream systems. Recommended buffer widths vary, depending upon the desired performance and parameters/pollutants of concern (Castelle et al. 1994), but should be a minimum of 50 feet on each side of the wetland or waterbody. Both wetland and riparian buffers should be incorporated as a component of compensatory mitigation.

EPA also recognizes the ecological value of upland inclusions within wetland mitigation areas, such as microtopographic features. In appropriate circumstances, EPA will consider compensatory mitigation credits for wetland buffers and upland inclusions. Buffers and inclusions should be planned or designed to contribute to or protect the functions of the wetland area with which they are associated.

V. Determination of "Appropriate" Wetland Mitigation

To determine the appropriateness of any compensatory mitigation proposal, the impacts to the proposed project site must be assessed. The assessment methodology used on the proposed impact site must also be used to assess the proposed mitigation site to allow comparison of the results. Any scientifically-based, well-documented, reference-based methodology is appropriate for assessing the functional capacity of the impact and mitigation sites. To date, only two such methods have been or are being developed, namely the Hydrogeomorphic Approach to Wetland Functional Assessment (HGM) and the Index of

Biological Integrity (IBI). Therefore these two methods are the preferred assessment methodologies. In the absence of HGM Regional Guidebooks and/or IBI, many states and Corps of Engineers Districts have developed abbreviated assessment/compensation methods (often in the form of SOPs) that are utilized to determine appropriate compensatory mitigation for wetland impacts. The SOPs present a simplified approach for the assessment of relatively small impacts. However, most of these assessment approaches are not based on reference ecosystems, and thus lack the correlation with actual field sites (reference conditions). Use of these non-reference based assessments will be evaluated on a case-by-case basis.

Once the functional capacity of the impact site and the proposed mitigation site are assessed, the number of acres mitigated for the number of acres impacted is determined by: (1) considering the time required for the mitigation site to reach maturity or target conditions, (2) the risk of the mitigation not achieving functional replacement, and (3) an appropriate consideration of the loss of function over time. Implicit in the consideration of risk of failure to achieve functional replacement is consideration of the concepts of in-kind vs. out-of-kind mitigation and the differences between restoration, enhancement, and creation. By definition, in-kind replacement requires that the same HGM subclass be replicated in a similar landscape context as the impact site. The more similar the geomorphic setting, water source, hydrodynamics and landscape setting, the less risky the proposed mitigation; therefore the lower the compensation ratio needed to achieve functional replacement. Likewise, out-of-kind mitigation means that the geomorphic setting, water source, hydrodynamics and /or landscape context are dissimilar from the impact site and the risk of failure to replicate lost functions increases, thus the ratio increases. In addition to considering the aforementioned factors, the amount of time required for the mitigation site to achieve a level of function equivalent to the impacted site should also be considered. Functions dependent on re-establishment of wetland vegetation and soils (e.g., nutrient cycling, removal and sequestration of elements and compounds, organic carbon export, maintenance of plant and animal habitat) require time to achieve levels equivalent to the impact site. In general, the longer it takes a mitigation site to mature, the greater the ratio. Further, discount rates may be applied to mitigation ratios to account for the present value of the impacted wetlands (King et al. 1994, King and Bohlen 1994, and Hanrahan 1999).

If HGM Regional Guidebooks, IBI models, and State- or local-level agreements are unavailable, then general compensatory mitigation ratios may be used. The ratios qualitatively consider temporal loss and risk (likelihood of success) and are based on the premise that mitigation be performed in-kind, and on-site. Off-site and out-of-kind compensatory mitigation, if acceptable, would carry an additional mitigation responsibility. The following are suggested compensatory mitigation ratios by mitigation type:

Restoration	2:1
Enhancement	4:1

Creation	6:1
Preservation	10: 1 to 60: 1; depending upon the relative functions performed by the impact site versus the mitigation site. Preservation should typically be provided in combination with restoration, enhancement or creation.

For preservation, mitigation projects which consist of the donation of sites to local, state, or federal land management agencies or to conservancy groups, or mitigation sites which connect to existing public lands or preserved greenways, should be typically provided lower mitigation ratios than those projects which simply consist of placement of restrictive covenants or conservation easements. EPA believes that public or conservancy ownership provides greater benefits to the public from the permanent protection of the resource. The assessment approaches

used by the Corps of Engineers' Savannah and Jacksonville Districts account for the increased benefits of preserving a mitigation site through public or land trust ownership, and the Jacksonville District approach also accounts for connectivity of a preservation site with existing preserved areas. EPA recommends that other Districts and States incorporate a method to account for these benefits, where possible.

Even without any HGM Regional Guidebooks, IBI Models, or State or local agreements, it may be appropriate to qualitatively analyze functions at the impact and mitigation sites to adjust and fine-tune the general ratios. However, in the absence of site-specific functional models, the ratios listed above can be expected to result in replacement of lost functions as required by the Guidelines.

VI. Stream Mitigation

Historically, impacts to all aquatic systems have been mitigated with wetlands of one type or another. Compensatory mitigation conducted in this manner has not provided appropriate replacement of certain aquatic ecosystem functions. This is very apparent in instances where stream systems have been impacted by activities such as filling, impoundment, and channelization. Compensatory mitigation for these impacts has been in the form of wetlands mitigation which does not replace lost stream functions that include the transport of water and sediment produced by the stream's watershed, and providing habitat for aquatic organisms. [These functions are the underpinnings of the values, such as fishing and swimming, that society associates with these systems.]

Site specific as well as landscape scale processes and characteristics of fluvial systems determine the dimension, pattern and profile of a stream. Identification of these processes and characteristics has been used to create a hierarchy of stream morphology capable of assisting in the assessment of stream condition (Rosgen 1994 and 1996). This technique focuses on establishing the appropriate physical, hydrologic, and geomorphic context needed to link driving forces and response variables within these systems and allows the assessment of current and target stream conditions. The

use of this assessment technique provides a relatively consistent basis for communicating stream condition and can be used, in a general sense, to identify possible stream mitigation practices. Stream assessment techniques and the principles of fluvial geomorphology have been used to develop technical requirements for stream mitigation (restoration, in particular) with the intent of increasing the likelihood of mitigation project success (NCDENR 1999).

A. In-kind vs. Out-of-kind

The preference for stream mitigation is 'in-kind.' As with wetlands, in order to replace lost functions, the mitigation site should be in the appropriate landscape position. For streams, landscape position is most closely defined by stream order. Therefore, a first-order stream should be replaced by a first-order stream. Site specific plans should incorporate the

characteristics of stream systems, appropriate assessment techniques, and utilize stable, reference stream reach conditions to insure that the selected mitigation is appropriate. Stream mitigation projects will follow the same watershed requirements as outlined for wetlands.

B. Mitigation Options

Stream mitigation requirements and policies are still evolving at a state and regional level, but it should be clear that impacts to streams will require stream mitigation. As with wetlands mitigation, there are potential stream restoration, enhancement, or preservation mitigative measures. Stream restoration is the preferred form of mitigation for stream impacts. Stream restoration is a complex undertaking involving a stream design that must consider site specific as well as watershed conditions, but if conducted properly will result in a stable stream that will maintain the appropriate geomorphic dimension, pattern and profile as well as biological and chemical integrity. An example of stream restoration would be returning a channelized (straightened, widened, and/or deepened) stream to its original, meandering stream channel, along with restoration and preservation of the floodplain and riparian buffer. Enhancement is the second preference for mitigation. Stream enhancement activities are typically conducted on the streambank or in the riparian area, but may also include the placement of instream habitat structures when appropriate. Stream mitigation in the form of streambank stabilization and preservation may be appropriate in some instances. Stabilization of severely eroding banks using 'soft' methods (i.e., natural materials) may be effective in certain situations, but streambank stabilization that utilizes primarily 'hard' techniques (i.e., rip-rap, gabions) will generally not receive mitigation credit. Stream preservation on the impact site without substantial buffers is considered impact avoidance and has no compensatory mitigation value (though it reduces the need for compensatory mitigation). Stream relocation (the creation of a new stream channel) which typically occurs on impact sites may be considered as mitigation when the relocation design has an appropriate geomorphic dimension, pattern, and profile, and is capable of transporting the water and sediment produced by the stream's watershed. However, relocation to inappropriate areas or with an inappropriate design will

not be acceptable mitigation for stream impacts. Watershed-scale actions which are appropriately linked to improving stream functions may also be considered as compensatory mitigation for stream impacts. All stream mitigation should be reviewed on a case-by-case basis because none of the possible measures/techniques work in all situations, and the relative effectiveness of a stream mitigation project will be dependent upon site-specific and watershed conditions.

C. Riparian Buffers

As stated in Part IV.C, land use in areas adjacent to streams (or riparian buffers) can affect the physical, chemical, and biological processes that take place in the stream. Riparian buffers serve a critical role in maintaining regional species diversity and distribution by acting as a habitat corridor for the movement of species, and by moderating water temperature. Riparian buffers are capable of removing and/or retaining sediment, nutrients, and metals from runoff to stream systems. Recommended buffer widths vary, depending upon the desired performance and

parameters/pollutants of concern (Castelle et al. 1994), but should be a minimum of 50 feet on each side. Riparian buffers should be incorporated as a component of any compensatory stream mitigation proposal. The application of riparian buffers alone as a mitigation activity will be considered on a case-by-case basis.

VII. Implementation

This policy document is intended to support our review of mitigation proposals in regulatory and enforcement settings. The policy will be used to support our comments on individual Section 404 permit actions, mitigation banking instruments, and development of regional conditions. It will also be utilized during formulation and review of mitigation plans for enforcement actions. Further, EPA hopes that this policy will be used in developing SOPs, guidelines, or agreements at the District, State, or local level, for evaluation of mitigation proposals. The document will be made available internally and externally to the public on the EPA Region 4 Wetlands Web site (http://www.epa.gov/region4/water/wetlands/legal/mitigation). Hard copies are available upon request.

VIII. Other Procedures

This policy will be re-examined regularly, and may be subject to modification at any time. It may be superseded by subsequent Regional or national policy.

Original signed by:

John H. Hankinson, Jr. 01/16/01
Regional Administrator Date

References

Adams, P.R. 1992. Rapid Methods for Evaluating, Ranking, or Categorizing Wetlands. In Statewide Wetland Strategies: A Guide to Protecting and Managing the Resource. World Wildlife Fund. Island Press. pp. 186-224.

Ainslie, W.B., R.D. Smith, B.A. Pruitt, T.H. Roberts, E.J. Sparks, L. West, G.L. Godshalk, and M.V. Miller. 1999. A Regional Guidebook for Assessing the Functions of Low Gradient, Riverine Wetlands in Western Kentucky. Technical Report WRP-DE- 17, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Castelle, A.J., AW. Johnson, and C. Conolly. 1994. "Wetland and Stream Buffer Size Requirements - A Review," *Journal of Environmental Quality*, Volume 23, September-October 1994.

Cole, C.A. 1999. Ecological Theory and Its Role in the Rehabilitation of Wetlands. In An International Perspective on Wetland Rehabilitation, W. Streever (ed). Kluwer Academic Publishers. pp. 265-275.

Epps, Q., and W.B. Ainslie. In prep. A Regional Guidebook for Assessing the Functions of

Headwater Riverine Wetlands in South Carolina. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS (In Press).

Gwin, S.E., M.E. Kentula, P.W. Shaffer. 1999. Evaluating the Effects of Wetland Regulation Through Hydrogeomorphic Classification and Landscape Profiles. *Wetlands* 19(3): 477489.

Hankinson, John H., Jr. 1992. The Regional Mitigation Trust: An Integrated Approach to Wetland Mitigation. St. Johns River Water Management District. 12 pages.

Hanrahan, F. 1999. Wetland Compensatory Mitigation Template. Unpublished Report.

Karr, J.R. and D.R. Dudley. 198 1. Ecological Perspective on Water Quality Goals. *Environmental Management* 5:55-68.

King, D.M., C.C. Bohlen, and K.A. Adler. 1994. Watershed Management and Wetland Mitigation: A Framework for Determining Compensation Ratios. Univ. of Maryland, Center for Environmental and Estuarine Studies. Draft Report No. UMCEES-CBL-94046.

King, D.M., and C.C. Bohlen. 1994. Compensation Ratios for Wetland Mitigation: Guidelines and Tables for Applying the Methodology Described in "Wetland mitigation: A Framework for Determining Compensation Ratios." Univ. of Maryland, Center for Environmental and Estuarine Studies. Working Paper No. UMCEES-CBL-94-10.

North Carolina Department of Environment and Natural Resources. 1999. The Draft Technical Guide for Stream Work in North Carolina.

Rheinhardt, R.D., M.C. Rheinhardt, and M.M. Brinson. 2000. A Regional Guidebook for Applying the Hydrogeomorphic Approach to Wet Pine Flats on Mineral Soils in the Atlantic and Gulf Coastal Plains, USA. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS (In Press).

Rosgen, D.L. 1994. A Classification of Natural Rivers. *Catena* 22: 169-199.

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

Smith, R.D., A. Amman, C. Bartoldus, M.M. Brinson. 1995. An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices. Technical Report WRP-DE-9, U.S. Army Engineer Waterways

Experiment Station, Vicksburg, MS.

Smith, R.D. and C. Klimas. A Regional Guidebook for Assessing the Functions of Wetlands in the Yazoo Basin of the Mississippi Alluvial Valley. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS (In Prep.).

Strahler, A.N., 1952. Dynamic Basis of Geomorphology. *Geol. Soc. America Bull.* 63:923-38.

Streever, W. 1999. Examples of Performance Standards for Wetland Creation and Restoration. In Section 404 Permits and an Approach to Developing Performance Standards. WRP Technical Note WG-RS-3.3, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Uranowski, C., C. Huegel, Z. Lin, M. Del Charco, J. Garcia, J. Bartsch, M.S. Flannery, S. Miller, J. Bacheler, W. Ainslie. In Review. A Regional Guidebook for Assessing the Functions of Low Gradient, Blackwater, Riverine Wetlands in Peninsular Florida. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS (In Press).

Seaber, P.R., F.P. Kapinos, and G.L. Knapp. 1987. Hydrologic Unit Maps: U.S. Geological Survey Water-Supply Paper 2294.

Wenger, Seth. 1999. A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation. UGA Institute of Ecology (Masters' Thesis).

Wilder, T.C. and T.H. Roberts. In Press. A Regional Guidebook for Assessing the Functions of Low Gradient, Riverine Wetlands in Western Tennessee. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS (In Press).

Zedler, J.B. 1999. The Ecological Restoration Spectrum. In An International Perspective on Wetland Rehabilitation, W. Streever (ed). Kluwer Academic Publishers. pp. 301-3118.

Glossary

Fluvial Geomorphology: The study of landforms derived from the action of running water.

Geomorphology: The study of the evolutionary development of landscapes under a wide variety of climatic and geologic controls.

Hydrogeomorphic Approach to Wetland Functional Assessment (HGM): A wetland assessment procedure which utilizes concepts of hydrogeomorphic classification, functional capacity, reference domain and reference wetlands to relate assessment of wetland impacts and mitigation to reference wetlands.

Hydrologic Unit Code (HUC): A unique numerical designation assigned to hydrographic boundaries of major U.S. river basins which have been delineated by the U.S. Geological Survey. HUCs consist of two to 14 digits, based upon six levels of classification with the greater number of digits indicating a higher degree of subdivision. The eight digit HUC, known as the cataloguing unit, is currently the smallest subdivision available nationwide. However, further subdivision to 11-digit (watershed) and 14-digit (sub-watershed) HUCs exist, or are under development in several parts of the country (Seaber et al. 1987).

Index of Biological Integrity (IBI): An index which represents the ability of an aquatic ecosystem to support and maintain a balanced, adaptive community having a species composition, diversity, and functional organization comparable to that of natural habitats within a region (Karr and Dudley 1981).

In-kind stream compensation: The restoration, enhancement, creation (relocation), or preservation of a stream with appropriate geomorphology and stream order to offset losses of similar stream types.

In-kind wetland compensation: The restoration, enhancement, creation, or preservation of wetlands in the same HGM regional subclass and landscape context as the impact site (Brinson 1993, Smith et al. 1995, Ainslie et al. 1999, Rheinhardt et al. 2000, Wilder et al. in press, Smith and Klimas, in prep, Uranowski et al., in review, Epps et al., in prep) . For example, herbaceous depressional wetlands should be replaced with herbaceous depressional wetlands, and low gradient riverine wetlands should be replaced by low gradient riverine wetlands, etc.

Landscape Context: The spatial relationship of the wetland to other wetlands and natural habitats in a watershed.

Out-of-kind stream mitigation: Replacement of the stream impact order with a different stream order. The design of the mitigation stream should include appropriate geomorphology for the landscape context at the mitigation site. Out-of-kind stream mitigation may also include nontraditional means of water quality enhancement, or watershed-scale actions which improve certain ecological functions within the watershed.

Out-of-kind wetland mitigation: Replacement of the wetland impact type with a different HGM subclass and/or in an inappropriate landscape context. An example would be the replacement of an impacted low gradient riverine wetland with a depressional wetland.

Special Aquatic Site: Defined by Title 40 CFR §230.3(q-l) as including the following sites, (which are further identified in Title 40 CFR § 230, Subpart E): sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes. Title 40 CFR §230.3 (q-1) also defines these sites as "geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region."

Streambank stabilization: In-place stabilization of eroding streambanks using either soft or hard solutions.

Stream enhancement: The process of implementing certain stream rehabilitation practices intended to improve water quality and ecological function.

Stream order: as defined by Strahler (1952).

Stream preservation: Usually in the form of preservation of upland riparian buffers, as opposed to outright preservation of existing streams.

Stream relocation: Usually the creation of a new stream channel and rerouting of water from the existing channel to the new channel.

Stream restoration: Returning a stream, its floodplain, and riparian areas to a stable dimension, pattern, and profile as well as reestablishing biological habitat and function.

Wetland creation: The establishment of a wetland or other aquatic resource where one did not formerly exist.

Wetland enhancement: Activities conducted in existing wetlands which improve one or more aquatic functions, without compromising other wetland functions.

Wetland preservation: The protection of ecologically important, sustainable wetlands or other aquatic resources, in perpetuity, through the implementation of appropriate legal and physical mechanisms.

Wetland restoration: The re-establishment of wetland and/or other aquatic resource characteristics and functions at a site where they have ceased to exist as jurisdictional wetlands. In a regulatory sense, restoration is normally considered taking a non-jurisdictional wetland area and returning it to Section 404 jurisdiction.