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PUBLIC NOTICE

The US Army Corps of Engineers, Wilmington District (District), Regulatory Division is announcing the release of **Determining Appropriate Compensatory Mitigation Credit for Dam Removal Projects** for use in North Carolina. This guidance was developed by an interagency group consisting of representatives from the US Environmental Protection Agency (EPA), Region 4, US Fish and Wildlife Services (USFWS), NC Division of Water Quality (DWQ) and the NC Wildlife Resources Commission (NCWRC).

This document is intended to provide the regulated community of North Carolina with joint and consistent District and DWQ guidance with respect to determining appropriate compensatory mitigation for dam removal projects.

The US Army Corps of Engineers released final Stream Mitigation Guidelines on May 5, 2003, which addressed the requirements for stream mitigation, definitions of stream mitigation terms and activities, stream mitigation ratios, and monitoring requirements. This guidance primarily addressed the restoration and/or enhancement of those stream systems where the entire reach of the stream to be restored/enhanced and adjacent buffers could be acquired by the project proponent. Dam removals have the potential to restore anadromous fish migrations, reintroduce isolated native and endangered or threatened species and possibly improve water quality. However, stream restoration techniques outlined in the Stream Mitigation Guidelines would be difficult to apply to dam removals due to the presence of multiple property owners, acquisition of multiple tracts of land and the various implications to the aquatic ecosystem upstream and downstream of the structure.

Topics addressed in this document include the debit/credit process, general criteria considered for determining mitigation credit, additional factors considered for mitigation credit associated with dam removal, calculation of compensatory mitigation for dam removal, and credit release schedule. This guidance will generally apply to non-tidal waters. These guidelines should not be construed as affecting the applicability of the CWA 404(b)(1) Guidelines, found at 40 CFR Part 230, or the Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines. The guidelines require consideration and the selection of practicable alternatives to proposed project impacts that would avoid or minimize impacts to waters of the United States, including streams and wetlands, prior to considering compensatory mitigation.

Primary Guidance Objectives:

a. Restore and enhance aquatic habitat for anadromous, endangered and threatened and native species.
b. Maintain and improve water quality functions.
c. Maintain and restore public use of stream resources.

A copy of Determining Appropriate Compensatory Mitigation Credit for Dam Removal Projects may be downloaded at
http://www.saw.usace.army.mil/wetlands/mitigation/damremoval_guidance.html

This document is intended to be fair and flexible and is subject to periodic revision and update as new procedures and stream mitigation monitoring data support changes. Comments and suggestions are welcome at any time, especially during the initial 12-month period of this document's use from the publication date. Comments should be addressed to Mrs. Jean Manuele (Jean.B.Manuele@usace.army.mil), Ms. Becky Fox (fox.Rebecca@epa.gov) or Mr. John Dorney (john.dorney@ncmail.net).

Determining Appropriate Compensatory Mitigation Credit for Dam Removal Projects

Developed cooperatively by US Army Corps of Engineers (COE), Wilmington District, US Fish and Wildlife Service (Service), US Environmental Protection Agency (EPA), Region IV, NC Division of Water Quality (DWQ), and NC Wildlife Resources Commission (WRC)
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Although dam removal projects would be expected to result in the restoration of natural stream systems that had been previously impacted, there is no established procedure to identify when and how dam removal can be utilized as compensatory mitigation for loss of streams and stream functions due to permitted development projects. The following guidance has been prepared to address these issues and is intended to provide the regulated community of North Carolina with joint and consistent District and DWQ Guidance.

The intent of this guidance is to provide a consistent method to determine mitigation credit derived from appropriate dam removal projects across the state.

This guidance is intended to apply to the removal of larger dams. Removal of smaller dams (generally involving impoundments of 10 acres of surface area or less) may provide project specific compensatory mitigation opportunities, utilizing channel restoration that follows the typical natural channel design methods. The DWQ will use this guidance as a working policy. The Wilmington District also intends to use this guidance, but will do so only after the Corps follows its normal public interest review process, which provides for opportunity for public notice and comment. These guidelines should not be construed as affecting the applicability of the Clean Water Act (CWA) 404 (b)(1) Guidelines, found at 40 CFR Part 230, the Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army (DA) concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines, or the review process outlined in DWQ's rules (15A NCAC 2H.0506).

Although the agencies believe that there is benefit in dam removal projects, use of dam removal projects as compensatory mitigation should be used cautiously and on a limited basis until a better understanding of the benefits and consequences of dam removal projects is gained. It is anticipated that this guidance will be subject to periodic review and revision based on the review and monitoring of these projects. This guidance relates to dam removal projects only and is not intended to address other types of potential compensatory stream mitigation projects.

Debit/Credit Process

All considerations for compensatory mitigation credit for dam removal should be evaluated through the mitigation bank process involving a Mitigation Bank Review Team (MBRT) and subsequent execution of a Mitigation Banking Instrument (MBI). For proposals by the Ecosystem Enhancement Program (EEP), evaluation will be done by the EEP Program Assessment and Consistency Group (PACG) in accordance with the EEP Memorandum of Agreement (MOA). It is expected that all proposals will be adequately described in a planning document that is subject to review and approval by the appropriate agencies. Once it has been determined that a project may proceed under these guidelines, specific DA permit requirements for removal of the dam and any associated structures will be determined by the U.S. Army Corps of Engineers.

I. General criteria that will be considered when determining mitigation credit.

A. **Water quality issues**: Documented impairments to water quality in the impoundment that would be alleviated by removal of the dam. These include low dissolved oxygen levels, elevated temperatures (especially for trout or cool water ecosystems), elevated chlorophyll a, nutrient or toxicant levels or downstream flow interruptions. Other considerations include listing of the waterbody on the state's 303(d) list, or known, repeated violations of water quality standards, or High Quality Water (HQW) or Outstanding Resource Water (ORW) classification above or below the dam.

B. **Rare, endangered and threatened aquatic species:** State or Federally listed rare, endangered or threatened aquatic species that are likely to colonize the restored stream reach. Long-term monitoring (beyond 5 years) may be needed in order to demonstrate that this criterion has been met. If monitoring fails to demonstrate suitable habitat improvements or the presence of appropriate species, as described in the approved mitigation plan, then credit amount and/or release of future credits may be adjusted. In some instances, reintroduction of species by the appropriate agencies may be done in conjunction with the project.

C. **Establishment of an appropriate aquatic community:** Removal of the dam may result in the restoration of the appropriate aquatic community. Success criteria for this category may be based upon a demonstrated improvement of water quality from "good" to "Very Good" within the monitoring period. Use of DWQ's Benthic Macroinvertebrate stream rating system or similar metrics may be used to measure this criterion. Finally, restoration of appropriate stream community fish species, such as Darters, may also receive mitigation credit on a case-by-case basis. The credit would be based upon documentation of restoration of the fragmented aquatic habitat.

D. **Anadromous fish passage:** Documented re-establishment of anadromous fish use of streams upstream of the removed dam. If monitoring fails to demonstrate the presence of anadromous species, as described in the approved mitigation plan, then credit amount and/or release of future credits may be adjusted accordingly. In some, but not all cases, the applicant may be credited at a ratio of 5:1 for this criterion upstream of the impounded reach. However, the final decision will be determined as outlined in the Debit/Credit Process.

When reviewing projects pertaining to either endangered/threatened species and/or anadromous fish criteria, the MBRT and/or PACG will solicit the expertise of the appropriate Federal agency

(USFWS) and/or the National Marine Fisheries Service (NMFS) for federally listed species and the NCWRC and/or the North Carolina Division of Marine Fisheries (NCDMF) for state listed species to determine the viability of the restoration of endangered or threatened species and/or their habitat or anadromous fish of the project and will provide feedback with regard to the monitoring and the success criteria established by the project proponent.

II. Additional site-specific factors that may be considered during the review of dam removal projects for mitigation credits

A. **Wooded buffers:** This guidance recognizes the benefits that wooded buffers provide and encourages their establishment, where possible. More favorable mitigation credits will be supported where buffers are fully protected through conservation easements, either in their wooded state or would be replanted where buffers have been impacted by silvaculture, agricultural, and/or other human or natural activities which have resulted in a removal of the native woody riparian buffer are established on both sides of the waterbody. Buffers of at least 50 feet (30 feet in the mountains) are needed for water quality benefits while buffers up to 300 feet wide are often cited as valuable for wildlife habitat and corridors or where threatened or endangered species are present. The provision of wooded buffers will be treated as a significant factor for the amount of credit available from the site as described in Table 1.

B. **Human values:** If the project is designed to provide direct human benefits including recreational benefits (such as parks, trails, marked canoe trails, boat access, and signage for environmental education) or scientific research conducted beyond the required monitoring of the project, then additional credit may be generated as follows:

An additional 20% bonus (with no more than 10% for each category and up to no more than the maximum credit) could be available.

The purpose of this provision is to encourage dam removal applicants to provide these additional benefits to the public from the dam removal. These activities offered by the applicant may offset any negative local public perception associated with the dam's removal, if any. The provision of new recreational opportunities may also help offset any change in existing recreational uses such as traditional hunting or boating.

C. Calculation of compensatory mitigation for dam removal.

1. Selection of projects: Not all dam removal projects will be suitable for compensatory mitigation. If the dam removal does not meet any of the four general criteria listed above (e.g., water quality issues in the lake, endangered and threatened aquatic species, reestablishment of improved aquatic life and/or anadromous fish passage), then it is unlikely that the Federal and State agencies will support removal of the dam as compensatory mitigation.

2. Maximum Potential Credit:
With the exception of C.3, below, the maximum potential credit (in linear feet) that may be generated by a single project will be the length of stream restored to flowing condition measured from the dam to the upstream edge of the normal pool as indicated by the elevation of the crest of the dam for run-of-river dams or the outfall, whichever is lower in elevation. Restoration of flow in any perennial tributaries to the impoundment may also be counted. Any intermittent streams that would no longer be flooded may be credited at one-half of their length. Alternatively, a functional habitat-based calculation may be used on a case-by-case basis when either the MBRT or the PACG agree that such a calculation is appropriate.

3. Credit for demonstrated downstream benefits: A length of river immediately downstream of the dam may exhibit aquatic life and stream bank stability benefits due to the restoration of natural flows. Credit may be available for this reach on a case-by-case basis based on monitoring and evaluation by the appropriate agency review. The pool removal credit and the downstream benefit credit combine to establish the maximum potential credit. The amount of available credit associated from removal of the impoundment and the downstream benefit credit will be determined by either the MBRT or the PACG.

4. Baseline Mitigation Credit calculations: To establish the baseline mitigation credit, the maximum potential credit (as calculated above) will be adjusted based on the number of general criteria met and the length and width of any buffer that is protected (via conservation easement, etc.) adjacent to the restored stream.

If one criterion is met, 50% of the maximum credit will be available. In the event that 2 or 3 of the criteria are met, then the maximum credit will be 70%. Should all 4 criteria be present, then 100% of the maximum credit will be available. Furthermore, additional credit beyond 100% for buffer establishment and/or preservation will be determined on a case-by-case basis.

Table 1. Adjustment of Baseline Mitigation Credit based on the extent of protected buffers

Percent of Corridor Protected	Average Width[1]	Divide baseline credit by
100[2] to 75%	50 to 150 feet	0.75
	150 to 300 feet	0.70
74 to 50%	50 to 150 feet	0.85
	150 to 300 feet	0.80
49 to 25%	50 to 150 feet	0.95
	150 to 300 feet	0.90
24 to 0%	50 to 150 feet	1.0
	150 to 300 feet	1.0

[1] A minimum width of 30 feet can be substituted for the 50-foot threshold for projects in the mountains.
[2] Note that to facilitate calculation of buffer credits, the extent of the pre-project perimeter of the impoundment is equivalent to 100% of the buffer.

Dam removal credit calculation example:

A dam is removed and 1000 linear feet are restored to flowing water. The dam removal project meets 2 of the 4 general criteria outlined in Section 1. The stream bank buffers are 60%; buffer width is 100 feet on both sides of stream.

Baseline credit: 1000 lf x 70% = 700
Final credit: 700 credits ÷ 0.85 = 823 lf credits

Only in exceptional cases, where sufficient documentation exists, will the baseline credit be increased to an amount that exceeds the maximum credit as referenced in Section C.2.

It is acknowledged that it may be difficult to obtain easements (or other protective mechanisms) from all landowners along a channel. In addition, the acquisition and legal protection of buffers may take several years. Project sponsors are encouraged to propose what is likely to be obtained when the plan is submitted for review. Additional credit would be made available during the monitoring period as additional buffer is protected.

If these categories of buffer protection are not available, adjustments may be made on a case-by-case basis. These adjustments could be modified if the protection efforts target areas with special ecological functions and/or values that are identified by conservation groups such as the NC Natural Heritage Program. Areas that are already protected by conservation easements or public purchase can be utilized toward the protected buffer percentages. Additional credit may be provided on a case-by-case basis, if it is determined that the buffers need to be planted. Similarly, in river basins where DWQ administers riparian buffer protection rules that protect the

wooded buffer, these credit multipliers would likely be recalculated on a buffer width after subtracting the area of the protected buffer.

5. **Case-by-case process for unique situations:** The agencies acknowledge that there may be unusual and unique dam removal scenarios (such as provision of a buffer substantially larger than suggested herein or removal of an urban dam with on-site, watershed based stormwater management), which will require additional flexibility and extensive inter-agency coordination. In these cases, a special Mitigation Banking Review Team may need to be established to address these scenarios.

D. **Other factors to consider on a case-by-case basis in the Debit/Credit Process:**

1. **Wetlands:** Removal of some dams will result in a net gain of wetland acreage while others will result in a net decrease in wetland acreage. A careful evaluation of the effect that the removal of a dam would have on wetlands should be made. This would involve considering wetland functions, values, and eco-region context, as well as possible restoration of these functions prior to dam removal. Protection of any drained wetland areas through conservation easements would be helpful. Any net increase of wetland acreage may be counted as wetland mitigation credit while any net decrease could result in the need for compensatory mitigation to offset those impacts.

2. **Sediment:** The dam should be removed gradually to lessen the downstream impact of any accumulated sediment on downstream biota. Preferably the site should be dewatered and the dam gradually notched over a large portion of the monitoring period. In addition to the mentioned ways of removing or stabilizing sediment, it may also be feasible to reroute a new channel around the old dam to bypass the sediment, the lower the dam to restore/create wetlands or to act as a treatment area for storm flows. Other methods of gradually lowering the water level will also be

considered. Aquatic organism spawning and nursery periods should be considered when timing dam removal. Monitoring of sediment stability in newly exposed stream banks will be necessary to determine if temporary planting will be needed to control erosion. If the sediments are believed to contain toxicants such as heavy metals and toxic organic chemicals, then testing will be needed prior to removal of the dam. If levels of toxicants are problematic, then management of these sediments (including removal and appropriate disposal) will be needed before dam removal. However, if it is determined that the release of those toxicants would be detrimental to the aquatic environment, the MBRT or PACG may exclude the project from further consideration.

3. **Monitoring**: The purpose of monitoring is to document the projected benefits of the dam removal, identify any problems encountered and propose solutions, as well as, justify the amount of credit and the credit release schedule for the project. Monitoring of the biological, chemical and physical effects of dam removal will be required before, during, and after dam removal. Annual reports to the relevant agencies are also required. Action plans should then be developed, approved by the permitting agencies and implemented to address any problems found during the monitoring period. Monitoring should be done for five (5) years after the initiation of dam removal with one year of pre-dam removal monitoring to document baseline conditions. Monitoring should consider fish and macrobenthos monitoring, limited water chemistry monitoring, as well as stream bank stability and reestablishment of a stable channel within the now-drained impoundment. Finally, the monitoring plan must document how the project has resulted in an improvement to any of the criteria upon which the project was based. Existing data may be useful in this regard. If monitoring doesn't support the expected credits based on the criteria listed above, then the number of credits should be adjusted, as appropriate.

4. **Remedial action**: If problems are identified before, during or after dam removal, a remedial action plan must be developed which adequately addresses these issues. For instance, if the newly exposed stream banks are experiencing erosion, then a temporary seeding of a non-invasive annual plant may be needed until the native vegetation can stabilize these sites. Similarly, if downcutting occurs in the tributaries to the dam, measures to stabilize these streams may be necessary. Monitoring programs must be designed to identify these (and other) potential problems so they can be addressed adequately. If active measures are needed, then the use of natural channel design is recommended.

5. **Long-term protection of the dam site**: The dam site will need to be protected with a conservation easement to ensure that construction of a new dam will not occur. The extent of long-term protection of the remainder of the restored stream corridor will determine, in part, the mitigation credits as outlined in the buffer protection portions of this guidance. In cases where removal of the dam results in the creation of developable floodplain or lakebed, it is desirable that the entire floodplain or lakebed should be restored through traditional restoration measures and preserved through conservation easements, deed restrictions or public ownership to preclude future development of these areas.

6. **Rare, threatened and endangered species**: Dam removal in habitat known to support state or Federally listed rare, threatened or endangered species must be coordinated with the appropriate state and Federal agencies to ensure that upstream and downstream habitat is not adversely affected.

7. **Exotic species**: The project area should be thoroughly surveyed to ensure that exotic flora and fauna are neither released downstream nor allowed to invade upstream of the drained impoundment.

8. **Downstream flow alteration:** Following the removal of a dam, possible downstream flow alterations should be examined. Possible alterations could include changes in the regulated floodplain, alterations in the downstream channel morphology and low flow implications for wastewater dischargers.

9. **Existing physical constraints:** Existing features such as roads parallel to the channel, utilities or structures need to be considered with respect to the practical amount of buffer that can be restored or protected. If some of these features cannot be moved, then the maximum of possible buffer credit should be adjusted accordingly.

10. **Downstream flooding:** In most situations, it is likely that dam removal will have a negligible effect on downstream flooding. However, if this factor is of concern to the public or the agencies, then a modeling effort may be needed to evaluate this factor.

11. **Water Supply protection:** It is unlikely that dams will be approved for removal as compensatory mitigation if they are being actively used as water supplies. In any event, project proponents should check the classification of the water to be certain that it is not being used as a water supply.

E. Credit Release Schedule:

For dam removal projects when credit release schedules are appropriate (i.e., mitigation banks), the agencies propose to follow the recently agreed upon, joint federal and state credit release schedule for stream mitigation as outlined below. This schedule has been modified slightly to reflect the definitional differences between more typical stream mitigation and dam removal since some provisions for stream mitigation do not apply to dam removal projects.

<u>Initial crediting: 15%</u>

Execution of MBI (where appropriate)
Approval of final mitigation plan
Delivery of financial assurances

Recordation of preservation mechanism

Construction release (initiation of gradual dewatering of the lake): 10%

Upon initiation of initial physical and biological monitoring (25% cumulative)

After year 1: 10% if a bankfull event has not occurred; 20% if bankfull event has occurred, if channel is stable and other success criteria (if any) are met (cumulative 35% and 45%). This assumes that the project is satisfying the criteria upon which it was based.

After year 2: 10% if first bankfull event occurred in previous year or a bankfull event does not occur in this year; 20% if bankfull event has occurred and if the restored stream channel is stable and other success criteria (if any) are met (cumulative 45% and 55%). This assumes that the project continues to satisfy the criteria upon which it was based.

After year 3: 10% or 20% (same as year 2) (cumulative 55% to 65%). This assumes that the project continues to satisfy the criteria upon which it was based.

After year 4: 10% or 20% (same as year 2 and year 3), (cumulative 65% to 75%). This assumes that the project continues to satisfy the criteria upon which it was based.

After year 5: 25% if at least one bankfull event has occurred in the previous year(s). 35% if the first bankfull event occurs in year 5 and the agencies make a determination of success as defined in the mitigation plan. This assumes that the project continues to satisfy the criteria upon which it was based.

The above release schedule is to be utilized as a guideline, but can be modified by either the MBRT in the event that monitoring reveals that identified success criteria are being met prior to the outlined release schedule.