Virginia Marine Resources Commission

Guidelines for Establishment, Use and Operation of Tidal Wetland Mitigation Banks in Virginia

Virginia Marine Resources Commission

and

Virginia Institute of Marine Science

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Acknowledgments

I PURPOSE AND SCOPE

This document provides guidance for the development and operation of tidal wetland mitigation banks (Bank) in the Commonwealth of Virginia. It was developed jointly by the Virginia Marine Resources Commission (VMRC) and the Virginia Institute of Marine Science (VIMS) with the assistance of a Mitigation Banking Advisory Committee (MBAC) representing local, state and federal interests involved in tidal wetlands management and mitigation issues, as well as private sector developers, consultants and environmental groups.

These guidelines will supplement the existing Mitigation-Compensation Policy which is a part of the VMRC Wetlands Guidelines promulgated in 1974. This guidance is intended to provide VMRC, local wetlands boards (LWB) and other regulatory agencies with an additional management tool to compensate for unavoidable, permitted tidal wetlands losses, thereby addressing the habitat restoration goals and "no net loss" policy of the Chesapeake Bay Program. The effective date of these guidelines will be January 1, 1998.

In accordance with the general and specific criteria of the Mitigation-Compensation Policy, as well as Section 404 (b) (1) of the Clean Water Act, "sequencing" will be required prior to authorizing the use of an approved Bank as compensation for permitted wetland losses. Sequencing is a process whereby wetland impacts resulting from a proposed project are first avoided and then minimized to the greatest extent practicable prior to considering compensation.

In cases where compensation is found to be justified, it should be in-kind and occur on-site where possible, unless it is found to be environmentally preferable to mitigate off-site or through the use of an approved Bank.

II DEFINITIONS

For the purposes of these guidelines, the following terms are defined:

Authorizing Agency: Any Federal, state or local government agency that has authorized a tidal wetland mitigation bank, or a particular use of a mitigation bank, as compensation for an authorized activity; typically the U. S. Army Corps of Engineers, Virginia Marine Resources Commission, Department of Environmental Quality, and/or a local wetlands board which has the enforcement authority to ensure that the terms and conditions of the banking instrument are satisfied.

Banking Instrument: The legally binding document drafted by the bank sponsor and approved by the Mitigation Bank Review Team which describes in detail the physical and legal characteristics of the bank, and how the bank will be established and operated.

Bank Sponsor: Any public or private entity responsible for establishing and in most

circumstances operating a mitigation bank.

Cataloging Unit: Specific geographic area as defined by the Hydrologic Unit Map of the United States (United States Geological Survey, 1980).

Compensation: Actions taken which have the effect of substituting some form of wetland resource for those lost or significantly disturbed due to a permitted development activity; generally habitat restoration or creation.

Consensus: A process by which a group synthesizes its concerns and ideas to form a collaborative agreement acceptable to all members. While the primary goal of consensus is to reach agreement on an issue by all parties, unanimity may not always be possible.

Creation: The establishment of a functional tidal wetland where one did not formally exist.

Credit: A unit of measure representing the accrual or attainment of wetland functions at a mitigation bank. Credit measurements will be determined using the Function Specific Credit Calculation (FSCC) method.

Debit: A unit of measure representing the loss of wetland functions due to a permitted activity at a project site. Debit units will be determined using the same methodology as credit units.

Enhancement: Activities conducted in existing wetlands which increase one or more wetland function.

Function: Any one of the following five commonly recognized benefits provided by tidal wetlands: production and detritus availability, waterfowl and wildlife utilization, erosion buffer, water quality control, flood buffer.

Function Specific Credit Calculation(FSCC): Method developed by the Virginia Institute of Marine Science Wetlands Program for determining the compensation requirements (credits) for a project which results in permitted tidal wetland impacts to be mitigated through the use of an approved mitigation bank**.**

Mitigation: All actions, both taken and not taken, which eliminate or materially reduce the adverse effects of a proposed activity on the living and nonliving components of a wetland system or their ability to interact.

Mitigation Bank: A site where tidal wetlands are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. The use of a bank may only be authorized when impacts are unavoidable.

Mitigation Bank Review Team (MBRT): The interagency group of Federal, state, tribal and/or local regulatory and resource agency representatives, including but not limited to the U. S Army Corps of Engineers, Virginia Marine Resources Commission as co-chairs, Department of Environmental Quality, the Virginia Institute of Marine Science, and local wetlands board(s) in which the bank is located, which approve a banking instrument and oversee the establishment, use and operation of a mitigation bank.

Practicable: Available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes.

Preservation: The protection of ecologically important wetlands or other resources in perpetuity through the implementation of appropriate legal and physical mechanisms. Preservation of existing wetlands shall not generally be an acceptable form of compensation.

Restoration: Re-establishment of wetland characteristics and functions where they have ceased to exist, or exist in a substantially degraded state.

Service Area: The designated area wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands. A bank must be within the same cataloging unit (hydrologic unit), or in an adjacent cataloging unit within the same river watershed, as the impacted site.

Success Criteria: The minimum standards required to meet the objectives for which the bank was established. The success criteria will be based on the Function Specific Credit Calculation methodology and will be monitored over the operational life of the bank.

Watershed: The drainage area for each major river system within the Commonwealth.

Wetlands: For the purposes of these guidelines, wetlands include both vegetated and nonvegetated tidal wetlands as defined in Chapter 13 of Title 28.2 and Chapter 3.1 of Title 62.1 of the Code of Virginia, 1992, as amended.

III TIDAL WETLAND MITIGATION BANKING POLICY AND GUIDANCE

A. Policy

The existing Wetlands Mitigation - Compensation Policy (Appendix A) states "It shall remain the policy of the Commonwealth to mitigate or minimize the loss of wetlands and the adverse ecological effects of all permitted activities through the implementation principles set forth in the(se) Wetlands Guidelines which were promulgated in 1974 and revised in 1982."

The existing policy further states that a two-tiered mechanism will be used to determine whether compensation is warranted and permissible on a case-by-case basis. Any proposal to destroy wetlands and compensate for same in some prescribed manner, including the use of an approved mitigation bank, must first meet the following three specific criteria to evaluate the necessity of the proposed wetlands loss:

1. All reasonable mitigative actions, including alternative siting, which would avoid or minimize wetlands loss or disturbance must be incorporated in the proposal.

2. The proposal must be clearly water-dependent in nature.

3. The proposal must demonstrate clearly its need to be in the wetlands and its overwhelming public and private benefits.

The second tier of the review mechanism contains seventeen specific points which should be given due consideration for inclusion as conditions of any permit allowing the use of compensation to mitigate authorized wetlands losses. These points can be found in the

Supplemental Guidelines of the existing Wetlands Mitigation-Compensation Policy.

There is growing scientific evidence to suggest that new tidal wetlands can be successfully created from adjacent uplands and existing, disturbed wetlands can be restored so that they again function at their full ecological potential. This can provide interested parties with an opportunity to create or restore tidal wetlands in order to establish a Tidal Wetland Mitigation Bank to offer "credits" to offset unavoidable losses to tidal wetlands from authorized projects. Tidal wetland mitigation banks could also provide regulatory agencies an additional tool to ensure that all unavoidable wetland impacts are compensated.

B. Guidance

Section 28.2-1308 of the Code of Virginia (Appendix B) was amended in 1996 to provide applicants who wish to develop tidal wetlands with the opportunity to satisfy compensatory mitigation requirements for adverse impacts to the wetlands through "the purchase of credits from any wetlands mitigation bank that has been approved and is operating in accordance with applicable federal guidance ..." for such banks. The Federal Guidance for the Establishment, Use and Operation of Mitigation Banks is provided in Appendix C of this document.

Accordingly, any project which proposes to adversely impact tidal wetlands, is determined to be acceptable during the public interest review, and includes the proposed use of an approved Tidal Wetland Mitigation Bank, must be in full compliance with existing State and Federal statutes and regulations, as well as consistent with applicable agency policies, including , but not limited to:

1. Section 28.2 of the Code of Virginia including the VMRC Wetlands Mitigation-Compensation Policy

2. Clean Water Act, Section 404 (33 USE 1344)

3. Rivers and Harbors Act of 1899, Section 10 (33 USE 403 et seq.).

4. Environmental Protection Agency, Section 404 (b) (1) Guidelines (40 CFR part 230). Guidelines for the Specification of Disposal Sites for Dredged or Fill Material.

5. Department of the Army, Section 404 Permit Regulations (33 CFR Parts 320-330). Policies for evaluating permit applications to discharge dredged or fill material

6. Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clear Water Act Section 404(b) (1) Guidelines. (February 6, 1990).

7. National Environmental Policy Act (42 USC 4321 et seq,); and the Council on Environmental Quality's implementing regulations (40 CFR parts 1500-1508).

8. U.S. Fish and Wildlife Coordination Act (16 USC 661 et seq,).

9. U.S. Fish and Wildlife Service Mitigation Policy (46 FR 7644-7663, 1981.).

10. Magnuson Fishery Conservation and Management Act (16 USC 1801 et seq.).

11. National Marine Fisheries Service Habitat Conservation Policy (48 FR 53142-53147, 1983).

12. Coastal Zone Management Act (16 USC 1451 et. seq.)

The policies set forth in this document are not final agency action, but are intended solely as guidance. This guidance is not intended, nor can it be relied upon, to create any rights enforceable by any part in litigation with the Commonwealth of Virginia or the United States. This guidance does not establish or affect legal rights or obligations, establish a binding norm on any party and is not the final determinative of the issues addressed. Any regulatory decision made by the participating agencies in any matter addressed by this guidance will be made by applying the governing law and regulations to the relevant facts.

IV IMPLEMENTATION PROCEDURES

In order to increase the likelihood of success of a tidal wetland mitigation bank and minimize potential misunderstanding among all parties involved, the following criteria should be followed for bank planning, siting, construction and operation:

A. Establishment of Tidal Wetland Mitigation Banks

1. Any party or parties interested in creating a tidal wetland mitigation bank should first formally contact the Virginia Marine Resources Commission (VMRC) and the U. S. Army Corps of Engineers (Corps) through the submittal of a bank prospectus to provide notice of intent to establish a bank. This is critical for early review of site selection, development design and technical feasibility of the proposed bank. The prospectus should include information on the objectives for the bank and how it will be established, operated and monitored.

2. Upon receipt of a complete prospectus, the VMRC and Corps, as co-chairs, will establish the Mitigation Bank Review Team (MBRT) to facilitate the development of the banking instrument. The banking instrument will serve as documentation of agency concurrence on the objectives and administration of the bank. While the majority of the information in the banking instrument is to be provided by the bank sponsor, the MBRT will provide guidance where necessary to assure a complete and acceptable document. At a minimum, the banking instrument shall include the following information, but may be amended as necessary in accordance with the procedures used to establish the instrument and subject to agreement by the signatories:

a. Bank goals and objectives;

b. Ownership or other legally responsible party of bank lands;

c. Bank size and wetland community type(s), as defined by the Commission=s *Wetlands Guidelines* (Appendix D), proposed for inclusion in the bank, including baseline conditions, site plan and specifications;

d. Geographic service area;

e. Accounting procedures;

f. Reporting protocols and monitoring plan;

g. Contingency and remedial actions and responsibilities;

h. Financial assurances;

i. Provisions for long-term management and maintenance.

3. Individual banking instruments shall specify that the bank sponsor shall be accountable for all bank-related project costs including acquisition, administration, development, management, maintenance, monitoring, and remedial measures as necessary. A bond, letter of credit, or other financial assurance shall be required to provide alternative compensation in the event of bank failure.

4. The following performance standards will be used to determine credit availability and level of success of a tidal mitigation bank. For advance crediting to be considered, at a minimum the bank sponsor must satisfy items a, b and c.

a. MBRT approved banking instrument including specific marsh design and final elevation plans.

b. Acquisition of bank site and MBRT approved financial assurances in the form of a bond, letter of credit, etc.

c. Establishment and verification of proper tidal hydrology and substrate elevations relative to on-site tidal datum and satisfactory planting of bank site with proper wetland vegetation which clearly demonstrates an initiation of the wetland community type(s) specified in the banking instrument.

d. Minimum of 80% survival of plantings after the first growing season. If plant mortalities exceed 20%, the sponsor will have to replace those plantings or implement other remedial actions specified in the banking instrument.

e. Minimum 50% plant cover after one growing season.

f. Natural increase in the accumulation of organics in the bank substrate.

g. Natural recruitment of plant species within the bank.

h. Increasing primary production during the first three years.

i. Utilization by typical primary and secondary consumers.

j. Utilization by higher consumers (birds, mammals, fish, etc.).

5. Upon receipt of a complete banking instrument, the VMRC or Corps shall provide notification to the public, through standard procedures, and provide a reasonable comment period for the proposal.

B. Criteria for the Siting and Design of Tidal Mitigation Banks

1. The bank must be within the same cataloging unit or within an adjacent cataloging unit within the same river watershed as the impacted site (Figure 1).

2. The selection of a tidal wetland mitigation bank site should generally be based on: the restoration or creation potential of the site; the existing resource value of the site; the size of the site; the location of the site; costs associated with land acquisition and site preparation; existing landscape characteristics and potential future land uses adjacent to the site; presence of contaminants at the site; potential for human intrusion at the site; and the ability of the sponsor to protect the functions of the bank site over the long-term. Where wetland creation is undertaken, consideration should be given to establishing banks on sites having minor existing ecological value.

3. Preservation of existing tidal wetlands will not generally be accepted as a mitigation bank. However, preservation of adjacent non-tidal wetlands or upland buffers may be considered in the adjacent land use category of the functional value methodology for credit determination in a proposed bank if the sponsor can show demonstatable threat to those adjacent areas.

4. Mitigation banks should incorporate management strategies that contribute to overall water quality improvements in the ecosystem and that protect the ecological integrity of adjacent habitats (e.g., the use of buffers, acquisition of easements, etc.). Where practicable, provision should be made for wildlife migrational corridors between mitigation banks and other high quality aquatic and upland habitats.

5. Every effort should be made to avoid establishing banks which require regular and intensive maintenance and management . Exceptions will only be made when the MBRT determines that adequate procedures exist to insure the permanent viability of the bank site.

6. Once a potential bank site has been identified, the MBRT shall review the baseline site conditions to determine if the site has potential to develop mitigation credit.

7. Mitigation banking instruments shall contain a schedule and criteria governing withdrawal of credits from the bank. It shall specify the maximum credit withdrawals allowed prior to interim or final success determinations as appropriate. Permitting agencies shall assure that withdrawal of credits from a bank will be in accordance with the schedules and criteria contained in the banking instrument.

C. Criteria for the Use and Operation of Tidal Mitigation Banks

1. The MBRT will review the operation of a mitigation bank, but will not be responsible for specific operation protocols or any liabilities associated with bank operation. The bank sponsor will be responsible for day-to-day operations and any liabilities associated with such operation.

2. The MBRT will review the banking instrument, inspect the site and, using the functional assessment methodology, will determine the projected credits to eventually be available in a particular bank.

3. Prior to the withdrawal of credits from a mitigation bank, the MBRT will determine if the bank is functioning, consistent with construction thresholds and success criteria specified in the banking instrument as agreed to by the MBRT for that particular bank.

4. Based on the Function Specific Credit Calculation (FSCC)(Appendix E), the MBRT will establish a process or formula ("debiting plan") for translating compensation requirements into debits.

5. In certain instances, limited withdrawal of credits may be allowed by the MBRT prior to demonstrating functional success of the bank. A maximum of 15% of the total credits projected for the bank may be available for early withdrawal only when all of the following requirements are satisfied:

a. The banking instrument and final mitigation plans have been approved by the MBRT;

b. The bank site has been secured by deed, option to purchase agreement, easement or other legal means and appropriate financial assurances have been established (i.e. bond, letter of credit, etc.).

c. The proper hydrology has been established and satisfactory initial plantings demonstrating the desired wetland community type(s) have been installed.

6. If during the wetland permit review process compensation is found to be justified and on-site compensation or individual offsite compensation is unavailable or not environmentally preferable, the applicant and/or the bank sponsor will assess the impacts of the project and determine the necessary amount of compensation through an established bank to achieve no net loss of wetland function. The MBRT will review the assessment and use the Function Specific Credit Calculation (FSCC) method for translating compensation requirements into debits on a project by project basis.

7. Each use of a mitigation bank will be listed as a special condition of the Wetlands Permit for authorized projects. This special condition will specify the amount of credit required for a particular project.

8. To evaluate the long-term success of operational mitigation banks, annual monitoring will generally be required for the first five years of bank operation. Thereafter, reporting should be continued at a regular interval, to be determined by the MBRT and included in the banking instrument. Monitoring should provide sufficient written and graphic descriptions of bank conditions for the MBRT to evaluate the effectiveness of bank management and verify the availability of compensation credits. Reporting requirements may be discontinued after all the credits have been withdrawn from the bank, provided a minimum of three (3) years has passed since the bank was determined to be functioning successfully.

D. Dispute Resolution

All decisions made by the MBRT with respect to any aspect of mitigation bank establishment and operation, including development, management, operation, evaluation, monitoring, and remediation, as outlined in this guidance will be reached by consensus. In the event that consensus cannot be reached, the MBRT will follow the dispute resolution process as outlined in the current federal guidance.

V OTHER PROCEDURES

1. This guidance is subject to change subsequent to the receipt of additional national guidance on this issue.

2. Within one year of issuance, the VMRC and Corps will review this guidance for adequacy, applicability and/or acceptability. Thereafter, review will take place at a minimum of every two years. Any proposed modifications, additions or deletions to this guidance will be considered by the full Commission. The Mitigation Banking Advisory Committee will review any proposed modifications and, upon consensus, recommend necessary changes which should be adopted by the Commission.

3. Nothing in this guidance is intended to diminish, modify, or otherwise affect the statutory or regulatory authorities of the agencies involved.

4. Subsequent guidance related to the development and operation of mitigation banks will be issued as the need arises.

Appendix A Wetlands Mitigation-Compensation Policy

Definitions

The following words, when used in these guidelines, shall have the following meaning unless the context clearly indicates otherwise:

"Compensation" means actions taken which have the effect of substituting some form of wetland resource for those lost or significantly disturbed due to a permitted development activity; generally habitat creation or restoration. Compensation is a form of mitigation.

"Mitigation" means all actions, both taken and not taken, which eliminate or materially reduce the adverse effects of a proposed activity on the living and nonliving components of a wetland system or their ability to interact.

Policy

In spite of the passage of the Virginia Wetlands Act and the Federal Water Pollution Control Act in 1972, the pressures to develop lands, including wetlands along Virginia's shoreline, have continued to accelerate as evidenced by the increasing number of permit applications being submitted. At the same time scientific research has demonstrated that certain wetlands can be established or re-established in areas where wetlands are not found at present. This has led to an increasing number of proposals calling for the destruction of wetlands in one area in order to accommodate development, and the creation of wetlands in another area in order to offset the loss of the natural wetland resource.

Although compensating for the loss of a wetland by establishing another of equal or greater area sounds very attractive in theory and has been regarded as successful in a few specific cases, in general, this form of mitigation has proven difficult to successfully implement. Many questions regarding the ecological soundness and feasibility of substituting one

habitat for another remain to be answered. In addition, a number of studies have demonstrated that for various reasons the created habitats either never attain the level of productivity or diversity of the natural systems they replace or simply are not capable of performing the ecological functions of the undisturbed habitat.

Although California and Oregon now require compensation for lost wetlands on all projects, states such as North Carolina and New Jersey have taken a much more limited approach to the mitigation-compensation question. In general, these latter two states rely on wetland compensation only as a last resort to replace wetlands whose loss is highly justified and unavoidable. Virginia to this point has also taken a very conservative tack with regard to the use of wetland compensation as a management tool.

The Commission, and these guidelines, do not require that all wetlands losses be compensated. They do recommend, however, that compensation be required on a limited basis to replace unavoidable wetlands losses. There are three main reasons for this recommendation.

First, a literature survey and experience with implementing compensation on a day-to-day basis reveal a number of significant problems with the concept itself that remain to be resolved.

Second, there are general philosophical and technical questions regarding compensation which have not been answered by the scientific community to this point in time.

Third, and most important, a reading of the Wetlands Act clearly indicates that the General Assembly intended for the Commonwealth's wetland resources to be preserved in their "natural state," and emphasized through its declaration of policy, the importance of an overall ecological approach to wetlands management.

> "The Commonwealth of Virginia hereby recognizes the unique character of the wetlands, an irreplaceable natural resource which, in its *natural state*, is essential to the ecological systems of the tidal rivers, bays and estuaries of the Commonwealth." (Emphasis added)

The General Assembly also stated that where economic development in the wetlands is clearly necessary and justified it will be accommodated while preserving the wetlands resource.

> ".... it is declared to be the public policy of this Commonwealth to preserve the wetlands and to prevent their despoliation and destruction and to accommodate *necessary* economic development in a manner consistent with *wetlands preservation*." (Originally adopted under Section 62.1-13.1 of the Code of Virginia) (Emphasis added)

In Section 28.2-1308 of the Code of Virginia the General Assembly mandated the preservation of the ecological systems within wetlands of primary ecological significance and then stated:

> "Development in Tidewater, Virginia, to the maximum extent possible, shall be concentrated in wetlands of lesser ecological significance, in wetlands which have been irreversibly disturbed before July one, nineteen hundred seventy-two, and in areas of Tidewater, Virginia, apart from the wetlands."

The General Assembly has spelled out clearly that "necessary economic development" is to

be accommodated in Tidewater, Virginia, but that the emphasis is on wetlands preservation in their natural state.

General Criteria

It shall remain the policy of the Commonwealth to mitigate or minimize the loss of wetlands and the adverse ecological effects of all permitted activities through the implementation of the principles set forth in these Wetlands Guidelines which were promulgated in 1974 and revised in 1982. To determine whether compensation is warranted and permissible on a case-by-case basis, however, a two-tiered mechanism will be implemented. This dual approach will consist first of an evaluation of necessity for the proposed wetlands loss (See Specific Criteria). If the proposal passes this evaluation, compensation will be required and implemented as set forth in the second phase, the Supplemental Guidelines.

The primary thrust of combining the existing Wetlands Guidelines with the two-tiered compensation guidelines is to preserve the wetlands as much as possible in their natural state and to consider appropriate requirements for compensation only after it has been proven that the loss of the natural resource is unavoidable and that the project will have the highest public and private benefit. Commitments to preserve other existing wetlands shall not ordinarily be an acceptable form of compensation.

Specific Criteria

In order for a proposal to be authorized to destroy wetlands and compensate for same in some prescribed manner, the three criteria listed below must be met. If the proposal cannot meet one or more of these criteria, the activity shall be denied, or must occur in areas apart from the wetlands. Should it satisfy all three criteria, however, compensation for the wetlands lost is required.

1. All reasonable mitigative actions, including alternate siting, which would eliminate or minimize wetlands loss or disturbance must be incorporated in the proposal.

2. The proposal must clearly be water-dependent in nature.

3. The proposal must demonstrate clearly its need to be in the wetlands and its overwhelming public and private benefits.

Supplemental Guidelines

If compensation is required, then the following guidelines should be given due consideration and, if appropriate, may be included as conditions of the permit:

A. A detailed plan, including a scaled plan view drawing, shall be submitted describing the objectives of the wetland compensation, the type of wetland to be created, the mean tide range at the site, the proposed elevations relative to a tidal datum, the exact location, the areal extent, the method of marsh establishment and the exact time

frame from initial work to completion.

B. Once the grading is completed at the planting site, it should be inspected by a competent authority to insure that the elevations are appropriate for the vegetation to be planted and that the surface drainage is effective.

C. The compensation plan and its implementation must be accomplished by experienced professionals knowledgeable of the general and site-specific requirements for wetland establishment and long-term survival.

D. A performance bond or letter of credit is required and shall remain in force until the new wetland is successfully established; a minimum of two growing seasons.

E. The compensation marsh should be designed to replace as nearly as possible, the functional values of the lost resource on an equal or greater basis. In general this means creating a marsh of similar plant structure to that being lost. This may not be the case where a lesser value marsh is involved (i.e. Group 4 or 5 wetlands). A minimum 1:1 areal exchange is required in any case.

F. The compensation should be accomplished prior to, or concurrently with, the construction of the proposed project. Before any activity under the permit may begin, the permittee must own all interests in the mitigation site which are needed to carry out the mitigation.

G. All reasonable steps must be taken to avoid or minimize any adverse environmental effects associated with the compensation activities themselves.

H. On-site compensation is the preferred location alternative with off-site in the same watershed as a consideration when on-site is not possible. Locating a compensation site outside the river basin of the project is not acceptable unless it is done as part of a state-coordinated program of ecological enhancement.

I. In selecting a compensation site, one aquatic community should not be sacrificed to "create" another. In cases where dredged material must be placed overboard, the area may be used to create marsh, oyster rock or improve the resource value of the bottom.

J. The type of plant community proposed as compensation must have a demonstrated history of successful establishment in order to be acceptable.

K. The proposed activity should stand on its own merits in the permit review. Compensation should not be used to justify permit issuance.

L. Manipulating the plant species composition of an existing marsh community, as a form of compensation, is unacceptable.

M. Nonvegetated wetlands should be treated on an equal basis with vegetated wetlands with regard to compensation and mitigation, unless site-specific information indicates one is more valuable than the other.

N. Both short- and long-term monitoring of compensation sites should be considered on a case-by-case basis. For unproven types of compensation the applicant will be responsible for funding such monitoring as is deemed necessary.

O. Where on-site replacement for noncommercial projects is not feasible, compensation for small wetland losses (less than 1,000 sq. ft.) should be avoided in favor of eliminating loss of the natural marsh to the maximum extent possible.

P. Conservation or other easements to be held in perpetuity should be required for the compensation marsh. Easements accepted by the Commission will be processed in accordance with the provisions of Section 28.2-1301 of the Code of Virginia.

Q. All commercial projects which involve unavoidable wetland losses should be compensated.

Appendix B Section 28.2-1308 of the Code of Virginia, as amended

Section 28.2-1308. Standards for use and development of wetlands; utilization of guidelines.-- A. The following standards shall apply to the use and development of wetlands and shall be considered in the determination of whether any permit required by this chapter should be granted or denied:

1. Wetlands of primary ecological significance shall not be altered so that the ecological systems in the wetlands are unreasonably disturbed; and

2. Development in Tidewater Virginia, to the maximum extent practical, shall be concentrated in wetlands of lesser ecological significance, in vegetated wetlands which have been irreversibly disturbed prior to July 1, 1972, in nonvegetated wetlands which have been irreversibly disturbed prior to January 1, 1983, and in areas of Tidewater Virginia outside of wetlands.

B. The provisions of guidelines promulgated by the Commission pursuant to Section 28.2-1301 shall be considered in applying the standards listed in subsection A of this section.

C. When any activity authorized by a permit issued pursuant to this chapter is conditioned upon compensatory mitigation for adverse impacts to wetlands, the applicant may be permitted to satisfy all or part of such mitigation requirements by the purchase of credits from any wetlands mitigation bank that has been approved and is operating in accordance with applicable federal guidance for the establishment, use and operation of mitigation banks as long as: (1) the bank is in the same U.S.G.S. cataloging unit, as defined by the

Hydrologic Unit Map of the United States (U.S.G.S. 1980), or an adjacent cataloging unit within the same river watershed as the impacted site; (2) the bank is ecologically preferable to practicable on-site and off-site individual mitigation options, as defined by federal wetland regulations; and (3) the banking instrument, if approved after July 1, 1996, has been approved by a process that included public review and comment. (1972, c. 711, Section 62.1-13.3; 1982, c. 300; 1992, c. 836; 1996, c. 736.)

The 1996 amendment added subsection C.

Appendix C

Federal Guidance for the Establishment, Use and Operation of

Mitigation Banks

(CFR Vol 60, No. 228 / Tuesday, November 28, 1995/ Notices)

I. Introduction

A. Purpose and Scope of Guidance.

This document provides policy guidance for the establishment, use and operation of mitigation banks for the purpose of providing compensatory mitigation for authorized adverse impacts to wetlands and other aquatic resources. This guidance is provided expressly to assist Federal personnel, bank sponsors, and others in meeting the requirements of Section 404 of the Clean Water Act (CWA), Section 10 of the Rivers and Harbors Act, the wetland conservation provisions of the Food Security Act (FSA) (i.e., "Swampbuster"), and other applicable Federal statutes and regulations. The policies and procedures discussed herein are consistent with current requirements of the Section 10/404 regulatory program and "Swampbuster" provisions and are intended only to clarify the applicability of existing requirements to mitigation banking.

The policies and procedures discussed herein are applicable to the establishment, use and operation of public mitigation banks, as well as privately-sponsored mitigation banks, including third party banks (e.g. entrepreneurial banks).

B. Background.

For purposes of this guidance, mitigation banking means the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources.

The objective of a mitigation bank is to provide for the replacement of the chemical, physical and biological functions of wetlands and other aquatic resources which are lost as a result of authorized impacts. Using appropriate methods, the newly established functions are quantified as mitigation "credits" which are available for use by the bank sponsor or by other parties to compensate for adverse impacts (i.e., "debits"). Consistent with mitigation policies

established under the Council on Environmental Quality Implementing Regulations (CEQ regulations) [40 CFR Part 1508.20], and the Section 404(b)(1) Guidelines (Guidelines) [40 CFR Part 230], the use of credits may only be authorized for purposes of complying with Section 10/404 when adverse impacts are unavoidable. In addition, for both the Section 10/404 and "Swampbuster" programs, credits may only be authorized when on-site compensation is either not practicable or use of a mitigation bank is environmentally preferable to on-site compensation. Prospective bank sponsors should not construe or anticipate participation in the establishment of a mitigation bank as ultimate authorization for specific projects, as excepting such projects from any applicable requirements, or as preauthorizing the use of credits from that bank for any particular project.Mitigation banks provide greater flexibility to applicants needing to comply with mitigation requirements and can have several advantages over individual mitigation projects, some of which are listed below:

1. It may be more advantageous for maintaining the integrity of the aquatic ecosystem to consolidate compensatory mitigation into a single large parcel or contiguous parcels when ecologically appropriate;

2. Establishment of a mitigation bank can bring together financial resources, planning and scientific expertise not practicable to many project-specific compensatory mitigation proposals. This consolidation of resources can increase the potential for the establishment and long-term management of successful mitigation that maximizes opportunities for contributing to biodiversity and/or watershed function;

3. Use of mitigation banks may reduce permit processing times and provide more cost-effective compensatory mitigation opportunities for projects that qualify;

4. Compensatory mitigation is typically implemented and functioning in advance of project impacts, thereby reducing temporal losses of aquatic functions and uncertainty over whether the mitigation will be successful in offsetting project impacts;

5. Consolidation of compensatory mitigation within a mitigation bank increases the efficiency of limited agency resources in the review and compliance monitoring of mitigation projects, and thus improves the reliability of efforts to restore, create or enhance wetlands for mitigation purposes.

6. The existence of mitigation banks can contribute towards attainment of the goal for no overall net loss of the Nation's wetlands by providing opportunities to compensate for authorized impacts when mitigation might not otherwise be appropriate or practicable.

II. Policy Considerations

The following policy considerations provide general guidance for the establishment, use and operation of mitigation banks. It is the agencies' intent that this guidance be applied to mitigation bank proposals submitted for approval on or after the effective date of this guidance and to those in early stages of planning or development. It is not intended that this policy be retroactive for mitigation banks that have already received agency approval. While it is recognized that individual mitigation banking proposals may vary, it is the intent of this guidance that the fundamental precepts be applicable to future mitigation banks.

For the purposes of Section 10/404, and consistent with the CEQ regulations, the Guidelines, and the Memorandum of Agreement Between the Environmental Protection Agency (EPA) and the Department of the Army Concerning the Determination of Mitigation

under the Clean Water Act Section 404(b)(1) Guidelines, **mitigation** means sequentially avoiding impacts, minimizing impacts, and compensating for remaining unavoidable impacts. **Compensatory mitigation**, under Section 10/404, is 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. A site where wetlands and/or other aquatic resources are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources is a **mitigation bank**.

A. Authorities.

This guidance is established in accordance with the following statutes, regulations, and policies. It is intended to clarify provisions within these existing authorities and does not establish any new requirements.

1. Clean Water Act Section 404 [33 USC 1344].

2. Rivers and Harbors Act of 1899 Section 10 [33 USC 403 et seq.].

3. Environmental Protection Agency, Section 404(b)(1) Guidelines [40 CFR Part 230]. Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

4. Department of the Army, Section 404 Permit Regulations [33 CFR Parts 320-330]. Policies for evaluating permit applications to discharge dredged or fill material.

5. 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 [February 6, 1990].

6. Title XII Food Security Act of 1985 as amended by the Food, Agriculture, Conservation and Trade Act of 1990 [16 USC 3801 et seq.].

7. National Environmental Policy Act [42 USC 4321 et seq.], including the Council on Environmental Quality's implementing regulations [40 CFR Parts 1500-1508].

8. Fish and Wildlife Coordination Act [16 USC 661 et seq.].

9. Fish and Wildlife Service Mitigation Policy [46 FR pages 7644-7663, 1981].

10. Magnuson Fishery Conservation and Management Act [16 USC 1801 et seq.].

11. National Marine Fisheries Service Habitat Conservation Policy [48 FR pages 53142-53147, 1983].

The policies set out in this document are not final agency action, but are intended solely as guidance. The guidance is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. This guidance does not establish or affect legal rights or obligations, establish a binding norm on any party and it is not finally determinative of the issues addressed. Any regulatory decisions made by the

agencies in any particular matter addressed by this guidance will be made by applying the governing law and regulations to the relevant facts.

B. Planning Considerations.

1. Goal setting.

The overall goal of a mitigation bank is to provide economically efficient and flexible mitigation opportunities, while fully compensating for wetland and other aquatic resource losses in a manner that contributes to the long-term ecological functioning of the watershed within which the bank is to be located. The goal will include the need to replace essential aquatic functions which are anticipated to be lost through authorized activities within the bank's service area. In some cases, banks may also be used to address other resource objectives that have been identified in a watershed management plan or other resource assessment. It is desirable to set the particular objectives for a mitigation bank (i.e., the type and character of wetlands and/or aquatic resources to be established) in advance of site selection. The goal and objectives should be driven by the anticipated mitigation need; the site selected should support achieving the goal and objectives.

2. Site selection.

The agencies will give careful consideration to the ecological suitability of a site for achieving the goal and objectives of a bank, i.e., that it possess the physical, chemical and biological characteristics to support establishment of the desired aquatic resources and functions. Size and location of the site relative to other ecological features, hydrologic sources (including the availability of water rights), and compatibility with adjacent land uses and watershed management plans are important factors for consideration. It also is important that ecologically significant aquatic or upland resources (e.g., shallow sub-tidal habitat, mature forests), cultural sites, or habitat for Federally or State-listed threatened and endangered species are not compromised in the process of establishing a bank. Other significant factors for consideration include, but are not limited to, development trends (i.e., anticipated land use changes), habitat status and trends, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality and floodplain management goals, and the relative potential for chemical contamination of the wetlands and/or other aquatic resources.

Banks may be sited on public or private lands. Cooperative arrangements between public and private entities to use public lands for mitigation banks may be acceptable. In some circumstances, it may be appropriate to site banks on Federal, state, tribal or locally-owned resource management areas (e.g., wildlife management areas, national or state forests, public parks, recreation areas). The siting of banks on such lands may be acceptable if the internal policies of the public agency allow use of its land for such purposes, and the public agency grants approval. Mitigation credits generated by banks of this nature should be based solely on those values in the bank that are supplemental to the public program(s) already planned or in place, that is, baseline values represented by existing or already planned public programs, including preservation value, should not be counted toward bank credits.

Similarly, Federally-funded wetland conservation projects undertaken via separate authority and for other purposes, such as the Wetlands Reserve Program, Farmer's Home Administration fee title transfers or conservation easements, and Partners for Wildlife Program, cannot be used for the purpose of generating credits within a mitigation bank.

However, mitigation credit may be given for activities undertaken in conjunction with, but supplemental to, such programs in order to maximize the overall ecological benefit of the conservation project.

3. Technical feasibility.

Mitigation banks should be planned and designed to be self-sustaining over time to the extent possible. The techniques for establishing wetlands and/or other aquatic resources must be carefully selected, since this science is constantly evolving. The restoration of historic or substantially-degraded wetlands and/or other aquatic resources (e.g., prior-converted cropland, farmed wetlands) utilizing proven techniques increases the likelihood of success and typically does not result in the loss of other valuable resources. Thus, restoration should be the first option considered when siting a bank. Because of the difficulty in establishing the correct hydrologic conditions associated with many creation projects and the tradeoff in wetland functions involved with certain enhancement activities, these methods should only be considered where there are adequate assurances to ensure success and that the project will result in an overall environmental benefit.

In general, banks which involve complex hydraulic engineering features and/or questionable water sources (e.g., pumped) are more costly to develop, operate and maintain, and have a higher risk of failure than banks designed to function with little or no human intervention. The former situations should only be considered where there are adequate assurances to ensure success. This guidance recognizes that in some circumstances wetlands must be actively managed to ensure their viability and sustainability. Furthermore, long-term maintenance requirements may be necessary and appropriate in some cases (e.g., to maintain fire-dependent plant communities in the absence of natural fire; to control invasive exotic plant species).

Proposed mitigation techniques should be well-understood and reliable. When uncertainties surrounding the technical feasibility of a proposed mitigation technique exist, appropriate arrangements (e.g., financial assurances, contingency plans, additional monitoring requirements) should be in place to increase the likelihood of success. Such arrangements may be phased-out or reduced once the attainment of prescribed performance standards is demonstrated.

4. Role of preservation.

Credit may be given when existing wetlands and/or other aquatic resources are preserved in conjunction with restoration, creation or enhancement activities, and when it is demonstrated that the preservation will augment the functions of the restored, created or enhanced aquatic resource. Such augmentation may be reflected in the total number of credits available from the bank.

In addition, the preservation of existing wetlands and/or other aquatic resources in perpetuity may be authorized as the sole basis for generating credits in mitigation banks only in exceptional circumstances, consistent with existing regulations, policies and guidance. Under such circumstances, preservation may be accomplished through the implementation of appropriate legal mechanisms (e.g., transfer of deed, deed restrictions, conservation easement) to protect wetlands and/or other aquatic resources, accompanied by implementation of appropriate changes in land use or other physical changes as necessary (e.g., installation of restrictive fencing).

Determining whether preservation is appropriate as the sole basis for generating credits at a mitigation bank requires careful judgment regarding a number of factors. Consideration must be given to whether wetlands and/or other aquatic resources proposed for preservation (1) perform physical or biological functions, the preservation of which is important to the region in which the aquatic resources are located, and (2) are under demonstrable threat of loss or substantial degradation due to human activities that might not otherwise be expected to be restricted. The existence of a demonstrable threat will 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 bank sponsor. Wetlands and other aquatic resources restored under the Conservation Reserve Program or similar programs requiring only temporary conservation easements may be eligible for banking credit upon termination of the original easement if the wetlands are provided permanent protection and it would otherwise be expected that the resources would be converted upon termination of the easement. The number of mitigation credits available from a bank that is based solely on preservation should be based on the functions that would otherwise be lost or degraded if the aquatic resources were not preserved, and the timing of such loss or degradation. As such, compensation for aquatic resource impacts will typically require a greater number of acres from a preservation bank than from a bank which is based on restoration, creation or enhancement.

5. Inclusion of upland areas.

Credit may be given for the inclusion of upland areas occurring within a bank only to the degree that such features increase the overall ecological functioning of the bank. If such features are included as part of a bank, it is important that they receive the same protected status as the rest of the bank and be subject to the same operational procedures and requirements. The presence of upland areas may increase the per-unit value of the aquatic habitat in the bank. Alternatively, limited credit may be given to upland areas protected within the bank to reflect the functions inherently provided by such areas (e.g., nutrient and sediment filtration of stormwater runoff, wildlife habitat diversity) which directly enhance or maintain the integrity of the aquatic ecosystem and that might otherwise be subject to threat of loss or degradation. An appropriate functional assessment methodology should be used to determine the manner and extent to which such features augment the functions of restored, created or enhanced wetlands and/or other aquatic resources.

6. Mitigation banking and watershed planning.

Mitigation banks should be planned and developed to address the specific resource needs of a particular watershed. Furthermore, decisions regarding the location, type of wetlands and/or other aquatic resources to be established, and proposed uses of a mitigation bank are most appropriately made within the context of a comprehensive watershed plan. Such watershed planning efforts often identify categories of activities having minimal adverse effects on the aquatic ecosystem and that, therefore, could be authorized under a general permit. In order to reduce the potential cumulative effects of such activities, it may be appropriate to offset these types of impacts through the use of a mitigation bank established in conjunction with a watershed plan.

C. Establishment of Mitigation Banks.

1. Prospectus.

Prospective bank sponsors should first submit a prospectus to the Army Corps of Engineers (Corps) or Natural Resources Conservation Service (NRCS) to initiate the planning and review process by the appropriate agencies. Prior to submitting a prospectus, bank sponsors are encouraged to discuss their proposal with the appropriate agencies (e.g., pre-application coordination).

It is the intent of the agencies to provide practical comments to the bank sponsors regarding the general need for and technical feasibility of proposed banks. Therefore, bank sponsors are encouraged to include in the prospectus sufficient information concerning the objectives for the bank and how it will be established and operated to allow the agencies to provide such feedback. Formal agency involvement and review is initiated with submittal of a prospectus.

2. Mitigation banking instruments.

Information provided in the prospectus will serve as the basis for establishing the mitigation banking instrument. All mitigation banks need to have a banking instrument as documentation of agency concurrence on the objectives and administration of the bank. The banking instrument should describe in detail the physical and legal characteristics of the bank, and how the bank will be established and operated. For regional banking programs sponsored by a single entity (e.g., a state transportation agency), it may be appropriate to establish an "umbrella" instrument for the establishment and operation of multiple bank sites. In such circumstances, the need for supplemental site-specific information (e.g., individual site plans) should be addressed in the banking instrument. The banking instrument will be signed by the bank sponsor and the concurring regulatory and resource agencies represented on the Mitigation Bank Review Team (section II.C.2.). The following information should be addressed, as appropriate, within the banking instrument:

a. bank goals and objectives;

b. ownership of bank lands;

c. bank size and classes of wetlands and/or other aquatic resources proposed for inclusion in the bank, including a site plan and specifications;

d. description of baseline conditions at the bank site;

e. geographic service area;

f. wetland classes or other aquatic resource impacts suitable for compensation;

g. methods for determining credits and debits;

h. accounting procedures;

i. performance standards for determining credit availability and bank success;

j. reporting protocols and monitoring plan;

k. contingency and remedial actions and responsibilities;

l. financial assurances;

m. compensation ratios;

n. provisions for long-term management and maintenance.

The terms and conditions of the banking instrument may be amended, in accordance with the procedures used to establish the instrument and subject to agreement by the signatories.

In cases where initial establishment of the mitigation bank involves a discharge into waters of the United States requiring Section 10/404 authorization, the banking instrument will be made part of a Department of the Army permit for that discharge. Submittal of an individual permit application should be accompanied by a sufficiently-detailed prospectus to allow for concurrent processing of each. Preparation of a banking instrument, however, should not alter the normal permit evaluation process time frames. A bank sponsor may proceed with activities for the construction of a bank subsequent to receiving the Department of the Army authorization. It should be noted, however, that a bank sponsor who proceeds in the absence of a banking instrument does so at his/her own risk.

In cases where the mitigation bank is established pursuant to the FSA, the banking instrument will be included in the plan developed or approved by NRCS and the Fish and Wildlife Service (FWS).

3. Agency roles and coordination.

Collectively, the signatory agencies to the banking instrument will comprise the Mitigation Bank Review Team (MBRT). Representatives from the Corps, EPA, FWS, National Marine Fisheries Service (NMFS), and NRCS, as appropriate given the projected use for the bank, should typically comprise the MBRT. In addition, it is appropriate for representatives from state, tribal and local regulatory and resource agencies to participate where an agency has authorities and/or mandates directly affecting or affected by the establishment, use or operation of a bank. No agency is required to sign a banking instrument; however, in signing a banking instrument, an agency agrees to the terms of that instrument.

The Corps will serve as Chair of the MBRT, except in cases where the bank is proposed solely for the purpose of complying with the FSA, in which case NRCS will be the MBRT Chair. In addition, where a bank is proposed to satisfy the requirements of another Federal, state, tribal or local program, it may be appropriate for the administering agency to serve as co-Chair of the MBRT.

The primary role of the MBRT is to facilitate the establishment of mitigation banks through the development of mitigation banking instruments. Because of the different authorities and responsibilities of each agency represented on the MBRT, there is a benefit in achieving agreement on the banking instrument. For this reason, the MBRT will strive to obtain consensus on its actions. The Chair of the MBRT will have the responsibility for making final decisions regarding the terms and conditions of the banking instrument where consensus cannot otherwise be reached within a reasonable timeframe (e.g., 90 days from the date of

submittal of a complete prospectus). The MBRT will review and seek consensus on the banking instrument and final plans for the restoration, creation, enhancement, and/or preservation of wetlands and other aquatic resources.

Consistent with its authorities under Section 10/404, the Corps is responsible for authorizing use of a particular mitigation bank on a project-specific basis and determining the number and availability of credits required to compensate for proposed impacts in accordance with the terms of the banking instrument. Decisions rendered by the Corps must fully consider review agency comments submitted as part of the permit evaluation process. Similarly, the NRCS, in consultation with the FWS, will make the final decision pertaining to the withdrawal of credits from banks as appropriate mitigation pursuant to FSA.

4. Role of the bank sponsor.

The bank sponsor is responsible for the preparation of the banking instrument in consultation with the MBRT. The bank sponsor should, therefore, have sufficient opportunity to discuss the content of the banking instrument with the MBRT. The bank sponsor is also responsible for the overall operation and management of the bank in accordance with the terms of the banking instrument, including the preparation and distribution of monitoring reports and accounting statements/ledger, as necessary.

5. Public Review and Comment.

The public should be notified of and have an opportunity to comment on all bank proposals. For banks which require authorization under an individual Section 10/404 permit or a state, tribal or local program that involves a similar public notice and comment process, this condition will typically be satisfied through such standard procedures. For other proposals, the Corps or NRCS, upon receipt of a complete banking prospectus, should provide notification of the availability of the prospectus for a minimum 21-day public comment period. Notification procedures will be similar to those used by the Corps in the standard permit review process. Copies of all public comments received will be distributed to the other members of the MBRT and the bank sponsor for full consideration in the development of the final banking instrument.

6. Dispute resolution procedure.

The MBRT will work to reach consensus on its actions in accordance with this guidance. It is anticipated that all issues will be resolved by the MBRT in this manner.

a. Development of the banking instrument.

During the development of the banking instrument, if an agency representative considers that a particular decision raises concern regarding the application of existing policy or procedures, an agency may request, through written notification, that the issue be reviewed by the Corps District Engineer, or NRCS State Conservationist, as appropriate. Said notification will describe the issue in sufficient detail and provide recommendations for

resolution. Within 20 days, the District Engineer or State Conservationist (as appropriate) will consult with the notifying agency(ies) and will resolve the issue. The resolution will be forwarded to the other MBRT member agencies. The bank sponsor may also request the District Engineer or State Conservationist review actions taken to develop the banking instrument if the sponsor believes that inadequate progress has been made on the instrument by the MBRT.

b. Application of the banking instrument.

As previously stated, the Corps and NRCS are responsible for making final decisions on a project-specific basis regarding the use of a mitigation bank for purposes of Section 10/404 and FSA, respectively. In the event an agency on the MBRT is concerned that a proposed use may be inconsistent with the terms of the banking instrument, that agency may raise the issue to the attention of the Corps or NRCS through the permit evaluation process. In order to facilitate timely and effective consideration of agency comments, the Corps or NRCS, as appropriate, will advise the MBRT agencies of a proposed use of a bank. The Corps will fully consider comments provided by the review agencies regarding mitigation as part of the permit evaluation process. The NRCS will consult with FWS in making its decisions pertaining to mitigation.

If, in the view of an agency on the MBRT, an issued permit or series of permits reflects a pattern of concern regarding the application of the terms of the banking instrument, that agency may initiate review of the concern by the full MBRT through written notification to the MBRT Chair. The MBRT Chair will convene a meeting of the MBRT, or initiate another appropriate forum for communication, typically within 20 days of receipt of notification, to resolve concerns. Any such effort to address concerns regarding the application of a banking instrument will not delay any decision pending before the authorizing agency (e.g., Corps or NRCS).

D. Criteria for Use of a Mitigation Bank.

1. Project applicability.

All activities regulated under Section 10/404 may be eligible to use a mitigation bank as compensation for unavoidable impacts to wetlands and/or other aquatic resources. Mitigation banks established for FSA purposes may be debited only in accordance with the mitigation and replacement provisions of 7 CFR Part 12.

Credits from mitigation banks may also be used to compensate for environmental impacts authorized under other programs (e.g., state or local wetland regulatory programs, NPDES program, Corps civil works projects, Superfund removal and remedial actions). In no case may the same credits be used to compensate for more than one activity; however, the same credits may be used to compensate for an activity which requires authorization under more than one program.

2. Relationship to mitigation requirements.

Under the existing requirements of Section 10/404, all appropriate and practicable steps must be undertaken by the applicant to first avoid and then minimize adverse impacts to aquatic resources, prior to authorization to use a particular mitigation bank. Remaining

unavoidable impacts must be compensated to the extent appropriate and practicable. For both the Section 10/404 and "Swampbuster" programs, requirements for compensatory mitigation may be satisfied through the use of mitigation banks when either on-site compensation is not practicable or use of the mitigation bank is environmentally preferable to on-site compensation.

It is important to emphasize that applicants should not expect that establishment of, or purchasing credits from, a mitigation bank will necessarily lead to a determination of compliance with applicable mitigation requirements (i.e., Section 404(b)(1) Guidelines or FSA Manual), or as excepting projects from any applicable requirements.

3. Geographic limits of applicability.

The service area of a mitigation bank is the area (e.g., watershed, county) wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic resources. This area should be designated in the banking instrument. Designation of the service area should be based on consideration of hydrologic and biotic criteria, and be stipulated in the banking instrument. Use of a mitigation bank to compensate for impacts beyond the designated service area may be authorized, on a case-by-case basis, where it is determined to be practicable and environmentally desirable.

The geographic extent of a service area should, to the extent environmentally desirable, be guided by the **cataloging unit** of the "Hydrologic Unit Map of the United States" (USGS, 1980) and the **ecoregion** of the "Ecoregions of the United States" (James M. Omernik, EPA, 1986) or **section** of the "Descriptions of the Ecoregions of the United States" (Robert G. Bailey, USDA, 1980). It may be appropriate to use other classification systems developed at the state or regional level for the purpose of specifying bank service areas, when such systems compare favorably in their objectives and level of detail. In the interest of integrating banks with other resource management objectives, bank service areas may encompass larger watershed areas if the designation of such areas is supported by local or regional management plans (e.g. Special Area Management Plans, Advance Identification), State Wetland Conservation Plans or other Federally sponsored or recognized resource management plans. Furthermore, designation of a more inclusive service area may be appropriate for mitigation banks whose primary purpose is to compensate for linear projects that typically involve numerous small impacts in several different watersheds.

4. Use of a mitigation bank vs. on-site mitigation.

The agencies' preference for on-site mitigation, indicated in the 1990 Memorandum of Agreement on mitigation between the EPA and the Department of the Army, should not preclude the use of a mitigation bank when there is no practicable opportunity for on-site compensation, or when use of a bank is environmentally preferable to on-site compensation. On-site mitigation may be preferable where there is a practicable opportunity to compensate for important local functions including local flood control functions, habitat for a species or population with a very limited geographic range or narrow environmental requirements, or where local water quality concerns dominate.

In choosing between on-site mitigation and use of a mitigation bank, careful consideration should be given to the likelihood for successfully establishing the desired habitat type, the compatibility of the mitigation project with adjacent land uses, and the practicability of long-term monitoring and maintenance to determine whether the effort will be ecologically sustainable, as well as the relative cost of mitigation alternatives. In general, use of a mitigation bank to compensate for minor aquatic resource impacts (e.g., numerous, small

impacts associated with linear projects, impacts authorized under nationwide permits) is preferable to on-site mitigation. With respect to larger aquatic resource impacts, use of a bank may be appropriate if it is capable of replacing essential physical and/or biological functions of the aquatic resources which are expected to be lost or degraded. Finally, there may be circumstances warranting a combination of on-site and off-site mitigation to compensate for losses.

5. In-kind vs. out-of-kind mitigation determinations.

In the interest of achieving functional replacement, in-kind compensation of aquatic resource impacts should generally be required. Out-of-kind compensation may be acceptable if it is determined to be practicable and environmentally preferable to in-kind compensation (e.g., of greater ecological value to a particular region). However, non-tidal wetlands should typically not be used to compensate for the loss or degradation of tidal wetlands. Decisions regarding out-of-kind mitigation are typically made on a case-by-case basis during the permit evaluation process. The banking instrument may identify circumstances in which it is environmentally desirable to allow out-of-kind compensation within the context of a particular mitigation bank (e.g., for banks restoring a complex of associated wetland types). Mitigation banks developed as part of an area-wide management plan to address a specific resource objective (e.g. restoration of a particularly vulnerable or valuable wetland habitat type) may be such an example.

6. Timing of credit withdrawal.

The number of credits available for withdrawal (i.e., debiting) should generally be commensurate with the level of aquatic functions attained at a bank at the time of debiting. The level of function may be determined through the application of performance standards tailored to the specific restoration, creation or enhancement activity at the bank site or through the use of an appropriate functional assessment methodology.

The success of a mitigation bank with regard to its capacity to establish a healthy and fully functional aquatic system relates directly to both the ecological and financial stability of the bank. Since financial considerations are particularly critical in early stages of bank development, it is generally appropriate, in cases where there is adequate financial assurance and where the likelihood of success of the bank is high, to allow limited debiting of a percentage of the total credits projected for the bank at maturity. Such determinations should take into consideration the initial capital costs needed to establish the bank, and the likelihood of its success. However, it is the intent of this policy to ensure that those actions necessary for the long-term viability of a mitigation bank be accomplished prior to any debiting of the bank. In this regard, the following minimum requirements should be satisfied prior to debiting: (1) banking instrument and mitigation plans have been approved; (2) bank site has been secured; and (3) appropriate financial assurances have been established. In addition, initial physical and biological improvements should be completed no later than the first full growing season following initial debiting of a bank. The temporal loss of functions associated with the debiting of projected credits may justify the need for requiring higher compensation ratios in such cases. For mitigation banks which propose multiple-phased construction, similar conditions should be established for each phase.

Credits attributed to the preservation of existing aquatic resources may become available for debiting immediately upon implementation of appropriate legal protection accompanied by appropriate changes in land use or other physical changes, as necessary.

7. Crediting/debiting/accounting procedures.

Credits and debits are the terms used to designate the units of trade (i.e., currency) in mitigation banking. Credits represent the accrual or attainment of aquatic functions at a bank; debits represent the loss of aquatic functions at an impact or project site. Credits are debited from a bank when they are used to offset aquatic resource impacts (e.g. for the purpose of satisfying Section 10/404 permit or FSA requirements).

An appropriate functional assessment methodology (e.g., Habitat Evaluation Procedures, hydrogeomorphic approach to wetlands functional assessment, other regional assessment methodology) acceptable to all signatories should be used to assess wetland and/or other aquatic resource restoration, creation and enhancement activities within a mitigation bank, and to quantify the amount of available credits. The range of functions to be assessed will depend upon the assessment methodology identified in the banking instrument. The same methodology should be used to assess both credits and debits. If an appropriate functional assessment methodology is impractical to employ, acreage may be used as a surrogate for measuring function. Regardless of the method employed, the number of credits should reflect the difference between site conditions under the with- and without-bank scenarios.

The bank sponsor should be responsible for assessing the development of the bank and submitting appropriate documentation of such assessments to the authorizing agency(ies), who will distribute the documents to the other members of the MBRT for review. Members of the MBRT are encouraged to conduct regular (e.g., annual) on-site inspections, as appropriate, to monitor bank performance. Alternatively, functional assessments may be conducted by a team representing involved resource and regulatory agencies and other appropriate parties. The number of available credits in a mitigation bank may need to be adjusted to reflect actual conditions.

The banking instrument should require that bank sponsors establish and maintain an accounting system (i.e., ledger) which documents the activity of all mitigation bank accounts. Each time an approved debit/credit transaction occurs at a given bank, the bank sponsor should submit a statement to the authorizing agency(ies). The bank sponsor should also generate an annual ledger report for all mitigation bank accounts to be submitted to the MBRT Chair for distribution to each member of the MBRT.

Credits may be sold to third parties. The cost of mitigation credits to a third party is determined by the bank sponsor.

8. Party responsible for bank success.

The bank sponsor is responsible for assuring the success of the debited restoration, creation, enhancement and preservation activities at the mitigation bank, and it is therefore extremely important that an enforceable mechanism be adopted establishing the responsibility of the bank sponsor to develop and operate the bank properly. Where authorization under Section 10/404 and/or FSA is necessary to establish the bank, the Department of the Army permit or NRCS plan should be conditioned to ensure that provisions of the banking instrument are enforceable by the appropriate agency(ies). In circumstances where establishment of a bank does not require such authorization, the details of the bank sponsor's responsibilities should be delineated by the relevant authorizing agency (e.g., the Corps in the case of Section 10/404 permits) in any permit in which the permittee's mitigation obligations are met through use of the bank. In addition, the bank sponsor should sign such permits for the limited purpose of meeting those mitigation responsibilities, thus confirming that those responsibilities are enforceable against the bank sponsor if necessary.

E. Long-Term Management, Monitoring and Remediation.

1. Bank operational life.

The operational life of a bank refers to the period during which the terms and conditions of the banking instrument are in effect. With the exception of arrangements for the long-term management and protection in perpetuity of the wetlands and/or other aquatic resources, the operational life of a mitigation bank terminates at the point when (1) compensatory mitigation credits have been exhausted or banking activity is voluntarily terminated with written notice by the bank sponsor provided to the Corps or NRCS and other members of the MBRT, and (2) it has been determined that the debited bank is functionally mature and/or self-sustaining to the degree specified in the banking instrument.

2. Long-term management and protection.

The wetlands and/or other aquatic resources in a mitigation bank should be protected in perpetuity with appropriate real estate arrangements (e.g., conservation easements, transfer of title to Federal or State resource agency or non-profit conservation organization). Such arrangements should effectively restrict harmful activities (i.e., incompatible uses[2]) that might otherwise jeopardize the purpose of the bank. In exceptional circumstances, real estate arrangements may be approved which dictate finite protection for a bank (e.g., for coastal protection projects which prolong the ecological viability of the aquatic system). However, in no case should finite protection extend for a lesser time than the duration of project impacts for which the bank is being used to provide compensation.

The bank sponsor is responsible for securing adequate funds for the operation and maintenance of the bank during its operational life, as well as for the long-term management of the wetlands and/or other aquatic resources, as necessary. The banking instrument should identify the entity responsible for the ownership and long-term management of the wetlands and/or other aquatic resources. Where needed, the acquisition and protection of water rights should be secured by the bank sponsor and documented in the banking instrument.

3. Monitoring requirements.

The bank sponsor is responsible for monitoring the mitigation bank in accordance with monitoring provisions identified in the banking instrument to determine the level of success and identify problems requiring remedial action. Monitoring provisions should be set forth in the banking instrument and based on scientifically sound performance standards prescribed for the bank. Monitoring should be conducted at time intervals appropriate for the particular project type and until such time that the authorizing agency(ies), in consultation with the MBRT, are confident that success is being achieved (i.e., performance standards are attained). The period for monitoring will typically be five years; however, it may be necessary to extend this period for projects requiring more time to reach a stable condition (e.g., forested wetlands) or where remedial activities were undertaken. Annual monitoring reports should be submitted to the authorizing agency(ies), who is responsible for distribution to the other members of the MBRT, in accordance with the terms specified in the banking instrument.

4. Remedial action.

The banking instrument should stipulate the general procedures for identifying and implementing remedial measures at a bank, or any portion thereof. Remedial measures should be based on information contained in the monitoring reports (i.e., the attainment of prescribed performance standards), as well as agency site inspections. The need for remediation will be determined by the authorizing agency(ies) in consultation with the MBRT and bank sponsor.

5. Financial assurances.

The bank sponsor is responsible for securing sufficient funds or other financial assurances to cover contingency actions in the event of bank default or failure. Accordingly, banks posing a greater risk of failure and where credits have been debited, should have comparatively higher financial sureties in place, than those where the likelihood of success is more certain. In addition, the bank sponsor is responsible for securing adequate funding to monitor and maintain the bank throughout its operational life, as well as beyond the operational life if not self-sustaining. Total funding requirements should reflect realistic cost estimates for monitoring, long-term maintenance, contingency and remedial actions.

Financial assurances may be in the form of performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, legislatively-enacted dedicated funds for government operated banks or other approved instruments. Such assurances may be phased-out or reduced, once it has been demonstrated that the bank is functionally mature and/or self-sustaining (in accordance with performance standards).

F. Other Considerations.

1. In-lieu-fee mitigation arrangements.

For purposes of this guidance, in-lieu-fee, fee mitigation, or other similar arrangements, wherein funds are paid to a natural resource management entity for implementation of either specific or general wetland or other aquatic resource development projects, are not considered to meet the definition of mitigation banking because they do not typically provide compensatory mitigation in advance of project impacts. Moreover, such arrangements do not typically provide a clear timetable for the initiation of mitigation efforts. The Corps, in consultation with the other agencies, may find there are circumstances where such arrangements are appropriate so long as they meet the requirements that would otherwise apply to an off-site, prospective mitigation effort and provides adequate assurances of success and timely implementation. In such cases, a formal agreement between the sponsor and the agencies, similar to a banking instrument, is necessary to define the conditions under which its use is considered appropriate.

2. Special considerations for "Swampbuster".

Current FSA legislation limits the extent to which mitigation banking can be used for FSA purposes. Therefore, if a mitigation bank is to be used for FSA purposes, it must meet the requirements of FSA.

II. Definitions

For the purposes of this guidance document the following terms are defined:

A. **authorizing agency.** Any Federal, state, tribal or local agency that has authorized a particular use of a mitigation bank as compensation for an authorized activity; the authorizing agency will typically have the enforcement authority to ensure that the terms and conditions of the banking instrument are satisfied.

B. **bank sponsor.** Any public or private entity responsible for establishing and, in most circumstances, operating a mitigation bank.

C. **compensatory mitigation.** For purposes of Section 10/404, compensatory mitigation is 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 has been achieved.

D. **consensus.** The term consensus, as defined herein, is a process by which a group synthesizes its concerns and ideas to form a common collaborative agreement acceptable to all members. While the primary goal of consensus is to reach agreement on an issue by all parties, unanimity may not always be possible.

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

F. **credit.** A unit of measure representing the accrual or attainment of aquatic functions at a mitigation bank; the measure of function is typically indexed to the number of wetland acres restored, created, enhanced or preserved.

G. **debit.** A unit of measure representing the loss of aquatic functions at an impact or project site.

H. **enhancement.** Activities conducted in existing wetlands or other aquatic resources which increase one or more aquatic functions.

I. **mitigation.** For purposes of Section 10/404 and consistent with the Council on Environmental Quality regulations, the Section 404(b)(1) Guidelines and 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, mitigation means sequentially avoiding impacts, minimizing impacts, and compensating for remaining unavoidable impacts.

J. **mitigation bank.** A mitigation bank is a site where wetlands and/or other aquatic resources are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. For purposes of Section 10/404, use of a mitigation bank may only be authorized when impacts are unavoidable.

K. **Mitigation Bank Review Team (MBRT).** An interagency group of Federal, state, tribal and/or local regulatory and resource agency representatives which are signatory to a banking instrument and oversee the establishment, use and operation of a mitigation bank.

L. **practicable.** Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

M. **preservation**. The protection of ecologically important wetlands or other aquatic resources in perpetuity through the implementation of appropriate legal and physical mechanisms. Preservation may include protection of upland areas adjacent to wetlands as necessary to ensure protection and/or enhancement of the aquatic ecosystem.

N. **restoration.** Re-establishment of wetland and/or other aquatic resource characteristics and function(s) at a site where they have ceased to exist, or exist in a substantially degraded state.

O. **service area.** The service area of a mitigation bank is the designated area (e.g., watershed, county) wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic resources.

Appendix D Tidal Wetland Community Types and Properties

Wetlands, as defined in Chapter 13 of Title 28.2 of the Code of Virginia, fall into two major groupings: vegetated (tidal marshes and swamps) and nonvegetated (intertidal flats, bars and beaches). Although seldom recognized by the general public except as exhibited in the desire to live on or near the water, wetlands have a variety of both tangible and intangible values which place them in a position of inestimable importance to the Commonwealth.

This section of this document first identifies the primary values of the wetlands, then describes the general wetland types found in "Tidewater" Virginia, and finally ranks these types relative to each other in terms of these primary values.

Each wetland type is evaluated in accordance with five general values.

These are:

A. Production and detritus availability. Marshes and tidal flats are major sites of primary production in the marine ecosystem. When this plant material dies and begins to decay (detritus) it becomes the basis of a major marine food pathway. The productivity of all the major marsh community types is well documented and ranges from one to six tons per acre per year. Generally, the lower the elevation of the marsh, the greater its contribution of detritus and the greater its value to the aquatic environment.

Plant productivity on tidal flats is typically less than that of tidal marshes but higher than the bottom in deeper open water areas due to the greater supply of light and nutrients available. Plant productivity in intertidal areas is dominated by nonvascular plants (bottom-dwelling, one-celled micro- and macroalgae). Probably the most important function of the nonvegetated wetlands is that of mediating the breakdown of detritus produced on the vegetated marshes. Tidal flats located adjacent to extensive marsh areas may therefore be more biologically valuable than more isolated tidal flats. As mediators of detrital breakdown, nonvegetated wetlands are often the sites of large, diverse invertebrate populations and are often major feeding sites and spawning and nursery grounds for estuarine organisms of sport and commercial value to man.

B. Waterfowl and Wildlife Utilization. Long before wetlands were discovered to be detritus producers and feeding areas for marine organisms, they were known as rich habitats for various mammals, marine birds and migratory waterfowl. Some wetland types are more important than others in this regard but in many cases distinctions may not be clear-cut. A species, for example, may appear to be dependent on vegetated marsh for cover and breeding but without the adjacent tidal flats may not use a certain marsh at all. Wetlands offering a variety of habitats and plant types are generally the more valuable from a habitat perspective.

C. Erosion Buffer. Erosion is a common problem throughout coastal Virginia and is by no means limited to ocean beaches. Vegetated wetlands do erode but by virtue of their ability to establish dense root systems, trap and accumulate sediments, and baffle wave energy they are buffers against erosion and sea level rise. Among the vegetated wetlands the freshwater communities are less effective in this regard.

Nonvegetated wetlands are also effective erosion buffers although they function in a different manner from the marshes. For example, a broad, gently sloping sand beach is an excellent wave energy dissipator and large intertidal bars and flats serve to "trip" waves as they move shoreward thus reducing their energy before they strike the shoreline. The disruption of nearshore intertidal areas may increase wave energy striking the adjacent shoreline thus accelerating erosion there.

D. Water Quality Control. The dense growth of some marshes acts as a filter, trapping upland sediment before it reaches waterways and thus protecting shellfish beds and navigation channels from siltation. Marshes can also filter out sediments that are already in the water column. The ability of marshes to filter sediments and maintain water clarity is of particular importance to the maintenance of clam and oyster production. Some marshes have been shown to act as sinks or traps for other pollutants and marsh plants take up nutrients deposited in marsh soils. Excess nutrient levels in an estuary can be a problem but the exact role of marshes in nutrient removal is not yet fully understood.

Nonvegetated wetlands are also important in the cycling of nutrients in the estuary and the filter feeding organisms present, particularly on tidal flats, remove suspended solids from the water column in amounts that may significantly affect water clarity.

E. Flood Buffer. The peat substratum of some marshes acts as a giant sponge in receiving and releasing water. This characteristic is an effective buffer against coastal flooding, the effectiveness of which is a function of marsh type and size. The higher elevation marshes are the more effective flood buffers. Nonvegetated wetlands, because of their intertidal location have little value in this regard.

The following descriptions of wetland community types are identified and presented for management purposes. The first twelve of these are the vegetated wetlands and of these the first ten are characterized by a single dominant species of emergent vegetation. The term "dominant" is defined here to mean at least 50% of the vegetated surface of the marsh is covered by a single plant species. Types eleven and twelve are brackish and freshwater marshes which have no clearly dominant species of vegetation.

The five types of nonvegetated wetlands described here are identified mainly by physiographic position and sediment composition. No attempt is made to quantitatively separate the communities by particle size dominance since this is not necessary for value judgements on the level described in this publication.

A. Vegetated Wetland Communities

Type I. Saltmarsh Cordgrass Community

Dominant vegetation: Saltmarsh cordgrass (*Spartina alterniflora* Loisel).

Associated vegetation: Saltmeadow hay, saltgrass, black needlerush, saltwort, sea lavender, marsh elder, groundsel tree, sea oxeye.

Growth habit: Stout, erect grass; long, smooth leaves, often with attached periwinkle snails; located at the waters edge. Tall form 4 to 6 feet along the water; short form 1 to 2 feet at or slightly higher than MHW.

Physiographic position: Ranges from mean sea level to approximately mean high water.

Average density: Usually 20 plants per square foot. Can range from 10 to 50 plants.

Annual production and detritus availability: Average yield is about 4 tons per acre per annum; optimum growth up to 10 tons per acre. Daily tides flux nearly throughout this community. Available detritus to the marine environment is optimum. This type of marsh is recognized as an important spawning and nursery ground for fish.

Waterfowl and wildlife utility: Roots and rhizomes eaten by waterfowl. Stems used in muskrat lodge construction. Nesting material for Forsters tern, clapper rail and willet.

Potential erosion buffer: Most salt marshes and brackish water marshes are bordered by saltmarsh cordgrass along the waters edge. A marsh/water interface of this type is highly desirable as a deterrent to shoreline erosion. Underlying peat with a vast network of rhizomes and roots is very resistant to wave energy.

Water quality control and flood buffer: Marshes of this type can also serve as traps for sediment that originate from upland runoff. This also includes large debris that may accumulate on the marsh

surface.

SUMMARY: Considering the many attributes of this type of marsh community, its conservation should be of highest priority.

Type II. Saltmeadow Community

Dominant vegetation: Saltmeadow hay (*Spartina patens* (L.) Greene) Saltgrass (*Distichlis spicata* (L.) Greene).

Associated vegetation: Saltmarsh cordgrass, black needlerush, marsh elder, groundsel tree, saltwort, sea oxeye.

Growth habit: Matted meadow-like stands with swirls or "cowlicks," individual plants wiry in appearance; saltgrass 1-2 feet high.

Physiographic position: About mean high tide to the limit of spring tides; saltgrass at lower elevations, saltmeadow hay predominates at the higher end of the range.

Average density: Mixed populations; 50-150 stems per square foot.

Annual production and detritus availability: Ranges from 1-3 tons per acre annum.

Only small amounts of dead plant material are flushed out during storms and spring tides.

Waterfowl and wildlife utility: Seeds eaten by birds; provides nesting area. Habitat for a snail (*Melampus*) important as food for birds.

Potential erosion buffer: Effective erosion deterrent at higher elevations.

Water quality control and flood buffer: In many cases, this community represents the oldest part of a marsh system. Peat may accumulate to great depths, making this type of marsh act as a giant sponge when flood waters wash over it. Denseness of vegetation and deep peat filter sediments and waste material.

SUMMARY: This system is an excellent buffer, filtering out sediments and wastes and absorbing runoff water originating in the uplands. Production and detritus are less important to the marine environment than in Type I communities. Its contributions tend to favor the upland environment. Its values rank somewhat below Type I but, nevertheless, a Type II marsh should not be unnecessarily disturbed.

Type III. Black Needlerush Community

Dominant vegetation: Black needlerush (*Juncus roemerianus* Scheele.)

Associated vegetation: Usually pure stands with saltmarsh cordgrass, saltgrass and saltmeadow hay near the margin.

Growth habit: Dense monospecific stands; plant leafless, cylindrical hard stems tapering to a sharp pointed tip; brown to dark green in color, 3 to 5 feet high.

Physiographic position: About mean high water to somewhat below spring tide limit. Seems to prefer sandy substratum.

Average density: 30 to 50 stems per square foot.

Annual production and detritus availability: 3 to 5 tons per acre per annum, decomposes more slowly than most of the marsh grasses. Not flushed daily by tides.

Waterfowl and wildlife utility: There is no evidence that waterfowl or wildlife utilize this type of plant directly as a food. Because of the dense, stiff stands, it has little wildlife value except for limited cover.

Potential erosion buffer: The dense system of rhizomes and roots of black needlerush are highly resistant to erosion. On sandy shores and low sand berms which support this community type, this characteristic is of high value.

Water quality control and flood buffer: An effective trap for suspended sediments, but less effective than the densely matted saltmeadow community. Provides effective absorbent areas to buffer coastal flooding.

SUMMARY: As a single monospecific community this type would support less wildlife diversity than Type I and II. It functions well as a sediment trap and erosion deterrent but ranks lower than the preceding types. The rhizomes of black needlerush are harder and tougher than the grasses that dominate Types I and II communities; therefore, needlerush is useful as an erosion deterrent. Overall, the values of this marsh type rank below Types I and II.

Type IV. Saltbush (Gallbush) Community

Dominant vegetation: Groundsel tree, highwater bush (*Baccharis halimifolia* L.), marsh elder saltwater bush (*Iva frutescens* L.)

Associated vegetation: Saltmeadow hay, saltgrass, wax myrtle, sea oxeye.

Growth habit: Shrubs 3 to 10 feet high along the margin of the

marsh and upland plant communities.

Physiographic position: Lower limit is approximately the upper limit of marsh (marsh-upland ecotone).

Average density: May provide dense canopy over marsh. Individual shrub trunks usually spaced 3 to 10 feet apart.

Annual production and detritus availability: Probably less than 2 tons per acre per annum. Detritus of little value.

Waterfowl and wildlife utility: Provides diversity for wildlife in general and especially as a nesting area for small birds. No significant food value.

Potential erosion buffer: Although not structurally suited as an assimilator of sediment and flood waters, it serves somewhat as a buffer to erosion on sand berms that often front small pocket marshes. Also functional as a trap for larger flotsam.

Water quality control and flood buffer: Of minor consequence, but does trap larger material. (See above).

SUMMARY: Useful as an indicator of upper limits of marshes as defined in the Wetlands Act. Values of this type rank below that of the preceding types. However, this community does add diversity to the marsh ecosystem.

Type V. Big Cordgrass Community

Dominant vegetation: Big cordgrass (*Spartina cynosuroides* (L.) Roth.)

Associated vegetation: Usually pure stands.

Growth habit: Very tall (6-12 feet), heavily stemmed, leafy grass with distinct branched fruiting head in the fall.

Physiographic position: At or slightly above mean high water and extending to the upland margin. Most common in brackish or lower salinity marshes.

Average density: 10 to 15 stems per square foot.

Annual production and detritus availability: 3 to 6 tons per acre per annum. Detritus accessible only on spring or wind tide, however is rivaled only by saltmarsh cordgrass, which gives big cordgrass a higher value in the context of production than other grasses found above mean high tide. Decomposes more slowly than saltmarsh cordgrass.

Waterfowl and wildlife utility: Utilized as a habitat by small

animals, often used for muskrat lodges. Geese often eat its rhizomes.

Potential erosion buffer: The large, coarse rhizomes and intertwining roots stabilize peat along marsh edges.

Water quality control and flood buffer: Usually this community type occupies the older parts of a marsh system where peat may be deeper increasing its capacity as a flood water assimilator. It is also useful in trapping flotsam.

SUMMARY: Although the elevation occupied by this community type is similar to that of the saltmeadow community, big cordgrass has a much higher yield of organic matter which likely contributes to the marine food web. It is also relatively high in value as a wildlife food as well as a buffer to erosion.

Type VI. Cattail Community

Dominant vegetation: Narrowleaf cattail (*Typha angustifolia* L.)

Associated vegetation: Broadleaf cattail (*Typha latifolia* L.), sedges, bulrushes, arrow arum, pickerel weed, smartweed, other fresh or brackish water plants.

Growth habit: Characteristic "Wiener on a stick" fruiting heads, long strap-like leaves, somewhat blunted tips. 4 to 6 feet tall.

Physiographic position: Very wet sites, sometimes in standing water, often at the margin of marsh and uplands. Does well in seepage areas resulting from upland runoff.

Average density: 2 to 6 stalks per square foot.

Annual production and detritus availability: 2 to 4 tons per acre. Detritus usually not readily accessible to the marine environment.

Waterfowl and wildlife utility: Provides habitat for certain birds; roots consumed by muskrats.

Potential erosion buffer: Because of its preferred habitat and its characteristic shallow root system, Type VI is only a minor buffer to erosion.

Water quality control and flood buffer: Its usual habitat along the upland margins in soft muddy areas ranks this marsh type high as a sediment trap despite its shallow rooted condition. Very few species will grow in these areas either because of the stagnant condition of the substratum or because they are inhibited by toxin release of the cattail roots or a combination of the two factors.

SUMMARY: Because of its value as a wildlife food and habitat, its

function as a sediment trap, its relatively high production and the usual soft substratum, this type of marsh community should not be indiscriminately used as a development site. As far as overall value is concerned it compares with a saltmeadow marsh (Type II).

Type VII. Arrow Arum-Pickerel Weed Community

Dominant vegetation: Arrow arum (*Peltandra virginica* (L.) Kunth.) Pickerel weed *Pontederia cordata* L.)

Associated vegetation: Sedges, smartweeds, bulrushes, ferns, cattails, pond lily.

Growth habit: Many broad leaved clumps growing from a thick, cylindrical rhizome; arrow or heart shaped leaves. Clumps 2 to 6 feet tall, average height 3 feet.

Physiographic position: On tidal mud flats from mean sea level to about mean high tide in low salinity or freshwater marshes.

Average density: 1 or 2 clumps per 10 square feet.

Annual production and detritus availability: 2 to 4 tons per acre. Detritus readily available to the marine food web because of daily tide fluxes. In the fall of the year these species decompose quite rapidly and completely except for the root stock.

Waterfowl and wildlife utility: Seeds and shoots of both species are eaten by ducks. Arrow arum seeds float after the pod decays and are readily available for wood ducks. Often associated with confirmed spawning and nursery areas for herring and shad.

Potential erosion buffer: Although this community type lacks the vast network of rhizomes, roots and peat substratum typical of a saltmarsh cordgrass community, this marsh/water interface vegetation is often the only vegetative buffer to shoreline erosion in freshwater areas. The substratum in a marsh such as this is typically often, unstable mud. After the vegetation has decayed in the winter time, the mud flats are highly susceptible to erosion due to winter rains.

Water quality control and flood buffer: Slows the flow of flood waters, causing some suspended sediment to settle out.

SUMMARY: Under natural conditions the marsh of this type is relatively stable but is highly sensitive to development and activities such as excessive boat traffic. Because of its many attributes this marsh ranks similar to that of Type 1.

Type VIII. Reed Grass Community

Dominant vegetation: Reed grass (*Phragmites australis*) formerly (*Phragmites communes* Trinius)

Associated species: Switch grass, saltbushes, a few others.

Growth habit: Tall stiff grass with short, wide leaves tapering abruptly to a point; soft plume-like seed head. 6 to 10 feet high.

Physiographic position: Usually above mean high tide, drier areas on disturbed sites.

Average density: 3 to 6 stems per square foot.

Annual production and detritus availability: 4 to 6 tons per acre, detritus seldom available except in storm conditions.

Waterfowl and wildlife utility: Little direct value to wildlife except as cover. May have a detrimental effect in that it can invade areas of a marsh and compete with desirable species. It appears to be replacing big cordgrass and other plants in freshwater marshes of the Pamunkey River.

Potential erosion buffer: Good erosion deterrent on disturbed sites, especially on spoil.

Water quality control and flood buffer: Valuable as a buffer to erosion. Potential as sediment trap and flood deterrent appears to be minimal.

SUMMARY: This plant is a relatively recent invader in Virginia but is spreading rapidly, often displacing more important marsh plants. It has little or no value to wildlife in general. Its only important value would be its function as a stabilizer on dredge spoil. This community type ranks below a Type III marsh, the black needlerush community.

Type IX. Yellow Pond Lily Community

Dominant vegetation: Yellow pond lily, spatter-dock (*Nuphar luteum* (L. Sibthrop and Smith)

Associated vegetation: Pickerel weed, arrow arum.

Growth habit: Saucer shaped leaves with a narrow notch, floating on water; large, leathery yellow flower. 2 to 4 feet high from submerged root stalk.

Physiographic position: Submerged except for floating leaves at high tide. Found in freshwater areas.

Average density: One plant (cluster of leaves) for every 3 to 5 square feet.

Annual production and detritus availability: To 1 ton per acre; detritus readily available but not a significant contributor to the food chain.

Waterfowl utility: Excellent cover and attachment site for aquatic animals and algae. Feeding territory for aquatic birds and fish.

Potential erosion buffer: While lacking the stiffness of grasses and sedges, these plants do reduce wave action from wind and boats. This has been noted in freshwater streams and boat channels.

Water quality control and flood buffer: Although not a direct assimilator of sediments and flood waters, the flow of flood water is slowed somewhat and sediments can settle out. This function is minimal because the community is submerged completely in flood conditions.

SUMMARY: Destruction of the community would result in a decrease in number and diversity of aquatic animal life in the immediate area. The greatest value the community has is its habitat for aquatic biota. This type should be ranked with or slightly higher than a Type III (black needlerush) marsh.

Type X. Saltwort Community

Dominant vegetation: Saltwort, glasswort (*Salicornia* sp.)

Associated vegetation: Saltmarsh cordgrass, saltgrass, sea lavender.

Growth habit: Leafless green fleshy-stemmed plant, red in color in fall; 8 in. to 1 ft. tall.

Physiographic position: Above mean high tide in pannes or sparsely vegetated areas.

Average density: 10 to 15 stems per square foot.

Annual production and detritus availability: Less than 1/2 ton per acre. Exerts very little influence on the marine environment.

Wildlife and waterfowl utility: Some evidence that stems are eaten by ducks. May be a feeding area for other marsh birds.

Potential erosion buffer: Has very little value as an erosion deterrent.

Water quality control and flood buffer: Because of the character of the stem, a shallow root system and the usual small sizes of the populations, these community types have little or no value in this category.

SUMMARY: This community is not high in value. It usually occupies small areas within larger more productive marshes and can be used as an indicator of higher marsh elevations.

Type XI. Freshwater Mixed Community

Dominant vegetation: No single species covers more than 50% of the site.

Associated vegetation: Bulrushes, sedges, waterdock, smartweeds, ferns, pickerel weed, arrow arum, wildrice beggar's ticks, rice cutgrass.

Growth habit: Heterogeneous mixture of plants.

Physiographic position: From submerged to the upper limits of the wetlands.

Average density: Highly variable.

Annual production and detritus availability: 3 to 5 tons per acre. Detritus of species such as arrow arum, pickerel weed and yellow pond lily would be available in the intertidal zone.

Waterfowl and wildlife utility: A highly valuable marsh for a broad diversity in wildlife species. Plant species such as smartweeds, waterdock, wildrice and others are prime waterfowl and sora rail foods. Waters adjacent to these type marshes are also known as spawning and nursery grounds for striped bass, shad and river herring.

Potential erosion buffer: Shoreline erosion protection provided by this type of marsh is equivalent to Type VII, arrow arum - pickerel weed community.

Water quality control and flood buffer: This ranks somewhat higher as a sediment trap and flood deterrent than an arrow arum - pickerel weed community. The presence of the stiffer, more resilient grasses, sedges and rushes and peaty-type substratum increases the ability of this type of community over a Type VII marsh as an assimilator of sediments and flood waters.

SUMMARY: These are very valuable marshes and the aim should be to keep them in a natural state. This type of marsh would be ranked equivalent to a saltmarsh cordgrass marsh (Type I) and an arrow arum - pickerel weed (Type VII) marsh.

Type XII. Brackish Water Mixed Community

Dominant vegetation: No single species covers more than 50% of

the site.

Associated vegetation: Saltmarsh cordgrass, saltmeadow hay, saltgrass, black needlerush, saltbushes, threesquares, big cordgrass, cattails.

Growth habit: Heterogeneous mixture of plants in wet areas.

Physiographic position: Extending from about mean sea level to the upland margin.

Average density: Highly variable.

Annual productivity and detritus availability: 3 to 4 tons per acre, detritus readily available in the intertidal zone.

Waterfowl and wildlife utility: Wide diversity of vegetation provides a variety of wildlife food. Waterfowl foods are plentiful, such as the generous seed heads of saltmarsh bulrush.

Potential erosion buffer: Shoreline erosion protection is the same as that of a Type I marsh (saltmarsh cordgrass). Most brackish water marshes are bordered by saltmarsh cordgrass.

Water quality control and flood buffer: Ranks high in this category, having similar attributes as a Type II marsh (saltmeadow).

SUMMARY: This marsh is a microcosm of all the communities found in saline waters. Brackish water marshes are known spawning and nursery grounds. This community type contains valuable food and habitat for a wide diversity of wildlife species. Ranks with a Type I (saltmarsh cordgrass) marsh.

B. Nonvegetated Wetland Communities

Type XIII. Intertidal Beach Community

Dominant species: Ocean Beach - Mole crabs, Donax clam, Haustorid amphipodsBay Beach - Haustorid amphipods, oligochaete worms, beach fleas

Associated species: Ghost crabs, polychaete worms, razor clams

Growth habit: Most organisms buried just below the sand surface. Constantly being uncovered by waves and burrowing back into sand. Most species are annuals.

Average density: Highly variable, animals move up and down beach with tide level. In warmer months densities can average 100 to 5000 individuals/m^2. Annual production is very high.

Primary production and nutrient cycling: Relatively low compared to marshes and tidal flats because of high wave energy.

Habitat value: Very important foraging area for many shorebirds areas above mean high water are used as nesting sites by terns and skimmers. Fish utilize area for feeding during high tide.

Erosion buffer: Beach is an ideal natural wave-energy dissipator. It interacts with nearshore sand bars and dunes. Its most important ecological function to man is to buffer the effects of storm waves.

SUMMARY: Beach systems deserve the highest order of protection particularly when associated with extensive dunes and nearshore sandbars.

Type XIV. Sand Flat Community

Dominant species: Sandworm, bloodworm, amphipods, soft clams, razor clams.

Associated species: Other polychaete worms, mollusks and phoronid worms.

Growth habit: Most of the inhabitants are surface and deep burrowing species; some are permanent tube builders. Most species are annuals or biannuals, several reproduce throughout the warm weather period. There is a fairly rapid turnover of individuals due to predation so the average size of organisms is small.

Average density: Highly variable with polychaete worms reaching higher densities than other groups. Densities of major invertebrate groups range from 330 to 3000 ind./m^2.

Primary production: Annual production ranges from 100 to 200 g C/m^2. This is lower than that of marshes but only slightly less than other tidal flats. The primary production of this community enters the estuarine food web directly via grazing. This is more efficient than the detrital food chain where decomposition in an intermediate step. The large particle size of sand and lower percentage of organics reduces the role of this community type in nutrient recycling.

Habitat value: Very important as nursery and feeding area for fishes and blue crabs. Important shorebird feeding area. May support high shellfish populations.

Erosion buffer: Important in reducing wave energy and thus erosion potential on adjacent shorelines.

SUMMARY: Overall, the ecological value of this community rates only slightly below beaches, oyster reefs and Group I marshes.

Type XV. Sand/Mud Mixed Flat Community

Dominant species: Hard clams, parchment worms, Spionid polychaetes, soft clams, razor clams and mud snails.

Associated species: Other polychaetes, molluscs, crustaceans, acorn worms, Phoronid worms.

Growth habit: This community is populated in general by many surface and deep burrowers, and permanent tube builders. Otherwise similar to sand flats.

Average density: Highly variable but overall higher than sand flats or mud flats. Densities range from 5300 to 8300 individuals/m^2.

Primary production and nutrient cycling: Primary production in this community is very similar to sand flats. Since the organic matter content of the sediments is higher than that of sand flats, secondary, microbial production may be higher and this augments the primary production. This community probably interacts with estuarine nutrient cycles to a greater extent than sand flats.

Habitat value: This community is a very important area for wading birds, shorebirds and other other migratory waterfowl. It is heavily used by important commercial and sports fishes for feeding and is important blue crab habitat. The habitat value may increase in importance when a marsh is adjacent due to higher organic content in the sediments and the habitat variety provided by the marsh.

Erosion buffer: Slows wave velocity and thus may reduce wave erosion impinging on adjacent shoreline.

SUMMARY: Overall this community has very high habitat values especially if associated with marshes. Ranks only slightly below beaches and intertidal oyster reefs.

Type XVI. Mud Flat Community

Dominant species: Spionid worms, mud snails, razor clams, bloodworms.

Associated species: Other polychaetes, molluscs and crustaceans.

Growth habit: Surface and shallow burrowing organisms predominate in this community type. Some permanent tube builders may be present. Problems with sediment stability limit species to mainly surface detrital feeders.

Average density: Highly variable; Generally densities are slightly lower than mixed flats but higher than sand/flats with a range of 50 to 5000 individuals/m^2.

Primary production and nutrient cycling: The areal extent of mud flats is probably equal to or greater than the total for marshes.

Primary production is probably the highest of the nonvegetated communities. Mud flats interact significantly with adjacent vegetated areas in the cycling of nutrients. Where mudflats and marshes occur together they are mutually dependent. Ecologically, each is an extension of the other.

Habitat value: Highly important foraging area for waterfowl, sports and commercial fishes and many other species of food chain value in the marine ecosystem.

Erosion buffer: Since this community is generally only found in quiescent areas it has less value in this regard than sand or mixed flats.

SUMMARY: The overall ecological value of mud flats is comparable to sand flats and mixed flats. It is probably most important in nutrient cycling of the three.

Type XVII. Intertidal Oyster Reef Community

Dominant species: Oysters, hard clams, sand worms, amphipods, mud crabs.

Associated species: Other polychaetes, mud snails, curved mussels, barnacles, sponges, hydroids, razor clams, other molluscs and crustaceans.

Growth habit: Oyster shells provide increased diversity of habitats for a variety of estuarine species. This community is characterized by high diversity of attached and associated organisms.

Average density: Oysters dominate when area managed by man. Otherwise the reef is dominated by fouling organisms as listed above. Highly variable density but generally greater than other flats.

Primary productivity and nutrient cycling: Very little data are available concerning the primary production of oyster reefs. Given the high habitat and animal diversity however, it is probable that primary production is at least as high as other nonvegetated communities.

Habitat value: Very high; many important food chain organisms associated. This community is heavily utilized by blue crabs and fishes during high tides. Very high diversity and secondary productivity.

Erosion buffer: Shells cemented together may be important in dissipating waves and may resist shoreline erosive forces.

SUMMARY: Overall ecological value very high. This community is an excellent habitat with high diversity.

Evaluation of Wetlands Types

For management purposes, the twelve types of vegetated wetlands (marshes) and five types of nonvegetated wetlands (tidal flats and beaches) identified in Section II are grouped into five classifications based on the estimated total environmental value of an acre of each type. The reader is cautioned however that these groupings are based on average values and case-by-case analysis may yield differing results. One must also exercise restraint when comparing vegetated vs. non-vegetated communities.

Group One: Vegetated communities

Saltmarsh cordgrass (Type I)

Arrow arum-pickerel weed (Type VII)

Freshwater mixed (Type XI)

Brackish water mixed (Type XII)

Nonvegetated communities

Intertidal beaches (Type XIII)

Intertidal oyster reef (Type XVII)

The vegetated community types in Group One have the highest values in productivity and wildlife utility and are closely associated with fish spawning and nursery areas. They also have high values as erosion inhibitors, are important to shellfish populations and are important factors in nutrient cycling.

Intertidal beaches and sand bars have the highest relative values as buffers to shoreline erosion. In addition, they rank very high as marine habitat and in secondary productivity. Intertidal oyster reefs, which occur primarily on the seaside of the Eastern Shore, have their highest values in terms of productivity, habitat and commercial importance.

All of the communities in the Group One classification merit the highest order of protection.

Group Two: Vegetated communities

Big cordgrass (Type V)

Saltmeadow (Type II)

Cattail (Type VI)

Nonvegetated communities

Sand/flats (Type XIV)

Sand/mud mixed flats (Type XV)

Mud/flats (Type XVI)

The marshes in Group Two are only slightly less valuable than those in the Group One classification. The major differences being the reduced availability of detritus from the Group Two marshes due to physiographic factors. The detritus produced on the Group Two marshes is more likely to accumulate in the marsh and is less available to marine organisms. Group Two marshes have high values in maintaining water quality, buffering coastal flooding, and as habitat.

The Group Two nonvegetated communities have high general productivity values and play an essential role in nutrient cycling in the estuary. They are very important foraging areas for marine birds and many mobile marine organisms of commercial and recreational importance. They have less value than the Group One communities from an erosion and flood buffering standpoint.

Group Two wetlands communities rank only slightly below those of Group One in overall environmental importance. They deserve an order of protection only slightly below that of the Group One wetlands. Since there are many variables involved in any evaluation scheme, it is highly likely that some Group Two wetlands may on occasion outrank some Group One communities. This may be particularly true of the nonvegetated communities which exhibit a great deal more variability than the vegetated communities.

Group Three: Yellow pond lily (Type IX)

Black needlerush (Type III)

The two marshes in the Group Three category are quite dissimilar in properties. The yellow pond lily marsh is not a significant contributor to the food web but it does have high values to wildlife and waterfowl. Black needlerush has a high productivity factor but a low detritus availability value. Black needlerush has little wildlife value but it ranks high as an erosion and flood buffer. Group Three marshes are important, though their total values are less than Group One and Two marshes. If development in wetlands is considered necessary, it would be better to alter Group Three marshes than Group One or Two.

Group Four: Saltbush (Type IV)

The saltbush community is valued primarily for the diversity and bird nesting habitat it adds to the marsh ecosystem. To a lesser extent it also acts as an erosion buffer. Group Four marshes should not be unnecessarily disturbed but it would be better to concentrate necessary development in these marshes rather than disturb any of the marshes in the preceding groups.

Group Five: Saltwort (Type X)

Reedgrass (Type VIII)

Based on present information Group Five marshes have only a few values of significance. While Group Five marshes should not be unreasonably disturbed, it is preferable to develop in these marshes than in any of the other types.

The ranking system above is only a partial tool for use in making decisions to alter wetlands for it measures only one wetland type against another. Other factors, involving a total view of the creek or river system involved, should be considered in the decision making process.

Acreage is obviously one important factor to consider when evaluating a specific wetland. A large wetland is inherently more valuable than a smaller wetland of the same type. Many creeks and rivers in Virginia however, contain vegetated and nonvegetated wetland areas which are quite small and/or fragmented. The cumulative value of these small areas may be as great or greater than that of a single wetland of the same type and acreage.

Any marsh which is 2 feet or more in average width is considered to have significant values as an erosion deterrent and in filtering sediments coming from the uplands. It may also have other values depending upon the total acreage of the marsh parcel. Any marsh which is greater than 1/10 of an acre in size may have, depending on type and viability, significant values in terms of productivity, detritus availability and wildlife habitat. Depending on its location, it may also have value as an erosion buffer.

In Virginia wetlands represent a little over 1% of the total acreage in the state yet they play a vital role in sustaining the important commercial and recreational fisheries which millions of east coast citizens enjoy. Population and development pressures in the tidal portion of Virginia pose a subtle but constant threat to these marine resources. Habitat losses are generally counted in small portions rather than catastrophic leaps. It is very important to note that although the large scale projects attract greater publicity, the total resource loss due to many small projects may be of equal or greater importance from an environmental viewpoint.

Because of the essential functions performed by wetlands in the marine environment and the limited extent of this resource, it is necessary to limit the activities which adversely affect wetlands to those considered highly essential. If the activity proposed can be accommodated while preserving all or most of the wetlands involved, a proper balance has been struck. In cases where development and preservation are mutually exclusive the necessity of the activity must be weighed against the value of the resource involved and the degree of adverse impact the activity will have on the wetland.

Appendix E Function Specific Credit Calculation Method

for the

Guidelines for the Establishment, Use and Operation of

Tidal Wetland Mitigation Banks in Virginia

Virginia Institute of Marine Science

School of Marine Science

College of William and Mary

Department of Resouce Management and Policy

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Debit/Credit Determinations

Introduction

It has long been recognised by scientists, resource managers and others working with wetland compensatory mitigation that the goal of the process must be replacement of wetland **function** rather than simply replacing acreage if the practice is to have any real potential for offsetting wetland losses due to development (Mitsch and Gosselink, 1993; Havens et al., 1995; Mitsch and Wilson, 1996). The problem has been and remains that there is not a complete understanding of wetland function at the community level or within the landscape. This difficulty is more evident in nontidal wetlands where various hydrologic regimes complicate the situation. Consequently, many methods have been used in the assessment of function but to this point no one method clearly stands out in terms of both accuracy and utility. In tidal wetlands however, where the hydrologic regime is dictated by the tides and where the beginnings of wetland science are rooted, determining the function and value of certain wetland communities is less difficult. The boundaries of regulated tidal wetlands in Virginia can be determined exactly (Boon and Lynch, 1972; Code of Virginia 28.2-1300) and have been divided into 17 distinct community types

(Table 1) (VMRC, 1993). Virginia=s *Wetlands Guidelines,* originally promulgated in 1972, posited five primary values for tidal wetlands: production and detritus availability (production), waterfowl and wildlife utilization (habitat), erosion buffer (erosion), water quality control (water quality) and flood buffer (flood). The relative capability of each wetland community type in each of these five functional categories is well-documented for tidal wetlands (USFWS, 1954; Shaw and Fredine, 1956; Teal, 1962; Teal and Teal, 1969; Wass and Wright, 1969; Silberhorn et al., 1974; Greeson, et al., 1979; Pomeroy and Wiegert, 1981; Nixon, 1982; Odum et al., 1984; Teal, 1986; Mitsch and Gosselink, 1993) and are used in this method of functional credit determination..

In developing the credit calculation method presented here, identifying and valuing specific

wetland functions was of highest priority. In addition, landscape setting and wetland shape were seen as modifiers of functional value. The shape of a wetland can affect its importance in performing specific functions (Odum et al., 1979). The amount of edge can affect habitat utilization (Zimmerman et al., 1990; Peterson et al., 1995), the length along the shoreline can affect water quality (Boto and Patrick, Jr., 1978), and the width can affect erosion and flood buffering capability (Broome, 1990). Surrounding landuse can affect the importance of a wetland in the performance of a particular function, an example being the effect of urban development on habitat (Kusler, 1988; Holland et al., 1995) or agriculture on water quality (van der Valk et al., 1978; Mitsch, 1992; Rodgers and Dunn, 1992).

It is also the intention of this method that each of the five functions be assessed individually and be debited and credited individually in order to insure that specific functions are compensated on a like for like basis. Because of their long-standing acceptance, the state tidal wetlands guidelines were the primary basis for the relative assessments developed for the seventeen identified wetland types.

Also defined in these guidelines are seventeen tidal wetland community types from the characterizations of which are derived the relative functional values for each type. This functional valuation is then encorporated with value modifiers for wetland shape and adjacent landuse to characterize debit totals for each of the five specific wetland values for the natural wetland to be lost. This credit value is then employed, along with any replacement ratios deemed necessary during the permit process, to debit the wetland bank. Total bank credits are determined using the same process with acreage used as an additional multiplier. The procedure and an example determination are detailed below.

Function Specific Credit Calculation (FSCC) Method

Calculation of the credits to be used in a wetland bank for each function of a wetland require a determination of:

1. The **TYPE** of wetland

2. The **SHAPE** of the wetland; and

3. The **LANDUSE** adjacent to the wetland

Calculation of the FUNCTION SPECIFIC DEBITS or CREDITS for any impacted wetland or any wetland bank uses the formula below. For purposes of this calculation, we have assigned rankings numerical values as follows: HIGH=3; MEDIUM=2; and LOW=1.

DEBITS or CREDITS = TYPE (T) value + 0.5 (SHAPE (S) value + LANDUSE (L) value)

NOTE: FUNCTION SPECIFIC DEBITS or CREDITS should NOT be combined to produce an overall wetland credit value. The point of this procedure is to assess the losses/gains in performance of each specific function. Combining credit values from several functions makes the inappropriate assumption that performance of one function can be offset by performance of a different function.

For purposes of managing a wetland bank, we recommend that the area of wetland impacted be multiplied by the credit value of the wetland for each function. Area can be measured in any units appropiate (e.g. acres, square feet, square meter) as long as the same units are used for both the impacted wetland and the wetland bank.

The Wetlands Guidelines classify and characterize seventeen wetland community types. Each **TYPE** of wetland has been assigned a HIGH, MEDIUM, or LOW value based on an assessment of the general ability of that wetland type to perform each of five functions, also defined in the guidelines. Table 1 presents the assigned values.

Table 1. **TYPE (T)**: Probability that a wetland of specific type would generally be important for the performance of a specific function.

	production	habitat	erosion	flood	water qual
Saltmarsh cordgrass	high	high	high	medium	high
Saltmeadow	medium	high	high	high	high
Black needlerush	medium	low	high	medium	medium
Saltbush	low	high	low	low	low
Big cordgrass	high	high	medium	medium	medium
Cattail	medium	medium	low	low	high
Arrow arum-Pickerel weed	high	high	low	low	low
Reed grass	medium	low	high	low	medium

Yellow pond lily	low	high	low	low	low
Saltwort	low	low	low	low	low
Freshwater mixed	high	high	low	medium	medium
Brackish mixed	high	high	high	high	high
Intertidal beach	low	medium	high	low	low
Sand flat	low	medium	medium	low	low
Sand/mud	medium	high	medium	low	medium
Mud flat	medium	medium	low	low	medium
Intertidal oyster	high	high	medium	low	high

There are eight shapes of wetlands. The shapes are based on those identified in the Tidal Wetland Inventories produced by the Virginia Institute of Marine Science. Each **SHAPE** of wetland has been assigned a HIGH, MEDIUM, or LOW value based on an assessment of the general probability that a wetland of that shape will be important for performance of a given function. Table 2 presents the assigned values.

Table 2. **SHAPE (S)**: Probability that a wetland of a given shape would be important for the

performance of a specific function (VIMS Tidal Wetlands Inventory).

	production	habitat	erosion	flood	water quality
Cove	high	medium	high	low	high
Creek	high	high	high	high	high
Delta	high	medium	high	high	medium
Extensive	high	high	high	high	medium
Fringe	high	low	high	low	high
Island	high	high	medium	low	low
Pocket	medium	medium	medium	medium	high
Point/spit	high	medium	medium	low	low

There are four general landuses considered in this method. The types of landuses are based on a classification developed by the USEPA and the USGS. The four classes used here composit a number of vegetated classes into agriculture (grassland/pasture, row crop, probable row crop) and forested (coniferous, deciduous, mixed). We have not considered barren, water and wetland classes because they represent a very small fraction of landuse adjacent to tidal wetlands. Each **LANDUSE** has been assigned a value of HIGH, MEDIUM, or LOW based on the probability that a wetland adjacent to that landuse would be important for performance of the selected function. Table 3 presents the assigned values.

Table 3. **LANDUSE (L)**: Probability that a wetland adjacent to a given landuse would be important for the performance of a particular function.

	production	habitat	erosion	flood	water quality
Develop-hi	medium	low	high	high	high
Develop-lo	medium	medium	high	medium	high
Agriculture	medium	medium	high	medium	high
Forest	medium	high	medium	medium	medium

EXAMPLE. A project for construction of a marina will result in filling of 2 acres of Saltmarsh cordgrass fringe marsh and 1.5 acres of intertidal sand/mud flat. Calculation of the function specific credit value would occur as follows.

For the fringe marsh impacts:

	production	habitat	erosion	flood	water quality
TYPE (T) = Saltmarsh cordgrass	H = 3	H = 3	H = 3	M = 2	H = 3

SHAPE (S) = fringe marsh	H = 3	L = 1	H = 3	L = 1	H = 3
LANDUSE (L) = developed hi	M = 2	L = 1	H = 3	H = 3	H = 3
V=T+0.5 (S+L)	(3+0.5(3+2)) =5.5	(3+0.5(1+1)) =4	(3+0.5(3+3)) =6	(2+0.5(1+3)) =4	(3+0.5(3+3)) =6
DEBIT VALUE	5.5	4	6	4	6
Total for 2 acres impact	**11.0**	**8.0**	**12.0**	**8.0**	**12.0**

For the sand/mud flat impacts:

	production	habitat	erosion	flood	water quality
TYPE (T) = sand/mud flat	M = 2	H = 3	M = 2	L = 1	M = 2
SHAPE (S) = cove	H = 3	M = 2	H = 3	L = 1	H = 3
LANDUSE (L) =	M = 2	L = 1	H = 3	H = 3	H = 3

developed hi					
V=T+0.5 (S+L)	(2+0.5(3+2)) =4.5	(3+0.5(2+1)) =4.5	(2+0.5(3+3)) =4.5	(1+0.5(1+3)) =5	(2+0.5(3+3)) =5
DEBIT VALUE	4.5	4.5	4.5	3.0	5.0
Total for 1.5 acres impact	**6.75**	**6.75**	**6.75**	**4.5**	**7.5**

To determine the total credit value of wetlands to be impacted, add vegetated wetlands credits and nonvegetated wetlands credits.

	production	habitat	erosion	flood	water quality
Vegetated wetlands credits required	11.0	8.0	12.0	8.0	12.0
Nonvegetated wetlands credits required	6.75	6.75	6.75	4.5	7.5
Total wetlands credits required	**17.75**	**14.75**	**18.75**	**12.50**	**19.50**

If the marina impacts are to be offset by debiting a 10 acre brackish mixed wetland bank constructed in an old borrow pit in a forested area, the calculation of bank credits required would be as follows.

For the value of the wetland bank per unit area:

	production	habitat	erosion	flood	water quality
TYPE (T) = brackish mix	H = 3	H = 3	H = 3	H = 3	H = 3
SHAPE (S) = pocket	M = 2	M = 2	M = 2	M = 2	L = 1
LANDUSE (L) = forest	M = 2	H = 3	M = 2	M = 2	M = 2
V=T+0.5(S+L)	3+0.5(2+2)=5	3+0.5(2+3) =5.5	3+0.5(2+2)=5	3+0.5(2+2)=5	3+0.5(1+2) =4.5
UNIT CREDIT VALUE	**5.0**	**5.5**	**5.0**	**5.0**	**4.5**

For the total value of the wetlands bank, multiply by 10 acres:

Total Bank CreditS	**50.0**	**55.0**	**50.0**	**50.0**	**45.0**

At ratio of 1:1 the wetlands bank would be debited credits as follows:

	production	habitat	erosion	flood	water quality
Total Bank Credits	50.0	55.0	50.0	50.0	45.0
Credits required for compensation	17.75	14.75	18.75	12.50	19.50
Total credits remaining	32.25	40.25	31.25	37.50	25.50

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