

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD  
MARYLAND**

**WETLAND ENHANCEMENT**

(Ac.)

**CODE 659**

**DEFINITION**

The augmentation of wetland functions beyond the original natural conditions on a former, degraded, or naturally functioning wetland site; sometimes at the expense of other functions.

**PURPOSE**

To increase the capacity of specific wetland functions (such as habitat for targeted species, and recreational and educational opportunities) by enhancing:

- Hydric soil functions (changing soil hydrodynamic and/or bio-geochemical properties).
- Hydrology (dominant water source, hydroperiod, and hydrodynamics).
- Vegetation (including the removal of undesired species, and/or seeding or planting of desired species).
- Enhancing plant and animal habitats.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to any degraded or non-degraded wetland sites, including existing created and artificial wetlands and wetlands that were previously restored, where the objective is to enhance selected wetland functions to conditions different than those that originally existed on the site.

This practice does not apply to:

- The treatment of point and non-point sources of water pollution (Constructed Wetland – Code 656);

- The rehabilitation of a degraded wetland or the re-establishment of a former wetland so that soils, hydrology, vegetative community, and habitat are a close approximation or precursor of the original natural condition and boundary that existed prior to the modification (Wetland Restoration – Code 657).
- The creation of a wetland on a site that was historically non-wetland. (Wetland Creation – Code 658).
- The management of fish and wildlife habitat on wetlands enhanced under this standard.

**CRITERIA**

**General Criteria Applicable to All Purposes**

The purpose, goals, and objectives of the enhancement shall be clearly defined in the enhancement plan, including soils, hydrology, vegetation, and fish and wildlife habitat criteria that are to be met and are appropriate for the site and the project objectives.

The planning process will evaluate the impact of this practice on existing non-degraded wetland functions and/or values. The relative increase or decrease in functions will be assessed with the use of a functional assessment procedure or state approved equivalent. The functions to be increased or decreased on wetlands found to be currently functioning at or near a “reference” condition will be documented.

This practice will typically not be used to convert natural wetlands to another wetland functional type, except where the purpose is to improve habitat for targeted rare, threatened or

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the [Natural Resources Conservation Service - Maryland](#) or visit the [Field Office Technical Guide](#).

endangered species. The practice must not adversely affect rare, threatened or endangered species.

The soils, hydrology, and vegetative conditions existing on the site, the adjacent landscape, and the contributing watershed shall be documented in the planning process.

The nutrient and pesticide tolerance of the plant and animal species likely to occur shall be evaluated where known nutrient and pesticide contamination exists. Sites suspected of containing hazardous material shall be tested to identify appropriate remedial measures. If remedial measures are not possible or practicable, the practice shall not be planned.

Upon completion, the site shall meet the appropriate wetland criteria and provide wetland functions as defined in the project's objectives.

Invasive species, federal/state listed noxious plant species, and nuisance species (e.g., those whose presence or overpopulation jeopardize the practice) shall be controlled on the site as necessary to enhance wetland functions. The establishment and/or use of non-native plant species shall be discouraged.

Obtain all applicable permits and authorizations prior to implementing this practice.

#### **Criteria for Hydric Soil Enhancement**

Enhancement sites will be located on soils that are hydric.

Changes to soil hydrodynamic and biogeochemical properties such as permeability, porosity, pH, or soil organic carbon levels shall be made as needed to meet the planned objectives.

#### **Criteria for Hydrology Enhancement**

The hydroperiod, hydrodynamics, and dominant water source of the enhanced site shall meet the project objectives. The enhancement plan shall document the adequacy of available water sources based on groundwater investigation, stream gage data, water budgeting, or other appropriate means.

The work associated with the wetland shall not adversely affect adjacent properties or other water users unless agreed to by signed written letter, easement or permit.

Timing and level setting of water control structures required for the establishment and maintenance of vegetation, soil, and wildlife and fish habitat functions shall be determined.

Other structural practices, macrotopography and/or microtopography may be used to meet the planned objectives.

For structures such as embankments, ditch plugs, and water control structures, refer to the structural criteria in the practice standards for Wetland Restoration (Code 657), Dike (Code 356), and Structure for Water Control (Code 587).

Water control structures that may impede the movement of target aquatic species or species of concern shall meet the criteria in Aquatic Organism Passage – Code 396.

#### **Criteria for Vegetative Enhancement**

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established and the varying hydrologic regimes and soil types within the wetland. Preference shall be given to native wetland plants with localized genetic material.

Where natural colonization of acceptable species can realistically be expected to occur within 3 years, sites may be left to revegetate naturally. If not, the appropriate species will be established by seeding or planting.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the plan.

Where planting and/or seeding is necessary, the species composition to be established shall be based on a reference wetland unless the objectives require a different plant community.

- If the targeted hydrophytic vegetation is predominantly herbaceous, species diversity will be maximized as appropriate to meet the targeted functions. Seeding rates shall be based upon the percentage of pure live seed and labeled with a current seed tag from a registered seed laboratory identifying the germination rate, purity analysis, and other seed statistics.
- Where the dominant vegetation will be forest or woodland community types, vegetation

establishment will include a mix of woody species (trees and/or shrubs) adequate to establish the reference wetland community.

Refer to the Wetland Restoration (Code 657) practice standard for appropriate hydrophytic plant species.

## **CONSIDERATIONS**

### **Regulatory and Permitting Considerations**

Consider the regulatory constraints of enhancing a wetland with respect to the following:

- The permitting and authorization requirements.
- Enhancement activities typically are not authorized in natural wetlands, except to control invasive species and/or manage plant communities.
- Enhancement activities will not be authorized in wetlands supporting rare, threatened, or endangered species, except where the purpose is to improve habitat for these species.
- Conversion of vegetated wetlands to open water is typically not authorized, except if the activity will result in a net increase of vegetated wetlands.
- The potential need to mitigate for functions lost due to the enhancement.

### **Soil Considerations**

Consider modifications of saturated hydraulic conductivity and the incorporation of soil amendments.

Consider the effect of construction equipment on soil density, infiltration, and structure.

Consider changes in soil bio-geochemical properties, including:

- Increasing soil organic carbon by incorporating compost.
- Increasing or decreasing soil pH with lime, gypsum, or other compounds.

### **Hydrology Considerations**

Consider the general hydrologic effects of the enhancement, including:

- Impacts on downstream stream hydrographs, volumes of surface runoff, and

groundwater resources due to changes of water use and movement created by the enhancement.

Consider the impacts of water level management, including:

- Increased predation due to concentrating aquatic organisms, including herptivores, in small pool areas during draw downs.
- Increased predation of amphibians due to high water levels that can sustain predator fish.
- Decreased ability of aquatic organisms to move within the wetland and from the wetland area to adjacent habitats, including fish and amphibians, as water levels are decreased.
- Increases in water temperature on-site, and in off-site receiving waters.
- Changes in the quantity and direction of movement of subsurface flows due to increases or decreases in water depth.
- The effect changes in anaerobic conditions have on soil bio-geochemical properties; including oxidation/reduction, and maintenance of organic soils.
- The potential for water control structures, dikes, and macrotopographic features to negatively impact the movement of non-target aquatic organisms.

### **Vegetation Considerations**

Consider:

- The potential for vegetative buffers to increase function by trapping sediment, cycling nutrients, and removing pesticides.
- The selection of vegetation for the protection of structural measures that is appropriate for wetland function.
- The potential for invasive or noxious plant species to establish on bare soils after construction and before the planned plant community is established.
- The use of prescribed burning to maintain wetland and adjacent upland plant communities.

### **Fish and Wildlife Habitat Considerations**

Consider:

- The effects, both positive and negative, on existing populations of native wetland-dependent plants and animals, and especially on rare, threatened, and endangered species.
- The addition of coarse woody debris to provide an initial carbon source and fish and wildlife cover.
- The potential to restore habitat capable of supporting fish and wildlife with the ability to control disease vectors such as mosquitoes.
- The potential to establish fish and wildlife corridors linking the site to adjacent landscapes, streams, and water bodies and to increase the sites colonization by native flora.
- The need to provide barriers to passage for unwanted or predatory fish and wildlife species.
- The opportunity to enhance vegetative diversity to benefit an array of species.

#### **PLANS AND SPECIFICATIONS**

Plans and specifications for the enhancement of a wetland shall be prepared for specific field sites, according to the Considerations, Criteria, and Operation and Maintenance described in this standard, and will normally be part of the overall conservation plan. Plans and specifications shall include construction plans, photographs, drawings, job sheets, construction specifications, narrative statements in the conservation plan, and other similar documents, as appropriate. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

All components of the completed measures shall conform to the lines, dimensions, grades, and slopes shown on the plans or staked on the site. All materials shall be as specified on the construction drawings. The contractor shall be responsible for furnishing materials certification. These certification slips shall be retained with the "as-built" plans.

#### **OPERATION AND MAINTENANCE**

An operation and maintenance plan shall be prepared for each wetland restoration site. Appropriate Job Sheet(s) may be used to serve as the management plan as well as supporting documentation, and shall be provided to the client. At a minimum, the following components shall be addressed in the O&M plan, as applicable:

##### **Structures**

Describe what inspections are required to assess the integrity of the structure and determine whether it is functioning properly. Describe the purpose and extent of management if the structure is to be actively managed (e.g. temporary drawdown for seedling development).

##### **Removal of Sediment and Other Repairs**

Describe locations where sediment removal is acceptable (e.g., designed sediment basins, open water areas); conditions under which sediment may be removed and repairs made (e.g., time of year restrictions, permits needed, etc.).

##### **Vegetation in the Wetland Area**

Describe what inspections are required to determine whether the desired vegetation is present in suitable quantity, quality, and distribution to meet objectives of the project. Describe the extent of management needed to maintain vegetation in the desired species composition or age class (if applicable), or no management required (e.g., natural area).

##### **Vegetation on Structures and in Buffer Areas**

Describe the extent of vegetative management that will be allowed/needed after the practice is established. Management may consist of mowing, burning, selective cutting, or other actions, as appropriate.

When optimum wildlife habitat is desired, vegetation on structures and in buffers shall not be mowed, burned, or otherwise disturbed during the nesting season of the desired wildlife species. For Maryland, the primary nesting season is generally from April 15 through August 15.

**Nuisance Plants and Animals**

Describe the extent to which plant and animal pest species, including noxious weeds, will need to be controlled.

**Acceptable Uses**

Describe the acceptable uses (e.g., timber production, grazing, hunting, nature preserve, etc.) and time of year/frequency of use restrictions, if any.

**Frequency of Inspections**

At a minimum, require annual inspections of structural and vegetative components.

**SUPPORTING DATA AND DOCUMENTATION****Planning Information, Field Data, and Survey Notes**

Record on survey note paper, SCS-ENG-28 & 29, and/or in the conservation plan folder, as appropriate. The following is a list of the minimum data and documentation to be recorded in the case file:

1. Field location of the project, acres, and assistance notes. Also note the location of the project on the conservation plan map. Assistance notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
2. Description of the objectives of the project, including the desired functions that the wetland is expected to provide;
3. Soil investigation logs and notes;
4. Inventory of existing vegetation on the site. If applicable and available, note the agrichemicals that have been used on the site during the past 5 years;
5. Topographic survey of the site, as appropriate for site conditions and the proposed design;
6. Description of existing drains and extent of existing blockage (if any).

**Design Data**

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field

Handbook, Part 650. The following is a list of the minimum required design data:

1. Hydrologic and hydraulic design computations;
2. Normal and design storm water surface elevations;
3. Cross-section(s) of embankment for quantities determination;
4. Profile of vegetated spillway;
5. Detail of water control structure, including profile, elevations, and materials specifications with type and gauge/thickness of pipes;
6. Planned blockage of drainage systems, including cross sections and lengths of drain plugs;
7. Plan view(s) to scale with north arrow and stationing showing topographic contours, planting zones for vegetation, and locations of other features, as appropriate;
8. Seeding and/or planting requirements, including species selected for each planting zone, stocking/seeding rates, and the size and type of planting stock to be used (e.g., bare-root seedlings, containerized stock, etc.), shown on plans;
9. Quantities estimate;
10. Show job class on plans;
11. Operation and maintenance plan.

**Construction Check Data/As-Built**

Record on survey notepaper, SCS-ENG-28, or other appropriate engineering paper or devices. Survey data shall be plotted on plans in red. The following is a list of minimum data needed for as-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Check notes recorded during or after completion of construction, and plans showing as-built conditions of all structures;
3. Note plant species as-installed, including species used, quantities, date(s) planted,

and arrangement of plants within each planting zone;

4. Final quantities, and documentation for quantity changes and materials certification;
5. Sign and date checknotes and plans by a person with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.

## REFERENCES

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USDA-NRCS. Hydric Soil Technical Note 13, Deliberations of the National Technical Committee for Hydric Soils (NTCHS). [ftp://ftp-fc.sc.egov.usda.gov/NSSC/Hydric\\_Soils/note13.pdf](ftp://ftp-fc.sc.egov.usda.gov/NSSC/Hydric_Soils/note13.pdf)