

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

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 with hydric soils, 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 (Conservation Practice Standard (CPS) Constructed Wetland (656));
- The rehabilitation of a degraded wetland or the reestablishment of a former wetland so that soils, hydrology, vegetative

community, and habitat are a close approximation of the original natural condition and boundary that existed prior to the modification (CPS Wetland Restoration (657));

- The creation of a wetland on a site location that was historically nonwetland. (CPS Wetland Creation (658));
- The management of fish and wildlife habitat on wetlands enhanced under this standard (CPS Wetland Wildlife Habitat Management (644)).

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 nondegraded wetland functions and/or values. The relative increase or decrease in functions will be assessed. The functions to be increased or decreased on wetlands found to be currently functioning at or near a "reference" condition will be documented.

Use the wetland functional assessment tools approved for use, in South Dakota (SD), or an appropriate approved expedited minimal effect.

The State Approved Wetland Assessment Equivalent is form SD-CPA-67. For a list of approved functional assessments refer to the hydrogeomorphic assessment models listed in Section I, Resource Evaluation Tools – (8)

Wetlands, of the SD Technical Guide at: <http://efotg.sc.egov.usda.gov/references/public/SD/INTRODUCTION-INDEX-NoticeSD136.pdf>.

If additional assistance is needed, contact a SD Natural Resources Conservation Service (NRCS) biologist, engineer, or other person with job approval authority for wetland functional analysis. A minimal effect agreement and supporting documentation shall be developed as necessary.

The soils, hydrology, and vegetative conditions existing on the site, the adjacent landscape, and the contributing watershed shall be documented in the planning process. A portion of this documentation may exist as part of a wetland determination for the site, or it shall be developed using the current version of the state wetland mapping conventions found in Section I of the SDTG.

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. If hazardous wastes are identified on the site, planning for the practice will proceed only after the site has been cleaned, the clean up approved by the responsible regulatory agency, and the state conservationist has agreed to provide technical assistance for planning.

The availability of sufficient water rights should be reviewed prior to enhancement.

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 nonnative plant species shall be discouraged.

Criteria for Hydric Soil Enhancement

Enhancement sites will be located on soils that are hydric.

Changes to soil hydrodynamic and bio-geochemical 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. Detailed surveys shall be conducted at the wetland site to determine the extent of planned water levels near property lines. The full pool level shall be a minimum of 12 inches below the adjacent property boundary elevation to prevent saturation of the soils on the adjacent property unless a detailed hydrologic evaluation shows there will be no negative impacts at higher water levels. A signed written letter, easement, or permit by the adjacent landowner must be obtained if temporary water storage will occur on adjacent properties due to the wetland enhancement.

Well water pumped from an aquifer or flowing from an artesian well may not be used as a water supply.

All wells within the wetland enhancement area shall be decommissioned according to the CPS Well Decommissioning (351) for enhancements greater than 15 years. For short-term enhancements, where the enhancement is likely to not be maintained for more than 15 years, the well shall not be used to add water to the area and shall be raised above the maximum designed water level. Water from flowing wells shall bypass the enhancement area.

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.

Existing drainage systems may be utilized, removed, or modified as needed to achieve the intended purpose.

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

Macrotopographic features, including ditch plugs installed in lieu of re-filling surface drainage ditches, shall meet the requirements of other practice standards to which they may apply due to purpose, size, water storage capacity, hazard class, or other parameters. If no other practice standard applies, they shall meet the requirements for CPS Dike (356) unless there is no potential for damage to the feature or other areas on or offsite due to erosion, breaching, or overtopping.

Water control structures that may impede the movement of target aquatic species or species of concern shall meet the criteria in CPS Fish Passage (396).

Surface Drainage Removal. Where open channels were constructed to drain the wetland, the channel will be filled with earth or controlled with a grade stabilization structure and/or a water control structure to restore or enhance the wetland hydrologic conditions.

The channel may be blocked with earthfill without a water control structure where the block will be permanently maintained and flow rate and duration will not cause erosion and head cutting. The surface drain block must be located so that it will provide for the water storage in the wetland that meets the purpose, goals, and objectives of the enhancement. The area under the surface drain block must be stripped of vegetation, silt, and debris before installation of the earthfill.

The required surface block length (measured parallel to the channel) will depend on site conditions, including land use, soils, and size of the watershed. The surface drain block top length must be at least 20 feet for wetland areas in permanent vegetation and 50 feet for areas in cropland. A longer plug may be needed to adequately restore wetland

functions. Surface drain block end slopes must be 3:1 or flatter upstream and 8:1 or flatter downstream. Drain block fills must be carefully compacted and overfilled 10 percent of the fill height to allow for settlement.

Long duration flows and high peak discharges will severely impact drain blocks. In these cases a water control structure designed in accordance with the CPS Grade Stabilization Structure (410) or the CPS Pond (378) should be used.

Drain blocks located near the edge of the wetland will more fully restore water storage in the wetland to the elevation of the original wetland. Multiple blocks may be used in a drainage channel to further enhance the wetland.

Grade Stabilization Structure. When the 10-year frequency, 24-hour duration storm flow or base flow from snow melt or groundwater inflow results in long duration flows or high peak discharge, the channel will be filled and stabilized with a structure that meets the criteria for CPS Grade Stabilization Structure (410).

Water Control Structure. When it is desirable to control or manipulate the water level for operation and maintenance (O&M) of the wetland at an elevation different than that caused by blocking the channel, a water control device meeting the criteria of the CPS Structure for Water Control (587) will be used.

The water control device may not increase the inflow into a downstream drain beyond what was originally apportioned or designed for the drain.

A water control device placed on the inlet of an existing drain may be designed to intentionally limit inflow into downstream drains. This may prevent damage to the downstream drains.

Subsurface Drainage Removal. In areas where subsurface drains were used to remove surface water or soil saturation, the existing system will be modified to restore or enhance the wetland hydrologic conditions. Review of drainage records, interviews, and site investigations will be needed to determine the extent of the existing system. The effect of

any modification to the existing subsurface drainage system on upstream and downstream landowners will be evaluated and the landowner will be notified of potential offsite impacts. This evaluation will include both surface and subsurface impacts.

Where the subsurface drain serves as an outlet for upstream properties, it will be necessary to meet applicable state and local laws and regulations pertaining to subsurface drainage and flooding. Upstream surface and subsurface drainage will not be impacted unless appropriate easements are obtained or mitigation measures are implemented.

The effects of the subsurface drainage system may possibly be eliminated by the following:

- removing a portion of the drain at the upstream and downstream edges of the site; or
- modifying the drain with a water control device at the downstream edge of the site; or
- installing nonperforated pipe in and an appropriate lateral effect distance upstream and downstream from the wetland boundary.

The minimum length (measured from the outside edge of the wetland) of the drain to be removed is 50 feet for soils with a hydraulic conductivity of less than 0.6 inches per hour; 100 feet for 0.6 to 2.0 inches per hour; and 150 feet for greater than 2.0 inches per hour. All envelope filter material or other flow enhancing material will also be removed for this length. The trench will be filled and compacted to achieve a density equal to adjacent material.

Any water control structure will be attached to a nonperforated conduit that extends at least the minimum length previously specified for length of drain to be removed. The connections of the water control structure and the nonperforated pipe will be watertight at the head created at the maximum pool level.

Storage Volume Replacement. Where sediment, land shaping, or other activities have filled the wetland site, the storage may be replaced by excavating the fill material from the site or by construction of an earth embankment.

Embankments. Where surface drainage removal with drain blocks are not sufficient to restore hydrology or further enhancement to the wetland is desired, an earthen embankment may be constructed to create a pool storage which meets the intent of the wetland enhancement. Embankments with an effective height of less than six feet will meet the criteria for the CPS Dike (356). Embankments with an effective height of greater than six feet will meet the criteria for the CPS Pond (378).

Embankments meeting criteria for dikes will safely pass a 10-year frequency, 24-hour storm at the dike design high water level.

Criteria for Vegetative Enhancement

Hydrophytic vegetation enhancement 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.

The appropriate plant community will be determined using one of the following:

- a. Biology Technical Note No. 16, Wetland Vegetation Establishment;
- b. The plant community found on an established reference wetland site;
- c. The plant community found in the state and transition diagram for the Ecological Site Description.

Where natural colonization of acceptable species can realistically be expected to occur within five years, sites may be left to re-vegetate 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 minimum number of native species to be established shall be based on Biology Technical Note No. 16 or 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.
- Use the procedures in Biology Technical Note No. 16 (and Range Technical Note No. 4, when appropriate) or contact an area biologist. Select wetland species based on 1) the wetland mixes provided in Biology Technical Note No. 16, 2) a wetland reference site (approved by the area or state biologist), or 3) the ecological site description.

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.

- For forested wetland enhancement, where six or more native species are adapted to the site, reforestation shall include at least six species. If fewer native species are suited, a subset of those species may be planted.

Criteria for Enhancement of Wildlife Habitat Functions by Creating Islands for Waterfowl or Other Water Birds

Constructed islands may provide secure nesting sites for several species of waterfowl, geese, and other water birds. Location, size, and management criteria listed below must all be met. Constructed islands may need to be planted with shrubs to prevent over-utilization by Canada geese.

Location.

Construction of islands shall be done only in large wetlands that are at least 25 acres in size, have an average depth of 2 to 3 feet, and at least a semi-permanent water regime.

Saline to brackish water chemistry is preferable to fresh water.

Constructed islands will be located in an area with at least 40 wetlands within 1 mile, including temporary, seasonal, and semi-permanent water regimes.

Constructed islands will be located at least 100 yards from shore or emergent vegetation.

The islands must be located in areas where the waterfowl pair population is expected to be high in average years, as determined using current waterfowl pair maps from the United States Fish and Wildlife Service.

Size and construction.

The surface area of the island above water shall be 0.25 to 1.0 acre.

The top of the island shall be three to four feet above the average wetland water level.

Construct no more than one acre of islands for each square mile of suitable habitat.

Construct islands with a well packed soil base and at least five inches of topsoil. Side slopes above the normal water level of the wetland will be 4:1 or flatter and below the normal water level they will be 10:1. A flat berm, 10 feet in width, will be created at the normal water level.

Islands shall be vegetated using a mix suitable for critical area planting and may include shorter wildlife shrub clump plantings if possible.

Criteria for Enhancement of Wildlife Habitat Functions by Creating Areas of Deeper Water

Excavation within wetlands shall meet minimal effect criteria established for SD and shall be based on a functional assessment or an appropriate approved expedited minimal effect.

Excavations within wetlands will be limited to wetland sites that have previously been degraded.

Excavations will not adversely impact any threatened, endangered, or other special concern species.

Excavations shall be no more than six feet in depth and have side slopes of no more than 4:1.

Excavated material shall be removed from the wetland where feasible.

CONSIDERATIONS

Soil Considerations

Consider making changes to physical soil properties, including:

- Increasing or decreasing saturated hydraulic conductivity by mechanical compaction or tillage, as appropriate;
- Incorporating soil amendments;
- 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 relative effects of planting density on fish and wildlife habitat versus production rates in woody plantings;
- 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 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 waterbodies and to increase the sites colonization by native flora;
- The need to provide barriers to passage for unwanted or predatory fish and wildlife species.
- Nest structures to be used for nesting rather than constructing artificial islands. Nest structures are likely to provide better nest success at considerably less expense.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared for each site. Plans and specifications shall be recorded using approved specifications sheets, job sheets, or other documentation. The plans and specifications for structural features will include, at a minimum, a plan view, quantities, and sufficient profiles and cross-sections to define the location, line, and grade for stakeout and checkout. Plans and specifications shall be reviewed and approved by staff with appropriate job approval authority.

OPERATION AND MAINTENANCE

A separate Operation and Maintenance (O&M) plan will be prepared for sites that have structural features. The plan will include specific actions for the normal and repetitive operation of installed structural items, especially water control structures, if included in the project. The plan will also include the actions necessary to assure that constructed items are maintained for the life of the project. It will include the inspection schedule, a list of items to inspect, a checklist of potential damages to look for, recommended repairs, and procedures for documentation.

Management and monitoring activities needed to ensure the continued success of the wetland enhancement objectives may be included in the above plan, or in a separate management and monitoring plan. In addition to the monitoring schedule, this plan may include the following:

- The timing and methods for the use of fertilizers, pesticides, prescribed burning, or mechanical treatments;
- Circumstances when the use of biological control of undesirable plant species and pests (e.g., using predator or parasitic species) is appropriate, and the approved methods;
- Actions which specifically address any expected problems from invasive or noxious species;
- The circumstances which require the removal of accumulated sediment;
- Conditions which indicate the need to use haying or grazing as a management tool, including timing, and methods.

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