NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WETLAND ENHANCEMENT

(Ac.)

CODE 659

DEFINITION

The rehabilitation or re-establishment of a degraded wetland, and/or the modification of an existing wetland, which augments specific site conditions for specific species or purposes; possibly at the expense of other functions and other species.

PURPOSE

To provide specific wetland conditions to favor specific wetland functions and targeted species by:

- hydrologic enhancement (depth duration and season of inundation, and/or duration and season of soil saturation);
- vegetative enhancement (including the removal of undesired species, and/or seeding or planting of desired species).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on any degraded or non-degraded existing wetland where the objective is specifically to enhance selected wetland functions.

This practice does not apply to the following where the intention is to:

- treat point and nonpoint sources of water pollution (Conservation Practice Standard (CPS) Constructed Wetland (656));
- rehabilitate a degraded wetland where the soils, hydrology, vegetative community, and biological habitat are returned to original conditions (CPS Wetland Restoration (657));
- create a wetland on a site that historically was not a wetland (CPS Wetland Creation (658)).

CRITERIA

General Criteria Applicable to All Purposes

The purpose, goals, and objectives of the enhancement shall be clearly outlined, including the soils, hydrology, and vegetation criteria that are to be met and are appropriate for the site and the project purposes.

The impact of this practice on existing non-degraded wetland functions and/or values will be evaluated. Use the wetland functional assessment tools approved for use, in South Dakota (SD), or an appropriate approved expedited minimal effect. 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 characteristics existing on the site and the contributing watershed shall be documented before enhancement of the site begins. This documentation may exist as part of a wetland determination for the site, or it shall be developed using the SD forms for documenting soils, hydrology, and vegetation for completing a certified wetland determination.

Where known nutrient and pesticide contamination exists, species selected will be tolerant of these conditions.

Sites containing hazardous material shall be cleaned prior to the establishment of this practice. Appropriate actions to clean sites suspected of containing hazardous wastes shall be based on soil tests. 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.

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. The establishment and/or use of nonnative plant species shall be discouraged.

Any use of fertilizers, mechanical treatments, prescribed burning, pesticides, and other chemicals shall assure that the intended purpose of the wetland enhancement shall not be compromised.

Criteria for Hydrologic Enhancement

The hydrology of the site (defined as the rate and timing of inflow and outflow, source, duration, frequency, and depth of flooding, ponding or saturation) shall meet the project objectives. An adequate source of water must be available to meet hydrology designs.

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.

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 is required for the establishment of desired hydrologic conditions for management of vegetation and for optimum wildlife and fish use.

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

Tile drainage from cropland may outlet into the enhanced wetland provided the tile drainage does not divert water from other wetland resources (e.g., prairie pothole wetland complexes or springs) and water quality is not the primary intention of the wetland enhancement.

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.

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.

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 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 6 feet will meet the criteria for the CPS Dike (356). Embankments with an effective height of greater than 6 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

Establish native hydrophytic vegetation typical for the wetland type(s) being established. Each state will develop specific guidelines that consider soil, seed sources, and species.

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

a. Establish at least two plant species from the plant community corresponding to the water regime and salinity of the enhanced wetland area using the plant communities described by Stewart and Kantrud (1971 and 1972).

b. Establish at least two plant species from the plant community corresponding to the water regime of the enhanced wetland area using the plant lists included in SD Biology Technical Note No. 10 (1987).

c. If an appropriate, documented reference site is available with similar soils and similar hydrologic conditions, it may be used to identify an appropriate plant community for the site.

Where natural colonization of selected species will dominate within five years, natural regeneration can be left to occur.

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

If the targeted hydrophytic vegetation is predominantly herbaceous, several species adapted to the site shall be established. Herbaceous vegetation may be established by a variety of methods including: mechanical or aerial seeding, top soiling, organic mats, etc., over the entire site, or a portion of the site and at densities and depths appropriate.

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.

Seeding rates shall be based upon percentage of pure live seed within six months of planting.

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 must all be met.

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 waterfowl pair population in the surrounding area 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. The center of the island shall be planted with clump plantings of

native shrubs, such as, buck brush, wild rose, or similar sized species.

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

Conservation Practice Standards Dike (356), Wetland Restoration (657), and Structure for Water Control (587), may be used to enhance the performance of this practice.

Consider manipulation of water levels to control unwanted vegetation.

Consider existing wetland functions and/or values that may be adversely impacted.

If the enhancement includes adding additional water by means of a tile outlet, there may be negative impacts associated with both the water quantity and water quality of the existing wetland.

Tile water may contain high levels of nutrients and chemicals that could negatively impact the functions and values of both the existing wetland and the intended enhancements.

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.

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.

Consider effect enhancement will have on disease vectors such as mosquitoes.

The inclusion of microtopography can achieve changes in depth and duration of flooding without changing extent of surface area.

Consider effect of volumes and rates of runoff, infiltration, evaporation, and transpiration on the water budget.

Consider effects on downstream flows or aquifers that would affect other water uses or users.

Consider effects on fish and wildlife habitats that would be associated with the practice.

Consider linking wetlands by corridors wherever appropriate to enhance the wetland's use and colonization by the flora and fauna.

Establishing vegetative buffers on surrounding uplands can reduce sediment and soluble and sediment-attached contaminant delivery by runoff and/or wind.

Consider effects on temperature of water resources to prevent undesired effects on aquatic and wildlife communities.

Soil disturbance associated with the installation of this practice may increase the potential for invasion by unwanted species.

On sites where woody vegetation will dominate, consider adding one to two dead snags, tree trunks, or logs per acre to provide structure and cover for wildlife and a carbon source for food chain support.

For discharge wetlands, consider underground upslope water and/or groundwater source availability.

When determining which species to plant, consider microtopography and the different hydrology levels.

Consider the effects that location, installation, and management may have on subsurface cultural resources.

Consider the effect of water control structures on the ability of fish to move in and out of the wetland.

Consider the effects that water level draw drowns will have on the mortality of aquatic species such as turtles.

Consider timing of water control to mimic the natural hydrological regime of the area, further enhancing the habitat for aquatic species.

Consider design modifications that will limit potential negative impacts of wetland plants and animals on the project.

Artificial islands for nesting are quite expensive and nest structures are likely to provide better nest success at considerably less expense.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other documentation. Requirements for the operation and maintenance of the practice shall be incorporated into site specifications. Plans and specifications should be reviewed by staff with appropriate training in design and implementation of wetland enhancement.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Biological control of undesirable plant species and pests (e.g., using predator or parasitic species) should be implemented where available and feasible.

Inspection schedule for embankments and structures for damage assessment.

Depth of sediment accumulation to be allowed before removal is required.

Management needed to maintain vegetation, including control of unwanted vegetation.

Haying or grazing shall be used as appropriate to manage vegetation. Minimize disturbance to ground nesting species, especially during the primary nesting season.

REFERENCES

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