



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
WETLAND ENHANCEMENT

Code 659

(Ac)

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).
- 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 (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 (Wetland Restoration (657)).
- The creation of a wetland on a site location that was historically non-wetland (Wetland Creation (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.

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

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 the current Iowa NRCS functional assessment models. The functions to be increased or decreased on wetlands found to be currently functioning at or near a “reference” condition will be documented.

The current 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.

Water rights, if applicable, shall be assured 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. This includes, but is not limited to, the manipulation of water levels or topography to control unwanted vegetation. The establishment and/or use of non-native plant species shall be discouraged.

Establish vegetative buffers on surrounding uplands around the wetlands to reduce the movement of sediment and soluble and sediment-attached substances carried by runoff. Use Filter Strip (393) to determine the minimum width of the vegetative buffer.

Embankments, spoil mounds, and excavated areas shall be shaped in a manner that is compatible with the existing landscape. For excavated areas leave the ground surface as irregular as possible.

Where practicable, spoil material shall be placed on non-hydric soils.

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, the capacity of drainage systems on other properties, and shall not back surface water onto an adjoining property unless agreed to by signed written letter, easement or permit.

Any existing surface or subsurface drainage systems that would affect or be affected by the wetland shall be located and measures taken to determine the extent of those systems. Existing drainage systems will be utilized, removed, or modified as needed to achieve the intended purpose. Refer to NEH, Part 650, (EFH) Chapter 13 and current Iowa NRCS guidance for information related to surface and subsurface drain plugging.

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. Refer to Structure for Water Control (587) and Iowa Biology Technical Note 20 for guidance. Other structural practices, macrotopography (excavations/fills causing an elevation change over 6 inches) and/or microtopography (excavations/fills causing an elevation change less than 6 inches) may be used to meet the planned objectives.

The design of embankment features, not including spoil mounds, and macrotopographic excavations shall meet the criteria of other practice standards to which they apply due to purpose, size, water storage capacity, hazard class, or other parameters. Practice standards to be used include:

- Pond (378),
- Dike (356),
- Grade Stabilization Structure (410), and
- Water and Sediment Control Basin (638).

If no other practice standard applies, they shall meet the requirements for Dike (356).

Water control structures that may impede the movement of target aquatic species or species of concern shall meet the criteria in Fish Passage (396). Preclude fish access to the wetland unless fish habitat is an objective.

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 5 years, sites may be left to re-vegetate naturally. If not, the appropriate species will be established by seeding or planting. To decide if natural revegetation is appropriate, refer to ECS 190-15, Wetland Restoration, Enhancement, Management, and Monitoring for natural regeneration decision keys.

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 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.

Vegetative establishment shall address species, functional, and structural diversity.

Where topsoil will be used as a seedbank, topsoil shall not be stockpiled prior to redistribution during the summer. For other periods, topsoil shall be stockpiled in a manner to limit deterioration of viable plant parts and seeds. Refer to ECS 190-15, Wetland Restoration, Enhancement, Management, and Monitoring, for guidance.

Refer to Conservation Cover (327), Tree/Shrub Establishment (612), Restoration and Management of Declining Habitats (643), Wetland Wildlife Habitat Management (644), and NEH, Part 650, Chapter 13, and applicable Iowa Job Sheets and Technical Notes for vegetation establishment guidance.

If uplands are planned as part of a wetland creation, then native species shall be used for these areas as well. Refer to Conservation Cover (327) for herbaceous restorations or Tree/Shrub Establishment (612) and Upland Wildlife Habitat Management (645) if trees and/or shrubs are desired.

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, embankments, 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 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.

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.

The following list of Construction Specifications is intended as a guide to selecting the appropriate specifications for each specific project. The list includes most, but may not contain all, of the specifications that are needed for a specific project:

- IA-1 Site Preparation
- IA-5 Pollution Control
- IA-6 Seeding and Mulching for Protective Cover
- IA-9 Subsurface Drain Investigation, Removal, and Repair
- IA-11 Removal of Water
- IA-21 Excavation
- IA-23 Earthfill
- IA-26 Topsoiling
- IA-27 Diversion
- IA-45 Plastic (PVC, PE) Pipe
- IA-46 Tile Drains for Land Drainage
- IA-51 Corrugated Metal Pipe Conduits
- IA-52 Steel Pipe Conduits
- IA-61 Loose Rock Riprap
- IA-95 Geotextile

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 maintenance 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 functions 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 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.
- The timing and level setting of water control structures for the establishment and maintenance of vegetation, soil, and wildlife functions.

REFERENCES

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