

UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WETLAND RESTORATION

(Acre)

Code 657

**DEFINITION**

A rehabilitation of a drained or degraded wetland where the soils, hydrology, vegetative community, and the biological habitat are returned to the natural condition to the extent possible.

**PURPOSE**

This practice is used to restore hydric soil conditions, hydrologic conditions, hydrophytic plant communities, and wetland functions that occurred on the disturbed wetland site prior to modification to the extent practicable.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies only to sites with hydric soils that have sustained some hydrologic and/or vegetative manipulation such that the extent of original wetland functions has been diminished.

Upon completion of the restoration the site shall meet the current NRCS soil, hydrology, and vegetation criteria of a wetland.

This practice does not apply to:

- A constructed wetland (656) intended to treat point and non-point sources of water pollution
- Wetland enhancement (659) intended to rehabilitate a degraded wetland where specific functions and/or values are enhanced beyond original conditions
- Wetland creation (658) for creating a wetland on a site location which historically was not a wetland or was formerly a wetland but shall be replaced with a wetland type not naturally occurring on the site

**CRITERIA**

**Criteria Applicable to all Purposes**

Materials used for water control structures shall have a minimum 25-year durability for the soil,

water, and climate conditions associated with the site. Fire resistant materials shall be used for exposed portions of structures where vegetation is to be maintained by burning.

The land user shall obtain any permits required by federal, state, or local laws before restoration.

**Criteria Applicable to Hydric Soils**

Sites to be restored shall have a predominance of hydric soils. Soil quality and soil biology will be restored to the extent possible.

Original soil micro-topography shall be recreated to the extent possible. Means of re-creating micro-topography include, but are not limited to, roughing the soil with a plow, grading to create shallow isolated pools (ephemeral ponds), removing fill and relocating fill to recreate "windthrow mounds" or to create mini-levees and to recreate sloughs and oxbows.

**Criteria Applicable to the Restoration of Hydrology**

Hydrologic conditions of the site include the volume of water stored, rate and timing of inflow and outflow, duration, frequency and depth of flooding, ponding or saturation. Hydrologic alteration includes any significant decrease or increase in hydrology from normal hydrologic conditions.

The minimum restored hydrologic conditions of the site must meet the current wetland criteria.

The hydrologic conditions on the restored site shall approximate the conditions that existed before conversion or extensive alteration by beavers.

**Criteria Applicable to Surface Drainage Removal**

Open channels or ditches constructed to drain the wetland shall be filled with earth or a water control structure may be installed in the channel to maintain hydrologic conditions.

Provisions shall be made to store, pass, or divert the flow from the 10 year frequency 24 hour storm so that it does not cause erosion and flooding.

Where the channel serves as an outlet for upstream drainage, it is necessary to meet applicable state and local laws and regulations pertaining to flooding, surface, and subsurface drainage.

The channel may be blocked with earth fill without a flow control device where flow duration and rate will not cause accelerated erosion and head cutting. The minimum length of the channel to be filled shall be based on the hydraulic conductivity (permeability) of the soil on the site. The minimum length to be filled is 50 feet for soils with an average 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. The side slopes on channel blocks shall be stable. All fill material shall be compacted to achieve the density of adjacent materials. The fill for the channel block shall be crowned a minimum of one foot above the top of the lowest existing channel bank to account for settlement and to prevent concentrated flow over the channel block.

#### **Criteria Applicable to Grade Stabilization Structures**

Where the 10 year frequency 24 hour duration storm flow or base flow from groundwater inflow will prevent stabilizing the site because of long duration flows or high peak discharge, the channel shall be filled and stabilized with a structure that meets the criteria for Grade Stabilization Structure (410).

#### **Criteria Applicable to Water Control Structures**

Where it is desirable to control or manipulate the water level for operation and maintenance of the wetland at an elevation different than that caused by blocking the channel, a water control device meeting the criteria of Structure for Water Control (587) shall be used. The water control structure shall be installed in a manner to prevent internal soil erosion (piping) through or around the channel block.

#### **Criteria Applicable to Removal of Excess Hydrology Due to Beavers**

In areas where beavers are causing extensive alteration of hydrology and vegetation, removal of these animals and their dams may be necessary.

The animals should be removed by shooting or trapping before dam removal begins. Contact local law enforcement with Alabama Dept of

Conservation before beginning beaver removal to ensure all applicable state and local laws are followed.

Removing dams can be done with hand tools, agricultural explosives, or with excavation equipment where accessible. The use of agricultural explosives should only be done by those trained and qualified to do so, such as employees of USDA Wildlife Services.

Careful consideration of the extent of damage should be done before the decision to remove beavers is made. Beavers are a naturally occurring component of most wetland ecosystems in the southeast. Some flooding by beavers will create excellent wildlife habitat and can generally be tolerated. Extensive flooding above normal water levels or flooding of mast bearing hardwoods should exist before making the decision to remove beavers and their dams.

#### **Criteria Applicable to Subsurface Drainage Removal**

In areas where subsurface drainage was used to lower the water table, the existing system shall be modified to restore the wetland hydrologic conditions. Review of drainage records, interviews, and site investigations may be needed to determine the extent of the existing system. The effect of any modification to the existing subsurface drainage system on upstream owners shall be evaluated and the land user shall be notified of potential offsite impacts. This evaluation shall include both surface and subsurface impacts.

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

The effects of a subsurface drainage system may be eliminated by removing a portion of the drain at the downstream edge of the site or by modifying the drain with a water control device.

The minimum length of drain to be removed is 50 feet for soils with an average 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 shall also be removed for this length. The trench shall be filled and

compacted to achieve a density equal to adjacent material.

A water control device shall be placed on the inlet of an existing drain to limit inflow in order to prevent damage to the drain downstream of the site. If the drain serves other areas, inflow shall be limited to the capacity originally apportioned to the drain. The water control structure shall be attached to a non-perforated 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 non-perforated pipe shall be watertight at the head created at the maximum pool level.

In certain situations, subsurface drainage may actually be caused by tree and/or shrub species invading a traditionally herbaceous wetland type. A good example is slash pine that has invaded a pitcher plant bog because of fire suppression. In some cases, landowners bed and plant slash pine through bogs. The evapotranspiration rate for woody vegetation is higher than for the traditional herbaceous vegetation. In most cases, this has the same affect on hydrology degradation as traditional methods of drainage such as ditching.

**Criteria Applicable to Storage Volume Replacement**

Sediment deposition or other fill materials shall only be removed to the original surface of the hydric soil. Sediment shall be removed and placed on upland sites. Permanent vegetative cover shall be established on spoil materials.

**Criteria Applicable to Construction of Embankments**

An earth embankment may be constructed to create a pool storage volume equal to that, which existed prior to the conversion of the site. Embankments shall meet the criteria for Dike (356) or Pond (378) as appropriate.

**Criteria Applicable to Hydrophytic Plant Restoration**

Vegetation restoration shall attempt to reproduce a natural arrangement of plant communities along environmental gradients.

In sites where seed banks of desirable species exist then natural regeneration may be allowed. Specific guidelines that consider soil, seed source, and species shall be developed as needed.

Where herbaceous vegetation was predominant prior to conversion and planting is necessary,

establish a minimum of two species that are adapted to the site. Herbaceous vegetation can also be established by placing a minimum of 4 inches of soil containing seed or tubers over 50% of the site.

Tree plantings shall include those species that are suitable for wetlands. Where conditions are suitable, at least two of the species shall be hard mast producers. Site preparation and planting shall meet the criteria in Forest Site Preparation (490) and Tree/Shrub Establishment (612).

If the desired plant community is a fire maintained community, then prescribed burning shall be a required maintenance item. Prescribed burning shall be carried out at an interval appropriate to the community type throughout the life of the practice.

**CONSIDERATIONS**

The pre-alteration hydrologic and vegetative characteristics of the site and its contributing watershed should be established. Review of soil surveys, drainage records, historical aerial photography, NWI maps, historic records, and site investigations can accomplish this. Vegetation may be determined from historic records or examination of vegetation on similar but unconverted sites.

The vegetation selected for establishment should be compatible with the planned hydrologic condition.

The nutrient and pesticide tolerance of the species to be planted should be considered.

The exclusion of livestock shall be considered where applicable.

If the presence of hazardous waste materials in the sediment or fill is suspected, soil samples shall be collected and analyzed for the presence of hazardous waste as identified by local, state or federal authorities.

Wetland restoration applied to a converted site that is adjacent to an existing wetland, increases the wetland system complexity and diversity, decreases habitat fragmentation and, ensures colonization of the site by wetland plants and animals. Where multiple wetland sites are not adjacent, use forested corridors of non-wetland as links.

Sediment delivery to restored wetlands shall be minimized. This may be accomplished by land treatment of adjacent fields or the use of grassed or forested riparian buffer areas.

Embankments and excavated slopes should be located and shaped in a manner that is compatible with existing landscape.

Tree/shrub removal, when needed to restore hydrology to overgrown herbaceous communities, will be done in an environmentally sensitive manner.

Cultural resources shall be considered when planning this practice. This practice has the potential to adversely affect cultural resources and compliance with GM 420; Part 401 during the planning process is necessary. Where appropriate, local cultural values shall be incorporated into practice design in a technically sound manner. Compliance with all applicable federal, state, and local laws/regulations, including permits, permissions, or notifications is required.

If the presence of hazardous waste materials in the sediment or fill is suspected, soil samples shall be collected and analyzed for the presence of hazardous waste as defined by local, state, or

federal authorities. Sites containing hazardous waste shall not be restored under this standard.

#### **PLANS AND SPECIFICATIONS**

Plans and specifications for the restoration of wetlands shall be prepared for each site in accordance with the criteria for this practice.

#### **OPERATION AND MAINTENANCE**

An operation and maintenance plan shall be prepared for each restored wetland. The following activities shall be addressed in the plan:

- Seasonal manipulation (if applicable) and elevation setting of water control structures required for the establishment of desired hydrologic conditions or for management of vegetation;
- Inspection schedule of embankments or structures;
- Establishment and management of vegetation.