

Wetland Restoration

Conservation Practice WV Job Sheet

Code 657



DEFINITION

This practice pertains to the restoration of an area that was once a wetland or where a wetland has had at least a portion of the original functions and/or values significantly degraded, altered or removed.

PURPOSE

The purpose of this practice is to restore the wetland as closely as possible to the original conditions prior to the alterations or modifications. This document is intended to be used as a tool to assist in the preliminary planning of wetland restorations where the natural topography has been altered or eliminated. The planner is encouraged to be creative when developing a restoration plan. **This job sheet is designed to document the general concept of restoration strategies and should not be used for final quantities or design criteria.** Restoration of wetlands is often a complex planning process requiring knowledge in hydrology, engineering, soils and biology. Detailed plans and designs, as well as component practices are often required to complete this process. Work closely with NRCS throughout the restoration process.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on any degraded natural wetland where the wetland function(s) or value(s) have been degraded by agricultural activities such as cropping, grazing, mowing/haying or other farming activities. Usually wetlands that need to be restored have had the natural plant community altered (requires vegetative restoration) or; had the natural water regime

altered (requires hydrologic restoration). In some cases, both the plant community and the water levels have been altered.

VEGETATIVE RESTORATION

The vegetation should be restored as similar to the natural plant community as possible. The determination of the original plant community's species and percent composition may be based upon historic records, reference wetlands of the same type being restored or an adjacent plant community.

These plant communities may be established through natural succession or by planting. Unless high levels of maintenance are planned for the wetland, natural succession should be utilized to the extent possible.

Vegetative restoration of a wetland may simply require the elimination of current uses or management practices to permit the wetland to return to its original state. For example, a wetland that has been degraded due to grazing by livestock may simply need to be fenced out and the wetland allowed to naturally revegetate. In order to accomplish this, a seed bank must exist, and natural colonization of native plants should dominate in approximately 5 years.

Planting certain herbaceous species may be beneficial to accelerate the plant community development. If planting is selected as a restoration method, techniques such as transplanting, sod mats, donor soil, or other methods could be used. Preference should be given to native and/or endemic wetland plants wherever feasible.

Planted vegetation (herbaceous or woody) should imitate the natural community. Therefore, vegetation should be planted as randomly as possible to mimic a more natural setting and be compatible with the wetland functions.

In wetlands dominated by woody vegetation, trees and shrubs may be planted to enhance the natural regeneration process. For woody vegetation suitable for establishment, the establishment methods, and the operation and maintenance required, refer to conservation practice standards (612) Tree/Shrub Establishment and (490) Tree/Shrub Site Preparation or associated job sheets.

Refer to the list of pollinator plants within the West Virginia Pollinator Handbook that may provide guidance and considerations for herbaceous

plants beneficial to pollinators and other wildlife in wetlands.

HYDROLOGIC RESTORATION

Historically in West Virginia, many areas that were flat and contained relatively good agricultural soils unfortunately were too wet to produce crops. These areas were drained by surface or sub-surface systems that resulted in the loss of many acres of wetlands throughout the state. One common method of drainage was a system of raised beds that allowed water to drain from the field and elevated the crop above the water table. Others installed drainage systems below ground (called subsurface drainage or "tile") to remove underground water before it reached the crop roots.

The restoration of hydrology can be achieved through a variety of methods including the alteration of the landscape to decrease or increase the timing, amounts or duration of the water levels. For example, plugging or blocking surface ditches at the original ground level (channel blocks) or severing and/or removing sub-surface drainage lines.

A. Channel Blocks

Channel blocks are earth impoundments installed in an existing man-made surface drainage ditch under the following conditions where:

- the drainage area is equal to or less than 20 ac.
- the ditch slope is less than 2%
- the flow velocity of the ditch is less than the allowable velocity for the soil as determined by NRCS
- the ditch depth is less than 2 ft.
- the downstream slope of the channel block will be 5:1 or flatter. The upstream slope will be 3:1 minimum.
- the soil depth and texture in excavated areas are adequate for impounding water without excess seepage
- the designed top of the earthfill channel block should be no higher than the depth of the ditch and should be level from side to side; and will slope from the upstream end to the downstream end at the same slope as the ditch bottom
- the length (topwidth) of the channel block may vary from 50 to 150 feet depending on the soil type and conductivity as determined by NRCS

B. Subsurface Drainage Systems

In areas where subsurface drains were used to remove surface water or soil saturation, the existing system should be destroyed or modified to restore the wetland hydrology. Modification may be achieved by removing a portion of the drain,

modifying the existing drain, installing a water control device or installing non-perforated pipe through the wetland. The methods utilized will vary depending on site conditions.

The minimum length of drain to be removed should be enough to effectively restore the original extent of the altered wetland. This should be determined by NRCS or a consulting engineer. Pipe removal may be at the outlet of the drainage system; or just downstream of the wetland when a portion of the drainage system is to be maintained. Any envelope, filter or other flow enhancing material must also be removed. The trench should be filled and compacted equal to the adjacent soils.

If a portion of the drainage system upstream of the site is to be maintained, the pipe through the site should be replaced with watertight pipe for a distance that will eliminate the effect of the drainage system on the wetland. Relocation of the drainage system around the wetland may be a good alternative, provided the drain can be located at a distance where it will not affect the wetland. Also, a surface inlet or other water control device may need to be installed to maintain the capacity of the system.

CONSIDERATIONS FOR ESTABLISHMENT

Many factors should be carefully considered when applying this practice. Most importantly, permits from other Federal and State Agencies may be required prior to implementing this practice, including but not limited to:

US Army Corps of Engineers Pittsburgh District

William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222
Phone: (412) 395-7154

US Army Corps of Engineers Huntington District

WV Permits Section
502 Eighth Street
Huntington, WV 25701
(304) 399-5710

WV Division of Environmental Protection

Director Division of Water and Waste Management
601 - 57th Street
Charleston, WV 25304
Phone: (304) 926-0495

WV Public Land Corporation

State Capitol Complex
Building 3, Room 643
1900 Kanawha Blvd., East
Charleston, WV 25305-0665
Phone: (304) 558-3225

Other considerations include:

It is always advisable to develop a “water budget” prior to restoring wetlands. A water budget will determine items such as transpiration rates, infiltration and ensure that water levels are present at the desired times and frequency. NRCS or private consultants may be able to help develop a water budget.

Prior to restoration, consider the positive and negative effects on downstream flows that may impact other water uses.

Consider the visual appearance of the restored wetland in areas of high visibility and recreation.

Restoration should be a high priority for those sites adjacent to existing wetlands as they increase wetland system complexity and diversity, decrease habitat fragmentation.

The effects of adjacent land uses can often impact the wetland both negatively and positively. Consider all the adjacent land uses carefully prior to restoration and use buffers around wetlands.

Where possible, try to link wetlands in the landscape using upland corridors or riparian buffers to enhance the wetland's use and colonization of plants and animals.

Wetland dependent animals such as beaver and muskrat can often damage structures. Strategies should be planned to minimize their impacts. Deer browse may also be detrimental to plantings (e.g. tree tubes on planted seedlings).

Water temperature can have an effect on certain wildlife and plant species. If a water temperature change may occur due to restoration, consider all the potential impacts on those organisms.

Where possible, always utilize multiple water depths. This creates greater diversity in the number, kinds and quantities of plants and animals that will use the site. Attempt to restore the natural topography that once existed on the site prior to manipulation.

OPERATION AND MAINTENANCE

Actions should be carried out to insure that this practice functions as intended throughout its expected life. Wetland restoration is a practice that may require several component practices such as tree planting, water control structures, tree/shrub site preparation, diversions, etc. Each component practice may have separate operation and maintenance requirements. Follow the individual operation and maintenance requirements for that practice component.

For wildlife habitat purposes haying and grazing, if justified as a necessary wildlife/wetland management tool, may be used for establishment, development, and management of vegetation.

Any maintenance activities required for this practice should not disturb target waterfowl or ground nesting species where feasible.

Wetlands are dynamic communities that may require disturbance to maintain the desired vegetative stage or composition. The use of fertilizers, mechanical treatments, pesticides and other chemicals will not compromise the restored functions (i.e. water quality, wildlife habitat, etc.).

The timing and level of any water control structures may require a separate schedule for the maintenance of desired water levels and the management of vegetation for optimum wildlife use. Fluctuation of water levels and strategies for the management of various wildlife species may be found in Shallow Water Development and Management (646) and/or job sheet(s).

Unwanted vegetation including noxious and invasive species must be monitored and controlled by chemical, mechanical or biological methods.

For some types of wetlands, accumulated sediment may need to be periodically removed to maintain the desired functions. A separate schedule outlining the depth of sediment accumulation prior to removal may need to be prepared. This schedule should also include the methods of removal. Refer to individual component practice designs and specifications for this information.

Some USDA programs have requirements for operation and maintenance and may outline acceptable uses including the timing and intensities of these activities (e.g. grazing, haying and timber harvest). Contact NRCS for details concerning various program restrictions.

SPECIFICATIONS

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide.

Wetland Restoration – WV Job Sheet

Client:	Farm #:	Restored Wetland Acres Planned _____ acres
Field(s):	Tract #:	
Designed By:	Date:	
Goals & Objectives:	Special Aquatic Site or Targeted Wildlife Specie(s):	

Purpose (Check all that apply)

<input type="checkbox"/> Restoration of wetland hydrology only	<input type="checkbox"/> Restoration of both hydrology and the vegetative community
<input type="checkbox"/> Restoration of wetland vegetation only	<input type="checkbox"/> Restoration of hydrology and/or vegetation of a marl marsh or other special aquatic site.
<input type="checkbox"/> Hydric soil restoration (removal/replacement of degraded soils)	<input type="checkbox"/> Other : _____

Restored Wetland Functions Planned (check all that apply)

<input type="checkbox"/> Temporary Surface Water Storage (Flood Storage)	<input type="checkbox"/> Removal of Imported Elements and Compounds	<input type="checkbox"/> Soil-Water Storage (Aquifer and/or Ground-Water Recharge)	<input type="checkbox"/> Critical Component of Landscape Complexity and Diversity
<input type="checkbox"/> Sediment Retention	<input type="checkbox"/> Connectivity (Habitat or Landscape)	<input type="checkbox"/> Nutrient Cycling	<input type="checkbox"/> Wildlife Habitat
Other Function (specify):			

Required Supplemental Information (Check all that apply)

<input type="checkbox"/> Upland Buffers Required – Refer to additional information or job sheet(s): <input type="checkbox"/> Critical Area Planting (342) <input type="checkbox"/> Filter Strips (393) <input type="checkbox"/> Tree/Shrub Site Preparation (490) <input type="checkbox"/> Forage and Biomass Planting (512) <input type="checkbox"/> Riparian Forest Buffer (391) <input type="checkbox"/> Riparian Herbaceous Cover (390) <input type="checkbox"/> Tree and Shrub Establishment (612) <input type="checkbox"/> Hedgerow Planting (422) <input type="checkbox"/> Upland Wildlife Habitat Management (645) <input type="checkbox"/> Other: _____ <input type="checkbox"/> Other: _____	<input type="checkbox"/> Other engineering design(s) and/or specifications necessary for restoration – Refer to the specific engineering drawings, specifications, designs and criteria for the following: <input type="checkbox"/> Dike (356) <input type="checkbox"/> Channel Blocks <input type="checkbox"/> Access Control (472) <input type="checkbox"/> Subsurface Drainage (removal) <input type="checkbox"/> Pond (378) <input type="checkbox"/> Grassed Waterway (412) <input type="checkbox"/> Diversion (362) <input type="checkbox"/> Structure for Water Control (587) <input type="checkbox"/> Other: _____ <input type="checkbox"/> Other: _____
	<input type="checkbox"/> Section 401 and 404 of the Clean Water Act or other permits may be required prior to practice establishment (Refer to Nationwide Permits, Individual Permits or other regulatory requirements)
<input type="checkbox"/> Wetland Wildlife Habitat will be managed (Refer to 644 – Wetland Wildlife Habitat Management)	<input type="checkbox"/> Restoration includes manipulation of water levels during critical periods - (Refer to 646 – Shallow Water Development and Management and/or associated job sheet)

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Hydrologic Restoration (Use only if restoration of hydrology is required. If not required, list as N/A.)							
Field #	Existing Hydrologic Manipulation ¹	Planned Restoration Measure(s) ²	Number or Quantity (ea, ft, etc)	Water Table Depth ³ (in)		Dominant Soil Type ⁴	Slope ⁵ (%)
				Existing	Planned		

¹ Identify the existing hydrologic manipulation requiring restoration. List as: **Sub-Surface Drainage** (tile drainage), **Surface Drainage** (ditches, diversions, channels, etc), **Dredging**, **Filling**, **Impoundments** or **Other** (specify in the “Additional Specifications and Notes” section). Combinations may be required (e.g. Surface Drainage/Diversion)

² Identify how the hydrology will be restored: **Channel Blocks**, **Embankment**, **Diversion**, **Tile Removal** or **Other** (specify in the “Notes” section). Combinations of restoration may be required.

³ If known, identify the existing and planned average water table depth before the project. Refer to the soil description in the local soil survey to determine water table depths.

⁴ List the predominant soil type of the project area as shown in the local soil survey.

⁵ Identify the approximate average slope of the project area (i.e. from the inlet to the low point of the site).

Noxious and Invasive Species (List any <u>existing</u> invasive plants on the site and the approximate percentage of cover over the project area. If none, list as N/A.)		
Species	Approx % of Cover On-Site	Planned Method of Control ¹
1		
2		
3		

¹ List as **chemical**, **mechanical**, **biological** or **other control** methods. (If other, specify in the “Additional Specifications and Notes” section).

Existing On-Site or Adjacent Vegetation or Reference Site Vegetation Use the following to determine what the restored community should contain. (List the dominant species and approximate percentage of cover of each species.) This information should be used to determine the proper restored vegetative community. (Check all that apply)					
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<input type="checkbox"/> This is existing on-site. <input type="checkbox"/> This is the planned community. <input type="checkbox"/> This is an adjacent community.		<input type="checkbox"/> This is a reference site. List reference site name/location or topographic quad: _____			
Woody	% Cover	Herbaceous	% Cover	Vines/Other	% Cover
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Vegetative Restoration (Refer to 612 Tree and Shrub Establishment for information regarding establishment of woody vegetation) Use additional sheets if necessary.

Field #	Original & Restored Wetland Type ¹	Restored Vegetation Type ²	Species Planned for Establishment ³ (woody or herbaceous species)	Establishment Method ⁴	HERBACEOUS ONLY (Identify the species, quantity, planting dates, spacing and planting depths <u>only</u> for planted herbaceous vegetation. Refer to the Tree and Shrub Establishment and/or Tree/Shrub Site Preparation Job Sheet(s) for information regarding the establishment of woody vegetation.)				
					Herbaceous Stock Type ⁵	Planting Date	Average Spacing (ft)	Rate or Quantity (per acre)	Planting Depths (in)
			1						
			2						
			3						
			4						
			5						
			6						
			1						
			2						
			3						
			4						
			5						
			6						

¹ **Original & Restored Wetland Type** - Identify the wetland type(s) as: **PEM** (Palustrine Emergent Wetland) , **PFO** (Palustrine Forested Wetland), **PESS** (Palustrine Emergent Scrub-Shrub), or **Other** (e.g. special aquatic site marl marsh or slough) NOTE: Uses Cowardin classification.

² **Restored Vegetation Type** - Identify the restored vegetation type as **Herbaceous, Woody** or **Both**.

³ **Species Planned for Establishment** – List species planned for the area. If planting, consider at least three (3) species for restoration of herbaceous wetlands. For wetlands containing two (2) or more types a minimum of two (2) species should be established. For methods, rates, spacing and all other guidelines for establishment of trees and shrubs refer to (612) Tree/Shrub Establishment. **For herbaceous vegetation**, refer to the West Virginia Pollinator Handbook for a list of wetland species and the Critical Area Seeding (314) or Forage and Biomass Planting (512) for establishment criteria. *No variety of tall fescue, purple loosestrife or reed canarygrass shall be used in conjunction with this practice.*

⁴ **Establishment Method** –Identify the method of establishment as; Hand Planting (**HP**), Mechanical Planting (**MP**) or Natural Regeneration (**NR**). For natural regeneration, an existing seed source must be present within reasonable proximity. Refer to Conservation Practice Standard Tree and Shrub Establishment (612) and associated job sheets for methods, operation and maintenance. For site preparation methods, refer to Conservation Practice Standard Tree/Shrub Site Preparation (490) and/or associated job sheet(s).

⁵ **Herbaceous Stock Type** – If planting herbaceous species, identify the stock type as; **Tuber, Seed, Rhizome, Transplant, Donor Soil, Sod Mats, Cuttings, Seedlings, Bulbs** or **Other** acceptable source (If other, specify in the “Additional Specifications and Notes” section).

Wetland Restoration – WV Job Sheet

If needed, an aerial view, map or a sketch of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.



Additional Specifications and Notes: (i.e. required permits or special conditions, special aquatic sites, herbicide applications, operation and maintenance specifics, etc.)

Maintain the restored wetland by following the guidelines as outlined in the section of this document entitled **Operation and Maintenance** and those additional specifications listed below.

- Prescribed grazing will be utilized to maintain vegetative communities at a given growth stage. Refer to the WV conservation practice standard Prescribed Grazing (528) for timing and intensities.

Additional Notes:

Questions regarding the establishment, operation or maintenance of this practice should be directed to:

_____ at _____

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