

Appendix 11: Seven Common Types of Forested Wetlands

Forestry operations and applicable BMPs may differ among wetland types, so a wetland classification system is outlined below. The classification system used here is based on the hydrogeomorphic (HGM) classification system developed by the USACE (Brinson, 1993; Smith et al., 1995). Seven standard wetland types that apply nationally are described, based on geomorphic setting and hydrologic character. The seven types are briefly described below (listed alphabetically) in order to provide a framework for understanding BMPs that may be appropriate to one or more wetland types.

Common names applied to wetlands vary widely and are not standardized enough to use as the basis of a classification system. However, the common names often used by foresters and ecologists for many forested and non-forested wetland subtypes within each wetland type are also provided for reference.

Past hydrologic alterations such as large reservoirs that altered flooding regimes in river bottomlands, stream channelization that limited flooding on small streams, and land drainage that altered water table regimes may have caused wetland areas to become wetter or drier. In such situations, the soil condition may be different than described in the county soil survey. Onsite assessment of wetland condition should consider the effects of such hydrologic alterations.

Depressional Wetlands

Description: Occur in topographic depressions with a closed elevation contour that allows accumulation of surface water. Usually do not have channel inlets and outlets and commonly occur as inclusions in nonwetland forests.

Hydrology: Influenced by groundwater discharge and interflow from the adjacent uplands, and often, restrictive soil layers that limit seepage downward.

Size: Relatively small (from 0.01 to a few acres), other than Carolina Bays. Carolina Bays range in size from a few acres to several thousand acres. Many have stream outlets, and may have mineral or organic soils or complexes of both.

Soils: Soils are usually mineral

Common Name Sub-types: Coastal Plain depressions (Coastal Plain ponds, Coastal Plain sinkholes), maritime depressions (on Outer Banks), perched wetlands (ephemeral wetlands, or vernal pools - small depressional wetlands that occur in forested areas throughout the Piedmont and Mountains).

Lacustrine Fringe Wetlands

Description: Adjacent to lakes where the water elevation of the lake maintains the water table in the wetland.

Hydrology: Influenced by groundwater discharge and interflow from the adjacent uplands, and occasionally, subsurface flow from the lake back into the shoreline soil. During wet periods, the groundwater hydraulic gradient is from land to lake and water flows through the wetland soil are from land to lake. During periods of high evapotranspiration rates, the water table in the wetland may often decline below the lake water level and water flow through the wetland soil is from lake to land.

Size: Dependant upon size of lake

Soils: Soils may be mineral or organic.

Common Name Sub-types: Lacustrine fringe wetlands occur on the shorelines of ponds, lakes, and reservoirs throughout the state with vegetation types ranging from open herbaceous marsh, to mixed hardwoods, or cypress.

Mineral Flat Wetlands

Description: Very low relief, usually relatively large areas in the Coastal Plain that occur on flat interstream uplands or large flood plain terraces

Hydrology: Influenced by low relief and slowly permeable soil layers that limit rates of runoff and downward seepage. Precipitation is the only source of water for mineral flat wetlands that occur on high terrain areas. Subsurface groundwater input influences hydrology where adjacent uplands are at higher elevation than the wetland.

Size: From tens up to hundreds or thousands of acres

Soils: Mineral soils only. As a result, the texture of the soil surface layers may range from sandy texture with very low organic carbon content to shallow organic layers (histic epipedon) up to 15" thick.

Common Name Sub-types: Wet pine flats-mineral (including drained and undrained pine plantations), wet hardwood flats, non-riverine swamp forest (mineral soils), wet pine savanna, mixed pine-hardwood flats

Organic Flat Wetlands

Description: Very low relief, usually relatively large areas in the Coastal Plain that are similar in geomorphic locations and hydrologic character to mineral flat wetlands except that wetter conditions have resulted in the development of organic soils.

Hydrology: Direction of runoff is horizontally outward in all directions in large domed peatlands, but may flow across in some organic soil flats.

Size: From tens up to hundreds or thousands of acres

Soils: Soils have a surface or near surface layer of organic soil material that is 16" or more thick

Common Name Sub-types: Pocosins, wet pine flats-organic (including drained and undrained pine plantations), white cedar forest, nonriverine swamp forest (organic soils)

Riverine Wetlands

Description: Occur in riparian zones and flood plains along stream channels throughout the state

Hydrology: Influenced by groundwater discharge and inter-flow from the adjacent uplands and overbank flow from the stream in areas that sustain frequent, long duration flooding

Size: Range in size from small inclusions (down to 0.01 ac.) in nonwetland riparian zones in the Piedmont and Mountains to extensive floodplain swamps in the Coastal Plain (up to hundreds or thousands of acres).

Soils: Both mineral and organic hydric soils occur. Note that many bottomland hardwood forests occur on somewhat poorly drained soils to well-drained soils that are nonhydric, but it is recommended that all BMPs described in this chapter be utilized for forestry operations on floodplains.

Common Name Sub-types: Wet headwaters forests, wet bottomland hardwoods, mountain bogs and bog forests, blackriver bottom forest, muck swamps, gum-cypress swamps

Slope Wetlands

Description: Normally found on sloping terrain where there is a discharge of groundwater to the land surface, usually due to a restrictive layer in the soil

Hydrology: The surface runoff of water from large slope wetlands often forms channels that are the origins of first order streams and the slope wetland may transition to riverine wetlands along the stream.

Size: Slope wetlands or seeps are usually small, much less than an acre, but may range up to several acres in size.

Soils: Soils are usually mineral

Common Name Sub-types: Usually occur as small inclusions in nonwetland forested areas throughout the upper Coastal Plain, Piedmont, and Mountains

Tidal Fringe Wetlands

Description: Occur along sea coasts and sound or estuary shorelines and are under the influence of sea level and regular lunar tide cycles.

Hydrology: Intergrade with riverine wetlands in estuaries where tidal currents diminish and river flow is constantly downstream. In North Carolina, the tidal fringe wetlands along the sound shorelines are also influenced by irregular wind tides.

Size: Subject to bi-directional subsurface and surface flow, the pattern of which is controlled by the tidal pattern.

Soils: Soils may be mineral or organic.

Common Name Sub-types: Tidal hardwoods, tidal gum-cypress swamp, and tidal marshes of various types, depending on water salinity. Coastal Wetlands as defined in NC G.S. 113-229(n)(3) are a subset of tidal marshes that contain 1 or more, of 10 marsh grass species.

Appendix 12 - Chapter References and Literature Cited

Chapter 4

US Environmental Protection Agency. April 2005. *National Management Measures to Control Nonpoint Source Pollution from Forestry*. USEPA Office of Water Publication No. EPA-841-B-05-001. Washington, DC.

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USFWS. 1988. *National List of Plant Species that Occur in Wetlands: Southeast (Region 2)*. US Department of the Interior - Fish and Wildlife Service. Biological Report 88 (26-2).

Appendix 13 - Glossary of Select Terms

NOTE: *There are several terms defined in the NC FPGs and DWQ riverbasin / watershed riparian buffer rules. Refer to each rules citation as noted in Appendix 1.*

Accelerated erosion

Any increase over the rate of natural erosion, as a result of land-disturbing activities.

Source: NC FPGs (15A NCAC 011 .0102 (1))

Adjacent

As cited in the source reference, adjacent means bordering, contiguous or neighboring. Examples include wetlands separated from other waters of the US by man-made dikes or barriers, natural river berms, beach dunes and similar situations.

Source: United States 33 CFR 328.3(c)

Best Management Practice - BMP

A practice, or combination of practices, that is determined to be an effective and practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. Source: NC FPGs (15A NCAC 011 .0102 (4))

Borrow ditch

A borrow ditch retains water that either seeps in from groundwater sources, and/or runs off from the surface as a nonpoint source. Borrow ditches are usually excavated with a backhoe or similar equipment and often are located alongside roadways, so that the spoil material from the borrow ditch can be used to construct or maintain a road. A borrow ditch does not have an outlet to a natural waterway. Source: NC Forestry Technical Advisory Committee, 2006

Braided stream

Streams with multiple channels that inter-connect like the strands of a braid. Braided streams are often characterized by very low stream gradients (less than 0.5% channel slope); broad valleys with well-defined floodplains; frequent high water tables; and soil with high organic matter content. Source: South Carolina Forestry Commission. March 1999. "Braided Stream Systems: A Supplement to the 1994 BMP Manual."

Channel

A natural water-carrying trough cut vertically into low areas of the land surface by erosive action of concentrated flowing water or a ditch or canal excavated for the flow of water. Source: NC FPGs (15A NCAC 011 .0102 (5))

Discharge

"Discharge" shall mean, but shall not be limited to, any emission, spillage, leakage, pumping, pouring, emptying, or dumping of oil or other hazardous substances into waters of the State or into waters outside the territorial limits of the State which affect lands, waters or uses related thereto within the territorial limits of the State, or upon land in such proximity to waters that oil or other hazardous substances is reasonably likely to reach the waters, but shall not include amounts less than quantities which may be harmful to the public health or welfare as determined pursuant to G.S. 143-215.77A; provided, however, that this Article shall not be construed to prohibit the oiling of driveways, roads or streets for reduction of dust or routine maintenance; provided further, that the use of oil or other hazardous substances, oil-based products, or chemicals on the land or waters by any State, county, or municipal government agency in any program of mosquito or other pest control, or their use by any person in accepted agricultural, horticultural, or forestry practices, or in connection with aquatic weed control or structural pest and rodent control, in a manner approved by the State, county, or local agency charged with authority over such uses, shall not constitute a discharge; provided, further, that the use of a pesticide regulated by the North Carolina Pesticide Board in a manner consistent with the labeling required by the North Carolina Pesticide Law shall not constitute a "discharge" for purposes of this Article. The word "discharge" shall also include any discharge upon land, whether or not in proximity to waters, which is intentional, knowing or willful.

Source: N.C. General Statute (NC G.S.) Ch.143 Art.21A Sec.215-77(4)

Duff (also 'litter')

The surface layer of the forest floor which is not in an advanced stage of decomposition, usually consisting of freshly fallen leaves, needles, twigs, stems, bark, and fruits.

Source: "Glossary of Soil Science Terms", Soil Science Society of America Web site: www.soils.org/sssagloss/

Erodibility

- (i) The degree or intensity of a soil's state or condition of, or susceptibility to, being erodible.
- (ii) The K-factor in the Universal Soil Loss Equation.

Source: "Glossary of Soil Science Terms", Soil Science Society of America Web site: www.soils.org/sssagloss/

Grader ditch (also 'grader ditchline')

The name given to a shallow, angled trench that is excavated into the roadway surface along the roadside edge, usually no more than 3 to 6 inches deep, and most often created by using the end of the blade on a motor grader, bulldozer or similar blade. The purpose of the grader ditch (ditchline) is to control surface runoff from a roadway.

Source: NC Forestry Technical Advisory Committee, 2006

Ground cover

Any natural vegetative growth or other natural or manmade material which renders the soil surface stable against accelerated erosion. Source: NC FPGs (15A NCAC 011 .0102 (8))

Hydric soil

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Source: Federal Register of July 13, 1994.

Lists and/or maps of hydric soil mapping units by county may be obtained from the USDA-Natural Resources Conservation Service (NRCS) Web site: "Soil Data Mart" at: <http://soildatamart.nrcs.usda.gov/> or

Web Soil Survey (WSS) at: <http://websoilsurvey.nrcs.usda.gov/app/>

Hydrologically-connected ditch

A hydrologically-connected ditch has an outlet to a stream network, within which sediment and other nonpoint source pollution may enter that stream network unless appropriate BMPs or other measures are implemented to prevent this action from occurring. Source: NC Forestry Technical Advisory Committee, 2006

Nonpoint source (NPS)

Pollutant sources that are not defined by statute as 'point sources'. Nonpoint sources include return flow from irrigated agriculture; other agricultural runoff and infiltration; urban runoff and infiltration; urban runoff from small or non-sewered urban areas; flow from abandoned mines; hydrologic modification; and runoff from forestry activities.

Source: USEPA. April 2005. "National Management Measures to Control Nonpoint Source Pollution from Forestry." Publication No. EPA-841-B-05-001.

Nutrient sensitive waters

Those waters which are so designated in the classification schedule in order to limit the discharge of nutrients (usually nitrogen and phosphorus). They are designated by "NSW" following the water classification.

Source: Neuse River Nutrient Sensitive Waters Management Strategy (15A NCAC 02B .0202 (49))

Runoff (surface)

In forest areas, that portion of precipitation that flows from a drainage area on the land surface or in open channels.

Source: NC Forestry BMP Manual - 1989

Stream

A body of concentrated flowing water in a natural low area of the land surface.

Source: NC FPGs (15A NCAC 011 .0102 (17))

Ephemeral Stream

A stream that flows only during and for short periods following precipitation and flows in low areas that may or may not have a well-defined channel. Source: NC FPGs, 15A NCAC 011 .0102 (17)(a)

Intermittent Stream

A stream that flows only during wet periods of the year (30% to 90% of the time) and flows in a continuous well-defined channel. Source: NC FPGs, 15A NCAC 011 .0102 (17)(b)

Perennial Stream

A stream that flows throughout a majority of the year (greater than 90% of the time) and flows in a well-defined channel. Source: NC FPGs, 15A NCAC 011 .0102 (17)(c)

Organic matter

Plant and animal residue in the soil in various stages of decomposition

Source: *USDA-Natural Resources Conservation Service. "Urban Soil Primer." Issued 2005.*

'Permanently stabilized'

Permanently stabilized means that a site is protected to the state at which no further accelerated erosion is expected to occur from the forestry activities, as noted in 15A NCAC 01I .0102.

Pores

That part of the bulk volume of soil not occupied by soil particles. Soil pores have also been referred to as interstices or voids. Source: *"Glossary of Soil Science Terms", Soil Science Society of America Web site: www.soils.org/sssagloss/*

Primary Nursery Areas (PNAs)

Tidal saltwaters which provide essential habitat for the early development of commercially important fish and shellfish and are so designated by the Marine Fisheries Commission. Source: *Environmental Management (15A NCAC 02B .0202 (51)).*

Sedimentation

The process by which sediment resulting from accelerated erosion has been or is being transported off the site of the land-disturbing activity or into a lake or natural watercourse.

Source: *NC Sedimentation Control (15A NCAC 04A .0105 (12)).*

Sheetflow

Runoff that flows across and/or atop the ground surface as a thin, even layer, which is not concentrated within a channel.

Soil texture

The relative proportions of sand, silt, and clay particles in a mass of soil.

Source: *USDA-Natural Resources Conservation Service. "Urban Soil Primer." Issued 2005.*

Streamside Management Zone - SMZ

An area along both sides of intermittent and perennial streams and perennial waterbodies where extra precaution is used in carrying out forest practices in order to protect water quality. Source: *NC FPGs (15A NCAC 01I .0102 (18))*

Turbidity

Term used to describe cloudy water that results from very fine soil particles in suspension.

The turbidity standards for Class C freshwaters is cited below, for reference and is also in Appendix 1:

The turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural background conditions, the existing turbidity level cannot be increased. Compliance with this turbidity standard can be met when land management activities employ Best Management Practices (BMPs) [as defined by Rule .0202 of this Section] recommended by the Designated Nonpoint Source Agency [as defined by Rule .0202 of this Section]. BMPs must be in full compliance with all specifications governing the proper design, installation, operation and maintenance of such BMPs.

Source: *Fresh Surface Water Quality Standards for Class C Waters (15A NCAC 02B .0211(3)(k))*

Waterbody

A natural or man-made basin that stores water, not including jurisdictional wetlands or beaver ponds.

Source: *NC FPGs (15A NCAC 01I .0102 (20))*

Waters of the US

NOTE: In 2015 this term was re-defined by a change in federal rule code; refer to the website below.

The most recent definition of "Waters of the U.S." can be found in the Code of Federal Register (33 CFR 328.3).

For purposes of this regulation, the term "Waters of the U.S." includes not only regulated waterways and waterbodies but also certain special aquatic sites such as wetlands. **Source reference is available at this USEPA website:**

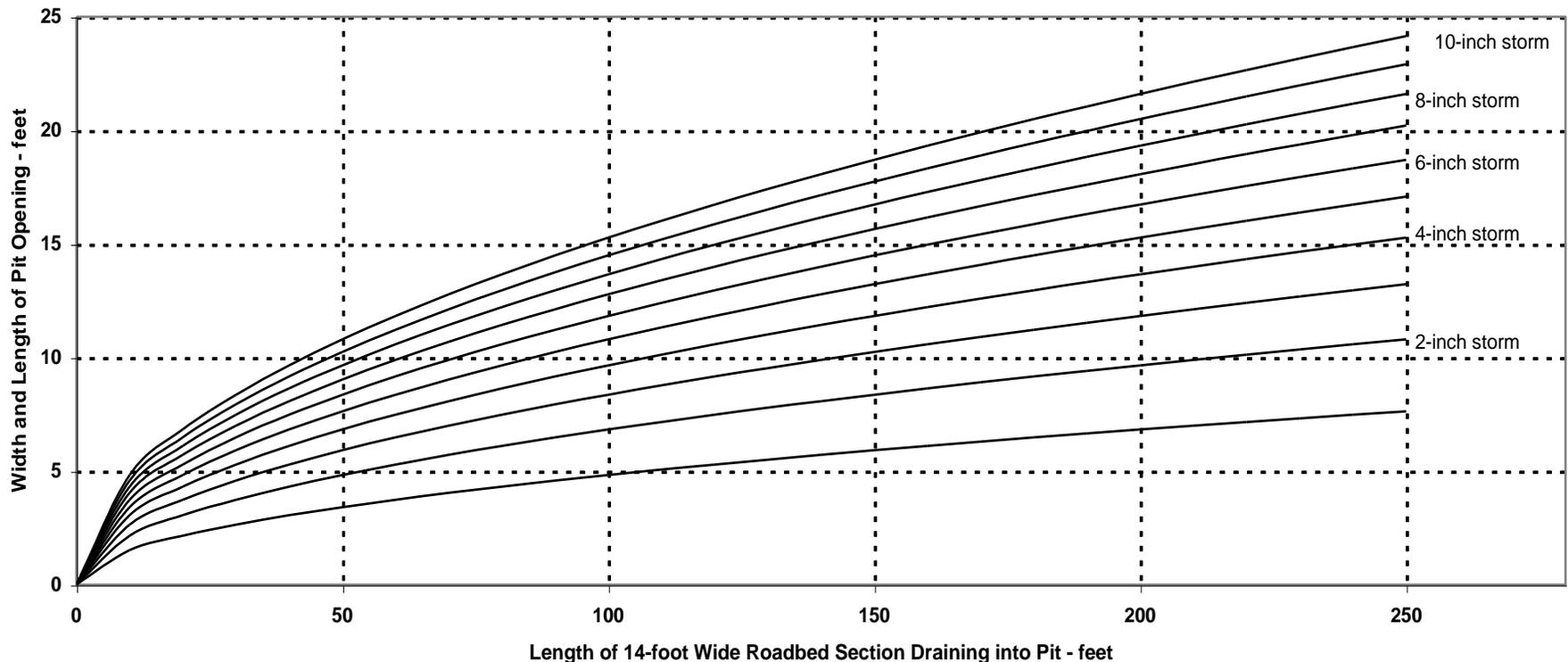
<http://www2.epa.gov/cleanwaterrule/documents-related-clean-water-rule>

Windrow

An elongated pile of residual vegetation commonly formed during site preparation activities related to forest regeneration.

Appendix 14: Estimating Sizes of Sediment Traps and Pits

Top Size of Square Sediment Pit, 5 feet Deep



The graph above estimates the area size dimensions of a sediment pit that can hold the water of storm runoff from a 14-foot wide roadway.

How to read the graph:

If you have a 50-foot long stretch of roadbed that is 14-feet wide, and you wish to capture a “4-inch storm” volume, you would need a sediment pit with dimensions of **at least** 5 feet deep x 7 feet wide x 7 feet long.

The calculations used to create this graph make the following assumptions, which may or may not apply to your forestry application:

- The sediment pit is 5 feet deep and the roadbed is 14-feet wide;
- The roadbed and inside ditchline are nearly impervious and all runoff from the road section enters the pit;
- No allowance is provided for deposited sediment that may be included within the storm’s water runoff. A larger dimension pit would be needed to accommodate the water runoff **and** sediment.

Source: Dr. Lloyd W. Swift, Jr. (ret.) Coweeta Hydrologic Laboratory, Southern Research Station, USDA-Forest Service. 2006.