DWR-NR-G-13 Tennessee Rapid Assessment Method for Wetlands-03/19/2025 (Draft)

Tennessee Rapid Assessment Method for Wetlands

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EFFECTIVE DATE: TBD

SIGNATURES:

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Title

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Drafter / Preparer

The existing version of the Tennessee Rapid Assessment Method for Wetlands (TRAM) was last revised in 2017. Based on field experience and comment from staff and mitigation professionals as well as on comments received during the Wetlands Summer Study Session of 2024 the Division proposes to issue an updated version of the TRAM. The purpose of this notice is to accept comments on the revisions of the TRAM shown in the updated document in blue text.

The draft revised Tennessee Rapid Assessment Method for Wetlands may be downloaded from the Division's Public Participation Opportunities website.

Tennessee Rapid Assessment Method for Wetlands

REVISION HISTORY TABLE

Revision Number	Date	Brief Summary of Change
	3/19/2025	• Additional instructions for measuring the variable "interspersion". • Addition of a new section at the beginning of the TRAM User Guide Section that provides for some wetland features to be easily assessed as 'low quality' without the need for further TRAM scoring. • Simplification of section "V7: Vegetation Composition and Diversity" in all HGM scoring methodologies. • Additional definitions in the Glossary in Appendix C. • Updated hyperlinks and references. • Other clarifying language and non-substantive corrections.

Tennessee Rapid Assessment Method for Wetlands

(TRAM)

2025

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Introduction

The Tennessee Rapid Assessment Method or TRAM is a set of procedures and models used by the Tennessee Department of Environment and Conservation (TDEC) for determining the quality of wetlands within the state of Tennessee. The TRAM for selected types of wetland hydrogeomorphic classes in Tennessee is based on models developed as part of the Hydrogeomorphic (HGM) Approach for assessing wetland functions. The score(s) generated by the TRAM can be used to determine current resource values, compare project alternatives, determine mitigation needs, and evaluate project success. The results from an assessment are designed to aid regulatory personnel in making permitting decisions for 401 certifications and Aquatic Resource Alteration Permits (ARAP). **Wetland delineations, jurisdictional status, and TRAM determinations must be confirmed by TDEC prior to issuance of any related ARAP's.** In most instances, an assessment can be performed at the time of the wetland determination/delineation field visit by a trained wetland professional. When the TRAM is used for resource value determination the following categories are used:

TRAM Score Range	Resource Value Determination
0-44	Low Resource Value
45-74	Moderate Resource Value
75 and above	High Resource Value/Possible ETW

**ETW: Affirmative answers and determination by TDEC to questions 7-13 in the Atypical/Red Flag Section on Page 18.*

Some wetlands exhibit characteristics where a determination of low resource value can be made without conducting the full HGM TRAM methodology. Other wetlands exhibit characteristics where the non-HGM methodology is more appropriate to evaluate resource value. In these situations, the atypical/ red flag section on page 18 should still be used to determine potential status as an Exceptional Tennessee Water. Refer to the user guide on page 13 for more information on when to make these determinations.

The initial step in the quantitative assessment procedure is to identify the HGM class of the wetland that is to be assessed. This is done by using the dichotomous key on page 15. The identification of the HGM class to which the wetland belongs is necessary for selecting the appropriate assessment model for use in the Quantitative Section. Classifying the wetland using the HGM approach has the additional benefit of contributing to a thorough understanding of how landforms and hydrologic regimes interact to create and maintain wetlands, and to the functions the wetland performs.

The models for the HGM classes of Depression, Slope, Flat, and Riverine wetlands can be found in Appendix A. Common terminology used within the HGM system can be found in Appendix B. A list of references used in the development of various HGM guidebooks that served as the basis for the models in the TRAM is found in Appendix C. Appendix D discusses where to place the evaluation boundaries. Appendix F is the non-HGM Tennessee Rapid Assessment Method. See TRAM User Guide located on page 13 for further instructions of when to use the non-HGM assessment. TDEC ***STRONGLY URGES*** the evaluator to read the instructions starting on page 9 for measuring the variables in the Quantitative Section prior to conducting an assessment. More information on HGM Guidebooks published jointly by the U. S. Army Corps of Engineers and the U. S. Environmental Protection Agency may be found at: *http://el.erdc.usace.army.mil/wetlands/guidebooks.cfm*.

HGM Classification and Description of Wetlands in Tennessee

Many types of wetlands are found within Tennessee and are referred to by different names in different locations. Besides the ubiquitous bottomland swamps and lake-fringe marshes, there are less common types such as rocky shoals, fens, glades, and seeps. Because of the varying terminology used, wetlands are best described by their hydrogeomorphic classification (Brinson 1993), which places them into categories based on landscape position, primary hydrology source, and hydrodynamics. Types present within Tennessee and described in the following sections include representatives from five HGM classes: Depression, Slope, Flat, Riverine, and Fringe.

The HGM classification terminology is utilized in the dichotomous key within the TRAM, and because the individual assessment models are HGM class specific, properly classifying the wetland is a critical first step in the assessment process. Although assigning a wetland to one of the HGM classes can be straightforward and intuitive, the user should be cautioned that problems can occur. These problems may arise if the wetland seems to be a natural inter-grade between two classes. It may also happen if the wetland has been significantly altered from its original condition.

The non-HGM TRAM should be used when classification of HGM type is difficult. It should also be used when assessing an emergent wetland, beaver pond, glade wetlands, wet meadows or other types of wetlands that are of such quality and resource value that an HGM assessment would not accurately evaluate the condition, quality, or resource value of the wetland. See the user guide on page 13 for guidance on when the non-HGM TRAM should be used.

Descriptions of each HGM class and the most common examples of problem situations are mentioned in the following sections.

Riverine Wetlands

Riverine wetlands are located within the floodplains of rivers and streams. In most Riverine systems, the wetlands are maintained by overbank discharge from the adjacent channel following significant rainfall events. The predominant hydrodynamics are lateral and down-gradient flow. In the lower reaches of many rivers, backwater flooding may be the primary source of hydrology.

Most unaltered Riverine wetlands support forest communities commonly referred to as “bottomland hardwoods.” They are dominated by various water-tolerant oaks including willow oak (*Quercus phellos*), pin oak (*Q. palustris*), Shumard oak (*Q. shumardii*), swamp chestnut oak (*Q. michauxii*), and overcup oak (*Q. lyrata*). Other common tree species associated with Riverine wetlands are green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sweetgum (*Liquidambar stryraciflua*), boxelder (*A. negundo*), black willow (*Salix nigra*), ironwood (*Carpinus caroliniana*), alder (*Alnus serrulata*), and associates. The oak component is less significant in central and eastern portions of the state, and in bottomlands in which timber harvests have been conducted. Bottomland wetlands associated with larger river systems commonly have distinctive zones as described by Wharton et al. (1982) and may contain sloughs and oxbow lakes dominated by very water tolerant species. Baldcypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) are the two most common in western Tennessee but are absent or not common in the remainder of the state. They are replaced by overcup oak, red maple, or by shrub species, especially buttonbush (*Cephalanthus occidentalis*). Smaller Riverine systems may contain fewer well defined zones and are often less floristically complex than larger Riverine wetlands.

Ground-level vegetation density is highly variable within Riverine wetlands and generally is inversely related to the length of the hydroperiod. The lower zones may contain arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), and a small number of other obligate wetland species, whereas the higher zones can be very diverse with dense cover of false nettle (*Boehmeria cylindrica*), panicled aster (*Aster lanceolatum ssp. lanceolatum*), common greenbriar (*Smilax rotundifolia*), poison ivy (*Toxicodendron radicans*), various sedges (*Carex* spp.), flatsedges (*Cyperus* spp.), and grasses as common dominants.

A common problem TRAM users may encounter when classifying Riverine wetlands is differentiating them from Slope wetlands. As a rule of thumb, wetlands associated with 1st or 2nd order streams are maintained by groundwater and thus would be classified as Slope, not Riverine. Since floodplains are topographically low and natural locations for receiving groundwater discharge (Winter and Woo 1990), there is often a significant groundwater input, especially near the margins. The influence of groundwater can be an important feature in minor bottoms. Hence, determining the stream Strahler order is one of the first steps in resolving the classification issue between Riverine and Slope wetlands. Indicators of flooding such as watermarks drift lines, and sediment deposits generally reveal little about the duration of the event(s). Streams in small systems can be "flashy" and floodplains adjacent to them are seldom inundated for periods long enough to establish wetland hydrology and hydric soils. Careful examination of the soil and its listing in the NRCS Hydric Soils database is another way to resolve the question of Riverine vs. Slope classification. For example, if the soil or soils within the floodplain are hydric due to frequent flooding (Criteria 4), the wetland would likely be classified as Riverine; whereas if the soil is hydric because of having a high groundwater table (Criteria 2B2 or 2B3), the wetland would be classified as Slope. Information on hydric soils is available at the NRCS website: http://soils.usda.gov/use/hydric/.

Sometimes alterations within the floodplain, especially levee construction, result in the cessation or a significant reduction in overbank flooding. Such areas may cease to be Riverine wetlands. However, if sufficient hydrology remains from precipitation, they essentially become Flat wetlands. Such a scenario is quite common in western Tennessee and serves to explain how areas remain wetlands even after overbank flow has been significantly reduced or eliminated. In areas in which levees are present (and effective), the hydrologic indicators associated with flooding mentioned above will not be present. Levees can prevent water from draining back into the channel, thus ponding may occur for very long periods of time. Eventually, the original bottomland forest community dies as the result of the significant lengthening of the hydroperiod, and the vegetation is replaced by more water tolerant species. This situation is quite common in western Tennessee and such areas are locally referred to as "swamped out." The issue that arises relative to classification is whether to view such areas as degraded Riverine wetlands or to view them as Depression wetlands (and possibly high quality ones). The resolution is not straightforward. As guidance, the relative permanence of the alteration may be considered. For example, if a levee has been in place for an extended period and likely will remain for the foreseeable future, it may be more accurate to classify the area as a Depression wetland. Conversely, if the levee is temporary and will be removed in the near future, then classifying the area as Riverine may be more accurate.

Seasonally Inundated Depression Wetlands

Depression wetlands occur in topographic low positions with closed topographic contours which result in the accumulation of surface water. Depression wetlands may have a combination of inlets and outlets or lack them completely. The dominant water sources are overland flow and less commonly groundwater discharge from the surrounding areas. The predominant hydrodynamics are vertical fluctuations. Depression wetlands occur throughout Tennessee and dominate portions of the state.

Depression wetlands are concave with an apparent break in elevation at the edge of the feature. Surface water accumulates in the depression for relatively long periods and is characteristic of this wetland class. Most Depression wetlands in Tennessee are ponded in late winter and spring when inputs into the wetland exceed the volume of water lost through evapotranspiration and percolation into the substrate. In the summer months, Depression wetlands are commonly devoid of surface water.

In karst areas, depressions form when limestone rock is subjected to surface drainage or groundwater that result in dissolution, weakening, and eventual collapse of the parent material. Once the "sinkhole" has filled with sediment from the surrounding area, the downward movement of water is restricted, thus promoting the formation of a Depression wetland (Wolfe 1996). In some areas, Depression wetlands form in areas in which fracture zones occur in the underlying bedrock (Heath 1984).

The depth of the depression and its primary source of hydrology have a significant effect on the type of Depression wetland that develops. Shallow depressions that are maintained by surface runoff and/or a restrictive soil layer near the surface tend to be seasonally inundated and often dry up by mid-to late-spring. These surface water Depression wetlands are commonly referred to as "vernal pools." Vernal pools provide important habitat for many wildlife species and often exhibit redoximorphic soil features consistent with the "F8" and "F9" indicators in *Field Indicators of Hydric Soils in the United States* (NRCS 2010).

Most unaltered surface water Depression wetlands are forested and dominated by many of the same species found in Riverine wetlands (i.e., oaks, red maple, green ash, etc.). Swamp black gum (*Nyssa sylvatica* var. *biflora*) also occurs regularly in shallow Depression wetlands in portions of the state. Common shrubs include Virginia willow (*Itea virginica*), nannyberry (*Viburnum nudum*), and highbush blueberry (*Vaccinium corymbosum*). Some Depression wetlands support a moderate density of ground cover plants including sedges (*Carex* spp.), grasses such as slender woodoats (*Chasmanthium laxum*), rushes (*Juncus* spp.), false nettle, common greenbriar, and associates; but most are sparsely vegetated due to extensive ponding and shading. In some shallow Depression wetlands, sphagnum moss (*Sphagnum* spp.) is common.

Depression wetlands that are deeper, and especially those that receive a substantial amount of groundwater discharge from surrounding uplands, tend to have much longer hydroperiods, and the central portion may contain open water for most or all of the year. These semi-permanently inundated Depression wetlands commonly have a zone of herbaceous vegetation that includes cattail (*Typha latifolia*), smartweeds (*Polygonum* spp.), bulrushes (*Schoenoplectus* spp.), short-bristled beakrush (*Rhynchospora corniculata*), arrowheads, and arrow arum (*Peltandra virginica*). Buttonbush, alders, meadowsweet (*Spirea alba*), and mallows (*Hibiscus* spp.) are common shrubs in the deeper areas. Nearer to the edge, a forest community similar to that found in surface water depressions predominates.

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As a result of the long-term ponding, Depression wetlands have well-developed moss-lichen lines and other water marks on trees and shrubs. Other indicators may be the presence of water-stained leaves and an accumulation or organic debris.

TRAM users may encounter difficulty with HGM classification when Depression wetlands are located within the floodplain of Riverine systems or within large Slope complexes. When these situations occur, the user should classify wetland complexes as a whole with a large-scale view in regard to landscape position.

Slope Wetlands

Slope wetlands occur on sloping landscapes where groundwater discharge dominates and creates saturated soil conditions. The predominant hydrodynamics are vertical fluctuations and slow lateral movement down gradient. Surface water may be present following heavy rainfall events, but long-term ponding does not occur.

Slope wetlands range from small seepage areas at the base of slopes (some only a few square yards in size) to quite large areas in broad upland drainage ways. Oftentimes, Slope wetlands occur above headwaters streams, but can occur adjacent to a developed stream channel lower in the watershed (reference the discussion in the Riverine section). In areas with karst topography, Slope wetlands in upland drainage ways may disappear underground.

Slope wetlands often develop where surface bedrock is common. Wetlands that form over limestone bedrock are referred to as glades (Klimas 2003). In many portions of the Southeast, Slope wetlands referred to locally as bogs (Hayes 1996, Meador 1996) are more accurately defined as fens (i.e., they are not oligotrophic and are maintained by groundwater). The Shady Valley Bog in northeastern Tennessee is one such example. The vegetation in Slope wetlands is influenced by water chemistry (Little and Waldron 1996, Hayes 1996, Klimas 2003). Vegetation described from “bogs” within the Southeast region varies from sedges and ferns (Meador 1996) typical of neutral to basic soils to those associated with acid conditions such as sphagnum mosses, cranberries (*Vaccinium* spp.), and red spruce (*Picea rubens*) (Little and Waldron 1996).

The hydroperiod of a Slope wetland defines its type. Areas at the base of slopes in which groundwater discharge occurs throughout the year are referred to as “perennial seeps” and tend to have soils high in organic matter; in some there may be an accumulation of a muck or mucky mineral layer. These wetlands tend to be small and are dominated by obligate and facultative wetland plants. The tree stratum, if present, tends to be dominated by red maple, green ash, sweetgum, and water tolerant associates. Common shrubs include highbush blueberry, Virginia willow, possumhaw, and pink azalea (*Rhododendron nudiflorum*). Some herbaceous examples include sedges such as *Carex lurida* and *C. vulpinoidea*, monkey flower (*Mimulus ringens*), cardinal flower (*Lobelia cardinalis*), jewelweed (*Impatiens capensis*), royal fern (*Osmunda regalis*), and sensitive fern (*Onoclea sensibilis*).

Other small Slope wetlands have substantially shorter hydroperiods with groundwater discharge ceasing during dry portions of the year. These wetlands are referred to as “wet-weather seeps” and are dominated by facultative species. They may support some of the same species mentioned above, but also others associated with adjacent mesic environments.

In their unaltered condition, larger Slope wetlands occurring in headwater areas or upland drainage ways support swamp forests. These wetlands are composed of similar species found in Riverine and Depression classes. Because of their size however, these Slope wetlands tend to be much more floristically complex than smaller ones.

Throughout Tennessee, Slope wetlands have been impacted by clearing and used for pasture/hayfields. In these instances, herbaceous plants such as soft rush (*Juncus effusus*), flatsedges, spikerushes (*Eleocharis* spp.), woolgrass (*Scirpus cyperinus*), swamp beggar ticks (*Bidens connata*), spotted Joe-Pye weed (*Eupatorium maculatum*), rough boneset (*E. pilosum*), spreading bentgrass (*Agrostis stolonifera*), various goldenrods (*Solidago* spp.) and other hydrophytes persist and may even dominate if the hydrology has not been significantly altered. Such areas are referred to as "wet meadows" and high quality ones are among the least common types of wetlands within the state. These wetlands were recognized as a distinct type (i.e., swamps, marshes, bogs, etc.) by Keddy (2000) and are unique in that they require periodic disturbance to prevent them from becoming dominated by woody plants. These wetlands may qualify under the Exceptional Status Wetlands section and/or the Non-HGM TRAM may be more applicable.

The primary problem TRAM users will encounter when classifying Slope wetlands is differentiating those that occur in stream from Riverine wetlands. Ways for doing so (refer to Riverine section) focus on the predominant source, presence, and duration of surface waters. In general, groundwater dominates Slope wetlands and indicators of long-term flooding or ponding will be absent or restricted to small areas. Often wetlands in the floodplain of lower order streams will classify as Slope wetlands rather than Riverine.

Caution should be used when classifying Slope wetland drainages that have been altered by the construction of roads or similar features that restrict water movement and result in ponding on the up-gradient side. In instances where surface water is present for long periods of time, the portion of the Slope wetland near the obstruction may be converted to a Depression wetland. TRAM users should consider the relative permanence of the alteration when classifying the wetland. For example, if the road or other feature has been in place for an extended period and likely will remain for the foreseeable future, it has likely evolved to the Depression class. Conversely, if the road or other feature is temporary, then classifying such areas as Slope wetlands may be accurate.

Flat Wetlands

Flat wetlands occur in locations where the land surface is nearly level and precipitation that falls is retained near the surface either by a relatively impermeable soil layer or by bedrock. Precipitation is the predominate source of hydrology, and Flat wetlands receive only minor inputs from other sources. The predominant hydrodynamics are vertical fluctuations and extremely slow down-gradient movement of groundwater. In some Flat wetlands, water may pond in micro-depressions following heavy rainfall events.

Flat wetlands occur in a variety of locations where little topographic relief is present. Some examples include watershed divides where the underlying bedrock is relatively level and on abandoned stream terraces. Larger Riverine systems may contain areas referred to locally as "pin oak flats" that occur within level areas of the floodplain. These areas are maintained by overbank flooding and would correctly be classified as Riverine wetlands. They should not be confused with wetlands within the Flat class.

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Most undisturbed Flat wetlands in Tennessee support forest communities composed of many of the same species found in other HGM classes of wetlands. Call (2003) compared the vegetation in Flat wetlands and surface water depressions in central Tennessee and determined that red maple and blackgum (*Nyssa sylvatica*) in the midstory and shrub strata; and royal fern and cinnamon fern (*O. cinnamomea*) in the ground stratum were good "indicators" for Flat wetlands. Due to limited topographic relief, Flat wetlands do not retain the amount of surface water and have shorter hydroperiods than Depression or Slope wetlands. These areas support an overstory dominated by species such as white oak (*Q. alba*), white ash (*F. americana*), and bitternut hickory (*Carya cordiformis*) (Klimas 2003). Some areas with shallow soils and an unsuppressed fire regime historically may have supported grassland communities dominated by prairie grasses such as big bluestem (*Andropogon gerardii*), indiangrass (*Sorghastrum nutans*), and associates. Such wetlands now are extremely uncommon in Tennessee. May Prairie in Coffee County is a rare example of this wetland type. These wetlands may qualify under the Exceptional Status Wetlands section and/or the Non-HGM TRAM may be more applicable.

The classification of Flat wetlands is straight forward. The primary diagnostic feature is level topography with very little change in elevation, often over a large area. Because surface water is not present except in micro-depressions, hydrologic indicators such as moss-lichen lines, water stained leaves, sediment deposits, etc. will be uncommon or absent. In portions of Flat wetlands where there is a slight gradient, there may be some difficulty determining between Flat and Slope classification. In these instances, TRAM users should focus on a small area (a few square yards) and ask themselves "is this small area a wetland because of direct precipitation or groundwater movement?"

Fringe Wetlands

Fringe wetlands occur throughout Tennessee at the edges of lakes, reservoirs, oxbows, ponds, and other deepwater habitats. The predominant water source is the waterbody itself where lake elevations maintain the water level in the wetland. The hydrodynamics are bidirectional lateral movement, caused either by wind or by water level fluctuations. In some areas, groundwater discharge may be significant and Fringe wetlands may inter-grade with Slope wetlands.

Natural lakes with associated Fringe wetlands are not common throughout Tennessee; however, reservoir construction has been widespread, and impoundments are found throughout the state. Many reservoirs are large with hundreds of miles of shoreline, and contain numerous Fringe wetlands, especially in shallow embayments. The hydrologic regime of Fringe wetlands associated with most reservoirs is controlled and often differs dramatically from "natural" conditions. It is common for levels to be highest in summer, a period when most natural wetlands are at their driest. Fringe wetlands connected to Reelfoot Lake in northwest Tennessee are designated Outstanding Natural Resource Waters and would need to be addressed using the Exceptional Status Wetlands section.

Fringe wetlands may support forest, shrub, or herbaceous plant communities. Trees and shrubs are those tolerant of prolonged inundation such as baldcypress, water tupelo, overcup oak, red maple, buttonbush, black willow, and sandbar willow (*Salix interior*) Floating-leaved species such as American lotus (*Nelumbo lotus*), white water lily (*Nymphaea odorata*), and spatterdock (*Nuphar lutea*) sometimes occur in deeper areas. Depending on the shoreline configuration, emergents and moist-soil species such as cattails, arrowheads, arrow arum, smartweeds, water willow (*Decodon verticillatus*), spikerushes, bulrushes (*Scheonoplectus* spp.), sedges, and flatsedges may be present.

Fringe wetland communities often vary substantially over time given water level variation in lakes and reservoirs due to rainfall patterns, demands for hydropower production, and changing management goals.

The Fringe wetland classification is the only HGM class similar to the Depression wetland. They are typically distinguished based on size and hydroperiod. Fringe wetlands in Tennessee are primarily located adjacent to large (> 20 acres), open water bodies rather than adjacent to the smaller Depression wetlands. They are usually publicly owned and associated with named lakes and reservoirs. Further, most Depression wetlands in Tennessee will be devoid of surface water by May or June, whereas Fringe wetlands will be inundated year round.

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Instructions for Measuring Variables in the Assessment Models

Use a walking survey of the entire Wetland Assessment Area (WAA) for all variables except for “Canopy Tree Density”, “Shrub Cover”, and “Ground Vegetation Cover” which require the establishment of one or more 30-ft. radius plots in areas representative of the overall WAA, and “Buffer” which applies to the overall wetland regardless of project boundaries. The number of plots should vary with the size and heterogeneity of the WAA. If the project area is highly heterogeneous, requiring the designation of several WAAs, a separate assessment should be performed within each.

River Connection – This variable indicates whether or not a Riverine wetland is hydrologically connected to the adjacent stream or river. It is assumed that an unaltered stream will overtop its banks and inundate the adjacent floodplain wetlands at a frequency and duration sufficient to maintain a hydroperiod typical of unaltered Riverine wetlands within the reference domain. In Riverine wetlands in Tennessee, the normal overbank flooding regime of at least once every two years can be altered by levee construction, channelization, or headcutting. In severely impacted systems, overbank events essentially have been eliminated. To evaluate this variable, a visual inspection of the stream and indicators of flooding within the floodplain the vicinity of the WAA and/or consultation with local experts (e.g., U.S. Geological Survey, U.S. Army Corps of Engineers, etc.) will be necessary.

Hydroperiod – This variable addresses the capacity of a Riverine or Slope wetland to store an appropriate amount of water for an appropriate duration. In Riverine and Slope wetlands in Tennessee that receive normal hydrologic inputs (e.g., overbank flow, overland runoff, groundwater discharge, etc.), hydroperiod can be altered by levees, dikes, roads, other man-made structures, ditches, drainage tiles, land leveling, placement of fill material, or excessive sediment deposition. The presence or absence of these hydrology-altering structures/material and their impact is used to evaluate this variable. The magnitude of the impact is based on the user’s professional interpretation of the factors listed on the scoring form. ***NOTE:*** *The degree to which the plant community composition differs from reference standard or unaltered conditions can be useful in evaluating this variable.*

Wetland Depth – This variable addresses the hydrologic condition of a Depression Wetland in regard to alteration by filling, accelerated erosion, ditching, excavation or other activities. Such alterations affect the capacity of the wetland to store a characteristic amount of water. This in turn affects the ability of the wetland to support a characteristic biotic community and to perform characteristic biogeochemical processes. The average depth of reference standard wetlands in central Tennessee ranged from 2 to 10 inches. Maximum depths are typically between 18 and 24 inches. Impacts can include fill, excavation/dredging, raising or lowering of the inlet or outlet, etc. **Slightly impacted** wetlands are impacted with alterations that do not impede the overall resource value potential of the feature. Some outlets may be lowered or raised, very slight ditching or draining present, minimal fill material or minor excavation may be evident within a small portion of the site. **Moderately impacted** wetlands have lost some resource value due to the impact of moderate excavation, altered drainage from ditching or drainage tiles, increased hydroperiod due to slight impoundments or impacts from fill and sedimentation. **Significantly impacted** wetlands are no longer providing expected resource values due to significant drainage, fill, or impoundment of water that has permanently altered the size and/or hydroperiod but still support aquatic plant and animal habitat. **Severely impacted** wetlands may be almost completely filled, drained, or excavated to significant depths (i.e., 6 feet or more) with little to no remaining resource value. Professional judgment should be used to determine if the depth of fill material is a significant degrading influence on the wetland. To evaluate this variable, visually inspect the wetland to determine: 1) if it has been impacted, and if so, 2) the severity of the impact (i.e., depth of fill, amount of drainage), and 3) the percentage of the wetland that has been impacted. Then calculate a weighted average to determine the overall SI score. For example, if 60% of a wetland is severely impacted, 20% is moderately impacted, and 20% is not impacted, the weighted average SI for the site would be: [(60 x 0.1) + (20 x 0.5) + (20 x 1.0)]/100 = 0.36. ***NOTE:*** *The degree to which the plant community composition differs from reference standard or unaltered conditions can be useful in evaluating this variable.*

Watershed Integrity – This variable is an indicator of the condition of a watershed relative to its ability to store and release a characteristic amount of water to a Depression or Slope wetland. In Tennessee, watersheds typically are altered as a result of conversion of hardwood forest (the primary natural condition) to other land uses. Some landuses such as pasture, golf courses, and mostly vegetated land uses have only moderate effects on runoff, whereas commercial development with buildings, parking lots, and other impervious surfaces can dramatically alter the hydrologic regime. To evaluate this variable, it is necessary to estimate the percentage of the watershed in various land use categories and calculate a weighted average that represents the overall condition. For example, if 50% of the watershed is forested, 30% is in pasture, and 20% is urban, the weighted average SI for site would be: [(50 x 1.0) + (30 x 0.75) + (20 x 0.1)]/100 = 0.67.

Canopy Tree Size Class – This variable is an indicator with forest maturity and serves as an indicator of successional stage, forest community structure, wildlife habitat support, disturbance, and the amount of carbon and other elements available for cycling and export. This variable is measured only in areas with 20 percent or more tree canopy cover. Canopy trees are woody stems $\geq$ 3 inches diameter breast height (DBH) (measured at 4.5 feet above the ground) that comprise the uppermost stratum. The average DBH of trees that form the canopy of the stand among all plots within a single WAA is used to evaluate this variable.

Canopy Tree Density – This variable is as an indicator of successional stage, forest community structure, wildlife habitat support, disturbance, and the amount of carbon and other elements available for cycling and export. Areas of known size are needed for this variable thus plots (30-ft. radius or equivalent) should be placed in representative areas of each WAA. This variable is measured only in areas with 20 percent or more tree canopy cover. The evaluator should count the number of canopy trees $\geq$ 3 inches DBH within each 30-ft. radius plot. The average number of trees from the plot(s) sampled within a single WAA is used to evaluate this variable.

Shrub Cover – This variable is an indicator of successional stage, forest community structure, wildlife habitat support, disturbance, and the amount of carbon and other elements available for cycling and export. **<u>This variable is not used to evaluate wetlands that have a well-developed tree canopy.</u>** Instead, it is measured only in areas with less than 20 percent tree canopy and 20 percent or more shrub cover. Areas of known size are needed for this variable thus plots (30-ft. radius or equivalent) should be placed in representative areas of each WAA. The evaluator should estimate the percent cover of shrub stems (woody stems < 3 inches DBH and > 3 feet in height) within each 30-ft. radius plot. The average cover value from the plot(s) sampled within a single WAA is used to evaluate this variable.

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Ground Vegetation Cover – This variable is an indicator of successional stage, wildlife habitat support, disturbance, and the amount of carbon and other elements available for cycling and export. **This variable is not used to evaluate wetlands that have a well-developed tree or shrub canopy.** Instead, it is measured only in areas with less than 20 percent tree and shrub canopy. Areas of known size are needed for this variable thus plots (30-ft. radius or equivalent) should be placed in representative areas of each WAA. The evaluator should visually estimate the percentage of ground cover vegetation (all herbaceous vegetation, regardless height, and woody vegetation < 3 feet in height) within each 30-ft. radius plot, or alternatively, within smaller subplots (e.g., 1 square meter). The average percent cover from all plot(s) sampled in a single WAA is used to evaluate this variable.

Vegetation Composition and Diversity – This variable is an indicator of dominant species richness and serves as an indicator of successional stage, forest community structure, wildlife habitat support, and disturbance. For this variable, species are placed in one of two groups that reflect the floristic quality of the vegetation community. In the computations, species that typify a native plant community (Group 1) are weighted more heavily than Group 2 species that indicate habitat degradation. Invasive, exotic, non-native, crop, and weedy species reflect a highly disturbed or low-quality vegetation community and are assigned to Group 2. The dominant species within each WAA are identified according to the 50/20 rule as described in the Corps' Wetland Delineation Manual. Next, a Quality Index (Q) is calculated by multiplying the number of dominants in each of three groups, by an assigned constant. The value for Q then is multiplied by a constant that reflects the species richness (diversity) of the dominant species in the community. The square root of this product is the final score for this variable.

Soil Organic Matter – This variable is an indicator of the integrity of the uppermost surface soil horizon, specifically the "O" and "A" horizons. The O horizon is a soil layer dominated by partially decomposed organic material (i.e., muck, peat, or humus) on or near the surface of the ground. The A horizon is the uppermost mineral soil horizon located at the ground surface, or below the O soil horizon. The "B" horizon is below the "A" horizon and is a zone where clay content increases and organic matter decreases. The organic matter in the O and A horizons reflects the inherent capability of a site to support a biotic community and of the ability of the soil to provide a source of energy for the microbial communities that mediate many of the biogeochemical reactions that occur in wetlands. Reference standard wetlands in all HGM classes had 100% cover of an A or O horizon. The evaluator should use a soil probe or spade to sample soils throughout the WAA and determine the presence or absence of these horizons. This variable declines linearly from 100% (e.g., if 55% of the WAA has neither an O or A soil horizon due to a major disturbance such as grading, it will have an SI score of 0.45). ***NOTE**: High velocity flows and agricultural practices such as plowing may eliminate the O horizon, but normally not the A horizon.*

Buffer – This variable addresses the degree to which a Depression, Slope, or Flat wetland perimeter is connected to suitable upland habitat and is directly accessible to wildlife. The focal species are amphibians, including frogs, toads, and salamanders.

Suitable habitats (i.e., those that provide shade and cover) include all forested areas, scrub/shrub, prairies, unmowed/fallow fields, and pine plantations in which the soil has not been disturbed extensively through site preparation (e.g., bedded, compacted). Areas devoted to row crops, closely or periodically mowed or grazed areas, and most developed areas are not considered suitable cover for amphibians. In reference standard wetlands, suitable buffers occurred around 90% of the wetland perimeters. For many amphibians, the minimum buffer width surrounding Depression wetlands should be at least 492 feet (150m), but smaller buffers are capable of providing adequate habitat for many species. Ground surveys may be adequate to determine the values needed to calculate the SI for this variable, but for large wetlands, the use of maps or aerial photographs may be necessary. The first step is to determine the percentage of the wetland that has a suitable buffer regardless of its width. This value, referred to as the Connection Index (CI), is then multiplied by a value associated with various buffer widths to evaluate this variable.

Tract Size – This variable is as an indicator of the total amount of habitat present in a Riverine wetland landscape. Several wide-ranging mammal species require large tracts for their daily and seasonal activities and numerous “forest interior” birds require “interior core” habitat with little edge. Such conditions typically are associated with very large intact forest tracts that existed historically in the large river bottoms of western Tennessee. The values in the Riverine model are based on recommendations for forest interior birds within the Mississippi Alluvial Valley and are not necessarily appropriate for the remainder of the state. Measurements of the area of wetland and upland forest (both mature and shrub-dominated) that is contiguous with a Riverine wetland and is directly accessible to wildlife should be made from maps or aerial imagery to evaluate this variable. The user should use professional judgment and review the value added section when assigning scores for tracts of Riverine wetlands in central and eastern Tennessee.

Interspersion- This variable is an indicator of habitat heterogeneity. Interspersion is the extent of different habitat types present and the distribution of these different habitat types on the landscape and the connectivity of these habitat types. Interspersion is an important metric to consider because some animal species that utilize wetlands, often do not utilize just a single habitat type but rather they utilize many different wetland habitat types, and non-wetland habitats, throughout their life cycles as well as seasonally. High interspersion lends itself to higher biodiversity and species richness. If the landscape has a mosaic of habitat types, then the interspersion is high; If only one habitat type is present then the interspersion is low.

This section is intended to help users determine if a wetland is of low quality sufficient to forgo the quantitative section (i.e., HGM or non-HGM assessment) of the TRAM. Such wetland types and other scenarios are detailed below.

The Division strongly recommends the submission of photos and other documentation as justification for a low-quality determination. A wetland delineation using current United States Army Corps of Engineers methodology, including the appropriate Regional Supplement, must accompany a TRAM determination. The wetland delineation and TRAM determination require concurrence from the Tennessee Department of Environment and Conservation.

Low resource value wetlands can be important habitat for numerous migratory, threatened, endangered, or endemic species such as several of Tennessee's birds and amphibians. These wetlands are also vital in the life cycle of the many native species. These types of wetlands also play a vital role in habitat connectivity and maintenance of local water quality and flood storage capacity.

The following scenarios are generally considered indicative of low resource value wetlands, for which further quantitative TRAM assessment is not typically required. **However, the Exceptional Status Wetland section (also called "atypical/ red flag" section) must still be completed in order to determine whether the wetland may qualify as Exceptional Tennessee Waters (ETW). ETW status, which must be confirmed by TDEC, renders a wetland ineligible for a low resource value determination even if it matches a criteria below or receives a quantitative HGM or non-HGM score in the "low" range.**

1. Wetlands significantly degraded from past agricultural use. Wetlands being utilized for active agricultural row crops and pastures are exempt from regulation; if the land use of the wetlands changes to non-agricultural, then the exemption no longer applies.

2. Herbaceous wetlands (<20% aerial cover of woody species) where tall fescue (*Lolium arundinaceum/Schedonorus arundinaceus/Festuca arundiacea*) or remnant agricultural crop species are the only dominant species per the 50/20 Rule as described in the Regional Supplements to the US Army Corps of Engineers Wetland Delineation Manual;

3. Wetlands comprising a monoculture or near monoculture (>95% aerial cover) of broadleaf cattail (*Typha latifolia L*.). Certain cattail-dominated wetlands may be of a size or location that warrants quantitative measurement with the TRAM to determine resource value;

4. Man-made wetlands in an upland setting where no water feature previously existed;

5. Fringe wetlands around manmade ponds and other artificial features. Fringe wetlands around larger reservoirs may not be of low quality and may require a Non HGM-TRAM;

6. Wetlands that formed completely within upland areas solely as incidental features to a man-made alteration or land-use. **These wetlands exist where no feature existed prior to the man-made alteration that formed them.** Examples include but are not limited to:

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a) Incidental wetlands within lawns or landscaped areas of residential, commercial, administrative, or public infrastructure development;

b) Wetlands that exist solely and obviously due to improper drainage of a stream from a relatively recently constructed crossing by culvert, bridge, or similar structure;

c) Areas constructed solely to convey stormwater such as roadside ditches, irrigation ditches, man-made canals, borrow pits, or stormwater detention basins;

d) Tire ruts or puddles created by vehicles or machinery;

e) Wetlands formed due to active or historic landfills or mines.

Instructions for TRAM Assessment

If a wetland does not match a scenario above, the quantitative section (HGM or non-HGM assessment) must be completed.

The non-HGM TRAM is appropriate for wetlands that do not fit in a single HGM class **or** the HGM class cannot be determined. Additionally, the non-HGM TRAM may be more appropriate than HGM in the following scenarios:

1. Semi-permanent to permanently inundated wetlands (< 6.6 feet/2 meters surface water depth)
2. Beaver ponds
3. Glade wetlands in the Nashville Central Basin (Ecoregion 71)
4. Wet meadows
5. Herbaceous wetlands not otherwise classified as active agriculture
6. Seepage wetlands
7. Other types of wetlands that are of such quality and resource value that an HGM assessment would not appropriately quantify the condition, quality, or resource value of the wetland.

Key to Wetland HGM Classes in Tennessee

1a.Wetland within the active floodplain. **2**

1b. Wetland not within the active floodplain. **3**

2a. Wetland not in a closed topographic depression; primary water source is overbank flooding.. **Riverine**

2b. Wetland is not in a closed topographic depression; primary water source is groundwater discharge... ....**Slope**

3a. Topography is flat; primary water source is precipitation... .... **Flat**

3b. Topography is not flat... ....**4**

4a. Wetland is in a closed topographic depression; primary water source is surface flow or groundwater discharge... **Depression**

4b. Wetland is not in a closed topographic depression and is sloping or located at base of slope; primary water source is groundwater discharge. .... **Slope**

NOTE: Users should read the HGM Classification and Description of Wetlands section before keying wetland types. If wetland does not key clearly to one of the types listed above or exhibits altered or intermediate characteristics, use the Non-HGM TRAM.

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Wetland Status Determination

A wetland's classification is determined within TRAM through a three step process.

First, the **Exceptional Status Wetland** section, also referred to as the "red flag" section, identifies those wetlands with features or characteristics that merit special attention and consideration. Exceptional Status wetland features reflect significance at the state, regional, or national levels that may or may not be related to a traditional assessment of site conditions or resource value. Some wetlands may warrant an Outstanding National Resource Waters (ONRW), or Exceptional Tennessee Waters (ETW) designation based on the Exceptional Status Wetland Section alone. A positive response to any of the 13 items in this section places the wetland into either the ONRW or ETW category with documentation and concurrence of the Department.

Second, the **Quantitative Section** is designed to assess wetland resource condition relative to the highest quality reference wetlands within the same HGM class in Tennessee. The condition assessment models in this section are scaled using data collected from a minimum of 50 wetlands of varying conditions within each of the HGM classes. Reference standard sites are used as the standard against which other wetlands are compared. The reference standard sites are located throughout central and western Tennessee. Reference standard sites are judged to be of the highest quality as reflected by unaltered hydrology and a floristically complex, mature plant community. Most reference sites are located on public lands at places such as Arnold Air Force Base, Hatchie National Wildlife Refuge, Black Swamp Wildlife Management Area, and numerous state parks, natural areas, and wildlife management areas. Data collected at these sites are used to "scale" the variables in the models for all the wetland types. The scaling for a few of the variables (Shrub density, Buffer Width, and Tract Size) is based on the scientific literature. Individual functions performed by the wetland are evaluated separately and the scores for each are then averaged.

Third, the **Value Added Section** focuses on wetland size and/or features of local or regional significance. These include social and locational rarity considerations as well as unique physical, chemical, or biological characteristics. When appropriate, additional points are added to the mean score generated by the quantitative assessment models.

Once the TRAM is complete, the Division will calculate scores to gage the resource value of the wetland. Wetland conditions with an overall score of 100-75 are possible Exceptional Tennessee Waters upon final determination by TDEC. Wetlands with a score of 74-45 are considered to have moderate resource value, and wetlands with a score of 44 and below have low resource value. Please note that in addition to a high TRAM score, these resources can also be classified as Exceptional Tennessee Waters or Outstanding Natural Resource Waters based on wetland features or characteristics that merit special attention and consideration. These characteristics are evaluated in the Exceptional Status Wetlands Section.

Exceptional Status Wetlands

INSTRUCTIONS: Affirmative answers to the categories on the following page determine if the wetland has or may have special status within the state. **Numbers 1-6** in the following table should be answered based on information obtained through the TDEC. Waters designated as **Outstanding National Resource Waters (ONRW)** are defined in Rule 0400-40-03-.06(5)(a) of the TDEC General Water Quality Criteria. The designation of **Exceptional Tennessee Waters (ETW)** is defined as waters that have the characteristics outlined in Rule 0400-40-03-.06(4)(a) of the TDEC General Water Quality Criteria. **All ETW wetlands should be submitted to TDEC for official documentation.** The remaining **numbers (7-13)** in the following table are designed to indicate potentially outstanding ecological or recreational resource values as intended in Rule 0400-40-03-.06(4)(a)7. Wetlands that fall into these remaining categories or are determined by a professional to have potential for characteristics not specifically listed are considered strong candidates for ETW status pending final determination by TDEC.

The term "**documented**" as it relates to rare species occurrences (number 4) means locations discovered, verified and reported by an environmental scientist in the field, or are listed and verified to be extant in databases maintained by governmental and other organizations such as the Tennessee Division of Natural Areas, Tennessee Wildlife Resources Agency, Tennessee Ornithological Society, U.S. Fish and Wildlife Service, NatureServe, and others. Wetland plant community concepts and current NatureServe Association-level natural community conservation status ranks (number 8) can be retrieved at http://explorer.natureserve.org/servlet/NatureServe?init=Ecol or by request to TDEC's Division of Natural Areas.

An affirmative response to any of numbers 1-6 of the Decision Table identifies the wetland per rule as an Outstanding National Resource Water or Exceptional Tennessee Water. A positive response to 7-13 requires a final determination by the Department.

#	Atypical/ Red Flag Section Wetland Feature Decision Table	Yes/No	Affirmative Result
1	The wetland has been designated as an **Outstanding National Resource Water (ONRW)** by the 0400-40-03-.06(5)(a)**.**		**ORNW**
2	The wetland has previously been designated and documented as an Exceptional Tennessee Water (ETW) by the Department under 0400-40-03-.06(4)(a)		**ETW**
3	The wetland is within a state or national park, wildlife refuge, forest, wilderness area, or natural area.		**ETW**
4	The wetland is known to contain a documented non-experimental population of a state or federally listed threatened or endangered aquatic or semi-aquatic plant(s), or aquatic animal(s).		**ETW**
5	The wetland or the area it is in has been designated by the U.S. Fish and Wildlife Service as "**Critical Habitat**" for any threatened or endangered aquatic or semi-aquatic plant or aquatic animal.		**ETW**
6	The wetland falls within an area designated as Lands Unsuitable for Mining pursuant to the federal Surface Mining Control and Reclamation Act where such designation is based in whole or in part on impacts to water resource values		**ETW**
7	**The wetland exhibits outstanding ecological or recreational values such as, <u>but not limited to</u>, those as outlined in 8-12**		Determination Required by TDEC
8	The wetland fits within the species composition concept for any plant community found in the state of Tennessee **ranked G3, G2, G1, or more imperiled** according to the NatureServe and Natural Heritage Ranking system (e.g., “bog”, “fen”, and “wet prairie/barren” communities). Find more information at; https://explorer.natureserve.org/		Determination Required by TDEC
9	The wetland is **an inherently valuable resource** (e.g., vernal pools, headwater wetlands, sinks, spring/seeps, glades, newly described communities, high recreational or socioeconomic value) in the region**.**		Determination Required by TDEC
10	The wetland is an **older aged, forested wetland** comprised of overstory trees with an average diameter at breast height (dbh) being **greater than or equal to 30 in** within the WAA.		Determination Required by TDEC
11	The wetland is observed and documented to be a **significant fish and wildlife habitat area**. These may include rookeries, migratory congregations, nesting sites, breeding areas, etc.		Determination Required by TDEC
12	The wetland is **hydrologically connected** to and has significant ecological contribution to an **ETW**.		Determination Required by TDEC
13	The wetland has High Resource Value as determined by a **score of 75 or above** using the TRAM or non-HGM TRAM (to be determined after completing the quantitative portion of this manual).		Determination Required by TDEC

End of Narrative Rating. Begin Quantitative Rating on Next Page.

Quantitative Rating

Value Added Section

Wetland Size – Wetland size is correlated with some wetland functions and can provide greater habitat value to wildlife. In some regions within the state, large wetlands or wetlands of certain types may be rare and may play a vital and significant local and/or regional ecological role. Use Tables 1 through 3 below to determine if and how many points should be added to the overall HGM model scores.

Other Significant Value – Use Table 4 below to determine if and how many points should be added to the overall HGM model scores.

Critical Sizes for Tennessee Wetlands by HGM Class and Region of State

Table 1. Depression wetland size throughout Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥5 acres	5
3 - <5 acres	3

Table 2. Slope and Flat wetland size throughout Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥50 acres	5
25 - <50 acres	3
10 - <25 acres	2
5 - <10 acres	1

Table 3. Riverine wetland size in central and eastern Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥50acres	5
25 - <50 acres	3
10 - <25 acres	2
5 - <10 acres	1

Table 4. Other significant value (max 5 pts)	**Points**
Wetland falls within a category **from numbers 8-13 of the Exceptional Status Wetlands Decision Table** (pg. 17) but has not been determined by the Division to qualify for Exceptional Tennessee Waters status.	5

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Wetland Background Information

Name(s) of Field Personnel:	
Assessment Date:	
Agency/Organization:	
Office Address:	
Phone Number:	
E-mail Address:	
Wetland Name(s):	
Wetland Location: Include drawing or map of project area limits or attach map showing location and project area limits, county, nearest street address, and narrative description of location, etc.	
Watershed (12-Digit HUC):	
Lat/Long (dd.dddd, -dd.dddd) or UTM Coordinates (m easting, m northing):	
Circle coordinate system used: NAD83 WGS84 UTM NAD27	
USGS Quad Name:	
Depicted on National Wetland Inventory Map: (Y/N)	
Soil Survey Map Units, Hydric Rating:	
Cowardin Wetland Type(s):	
HGM Classification:	
Final Score:	

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TRAM Summary Worksheet

	EXCEPTIONAL STATUS WETLANDS	**Check if applicable**
	1. ONRW	
	2. ETW	
	3. Further Review Requested: Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
	WETLAND FUNCTION (FCI)	**SCORE**
	Maintain Hydrologic Regime	
	Maintain Biogeochemical Processes	
	Retain Particulates (Riverine Only)	
	Maintain Characteristic Plant Community	
	Maintain Characteristic Wildlife Community	
	Quantitative Score (Average of FCIsX100)	
	Value Added Total	
	TOTAL SCORE	

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APPENDIX A

HGM FUNCTIONAL ASSESSMENT
SEASONALLY INUNDATED DEPRESSION WETLANDS

Date: ______________________ Project Name __________________________________

Field Personnel _________________________ Wetland Name/Location _________________________

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA.

V1: Wetland Depth (WETDEPTH)

1. Wetland depth not impacted (SI = 1.0)

- no fill material or sediment	- outlet unaltered	- no excavation
- no ditches/drainage tiles	- runoff/input unaltered	

2. Wetland depth slightly impacted (SI = 0.75)

- portion of site with minimal fill material or sediment	- outlet lowered/raised	- minor excavation
- portion of site with ditches/drainage tiles	- runoff/input increased	

3. Wetland depth moderately impacted (SI = 0.5)

- portion of site with moderate fill material or sediment	- outlet lowered/raised	- moderate excavation
- portion of site with ditches/drainage tiles	- increased hydroperiod	

4. Wetland depth significantly impacted (SI = 0.25)

- portion of site with significant fill material or sediment	- outlet lowered/raised	- significant excavation
- portion of site with ditches/drainage tiles	- increased hydroperiod	

5. Wetland depth severely impacted (SI = 0.1)

- excessive fill material or sediment	- outlet removed/blocked	- entire wetland affected
- numerous ditches/drainage tiles	- increased hydroperiod	- recovery potential lost

V2: Wetland Watershed Integrity (WSHEDINT)

Use weighted average as discussed on page 10. Examples of land uses and multipliers listed below

A = Percentage forested with no impervious surfaces _____
B = Percentage permeable land (e.g., park, golf course, pasture, hay, orchard, tree farm, or similar) _____
C = Percentage low density residential, construction, or similar _____
D = Percentage high density residential, or similar _____
E = Percentage urban, commercial, industrial, or similar _____

V2 = (A x 1.0) + (B x 0.75) + (C x 0.5) + (D x 0.25) + (E x 0.01)/(100) = ________

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ ≥ 13 in. (SI = 1.0) __ 10 – 12 in. (SI = 0.75) __ 6 – 9 in. (SI = 0.5) __ 3 – 5 in. (SI = 0.25)
__ < 3 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 3 – 7 (SI = 1.0) __ 8 – 11 (SI = 0.75) __ > 11 (SI = 0.5) __ 1 – 2 (SI = 0.5)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥ 20 (SI = 1.0) __ < 20, go to V6

This variable is not used to evaluate wetlands that have a well-developed tree canopy. Please refer to pages 10-11 for instructions.

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥ 70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1) __ < 20 (SI=0.0)

This variable is not used to evaluate wetlands that have a well-developed tree or shrub canopy. Please refer to Page 11 for instructions.

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V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1 and 2 below using the 50/20 rule.

GROUP 1 (Native Species List)		GROUP 2 (Invasive, Exotic, Crop, and Weedy Species List)		Notes
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	

2. Using the number of dominants in Groups 1 and 2 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.0 x # of checked dominants in Group 2)]/ total # of checked dominants in all groups = ____________

3. Multiply Q above by one of the following constants that reflects species richness:[1]
   - a) if ≥ 4 species from Group 1 occur as dominants, multiply Q by 1.0 ____________
   - b) if 3 species from Group 1 occur as dominant, multiply Q by 0.75 ____________
   - c) if 2 species from Group 1 occur as dominants, multiply Q by 0.50 ____________
   - d) if 1 species from Group 1 occurs as dominant, multiply Q by 0.25 ____________
   - e) if no species from Group 1 occurs as dominant, multiply Q by 0.0 ____________

4. Calculate the square root of the value from Step 3 above. This value is the SI for **V7**= ____________

*In some Depression wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases in which this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered
   __ 100 percent cover of O and/or A horizon present (SI = 1.0)
2. __ Surface horizons altered (estimate the percent of the WAA in which neither an O or A horizon is present)
3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).
   This value is the SI for **V8**=_______

V9: Buffer (BUFFER)

1. Determine the Connection Index (CI) by estimating the percent of the wetland surrounded by suitable buffer habitat.
   __ 90% – 100% (CI = 1.0) __ 75% – 89% (CI = 0.75) __ 40% – 74% (CI = 0.5) __ 10% – 39% (CI = 0.25)
   __ < 10% (CI = 0.1)
2. Multiply the CI by one of the following values:
   - a) if average buffer width is ≥ 492 ft., multiply by **1.0**
   - b) if average buffer is 98 ft. to 491 ft., multiply by **0.66**
   - c) if average buffer width is 33 ft. to 97 ft., multiply by **0.33**
   - d) if average buffer width is < 33 ft., multiply by **0.1**

VALUES USED TO CALCULATE FUNCTIONAL CAPACITY INDICES (FCIs)

SUBINDEX VALUES:

V1_______ (WETDEPTH) V3_______ (TSIZE) V5_______ (SCOV) V7_______ (COMP) V9_______ (BUFFER)

V2_______ (WSHEDINT) V4_______ (TDEN) V6_______ (GVC) V8_______ (ORGANIC)

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WETLAND FUNCTIONS

FUNCTION 1: MAINTAIN HYDROLOGIC REGIME

FCI 1: $(V1 \text{ x } V2)^{1/2}$ =

FUNCTION 2: MAINTAIN BIOGEOCHEMICAL PROCESSES

FCI 2: (trees present) = $\left((V1 \text{ X } V2)^{\frac{1}{2}} \text{ x } \left(\frac{\left(\frac{V3+V4}{2}\right)+V8}{2}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\frac{\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)+\underline{\quad}}{2}\right)\right)^{1/2}$ =

=

FCI 2: (shrubs present) = $\left((V1 \text{ x } V2)^{1/2} \text{ x } \left(\frac{V5+V8}{3}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\frac{\underline{\quad}+\underline{\quad}}{3}\right)\right)^{1/2}$ =

FCI 2: (ground cover) = $\left((V1 \text{ x } V2)^{1/2} \text{ x } \left(\frac{V6+V8}{5}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\frac{\underline{\quad}+\underline{\quad}}{5}\right)\right)^{1/2}$ =

FUNCTION 3: MAINTAIN CHARACTERISTIC PLANT COMMUNITY

FCI 3: (trees present) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V3+V4+V7}{3}\right)}{3} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}+\underline{\quad}}{3}\right)}{3}$ =

FCI 3: (shrubs present) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V5+V7}{2}\right)}{6} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)}{6}$ =

FCI 3: (groundcover) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V6+V7}{2}\right)}{9} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)}{9}$ =

FUNCTION 4: MAINTAIN CHARACTERISTIC WILDILFE COMMUNITY

FCI 4: (trees) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V3+V4+V7}{3}\right)+V9}{4} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}+\underline{\quad}}{3}\right)+\underline{\quad}}{4}$ =

FCI 4: (shrubs present) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V5+V7}{2}\right)+V9}{6} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)+\underline{\quad}}{6}$ =

FCI 4: (groundcover) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V6+V7}{2}\right)+V9}{9} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)+\underline{\quad}}{9}$ =

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HGM FUNCTIONAL ASSESSMENT
SLOPE WETLANDS

Date: ______________________ Project Name __________________________________

Field Personnel _________________________ Wetland Name/Location _________________________

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: Hydroperiod (HYDRO)

1. Hydrology not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no roads or other impediments to surface or groundwater
   - no ditches/drainage tiles
   - no excavation
   - no alteration to overland runoff, groundwater discharge/recharge
2. Hydrology slightly altered (SI = 0.75)
   - portion of site with minimal fill or sediment
   - roads or other impediments, water flow slightly altered
   - portion of site with drainage ditches/tiles
   - minor portion of site excavated
   - some alteration to overland runoff, groundwater discharge/recharge
3. Hydrology moderately altered (SI = 0.5)
   - portion of site with moderate fill or sediment
   - roads or other impediments, water flow moderately altered
   - portion of site with drainage ditches/tiles
   - moderate portion of site excavated
   - some alteration to overland runoff, groundwater discharge/recharge
4. Hydrology significantly altered (SI = 0.25)
   - portion of site with significant fill or sediment
   - roads or other impediments, water flow significantly altered
   - portion of site with drainage ditches/tiles
   - significant portion of site excavated
   - significant alteration to overland runoff, groundwater discharge/recharge
5. Hydrology severely altered (SI = 0.1)
   - entire site impacted by fill or excessive sediment
   - roads or other impediments, water flow completely blocked
   - entire site with numerous drainage ditches/tiles
   - entire wetland affected
   - no contributions to or from overland runoff, groundwater discharge/recharge

V2: Wetland Watershed Integrity (WSHEDINT)

Use weighted average as discussed on page 10. Examples of land uses and multipliers listed below

A = Percentage forested with no impervious surfaces _____
B = Percentage permeable land, (e.g., park, golf course, pasture, hay, orchard, tree farm, or similar) _____
C = Percentage low density residential, construction, or similar _____
D = Percentage high density residential, or similar _____
E = Percentage urban, commercial, industrial, or similar _____

V2 = (A x 1.0) + (B x 0.75) + (C x 0.5) + (D x 0.25) + (E x 0.01)/(100) = ________

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH
   __ ≥ 15 in. (SI = 1.0) __ 10 – 14 in. (SI = 0.75) __ 6 – 9 in. (SI = 0.5) __ 3 – 5 in. (SI = 0.25)
   __< 3 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot
   __ 5 – 10 (SI = 1.0) __ 11 – 15 (SI = 0.75) __ > 15 (SI = 0.5) __ 1 – 4 (SI = 0.5)

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V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ > 20 (SI = 1.0)   __ < 20, go to V6

This variable is not used to evaluate wetlands that have a well-developed tree canopy. Please refer to pages 10-11 for instructions.

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥ 70 (SI = 1.0)   __ 55 – 69 (SI = 0.75)   __ 45 – 54 (SI = 0.5)   __ 30 – 44 (SI = 0.25)   __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

This variable is not used to evaluate wetlands that have a well-developed tree or shrub canopy. Please refer to Page 11 for instructions.

V7: Vegetation Composition and Diversity (COMP)

1. List the dominant species from Groups 1 and 2 below using the 50/20 rule.

GROUP 1 (Reference Standard)		GROUP 2 (Invasive, Exotic, Crop, and Weedy Species List)		Notes
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	
____________	____________	____________	____________	

2. Using the listed number of dominants in Groups 1 and 2 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.0 x # of checked dominants in Group 2)]/ total # of checked dominants in all groups =
3. Multiply Q above by one of the following constants that reflects species richness:[1]
   a) if ≥ 4 species from Group 1 occurs as dominants, multiply Q by 1.0 __________
   b) if 3 species from Group 1 occurs as dominant, multiply Q by 0.75 __________
   c) if 2 species from Group 1 occurs as dominants, multiply Q by 0.50 __________
   d) if 1 species from Group 1 occurs as dominant, multiply Q by 0.25 __________
   e) if no species from Group 1 occurs as dominant, multiply Q by 0.0 __________
4. Calculate the square root of the value from Step 3 above. This value is the SI for **V7**= __________

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered
   __ 100 percent cover of O and/or A horizon present (SI = 1.0)
2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.
3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This value is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25). This value is the SI for **V8**=_______

V9: Buffer (BUFFER)

1. Determine the Connection Index (CI) by estimating the percent of the wetland surrounded by suitable buffer habitat.
   __ 90% – 100% (CI = 1.0)   __ 75% – 89% (CI = 0.75)   __ 40% – 74% (CI = 0.5)   __ 10% – 39% (CI = 0.25)
   __ < 10% (CI = 0.1)
2. Multiply the CI by one if the following values:
   a) if average buffer width is ≥ 492 ft., multiply by 1.0
   b) if average buffer is 98 ft to 491 ft., multiply by 0.66
   c) if average buffer width is 33 ft to 97 ft., multiply by 0.33
   d) if average buffer width is < 33 ft., multiply by 0.1
3. This value is the SI for **V9 =**____

VALUES USED TO CALCULATE FUNCTIONAL CAPACITY INDICES (FCIs)

SUBINDEX VALUES:

V1_______ (HYDRO)   V3_______ (TSIZE)   V5_______ (SCOV)   V7_______ (COMP)   V9_______ (BUFFER)

V2_______ (WSHEDINT)   V4_______ (TDEN)   V6_______ (GVC)   V8_______ (ORGANIC)

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WETLAND FUNCTIONS

FUNCITION 1: MAINTAIN HYDROLOGIC REGIME

FCI 1: $(V1 \text{ x } V2)^{1/2} \Rightarrow (\underline{\quad\quad} \text{ x } \underline{\quad\quad})^{1/2}$ = ____________

FUNCTION 2: MAINTAIN BIOGEOCHEMICAL PROCESSES

FCI (trees present)= $\left((V1 \text{ x } V2)^{1/2} \text{ x } \left(\frac{\frac{V3+V4}{2}+V8}{2}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\frac{\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)+\underline{\quad}}{2}\right)\right)^{1/2}$ = ____________

FCI (shrubs present)= $\left((V1 \text{ x } V2)^{1/2} \text{ x } \left(\frac{V5+V8}{3}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\frac{\underline{\quad}+\underline{\quad}}{3}\right)\right)^{1/2}$ = ____________

FCI (ground cover) $\left((V1 \text{ x } V2)^{1/2} \text{ x } \left(\frac{V6+V8}{5}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\frac{\underline{\quad}+\underline{\quad}}{5}\right)\right)^{1/2}$ = ____________

FUNCTION 3: MAINTAIN CHARACTERISTIC PLANT COMMUNITY

FCI (trees present) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V3+V4+V7}{3}\right)}{3} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}+\underline{\quad}}{3}\right)}{3}$ = ____________

FCI (shrubs present) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V5+V7}{2}\right)}{6} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)}{6}$ = ____________

FCI (groundcover) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V6+V7}{2}\right)}{9} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)}{9}$ = ____________

FUNCTION 4: MAINTAIN CHARACTERISTIC WILDILFE COMMUNITY

FCI (trees) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V3+V4+V7}{3}\right)+V9}{4} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}+\underline{\quad}}{3}\right)+\underline{\quad}}{4}$ = ____________

FCI (shrubs present) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V5+V7}{2}\right)+V9}{6} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)+\underline{\quad}}{6}$ = ____________

FCI (groundcover) = $\frac{(V1 \text{ x } V2)^{1/2}+2\left(\frac{V6+V7}{2}\right)+V9}{9} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\underline{\quad}+\underline{\quad}}{2}\right)+\underline{\quad}}{9}$ = ____________

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HGM FUNCTIONAL ASSESSMENT
FLAT WETLANDS

Date: ________________________ Project Name____________________________________

Field Personnel ___________________________ Wetland Name/Location___________________________

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: Hydroperiod (HYDRO)

1. Hydrology not altered (SI = 1.0)
   - -no fill material or excessive sediment
   - -no excavation
   - -no ditches/drainage tiles
2. Hydrology slightly altered (SI = 0.75)
   - -portion of site with minimal fill or sediment
   - - minimal portion of site excavated
   - -portion of site with drainage ditches/tiles
3. Hydrology moderately altered (SI = 0.5)
   - - portion of site with moderate fill or sediment
   - - moderate portion of site excavated
   - - portion of site with drainage ditches/tiles
4. Hydrology significantly altered (SI = 0.25)
   - - portion of site with significant fill or excessive sediment
   - - significant portion of site excavated
   - - portion of site with drainage ditches/tiles
5. Hydrology severely altered (SI = 0.1)
   - - entire site impacted by fill or excessive sediment
   - - entire wetland affected
   - - entire site with numerous drainages/tiles

V2: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ ≥ 13 in. (SI = 1.0) __ 10 – 12 in. (SI = 0.75) __ 6 – 9 in. (SI = 0.5) __ 3 – 5 in. (SI = 0.25)

__< 3 in. or no trees present, go to V4

V3: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 3 – 7 (SI = 1.0) __ 8 – 11 (SI = 0.75) __ > 11 (SI = 0.5) __ 1 – 2 (SI = 0.5)

V4: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥ 20 (SI = 1.0) __ < 20, go to V6

This variable is not used to evaluate wetlands that have a well-developed tree canopy. Please refer to pages 10-11 for instructions.

V5: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ > 70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1) __ < 20 (SI=0.0)

This variable is not used to evaluate wetlands that have a well-developed tree or shrub canopy. Please refer to Page 11 for instructions.

DRAFT

V6: Vegetation Composition and Diversity (COMP) 1. List the dominant species from Groups 1 and 2 below using the 50/20 rule.		
GROUP 1 (Reference Standard)	**GROUP 2 (Invasive, Exotic, Crop, and Weedy Species List)**	**Notes**
______________ ______________ ______________ ______________ ______________ ______________ ______________ ______________ ______________ ______________	______________ ______________ ______________ ______________ ______________ ______________ ______________ ______________ ______________ ______________	
2. Using the listed dominants in Groups 1 and 2 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.0 x # of checked dominants in Group 2)]/ total # of checked dominants in all groups = ______________		
3. Multiply Q above by one of the following constants that reflects species richness:[1] a) if ≥ 4 species from Group 1 occur as dominants, multiply Q by 1.0 ___________ b) if 3 species from Group 1 occur as dominants, multiply Q by 0.75 ___________ c) if 2 species from Group 1 occur as dominants, multiply Q by 0.50 ___________ d) if 1 species from Group 1 occurs as dominant, multiply Q by 0.25 ___________ e) if no species from Group 1 occurs as dominant, multiply Q by 0.0 ___________ 4. Calculate the square root of the value from Step 3 above. This value is the SI for **V6 =** ___________ *In some Flat wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g. white oak) may be present. In cases in which this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.		
V7: Soil Organic Matter (ORGANIC) 1. Surface horizons unaltered __ 100 percent cover of O and/or A horizon present (SI = 1.0) 2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present. 3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This value is the SI for V7 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25). This value is the SI for **V7** =_______		
V8: Buffer (BUFFER) 1. Determine the Connection Index (CI) by estimating the percent of wetland surrounded by suitable buffer habitat. __ 90% – 100% (CI = 1.0) __ 75% – 89% (CI = 0.75) __ 40% – 74% (CI = 0.5) __ 10% – 39% (CI = 0.25) __ < 10% (CI = 0.1) 2. Multiply the CI by one if the following values: a) if average buffer width is ≥ 492 ft., multiply by **1.0** b) if average buffer is 98 ft to 491 ft., multiply by **0.66** c) if average buffer width is 33 ft to 97 ft., multiply by **0.33** d) if average buffer width is < 33 ft., multiply by **0.1** 3. This value is the SI for **V8 =** ____		

VALUES USED TO CALCULATE FUNCTIONAL CAPACITY INDICES (FCIs)

SUBINDEX VALUES:			
V1_______ (HYDRO)	V3_______ (TDEN)	V5_______ (GVC)	V7_______ (ORGANIC)
V2_______ (TSIZE)	V4_______ (SCOV)	V6_______ (COMP)	V8_______ (BUFFER)

DRAFT

WETLAND FUNCTIONS

FUNCITION 1: MAINTAIN HYDROLOGIC REGIME

FCI: $(V1)^{1/2} \Rightarrow \qquad = \_\_\_\_\_\_$

FUNCTION 2: MAINTAIN BIOGEOCHEMICAL PROCESSES

FCI (trees present)=

$$\left((V1)\ X\left(\frac{\left(\frac{V2+V3}{2}\right)+V7}{2}\right)\right)^{1/2} \Rightarrow \left((\_\_\_\_)\ x\left(\frac{\left(\frac{\_\_+\_\_}{2}\right)+\_\_}{2}\right)\right)^{1/2} = \_\_\_\_\_\_$$

FCI (shrubs present)= $\left((V1)\ x\left(\frac{V4+V7}{3}\right)\right)^{1/2} \Rightarrow \left((\_\_\_\_)\ x\left(\frac{\_\_\_+\_\_\_}{3}\right)\right)^{1/2} = \_\_\_\_\_\_$

FCI (ground cover)= $\left((V1)\ x\left(\frac{V5+V7}{5}\right)\right)^{1/2} \Rightarrow \left((\_\_\_\_)\ x\left(\frac{\_\_\_+\_\_\_}{5}\right)\right)^{1/2} = \_\_\_\_\_\_$

FUNCTION 3: MAINTAIN CHARACTERISTIC PLANT COMMUNITY

FCI (trees present) = $\frac{(V1)+2\left(\frac{V2+V3+V6}{3}\right)}{3} \Rightarrow \frac{(\_\_\_)+2\left(\frac{\_\_\_+\_\_\_+\_\_\_}{3}\right)}{3} = \_\_\_\_\_\_$

FCI (shrubs present) = $\frac{(V1)+2\left(\frac{V4+V6}{2}\right)}{6} \Rightarrow \frac{(\_\_\_)+2\left(\frac{\_\_\_+\_\_\_}{2}\right)}{6} = \_\_\_\_\_\_$

FCI (groundcover) = $\frac{(V1)+2\left(\frac{V5+V6}{2}\right)}{9} \Rightarrow \frac{(\_\_\_)+2\left(\frac{\_\_\_+\_\_\_}{2}\right)}{9} = \_\_\_\_\_\_$

FUNCTION 4: MAINTAIN CHARACTERISTIC WILDILFE COMMUNITY

FCI (trees present) = $\frac{(V1)+2\left(\frac{V2+V3+V6}{3}\right)+V8}{4} \Rightarrow \frac{(\_\_\_)+2\left(\frac{\_\_\_+\_\_\_+\_\_\_}{3}\right)+\_\_\_}{4} = \_\_\_\_\_\_$

FCI (shrubs present) = $\frac{(V1)+2\left(\frac{V4+V6}{2}\right)+V8}{6} \Rightarrow \frac{(\_\_\_)+2\left(\frac{\_\_\_+\_\_\_}{2}\right)+\_\_\_}{6} = \_\_\_\_\_\_$

FCI (groundcover) = $\frac{(V1)+2\left(\frac{V5+V6}{2}\right)+V8}{9} \Rightarrow \frac{(\_\_\_)+2\left(\frac{\_\_\_+\_\_\_}{2}\right)+\_\_\_}{9} = \_\_\_\_\_\_$

DRAFT

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: ______________________ Project Name__________________________________

Field Personnel _________________________ Wetland Name/Location_________________________

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - stream connected to floodplain
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   - levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - stream connected to floodplain
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   - widely spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   - moderately spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)
__ < 3 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 5 – 7 (SI = 0.75) __ 3 – 4 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥ 20 (SI = 1.0)) __ < 20, go to V6

This variable is not used to evaluate wetlands that have a well-developed tree canopy. Please refer to page 10-11 for instructions.

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥ 70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)

__ < 20 (SI=0.0)

This variable is not used to evaluate wetlands that have a well-developed tree or shrub canopy. Please refer to Page 11 for instructions.

V7: Vegetation Composition and Diversity (COMP)

1. List the dominant species from Groups 1 or 2 below using the 50/20 rule.

GROUP 1 (Native Species List)		GROUP 2 (Invasive, Exotic, Crop, and Weedy Species List)		Notes
______	______	______	______	
______	______	______	______	
______	______	______	______	
______	______	______	______	
______	______	______	______	

2. Using the listed dominants in Groups 1 and 2 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.0 x # of checked dominants in Group 2)]/ total # of checked dominants in all groups = ______________

3. Multiply Q above by one of the following constants that reflects species richness:[1]
   a) if ≥ 4 species from Group 1 occur as dominants, multiply Q by 1.0 ___________
   b) if 3 species from Group 1 occur as dominants, multiply Q by 0.75 ___________
   c) if 2 species from Group 1 occur as dominants, multiply Q by 0.50 ___________
   d) if 1 species from Group 1 occur as dominants, multiply Q by 0.25 ___________
   e) if no species from Group 1 occur as dominants multiply Q by 0.0 ___________
4. Calculate the square root of the value from Step 3 above. This value is the SI for **V7 =** ___________

[*] In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g. bald cypress) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This value is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).
This value is the SI for **V8** =_______

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state. This value is the SI for V9

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)

__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In eastern or central Tennessee (SI=1.0)

VALUES USED TO CALCULATE FUNCTIONAL CAPACITY INDICES (FCIs)

SUBINDEX VALUES:

V1_______ (RIVCON) V3_______ (TSIZE) V5_______ (SCOV) V7_______ (COMP) V9_______ (TRACT)

V2_______ (HYDRO) V4_______ (TDEN) V6_______ (GCV) V8_______ (ORGANIC)

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WETLAND FUNCTIONS

FUNCITION 1: MAINTAIN HYDROLOGIC REGIME

FCI 1: $(V1 \text{ x } V2)^{1/2} \Rightarrow (\_\_\_\_ \text{ x } \_\_\_\_)^{1/2}$ = __________

FUNCTION 2: RETAIN PARTICULATES

FCI 2: (trees present) = $\dfrac{(V1 \text{ x } V2)^{1/2} + V4}{2} \Rightarrow \dfrac{(FCI\ 1) + \_\_\_\_}{2}$ = __________

FCI 2: (shrubs present) = $\dfrac{(V1 \text{ x } V2)^{1/2} + V5}{2} \Rightarrow \dfrac{(FCI\ 1) + \_\_\_\_}{2}$ = __________

FCI 2: (ground cover) = $\dfrac{(V1 \text{ x } V2)^{1/2} + V6}{3} \Rightarrow \dfrac{(FCI\ 1) + \_\_\_\_}{3}$ = __________

FUNCTION 3: MAINTAIN BIOGEOCHEMICAL PROCESSES

FCI 3: (trees present)= $\left((V1 \text{ x } V2)^{1/2} \text{ x } \left(\dfrac{\frac{V3+V4}{2} + V8}{2}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \left(\dfrac{\frac{\_\_\_\_+\_\_\_\_}{2} + \_\_\_\_}{2}\right)\right)^{1/2}$ = __________

FCI 3: (shrubs present)= $\left((V1 \text{ x } V2)^{1/2} \text{ x } \dfrac{V5+V8}{3}\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \dfrac{\_\_\_\_+\_\_\_\_}{3}\right)^{1/2}$ = __________

FCI 3: (ground cover)= $\left((V1 \text{ x } V2)^{1/2} \text{ x } \dfrac{V6+V8}{5}\right)^{1/2} \Rightarrow \left((FCI\ 1) \text{ x } \dfrac{\_\_\_\_+\_\_\_\_}{5}\right)^{1/2}$ = __________

FUNCTION 4: MAINTAIN CHARACTERISTIC PLANT COMMUNITY

FCI 4: (trees present) = $\dfrac{(V1 \text{ x } V2)^{1/2} + 2\left(\frac{V3+V4+V7}{3}\right)}{3} \Rightarrow \dfrac{(FCI\ 1) + 2\left(\frac{\_\_\_\_+\_\_\_\_+\_\_\_\_}{3}\right)}{3}$ = __________

FCI 4: (shrubs present) = $\dfrac{(V1 \text{ x } V2)^{1/2} + 2\left(\frac{V5+V7}{2}\right)}{6} \Rightarrow \dfrac{(FCI\ 1) + 2\left(\frac{\_\_\_\_+\_\_\_\_}{2}\right)}{6}$ = __________

FCI 4: (groundcover) = $\dfrac{(V1 \text{ x } V2)^{1/2} + 2\left(\frac{V6+V7}{2}\right)}{9} \Rightarrow \dfrac{(FCI\ 1) + 2\left(\frac{\_\_\_\_+\_\_\_\_}{2}\right)}{9}$ = __________

FUNCTION 5: MAINTAIN CHARACTERISTIC WILDILFE COMMUNITY

FCI 5: (trees) = $\dfrac{(V1 \text{ x } V2)^{1/2} + 2\left(\frac{V3+V4+V7}{3}\right) + V9}{4} \Rightarrow \dfrac{(FCI\ 1) + 2\left(\frac{\_\_\_\_+\_\_\_\_+\_\_\_\_}{3}\right) + \_\_\_\_}{4}$ = __________

FCI 5: (shrubs present) = $\dfrac{(V1 \text{ x } V2)^{1/2} + 2\left(\frac{V5+V7}{2}\right) + V9}{6} \Rightarrow \dfrac{(FCI\ 1) + 2\left(\frac{\_\_\_\_+\_\_\_\_}{2}\right) + \_\_\_\_}{6}$ = __________

FCI 5: (groundcover) = $\dfrac{(V1 \text{ x } V2)^{1/2} + 2\left(\frac{V6+V7}{2}\right) + V9}{9} \Rightarrow \dfrac{(FCI\ 1) + 2\left(\frac{\_\_\_\_+\_\_\_\_}{2}\right) + \_\_\_\_}{9}$ =

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APPENDIX B

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NON-HGM Tennessee Rapid Assessment Method for Wetlands

2024

State of Tennessee
Department of Environment and Conservation
Division of Water Resources
Natural Resources Unit
Davy Crockett Tower
500 James Robertson Parkway, 9th Floor
Nashville, Tennessee 37243

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Quantitative Rating

<u>Metric 1. Wetland area (max 6 pts).</u> Estimate the area of wetland and select the appropriate size class and assign score. Estimated areas should clearly place the wetland within the appropriate class.

6pts	>50 acres (west TN)	>25 acres (middle TN)	>10 acres (east TN *)	
5pts	25 - <50 acres (west TN)	10- 25 acres (middle TN)	7-<10 acres (east TN*)	
4pts	10 - <25 acres (west TN)	7-< 25acres (middle TN)	3-<7 acres (east TN*)	
3pts	3 - <10 acres(west TN)	3< 7 acres (middle TN)	1-<3 acres (east TN)	
2pts	0.3 - <3 acres (west TN)	0.5- <3 acres (middle TN)	0.5-<1 acres (east TN)	
1pt	0.1 - <0.3 acres(west TN)	<0.5 acres (middle TN)	<0.5 acres (east TN)	

*More applicable to West Tennessee; use with discretion in Middle Tennessee, Consult TDEC-DWR Natural Resources Unit for use in East Tennessee.

Table 2. Metric to English conversion table with visual estimation sizes.

acres	ft^2	yd^2	ft on side	yd on side	ha	m^2	m on side
50	2,177,983	241,998	1476	492	20.2	202,000	449
25	1,088,992	120,999	1044	348	10.1	101,000	318
10	435,596	48,340	660	220	4.1	41,000	203
3	130,679	14,520	362	121	1.2	12,000	110
0.3	13,067	1,452	114	38	0.12	1,200	35
0.1	4,356	484	66	22	0.04	400	20

Metric 1 Total ____________

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<u>Metric 2. Upland buffers and intensity of surrounding land uses (Max 14 points).</u> Wetlands without upland "buffers", or that are located where human land use is more intensive, are often, but not always, more degraded and often have lower wildlife habitat resource value.

2a. Average Buffer Width (ABW). Calculate the average buffer width and select only one score. To calculate ABW, estimate buffer width on each side (max of 50m) and divide by the number of sides. Example: ABW of a wetland with buffers of 100m, 25m, 10m and 0m would be calculated as follows: ABW = (50m + 25m + 10m + 0m)/4 = 21.25m. Intensive land uses are not buffers, e.g., active row cropping, paved areas, housing developments, etc.		
7pts	WIDE. >50m (164ft) or more around perimeter.	
4pts	MEDIUM. 25m to <50m (82 to <164ft) around the perimeter.	
1pt	NARROW. 10m to <25m (32 to <82ft) around the perimeter.	
0pts	VERY NARROW. <10m (<32ft) around perimeter.	
2b. Intensity of predominant surrounding land use(s) Select one, or choose up to two and average score, for the intensity of the predominant land use(s) outside the wetland's buffer zone.		
7pts	VERY LOW. 2nd growth or older forest, prairie, barren, wildlife area, etc.	
5pts	LOW. Old fallow field, shrub land, early successional young forest, etc.	
3pts	MODERATELY HIGH. Residential, pasture, orchard, park, conservation tillage, mowed field, etc.	
1pt	HIGH. urban, industrial, row cropping, mining, construction, etc.	

Metric 2 Total ____________

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<u>Metric 3. Hydrology (Max 30 points).</u> This metric evaluates the wetland's water budget, hydroperiod, the hydrologic connectivity of the wetland to other surface waters, and the degree to which the wetland's hydrology has been altered by human activity**. A wetland can receive no more than 30 points for Metric 3 even though it is possible to score more than 30 points.**

3a. Sources of Water. Select all that apply and sum the score. This question relates to a wetland's water budget. It also is reflective that wetlands with certain types of water sources, or multiple water sources, e.g., high pH groundwater or perennial surface water connections, can be very high quality wetlands or can have high functions and values.

5pts	High pH groundwater (7.5-9.0)	
3pts	Other groundwater	
1pts	Precipitation	
3pts	Seasonal surface water	
5pts	Perennial surface water (lake or stream)	
3b. Connectivity. Select all that apply and sum score		
1pt	**100-year floodplain.** "Floodplain" is defined as "...the relatively level land next to a stream or river channel that is periodically submerged by flood waters. It is composed of alluvium deposited by the present stream or river when it floods." Where they a available, flood insurance rate maps (FIRMs) and flood boundary and floodway maps may be used.	
1pt	**Between stream/lake and other human land use.** This question asks whether the wetland is located <u>between</u> a surface water different adjacent land use, such that run-off from the adjacent land use could flow through wetland before it discharges into surface water buffering it. "Different adjacent land uses" include agricultural, commercial, industrial, mining, or residential uses.	
1pt	**Part of a larger wetland or upland complex.** This question asks whether the wetland is in physical proximity to, or a part of othe nearby wetland or upland habitat areas.	
1pt	**Part of riparian corridor**.	
3c. Maximum water depth. Select only one and assign score. The evaluator *does not* need to actually observe the wetland when its water depth is greatest in order to award the maximum points for this question. The use of secondary indicators, as outlined in the 1987 Manual will be useful in answering this question.		
3 pts	>0.7m (27.6in)	
2pts	0.4 to 0.7m (15.7 to 27.6in)	
1pt	<0.4m (<15.7in)	
3d. Duration of inundation/saturation. Select one or double check and average the scores if duration is uncertain. The use of ACOE 1987 Manual secondary indicators is necessary and expected in order to properly answer this question.		
4pts	Semi-permanently to permanently inundated or saturated	
3pts	Regularly inundated or saturated	
2pts	Seasonally inundated	
1pt	Seasonally saturated in the upper 30cm (12in) of soil	

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3e. Modifications to natural hydrologic regime. Check all observable modifications from list below. Score by selecting the most appropriate description of the wetland. Scores may be double checked and averaged. This question asks the evaluator to assess the "intactness" of, or lack of disturbance to, the natural hydrologic regime of the type of wetland that is being evaluated.

Once the evaluator has listed all possible past and ongoing disturbances, the evaluator should check the most appropriate category to describe the present state of the wetland. In instances where the evaluator believes that a wetland falls between two categories, or where the evaluator is uncertain as to which category is appropriate, it is appropriate to choose more than one and average the score.

The evaluator may check one or several of these possible disturbances, yet still determine that the natural hydrologic regime is intact. However, see Metric 4 where these same disturbances may be habitat alterations.

Check all that are observed present in or near the wetland.

	ditch(es), in or near the wetland		point source discharges to the (non-stormwater)
	tile(s), in or near the wetland		filling/grading activities in or near the wetland
	dike(s), in or near the wetland		roadbeds/RR beds in or near the wetland
	weir(s), in or near the wetland		dredging activities in or near the wetland
	stormwater inputs (addition of water)		other (specify)

Have any of the disturbances identified above caused or appear to have caused more than trivial alterations to the wetland's natural hydrologic regime.	YES Assign a score 1, 3 or 7, or an intermediate score, depending on degree of recovery from the disturbance.	NO Assign a score of 12 since there are no or no apparent modifications.	NOT SURE Choose "recovered" and assign a score of 9.5.

Select one or double check adjoining numbers and average the score.		**score**
12pts	NONE OR NONE APPARENT. There are no modifications or no modifications that are apparent to the evaluator.	
7pts	RECOVERED. The wetland appears to have recovered from past modifications.	
3pts	RECOVERING. The wetland appears to be in the process of recovering from past modifications.	
1pt	RECENT OR NO RECOVERY. The modifications have occurred recently occurred, and/or the wetland has not recovered from past modifications, and/or the modifications are ongoing.	

Metric 3 Total ____________

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Metric 4. Habitat Alteration and Development (Max 20 points). While hydrology may be the single most important determinant for the establishment and maintenance of specific types of wetlands and wetland processes, there is a range of other factors and activities which affect wetland quality and cause disturbances to wetlands that are unrelated to hydrology. These disturbances are termed "habitat alteration." In many instances, items checked as hydrologic disturbances in Question 3e will present as alterations to a wetland's habitat or disruptions in its development (successional state). In some instances, a disturbance may be appropriately considered under both Metric 3 and Metric 4. To determine the appropriate metric scores, the evaluator should carefully determine the actual cause of the disturbance to the wetland.

4a. Substrate/Soil Disturbance. Select one or double check and average. This question evaluates physical disturbances to the soil and surface substrates of the wetland. Note also that the labels on the scoring categories are intended to be descriptive but not controlling. In some instances, it may be more appropriate to consider the scoring categories as fixed locations on a disturbance continuum, from very high to very low or no disturbance.	Examples of substrate/soil disturbance include (circle all that apply): ____filling and grading ____plowing ____grazing (hooves) ____vehicle use (off-road vehicles, construction vehicles) ____sedimentation ____dredging, and other mechanical disturbances to the soil

	YES	NO	NOT SURE
Have any of soil or substrate disturbances caused or appear to have caused more than trivial alterations to the wetland's natural soils	Assign a score 1, 2 or 3, or an intermediate score, depending on degree of recovery from the disturbance.	Assign a score of 4 since there are no or no apparent modifications.	Choose "recovered" and assign a score of 3.5.

Select one or double check adjoining numbers and average the score.		
4pts	NONE OR NONE APPARENT. There are no disturbances or no disturbances apparent to the evaluator.	
3pts	RECOVERED. The wetland appears to have recovered from past disturbances.	
2pts	RECOVERING. The wetland appears to be in the process of recovering from past disturbances.	
1pt	RECENT OR NO RECOVERY. The disturbances have occurred recently, and/or the wetland has not recovered from past disturbances, and/or the disturbances are ongoing.	

4b. Habitat development. Select only one and assign score. This question asks the evaluator to assign an overall qualitative rating of how well-developed the wetland is in comparison to other ecologically and/or hydrogeomorphically similar wetlands. This question presumes knowledge of the types of wetlands and the range in quality typical of the region or access to data from reference standard examples. If unsure, score as GOOD or MODERATELY GOOD.

7pts	EXCELLENT. Wetland appears to represent the best of its type or class.	
6pts	VERY GOOD. Wetland appears to be a very good example of its type or class but is lacking in characteristics which would make it excellent.	
5pts	GOOD. Wetland appears to be a good example of its type or class but because of past or present disturbances, successional state, or other reasons, is not excellent.	
4pts	MODERATELY GOOD. Wetland appears to be a fair to good example of its type or class.	
3pts	FAIR. Wetland appears to be a moderately good example of its type or class but because of past or present disturbances, successional state, etc. is not good.	
2pts	POOR TO FAIR. Wetland appears to be a poor to fair example of its type or class.	
1pt	POOR. Wetland appears <u>not</u> to be a good example of its type or class because of past or present disturbances, successional state, etc.	

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4c. Habitat alteration. This question evaluates the "intactness" the natural habitat of the type of wetland that is being evaluated. This question does not discriminate between wetlands with different types of habitats. Check all possible alterations that are observed. All available information, field visits, aerial photos, maps, etc. can be used to identify possible alterations. Evaluate whether the alteration is trivial in relation to the wetlands overall habitat. Select the most appropriate score that best describes the present state of the wetland. It is appropriate to "double check" and average scores. **The evaluator may check one or several of these possible disturbances, yet still determine that the natural habitat is intact.**

Check all that are observed present in or near the wetland

	Mowing		Herbaceous layer/aquatic bed removal
	Grazing (cattle, horses, etc.)		Sedimentation
	Clearcutting		Dredging
	Selective cutting		Row-crop or orchard farming
	Woody debris removal		Nutrient enrichment, e.g., nuisance algae
	Toxic pollutants		Other (specify):
	Shrub/sapling removal		Other (specify):

Have any of the disturbances identified above caused or appeared to cause more than trivial alterations to the wetland's natural habitat.	<u>YES</u> Assign a score 1, 3 or 6, or an intermediate score, depending on degree of recovery from the disturbance.	<u>NO</u> Assign a score of 9 since there are no or no apparent modifications.	<u>NOT SURE</u> Choose "recovered" and assign a score of 6.

Select one score or double check adjoining numbers and average the score.		Score
9pts	NONE OR NONE APPARENT. There are no past or current alterations that are apparent to the evaluator.	
6pts	RECOVERED. The wetland appears to have recovered from past alterations.	
3pts	RECOVERING. The wetland appears to be in the process of recovering from past alterations.	
1pt	RECENT OR NO RECOVERY. The alterations have occurred recently, and/or the wetland has not recovered from past alterations, and/or the alterations are ongoing.	

Metric 4 Total ____________

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<u>Metric 5. Special wetland communities.</u> Assign points in left column if the wetland meets the associated criteria below. Refer to Narrative Rating for guidance. If wetland scores over 30 points within Metric 5 further determination needed to assess if the wetland exhibits outstanding ecological or recreational values as discussed in the Narrative Rating Section.			
5pts	> $10m^2$, sphagnum or other moss or vernal pools	5pts	Superior fish, waterfowl, bat, or amphibian breeding habitat
10pts 5pts 3pts	Ecological community with global rank (NatureServe): G1 (10pts), G2 (5pts), G2/G3 (3pts) or uncommon ecological resource in the ecoregion (habitat and/or species diversity, geology, wetland type, distribution/ occurrence) (10 pts)	5pts	Wetland contains and is a buffer for a headwater stream or wetland contributes significantly to the water quality of a 303(d) listed stream and/or to surface or and/or ground water
10pts	Older-aged mature forested wetland avg. DBH >= 30 inches	10 pts	Supports species Deemed in Need of Management by TWRA or TN Special Concern by TDEC

Metric 5 Total ____________

<u>Metric 6. Vegetation, Interspersion, and Microtopography (Max 20 points).</u> **6a. Wetland Vegetation Communities** Check each community present <u>both vertically and horizontally</u> within the wetland. Assign a score of 0 to 3 using Table 3 for 1-4 or Table 5 for 5-6. Sum the scores for the classes present.	Score
1)Aquatic Bed Includes areas of wetlands dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. Floating aquatic species like duckweed (*Lemna* spp., *Spirodela* spp.) are excluded from definition of "aquatic bed." Aquatic beds often occur as a distinct zone as an "understory" below shrubs or trees.	
2)Emergent Includes areas of wetlands dominated by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. Common names for emergent communities include marsh, wet meadow, wet prairie, sedge meadow, and fens.	
3)Shrub Includes areas of wetlands dominated by woody vegetation less than 1m (3ft.) - 6m (20 ft) tall with a dbh of <3in. The plant species include true shrubs, young trees, or trees or shrubs that are small or stunted because of environmental conditions. Shrub wetlands may represent a successional stage leading to a forested wetland or they may be relatively stable plant communities.	
4)Forested Includes wetlands or areas of wetlands characterized by woody vegetation greater than 6m (20ft) or taller. Forested wetlands have an overstory of trees and often contain an understory of young trees and shrubs and an herbaceous layer, although the young tree/shrub and herbaceous layers can be largely missing from some types of forested wetlands. Some forested wetlands are "vernal pools".	
5)Mudflats The "mudflat" class is equivalent to the "unconsolidated bottom/mud" class/subclass (PUB_3) described in Cowardin et al. (1979) and includes areas of wetlands characterized by exposed or shallowly inundated substrates with vegetative cover less than 30%.	
6)Open water The "open water" class is equivalent to the "open water - unknown bottom" class in Cowardin et al. (1979) and includes areas that are 1) inundated, 2) un-vegetated, and 3) and "open", i.e. there is no "canopy" of any type of vegetation.	

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Table 3. Use this table to assign a cover score for Metric 6a to each of the vegetation communities identified on the preceding page. Refer to Table 4 for narrative description of "low," "moderate," and "high" quality.

Cover Scale	Description
0	The vegetation community is either 1) absent from wetland
1	Vegetation community is present and either, 1) comprises a significant part of the wetland's vegetation and is of low or moderate quality, or 2) if it comprises a significant part of the wetland's vegetation and is of low quality
2	The vegetation community is present and either, 1) comprises a significant part of the wetland's vegetation and is of moderate quality, or 2) the vegetation community comprises a small part of the wetland's vegetation but is of high quality
3	The vegetation community is of high quality and comprises a significant part, or more, of the wetland's vegetation

Table 4. Use this table in conjunction with Table 3 to determine what is a "low", "moderate," or " high" quality community.

Narrative	Description
Low	Low species richness and a predominance of invasive, non-native, or disturbance tolerant "weedy" species.
Moderate	Native species are the dominant component of the vegetation, although non-native or disturbance tolerant "weedy" species can also be present, and species richness is moderate to moderately high, but generally without the presence of rare, threatened, or endangered species.
High	A predominance of native species, with non-native species absent or virtually absent, and high species diversity and/or the presence of rare, threatened or endangered species.

Table 5. Mudflat and open water community cover scale.

0	Absent <0.1 ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 ha to < 4 ha (2.47 to 9.88 acres)
3	High 4 ha (9.88 acres) or more

6b. Horizontal (plan view) interspersion. Evaluate the wetland from a "plan view," i.e., as if the looking down upon it. See Figure 1.	Score
5pts HIGH Wetland has a high degree of interspersion	
4pts MODERATELY HIGH Wetland has a moderately high degree of interspersion	
3pts MODERATE Wetland has a moderate degree of interspersion	
2pts MODERATELY LOW Wetland has a moderately low degree of interspersion	
1pt LOW Wetland has a low degree of interspersion.	
0pt NONE Wetland has no plan view interspersion	

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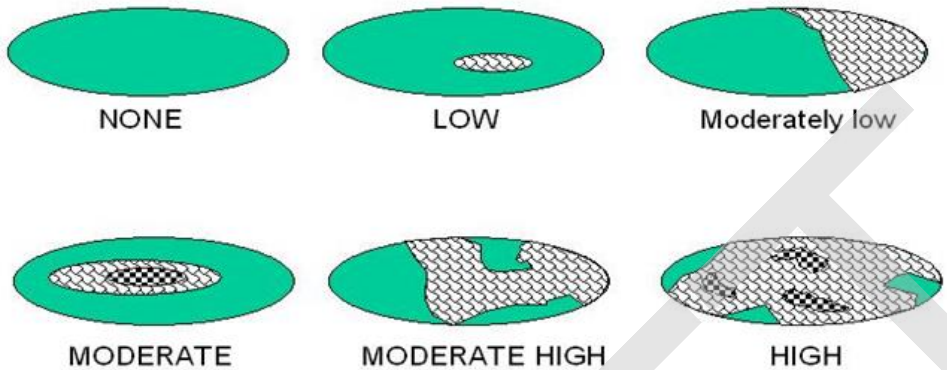

Figure 1. Hypothetical Wetlands for estimating degree of interspersion

6c. Coverage of Invasive Plant Species. Refer to Tennessee Exotic Pest Plant Council (http://www.tneppc.org/) for official list. Select only one and assign score.		Score
-5pts	Extensive >75% areal cover of invasive species	
-3pts	Moderate 25-75% areal cover of invasive species	
-1pts	Sparse 5-25% areal cover of invasive species	
0pt	Nearly absent. <5% areal cover of invasive species	
1pt	Absent	

6d. Microtopography. Check each feature present in the wetland. Assign cover score of 0 to 3 using Table 6. Evaluate various microtopograhic habitat features often present in wetlands.	Score
Vegetated hummocks and tussocks	
Coarse woody debris >15cm (6in) in diameter	
Standing dead trees >25cm (10in) diameter at breast height	
Amphibian breeding habitat, e.g., vernal pools with standing water of sufficient duration and depth to support reproduction, or habitat for frog reproduction	

Table 6. Cover scale for microtopographic habitat features

Microtopographic habitat quality	**Narrative description**
0	Feature is absent or functionally absent from the wetland
1	Feature is present in the wetland in very small amounts or if more common, of low quality
2	Feature is present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of the highest quality

Metric 6 Total _____________

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NON-HGM TRAM Summary Worksheet

Non-HGM Quantitative Rating	Metric 1: Size	
	Metric 2: Buffers and surrounding land use	
	Metric 3: Hydrology	
	Metric 4: Habitat	
	Metric 5: Special Wetland Communities	
	Metric 6: Plant communities, interspersion, microtopography	
	TOTAL SCORE	

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APPENDIX C

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Glossary

Assessment Model: A model that defines the relationship between ecosystem and landscape scale variables and functional capacity of a wetland. The model is developed and calibrated using reference wetlands within a reference domain.

Assessment Objective: The reason an assessment of wetland functions is conducted. Assessment objectives normally fall into one of three categories: documenting existing conditions, comparing different wetlands at the same point in time (e.g., alternatives analysis), and comparing the same wetland at different points in time (e.g., impacts analysis or mitigation success).

Assessment team (A-Team): An interdisciplinary group of regional and local scientists responsible for classification of wetlands within a region, identification of reference wetlands, construction of assessment models, definition of reference standards, and calibration of assessment models.

Canopy Tree: Self-supporting woody plants ≥ 3 in. DBH, whose crowns comprise the uppermost stratum of a forest. Canopy trees are not immediately overtopped by taller trees and would be clearly seen by an airborne observer.

Connection Index (CI): A measure of the percent of a wetland that is directly adjacent to habitat that is suitable for wildlife, particularly amphibians. It is the first step in evaluating the suitability of the buffer surrounding several types of wetlands. The CI of the wetland is multiplied by the average width of the suitable habitat to determine the SI for the buffer variable.

Diameter at Breast Height (DBH): Tree diameter measured at 4.5 ft. above the ground.

Exotics: See **Invasive species.**

Facultative species (FAC): A plant species equally likely to occur in wetlands or non-wetlands (estimated probability of occurrence in wetlands 34-66 percent).

Facultative upland species (FACU): A plant species that usually occurs in non-wetlands but sometimes is found in wetlands (estimated probability of occurrence in wetlands 1-33 percent).

Facultative wetland species (FACW): A plant species that usually occurs in wetlands (estimated probability 67-99 percent), but sometimes is found in non-wetlands.

Functional assessment: The process by which the capacity of a wetland to perform a function is measured. This approach measures capacity using an assessment model to determine a Functional Capacity Index.

Functional Capacity Index (FCI): An index of the capacity of a wetland to perform a function relative to other wetlands in a regional wetland subclass. Functional Capacity Indices are by definition scaled from 0.0 to 1.0. An FCI of 1.0 indicates the wetland is performing a function at the highest sustainable functional capacity, the level equivalent to a wetland under reference standard conditions. An FCI of 0.0 indicates the wetland does not perform the function at a measurable level and will not recover the capacity to perform the function through natural processes.

Functional capacity: The rate or magnitude at which a wetland ecosystem performs a function. Functional capacity is dictated by characteristics of the wetland ecosystem and the surrounding landscape, and interaction between the two.

Ground Vegetation: The layer of vegetation consisting of all herbaceous plants, regardless of height, and woody plants less than 3 ft. tall.

Hydrogeomorphic wetland class: The highest level in the Hydrogeomorphic Classification system. For this methodology there are five basic hydrogeomorphic wetland classes: Depression, Riverine, Slope, Fringe, and Flat .

Hydroperiod: The annual duration of flooding, ponding, or saturation (in days per year) at a specific point in a wetland.

Incidental and accidental feature: Features that were formed without intention or calculation. These are manmade features and are not altered forms of a previously existing water resource.

Invasive species: Generally, non-native species that aggressively out-compete native species as listed by the Tennessee Exotic Pest Plant Council (http://www.tneppc.org/).

Jurisdictional wetland: Areas that meet the soil, vegetation, and hydrologic criteria described in the "Corps of Engineers Wetlands Delineation Manual" (Environmental Laboratory 1987) or its successor and Regional Supplements and are also regulated as Waters of the U.S. and/or Waters of the State of Tennessee.

Land leveling: The process of grading the land surface (normally an agricultural field) to manage the hydrologic regime. Commonly, surface micro-topography is eliminated and the field is graded to slope in one direction to prevent water from standing on the surface for long durations.

Lawn: An area utilized for residential, commercial, or other use that is regularly maintained as turf grass or sod.

Mitigation wetland: A restored or created wetland that serves to replace resource value lost as a result of project impacts.

Mitigation: Restoration, enhancement, or creation of a wetland to replace resource value that is lost as a result of project impacts.

Model variable: A characteristic of the wetland ecosystem or surrounding landscape that influences the capacity of a wetland ecosystem to perform a function. The characteristics are measured and the values are used as variables within assessment models.

Monoculture: The growth of a single species in a specific area.

O horizon: A soil layer dominated by organic material that consists of recognizable or partially decomposed organic matter such as leaves, needles, sticks, or twigs in diameter, flowers, fruits, insect frass, moss, or lichens on or near the surface of the ground.

Obligate upland species (UPL): A plant species that almost always occurs in non-wetlands under natural conditions (estimated probability of occurrence in wetlands <1 percent).

Obligate wetland species (OBL): A plant species that almost always occurs in wetlands (estimated probability >99 percent) under natural conditions.

Organic matter: Plant and animal residue in the soil in various stages of decomposition. Organic matter is important in a soil's fertility and as a source of energy for soil microorganisms.

Partial wetland assessment area (PWAA): A portion of a WAA that is identified a priori, or while applying the assessment procedure to an area relatively homogeneous and different from the rest of the WAA with respect to one or more variables. Differences may be natural or result from anthropogenic disturbance.

Project alternative(s): Different ways in which a given project can be done. Alternatives may vary in terms of project location, design, method of construction, amount of fill required, and other ways.

Project area: The area that encompasses all activities related to an ongoing or proposed project.

Puddle: An area holding water as a result of recent precipitation or irrigation collecting in a depressional or disturbed location. This depressional or disturbed area must be resultant from vehicle or other human activity or animal traffic and not otherwise a wetland. An area holding water within a wetland shall be considered part of the wetland.

Quality Index (Q): A measure of the floristic quality of the vegetation in a wetland. It is based on the concept that species that reflect a lack of disturbance and an advanced seral stage are of higher "quality" than those that are associated with disturbance or a very early successional stage. Determining Q is one of the first steps in calculating the SI for the Vegetation Composition and Diversity variable in all the HGM models.

Exceptional status wetland features: Features of a wetland or surrounding landscape to which special recognition or protection is assigned on the basis of objective criteria. The recognition or protection may occur at a Federal, State, regional, or local level and may be official or unofficial.

Reference domain: All wetlands within a defined geographic area that belong to a single regional wetland subclass.

Reference standard wetlands: A subset of reference wetlands determined to be of the highest quality. These wetlands typically are among the least disturbed and function at the highest level across the suite of functions performed by the regional wetland subclass. By definition, these wetlands are assigned an FCI of 1.0.

Reference wetlands: Wetlands that encompass the variability within a regional wetland subclass in a reference domain. Reference wetlands are used to establish the range of conditions for construction and calibration of functional indices and to establish reference standards.

Region: A geographic area that is relatively homogeneous with respect to large-scale factors such as climate and geology that may influence how wetlands function.

Regional wetland subclass: Regional hydrogeomorphic wetland classes that can be identified based on landscape and ecosystem scale factors. There may be more than one regional wetland subclass for each of the hydrogeomorphic wetland classes that occur in a region, or there may be only one.

Resource Values: The benefits provided by the water resource. These benefits include, but are not limited to, the ability of the water resource to; a) filter, settle, and/or eliminate pollutants; b) prevent the entry of pollutants into downstream waters; c)assist in flood prevention; d) provide habitat for fish, aquatic life, livestock, and waterfowl; e) provide drinking water for wildlife and water fowl; f) provide and support recreational uses; and g) provide both safe and adequate quality and quantity of drinking water. As outlined in 0400-40-07.03 of the TDEC Aquatic Resource Alteration Rules.

Runoff: Water flowing on the surface either by overland sheet flow or by channel flow in rills, gullies, streams, or rivers.

Shrub layer: The vegetation layer consisting of self-supporting woody plants greater than 3 ft. in height but less than 3 in. diameter at breast height.

Seasonal high water table: The shallowest depth to free water that stands in an unlined borehole or where the soil moisture tension is zero for a significant period (for more than a few weeks).

Site potential: The highest level of functioning possible, given local constraints of disturbance history, land use, or other factors. Site capacity may be equal to or less than levels of functioning established by reference standards for the reference domain, and it may be equal to or less than the functional capacity of a wetland ecosystem.

Soil surface: The soil surface is the top of the mineral soil; or, for soils with an O horizon, the soil surface is the top of the part of the O horizon that is at least slightly decomposed. Fresh leaf or needle fall that has not undergone observable decomposition is excluded from soil and may be described separately.

Suitability Index (SI): An index of the relationship between the condition of an individual variable within an assessment model and reference standard conditions. Suitability Indices are scaled from 0.0 to 1.0. An SI of 1.0 indicates the condition of the variable is optimum. Suitability Indices are combined in equations to produce an overall FCI for a function.

Value of wetland function: The relative importance of a wetland function or functions to an individual, group, community, or society.

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Variable: An attribute or characteristic of a wetland ecosystem or the surrounding landscape that influences the capacity of the wetland to perform a function. Within the HGM model framework, variable are measured and their values are combined in logical equations to produce FCIs that reflect wetland condition/resource value.

Watershed: The geographic area in which surface water would flow or run off into the wetland.

Wet meadows: possess a treeless plant community on wet soil dominated by broad-leaved, herbaceous plants with lesser amounts of grasses and sedges. Wet meadows are common as a narrow band along the shores of shallow lakes, along stream margins, and at the edges of marshes. Wet meadows differ from marshes because they grow in wet soil but not in standing water, and they differ from prairies because they are not dominated by grasses.

Wetland assessment area (WAA): The wetland area in which a functional assessment is conducted. In many instances it will be synonymous with the project area.

Wetland ecosystems: In 404: "……. areas that are inundated or saturated by surface or ground water at a frequency and

duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (Corps Regulation 33 CFR 328.3 and EPA Regulations 40 CFR 230.3). In a more general sense, wetland ecosystems are three-dimensional segments of the natural world where the presence of water at or near the surface creates conditions leading to the development of redoximorphic soil conditions, and the presence of a flora and fauna adapted to the permanently or periodically flooded or saturated conditions.

Wetland functions: The normal activities or actions that occur in wetland ecosystems, or simply, the things that wetlands do. Wetland functions result directly from the characteristics of a wetland ecosystem and the surrounding landscape, and their interaction.

Wetland restoration: The process of restoring wetland function in a degraded wetland. Restoration is typically done as mitigation.

Wetland: In Section 404 of the Clean Water Act "…areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." The presence of water at or near the surface creates conditions leading to the development of redoximorphic soil conditions, and the presence of a flora and fauna adapted to the permanently or periodically flooded or saturated conditions.

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APPENDIX D

Guidelines to determine if a wetland system needs to be broken into separate Wetland Assessment Areas (WAA's).

Situation 1: Wetland narrows to a Stream Channel
Description: After the narrowing point, there is no dominance of wetland vegetation or hydric soils outside the channel or beyond the limits of the stream channel and bank.
Decision: The point at which the wetland narrows to the stream channel is the downstream limit of that wetland evaluation unit. The evaluator will need to determine if a break is needed based on field assessment.

Situation 2: Wetland is bisected by an active railroad or a one or two lane road
Situation 2a:
Description: Properly sized culverts or a bridge allow the free flow of surface water from one side to the other. **Decision:** Evaluate the wetland area on each side of the road as a single wetland evaluation unit.

Situation 2b:
Description: Undersized culvert or properly sized culvert is blocked; culvert is perched above the water surface, or no culvert present. In these instances, there may be different vegetation types and hydrology on each side of the road.
Decision: Evaluate the wetland areas on each side of the road as two separate wetland evaluation units.

Situation 3: Wetland is bisected by an abandoned railroad or a road
Description: The wetland is traversed by an abandoned railroad or a road.
Decision: Evaluate the wetland areas on both sides of the road/abandoned railroad as a single wetland evaluation unit **unless there is an obvious hydrologic disconnection between the two sides**, e.g., no culverts or bridges, and distinctly different vegetation classes on each side of the Class 6 road/abandoned railroad.

Situation 4: Wetland is cut by four-lane or larger highway

Situation 4a:
Description: The highway is elevated and spans the entire wetland complex, and there is no obvious interruption to wetland hydrology
Decision: Consider the wetland on both sides of the highway as a single wetland evaluation unit.

Situation 4b:
Description: The highway crosses through the wetland on fill and there are no culverts or bridges allowing the free flow of water or there are inadequately sized culverts.
Decision: Consider the wetland areas on each side of the highway to be two separate evaluation units.

Situation 5: Wetland crosses a town boundary
Description: Wetland extends across a town line or watershed boundary
Decision: Evaluate the wetland complex as a single unit regardless of the boundaries.

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Situation 6: Wetland is directly adjacent to a river or stream

Situation 6a:
Description: Wetland is associated with a 1st, 2nd 3rd or 4th order stream
Decision: The stream and associated wetland(s) are considered to be a single wetland unit for evaluation. Only include the stream reach between the beginning and end points for the wetland

Situation 6b:
Description: Wetland is associated with a 5th order or larger stream.
Decision: Evaluate the wetland areas on each side of the river as separate wetland evaluation units. Include any part of the river that is less than 6.6ft deep (i.e., include any water with aquatic bed vegetation) in the evaluation area. **Use your judgment; based on field checking, to decide if the wetland on both sides of the river should be evaluated as a single unit (some 5th order streams may be quite shallow).**

Situation 7: Wetland is associated with a lake that is classified as Lacustrine
Description: Wetland is connected to a lake, classified as Lacustrine (e.g., L1UBH) on NWI maps (depth greater than 6.6ft).

Decision A: If the wetland areas cumulatively occupy less than 1/3 of the surface area of the adjacent deepwater habitat, identify separate "fringe" wetland evaluation units. These units may be formed by bays, coves and other similar shoreline features. Include any adjacent deepwater that is less than 6.6ft deep - i.e., include any water with aquatic bed vegetation directly out from the lakeshore end of the wetland evaluation unit.

Decision B: Where the wetland areas around a lake occupy more than 1/3 of the surface area of the deepwater habitat, evaluate all wetland areas surrounding the water body as a single evaluation unit and include the area of water as part of the evaluation unit.

Situation 8: Wetland contains a portion of older aged mature trees (avg. >30in dbh)
Description: The wetland project area contains a young stand and an older aged or old growth stand with trees averaging over 30 inches dbh.

Decision A: If the young and old wetland areas are easily delineated, identify separate wetland evaluation units. Conduct sampling separately within each WAA.

Review Additional Map Data

a. Next review the **hydric soils** together with NWI data and identify areas of hydric soils beyond the NWI boundaries that may need to be field checked to confirm that these areas are wetlands. The TDEC Predicted Wetlands Tool is available to assist in this review: https://experience.arcgis.com/experience/a7f5e5149e654b4f9ab5fa8a977d0fac/page/Predicted-Wetlands/

b. Review **aerial photos** that can provide additional information prior to field evaluation. It is best to use spring leaf-off photos for this step.

c. Use all of the above data to refine the wetland boundary.

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Field check wetland site to the extent possible

a. Field checking is an important next step to establishing wetland evaluation units. Pay particular attention to wetland units whose continuity is not clear from mapped information.

b. After following the guidance above, you may find that after field analysis the wetland evaluation unit may need to be changed in order to more accurately reflect the functions and values of the entire wetland. For example, if the field visit shows that hydrology is not being significantly impaired by a road, railroad, or trail bridge crossing, then you may end up combining two units you previously separated. The reverse may be true if plant community characteristics indicate that the wetland is so impaired that it is effectively acting as two separate units with very different functional values.

c. Keep in mind both historic conditions prior to human disturbance as well as future conditions that may arise from restoration or enhancement efforts. Are the separate units of a wetland complex irreparably distinct? Or could they act as a fully functioning unit after being restored? Are most of the wetland functions completely different among the units? Or is there only one or two that is being affected by the artificial separation?

d. Adjust the wetland size (larger or smaller) based on field checking.

e. When field checking wetlands for determining evaluation units, you can make more efficient use of your time in the field by conducting wetland evaluation at the same time. Section 3 describes what to look for in the field.

Note: Be sure to secure landowner permission before accessing properties to field check wetlands.

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APPENDIX E

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