Rapid Ecological Integrity Assessments of Wetlands in Riparian Areas in Maryland: Piedmont Region

Data Sheet, Field Guidance, and Scoring Tables

Project/Site Name:_____ **City/County:**_____ **Sampling Date:**_____

Assessment Area Name (if >1 AA): _____ **Observer(s):**_____

Delineation performed: ☐previously ☐ concurrently **Lat/Long:** _____ **AA size:** _____ **units** _____

GENERAL GUIDANCE AND PROCESS

-This Ecological Integrity Assessment uses information collected in the field and from online sources/imagery. **Additional background and information can be found in the referenced sections of the "Field Manual for Rapid Ecological Integrity Assessments of Wetlands in Riparian Areas in Maryland: Piedmont" (Manual).**

-**Review** the metrics, guidance, and example photos in the Manual. **Prepare for the site visit** by reviewing aerial imagery (recent and historical if available), mapped soil characteristics for the site, mapped wetlands, and topography, including LiDAR Hillshade imagery, using the Maryland Watershed Resources Registry or other sources (Section 2). Carry out the Landscape Assessment (Section 3) before you go into the field if the project area boundary is known.

-Use this packet to carry out the procedures indicated to collect data. Record your data where indicated, using the check boxes to indicate features present and filling in other required information where needed. Use the data that you record and the scoring tables in this document to determine a score for each metric. Enter all scores on the final Scoring Form and follow the Manual instructions to calculate the Final Score.

-An Excel sheet is also available for data entry. Some fields will automatically fill in if the wetland delineation Excel sheet and the AA assessment data sheet are both open. Further instructions can be found on the Excel sheet.

-Scoring can vary due to the conditions expected for different Key Wildlife Habitats (Section 4.3). **Be sure to use the sections of the tables that correspond to the Key Wildlife Habitat being evaluated**.

-**NOTE:** All of the characteristics described for a given score category may not be present. **Assign the score to the category with the majority of features present.**

ASSESSMENT AREA DETERMINATION (Section 2)

The first step is to identify the wetland assessment area (AA) or areas on the project site. AA(s) are located within or adjacent to the proposed stream restoration project footprint. Each AA should be evaluated and scored separately. Refer to Section 2 in the Manual for further information on how to determine AA boundaries. Use imagery in addition to field observations. An AA should be composed of only one Key Wildlife Habitat, consistent with guidance for wetland determinations to sample a single vegetation community or major landscape unit. Field data collection in the AA is carried out using a site walkthrough approach.

LANDSCAPE ASSESSMENT (Section 3)

Watershed features can impact habitat quality for the organisms in the project area. Natural habitats provide the greatest benefit for wetland buffers, which play a critical role in the condition of the wetland relative to key abiotic and biotic factors. One Landscape Assessment is done for the entire project area and will apply to each AA in the project area. **Most of the landscape-level assessments will be done in the office** using mapped features and aerial imagery as described in the Manual. However, additional features noted in the field that are not visible on available imagery may affect the assessment. **In the field, as you are traveling to and assessing the AA, make note of the features described below to supplement the in-office assessment related to the buffer, presence of other wetlands, and size of the AA. Record these observations in the space on the next page.** If access to the buffer area is limited, scoring will need to rely more on aerial imagery as described in the Manual. Using in-office evaluations and any modifications or additions noted in the field, fill in the check boxes and values on the next page and on the Scoring Form (Sections 3.5 and 5.1) to capture the information and to assign scores. In the next section (Section 4.1), you will describe the full AA.

Landscape Features	Assess out to this distance from the outer edges of the proposed stream restoration project area (all AA are included in project area):	Note these features below for use with information from aerial imagery:
Buffer Perimeter	10m (33 feet)	Natural and altered habitats (see table)
Buffer Condition	100m (330 feet)	Natural and altered habitats (see table)
Aquatic Context	300m (1000 feet)	Small-scale wetlands, such as Springs or Vernal Pools, or streams that may not be evident from aerial imagery or are newly formed
Comparative Size	n/a- assessment occurs for each AA in the project area	Deviations from aerial imagery that could affect wetland size estimation; source(s) of size reduction of the AA such as roads, impoundment, development, etc.

Examples of Land Covers Included in Natural Buffers	Examples of Land Covers Excluded from Natural Buffers (Altered Habitats)
Natural plant communities; naturally vegetated rights-of-way; natural swales and ditches; natural open water features including rivers, streams, and ponds created by beaver activity; wetlands	Parking lots; commercial and private developments and structures; roads (all types); intensive agriculture; intensive plantations; orchards; vineyards; railroads; planted pastures; planted hayfields; animal pastures; lawns; sports fields; traditional golf courses; fallow farm fields; ditches; stormwater ponds; ponds formed by unnatural blockages; culverts

Field observations to assist with scoring of buffers, aquatic context, or size of AA:

METRIC	**SCORE** (applies to all AA in project area)
Buffer Perimeter: **%Natural:** _____ 4 = Excellent: >95% 3 = Good: 85-95% 2 = Fair: 75-84% 1 = Poor: <75%	
Buffer Condition: **%Natural:** _____ 4 = Excellent: >90% 3 = Good: 75-90% 2 = Fair: 50-74% 1 = Poor: <50%	
Aquatic Context: **Number of aquatic resources**: _____ 4 = Excellent: 4 or more aquatic resources 3 = Good: 3 resources 2 = Fair: 2 resources 1 = Poor: 0-1	
*Comparative Size (*see Manual for scoring*):* ☐ Very large ☐ Large ☐ Medium to small ☐ Small to very small	

Source(s) of size reduction, if any: ☐ Beaver dam or lodge ☐ Trail ☐ Road ☐ Railroad ☐ Development ☐ Agriculture ☐ Impoundment ☐ Human-constructed drainage (into or out of wetland) ☐ Excavation ☐ Fill ☐ Groundwater extraction ☐ Other _____

From StreamStats: Impervious Surface in project area basin: _____ Forest Cover in project area basin:_____ %limestone geology: _____
Additional channels in project area visible on LiDAR Hillshade image:

SITE DESCRIPTION AND ENVIRONMENTAL INFORMATION (Section 4.1)

Provide a detailed description of the assessment area, including the features listed below. A sketch may be helpful.

Site Description: (general landscape setting, overview of riparian corridor, presence of braided/multithread system, topography including karst, vegetation patterns, complexity and habitat richness; human and natural disturbance as indicated by spoil piles, beaver activity, dumping, vegetation removal, pest impacts, excessive flow; description of adjacent stream and sources/evidence of water input or alterations such as culverts, roads/trails, sediment). Representative site photographs of soil, nearest stream channel and banks, and vegetation are useful to show the features present.

ENVIRONMENTAL INFORMATION (Section 4.2)

Note Landscape Position, Water Source, and Hydrological Regime for the AA. If there is more than one water source, rank as P (primary), S (secondary), and T (tertiary). The Hydrological Regime usually matches the mapped wetland type. Definitions for Hydrological Regime are provided in the Manual (Table 11).

Landscape Position: Indicate all features present.

☐ Active floodplain (depression or terrace)	☐ Beaver pond/Natural impoundment	☐ Riparian-Depression (in floodplain)	☐ Riparian terrace (outside seasonal flooding; historic floodplain or current terrace)
☐ Headwater stream/spring	☐ Seep/groundwater discharge site (toe slope)	☐ Swale	☐ Isolated Depression
☐ Oxbow	☐ Wetland charged by groundwater seeps (hill slope)	☐ Streambank	☐ Point bar
☐ Flats	☐ Braided Channels	☐ Other- describe	

Water Source: If more than one source is present, label as P (primary), S (Secondary), T (tertiary)

☐ Direct precipitation	☐ Groundwater discharge	☐ Natural surface flow	☐ Urban run-off/culverts
☐ Overbank flooding	☐ High groundwater	☐ Irrigation	☐ Pipes/outfall (directly feeding wetland)

Hydrological Regime: Circle the regime that best matches the conditions in the AA (see Manual for definitions)

H Permanently Flooded	G Intermittently Exposed	F Semipermanently Flooded	C Seasonally Flooded	E Seasonally Flooded-Saturated
B Seasonally Saturated	D Continuously Saturated	A Temporarily Flooded	I Intermittently Flooded	K Artificially Flooded

Observations/Comments:

ASSIGNMENT OF AA TO KEY WILDLIFE HABITAT (Section 4.3) and Vegetation Indicators

Use the key below to determine the Key Wildlife Habitat (KWH) and HGM class for the AA. Also indicate the stream type and, if possible, the community type/plant association. See the Manual for photos and complete descriptions. Lists of typical species in each stratum by KWH and indicator species by KWH are listed below. These species lists may assist with KWH selection and will be used in the KWH and Vegetation Composition metrics in Section 4.6.

Key Wildlife Habitat: _____ HGM Class: _____
Optional: NVC Community Type/Plant Association: _____
Stream Key Wildlife Habitat Type: ☐Piedmont Stream ☐ Coldwater Stream ☐ Limestone Stream ☐ Piedmont River

1a. Wetlands bordering streams and rivers with overland, non-tidal flooding regimes (i.e., floodplains). Distinct alluvial landforms (e.g., backswamps, levees, terraces) and indicators present (e.g., scour marks, recent sediment deposition, vegetation damaged/bent in one direction, soils with alternating deposits, channel banks with flood marks). Structurally and compositionally diverse vegetation present ranging from closed mixed forests to open, beaver-created pools with floating aquatics…**MONTANE-PIEDMONT FLOODPLAIN** HGM Class: Riverine

1b. Wetlands primarily controlled via groundwater discharge often associated with depressional and slope geomorphic features as well as the margins of small stream (1st and 2nd order) floodplain wetlands.

2a. Wetlands associated with toe slopes and floodplains of small streams of the Piedmont where groundwater discharge is a major contributing input source (mixed hydrological regime: occurs in very narrow part of the groundwater driven complex that is influenced by overbank flooding) with alluvial landform a minor part of the complex; smaller order stream floodplain margins where groundwater input also contributes to overall hydrology. These areas are generally small features along streams and are usually not as well-developed as seepage swamps in larger stream systems…**PIEDMONT SEEPAGE WETLAND (WET MEADOW/FEN)** HGM Class: Riverine or Slope

2b. Wetlands associated with distinct depressional and slope geomorphic features.

3a. Isolated basin wetlands, depressions, or very flat areas with evidence of ponded water, unidirectional flow not evident, lacks natural outlet, maintained by high water tables and seasonal precipitation. Hydrologic regimes range from saturated to seasonally flooded.

4a. Located over shallow bedrock or clay hardpans with seasonally perched water tables…**PIEDMONT UPLAND DEPRESSION SWAMP** HGM Class- Depression

4b. Small (<0.1 ha- 2 ha) shallow pools with a well-defined, discrete basin overlying a clay hardpan or other impermeable soil or rock layer impeding drainage, may or may not have vegetation in basin…**VERNAL POOL** HGM Class: Depression

3b. Slope wetlands associated with groundwater discharge zones (i.e., seeps, springs) and perennial, unidirectional flow towards a natural outlet such as a stream.

5a. Small (usually <1m^2), localized area of groundwater discharge coming from a point source…**SPRING** HGM Class: Slope

5b. Larger wetland systems with diffuse drainage patterns, widespread.

6a. Saturated forests of sloping small stream headwaters, large spring seeps, lateral seeps in ravines and rocky stream bottoms with diffuse drainage patterns. Perennial seepage flow allows for year-round saturation. Braided stream channels, muck-filled depressions, areas of coarse gravel and cobble deposition, and hummock-and-hollow microtopographic features evident…**MONTANE-PIEDMONT SEEPAGE SWAMP** HGM Class: Slope or Riverine

6b. Open, graminoid-dominated meadows and shrub swamps of Piedmont hillside toeslopes and margins of small stream floodplains where saturated conditions persist due to groundwater discharge. Surficial soils predominately organic muck…**PIEDMONT SEEPAGE WETLAND (WET MEADOW/FEN)** HGM Class: Riverine or Slope

Species by vegetation stratum that represent those with high constancy values (>75%) for the more common finer community types (i.e., association level) of Key Wildlife Habitats. Indicator species are those with a high diagnostic value to type, high fidelity, and high relative cover.

Key Wildlife Habitat	Trees	Shrubs	Herbs	Vines	Indicator
Montane-Piedmont Floodplain (Piedmont section)	*Platanus occidentalis, Juglans nigra, Acer negundo, Acer rubrum, Ulmus americana, Liriodendron tulipifera, Fraxinus pennsylvanica, Carya cordiformis, Celtis occidentalis, Quercus bicolor, Quercus palustris, Nyssa sylvatica*	*Lindera benzoin, Asimina triloba, Ilex opaca, Ilex verticillata, Carpinus caroliniana*	*Hydrophyllum canadense, Ranunculus abortivus, Amauropelta (Thelypteris) noveboracensis, Mitchella repens, Arisaema triphyllum, Boehmeria cylindrica, Saururus cernuus, Cinna arundinacea, Galium circaezans, Medeola virginiana, Thalictrum thalictroides, Impatiens capensis, Glyceria striata*	*Toxicodendron radicans, Parthenocissus quinquefolia, Campsis radicans*	*Platanus occidentalis, Fraxinus pennsylvanica, Acer rubrum/negundo, Boehmeria cylindrica, Impatiens capensis, Arisaema triphyllum*
Piedmont Seepage Wetland (Wet Meadow/ Fen)	*Acer rubrum, Salix nigra (trees may not be present)*	*Lindera benzoin, Rosa palustris, Viburnum dentatum, Alnus serrulata, Spirea spp.*	*Carex stricta, Symplocarpus foetidus, Impatiens capensis, Onoclea sensibilis, Cinna arundinacea, Leersia oryzoides, Juncus effusus, Thelypteris palustris, Scirpus cyperinus, Persicaria (Polygonum) spp.*		*Carex stricta, Symplocarpus foetidus, Salix nigra*
Piedmont Upland Depression Swamp	*Quercus phellos, Quercus palustris, Quercus michauxii, Quercus bicolor, Fraxinus pennsylvanica, Acer rubrum, Nyssa sylvatica*		*Carex spp.*	*Smilax rotundifolia*	*Quercus phellos, Quercus michauxii, Quercus palustris*
Montane-Piedmont Seepage Swamp (Piedmont section)	*Nyssa sylvatica, Acer rubrum, Liriodendron tulipifera, Magnolia virginiana, Fraxinus americana, Fraxinus pennsylvanica, Carpinus caroliniana*	*Vaccinium corymbosum, Rhododendron viscosum, Ilex verticillata, Viburnum nudum, Viburnum dentatum, Alnus serrulata, Lindera benzoin, Rubus hispidus*	*Symplocarpus foetidus, Veratrum viride, Osmundastrum cinnamomeum, Impatiens capensis, Pilea pumila, Carex folliculata, Chelone glabra, Amauropelta (Thelypteris) noveboracensis, Osmunda regalis, Viola cucullata, Thalictrum pubescens, Arisaema triphyllum, Glyceria striata, Cinna arundinacea, Boehmeria cylindrica, Lycopus virginicus*	*Smilax rotundifolia, Toxicodendron radicans, Parthenocissus quinquefolia*	*Sphagnum spp., Symplocarpus foetidus, Veratrum viride, Magnolia virginiana*
Vernal Pools and Springs have limited to sparse herbaceous and/or shrub vegetation in the wetland basin. Some Springs have *Sphagnum* species. The surrounding vegetation will represent one of the KWH listed here. Vernal Pools and Springs are most likely to be embedded in Montane-Piedmont Floodplain, Montane-Piedmont Upland Depression Swamp, or Montane-Piedmont Seepage Swamp.					

SOIL/SUBSTRATE (Section 4.4)

Healthy soil function supports plant life and biogeochemical processing for nutrient storage and transformation. Surface features such as changes in elevation over a small area (microtopography) can add to the complexity of the habitat and increase biodiversity, and organic matter accumulation and nutrient dynamics are influenced by leaf litter and ground cover. Disturbance of the surface layer increases the potential for erosion or sedimentation. Prior to fieldwork, mapped soil characteristics for the site should be reviewed. Note any deviations from these characteristics below as well as indications of soil compaction and disturbances. Depth to water table and/or extensive roots in the soil should be noted. Examine a soil sample to determine all of the standard measures below unless the floodplain does not naturally have hydric soils and/or does not have functioning hydric soils under current conditions. Check off the features present and use them to assign a score for each metric below. Note the presence of a gravelly substrate in the Observations/Comments section.

Note: if the floodplain does not naturally have hydric soils and/or does not have functioning hydric soils under current conditions, only score Microtopography and Organic Matter Accumulation, and Soil Disturbance.

Mapped Soil Type:_____ **Depth to water table** _____ **Hydric soil?**_____ **Hydric soil indicators**_____
Depth of O horizon _____ **Depth of A horizon** _____ **Extensive roots in soil?** _____ **Soil Matrix Hue Value/Chroma**_____
Note any deviations from the characteristics described for the mapped soil type for this AA and potential causes. Describe any impacts to the soil surface such as trampling/compaction from animals or machinery, ruts or other disturbances from ATV or other vehicular activity, or sedimentation.
Observations/Comments (including for metrics below):

Soil Biogeochemical Processing:

Redox concentrations: >10% surface area and ☐ start 0-6" from soil surface ☐ start >6-12" ☐ start >12-18"
<10% surface area and ☐ start 0-6" from soil surface ☐ start >6-12" ☐ None within 18"

Soil Organic Matter: ☐ Horizon present (any thickness) ☐ Mineral surface layer(s) ≥ 4" thick with matrix value ≤3 and chroma ≤2
☐ Mineral surface layer <4" thick and ☐ Matrix value ≤3 and chroma ≤2 ☐ Matrix value >3 and ≤4 or chroma >2 and ≤3

Microtopography: ☐ ≥50% of Assessment Area ☐ 30-49% of AA ☐10-29% of AA ☐ <10% of AA

Organic Matter Accumulation: **Organic Matter Accumulation**: Estimated ground cover of herbaceous/woody plants (living and dead residue): _____%
Estimated cover of leaf litter (loose leaves must be at least 1" thick or decaying leaves must have at least 5 stacked layers): _____%
% herbaceous/woody + % leaf litter: ☐ >75% ☐ >50-74% ☐>25-50% ☐ ≤25%

Soil Disturbance: Presence of bare soil due to human activities: ☐ None/minimal ☐ Minor/small patches ☐ Moderate ☐ Substantial
Extent of impact of disturbance: ☐None ☐ Minimal ☐ Moderate ☐ Extensive
Depth of disturbance and ponding/channeling: ☐ None ☐ <2" ☐ 2-4", some ponding/channeling ☐ >4", ponding/channeling

Redox Concentrations -Do not score if the floodplain does not naturally have hydric soils and/or does not have functioning hydric soils under current conditions (e.g., relict conditions). Consider depth to groundwater and if other water sources are altered or still sufficient to contribute to reducing conditions. **Extract a sample that is 18" deep from a representative area of the AA** where the soil has not obviously been disturbed. You may need to break open the soil sample to effectively see the rusty red redox concentrations. See Manual for guidance related to scoring soils with red parent material or other problematic soils.

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Biogeochemical cycling excellent, with redox concentrations starting 0 to 6" from the soil surface and covering >10% of the surface area.
Good = 3	Biogeochemical cycling good, with redox concentrations starting >6" to 12" from the soil surface and covering >10% of the surface area OR redox concentrations start 0-6" from the soil surface and represent <10% of the surface area.
Fair = 2	Biogeochemical cycling fair, with redox concentrations starting >12" to 18" from the soil surface and covering >10% of the surface area OR redox concentrations start >6" to 12" from the soil surface and represent <10% of the surface area.
Poor = 1	Biogeochemical cycling poor, with redox concentrations starting >12" to 18" from the soil surface and covering <10% of the surface area OR no redox concentrations within 18" of the soil surface.

Soil Organic Matter- Do not score if the floodplain does not naturally have hydric soils and/or does not have functioning hydric soils under current conditions. Consider depth to groundwater and if other water sources are altered or still sufficient to contribute to reducing conditions. **Examine the extracted soil sample** for an organic surface horizon or determine features of the mineral surface layer(s).

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Organic surface horizon present (any thickness).
Good = 3	Mineral surface layer(s) are ≥4" thick with Matrix value ≤3 and chroma ≤2.
Fair = 2	Mineral surface layer(s) are <4" thick with matrix value ≤3 and chroma ≤2.
Poor = 1	Mineral surface layer(s) are <4" thick with matrix value >3 and ≤4 or chroma >2 and ≤3.

Microtopography- Estimate the percent of the AA with an elevation change of at least 3" due to soil elevations and woody debris in an advanced stage of decomposition. Microtopography is often present as vegetated hummocks, raised areas that support tree trunks and roots, or nursery logs.

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	More than 50% of the AA shows at least a 3" increase in elevation over the base elevation of the AA.
Good = 3	30-49% of the AA shows at least a 3" increase in elevation over the base elevation of the AA.
Fair = 2	10-29% of the AA shows at least a 3" increase in elevation over the base elevation of the AA.
Poor = 1	<10% of the AA shows at least a 3" increase in elevation over the base elevation of the AA.

Organic Matter Accumulation- Organic Matter Accumulation- Indicators will vary with season and KWH. **Estimate the percent cover** of herbaceous and woody plants, both living and dead residue. **Estimate how much of the AA is covered by >1" of loose leaf litter OR by at least 5 stacked layers of decaying or wetted leaves.** When leaf litter depth is naturally lower, pick apart decaying or wetted leaves to determine if there are 5 or more stacked layers and estimate percent coverage.

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Organic matter accumulation from root turnover/leaf litter is high as herbaceous and woody plant ground cover plus leaf litter covers >75% of the surface. To count towards coverage, loose leaves must be at least 1" thick or decaying leaves must have at least 5 stacked layers.
Good = 3	Organic matter accumulation from root turnover/leaf litter is moderate as herbaceous and woody ground cover plus leaf litter covers >50-74% of the surface. To count towards coverage, loose leaves must be at least 1" thick or decaying leaves must have at least 5 stacked layers.
Fair = 2	Organic matter accumulation from root turnover/leaf litter is low as herbaceous and woody ground cover plus leaf litter covers >25-50%. To count towards coverage, loose leaves must be at least 1" thick or decaying leaves must have at least 5 stacked layers.
Poor = 1	Organic matter accumulation from root turnover/leaf litter is minimal as herbaceous or woody ground cover plus leaf litter covers ≤25%. To count towards coverage, loose leaves must be at least 1" thick or decaying leaves must have at least 5 stacked layers.

Soil Disturbance- Note impacts to the soil surface as indicated by bare soil, unless caused by natural factors or the soil is naturally bare. Look at the extent of impact across the AA and the greatest depth of the impact (including ponding or channeling of water).

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Little bare soil OR bare soil and soil disturbed areas are limited to naturally caused disturbances such as flood deposition, game trails, beaver activity, etc. OR soil is naturally bare. No human-caused impacts evident.
Good = 3	Minor amounts or localized, small patches of bare or disturbed soil are present from factors such as cattle trampling or heavy grazing that leads to erosion, compaction or trampling by machinery, ruts or other disturbances from ATV or other vehicular activity, sedimentation due to human causes, or invasive earthworms. Extent of impact is minimal and greatest depth is limited to a few centimeters (a few inches) and does not show evidence of ponding or channeling of water.
Fair = 2	Moderate amounts of bare or disturbed soil are present due to human-caused activities. Extent of impact is moderate and greatest depth may extend 5–10 cm (2–4 inches), with localized deeper ruts. Shows some evidence of ponding or channeling of water.
Poor = 1	Substantial amounts of bare or disturbed soil are present due to human-caused activities. Impact is extensive with long-lasting impacts. Greatest depth of impact extends > 10 cm (4 inches); deeper ruts may be widespread and show some evidence of extensively altering hydrology (e.g., ponding or channeling of water).

HYDROLOGY (Section 4.5)

Hydrology is a complicated ecological factor to measure during a rapid assessment, as the evaluation of one metric partly relates to another. In this section, two aspects of the hydrology of the AA are scored by indicating the presence of natural and altered features of the Water Source and Hydroperiod and Hydrologic Connectivity. The scoring for these metrics varies depending on the type of KWH, so make sure you are using the correct scoring table. The Stream Bank and Channel metric, in contrast, is assessed for the entire project area using indicators of alteration as well as stabilization and recovery. Check boxes will capture features for scoring mentioned in the sections below. Obstructions, alterations, and point source discharges may be visible on aerial photos or other available imagery. LiDAR Hillshade images may assist with identifying existing channels and other relevant features.

Water Source (Section 4.5.1) This metric focuses on the forms and places of direct inputs of water to the AA, as well as any unnatural diversions of water from the AA or other features that affect saturation of the wetland. **Focus on the main source of water for this evaluation and use the scoring table for the correct KWH.** Note evidence of natural and unnatural/manipulated characteristics using the check boxes. Consider whether alterations are recent and if they are currently having a negative effect. Beaver activity, although it may have caused changes, should be considered as a natural change for scoring.

Water Source

☐ **Natural**: ☐ Sheet flow present ☐ Natural narrow channel present ☐ Mimics natural hydrology ☐ Coldwater spring flow ☐ Groundwater input ☐ Expected overbank flooding ☐ Expected plant community ☐ Other _____

☐ **Unnatural/Manipulated**: ☐ Impoundment ☐ Inflow from anthropogenic sources ☐ Fill ☐ Ditching ☐ Channelization ☐ Confined to small outlet ☐ Lost water sources due to alterations ☐ Multiple sources and some degraded ☐ Incised and no longer floods ☐Other_____

Point Source Discharge (into or adjacent to site): ☐ Lacking ☐ Minor ☐ Moderate ☐ Major

Unnatural Obstructions (to ground or surface water): ☐ None ☐ Minor (<25%) ☐ Moderate (25-75%) ☐ Major (>75%)

Alteration to: ☐Overland Flow ☐ Groundwater ☐ Overbank Flooding ☐ Plant Community ☐ Wetland Extent input

Timing: ☐ Recent (within 5 years) ☐ Historic ☐ Permanent hydrologic change

Negative effect: ☐ AA Flow and circulation ☐ Redirects or confines flows into/through AA ☐ Reduced water table ☐ Reduced inundation ☐ None

Observations/Comments:

Montane-Piedmont Floodplain: Groundwater discharge not a major input. For scoring, note stream bank alterations that will affect the riparian water source.

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Water source is natural. Lacks point charge discharges into or adjacent to the site. No unnatural obstructions to water source or impact on overland flow and overbank flooding. Plant community reflective of characteristic KWH or not altered by natural changes to water source.
Good = 3	Water source is mostly natural, but wetland directly receives occasional or small amounts of inflow from anthropogenic sources such as some road runoff, small storm drains, or other minor point source discharges emptying into the wetland. Up to 25% of stream banks are affected due to dikes, rip rap and/or elevated culverts, or there is increased discharge due to other causes. Little change in plant community resulting from unnatural alterations.
Fair = 2	Water sources are moderately impacted by anthropogenic sources but are still a mix of natural and non-natural sources. Between 25-75% of stream banks are affected (e.g., dikes, rip rap, concrete, and elevated culverts) or increased discharge due to other causes. Wetlands still present due to groundwater or other water inputs, but potentially reduced in extent and showing some plant community changes; or plant community changes due to increased unnatural water inputs.
Poor = 1	Water source contains a substantial amount of inflow from anthropogenic sources, such as major point source discharges into or adjacent to the wetland. > 75% of stream banks are affected (for example due to dikes, rip rap, concrete, and elevated culverts) or increased discharge due to other causes. Wetlands are reduced in extent unless high groundwater or other surface water inputs maintain them. Plant community changes are observed due to unnatural water inputs.

Montane-Piedmont Floodplain: Mixed hydrologic regime with some input from groundwater and from precipitation or limited flooding

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Water source is natural. Lacks point charge discharges into or adjacent to the site. No unnatural obstructions to lateral or vertical movement of ground or surface water. Plant community reflective of characteristic KWH or not altered by natural changes to water source.
Good = 3	Water source is mostly natural, but wetland directly receives occasional or small amounts of inflow from anthropogenic sources such as some road runoff, small storm drains, or other minor point source discharges emptying into the wetland. Minor restrictions to the lateral or vertical movement of ground or surface waters by unnatural features. Little change in plant community resulting from unnatural alterations.
Fair = 2	Water sources are moderately impacted by anthropogenic sources, but are still a mix of natural and non-natural sources. Wetland is still connected to its natural water source (e.g., modified ponds on a floodplain that are still connected to alluvial aquifers, natural stream channels that now receive substantial irrigation return flows, many small/few large storm drains), but moderately disconnected from floodplain due to multiple geomorphic modifications. Moderate restrictions to the lateral or vertical movement of ground or surface waters by unnatural features. Wetlands still present due to groundwater or other water inputs, but limited reduction in extent and showing some plant community changes; or some limited plant community changes due to increased unnatural water inputs.
Poor = 1	Water source contains a substantial amount of inflow from anthropogenic sources, such as major point source discharges into or adjacent to the wetland. Wetland has reduced connection to natural water source (e.g., loss of overbank flow). Wetlands are potentially reduced in extent if no other surface water inputs maintain them. Plant community changes are observed due to unnatural water inputs.

All other KWH: Predominantly groundwater or precipitation water source, with potential limited flooding from small stream in relation to wetlands in riparian system

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Water source is natural. Lacks point charge discharges into or adjacent to the site. Groundwater or precipitation dominant or only water source; otherwise, no unnatural obstructions to lateral or vertical movement of ground or surface water, or, if perched water table, impermeable soil layer is intact. Plant community reflective of characteristic KWH or not altered by natural changes to water source.
Good = 3	Water source is mostly natural, but wetland directly receives occasional or small amounts of inflow from anthropogenic sources such as some road runoff, small storm drains, or other minor point source discharges emptying into the wetland. Minor restrictions to the lateral or vertical movement of ground or surface waters by unnatural features, such as levees or excessively high banks (less than 25% of the site). If perched, impermeable soil layer partly disturbed. Little change in plant community resulting from water source alterations.
Fair = 2	Water source is moderately impacted by anthropogenic sources, but still a mix of natural and non-natural sources. Moderate restrictions to the lateral or vertical movement of ground or surface waters by unnatural features or alteration. Between 25-75% of the site is restricted by barriers to drainage. If perched, impermeable soil layer moderately disturbed. Drainage back to the wetland is incomplete due to impoundment. Wetlands still present due to groundwater or other water inputs, but limited reduction in extent and showing some plant community changes; or some limited plant community changes due to water source alterations.
Poor = 1	Water source contains a substantial amount of inflow from anthropogenic sources, such as major point source discharges into or adjacent to the wetland. Most or all water stages are contained within artificial banks, levees, or comparable features. Greater than 75% of wetland is restricted by barriers to drainage. If perched, impermeable soil layer strongly disturbed. Wetlands reduced in extent and show plant community changes due to water source alterations.

Stream Bank and Channel (Section 4.5.2) Indicate the characteristics of the stream bank and channel for the project area using the check boxes below and additional lines as needed, including evidence of equilibrium, signs of recovery, channel and bank instability and their sources. **This score will apply to all AA in the project area.** Examples of field indicators of equilibrium, degradation, and aggradation are presented in the table at the end of this section. If available, indicate the Bank Erosion Hazard Index (BEHI) score, Near Bank Stress (NBS) score, and modeled inundation from storm events and use them in your scoring process. Use online resources (Section 3.1) to fill in the Benthic Index of Biotic Integrity (IBI) and Fish IBI Values and Ratings if available.

Stream Bank and Channel

Evidence of bank/channel equilibrium: ☐ Recovering to meander ☐ Low energy stream with bare banks ☐ Variety of pool depths ☐ Variety of stream velocities ☐ Visual flow of water from channel banks or wetlands (groundwater flow) ☐ Embedded woody debris of size and amount consistent with what is available in riparian area ☐ Well-defined usual high water line with obvious floodplain ☐ Little or no active undercutting or burial of riparian vegetation ☐ Other _____

Evidence of channel instability/migration: ☐ Riparian vegetation buried ☐ Recent sediment or gravel deposited ☐ Active incision/downcutting ☐ Buried hydric soil and/or gravel layer and depth _____ ☐ Other _____

Overall channel instability: ☐None/minimal ☐ Minor ☐ Moderate ☐ Substantial

Sources of channel instability/migration: ☐ Lacks vertical controls (vegetation, wood, rock, etc.) ☐ Excessive channel deposition/bar development ☐Historic channel alteration ☐Proximity and landscape position presents potential impact to AA hydrology ☐ Other _____

Evidence of bank instability: ☐ Banks undercut, slides, and/or slumps ☐ Riparian vegetation declining ☐ Shrub/trees falling into channel ☐ Bank uniformly scoured and unvegetated ☐ Other _____

Overall bank instability: ☐ None ☐ Minimal ☐ Minor ☐ Moderate ☐ Substantial

Sources of bank instability: ☐ Vertical banks ☐ Highly erodible materials ☐ Raw unvegetated banks ☐ Excessive bedload ☐ Other _____

If available: Bank Erosion Hazard Index _____ Near Bank Stress _____

Aquatic Life: (if available for site or use nearest, most recent Biological Stream Survey point in stream):

Benthic IBI- Value _____ Rating: ☐ Good (≥ 4) ☐ Fair (3-3.99) ☐ Poor <3 Fish IBI- Value _____ Rating: ☐ Good (≥ 4) ☐ Fair (3-3.99) ☐ Poor <3

Observations/Comments:

Stream Bank and Channel in Project Area (score applies to all AA in project area)

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Indicators of channel equilibrium present. Minimal or no evidence of degradation or aggradation leading to channel instability or migration. Bank instability none or minimal. Channel is not unnaturally entrenched. If calculated, BEHI/NBS scores low.
Good = 3	Minor channel incision. Channel is somewhat entrenched (overbank flow occurs during most floods). Some evidence of degradation or aggradation leading to a minimal level of channel instability or migration. Minor bank instability. If calculated, BEHI/NBS scores low.
Fair = 2	Channel is incised. Channel is moderately entrenched (overbank flow only occurs during moderate to severe floods, functioning at risk). Uncharacteristic aggradation or degradation is present leading to a moderate level of channel instability or migration. Bank instability moderate. BEHI/NBS scores moderate.
Poor = 1	Channel is incised. Channel is substantially entrenched (overbank flow never occurs or only during severe floods-not functioning). Channel entirely or extensively disconnected from the floodplain. Bank instability substantial. BEHI/NBS scores high, very high, or extreme.

Hydroperiod and Hydrologic Connectivity (Section 4.5.3) This metric examines the characteristic frequency, level, and duration of wetland inundation or saturation, regardless of the source, and the ability of water to flow into or out of the wetland. **Use the scoring table for the correct KWH and check off what you observe below.** Estimate the hydroperiod variation based on visual indicators and soil redox. Indicators of changes in extent and duration of inundation or saturation are presented in the following table. If available, add information for storm interval flooding, Bank Height Ratio, and Entrenchment Ratio.

Hydroperiod and Hydrologic Connectivity

Natural variation of hydroperiod: ☐ Low ☐ High

Information Sources: ☐Visual indicators ☐ Monitoring Wells ☐ Hydrology/Hydraulic analysis ☐ Bank Height Ratio _____ Entrenchment Ratio _____

Overbank flooding (if available): ☐ 2-year storm ☐ 10-year ☐ 100-year

Degree of connection to floodplain: ☐ Complete **Disconnection/entrenchment**: ☐ Minimal ☐ Moderate ☐ Disconnected and/or severely entrenched

Evidence of overbank flooding: ☐ Recent ☐ Evidence of overbank flooding ☐ Some evidence, likely during large storm events ☐ Generally no longer occurs

Change/Alteration of hydroperiod: ☐None ☐ Due to natural events ☐ Due to human influences: ☐ Minor ☐ Moderate ☐ Substantial

☐ Backwater flooding or lateral movement affected by restrictions: List restrictions: _____

Observations/Comments:

Montane-Piedmont Floodplain Note: Recent beaver activity may lead to deviations from rating descriptions. This should be noted in the comments.

Low natural variation of hydroperiod _____ High natural variation of hydroperiod_____

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Evidence of recent overbank flooding. Completely connected to floodplain (backwater sloughs and channels). No major hydrologic stressors present that impact natural hydroperiod or impact due to natural events (e.g., beaver dams). No unnatural obstructions to lateral or vertical movement of ground or surface water.
Good = 3	Evidence of overbank flooding. Minimally disconnected from floodplain. Minor alterations in frequency, levels, or duration of hydroperiod. Minor restrictions to the lateral or vertical movement of ground or surface waters by unnatural features. Flooding at 2-year storm interval.
Fair = 2	Some evidence of overbank flooding, likely during larger storm events. Moderately disconnected from floodplain due to multiple geomorphic modifications. Moderate restrictions to the lateral or vertical movement of ground or surface waters by unnatural features. Moderate flooding at 10-year storm interval.
Poor = 1	Overbank flooding generally no longer occurs. Disconnected from floodplain, likely causing some drainage of groundwater. Flooding may or may not occur at 100-year or greater storm interval.

Other KWH

Low natural variation of hydroperiod _____ High natural variation of hydroperiod_____

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Overbank flooding present and recent but not predominant water source to wetland. No unnatural obstructions to lateral or vertical movement of ground or surface water.
Good = 3	Evidence of overbank flooding but not predominant water source to wetland. Hydroperiod with minor alterations in frequency, levels, or duration due to groundwater and other inputs. Minor restrictions to the lateral or vertical movement of ground or surface waters by unnatural features.
Fair = 2	Some evidence of overbank flooding, likely during larger storm events. Hydroperiod with moderate alterations in frequency, levels, or duration due to groundwater and other inputs. Moderate restrictions to the lateral or vertical movement of ground or surface waters by unnatural features.
Poor = 1	Overbank flooding generally no longer occurs. Hydroperiod with substantial alterations in frequency, levels, or duration due to groundwater and other inputs. Substantial restrictions to the lateral or vertical movement of ground or surface waters by unnatural features.

Condition	Field Indicators for Stream Bank and Channel and Hydroperiod for Montane-Piedmont Floodplain
Indicators of Channel Equilibrium	● The channel (or multiple channels in braided systems) has a well-defined usual high water line, or bankfull stage, that is clearly indicated by an obvious floodplain. A topographic bench represents an abrupt change in the cross-sectional profile of the channel throughout most of the site. ● The usual high water line (consistent with ACOE ordinary high water mark) or bankfull stage corresponds to the lower limit of riparian vascular vegetation. ● The channel contains embedded woody debris of the size and amount consistent with what is available in the riparian area. ● There is little or no active undercutting or burial of riparian vegetation.
Indicators of Active Degradation (Erosion)	● Portions of the channel are characterized by deeply undercut banks with exposed living roots of trees or shrubs. There are abundant bank slides or slumps, or the banks are uniformly scoured and unvegetated. ● Riparian vegetation may be declining in stature or vigor, and/or riparian trees and shrubs may be falling into the channel. ● The channel bed lacks any fine-grained sediment (unless it is the dominant bank material). ● Recently active flow pathways appear to have coalesced into one channel (i.e., a previously braided system is no longer braided).
Indicators of Excessive Aggradation (Sedimentation)	● The channel through the site lacks a well-defined usual high water line. ● There is an active floodplain with fresh splays of excessive sediment covering older soils or recent vegetation. ● There are partially buried tree trunks or shrubs. ● Excessive cobbles and/or coarse gravels have recently been deposited on the floodplain. ● There are partially buried, or sediment-choked, culverts.
Condition	**Hydroperiod Field Indicators for Other KWH Types**
Reduced Extent and Duration of Inundation or Saturation	● Upstream diversions, impoundments, pumps, ditching, or draining from the wetland. ● Water withdrawal (wells). ● Evidence of aquatic wildlife mortality. ● Encroachment of terrestrial vegetation. ● Encroachment of young, tall, vigorous trees if not usually present, shading of underlying mosses. ● Stress or mortality of hydrophytes or sphagnum.

	• Compressed or reduced plant zonation. • Organic soils occur well above contemporary water tables. • Increased discharges resulting in channel downcutting.
Increased Extent and Duration of Saturation	• Berms, dikes, or other water control features that increase duration of ponding (e.g., pumps). • Diversions, ditching, or draining into the wetland. • Late-season vitality of annual vegetation. • Recently drowned riparian or terrestrial vegetation (e.g., beaver-created impoundment). • Extensive fine-grained deposits on the wetland margins.

KEY WILDLIFE HABITAT AND VEGETATION COMPOSITION (Section 4.6)

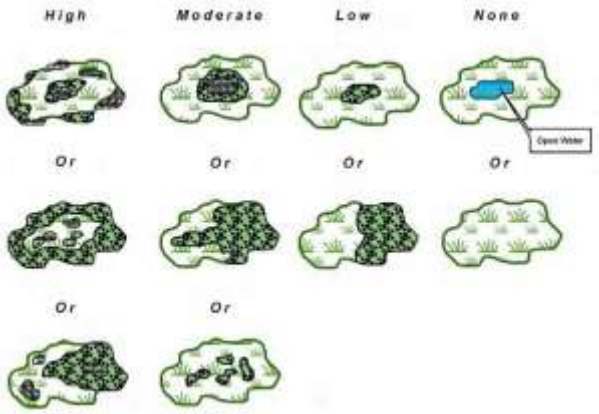
Vegetation structure and composition are of particular interest for assessing the condition of Key Wildlife Habitats because they directly support the ecological needs of animal and plant species of concern. In this section, metrics provide information on the interspersion of vegetation patches, habitat features/evidence of animal use, vertical structure, and standing and downed woody debris (standing tree snags and downed trees and branches). Vegetation data collected previously or simultaneously using standard wetland delineation methods are used to document vegetation composition and can be used to assess most metrics. Scores are assigned to reflect the presence and extent of invasive and native plant species in herbaceous and woody layers, including the presence of native species that are diagnostic (Section 4.3) and indicative of disturbance. Additionally, any plant species listed as rare, threatened, or endangered in Maryland should be identified (see Manual for source of current list). **These species should be noted on the data sheet even if they are not dominant**. A Floristic Quality Assessment will be calculated using the Excel data sheet or as otherwise described in the Manual. **Expected conditions vary by Key Wildlife Habitat for some metrics- use the correct scoring tables.**

Interspersion and Patch Richness (Section 4.6.1) For this metric, interspersion and patch richness will be scored separately and then averaged for a final score. Interspersion is assessed within the AA but patch richness is assessed within the AA and out to 10m around the AA on each side.

Interspersion: The figures below show a range of patterns for the interspersion of vegetation patches for different Key Wildlife Habitats. Different vegetation types, such as hummocks, sphagnum, shrub areas, patches of herbaceous vegetation, and patches or lines of trees of different heights or ages, should be noted for the AA. **Select the diagram below for the appropriate KWH** to determine a score for this metric. To be considered, vegetative patches should represent at least 5% of the AA in single or multiple locations. This metric is often reflective of the topographic complexity metric in many wetland types. Record the score on the next page.

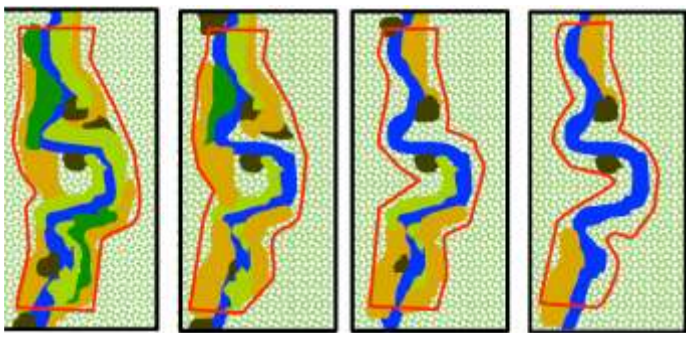
Montane-Piedmont Seepage Swamp, Piedmont Seepage Wetland, Piedmont Upland Depression Swamp, Vernal Pool, Spring. (Source: USACE 2015 Texas Rapid Assessment Method)

***Scoring*: High = 4** Vegetation patches are large and intertwined or numerous and scattered
Moderate = 3 At least two types of vegetation patches are present but patches are slightly smaller or less scattered/intertwined than "High" category
Low = 2 Two types of vegetation patches are present but in smaller, very localized, and/or isolated patches
None = 1 Only one type of vegetation patch is present



Montane-Piedmont Floodplain: The red box represents the boundary of the AA and each color represents a unique plant zone such as shrub areas, patches of herbaceous vegetation, or tree clumps of different ages or heights. The speckled background represents the background matrix of vegetation and the blue line represents the stream. For multithread stream systems, evaluate the channel with the highest complexity of plant zones for scoring. (Source: California Rapid Assessment Methods for Wetlands Riverine Wetlands Field Book 2013)

Scoring: A = 4 High complexity of scattered and intertwined plant zones
B = 3 Moderate complexity of intertwined plant zones
C = 2 Minimal complexity of plant zones with little interspersion
D = 1 Few plant zones with localized, isolated patches



Patch Richness: Patch richness provides a measure of components that represent potential wildlife habitat. **Check the following features off below if they are present in the AA or within 10 m (33 feet) of the AA boundary**. Count the number of features present. Also indicate the presence of any observed wetland- or stream-associated animals such as frogs, waterbirds, crayfish, fish, mussels, etc. using the check boxes. Record the score on the next page.

Features present: ☐ Spring or upwelling groundwater ☐ Depression ☐ Vegetated pool ☐ Unvegetated pool ☐ Unvegetated flat ☐ Island ☐ Animal mound or burrow ☐ Beaver dam or lodge ☐ Beaver-chewed vegetation ☐ Oxbow, swale, secondary channel ☐ Wind-thrown tree hole ☐ Mound ☐ Bank overhang with tree roots ☐ Tip-up tree root mound ☐ Brush piles ☐ Abundant deciduous leaf litter ☐ Partially buried natural debris ☐ Debris jam ☐ Plant hummock/tussocks ☐Other wildlife habitat Wildlife species observed:_____

Score	Montane-Piedmont Floodplain, Piedmont Seepage Wetland, Montane-Piedmont Seepage Swamp	Piedmont Upland Depression Swamp	Vernal Pool/Spring
4	≥ 5	≥ 6	≥ 4
3	4 - 5	5 - 6	3 - 4
2	2 - 3	3 - 4	2
1	< 2	< 3	<2

Interspersion and Patch Richness Score: Calculate the mean of the Interspersion and Patch Richness metrics below. Use the table to assign an overall score for this metric**.**

Score	Mean of Interspersion and Patch Richness Metric Scores
Excellent = 4	3.5 – 4
Good = 3	2.6 - 3.4
Fair = 2	1.6- – 2.5
Poor = 1	1 – 1.5

Interspersion Score: _____

Patch Richness Score: _____

Mean of Interspersion and Patch Richness Scores:_____

Overall Score for Metric (see table at left): _____

Observations/Comments:

Vertical Structure (Section 4.6.2) This metric provides an assessment of the overall structural complexity of vegetation layers, including presence of multiple strata, age and structural complexity of canopy layer, and effects of disease or mortality on structure. **Assess within the AA and out to 10m (33 feet) of the AA boundary.** Forested KWH are assessed differently than non-forested KWH (Piedmont Seepage Wetland). As **beaver activity** can impact vertical structure, the vertical structure in the surrounding area and previous structure as indicated by snags and downed trees should be considered when assigning a score. Note the presence of these changes in the comments. **Vernal Pools and Springs** are expected to have only sparse woody and/or herbaceous vegetation in the basin area, if any. For these KWH, assess the vertical structure in the surrounding area. For **Piedmont Seepage Wetlands**, an evaluation of the integrity of dominant growth forms is made (e.g., whether shrubs have been removed, killed, or increased or if the herbaceous layer has been reduced or homogenized by stressors). **Check off the features present and use the correct KWH table.**

Forested systems: Canopy: Heterogeneous patches of different ages or sizes: ☐ Yes ☐ Mostly ☐ Somewhat ☐ No
☐ Gaps of varying sizes ☐ Impacted by beaver activity ☐ Impacted by forest pests/pathogens
Woody vertical layers: ☐ Multiple layers present ☐ One layer missing or homogeneous ☐ >1 layer missing, little variation ☐ Only 1-2 layers present
Large trees (DBH > 60 cm or 24") present: ☐ ≥10% ☐ <10%
Trees present with DBH > 30 cm or 12": ☐ ≥ 20% ☐ < 20%
Degradation due to cutting, browsing, pests/pathogens: ☐ Minimal ☐ Moderate ☐ Extensive Source(s) of degradation: _____
Seepage wetland: **Woody layer mortality (if layer present)**: ☐ Due to natural factors ☐ Minor human-caused ☐ Moderate human-caused
☐ Extensive human- caused ☐ Impacted by forest pests/pathogens ☐ Impacted by browsing/grazing
Expected structure: ☐ Present ☐ Minor alteration ☐ Moderate Alteration ☐ Extensive Alteration

Observations/Comments:

Montane-Piedmont Floodplain, Piedmont Upland Depression Swamp, Montane-Piedmont Seepage Swamp
Vernal Pool and Spring: only assess structure in area surrounding basin- limited to sparse herbaceous vegetation is usually present in the basin area.
Note: Recent beaver activity may lead to deviations from rating descriptions for Montane-Piedmont Floodplain. This should be noted in the comments.

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Tree canopy or highest woody level present is a heterogeneous mosaic of patches of different ages or sizes. Gaps of varying size. Multiple layers are created through the presence of trees of varying ages and heights and the shrub layer. Large trees (> 60 cm or 24" dbh) expected to be present (≥ 10% of trees present). If large trees are absent, few or no large stumps are present and there is evidence of a natural disturbance event (e.g., large downed wood from wind storms, fire scars, beaver activity, tree senescence). Little impact from deer browse.
Good = 3	Tree canopy or highest woody level present is largely heterogeneous in age or size. Multiple layers are present, but one layer missing or little variation in ages and heights of woody vegetation in at least one layer. Less than 10% of trees present are large trees (>60 cm or 24" dbh) due to human activities. At least 20% of trees present are >30 cm or 12" dbh. Minor presence of cutting, browsing, grazing and other degradation such as forest pest/pathogens. If large trees are absent, few or no large stumps are present and there is evidence of a natural disturbance event (e.g., large downed wood from wind storms, fire scars, beaver activity, tree senescence). Little impact from deer browse.
Fair = 2	Tree canopy or highest woody level present is somewhat homogeneous in age or size. More than one layer present, but one or more layers missing. Little variation in ages and heights of woody vegetation in layers. Less than 20% of trees present are >30 cm or 12" dbh are present. Moderate levels of cutting, browsing, or grazing, or other degradation such as forest pest/pathogens has caused the loss of larger trees rather than a natural disturbance event.
Poor = 1	Tree canopy or highest woody level present is very homogeneous in age or size. Only one or two layers present due to human activities. Most, if not all, larger trees (dbh 30-60 cm or 12-24") have been removed. Major cutting, heavy browsing, grazing, or other degradation such as forest pest/pathogens.

Piedmont Seepage Wetland

Score	Assign rating to category with majority of features present: SCORE _____
Excellent = 4	Mortality of woody vegetation, if present, is due to natural factors such as wind storms or senescence. Excellent potential for site recovery given structure present and lack of degradation (past or present). Includes shrub and herb strata (some tall and some short, or primarily short-statured). When present (site not too wet), trees are relatively short and stunted and do not form a closed canopy. Shrubs are present as a patchwork or are < 50 cm (20") and open enough to allow for a nearly continuous ground cover of graminoid-dominated vegetation.
Good = 3	Minor negative anthropogenic influences present, or the site is still recovering from major past human disturbances. Mortality or degradation due to grazing, limited timber harvesting, or other anthropogenic factors may be present, though not widespread. The site can be expected to meet minimally disturbed conditions in the near future if negative influences do not continue. Shrubs and herbs show minor alterations from expected conditions and there may be some invasive species cover. A few areas of dense and tall shrubs (>1 m or about 3' tall) or trees may occur. Some trees may have been or killed due to anthropogenic stressors or pests/pathogens.
Fair = 2	Expected structural classes are not present. Shrubs and herbs moderately altered from expected conditions. The site will recover to minimally disturbed conditions only with the removal of degrading influences and moderate recovery times. Shrub cover or tree cover are beginning to reduce herbaceous cover. Moderate levels of cutting, mowing, browsing, or grazing.
Poor = 1	Expected structure is absent or much degraded due to anthropogenic factors or excessive shrub and tree growth. Overall, evidence of degradation includes major cutting, mowing, browsing, or grazing. Shrubs and herbs substantially altered from expected conditions. Recovery to minimally disturbed condition is questionable without restoration or will take many decades.

Standing and Downed Coarse Woody Debris (Section 4.6.3) Standing or fallen woody debris (snags and downed branches and trees) plays a critical role in riparian systems. Estimation of coarse woody debris should be based on a walkthrough of the entire AA if possible. For large AA, estimation along transects may be preferred. Use the check boxes below to indicate features present for the correct KWH. In forested KWH, pay special attention to the amount of coarse woody debris when surveying the AA and note the creation of woody debris from cutting, pests/pathogens, or other factors. Riverine wetlands that have incised banks, no longer experience flooding, experience overgrazing, or are no longer at a dynamic equilibrium may lack coarse woody debris. For wetlands dominated by shrub and herb layers, note the quantity and distribution of litter compared with the baseline that may be expected in the landscape. Active floodplain systems are typically low in litter. As **Vernal Pools and Springs** may have only scattered woody debris, evaluate both the basin and the surrounding area. Peatlands are dominated by peat-forming species which contribute enough litter and debris to maintain carbon dynamics, playing a critical role in these systems that may naturally include little coarse woody debris.

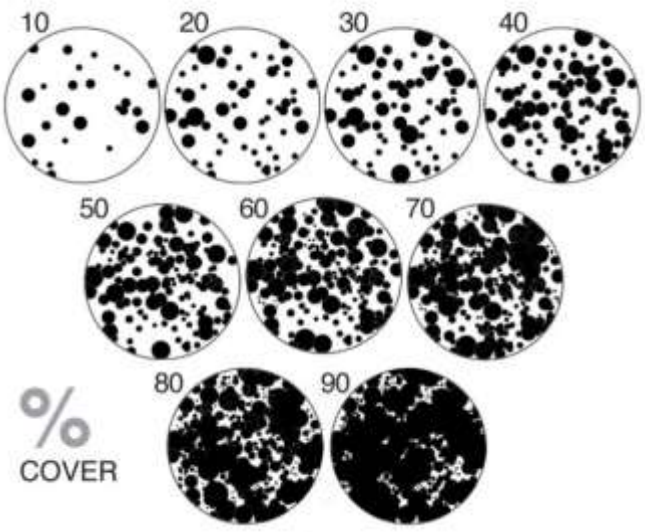
Forested systems: Standing snags and downed logs: Size diversity: ☐ High ☐ Moderate ☐ Moderate-low ☐ Low
Stage of downed log decay: ☐ Variable including advanced stage ☐ Variable with few advanced ☐ Variable with no advanced ☐ Low variability
Source(s) of woody debris if not natural (cutting, pest/pathogens, etc.): _____
Seepage wetland: Woody and/or litter: ☐ Typical ☐ Human-caused alteration Minor ☐ Moderate ☐ Substantial ☐ Impacted by forest pests/pathogens
Ground cover alterations: ☐ None ☐ Minor ☐ Moderate ☐ Substantial
Observations/Comments:

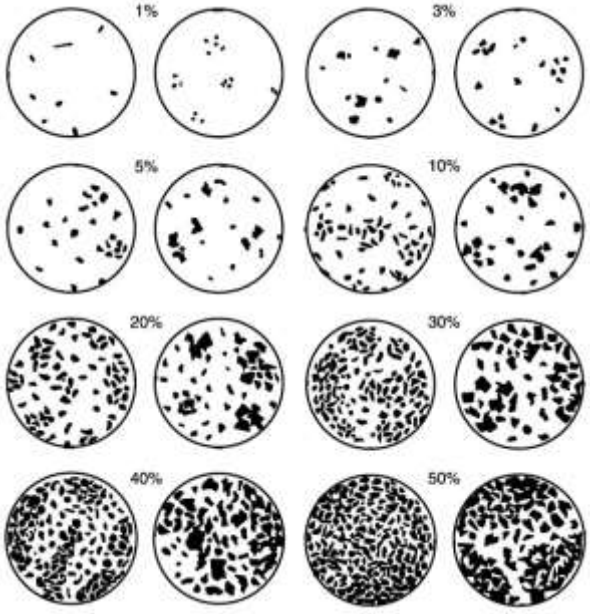
Montane-Piedmont Floodplain, Piedmont Upland Depression Swamp, Montane-Piedmont Seepage Swamp **Vernal Pool and Spring:** assess presence in immediate surrounding area as well as the basin. **If non-natural sources have created standing and/or downed woody debris, indicate this in the comments.**	
Score	**Assign rating to category with majority of features present: SCORE _____**
Excellent = 4	Wide diversity of sizes for both standing and downed logs, including larger sizes [> 30 cm (12 in) diameter and > 2 m (6 ft) long)] present with 5 or more snags per ha (2.5 ac), but not excessive numbers (suggesting disease or other problems). Downed logs are in various stages of decay, from sound and intact to soft pieces that no longer maintain their shape.
Good = 3	Moderate diversity of sizes for both standing and downed logs, but larger sizes [> 30 cm (12 in) diameter and > 2 m (6 ft) long)] are rare. Larger size class present with 2-4 snags per ha, or an increased but not excessive number of snags (suggesting disease or other problems). Downed logs are in various stages of decay, with few soft pieces that no longer maintain their shape.
Fair = 2	Moderate-low diversity of sizes for both standing and downed logs, but larger sizes [> 30 cm (12 in) diameter and > 2 m (6 ft) long)] very rare or not present. Larger size class present with 1-2 snags per ha, or moderately excessive numbers (suggesting disease or other problems). Downed logs are in various stages of decay, but few to no soft pieces that no longer maintain their shape.
Poor = 1	Low diversity of sizes for both standing and downed logs. Larger size class [> 30 cm (12 in) diameter and > 2 m (6 ft) long)] present with < 1 snag per ha, or very excessive numbers (suggesting disease or other problems). Downed logs are mostly in early stages of decay.

Piedmont Seepage Wetland	
Score	**Assign rating to category with majority of features present: SCORE _____**
Excellent = 4	Typical of the system. Mortality of woody vegetation, if present, is due to natural factors.
Good = 3	Minor alterations to system present. Limited grazing/browsing, timber harvesting, or other anthropogenic factors may be present, but not widespread.
Fair = 2	Moderate alterations to system present. Ground cover absent from some sections due to disturbance or shading.
Poor = 1	Substantial alterations to system present. Ground cover absent from large sections due to disturbance or shading.

Vegetation Composition (Section 4.6.4) Vegetation of the AA is characterized using the four strata version of the wetland delineation determination (USACE 2012). The species composition is assessed relative to the species expected in each stratum for the KWH. **The coverage of invasive species and native species (both diagnostic and those indicative of disturbance) should be noted even if they are not dominant species in the AA.** Diagnostic species are listed in Section 4.3. State rare species should be noted. In addition, the sources of stressors or alterations to the native plant community should be noted on the data sheet as well as suggestions for improving native species cover. The diagrams below may be useful to assist with the estimation of percent cover.

% Cover Estimation Diagrams *(johnmuirlaws.com and Terry and Chilingar 1955)*





VEGETATION Additional species may be listed on a separate sheet. Include all native diagnostic, disturbance indicator, and state rare, threatened, and endangered species regardless of % cover.

Species:	Absolute % Cover	Species:	Absolute % Cover
Tree Stratum: woody plants, excluding woody vines, 3 in. (7.6 cm) or larger DBH (any height)			
1.		5.	
2.		6.	
3.		7.	
4.		8.	
Sapling/Shrub Stratum: woody plants, excluding woody vines, less than 3 in. (7.6cm) DBH and greater than 3.28 ft (1 m) tall			
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	
Herb Stratum: all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and all other plants less than 3.28 ft (1 m) in height			
1.		11.	
2.		12.	
3.		13.	
4.		14.	
5.		15.	
6.		16.	
7.		17.	
8.		18.	
9.		19.	
10.		20.	
Woody Vine Stratum: all woody vines, regardless of height			
1.		4.	
2.		5.	
3.		6.	

Invasive Species (Section 4.6.5) Invasive species are non-native species that can spread into natural ecosystems, where they can displace native species and cause major alterations to KWH. The most common plant invasive species in Piedmont stream-associated wetlands are *Microstegium vimineum, Glechoma hederacea, Rosa multiflora, Lonicera japonica, Berberis thunbergii, Phalaris arundinacea,* and *Phragmites australis*. *Humulus japonicus* is prevalent in some areas. Identification references and additional species can be found in the Manual. Note the cover of invasive species below. Scoring for Vernal Pools and Springs should use observations from the basin and surrounding area, as only limited sparse vegetation may be present in the basin.

Maximum invasive species cover in any one woody layer (if present): ☐ <1% ☐ 1- 5% ☐ >5-10% ☐ >10%
Absolute cover of invasive/disturbance species in herbaceous layer: ☐ <1% ☐ 1-5% ☐ >5-30% ☐ >30%

Observations/Comments:

Montane-Piedmont Floodplain, Piedmont Upland Depression Swamp, Montane-Piedmont Seepage Swamp, Piedmont Seepage Wetland

Vernal Pool and Spring: assess vegetation structure in area surrounding basin, as only limited to sparse vegetation may be present in the basin area.

Score	**Assign rating to category with majority of features present:** **SCORE _____**
Excellent = 4	Invasive species are absent from all layers or absolute cover in any one woody layer (if present) and herbaceous layer is <1%.
Good = 3	Invasive species are sporadic (no more than 1-5% absolute cover in any layer).
Fair = 2	Absolute cover of Invasive species is >5-10% in any one woody layer (if present) and/or present with moderate absolute cover (>5-30%) in the herbaceous layer. Patches of native vegetation are reduced in size and complexity due to the presence of invasive species.
Poor = 1	Absolute cover of Invasive species is over 10% in any one woody layer (if present) and/or is very abundant (over 30%) in the herbaceous layer. Vegetation reduced in size and complexity due to human disturbance. Patches of native vegetation are reduced in size and complexity due to the presence of invasive species.

Native Species (Section 4.6.6) The presence and composition of native plant species provides an indication of KWH ecological integrity and how well the AA supports a diversity of native animal species. This metric uses the presence of indicator species and characteristic native species for the KWH in the AA (see tables related to section 4.3) as well as the presence of native species that indicate human disturbance. Metrics are adjusted for Montane-Piedmont Seepage Swamp systems and some Spring KWH due to the importance of *Sphagnum*. Indicate the species and stressors present in the AA using the check boxes below and provide suggestions for improvement.

Native Species Indicative of Disturbance: These species are those that seem to be more or less weedy and not picky about habitat, or they occur in young, often heavily altered wetland communities. Note the presence of these species to help assess the site and to assist with scoring Native Vegetation (Section 4.6.5).

Phalaris arundinacea	*Dichanthelium boscii*
Typha latifolia	*Dichanthelium sphaerocarpon*
Elymus glabriflorus	*Paspalum floridanum*
Muhlenbergia schreberi	*Echinochloa muricata*
Carex blanda	*Coleataenia anceps*
Dichanthelium scoparium	*Panicum dichtomiflorum*
Carex frankii	

Woody layer (if present): ☐ Dominated by diagnostic native species ☐ Some diagnostic species absent/reduced ☐ Few diagnostic species ☐ Few/no diagnostic species present
Herbaceous layer: ☐ Dominated by diagnostic native species ☐ Some diagnostic species absent/reduced ☐ Few diagnostic species ☐ Few/no diagnostic species present
Cover of native species indicative of disturbance: ☐ 0-1% ☐ 2-10% ☐>10-30% ☐ >30%
Seepage Swamp/Springs: Sphagnum cover - ☐ Continuous/abundant ☐ Absent from small areas ☐ Reduced ☐ Very low

Alterations/Stressors: Indicate stressors and alterations affecting the observed vegetation composition of the AA.
☐ Recent timber harvest (clearcut or selective cut) ☐ Tree plantation ☐ Mowing or shrub cutting ☐ Herbicide use ☐ Trampling/ORV ☐ Excessive animal herbivory ☐ Pest damage ☐ Unnatural fire regime ☐ Trash/dumping
☐ Other_____
Suggestions for improving native species cover and natural vegetation composition_____

_____

Observations/Comments:

Montane-Piedmont Floodplain, Piedmont Upland Depression Swamp, Montane-Piedmont Seepage Swamp, Piedmont Seepage Wetland (see information on second and third pages for diagnostic native species and those that indicate disturbance)
Vernal Pool and Spring: assess vegetation structure in area surrounding basin, as only limited to sparse vegetation is usually present in the basin area.
Note: Recent beaver activity may lead to deviations from rating descriptions for Montane-Piedmont Floodplain. This should be noted in the comments and considered in assignment of the score.

Score	**Assign rating to category with majority of features present:** **SCORE _____**
Excellent = 4	Herbaceous and woody layers (if present) dominated by indicator native species. Layers may be sparse and patchy in areas with deeper flooding, with patches of vegetation confined to hummocks. In other areas, diverse native vegetation is present unless there has been a recent natural disturbance. Montane-Piedmont Seepage Swamps, some Springs: *Sphagnum* is growing around tree/shrub bases AND in low hummocks, hollows, or other low areas.
Good = 3	Some indicator native species absent or substantially reduced in abundance OR low cover (<10%) of native species indicative of human disturbance. Layer may be sparse and patchy in areas with deeper flooding. Montane-Piedmont Seepage Swamps, some Springs: *Sphagnum* and other mosses actively growing, but may be eliminated from some areas due to disturbance or invasive species.
Fair = 2	Few indicator species are present. Native species indicative of human disturbance are present with moderate cover (10-30%). Patches of native vegetation are reduced in size and complexity due to human disturbance. Montane-Piedmont Seepage Swamps, some Springs: *Sphagnum* cover reduced but still regenerating in open areas.
Poor = 1	Few to no indicator species are present. Native species indicative of human disturbance are present with >30% cover. Patches of native vegetation are reduced in size and complexity due to human disturbance. Montane-Piedmont Seepage Swamps, some Springs; Very little *Sphagnum* cover. Cover of active peat-formers dramatically reduced and site is now dominated by non-peat-forming grasses and forbs.

Floristic Quality Assessment (Section 4.6.6) This method derives an estimate of nativity or habitat quality based on a combination of the tolerance to disturbance or environmental stress and the fidelity of individual plant species to specific habitats (coefficient of conservatism or C-value). These values will be calculated according to the procedure in the Manual using the list of plant species identified on the AA. The Excel data sheet file will calculate the required values if the plant species are entered into the Excel file. Note the calculated values and score below. The Adjusted FQI is not scored but provides information on the influence of disturbance on the quality of the habitat being evaluated.

Native mean C-value _____
4 = Excellent: Value >4 3 = Good: Value of 3-4 2 = Fair: Value of <3-2 1 = Poor: Value of <2

Adjusted FQI _____

SCORE _____

Calculation of Final Key Wildlife Habitat Ecological Integrity Assessment Score (Section 5)

The major components of the EIA include four core factors: landscape, soil/substrate, hydrology, and KWH and vegetation composition. The previously scored metrics that pertain to these core factors should be entered into the Scoring Form on the next page. To calculate Mean Core Factor Scores, add up the Metric Scores for that Core Factor and divide by the number of Metrics. Note that if only Microtopography, Organic Matter Accumulation, and Soil Distrubance were scored for the Soil/Substrate Core Factor, you will divide by 3 rather than 5. The Core Factors are weighted for the calculation of overall scores for the AA to reflect their relative importance to the ecological integrity and function of Key Wildlife Habitats and the species that they support. Multiply the Weighting Factor and the Mean Core Factor Score to get the Overall Core Factor Scores. Sum these values to calculate the Overall KWH Ecological Integrity Assessment Score. To rate the AA in terms of its overall ecological integrity, use the table below.

Numerical Score	Rating
3.5 – 4	Excellent
2.5 – 3.49	Good
1.5 – 2.49	Fair
1 – 1.49	Poor

Use the check boxes on the Scoring Form to note if any of the additional features are present from the sources indicated as described in the Manual (Sections 3.5 and 5.1)**. If the EIA score is not "Excellent",** add additional points for unique resources present at the project area according to the instructions on the Scoring Form to calculate the Final Key Wildlife Habitat Ecological Integrity Assessment Score and Rating for the AA.

Additional remarks and scoring rationales or challenges:

MARYLAND WETLAND ECOLOGICAL INTEGRITY ASSESSMENT: Piedmont Region SCORING FORM

Project/Site Name:_____ **City/County:**_____ **Sampling Date:**_____

Assessment Area Name (if >1 AA): _____ **Observer(s):**_____

Scoring Scale: 3.5- 4 = Excellent 2.5-3.49 = Good 1.5-2.49 = Fair 1-1.49 = Poor

Core Factor	Metric	Metric Score	Mean Core Factor Score	Weighting Factor	Overall Core Factor Score (Mean Core Factor Score X Weighting Factor)
Landscape (Assessment for project area)	Buffer Perimeter		(Sum of metric scores: _____) / 4 = _____	0.3	
	Buffer Condition				
	Aquatic Context				
	Comparative Size				
Soil/Substrate* * If only Microtopography, Organic Matter Accumulation, and Soil Disturbance were scored, divide by 3 rather than 5	Redox Concentrations		(Sum of metric scores: _____) / 5 or /3* = _____	0.1	
	Microtopography				
	Soil Organic Matter				
	Organic Matter Accumulation				
	Soil Disturbance				
Hydrology	Water source		(Sum of metric scores: _____) / 3 = _____	0.2	
	Channel				
	Hydroperiod and Hydrologic Connectivity				
Key Wildlife Habitat and Vegetation Composition	Interspersion/Patch Richness		(Sum of metric scores: _____) / 6 = _____	0.4	
	Vertical Structure				
	Coarse Woody Debris				
	Invasive Species				
	Native Species Composition				
	Floristic Quality Assessment				
Sum of Overall Core Factor Scores = <u>Overall KWH Ecological Integrity Assessment (EIA) Score:</u>					

Note the presence of these unique features in the project area using the check boxes.

Add additional Points <u>IF</u> the Overall EIA score is not "Excellent" for each of the following:

<u>From WRR layers (see Manual Section 3.5): Mark all categories present in WRR layers. Assign the single highest score for a maximum of +0.2 for WRR layers:</u>

☐ Nontidal Wetlands of Special State Concern (+ 0.2)

☐ Biodiversity Conservation Network Tier 1, 2, or 3 (+ 0.2)

☐ Forest Interior Dwelling Species (FIDS) area: Class 1 (+ 0.1)

☐ Targeted Ecological Area (+ 0.1)

☐ Sensitive Species Project Review Area (+ 0.1)

<u>From MDE Tier II High Quality Waters (Section 3.5):</u>

☐ Upstream of, within, or adjacent to Tier II High Quality stream segment (+ 0.2)

<u>From StreamStats (see Manual Section 3.5):</u>

☐ Impervious surface area for project area basin is low (< 5%) (+ 0.2)

☐ Forest cover in project area basin is >90% (+ 0.2)

<u>From field observations (see Manual Section 5.1):</u>

☐ Maryland nontidal wetland(s) with significant plant or wildlife value (as defined by COMAR 26.23.01.01B80) but not designated as a Nontidal Wetland of Special State Concern (add + 0.2 for each wetland to the Overall EIA score)

☐ State rare, threatened, or endangered plants or state rare natural community noted during field data collection but not mapped in Biodiversity Conservation Network Tier 1, 2, or 3 (+ 0.2)

☐ Sensitive species (colonial waterbird nesting colony, native mussel bed, anadromous fish) (+ 0.1)

☐ Dominated by native trees greater than 30cm or 12" diameter at breast height (+ 0.1)

☐ Dominated by hard mast (i.e., acorns and nuts) producing native species in the tree stratum (+ 0.1)

FINAL Key Wildlife Habitat Ecological Integrity Assessment SCORE and RATING: _____

Comments: