Guidance for Rating Wetland Values in Delaware

Version 1.1

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Delaware Department of Natural Resources and Environmental Control
820 Silver Lake Blvd., Suite 220
Dover, DE 19904

General Guidance for Rating Wetland Values

Version 1.1

(September 2014)

Wetlands in Delaware vary in the values they provide, oftentimes independently of their ecological functions. A condition-based evaluation method has been in place for Delaware's nontidal wetlands since 2000. Additional metrics were developed in 2013 to also assess the values provided by nontidal wetlands and are designed to be completed remotely using Geographic Information Systems (GIS) and in the field during the Delaware Rapid Assessment Procedure (DERAP) assessment.

Using this Guide

This guide is designed to aid users in rapidly assessing the values provided by non-tidal, freshwater wetlands in Delaware. DERAP condition scores estimate a wetland's efficacy in performing various functions and is independent of wetland values. Wetland values are based on the opportunity of the wetland to provide a function and the local significance of that function. This protocol is designed be used with DERAP to obtain two separate scores: Wetland Condition and Wetland Value. Therefore, a pristine wetland will receive a higher condition score but may receive a lower value score than a disturbed wetland based on the societal benefits provided by that system.

DERAP provides guidance for determining wetland classification, locating and establishing the assessment area, and properly filling out the datasheet.

The following tools should be used to complete the value-added metrics:

1. GIS software with the most-recent state level aerial photographs
2. Delaware's 2007 State Wetland Mapping Program (SWMP) wetlands GIS layer
3. Modified copy of the 2007 SWMP layer containing only palustrine wetlands with adjacent wetland polygons dissolved ("2007_Palustrine_Dissolved.shp")
4. Delaware Ecological Network shapefile
5. Current tax parcel layer (to identify landowner, if needed)

Upon arriving at the wetland users must identify the wetland classification and establish an Assessment Area (AA). Steps for identifying the wetland class and AA are listed below and follows the same methodology outlines in DERAP v6.0:

WETLAND CLASSIFICATIONS

Although DERAP can be used on any type of nontidal wetland in Delaware's Coastal Plain Region[1], it is important to identify the type of wetland to properly assess the site and to compute a final condition score. If the wetland type is unknown, perform the methods and consult additional resources to determine the wetland subclass. There are six wetland classes in the Coastal Plain of Delaware (modified from Whited and Ainslie (2000)). Several of these classes also include distinguishing subclasses such as intermittent low order and perennial under riverine. Identification of wetlands should be performed to the lowest possible level.

1. Depression Wetland

Depression wetlands are located in low points in the landscape characterized by closed elevation contours that allow the accumulation of surface water. Potential water sources are precipitation, overland flow and groundwater. Depression wetlands may have any combination of inlets and outlets or lack them completely. The predominant direction of flow is from the higher elevations toward the center of the depression. The predominant hydrodynamics are vertical fluctuations that range from diurnal to seasonal. Depression wetlands may lose water through evapotranspiration, intermittent or perennial outlets, or recharge to groundwater. Depression wetlands in Delaware's Coastal Plain may be classified based on soil characteristics and community types:

Depressional Wetland

Mineral – mineral soils, most common in Delaware

Organic – organic soils, most common in Great Cypress Swamp

Sea Level Fen - Herbaceous/graminoid peatlands that occur at the upland edges of ocean tidal marshes; uncommon in Delaware.

[1] Currently the DERAP has only been tested and verified on Flat, Riverine, and Depressional wetlands

2. Flat Wetland

Flat Wetland

Flat wetlands are most common on interfluves, in the headwaters of watersheds, or large fluvial terraces. The dominant water source is generally precipitation; however, groundwater has some contribution to these systems. During late winter/ early spring saturation of upper soil horizons meets with saturation of lower soil horizons caused by rising ground water tables to a continuous saturated soil from the surface to the groundwater table. These zones then separate when the groundwater lowers and the surface wide subsides due to evapotranspiration. Flats lose water by evapotranspiration, overland flow, and seepage to underlying groundwater. They are distinguished from flat upland areas by their poor vertical drainage, slow lateral drainage, and low hydraulic gradients. Flat wetlands in Delaware's Coastal Plain may be classified based on soil characteristics:

Mineral – mineral soils, most common in Delaware
Organic – organic soils, most common in Great Cypress Swamp

3. Riverine Wetland

Riverine Wetland

Riverine wetlands occur in floodplains and riparian corridors associated with stream channels. Dominant water sources are overbank flow from channel or subsurface hydraulic connections between the stream channels and wetlands. Additional sources may be interflow, overland flow from adjacent uplands, tributary inflow, and precipitation. When overbank flow occurs, surface flow down the floodplain may dominate hydrodynamics. In headwaters, riverine wetlands often intergrade with slope, depressional, poorly drained flat wetlands, or uplands as the channel and bank disappear. Perennial flow is not required. Riverine wetlands lose surface water via the return of floodwater to the channel after flooding and through surface water

flow to the channel during rainfall events. They lose subsurface water by discharge to the channel, movement to deeper groundwater, and evapotranspiration. Slope wetlands which are typically located at the toe-slope of the riverine wetland and are dominated by ground water inputs are included in this subclass because they are typically very small. There are 4 subclasses of riverine wetlands in Delaware's Coastal Plain:

Upper perennial and intermittent – Typically first and second order streams that serve as headwaters to the watershed. These systems may or may not have a defined channel. Floodplains associated with these systems are fairly narrow and flow may be intermittent or perennial.

Lower Perennial – Typically third order and higher along the mid-reach or mainstem of the system. Floodplains are wide with a defined channel and surface water is perennial.

Beaver Impounded – Wetlands that are or have been impounded by beaver. Floodplains are generally dominated by herbs and emergent vegetation. Snags and dead trees may be present. Canopy tends to be open. Signs of beaver activity such as dams, lodges, chewed stumps and feeding platforms are generally present.

Human Impounded – Typically associated with wetlands along the edge of mill ponds or other manmade bodies of water.

4. Slope Wetland

Slope wetlands are normally found where there is discharge of groundwater to soil surface, typically on sloping land or at the toe of the slope. Slope wetlands may also occur in fairly flat areas if the dominant hydrologic source is groundwater. Slope wetlands flow downslope in a unidirectional flow. Usually slope wetlands lack a channel but if a channel is present, it carries water away from the wetland. Slope wetlands are differ from riverine wetlands in that channels carry water away from the wetland, rather than deliver water as in riverine wetlands. Slope wetlands may be small and surrounded by a riverine floodplain wetland, in which case it should be classified and assessed as a riverine wetland.

Slope Wetland

Key to Determining Wetland Class in the Coastal Plain

1. Is the wetland influenced by tidal cycles from a Bay or Ocean?
   No – go to step 3
   Yes – go to step 2

2. Is the wetland influenced by tidal cycles from the Ocean?
    Yes – Marine Tidal Fringe subclass (refer to MidTRAM for assessment)
    No – go to step 3
3. Is the wetland brackish or salt water?
    Yes go to step 4
    No – go to step 5
4. Is the wetland emergent?
    Yes - Estuarine Tidal Fringe subclass (refer to MidTRAM for assessment)
    No – Estuarine Tidal Fringe (tidal Riverine – DERAP being tested for this type)
5. Is the wetland in a valley or stream channel where it gets inundated by overbank flooding from that stream or river in an unaltered condition (i.e. if a stream has been channelized and no longer receives overbank flooding it could still be a riverine wetland in an altered condition)?
    No – go to step 6
    Yes – Riverine subclass
6. Is the wetland in a topographic depression, outside areas that are inundated by overbank flooding, in which water ponds during at least part of the year?
    No – go to step 7
    Yes – Depressional subclass
7. Is the wetland on a slope or at the bottom of a topographic slope with a distinct water source?
    No – Flat Subclass
    Yes – Slope subclass

Classification of Created and/or Manipulated Wetlands

The State of Delaware, in an effort to track and report progress in the State that is comparable with other on-going tracking efforts is using the definitions as defined by the Federal Geographic Data Committee, Wetlands Subcommittee. This subcommittee developed definitions for restoration and related activities designed to aid agencies in accurately reporting wetland increases due to their program activities. The definitions, below, provide standard terminology for the more than 15 agencies involved in wetland restoration, related activities, and/or mitigation.

Restoration: the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to former or degraded wetlands. For the purpose of tracking net gains in wetland acres, restoration is divided into:

- *Re-establishment:* the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland. Re-establishment results in rebuilding a former wetland and results in a gain in wetland acres. Restore acreage and function
- *Rehabilitation:* the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions of degraded wetland. Rehabilitation results in a gain in wetland function, but does not result in a gain in wetland acres. Restores only function, but not acreage

Establishment: the manipulation of the physical, chemical, or biological characteristics present to develop a wetland that did not previously exist on an upland or deepwater site. Establishment results in a gain in wetland acres. Create a new wetland from a different ecosystem type.

Enhancement: the manipulation of the physical, chemical, or biological characteristics of a wetland (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or for a purpose such as water quality improvement, flood water retention or wildlife habitat. Enhancement results in a change in wetland function(s) and can lead to a decline in other wetland function, but does not result in a gain in wetland acres. This term includes activities commonly associated with the terms enhancement, management, manipulation, directed alteration. Improves a specific function of a site not necessarily to reference condition

LOCATING ASSESSMENT AREA

The Assessment Area (AA) is the area within a wetland that will be sampled using the DERAP. Most measurements will be performed in the AA, however, some measurements will assess conditions surrounding the AA. The center of the AA is a random point located in a mapped wetland that has been selected using a probabilistic sampling design for a watershed scale study. If the method is being used for a site assessment more than one AA may need to be placed on the site for a complete assessment if the project site is >0.5ha. AAs should be placed to cover any changes in vegetation types, hydrology, topography, and disturbance history throughout the site.

Note: If this method is being used to sample a subjectively selected reference site, a center point for the AA should be located such that it is representative of the wetland and the ecological condition that it is representing (i.e. clear cut flat, channelized low-order riverine).

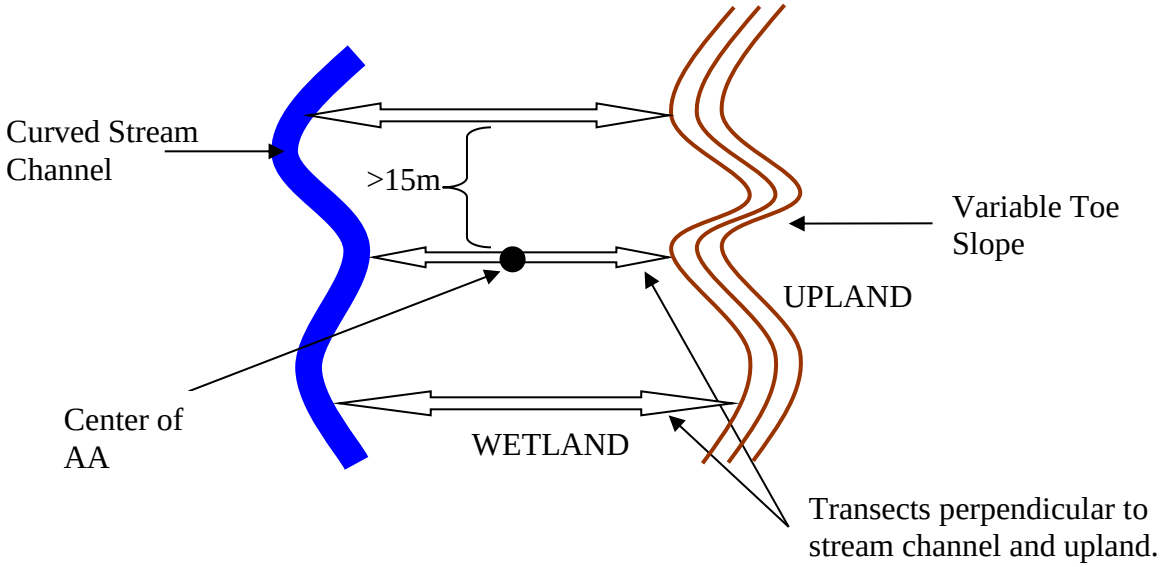
- Mark the center of the AA with a large piece of flagging.
- Establish the AA as a 0.5 ha area around the point (40-m radius circle centered on the point)

Several situations may occur that would require that the AA to be positioned differently than above. Each of these circumstances is detailed below. Please note: **If the location of the AA is moved make detailed notes on the datasheet explaining why the AA was moved and record the lat/long of the new center:**

1) If the mapped wetland does not extend 40m from the point in all directions, move the center of the AA so that the entire AA is within the wetland boundaries.
2) If the assessment area is within a naturally occurring upland inclusion in the wetland, move the center of the AA so that the uplands are excluded from the AA. If the upland inclusion is due to a disturbance i.e. a pile of fill, do not move the center of the AA.
    a) If the location of the original point is determined to be upland, examine the entire 40m radius circle around the original point for a wetland.
        i) If a wetland is found within this area, move the AA the least distance necessary to locate the AA in the wetland.
        ii) If no wetland if found, the site should be dropped and recorded as upland
3) If the AA is within a wetland that is smaller than 1.0 ha, the AA is the same size as the wetland (see below rules for riverine wetlands).

4) If the center of the AA is located in a riverine wetland:
    i. that is >80m wide on the side of the stream where the point falls, the stream channel should not be included in the AA and the AA should be located on the side of the channel where the original point fell
    ii. that is <80m wide:
        1. The channel should be included in the AA if the stream is wadable and permission to access both sides of the channel is granted. A stream is wadable if the deepest part of the stream is <1 m deep.
        2. If the stream is not wadable or permission is only received to access one side of the channel, make the AA a 0.5ha rectangle with the width being from the edge of the channel to the toe slope (i.e. upland). If the distance varies between the edge of the channel and the toe slope, measure 3 transects, at least 15 m apart perpendicular from the stream to the upland. Locate transects over the approximate length of the AA. Average the lengths of these 3 transects and use this as the average width of the AA. Use the calculated average width to determine the length of your rectangle (see figure below).

To determine the rectangle length, use the average distance between the channel edge and toe slope as determined from the 3 transects.



        3. Adjust the shape of the AA to a rectangle that is 5,000 sq.meters with the width being the average width of the transects (ex. If the average transect length is 50 meters, the AA would be 100m in length). If the average transect length is less than 50m in width use a maximum length for the AA of 100m and note this on the datasheet. The resulting rectangular AA should be variable in width (i.e. following the contours of the stream and upland) but a determined length.

5) If the AA is located in a depression ≤ 1,0 ha assess the entire wetland .

6) If the depressional wetland is >1.0 ha the AA should be placed as to encompass all vegetation zones present in the site, this will typically involve sampling half of the site or a pie-shaped section to include all vegetation zones. Even when depressional sites are split in half, you should still walk the entire site because some stressors may occur outside of the AA (see stressor scoring).

Datasheet Header Information

The following fields are located on the datasheet and should be filled out accordingly:

1. **Site #**: Unique EMAP number assigned to this site or a user-defined site number.
2. **Site Name**: Unique name given to the particular site.
3. **Date**: Date the assessment was completed.
4. **Observers**: Initials of all members of the crew that participated in the assessment.
5. **Lat/Long**: Coordinates, in decimal degrees, of the center of the wetland assessment area.
6. **AA moved from original location?**: Circle "yes" or "no" if the assessment area was moved from its originally assigned location.
7. **HGM**: Hydrogeomorphic wetland classification of the site.
8. **Cowardin**: Cowardin classification(s) of predominant wetland types in the assessment area.
9. **LLWW**: **L**andscape, **L**andform, **W**ater flow path, and **W**aterbody type (LLWW) classification for the predominant wetland type, as identified on the 2007 SWMP GIS layer. See FGDC Wetlands Mapping Standard (July 2009) for a detailed description of LLWW classifications (http://www.fgdc.gov/standards/projects/FGDC-standards-projects/wetlands-mapping/FinalDraft_FGDC_WetlandsMappingStandard_2009-01.pdf).
10. **Wetland AA size and shape**: Note if wetland is standard 40m radius circle or if the assessment area has otherwise been adjusted.

Value Metrics

1. Uniqueness/Local Significance

Data source: 2007 SWMP layer
Completed remotely with field verification

Six wetland types have been identified as ecologically significant and unique in Delaware, making up only 8% of the State's total palustrine wetland acreage. In the attribute table of the 2007 SWMP layer, these wetlands are assigned a corresponding special modifier code ("DE_Modifier" column). These special designated wetlands include:

DE_Modifier	Wetland Type
2	Delaware Coastal Plain Seasonal Ponds
3	Atlantic White Cedar Wetlands
4	Bald Cypress Wetlands
5	Interdunal Swales
6	Acidic Fens
12	Groundwater Seepage Wetlands (Piedmont Stream Valley Wetlands)

Locate the polygon and consult the SWMP layer for possible modifier codes assigned to that polygon. Confirm the wetland type during the field visit based on plant community and wetland characteristics. For more information on identifying these rare ecological communities, see the Guide to Delaware Vegetation Communities (http://www.wra.udel.edu/de-flora/wp-content/uploads/sites/2/2013/02/Guide-to-Delaware-Vegetation-Communities-Winter-2010.pdf). If the field visit reveals that the wetland represents of one of these six rare wetland communities but is not identified on the 2007 SWMP layer, provide notes on the data sheet. Conversely, if the field visit reveals that the DE_Modifier *is not* identified correctly on the 2007 SWMP layer, provide justification on the data sheet.

Wetlands may also be considered rare given the surrounding landscape. For example, the wetland pictured on the right is found in Wilmington and is particularly noteworthy because the region has been heavily developed with few wetlands remaining. Although these wetlands may be in poorer condition, the educational, recreational, and wildlife values can be relatively high.

Restored and created wetlands are unique in that their functional capacity may be reduced early in their development, but the wetland may still offer many values. Created wetlands offer great opportunities to research construction techniques and wetland succession, as well as educate the public and support different wildlife. Impounded wetlands also function differently than unmanipulated wetlands but are highly valuable for wildlife habitat.

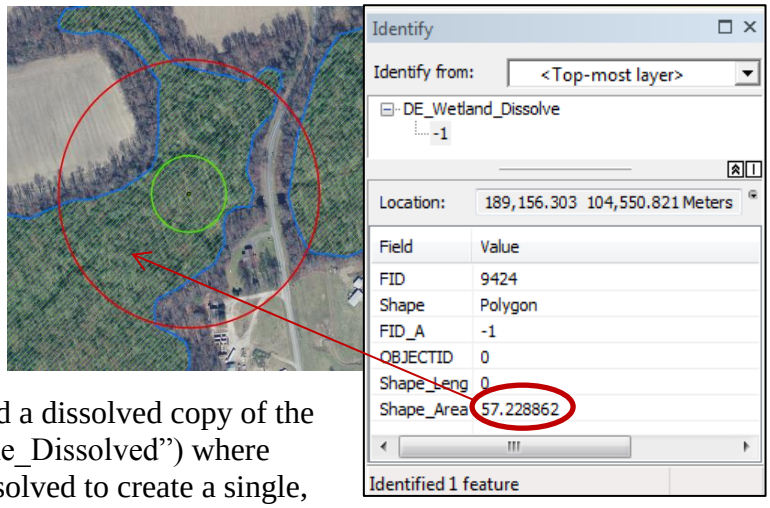
Scoring Uniqueness/Local Significance

Check all that apply	
☐ 20 pts	Wetland is an ecologically unique type in Delaware
☐ 5 pts	Wetland is rare within the local landscape
☐ 5 pts	Wetland has been restored, established, or enhanced

2. Wetland Size

Data source: "2007_Palustrine_Dissolved" GIS layer
Completed remotely with field verification

Large, undisturbed wetlands are exceedingly rare in Delaware, and even more uncommon in fragmented landscapes. The size of a wetland directly influences the amount of water it can store and the habitat available for plants and wildlife.



To estimate wetlands size we created a dissolved copy of the 2007 SWMP layer ("2007_Palustrine_Dissolved") where adjacent wetland polygons were dissolved to create a single, contiguous wetland. Wetland size can be estimated with the 'Identify' tool on ArcGIS. For example, the AA above is found in a 57.23 ha wetland complex. If needed, the size of the wetland can be adjusted during the field visit.

Scoring Wetland Size

Record the size of the wetland complex and select the appropriate point value. Wetlands over 300 ha receive the maximum of 10 points for this metric, with wetlands smaller than 5 ha receiving zero points.

Select one	
☐ 10 pts	≥ 300 ha
☐ 8 pts	≥ 150 ha to < 300 ha
☐ 6 pts	≥ 50 ha to < 150 ha
☐ 4 pts	≥ 15 ha to < 50 ha
☐ 2 pts	≥ 5 ha < 15 ha
☐ 0 pts	< 5 ha

3. Habitat Availability

Data source: Recent aerial photographs
Completed remotely with field verification

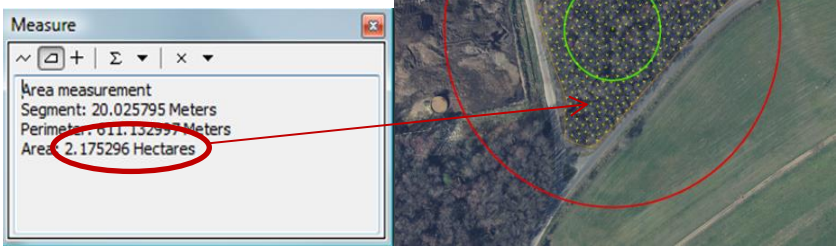
Large and contiguous natural wetland buffers are important for wildlife with complex habitat requirements. This metric measures the habitat available for an organism dispersing from the wetland AA and is dependent on land cover and the degree of isolation from the surrounding landscape. The area of interest includes the 40m AA and extends out to the edge of the 100m buffer (140m from the center point). Land cover types that are included in or excluded from the buffer are listed in the table below:

Land Cover Included in Buffers	Land Cover Fragmenting Buffers
Forest or regenerating scrub/shrub	Commercial or residential development
Wetland under natural cover	Paved roads or railroads
Open water	Agricultural fields
Biking and hiking trails	Mowed fields
Driveways, one-lane roads	Cleared land
Swales and ditches	Golf courses and sports fields

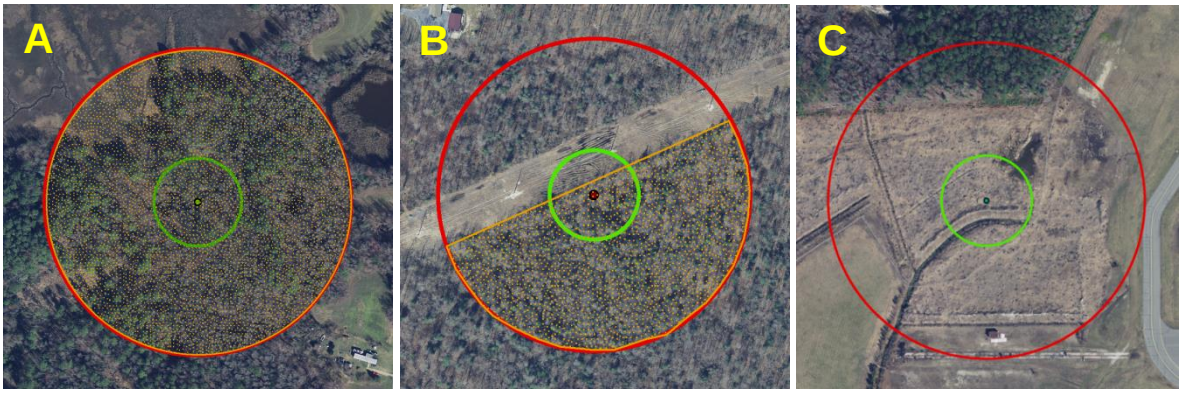
Estimate the unfragmented patch size on ArcGIS using the 'Measure > Measure an Area' tool on polygon setting and manually measure the unfragmented, natural land cover surrounding the center point based on aerial photographs. The wetland example below shows the contiguous buffer highlighted in orange dots. Note that the buffer does not extend north into the agricultural field or into the forest cover beyond the road. To estimate the percent of available habitat, use the following formula:

$$\text{Available Habitat (\%)} = \frac{Area\ of\ unfragmented\ natural\ habitat\ in\ buffer\ (ha)}{6.16\ ha\ (total\ area\ of\ a\ 140m\ radius\ circle)} \times 100$$

The amount of unfragmented, natural landscape within the AA buffer in the example below is 2.18 ha out of a maximum 6.16 ha (area of the 140 m radius circular buffer), which results in 35% of the buffer.



The following are examples of sites with accessible habitat highlighted in orange: 100% (A), 53% (B), and 0% (C; recently clear-cut). Note the forest cover north of the AA in examples 'B' and 'C' is not included because it is fragmented from the AA by areas that are cleared and not regenerating.



Scoring Habitat Availability

Record the percentage of unfragmented habitat in the wetland buffer. Sites with AA's that have been cleared or are otherwise completely fragmented from the surrounding landscape (0% accessible habitat) receive 0 points.

Select one	
☐ 10 pts	100% of buffer unfragmented and natural
☐ 8 pts	≥ 80% to < 100% of buffer unfragmented and natural
☐ 6 pts	≥ 60% to < 80% of buffer unfragmented and natural
☐ 4 pts	≥ 30% to < 60% of buffer unfragmented and natural
☐ 2 pts	≥5 to < 30% of buffer unfragmented and natural
☐ 0 pts	<5% of buffer unfragmented and natural

4. Delaware Ecological Network Classification

Data source: Delaware Ecological Network layer
Completed remotely

The Delaware Ecological Network (DEN) raster model was developed with GIS tools and field data as a method of prioritizing protection of important natural ecosystems. The DEN identifies corridors and large blocks of natural areas that are ecologically important and can support an array of plants and wildlife. The DEN GIS layer consists of two components: core areas and corridors. Core areas are high quality wetlands and aquatic ecosystems or large forest tracts. Corridors are linear natural areas that link these cores together. Roughly 60% (60,000 ha) of Delaware's palustrine wetlands are found in core areas.

Wetlands (orange hatching) in central Delaware. The large forest tract is identified by DEN as a core area (red hatching).

Additional information for each DEN polygon can be found in the shapefile's attribute table, including the number of rare,

threatened, and endangered species, the area of Habitats of Conservation Concern, and landscape metrics. Element occurrence records from the State's Biological Conservation Database for plants or animals of conservation or management interest are also provided for each core area Variables at the local- and landscape-level scale are used to compute a final score, scales 0 to 1.0, for each core area polygon.

Scoring Delaware Ecological Network Classification

Determine whether the AA and 100m buffer are completely, partially, or not within a DEN core area and assign the site the appropriate point value:

Scoring for of Assessment Areas completely, partially, or not within a DEN core area

If the AA is at least partially within a DEN core area polygon, examine the attribute table and assign points if the polygon is given a Final Score of at least 0.50 ("FINALSCORE" column) contains at least one Biological Conservation Database Element Occurrence ("NUM_EO" column).

Select one	
☐ 8 pts	AA and buffer are entirely within a core area
☐ 6 pts	AA entirely within core, buffer partially within core area
☐ 4 pts	AA partially within core area
☐ 0 pts	AA not within core area
	Select all that apply:
☐ 2 pts	AA partially in polygon with Final Score ≥ 0.50
☐ 4 pts	AA partially in polygon that contains an element occurrence

5. Habitat Structure and Complexity

Data source: Field visit and 2007 SWMP layer
Completed during site field visit

Heterogeneity within a wetland influences species diversity and abundance, as well as increases water storage and flood attenuation. While inspecting the site during DERAP, record the presence of various habitat features within the AA:

1. Snags: Snags are standing dead trees (i.e. no live leaves present) ≥ 15 cm DBH and ≥ 2 m in height. Snags are greater than 45° angle in relation to the ground.
2. Large downed wood: The diameter of large downed wood is also ≥ 15 cm, but this woody material is lying parallel to the ground or at an angle less than 45°. At least three pieces of large downed wood must be present to receive points.
3. Coarse woody debris: Woody material 7.5-15 cm DBH lying parallel to the ground or at an angle less than 45°.
4. Microtopographic relief: Variation in microtopography can be cause by hummocks, hollows, or tip-ups. Hummocks are defined as areas ≥15cm in height from the ground level of the wetland formed by tufts of vegetation or roots/logs/debris that has accumulated and made a higher elevation. Areas of microtopography must cover at least 10% of the AA.
5. Surface water suitable for amphibians/macroinvertebrates: For wetlands to support pond-breeding amphibians (and many reptiles, waterfowl, and macroinvertebrates) there should be evidence that water can pool on the site with surface water present for much of the year (Cowardin water regime modifiers C or wetter). Ideal habitats become exposed by the end of summer to prevent colonization from fish and other predators, or feature shallow littoral zones for refugia.
6. Surface water suitable for fish: Wetlands with persistent surface water (Cowardin water regime modifiers G and H) or ones that may be flooded by an adjacent permanent water body (perennial stream or permanent waterbody) are suitable for fish. Wetlands adjacent to permanent water bodies must have defined channels or overland flooding without barriers to allow fish to freely retreat as wetland water levels drop. DO NOT count wetlands adjacent to, or inclusive of, a persistent water bodies that lack surface connection.
7. Tree canopy gap: Large gaps in tree canopy cover increases sunlight reaching the understory and creates novel habitat for insects, vertebrates, and plants thereby increasing species diversity. Canopy gaps should only be counted if there is distinct spatial heterogeneity caused by the gap (increase in understory cover). Emergent and scrub-shrub wetlands lacking tree canopy cover is counted as a canopy gap.
8. Plant strata: Each plant stratum present in the AA is scored separately. A plant layer is considered present if it covers ≥ 10% of the assessment area (500m² of a standard 40m radius AA). Plant strata are identified as the following:
    a. Submerged aquatic vegetation – Vegetation at or below the water surface
    b. Herbs – Woody and non-woody plants <1m tall
    c. Shrubs/Saplings – Shrubs are woody species ≥ 1m tall but lacking the ability to become canopy species. Saplings are tree species ≤ 7.5cm DBH and ≥ 1m in height

d. Trees – Woody plants ≥ 7.5cm DBH and ≥ 1m in height
e. Vines – Perennial plants, ≥ 1m tall, whose stem requires support and which climbs by tendrils or twining.

Examples of habitat features documented in this metric:


Standing snags


Large downed wood and coarse woody debris


Surface water for amphibians/macroinvertebrates (PFO1E with 30cm of water)


Surface water for fish (PSS1/FO1F contiguous with a 3rd order stream)


Microtopographic relief (hummock and hollows)


Forest canopy gap dominated by herbs and saplings

Scoring Habitat Structure and Complexity

Each habitat feature present in the AA receives 1-2 points. Record the number of snags and large downed wood in the AA (if more than 5, write ">5"), and estimate the size of tree canopy gaps (estimate m² or % of AA)

	Check all present in AA	
2 points each	☐	Snags (≥ 15 cm DBH, ≥ 45°)
	☐	3 Large downed wood (< 15 cm DBH, < 45°)
	☐	Coarse woody debris (7.5-15 cm DBH, < 45°)
	☐	Microtopographic relief (≥10% of AA)
	☐	Surface water for amphibians/macroinvertebrates
	☐	Surface water for fish (water regime G, H or surface connection to stream)
	☐	Tree canopy gap
		Plant Layers *(covers ≥ 10% of AA)*
1 point each	☐	Submerged aquatic vegetation
	☐	Herbs
	☐	Shrubs/Saplings
	☐	Trees
	☐	Vines

6. Flood Storage/Water Quality

Data source: 2007 SWMP layer, NHD flowlines and field visit
Completed remotely and during site field visit

This metric relates to a wetland's ability to retain water and remove pollutants. The opportunity for a wetland to attenuate flood waters and improve water quality depends largely on its position within the landscape. During the field visit and with GIS software, examine the wetland for the following characteristics:

1. AA serves as a buffer for surface waters: Riparian wetlands along streams and fringing wetlands along the edges of ponds trap and store sediments and nutrients before they enter surface waters which benefits water quality. These wetlands buffers also store additional water during flood events. Use the 2007 SWMP layer, NHD flowline layer, and field observations to determine if the wetland polygon containing the point in question contains/abuts surface water (pond or perennial stream /river).
2. Water pools on ≥ 50% of AA: Most wetlands are capable of pooling water for some period of time, but the volume of stored water can vary greatly among wetlands. During the field visit, determine if water currently covers ≥ 50% of the AA. If less than 50% of the AA is covered by surface water, look for indicators that water collects for extended

periods elsewhere in the wetland (water-stained leaves, water marks on vegetation, algal crust, etc.).

3. Wetland is ≥75% vegetated AND has evidence of storm flow : Well-vegetated wetlands (≥75% cover) that receive overland flow during flood events are able to slow the velocity of flood waters and trap pollutants. During the field visit, search for signs of storm flow, including wrack deposits, sedimentation, and drainage patterns (rivulets or bent vegetation).
4. AA has a water regime C-H: The duration of flooding or inundation within a wetland influences its ability to allow for sediments to settle out of the water column. Utilizing the 2007 SWMP layer, identify the predominant Cowardin water regime modifier for the AA and note if it is classified as "C" through "H".
5. AA rated "Moderate" or "High" sediment retention: Ponds and wetlands with unidirectional flow are sinks for floodwaters, sediments, and nutrients which benefit downstream ecosystems. Use the 2007 SWMP later to determine if the majority of the AA was rated "High" or "Moderate" in the SR column.
6. AA rated "High" for surface water detention: For each wetland polygon, the 2007 SWMP layer contains estimates for eleven wetland functions based on wetland characteristics, landscape position, landform, and water flow path. Typically, wetlands that rate "high" for surface water detention ("SWD") are ponds or riverine basins that store excess flood waters. Use the 2007 SWMP layer to determine if the majority of the AA was rated "High" in the SWD column.

Scoring Flood Storage/Water Quality

Utilizing the 2007 SWMP layer, identify the wetland type that comprises most of the AA (only if the AA contains multiple wetland polygons; otherwise identify the single polygon containing the AA). Identify the Cowardin water regime classification, SR rating, and SWD rating. During the field visit document the presence, or potential, for surface water and search for direct evidence of storm flow.

Check all present in AA	**2 points each**
☐	AA serves as a buffer for surface waters (perennial stream or pond)
☐	Water pools on ≥ 50% of AA
☐	AA is ≥75% vegetated A has evidence of storm flow (wrack deposits, sedimentation, drainage patterns)
	Complete with GIS (Cowardin and LLWW classification)
☐	Water regime of C-H
☐	AA rated "High" or "Moderate" for sediment retention (SR)
☐	AA rated "High" for surface water detention (SWD)

7. Education

Data source: Field visit, tax parcel layer, and recent aerial photographs
Completed remotely and during site field visit

The educational and recreational values of a wetland depend on its accessibility to the public and aesthetic qualities. Ideal wetlands for education and recreation are located on public property with ample, safe parking for multiple vehicles, a trail system to the wetland, or even a boardwalk over the wetland. Parking areas must be designated, established spots which are suitable for most vehicles and have a paved/gravel/hard dirt surface. Wetland education may also be passive, including the ability to see the wetland from a public road (by motorists or walkers).

Elevated boardwalk through a forested wetland

Scoring Education

Determine if the AA contains any of the following characteristics of an ideal education site using aerial photography and field observations. Identify the wetland landowner using existing knowledge or the current tax parcel layer. Points are awarded for parking and trail systems only if the AA is located on public property. Each feature receives 1 point.

Check all present in AA	1 point each
☐	AA is viewable from a public road
☐	AA is on public property with public access
	The following are only applicable for public property:
☐	Parking available for ≥ 2 vehicles
☐	Trail system relatively close to the AA
☐	Elevated boardwalk/trail through the AA
Y / N / NA	Will the proposed activity increase public access and/or opportunity for education?

Final Scoring: Tally awarded points on the datasheet and determine the final score out of 100. Refer to the value category cutoffs to determine the corresponding value category and accompanying management recommendations. It is recommended that this value rating be used in conjunction with a condition ranking for more complete decision guidance.

Value Category	Value Score Range
Rich	≥45
Moderate	<45 ≥30
Limited	<30

For training or questions contact Alison Rogerson or Matthew Jennette with the Wetland Monitoring and Assessment Program at 302-739-9939.

DELAWARE WETLAND VALUE ASSESSMENT FORM Version 1.1

Site # _____ **Site Name** _____ **Date** _____

Observers _____ **Lat / Long** _____ **AA moved from original location? yes / no**

HGM _____ **Cowardin** _____ **LLWW** _____ **Wetland AA size and shape** _____

VALUE-ADDED METRICS — Points

1. UNIQUENSS/SIGNIFICANCE

- ☐ 20 pts Wetland is ecologically significant in DE
- ☐ 5 pts Wetland is rare in the given landscape
- ☐ 5 pts Wetland has been restored, established, or enhanced

Specify: _____

2. WETLAND SIZE _____ha

- ☐ 10 pts ≥ 300 ha
- ☐ 8 pts ≥ 150 to < 300 ha
- ☐ 6 pts ≥ 50 to < 150 ha
- ☐ 4 pts ≥ 15 to < 50 ha
- ☐ 2 pt ≥ 5 to < 15 ha
- ☐ 0 pts < 5 ha

3. HABITAT AVAILABILITY ____ha/6.16ha =____%

- ☐ 10 pts 100% of buffer unfragmented and natural
- ☐ 8 pts ≥80 to <100% of buffer unfragmented and natural
- ☐ 6 pts ≥60 to <80% of buffer unfragmented and natural
- ☐ 4 pts ≥30 to <60% of buffer unfragmented and natural
- ☐ 2 pts ≥5 to <30% of buffer is unfragmented and natural
- ☐ 0 pts <5% of buffer is unfragmented and natural

4. DELAWARE ECOLOGICAL NETWORK

Select one of the following:

- ☐ 8 pts AA and buffer entirely within core area
- ☐ 6 pts AA entirely within core area, buffer partially within
- ☐ 4 pts AA partially within core area
- ☐ 0 pts None of AA within core area

Select all that apply:

- ☐ 2 pts AA partially in polygon with Final Score ≥0.50
- ☐ 4 pts AA partially in polygon that contains a BCD element occurrence

_____ DEN Final Score value _____ # of BCD EO

VALUE-ADDED METRICS — Points

5. HABITAT STRUCTURE AND COMPLEXITY

2 pts for each structure present in AA

- ☐ Snags (≥15cm DBH, ≥45°) # _____
- ☐ ≥ 3 Large downed wood (≥15cm DBH, <45°) # _____
- ☐ Coarse woody debris (7.5-15cm DBH, <45°)
- ☐ Microtopographic relief (≥10% of AA)
- ☐ Surface water suitable for amphibians/macroinvertebrates
- ☐ Surface water suitable for fish
- ☐ Tree canopy gap est: ____% of AA

1 pt for each stratum present in AA

Plant Layers (≥10% of AA)

- ☐ Submerged aquatic vegetation
- ☐ Herb
- ☐ Shrub/Sapling
- ☐ Tree
- ☐ Vine

6. FLOOD STORAGE/WATER QUALITY

2 pts for each present

- ☐ AA is adjacent to surface waters
- ☐ Water pools on ≥ 50% of AA
- ☐ AA is 75% vegetated and has evidence of storm flow (wrack, sedimentation)

Complete with GIS (Cowardin and LLWW classifications):

- ☐ AA has water regime C or wetter
- ☐ AA rated 'Moderate' or 'High' for sediment retention
- ☐ AA rated 'High' for surface water detention

7. EDUCATIONAL VALUE

1 pt for each present

- ☐ AA is viewable from a public road
- ☐ AA is on public property with public access

For public property only:

- ☐ Parking available for ≥ 2 vehicles
- ☐ Trail system relatively close to AA
- ☐ Elevated boardwalk/trail through the AA

Y / N / NA Will proposed activity increase public access and/or opportunity for education?

COMMENTS:

FINAL SCORE:

Sum of values: ☐

Value Category: ☐ Rich ≥45 ☐ Moderate <45 ≥30 ☐ Limited <30

Refer to protocol for variable scoring and detailed descriptions

entered:_____

checked:_____