

Habitat Assessment Methodology Summary

Background:

The Ecological Network Assessment aims to identify the most important remaining habitats in the Virginia, Maryland, Pennsylvania, West Virginia, Delaware, and D.C. portions of the Bay Watershed. The assessment applies a “hubs and corridors” approach, which is based on principles of landscape ecology and conservation biology, that suggest that size and connectivity are critical factors of high integrity habitat.

Specifically, the Ecological Network gives priority to large patches of natural land cover, or “hubs”, giving greater weight to:

- larger areas with interior conditions
- intact as opposed to fragmented hubs
- hubs that provide habitat for rare, threatened or endangered species or unique natural communities
- hubs with a high diversity of plants, animals, and physical conditions
- hubs with aquatic or riparian habitats
- hubs remote from human disturbance or roads

For this assessment, hubs are natural areas that contain one or more core areas, and are bound by unsuitable land cover greater than 100 meters across.

Wetlands, upland forest and aquatic habitats are the three types of core areas for the assessment. Wetland and upland forest cores must contain a minimum of 100 acres of interior conditions. Cores areas are defined as a wetland when 50% or more of the interior is wetland, or it contains 100 acres of unmodified wetlands. Similarly, cores are classified as upland forest when 50% or more of the interior is upland forest, or it contains 100 acres of upland interior forest. Aquatic cores are defined at the HUC-11 scale, and the watershed must meet the following requirements: a) less than 10% impervious cover, b) greater than two-thirds forest cover, c) greater than two-thirds forest or marsh stream banks, d) contain no acid mine drainage.

Least cost path analyses were conducted to determine the best ecological connection between core areas. Corridors were identified based on the location of these paths. Corridors provide pathways for animals, water, seeds and pollen between core areas and are defined by adjacent land cover and topography, with a minimum width of 336 meters.

Data Layers:

Land Cover – NLCD

Streams – NHD

Wetlands – NWI

Roads, railroads, and powerlines – State and DLG

Protected Lands – States

Rare species locations and importance - Biological Conservation Databases for MD, DE, and VA

Watersheds – CBP HUC-11

Acid mine drainage – EPA

Ecoregions – Woods and Omernik for EPA Region 3

Vegetation – MD, DE, VA and WV Gap Analysis Programs

Potential vertebrate habitat - PA and VA Gap Analysis Programs

Neotropical migrant bird locations – Breeding Bird Atlases for DE, MD, WV, VA, and PA

Soils – STATSGO

Elevation, aspect and slope – NED

Methodology - Hub Rankings:

Each area meeting the requirements of a hub is identified by a unique number. For each hub, ecological parameters are calculated based on available GIS data. Hubs are then ranked for each parameter within their ecoregion. These scores/rankings are then multiplied by an assigned weight, which is established for each parameter based on the parameter's influence on ecological value. The final composite index for an individual hub is determined by combining its weighted scores. Hub parameters that contribute to the composite ecological score are listed in the table below.

Variables Used to Rank Hubs

Variable	Variable description	Weight
EO_WT_SUM	Rare species occurrences in the hub, weighted by their rarity and population condition or viability (MD and VA only)	8 in MD, 5 in VA
TOTALVERTS	Number of native vertebrate species modeled in the hub (PA only)	8
VA_MAXVERT	Number of native vertebrate species modeled in the hub (VA only)	3
TOT_NEOTRP	Number of neotropical migrant bird species in the hub	4
UPINTFORAC	Area of upland interior forest (ac)	4
WTINTFORAC	Area of wetland interior forest (ac)	4
OTHERWETAC	Area of other wetlands (ac)	3
IFSTRM_KM	Length of streams within interior forest in the hub (km)	4
VEGSUCCLSS	Fraction of the hub in mature and natural vegetation communities	4
NUM_ECOREG	Number of ecoregions in the hub	2
GAP_TYPES	Number of GAP vegetation types in the hub	1
WETL_TYPES	Number of NWI wetland types	2
STRM_NODES	Numer of stream sources and junctions	1
ELEV_STD	Topographic relief (standard deviation of elevation) in the hub	1
SOIL_GRP5	Number of STATSGO soil types	1
INTNAT_PCT	% of interior natural area in the hub	4
MAJRD_DIST	Mean distance to nearest major roads (m)	2
PAVERDDIST	Mean distance to nearest paved road (m)	2
RDRAILDIST	Mean distance to nearest paved road, unpaved road, railway, or VA powerline (m)	1
-NEARESTHUB	Distance to nearest neighboring hub, transformed by multiplying by -1 (m)	2
FORAC_1KM	Acres of forest outside the hub, but within 1 km	2
WETAC_1KM	Acres of unmodified wetlands outside the hub, but within 1 km	2
CORE_1KM	Acres of core area outside the hub, but within 1 km	2
FORAC10KM	Acres of forest outside the hub, but within 10 km	1
WETAC10KM	Acres of unmodified wetlands outside the hub, but within 10 km	1
CORE_10KM	Acres of core area outside the hub, but within 10 km	1
HUBPCT10KM	% hub area outside the hub, but within 10 km	1

- i. Hubs ranking in the top third (by quantile, not by area) either within their ecoregion, or within the entire study area, were designated "top tier hubs". Most of these ranked within the top third of both.
- ii. Hubs ranking in the middle third within their ecoregion were designated "middle tier hubs."
- iii. Hubs ranking in the bottom third within their ecoregion were designated "bottom tier hubs."