APPENDIX 2.1

Northeast Terrestrial and Aquatic Habitat Descriptions

Christopher Tracey ▪ Western Pennsylvania Conservancy | Pennsylvania Natural Heritage Program

Table of Contents

Terrestrial Habitat Descriptions

The following habitat guides are organized first by Formation, then by Macrogroup and habitats associated with them. Habitat descriptions and maps were adapted from the Northeast Habitat Guides (Anderson et al. 2013b).

This section is organized at the Macrogroup level, with habitats nested within each Macrogroup.

Relationship between Formation Class, Formation, Macrogroup, and Habitat:

Forest and Woodland Formation Class
└ Northeast Upland Forest Formation
└ Northern Hardwood & Conifer Macrogroup
└ Laurentian-Acadian Northern Hardwood

We excluded the "Open Water (NLCD-NHD open water)" class from the list as this was largely covered by the stream and lake classifications below. Subterranean habitats, while not part of the Northeast classification have been included as a category as recommended by Crisfield (2013).

For each terrestrial (and palustrine) habitat, the following information is presented:

- The Macrogroup the habitat is within and the scale at which the habitat occurs. The Habitat Classification System describes habitat types that occur at a variety of scales from very small (less than one hectare) to huge (greater than 10,000 hectares), reflecting the reality that biodiversity occurs at a variety of spatial scales. The scales for habitats recognized in this Plan include:
    1. Matrix-forming Forest – These are forested ecological systems that may cover many thousands of contiguous hectares, and are the background systems in which smaller scale upland and wetland systems are embedded. They show broad ecological amplitude, occurring over a range of topographies and geologic and edaphic types. Examples of these in the Northeast ecological systems like the 'Northern Hardwood' or 'Northeast Interior Dry-Mesic Oak Forest'.
    2. Patch types – Two patch types are recognized in this Plan. Large patch habitats range from 50 to hundreds of hectares (e.g. cove forests, interior pine barren, sub-boreal spruce flat) nested within matrix types. They are generally associated with a particular environmental condition or ecological process that operates at smaller scales. Small patch habitats are typically just a few hectares, or less (cliff, basin wetland, serpentine barren), occur in distinct and discrete environments that have dominant effects on natural community development, and often support rare species with specialized ecological requirements. Some systems that tend to track river networks have a linear configuration, and can be small or large.

This description is modeled after the Northeastern Habitat Guides (Anderson et. al. 2013b). Modifications have been made to the descriptions to reflect the habitat as it exists in Pennsylvania. A list, where available, of the Pennsylvania Terrestrial communities (Zimmerman et al. 2012) is provided within each description. These can help link the habitat to local mapping efforts. Upland and wetland plant community types, defined by present vegetation, were described for Pennsylvania by the

Pennsylvania Natural Heritage Program and Pennsylvania Bureau of Forestry for scientific and site management purposes (Fike 1999; Zimmerman et al. 2012). Crosswalks between these association types and the habitats, also known as ecological systems, are provided.

Tables of primary and secondary Species of Greatest Conservation Need (SGCN) habitat associations for each habitat are presented. SGCN associations with each particular habitat were determined using the methods outlined in Chapter 2. Primary habitat represents a statistical majority of the habitat within which documented observations occur. Secondary habitat was described as the next highest statistical habitat association. Note that SGCN may occur in other habitats than what are listed here.

Condition metrics were calculated for the state based on the Condition of Northeast Habitats (Anderson et. al. 2013a). "Condition" here refers to one aspect of condition--landscape context, which was assessed through remotely assessed metrics. Where possible, we compared condition metrics in Pennsylvania to those for the northeast. These data provide a snapshot of status for habitats restricted to Pennsylvania, and provide a general overview of status information for habitats that occur more broadly across the Northeast.

Securement metrics were calculated for the terrestrial habitats based on the most up to date protected lands data available. Three categories of securement are identified for each habitat type:

1. GAP Status 1 - Intended for Nature and Natural Processes: An area having permanent protection from conversion of natural landcover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management.
2. GAP Status 2 - Intended for Nature with Management: An area under permanent protection from conversion of natural landcover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance.
3. GAP Status 3 - Intended for Multiple Uses: An area having permanent protection from conversion of natural landcover for the majority of the area, but subject to extractive uses of either a broad, low intensity type (e.g., logging) or localized intense type (e.g., mining), or motorized recreation. Unknown GAP status is also included in this category.

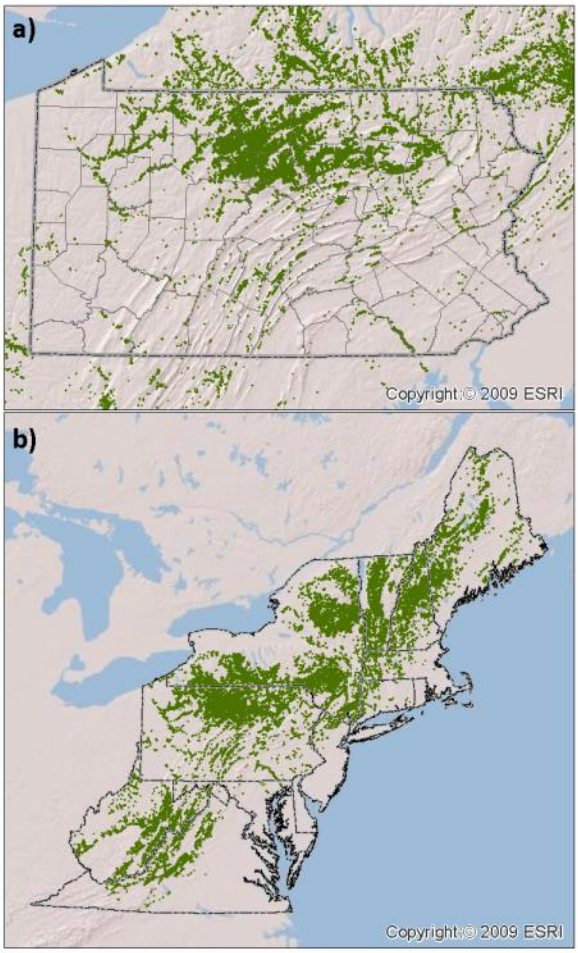
The Landscape Context Index (LCI) is a metric that quantifies the relative amount of development, agriculture, quarries, roads, or other fragmenting features within an area directly surrounding each 30 meter cell of land. The metric values range from 0 to 400. A LCI below 20 indicates that the occurrence is surrounded primarily by natural cover, whereas higher LCIs indicate increasing amounts of roads, development, and agriculture within the local neighborhood.

The Forest Stand Age metric shows the mean age of a particular habitat class. Older forests tend to have structural characteristics such as large standing snags with numerous cavities, big fallen logs, and dense shrubby understory layers are missing from younger forests. These features greatly increase a forest's value to wildlife, providing nesting, foraging, and denning sites for many species.

In addition to the above condition metrics, Anderson et al. (2013a) calculated metrics for patch size, age class distribution, likelihood of loss due to development, and degree of fragmentation, but these are not presented in the report.

Acidic Cliff and Talus

Macrogroup: Cliff and Talus
Scale: Patch
Area: Pennsylvania: 204,775 acres;
Northeast: 561,802 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A sparsely vegetated cliff or talus slope formed on granitic, sandstone, or other acidic bedrock. The lack of soil, highly acidic bedrock, and constant erosion, limits the vegetation to mosses, lichens, and herbs growing on bare rock or crevices and to sparse trees and shrubs rooted in deeper soil pockets. Lichen cover may be extensive. In the Central Appalachians, red cedar trees (*Juniperus virginiana*), poison ivy (*Toxiodendron radicans*), and rock polypody (*Polypody virginianum*) ferns are characteristic. Birch (*Betula* spp.) or spruce (*Picea* spp.) replaces red cedar in the north, where a shrubland of heaths and reindeer lichen may develop where cold air accumulates at the sheltered bottom of slopes. Areas of concentrated seepage are sometimes present. In the Cumberland region, a mosaic of cavelike "rockhouses" and associated sandstone box canyons are typical.

Landforms in this system are associated with steeper mountains and hills, river bluffs, and gorges. In some cases, this system may take the form of upper-slope boulder fields without adjacent cliffs, where talus forms from freeze/thaw action on the bedrock. This system is prone to harsh climatic conditions; frequent disturbances include drought stress, wind and storm damage. Mass movement of rocks can also reset the ecological clock.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

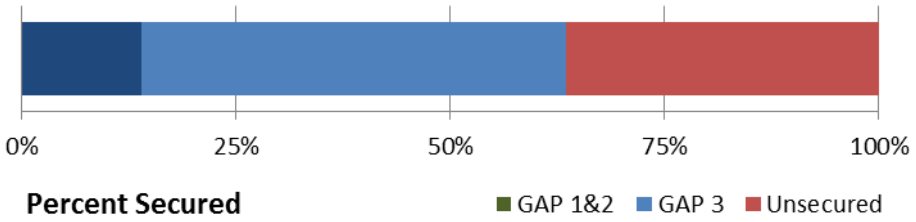
The “Birch (Black-gum) Rocky Slope Woodland” as described in the Pennsylvania Community Classification (Zimmerman et al. 2012) is typically associated within this habitat.

SGCN Associated with this Habitat

477 unique occurrences or observations of 61 SGCN were associated with the Acidic Cliff and Talus habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 48.2% of the Acidic Cliff and Talus habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 23.2% of the total distribution of the habitat in the Northeast:

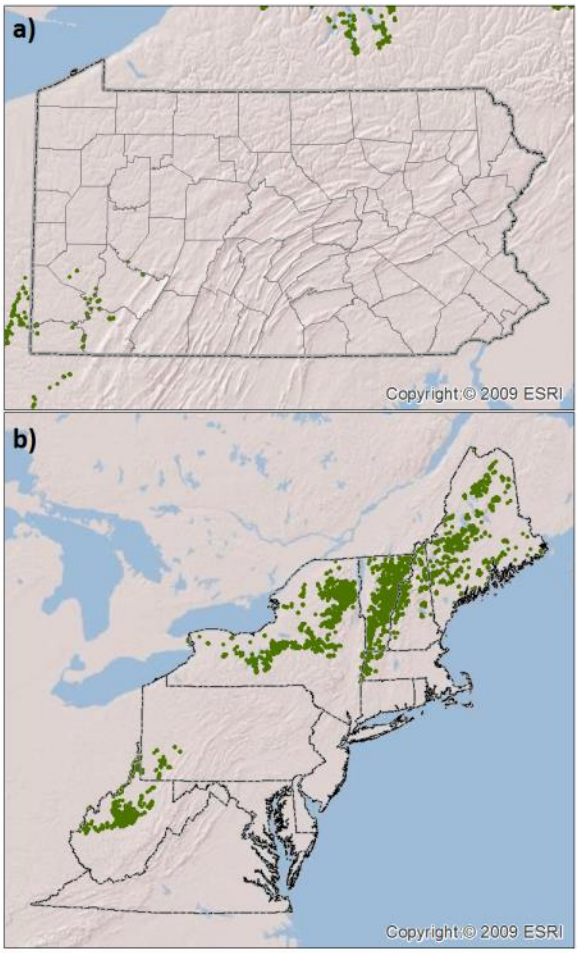


The mean Landscape Context Index (LCI) for this habitat is 32.9 (range 0-226.0) indicating that most patches of the habitat are primarily surrounded by natural cover; however some patches are surrounded by roads, development, and agriculture. The mean score for the northeastern states was 17.0, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 58.0 years (s.d. 14.3), suggesting that forests surrounding this habitat are relatively old.

Calcareous Cliff and Talus

Macrogroup: Cliff and Talus
Scale: Patch
Area: Pennsylvania: 118 acres;
Northeast: 56,251 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A sparsely vegetated cliff or talus slope formed on limestone, dolomite, or other calcareous bedrock. The high alkalinity (pH>7) increases nutrient availability, but the lack of soil, constant erosion, and harsh edaphic conditions limits vegetation to herbs, ferns, and sparse trees growing in rock crevices or soil pockets. Northern white cedar (*Thuja occidentalis*) is characteristic and may dominate on some cliffs– occasionally reaching ages upwards of 800-1000 years. Ash (*Fraxinus* spp.) and basswood (*Tilia americana*) and bladdernut (*Staphylea trifolia*) are other woody indicators of the enriched setting, as are ferns like spleenwort (*Asplenium* spp.) and cliffbrake (*Pellaea* spp.), and wiry herbs such as rock whiltow grass (*Draba arabisans*). This system includes the narrow zone of vegetation at the horizontal clifftop, often gladelike, where growing conditions are harsh.

This habitat is associated with near-vertical cliffs and talus slopes occurring on limestone or other calcareous rock, associated with steep hill slopes, bluffs, and river gorges. Wind and water erosion, mass movement, and fire are primary system dynamics. Harsh edaphic conditions limit the vegetation cover.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

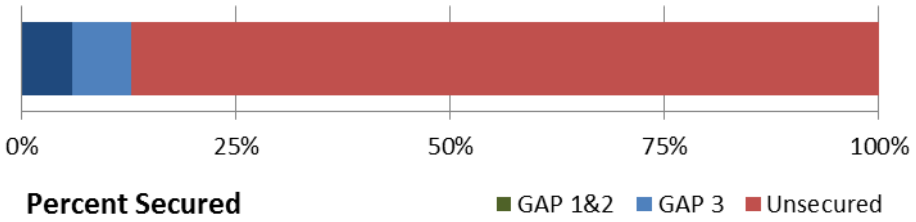
- Calcareous Opening/Cliff
- Side-oats Gramma Calcareous Grassland
- Little Bluestem-Pennsylvania Sedge Openings

SGCN Associated with this Habitat

No documented occurrences of SGCN had documented occurrences or observations on the Calcareous Cliff and Talus habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 48.2% of the Calcareous Cliff and Talus habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:



The Landscape Context Index (LCI) for this habitat is 120.9 (one patch), indicating that the habitat is surrounded by some amount of roads, development, and agriculture. The mean score for the northeastern states was 17.8, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

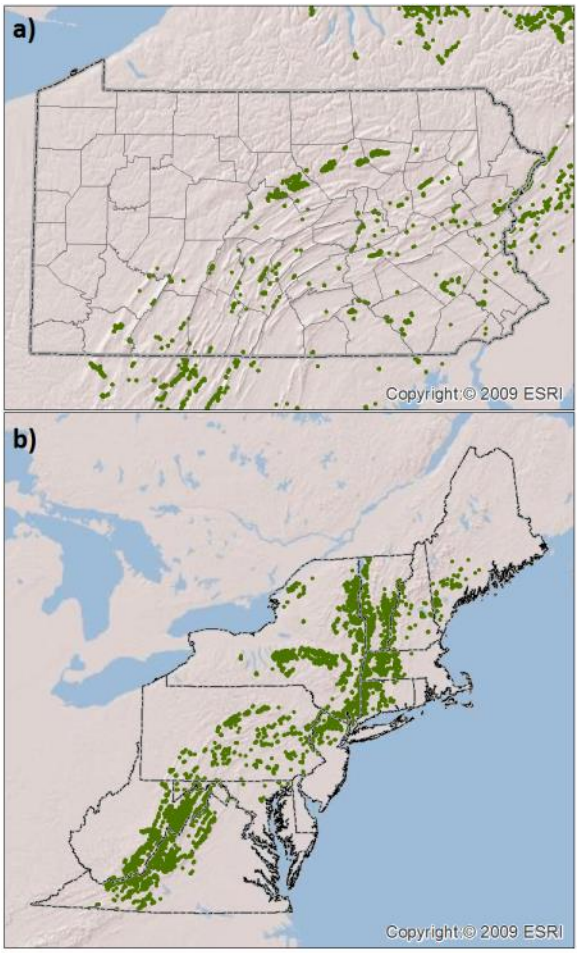
The mean stand age for this habitat was 21.6, suggesting that forests surrounding this habitat are relatively young.

Circumneutral Cliff and Talus

Macrogroup: Cliff and Talus
Scale: Patch
Area: Pennsylvania: 9,864 acres;
Northeast: 56,454 acres

A sparsely vegetated cliff or steep talus slope formed on calcareous sandstone or shale or other moderately calcareous bedrock. The vegetation varies from sparse to patchy as the lack of soil and constant erosion restricts vegetation growth to rock crevices or soil pockets. Trees are typically present and may form woodland or even forest vegetation. Basswood (*Tilia americana*), ash (*Fraxinus* spp.), and bladdernut (*Staphylea trifolia*) are woody indicators of the enriched setting. The herbaceous layer is typically not extensive but includes at least some species that are indicators of high nutrient conditions.

Typically found on vertical cliffs and steep talus slopes of substrates including calcareous sandstone, calcareous shale, or other sedimentary mixtures containing limestone or dolomite. This system occurs at low to mid elevations.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

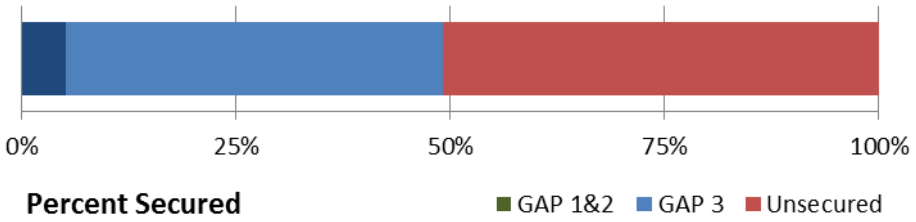
- Calcareous Opening/Cliff
- Sugar Maple - Basswood Forest
- Yellow oak - redbud woodland

SGCN Associated with this Habitat

51 unique occurrences or observations of 28 SGCN were associated with the Circumneutral Cliff and Talus habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 35.7% of the Circumneutral Cliff and Talus habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 8.6% of the total distribution of the habitat in the Northeast:

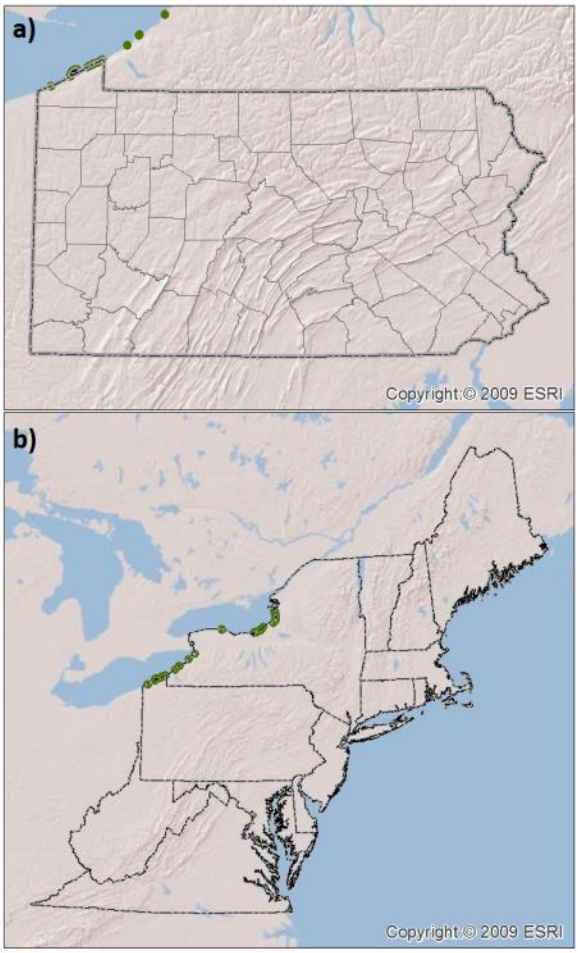


The mean Landscape Context Index (LCI) for this habitat is 36.8 (range 2.5-167.6) indicating that this habitat is largely surrounded by natural cover. However, some patches are in more modified contexts. The mean score for the northeastern states was 33.1, which suggests the Pennsylvania portion of this habitat may in similar condition to the region.

The mean stand age for this habitat was 56.1 years (s.d. 12.5), suggesting that forests surrounding this habitat are relatively old.

Great Lakes Dune and Swale

Macrogroup: Coastal Grassland & Shrubland
Scale: Patch
Area: Pennsylvania: 461 acres;
Northeast: 1,805 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes a sparsely vegetated dune complex on unconsolidated sand and shell sediments on the shores of the Great Lakes. Plant cover varies from sparse on active dunes to moderate depending on the degree of sand deposition, sand erosion, and distance from the lake. Beachgrass (*Ammophila breviligulata*) dominates the most active areas; on more stable portions, low shrubs including beach heather, juniper, and sand cherry predominate. Backdunes may grade into wooded cover of pines and other sandy soil trees. White pine (*Pinus strobus*) and red pine (*P. resinosa*) often form a scattered overstory canopy, and juniper (*Juniperus virginiana*) forms a dwarf shrub layer. Wet swales are usually graminoid-dominated, but partly forested swales of red maple (*Acer rubrum*), alder (*Alnus* spp.), and willow (*Salix* spp.) may be interspersed with the back-dune ridges.

This vegetated dune system, limited in Pennsylvania to the shores of Lake Erie, consists of a foredune and a series of low to high backdunes and low swales. The best examples of this are found at Presque Isle, other examples of the habitat are found where post-glacial streams enter Lake Erie, providing a dependable sand source. Along-shore currents, waves, and winds sustain the foredunes.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Great Lakes Region Bayberry - Cottonwood Community
- Great Lakes Region dry sandplain
- Great Lakes Palustrine Sandplain
- Great Lakes Bayberry – Mixed Shrub Wetland
- Great Lakes Sparsely Vegetated Shore

Each of these communities intergrades with each other and co-occur at a relatively small scale (Fike 1999).

SGCN Associated with this Habitat

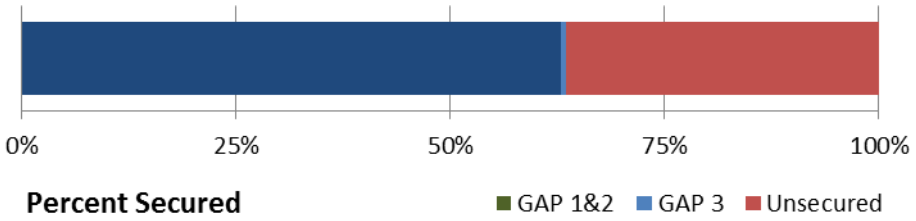
74 unique occurrences or observations of 25 SGCN were associated with the Great Lakes Dune and Swale habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Piping plover – Breeding (*Charadrius melodus*)	Great Lakes beaches (see USFWS 2003). Presque Isle State Park, Erie Co. is an historic nesting beach and remains the only location with suitable habitat for nesting Piping Plovers (McWilliams and Brauning 2000, Price 2002, Haffner 2007).
Birds	Piping plover - Migration (*Charadrius melodus*)	Great Lakes beaches and inland riverine and lacustrine mud flats. Gull Point, Erie Co. is the primary location for migrants, however they have also been observed along the lower Susquehanna Rivers (e.g., Conejohela Flats, Lancaster Co.) (McWilliams and Brauning 2000).
Birds	Common tern - Breeding *(Sterna hirundo*)	Sandy beaches (Presque Isle State Park is only historic nesting location) and rocky maritime sites.
Reptile	Blanding's turtle (*Emydoidea blandingii*)	Mosaics of small marshes, wet meadows, small ponds, and slow moving streams.
Spiders	Beach wolf spider (*Arctosa littoralis*)	
Tiger Beetles	Hairy-necked tiger beetle *(Cicindela hirticollis*)	
Tiger Beetles	Ghost tiger beetle (*Ellipsoptera lepida*)	

No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

Approximately 62.5% of the Great Lakes Dune and Swale habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 16.2% of the total distribution of the habitat in the Northeast:

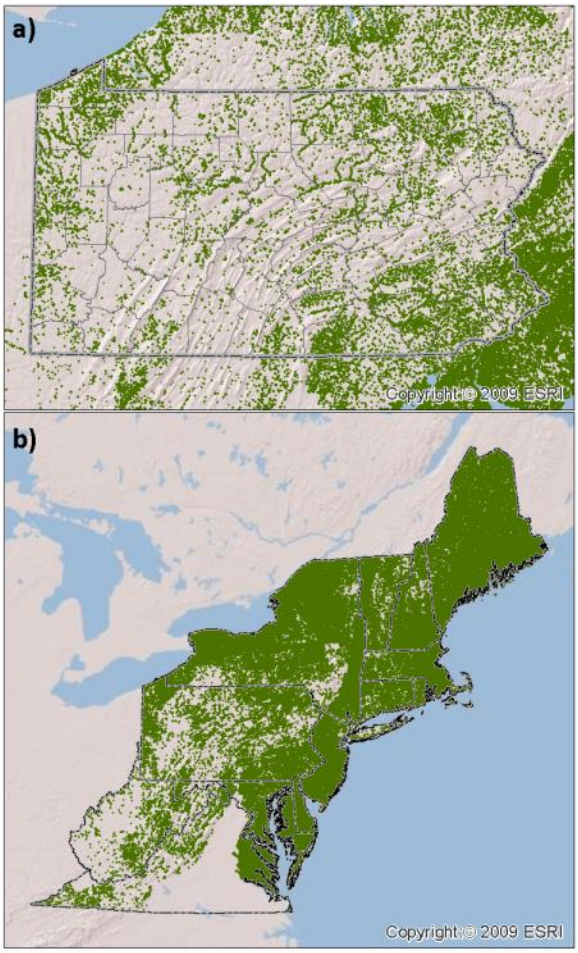


The mean Landscape Context Index (LCI) for this habitat is 69.0 (38.8-124.6). While patches of this habitat type typically have Lake Erie at its northern boundaries, much of the Erie coast is impacted by residential and commercial development. The mean score for the northeastern states was 35.8, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 4.7 years (s.d. 3.2), suggesting that forests surrounding this habitat are relatively young.

Laurentian-Acadian Freshwater Marsh

Macrogroup: Emergent Marsh
Scale: Wetland
Area: Pennsylvania: 48,783 acres;
Northeast: 906,723 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A freshwater emergent or submergent marsh dominated by herbaceous vegetation and associated with isolated basins, edges of streams, and seepage slopes. Typical plants include cattails (*Typha* spp.), marsh fern (*Thelypteris palustris*), touch-me-not (*Impatiens* spp.), pondweeds (*Potamogeton*), water lilies (*Nymphaea odorata*), pickerelweed (*Pontederia cordata*), and tall rushes (*Juncus* spp.), all species that tolerate sustained inundations and do not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. Zonation within a marsh is associated with water depth and length of inundation.

Freshwater marshes are associated with lakes, ponds, headwater basins and slow-moving streams, impoundments, ditches, or any low lying basin that collects water. Such basins are often flat-bottomed and shallow, or marsh vegetation forms a ring around the edge of deeper basins. They typically occur on muck over mineral soil, and as part of a larger wetland complex that may include forested or shrubby swamps, peatlands, and/or open water.

This habitat is associated with the Great Lakes coast (most notably Presque Isle), or isolated on the landscape, associated with the margin of lakes and ponds, or along the floodplains and riparian areas of smaller rivers.

<u>Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk</u>

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Spatterdock - Water-lily Emergent Wetland
- Cat-tail Marsh
- Bulrush Marsh
- Wool-grass - Mannagrass - Mixed Shrub Marsh
- Mixed Forb Marsh
- Common Reed Marsh
- Bluejoint – Reed Canary-grass Marsh
- Water-willow (*Decodon verticillatus*) Shrub Wetland

SGCN Associated with this Habitat

722 unique occurrences or observations of 117 SGCN were associated with the Laurentian-Acadian Freshwater Marsh habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	American black duck - Wintering (*Anas rubripes*)	Palustrine shallow wetlands in forested regions, scrub/shrub & forested wetlands, emergent marshes, and beaver flowages.
Birds	American bittern – Breeding (*Botaurus lentiginosus*)	Extensive freshwater wetlands w/dense stands of cattails, spatterdock, bulrushes, and sedges interspersed with open water.
Birds	Marsh wren - Breeding (*Cistothorus palustris*)	Large (>20 acre) cattail and bulrush marshes tidal marshes of the lower Delaware River with an abundance of standing water
Birds	Sora - Breeding (*Porzana carolina*)	Large shallow-intermediate depth emergent wetlands with a mosaic of open water, dense emergent vegetation, and mudflats.
Birds	King rail - Breeding (*Rallus elegans*)	Freshwater marshes (tidal and non-tidal), brackish tidal marshes, shrub swamps, rice fields w/grasses, sedges, rushes and cattails
Birds	Virginia rail - Breeding (*Rallus limicola*)	Shallow-intermediate depth emergent wetlands with a mosaic of open water and dense emergent vegetation.
Lepidoptera	A wave moth (*Idaea violacearia*)	
Lepidoptera	Eyed brown (*Lethe eurydice*)	
Lepidoptera	Mulberry wing (*Poanes massasoit*)	
Odonates	Big bluet (*Enallagma durum*)	
Odonates	Needham's skimmer (*Libellula needhami*)	
Snails	Vernal physa (*Physa vernalis*)	

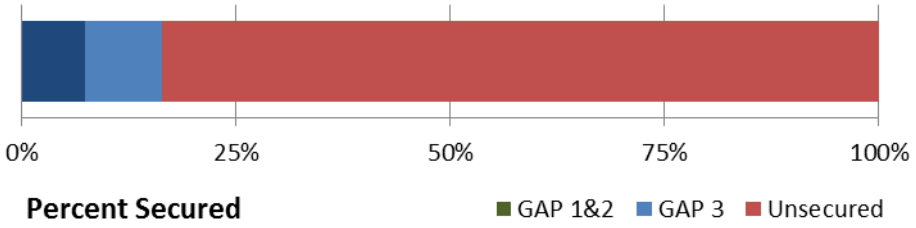
The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Black tern - Breeding (*Chlidonias niger*)	Open-water emergent marsh (> 20 hectares or part of a larger complex) with stable water levels during nesting.
Birds	American coot - Breeding (*Fulica americana*)	Large shallow-intermediate depth emergent wetlands and vegetated fringes of lakes and ponds with a mosaic of open water and emergent vegetation.
Birds	Wilson's snipe - Breeding (*Gallinago delicata*)	Wet meadows and poorly drained pastures where moderate grazing maintains the vegetation in a cropped condition.
Birds	Common gallinule - Breeding (*Gallinula galeata*)	Large shallow-intermediate depth emergent wetlands and vegetated fringes of lakes and ponds with a mosaic of open water and emergent vegetation.
Birds	Least bittern - Breeding (*Ixobrychus exilis*)	Palustrine emergent wetlands, dominated by tall emergents such as cattails interspersed with shrubs and open water
Lepidoptera	Hoary elfin (*Callophrys polios*)	
Mammals	West Virginia water shrew (*Sorex palustris punctulatus*)	Clear mountain streams at elevations > 1,500 to 2,000 ft. with high quality, moderate flow and bordered by deeply undercut stream banks, exposed tree root balls, rock, brush piles, and greater than 75% ground cover.
Odonates	Band-winged meadowhawk (*Sympetrum semicinctum*)	
Snails	Split-tooth dome	

	(*Ventridens virginicus*)	
Snails	Black gloss (*Zonitoides nitidus*)	

Condition metrics

Approximately 21.6% of the Laurentian-Acadian Freshwater Marsh habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.9% of the total distribution of the habitat in the Northeast.

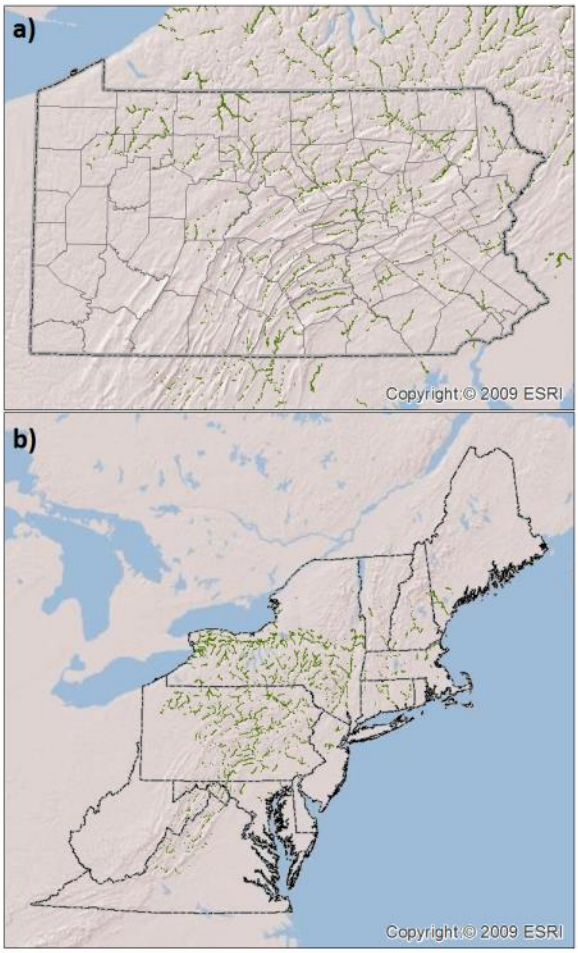


The mean Landscape Context Index (LCI) for this habitat is 125.6 (range 2.2-361.0). The mean score for the northeastern states was 69.8, which suggests this habitat may be in slightly poorer condition in Pennsylvania.

The mean stand age for this habitat was 27.8 years (s.d. 11.3), suggesting that forests surrounding this habitat are relatively young.

North-Central Appalachian Large River Floodplain

Macrogroup: Large River Floodplain
Scale: Wetland
Area: Pennsylvania: 59,967 acres;
Northeast: 254,862 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes the complex of wetland and upland vegetation on floodplains of medium to large rivers in Atlantic drainages. They are typical of larger rivers but they can occur on smaller rivers where the stream gradient is low and a broad floodplain develops. The vegetation complex includes floodplain forests in which silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), box elder (*A. negundo*), and cottonwood (*Populus deltoides*) are characteristic, as well as herbaceous sloughs, shrub wetlands, ice scours, riverside prairies, and woodlands. Most areas are underwater each spring; microtopography determining how long the various habitats are inundated. Depositional and erosional features may both be present depending on the particular floodplain.

Floodplains form on land adjacent to a stream or river that experiences periodic flooding when the river overflows its banks. A variety of microtopographic features form as a result of annual river activity. This broadly-defined system includes vegetation on deep alluvial deposits, on depositional levees and bars, in backwater sloughs, and (rarely) on bedrock where rivers cut through resistant geology.

This habitat can exist in acidic or calcium-rich conditions with minor differences in species composition.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Alder - Dogwood Floodplain Thicket
- Big Bluestem - Indian-grass Floodplain Grassland
- Bitternut Hickory Floodplain Forest
- Bottomland Hardwood Forest
- Buttonbush Wetland
- Circumneutral Mixed Shrub Wetland
- Floodplain Meadow
- Green Ash - Mixed Hardwood Floodplain Forest
- Hairy-fruited Sedge (*Carex trichocarpa*) Floodplain Wetland
- Lizard's-tail Emergent Bed
- Mixed Hardwood Floodplain Thicket
- Oak - Mixed Hardwood Palustrine Forest

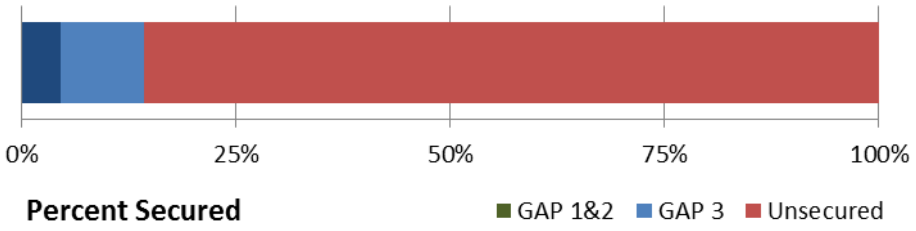
- Periodically Exposed Shoreline Community
- Red Maple - Elm - Willow Floodplain Forest Silver Maple Floodplain Forest
- Sugar Maple - Mixed Hardwood Floodplain Forest
- Sycamore - Mixed Hardwood Floodplain Forest
- Sycamore Floodplain Forest
- Twisted Sedge (*Carex torta*) Stream Margin
- Water-willow (*Justicia americana*) - Smartweed Emergent Bed
- Wool-grass - Mannagrass - Mixed Shrub Marsh

SGCN Associated with this Habitat

533 unique occurrences or observations of 105 SGCN were associated with the North-Central Appalachian Large River Floodplain habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 19.8% of the North-Central Appalachian Large River Floodplain habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 3.4% of the total distribution of the habitat in the Northeast.

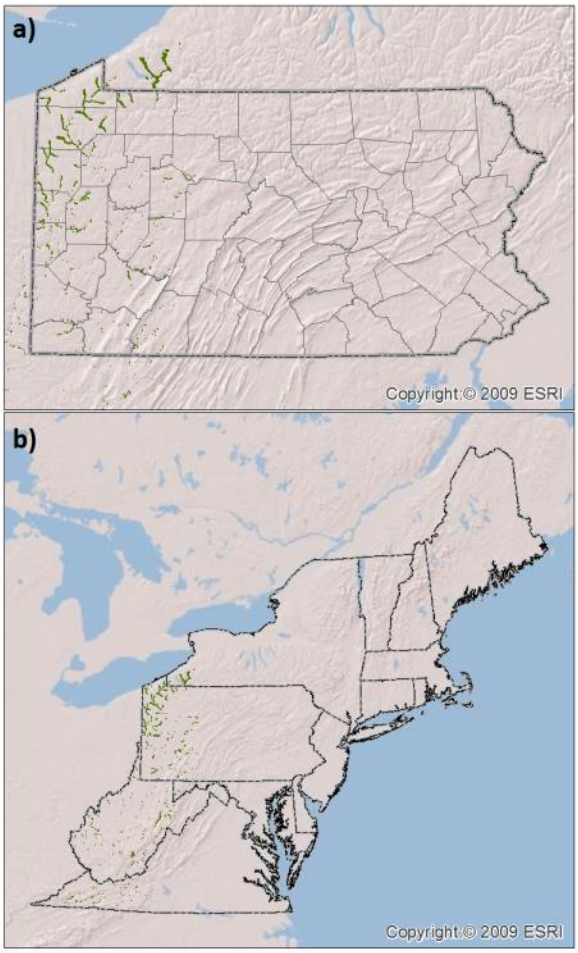


The mean Landscape Context Index (LCI) for this habitat is 114.3 (2.1-372.1), indicating that many patches are only minorly impacted by roads, agriculture, and development. The mean score for the northeastern states was 86.0, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 58.0 years (s.d. 14.3), suggesting that forests surrounding this habitat are relatively old.

North-Central Interior Large River Floodplain

Macrogroup: Large River Floodplain
Scale: Wetland
Area: Pennsylvania: 37,533 acres;
Northeast: 70,068 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes the complex of wetland and upland vegetation on floodplains of medium to large rivers in the Ohio River drainages. Vegetation is variable, dominants often include silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), sweet gum (*Liquidambar styraciflua*), pin oak (*Quercus palustris*), and swamp white oak (*Q. palustris*). Understory species are mixed, but include sedges (*Carex* spp.) and shrubs such as buttonbush (*Cephalanthus occidentalis*). A single occurrence may extend from river's edge across the outermost extent of the floodplain or to where it meets a wet meadow or upland system. Examples may contain welldrained levees, terraces and stabilized bars, herbaceous sloughs and shrub wetlands. Most areas are inundated at some point each spring; microtopography determines how long the various habitats are inundated.

Occurs along large rivers or streams where topography and alluvial processes have resulted in a well-developed floodplain. Soils range from very well-drained sandy substrates to very dense clays. Occasional severe floods can alter the system; exotic shrubs and herbs are a greater threat to floodplain communities than to other terrestrial habitats. This habitat can exist in acidic or calcium-rich conditions with minor differences in species composition.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

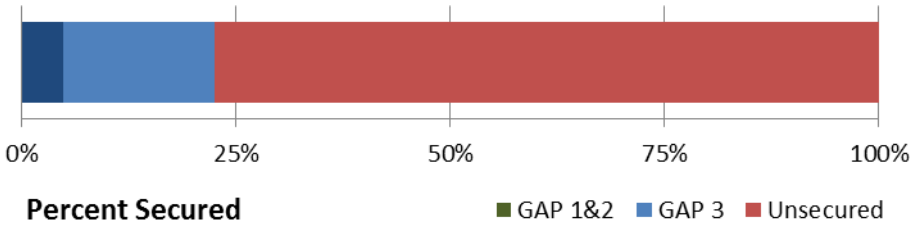
- Spatterdock - Water-lily Emergent Wetland
- Silver Maple Floodplain Forest
- Reed Canary-grass Floodplain Grassland

Species assemblages

427 unique occurrences or observations of 111 SGCN were associated with the North-Central Interior Large River Floodplain habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 15.6% of the North-Central Interior Large River Floodplain habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 12.1% of the total distribution of the habitat in the Northeast.

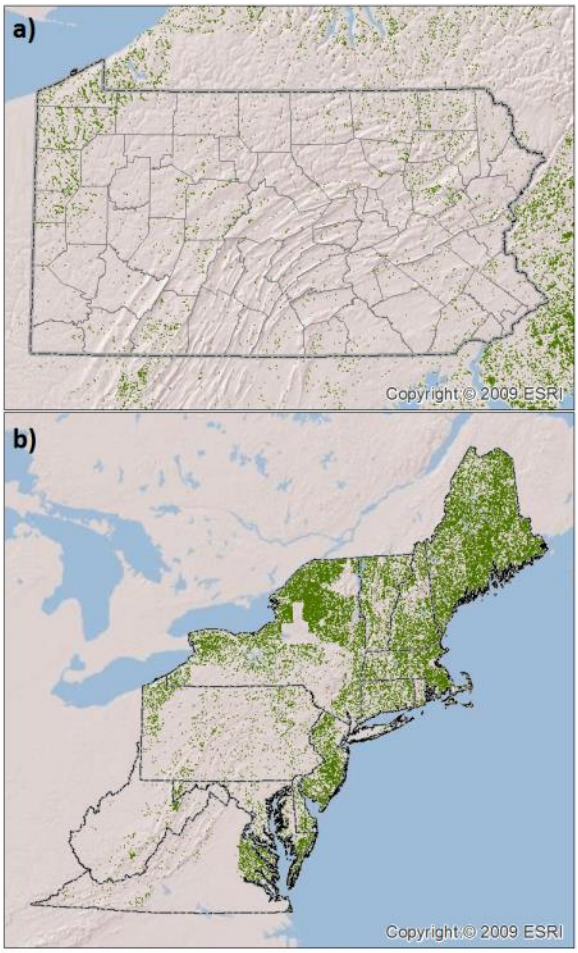


The mean Landscape Context Index (LCI) for this habitat is 101.3 (6.5-308.7), indicating that many patches are only minorly impacted by roads, agriculture, and development. The mean score for the northeastern states was 69.7, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 27.8 years (s.d. 11.3), suggesting that forests surrounding this habitat are relatively young.

Laurentian-Acadian Wet Meadow-Shrub Swamp

Macrogroup: Wet Meadow / Shrub Marsh
Scale: Wetland
Area: Pennsylvania: 39,797 acres;
Northeast: 990,077 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes the shrub-dominated swamp or wet meadow on mineral soils characteristic of the glaciated Northeast and scattered areas southward. Examples often occur in association with lakes and ponds or streams, and can be small and solitary pockets or, more often, part of a larger wetland complex. The habitat can have a patchwork of shrub and herb dominance. Typical species include willow (*Salix* spp.), red-osier dogwood (*Cornus sericea*), alder (*Alnus* spp.), buttonbush (*Cephalanthus occidentalis*), meadowsweet (*Spiraea alba*), bluejoint grass (*Calamagrostis canadensis*), sedges (*Carex spp.*), and rushes (*Juncus* spp.). Trees are generally absent or thinly scattered.

Shrub swamps and wet meadows are associated with lakes and ponds and along headwater and larger streams where the water level does not fluctuate greatly. They are commonly flooded for part of the growing season but generally do not have standing water throughout the season. This is a dynamic system that may return to marsh in beaver impounded areas or succeed to wooded swamp with sediment accumulation or water subsidence.

<u>Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk</u>

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Wool-grass - Mannagrass - Mixed Shrub Marsh
- Rice Cutgrass - Bulrush Marsh
- Circumneutral Mixed Shrub Wetland
- Tussock Sedge Marsh
- Bluejoint – Reed Canary-grass Marsh
- Buttonbush Wetland
- Cat-tail Marsh
- Circumneutral Mixed Shrub Wetland
- Common Reed Marsh
- Highbush Blueberry – Meadow-sweet Wetland
- Mixed Forb – Graminoid Wet Meadow
- Mixed Forb Marsh
- Red Maple – Highbush Blueberry Palustrine Woodland
- Red Maple – Mixed shrub Palustrine Woodland
- Red Maple – Sedge Palustrine Woodland
- Red Spruce – Mixed Hardwood Palustrine Woodland
- Water-willow (*Decodon verticillatus*) Shrub Wetland

SGCN Associated with this Habitat

328 unique occurrences or observations of 99 SGCN were associated with the Laurentian-Acadian Wet Meadow-Shrub Swamp habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Western chorus frog (*Pseudacris triseriata*)	Open palustrine emergent wetlands (PEM) mixed with small, shallow areas of temporary (vernal) standing water in forested areas.
Birds	Black tern - Breeding (*Chlidonias niger*)	Open-water emergent marsh (> 20 hectares or part of a larger complex) with stable water levels during nesting.
Birds	Willow flycatcher -Breeding (*Empidonax traillii*)	Low-elevation shrub swamp, wet meadow, and brushy habitats along streams and the edges of ponds and marshes; sometimes dry upland sites.
Birds	American coot - Breeding (*Fulica americana*)	Large shallow-intermediate depth emergent wetlands and vegetated fringes of lakes and ponds with a mosaic of open water and emergent vegetation.
Lepidoptera	Early hairstreak (*Erora laeta*)	
Lepidoptera	Sundew cutworm moth (*Hemipachnobia monochromatea*)	
Lepidoptera	Joe-Pye weed borer (*Papaipema eupatorii*)	
Lepidoptera	Broad-winged skipper (*Poanes viator viator*)	
Odonates	Tiger spiketail (*Cordulegaster erronea*)	
Reptile	Shorthead garter snake (*Thamnophis brachystoma*)	Riparian old fields and meadows with grasses, sedges, low herbaceous growth, and early successional perennials.
Snails	Meadow slug *(Deroceras laeve*)	

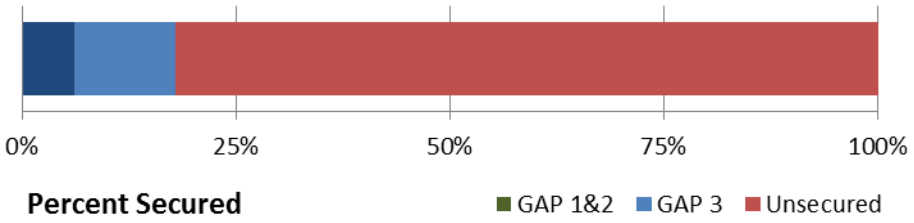
The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Bees	Yellow-banded bumble bee (*Bombus terricola*)	
Birds	American bittern - Breeding (*Botaurus lentiginosus*)	Extensive freshwater wetlands w/dense stands of cattails, spatterdock, bulrushes, sedges interspersed with open water.
Birds	Marsh wren - Breeding (*Cistothorus palustris*)	Large (>20 acre) cattail and bulrush marshes tidal marshes of the lower Delaware River with an abundance of standing water.
Birds	Red crossbill - Breeding (*Loxia curvirostra*)	Irruptive, responding to cone crops including pines, spruces, hemlocks, firs. Winter flocks can be very large and generally responding to mature trees including old growth hemlocks.
Birds	Pied-billed grebe - Breeding (*Podilymbus podiceps*)	Emergent wetlands with abundant vegetation (70% cover, 69-133cm in height) and shallow water (24-56cm depth).
Birds	King rail - Breeding (*Rallus elegans*)	Freshwater marshes (tidal and non-tidal), brackish tidal marshes, shrub swamps, rice fields w/grasses, sedges, rushes and cattails.
Lepidoptera	Dion skipper (*Euphyes dion*)	
Lepidoptera	Mulberry wing (*Poanes massasoit*)	

Mammals	Long-tailed or Rock shrew (*Sorex dispar*)	Cool, moist forests with rocky talus deposits. Often associated with mesic hardwood and mixed hardwood-conifer, and conifer forests with rhododendron component. Almost always associated with rocky, talus substrates.
Odonates	Lance-tipped darner (*Aeshna constricta*)	
Odonates	Cyrano darner (*Nasiaeschna pentacantha*)	
Odonates	Incurvate emerald (*Somatochlora incurvata*)	
Odonates	Cherry-faced meadowhawk (*Sympetrum internum*)	
Reptile	Eastern massasauga (*Sistrurus catenatus catenatus*)	Wetlands with surrounding old field and prairie habitats that contain sunny basking sites.
Spiders	A ghost spider (*Arachosia cubana*)	

Condition metrics

Approximately 25.5% of the Laurentian-Acadian Wet Meadow-Shrub Swamp habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.7% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 100.3 (range 1.3-354.9), indicating that many patches are only impacted by roads, agriculture, and development. The mean score for the northeastern states was 48.0, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

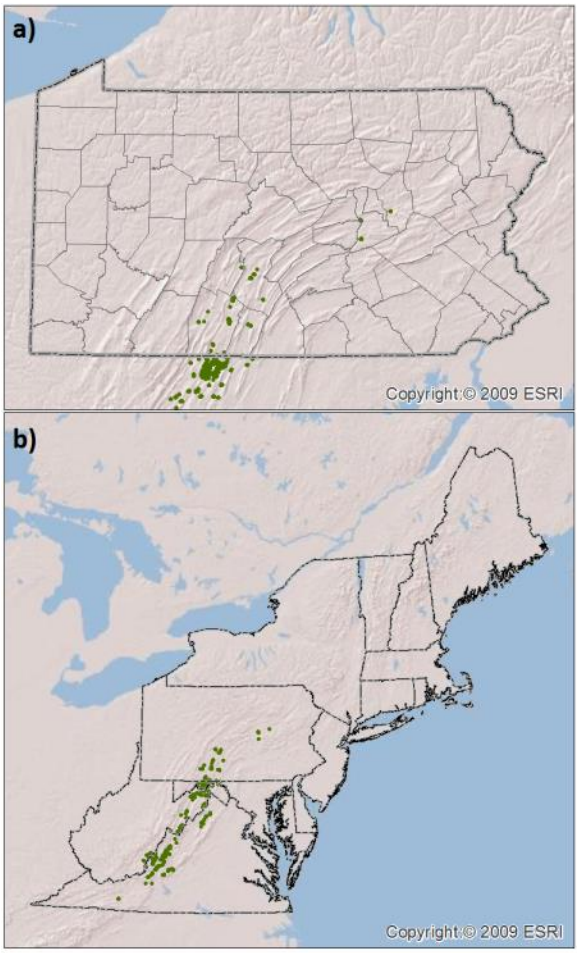
The mean stand age for this habitat was 31.5 years (s.d. 15.6), suggesting that forests surrounding this habitat are relatively old.

Appalachian Shale Barrens

Macrogroup: Glade, Barren and Savanna
Scale: Patch
Area: Pennsylvania: 407 acres;
Northeast: 5,169 acres

A mosaic of woodlands, shrublands, and large open areas of sparse vegetation formed on dry, exposed, steep slopes of unstable shale scree. Dominant trees are primarily stunted red and chestnut oak (*Quercus rubra, Q. montana*), scrub oak (*Quercus ilicifolia*), pignut hickory (*Carya glabra*), and Virginia pine (*P. virginiana*); on higher-pH substrates the common trees include red-cedar (*Juniperus virginiana*) and white ash (*Fraxinus americana*). Many of these may occur as shrubs, along with prickly pear (*Opuntia humifusa*) and various heaths. Shale barren endemics such as shale barren evening primrose (*Oenothera argillicola*), and Kate's mountain clover (*Trifolium virginicum*) are diagnostic in the herb layer. This is the distinctive shale barrens of the central Appalachians.

It typically occurs at low to mid elevations (about 800 to 2500 feet) on dry, rocky, steep slopes of fissile shale or solid rock. Slopes are often above steeply cut stream or river beds, commonly with south to west aspects. The lack of soil creates extreme conditions for plant growth. Introduced weeds and quarrying pose the most serious threats to this system.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Red-Cedar - Mixed Hardwood Rich Shale Woodland
- Virginia Pine - Mixed Hardwood Shale Woodland

SGCN Associated with this Habitat

Six unique occurrences or observations of six SGCN were associated with the Appalachian Shale Barrens habitat. The following SGCN had their Primary Habitat Association with this habitat:

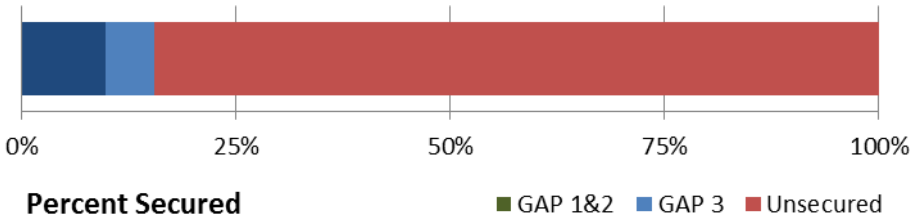
Taxa Group	SGCN	Specific Habitat Requirements
Lepidoptera	A noctuid moth (*Properigea costa*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Lepidoptera	Southern pine looper moth (*Caripeta aretaria*)	
Lepidoptera	Packard's lichen moth (*Cisthene packardii*)	
Lepidoptera	Lead-colored lichen moth (*Cisthene plumbea*)	

Condition metrics

Approximately 61.5% of the Appalachian Shale Barrens habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 1.2% of the total distribution of the habitat in the Northeast:



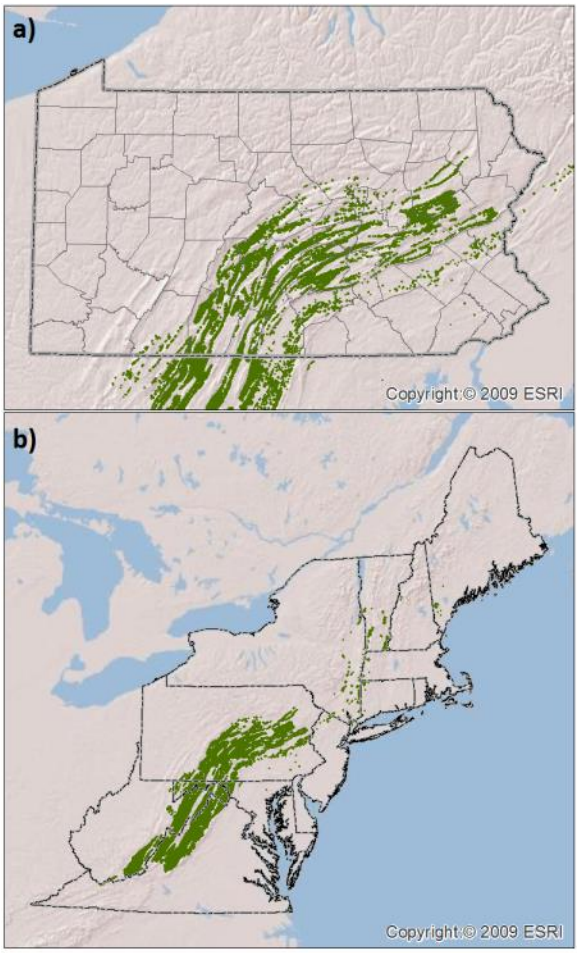
The mean Landscape Context Index (LCI) for this habitat is 65.0 (23.1-128.0), indicating that many patches are only minorly impacted by roads, agriculture, and development. The mean score for the northeastern states was 30.6, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 42.3 years (s.d. 12.9), suggesting that forests surrounding this habitat are relatively old.

Central Appalachian Alkaline Glade and Woodland

Macrogroup: Glade, Barren and Savanna
Scale: Patch
Area: Pennsylvania: 118,776 acres;
Northeast: 413,498 acres

A mosaic of woodlands and open glades on thin soils over limestone, dolostone or similar calcareous rock with its core distribution in the Central Appalachians, but extending well up into New England. In some cases, the woodlands grade into closed-canopy forests. Eastern red-cedar (*Juniperus virginiana*) is a common tree, filling in in the absence of fire, and chinquapin oak (*Quercus muehlenbergii*) is indicative of the limestone substrate. In the northern part of its range, northern white cedar (*Thuja occidentalis*) may replace red cedar. Other locally occurring trees and shrubs are sugar maple (*Acer saccharum*), red and white oak (*Q. rubra, Q. alba*), pignut hickory (*Carya glabra*), eastern redbud (*Cercis canadensis*), and hackberry (*Celtis occidentalis*). Prairie grasses are often dominant in the herb layer, and forb richness is often high, supporting species such as tall larkspur (*Delphium exaltatum*), American harebell (*Campanula rotundifolia*), columbine (*Aquilegia canadensis*), and four-leafed milkweed (*Asclepias quadrifolia*).



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

It typically describes a moderately dry patch community that forms in shallow soils at high landscape positions (upper slopes, ridgetops), at elevations up to about 2500 feet. It is known widely through the region. Fire is sometimes an important natural disturbance vector, but open conditions may also be maintained by drought and landslides. Lower elevation examples are often in highly fragmented agricultural landscapes.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Red-cedar - Redbud Shrubland
- Side-oats Gramma Calcareous Grassland
- Yellow Oak - Redbud Woodland
- Dry Oak-Mixed Hardwood Forest

SGCN Associated with this Habitat

234 unique occurrences or observations of 57 SGCN were associated with the Central Appalachian Alkaline Glade and Woodland habitat. The following SGCN had their Primary Habitat Association with this habitat:

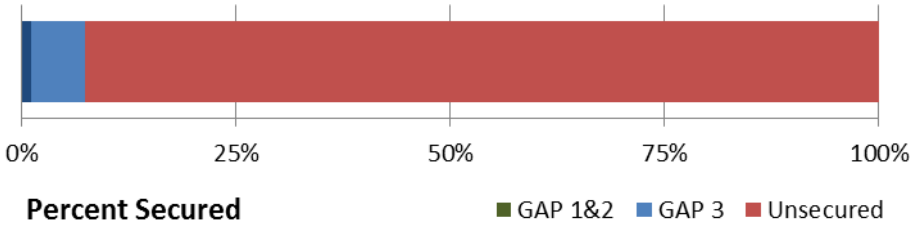
Taxa Group	SGCN	Specific Habitat Requirements
Bees	Rusty-patched bumble bee (*Bombus affinis*)	
Lepidoptera	Juniper hairstreak (*Callophrys gryneus*)	
Lepidoptera	Henry's elfin (*Callophrys henrici*)	
Lepidoptera	Broad-lined erastria moth (*Erastria coloraria*)	
Snails	Angular disc (*Discus catskillensis*)	
Snails	Armed snaggletooth (*Gastrocopta armifera*)	
Snails	Bark snaggletooth (*Gastrocopta corticaria*)	
Snails	Maze pinecone (*Strobilops labyrinthicus*)	
Snails	Pygmy vertigo (*Vertigo pygmaea*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Lepidoptera	Falcate orangetip (*Anthocharis midea*)	

Condition metrics

Approximately 11.6% of the Central Appalachian Alkaline Glade and Woodland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 2.1% of the total distribution of the habitat in the Northeast.

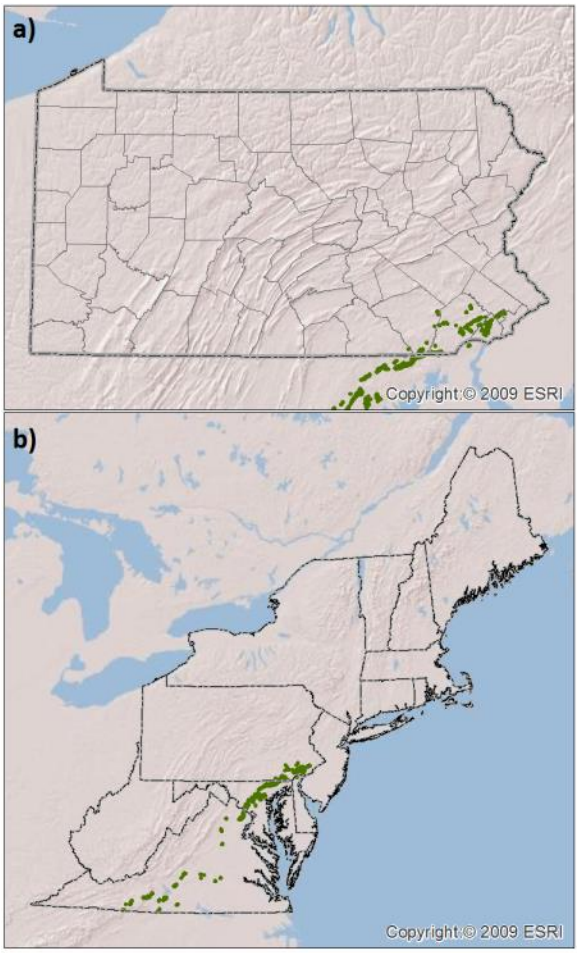


The mean Landscape Context Index (LCI) for this habitat is 91.7 (9.4-300), indicating that roads, agricultural, and development have somewhat impacted this habitat. The mean score for the northeastern states was 61.6, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 39.0 years (s.d. 15.2), suggesting that forests surrounding this habitat are relatively young.

Eastern Serpentine Woodland

Macrogroup: Glade, Barren and Savanna
Scale: Patch
Area: Pennsylvania: 3,985 acres;
Northeast: 11,954 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

An open woodland of distinct vegetation associated with serpentinite, soapstone, and other ultramafic rock substrates in Maryland, southern Pennsylvania, and Virginia. The open, stunted canopy, often less than five meters high, is composed of pitch pine (*Pinus rigida*), Virginia pine (*P. virginia*), white oak (*Quercus alba*), post oak (*Q. stellata*), and/or blackjack oak (*Q. marilandica*). Fire suppression probably leads to stronger dominance by pines. Extreme edaphic conditions lead to xerophytic (extremely dry) growing environments, resulting in relatively open structure and a ground cover dominated by prairie grasses and a variety of forbs. Endemics such as serpentine aster (*Symphyotrichum depauperatum*) and roundleaf fameflower (*Phemeranthus teretifolius*) are diagnostic.

This habitat in Pennsylvania is restricted to southeastern Pennsylvania, primarily in Lancaster and Chester Counties. This habitat is limited to areas where serpentine bedrock is near the surface, resulting in a limited range and distribution. The unusual and extreme soil chemistry determines the distinctive flora of the type, but fire frequency determines the physiognomy of particular examples over time, and many have succeeded to forest cover as a result of fire suppression. This, along with a history of intense habitat fragmentation and quarrying, has left most remnant patches small and in degraded condition. Serpentine barrens are best known to botanists as hotspots for disjunct and endemic plant species. These exceptional ecosystems are ranked high in priority for biodiversity conservation because they are rich in rare species of both plants and animals, including several that are globally rare and in danger of extinction. The barrens rate high in importance also because they comprise one of the rarest and most unusual sets of natural communities in eastern North America (Latham 1993).

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Serpentine Virginia Pine - Oak Forest
- Serpentine Pitch Pine - Oak Forest
- Serpentine Seep

SGCN Associated with this Habitat

70 unique occurrences or observations of 34 SGCN were associated with the Eastern Serpentine Woodland habitat. The following SGCN had their Primary Habitat Association with this habitat:

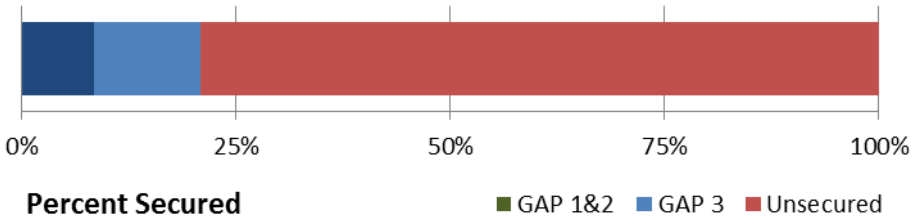
Taxa Group	SGCN	Specific Habitat Requirements
Birds	Summer tanager - Breeding (*Piranga rubra*)	Dry, upland forests, particularly oak woodlands with an open understory; often near minor openings.
Lepidoptera	Falcate orangetip (*Anthocharis midea*)	
Lepidoptera	Packard's lichen moth (*Cisthene packardii*)	
Lepidoptera	Pure lichen moth (*Crambidia pura*)	
Lepidoptera	Cobweb skipper (*Hesperia metea*)	
Lepidoptera	*Macromia taeniolata*	
Lepidoptera	Ash-tip borer (*Papaipema furcata*)	
Lepidoptera	Tolype moth (*Tolype notialis*)	
Reptile	Rough green snake (*Opheodrys aestivus*)	Riparian thickets and lake shores where trees or woody shrubs (1-3 meters in height) dominate the vegetation.
Reptile	Eastern smooth earth snake (*Virginia valeriae valeriae*)	Deciduous forests and adjacent open areas.

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Lepidoptera	Juniper hairstreak (*Callophrys gryneus*)	
Lepidoptera	Leonard's skipper (*Hesperia leonardus*)	
Lepidoptera	Barrens buckmoth (*Hemileuca maia*)	
Lepidoptera	Black-waved flannel moth (*Lagoa crispata*)	
Lepidoptera	Southern variable dart moth (*Xestia elimata*)	
Lepidoptera	Black-eyed zale (*Zale curema*)	

Condition metrics

Approximately 19.7% of the Eastern Serpentine Woodland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 6.9% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 134.1 (48.8-233.2) indicating the habitat is fairly impacted by roads, development, and agriculture. The mean score for the northeastern states was 102.5, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

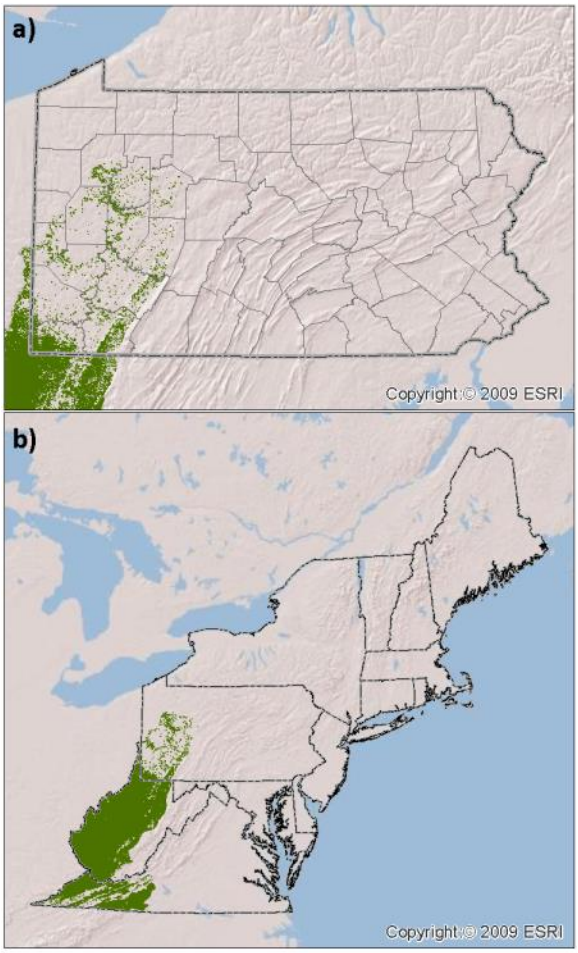
The mean stand age for this habitat was 21.9 years (s.d. 9.8), suggesting that forests surrounding this habitat are relatively young.

Allegheny-Cumberland Dry Oak Forest and Woodland

Macrogroup: Central Oak-Pine
Scale: Matrix forest
Area: Pennsylvania: 60,873 acres;
Northeast: 2,261,249 acres

A dry hardwood forest dominated by white oak (*Quercus alba*), southern red oak (*Q. falcata*), chestnut oak (*Q. montana*), scarlet oak (*Q. coccinea*), and black oak (*Q. nigra*), with lesser amounts of red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), mockernut hickory (*C. tomentosa*), Chestnut (*Castanea dentata*) was also common in these forests before chestnut blight eradicated it from the canopy, leaving occasional sprouts behind. Scattered and small inclusions of shortleaf (*Pinus echinata*) or Virginia pine (*P. virginiana*) may occur, particularly along to escarpments or following fire. Pitch pine (*P. rigida*) and table mountain pine (*P. pungens*) are also sometimes present. In the absence of fire, white pine (*P. strobus*) may become established. Heath shrub layers are common.

This habitat occurs as small to large patches at higher topographic positions on mostly acidic substrates in the Allegheny and Cumberland plateaus. Soils are dry and nutrient-poor. Fire has likely been the most ecologically significant disturbance historically.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Dry Oak - Heath Forest
- Pitch Pine - Mixed Hardwood Woodland
- Virginia Pine - Mixed Hardwood Forest
- Dry white pine (hemlock) - oak forest
- Dry oak-mixed hardwood forest

SGCN Associated with this Habitat

115 unique occurrences or observations of 44 SGCN were associated with the Allegheny-Cumberland Dry Oak Forest and Woodland habitat. One SGCN had their Primary Habitat Association with this habitat:

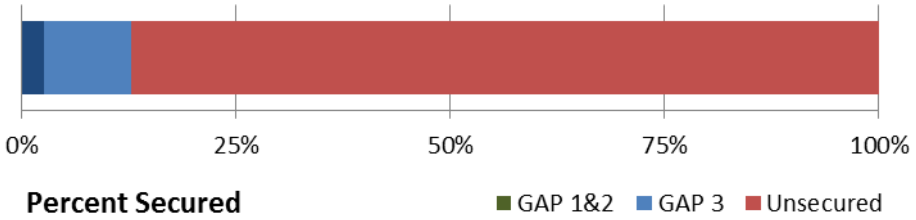
Taxa Group	SGCN	Specific Habitat Requirements
Snails	Baffled three-tooth (*Triodopsis fraudulenta*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Mountain chorus frog (*Pseudacris brachyphona*)	Vernal pools and spring seeps within wooded slopes of deciduous forests. Slow-moving streams and ditches with abundant vegetation along edges.

Condition metrics

Approximately 8.4% of the Allegheny-Cumberland Dry Oak Forest and Woodland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.3% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 66.7 (12.3-269.1) indicating the habitat is fairly impacted by roads, development, and agriculture. The mean score for the northeastern states was 29.9, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

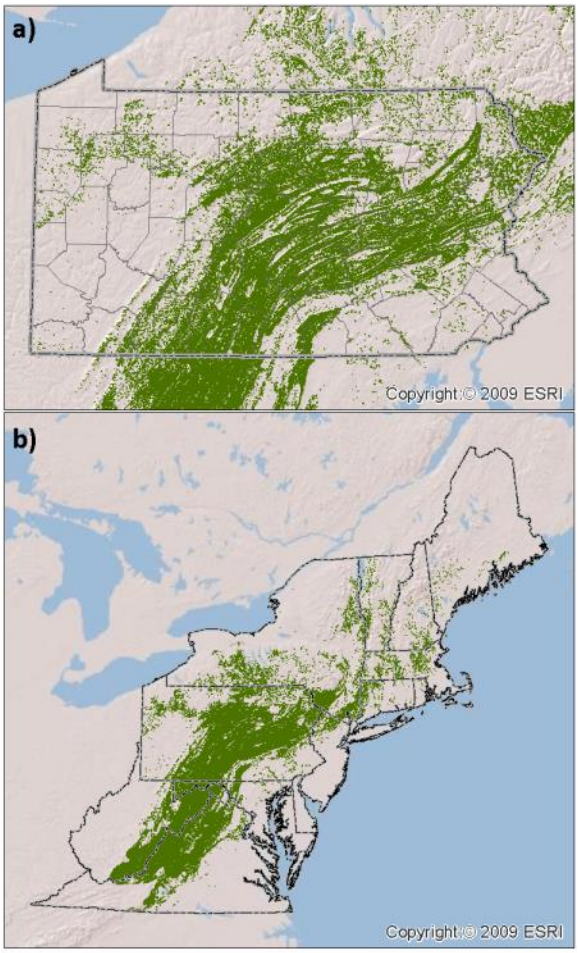
The mean stand age for this habitat was 37.6 years (s.d. 9.7), suggesting that patches of this habitat are relatively young.

Central Appalachian Dry Oak-Pine Forest

Macrogroup: Central Oak-Pine
Scale: Matrix forest
Area: Pennsylvania: 1,496,364 acres;
Northeast: 3,845,317 acres

An oak or oak-pine forest of dry sites, characterized by a variable mixture of drought tolerant oaks—including chestnut oak (*Quercus montana*), white oak (*Q. alba*), red oak (*Q. rubra*), black oak (*Q. nigra*), scarlet oak (*Q coccinea*)—and pines–including pitch (*Pinus rigida*), white (*P. strobus*), Virginia (*P. virginiana*). It occurs broadly in the Central Appalachians and northern Piedmont ecoregions, most commonly as a large (to very large) patch habitat. Community structure ranges from open woodlands to closed forest. Heath shrubs are common in the understory; the herb layer is often sparse and lacks diversity. In the absence of fire this system may tend to succeed to hemlock (*Tsuga canadensis*) and locally common hardwoods.

This is a habitat of dry rolling hills, high sunny slopes and ridgetops, where soils are often thin, well-drained, and nutrient-poor. Bedrock substrates are variable, and can influence herb diversity. Disturbance agents include fire, windthrow, and ice damage, and gypsy moths can wreak havoc in the oak overstory periodically.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Virginia Pine - Mixed Hardwood Forest
- Dry Oak-Mixed Hardwood Forest
- Dry Oak - Heath Forest
- Dry White Pine (Hemlock) - Oak Forest
- Pitch Pine - Heath Woodland
- Pitch Pine - Mixed Oak Forest

SGCN Associated with this Habitat

3,047 unique occurrences or observations of 130 SGCN were associated with the Central Appalachian Dry Oak-Pine Forest habitat. The following SGCN had their Primary Habitat Association with this habitat:

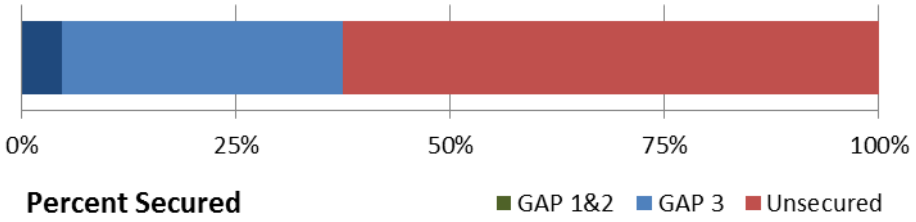
Taxa Group	SGCN	Specific Habitat Requirements
Birds	Golden eagle - Migration (*Aquila chrysaetos*)	Inhabit rugged, mostly wooded terrain throughout the Allegheny Plateau and Valley and Ridge regions
Birds	Red crossbill - Breeding (*Loxia curvirostra*)	Irruptive, responding to cone crops including pines, spruces, hemlocks, firs. Winter flocks can be very large and generally responding to mature trees including old growth hemlocks.
Birds	Cerulean warbler - Breeding (*Setophaga cerulea*)	Large stands of mature deciduous forest with large, well-spaced trees with dense, high, often broken or heterogeneous canopies. Especially bottomland forests dominated by sycamore or ridgetop mixed oak with major white oak component.
Lepidoptera	Yankee dart (*Abagrotis brunneipennis*)	
Lepidoptera	Brown elfin (*Callophrys augustinus*)	
Lepidoptera	Rare sand quaker (*Caradrina meralis*)	
Lepidoptera	Southern pine looper moth (*Caripeta aretaria*)	
Lepidoptera	Pine woods underwing (*Catocala sp. 1* nr. *jair*)	
Lepidoptera	Barrens chaetoglaea (*Chaetaglaea tremula*)	
Lepidoptera	Red dart moth (*Diarsia rubifera*)	
Lepidoptera	Barrens itame (*Speranzainextricata*)	
Lepidoptera	Purple plagodis (*Plagodis kuetzingi*)	
Lepidoptera	Edwards' hairstreak (*Satyrium edwardsii*)	
Lepidoptera	A noctuid moth (*Sympistis dentata*)	
Lepidoptera	Southern variable dart moth (*Xestia elimata*)	
Mammals	Allegheny woodrat (*Neotoma magister*)	Extensive expanses of sandstone and/or limestone rock outcrops in unfragmented oak- hickory forest communities.
Mammals	Tri-colored bat - Breeding (*Perimyotis subflavus*)	Human structures, trees, and cavities.
Reptile	Copperhead (*Agkistrodon contortrix*)	Open, rocky areas in deciduous hardwood forest w/low surface vegetation, reduced amounts of shade, and soil temperatures elevated by sunlight.
Reptile	Timber rattlesnake (*Crotalus horridus*)	Sandstone and/or limestone rock habitats in unfragmented oak-hickory forest communities.
Reptile	Eastern fence lizard (*Sceloporus undulatus*)	Open rock faces and talus in forest.
Snails	Bristled Slitmouth (*Stenotrema barbatum*)	
Tiger Beetles	Northern barrens tiger beetle (*Cicindela patruela*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Long-eared owl - Breeding (*Asio otus*)	Both during breeding and winter, we generally think of long-eared owls using planted conifers near agricultural or grassland habitats.
Birds	Eastern Whip-poor-will - Breeding (*Antrostomus vociferus*)	Early to mid-successional and open, forested habitats near clearings.
Lepidoptera	Northern Metalmark (*Calephelis borealis*)	
Lepidoptera	A Midget moth (*Elaphria georgei*)	
Lepidoptera	Pink Sallow (*Psectraglaea carnosa*)	
Lepidoptera	Appalachian Grizzled skipper (*Pyrgus wyandot*)	
Reptile	Northern Coal skink (*Plestiodon anthracinus anthracinus*)	Open habitat (less than 50 percent canopy cover by trees) where rocks and logs provide abundant cover.
Reptile	Eastern Hognose snake (*Heterodon platirhinos*)	Sandy clearings in forests and grasslands. Often associated with sandy floodplains along waterways.
Snails	Angular Disc (*Discus catskillensis*)	
Snails	Armed Snaggletooth (*Gastrocopta armifera*)	
Snails	White-lip Dagger (*Pupoides albilabris*)	
Snails	Honey Vertigo (*Vertigo tridentata*)	

Condition metrics

Approximately 34.1% of the Central Appalachian Dry Oak-Pine Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 14.2% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 69.0 (0-290.9), indicating that on average this habitat is moderately impacted by roads, agriculture, and development. The mean score for the northeastern states was 32.8, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

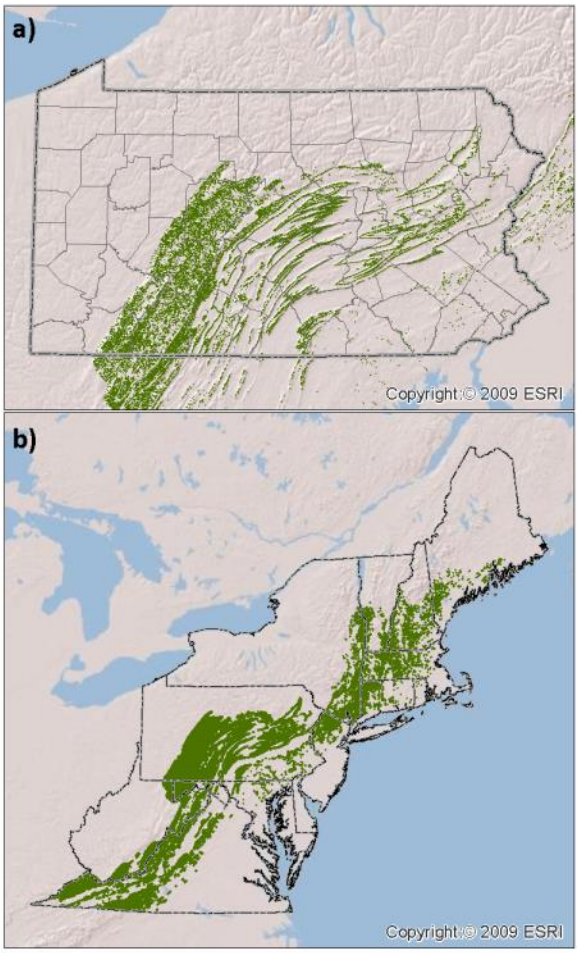
The mean stand age for this habitat was 45.5 years (s.d. 15.2), suggesting that patches of this habitat are relatively old.

Central Appalachian Pine-Oak Rocky Woodland

Macrogroup: Central Oak-Pine
Scale: Matrix forest
Area: Pennsylvania: 310,493 acres;
Northeast: 566,276 acres

A mixed forest or woodland of pitch pine (*Pinus rigida*) and/or Virginia pine (*P. virginiana*) mixed with dry-site oaks, primarily scrub oak (*Quercus ilicifolia*), scarlet oak (*Quercus coccinea*), and chestnut oak (*Q. montana*)). Red pine (*Pinus resinosa*) and shortleaf pine (*Pinus echinata*) may also occur. Some areas have a fairly well-developed heath shrub layer; a graminoid herb layer dominated by Pennsylvania sedge (*Carex pensylvanica*), poverty grass (*Danthonia spicata*), and common hairgrass (*Deschampsia flexuosa*) may be more prominent in others. The vegetation is patchy, with woodland as well as open portions, or even sparse cover on dry rocky hilltops and outcrops.

These forests occur on deep, acidic, coarse textured soils. A thick duff layer and dry conditions make this system subject to periodic fires, which in turn encourage oak regeneration.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Dry Oak - Heath Woodland
- Dry Oak-Mixed Hardwood Forest
- Little Bluestem - Pennsylvania Sedge Opening
- Low Heath - Mountain Ash Shrubland
- Low Heath Shrubland
- Pitch Pine - Heath Woodland
- Pitch Pine - Mixed Hardwood Woodland
- Scrub Oak Shrubland
- Virginia Pine - Mixed Hardwood Forest

SGCN Associated with this Habitat

796 unique occurrences or observations of 79 SGCN were associated with the Central Appalachian Pine-Oak Rocky Woodland habitat. The following SGCN had their Primary Habitat Association with this habitat:

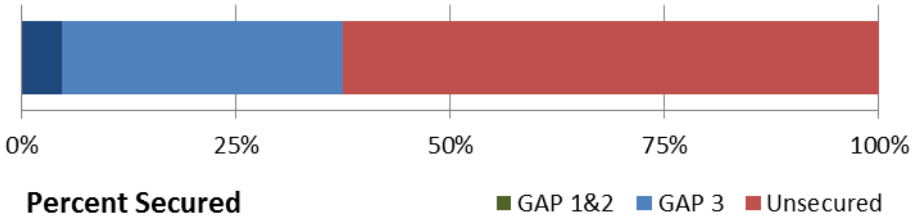
Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Upland chorus frog (*Pseudacris feriarum*)	Open palustrine emergent wetlands (PEM) mixed with small, shallow areas of temporary (vernal) standing water in forested areas.
Birds	Northern goshawk – Migration (*Accipiter gentilis*)	Any forested habitat, including edges and ruderal forests, presumably.
Birds	Golden eagle – Wintering (*Aquila chrysaetos*)	Inhabit rugged, mostly wooded terrain throughout the Allegheny Plateau and Valley and Ridge regions
Lepidoptera	Pink-edged sulphur (*Colias interior*)	
Mammals	Eastern spotted skunk (*Spilogale putorius*)	Pine and hardwood forests with rocky outcrops, dense understory, closed canopy, vines, and steep slopes (Reed and Kennedy 2000, Lesmeister et al. 2008, Lesmeister et al. 2013); reverting fields and hedgerows with coarse woody debris (Butfiloski and Swaygnham 2005).

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Green salamander (*Aneides aeneus*)	Moist crevices in sandstone outcrops and ledges.
Lepidoptera	Pointed sallow (*Epiglaea apiata*)	
Lepidoptera	The Maroonwing (*Sideridis maryx*)	
Reptile	Copperhead (*Agkistrodon contortrix*)	Open, rocky areas in deciduous hardwood forest w/low surface vegetation, reduced amounts of shade, and soil temperatures elevated by sunlight.
Reptile	Timber rattlesnake (*Crotalus horridus*)	Sandstone and/or limestone rock habitats in unfragmented oak-hickory forest communities.

Condition metrics

Approximately 38.4% of the Central Appalachian Pine-Oak Rocky Woodland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 20.5% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 54.3 (1.2-218.1), indicating that the habitat is moderately impacted by roads, agriculture, and development. The mean score for the northeastern states was 28.7, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

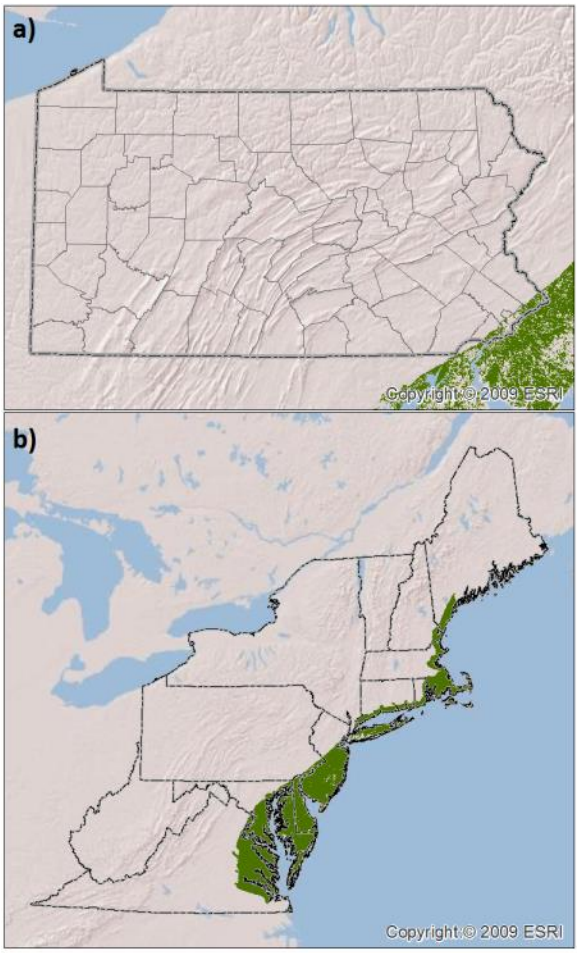
The mean stand age for this habitat was 49.8 years (s.d. 12.7), suggesting that patches of this habitat are relatively old.

North Atlantic Coastal Plain Hardwood Forest

Macrogroup: Central Oak-Pine
Scale: Matrix forest
Area: Pennsylvania: 10,632 acres;
Northeast: 2,145,627 acres

A hardwood forest largely dominated by oaks (*Quercus spp.*), often mixed with pine. American holly (*Ilex americana*) is sometimes present. Sassafras (*Sassafras albidum*), birch (*Betula spp.*), aspen (*Populus spp.*), and hazelnut (*Corylus americana*) are common associates in earlier-successional areas. In the northern half of the range, conditions can grade to dry-mesic, reflected in the local abundance of beech (*Fagus grandifolia*). A heath shrub layer is common; the herbaceous layer is sparse. In southern-more occurrences in Maryland or Virginia, pines (shortleaf (*Pinus echinata*), Virginia, and particularly loblolly may be important, even strongly dominant canopy trees. The pine component is usually an indication of past human disturbance.

These forests occur on deep, acidic, coarse textured soils on the flat to rolling. A thick duff layer and dry conditions make this system subject to periodic fires, which in turn encourage oak regeneration.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Dry oak-mixed hardwood forest
- Red maple (terrestrial) Forest
- Virginia pine - mixed hardwood forest
- Sweet gum - oak coastal plain forest

SGCN Associated with this Habitat

128 unique occurrences or observations of 39 SGCN were associated with the North Atlantic Coastal Plain Hardwood Forest habitat. The following SGCN had their Primary Habitat Association with this habitat:

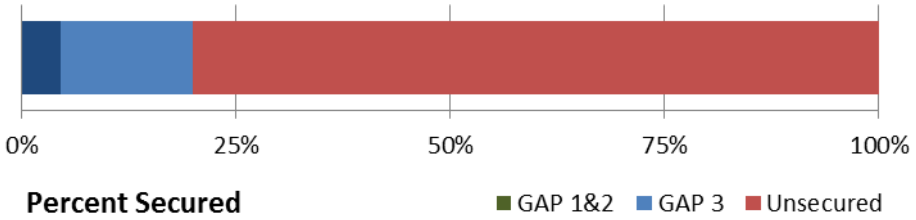
Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	New Jersey chorus frog (*Pseudacris kalmi*)	Permanent and temporarily inundated habitats including forested swamp, marshes, wet meadows, floodplains, riparian corridors, ditches, and canals.

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Southern leopard frog (*Lithobates sphenocephalus utricularius*)	Marshes, ponds, wet meadows, and the edges of slow-moving rivers and streams. Also brackish waters near coastal areas.
Amphibian	Northern cricket frog (*Acris crepitans*)	Lakes, bogs, ponds, vernal pools and large open water marsh w/vegetated shores and edges.

Condition metrics

Approximately 16.1% of the North Atlantic Coastal Plain Hardwood Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.1% of the total distribution of the habitat in the Northeast:

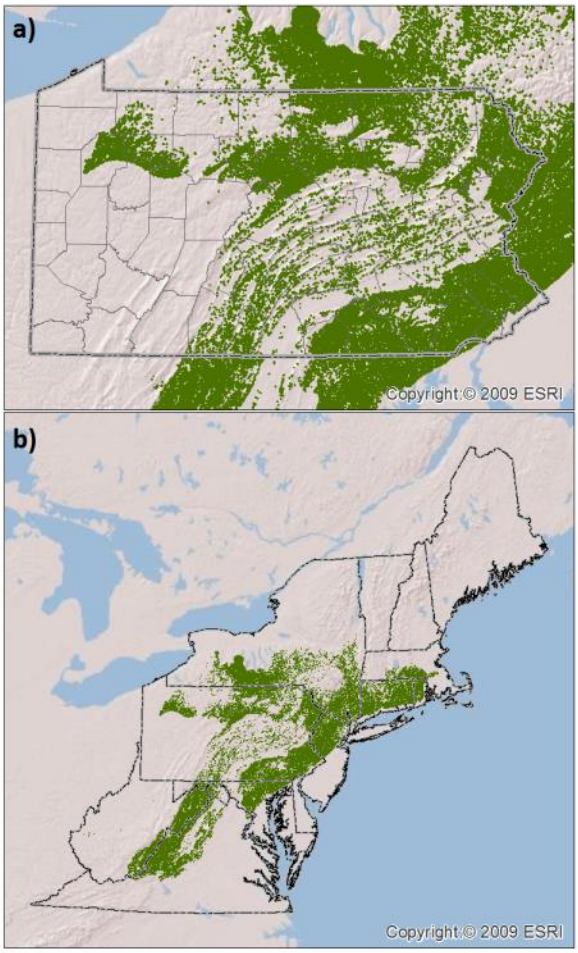


The mean Landscape Context Index (LCI) for this habitat is 257.3 (128.5-369.9), indicating that this habitat is highly impacted by roads and development. The mean score for the northeastern states was 83.8, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 16.4 years (s.d. 10.2), suggesting that patches of this habitat are relatively young.

Northeastern Interior Dry-Mesic Oak Forest

Macrogroup: Central Oak-Pine
Scale: Matrix forest
Area: Pennsylvania: 6,264,459 acres;
Northeast: 17,032,701 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

An oak-dominated, mostly closed canopy forest that occurs as a matrix (dominant) type through the central part of our region. Oak species characteristic of dry to mesic conditions (e.g., red, white, black, and scarlet oak) and hickories are dominant in mature stands. Chestnut oak may be present but is generally less important than other oak species. Red maple (*Acer rubrum*), black birch (*Betula lenta*), and yellow birch (*Betula alleghaniensis*) may be common associates. Heath shrubs are often present but not well developed. Local areas of limy bedrock, or colluvial pockets, may support forests that reflect the richer soils. With a long history of human habitation, many of the forests are mid-successional, in which pines (typically Virginia or white) or tuliptree (*Lireodendron tulipifera*) may be co-dominant or dominant.

Moderate moisture and heat loading are characteristic for this oak system. It occurs at low- to mid-elevations, where the topography is flat to gently rolling, occasionally steep. Substrate bedrock and soils are commonly but not always acidic. Chestnut was formerly a prominent tree in these forests. A moist-cool subtype of this habitat may occur on north facing slopes with may provide particular habitat conditions for some SGCN.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Dry Oak - Mixed Hardwood Forest
- Dry White Pine (Hemlock) - Oak Forest
- Dry Oak - Heath Forest

SGCN Associated with this Habitat

19,253 unique occurrences or observations of 294 SGCN were associated with the Northeastern Interior Dry-Mesic Oak Forest habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Marbled salamander (*Ambystoma opacum*)	Vernal pools in mixed deciduous forests - both upland and floodplain sites.
Amphibian	Mountain chorus frog (*Pseudacris brachyphona*)	Vernal pools and spring seeps within wooded slopes of deciduous forests. Slow-moving streams and ditches with abundant vegetation along edges.
Amphibian	Northern cricket frog (*Acris crepitans*)	Lakes, bogs, ponds, vernal pools and large open water marsh w/vegetated shores and edges.
Bees	Ashton cuckoo bumble bee (*Bombus ashtoni*)	
Bees	Yellow-banded bumble bee (*Bombus terricola*)	
Birds	Northern saw-whet owl - Breeding (*Aegolius acadicus*)	Dense shrubby understory, including ericaceous shrubs, young conifers.
Birds	Eastern whip-poor-will - Breeding (*Antrostomus vociferus*)	Early to mid-successional and open, forested habitats near clearings.
Birds	Ruffed grouse - Wintering (*Bonasa umbellus*)	Mosaic of age classes within a forested landscape, with early succession forest as 12-15% of total. High quality, native food and cover species within close proximity to one another. Conifers may provide important thermal cover from winter rain and ice. Diverse and complex native forest structure is preferred over heavily managed or thinned parcels.
Birds	Broad-winged hawk - Migration (*Buteo platypterus*)	Continuous deciduous or mixed deciduous forests with openings and water source nearby.
Birds	Kentucky warbler - Breeding (*Geothlypis formosa*)	Lowland deciduous forests with well-developed ground cover and a dense brushy or vine-filled understory, often near streams.
Birds	Wood thrush - Migration (*Hylocichla mustelina*)	Second-growth deciduous forest and forest-edge habitats; often with available fruit.
Birds	Cerulean warbler - Migration (*Setophaga cerulea*)	Large stands of mature deciduous forest with large, well-spaced trees with dense, high, often broken or heterogeneous canopies. Especially bottomland forests dominated by sycamore or ridgetop mixed oak with major white oak component.
Birds	Hooded warbler - Migration (*Setophaga citrina*)	Most frequent during migration in edges and early-successional deciduous forest (Rodewald & Matthews 2005).
Birds	Blackburnian warbler - Migration (*Setophaga fusca*)	Higher elevation, unfragmented forest with conifers.
Birds	Golden-winged warbler - Breeding (*Vermivora chrysoptera*)	Mosaic of herbaceous patches and shrubby thickets located along a forest edge, often at higher elevations; increasingly found in higher elevation bogs and forested wetlands.
Lepidoptera	Doll's merolonche (*Acronicta dolli*)	
Lepidoptera	Common roadside skipper (*Amblyscirtes vialis*)	
Lepidoptera	Spiny oakworm moth (*Anisota stigma*)	
Lepidoptera	A noctuid moth (*Aplectoides condita*)	
Lepidoptera	Dot-lined white moth (*Artace cribraria*)	
Lepidoptera	Straight lined mallow moth (*Bagisara rectifascia*)	
Lepidoptera	Frosted elfin (*Callophrys irus*)	
Lepidoptera	Curved halter moth (*Capis curvata*)	

Lepidoptera	A sallow moth (*Chaetaglaea cerata*)	
Lepidoptera	Silvery checkerspot (*Chlosyne nycteis*)	
Lepidoptera	Melsheimer's sack bearer (*Cicinnus melsheimeri*)	
Lepidoptera	Lead-colored lichen moth (*Cisthene plumbea*)	
Lepidoptera	Pine devil (*Citheronia sepulcralis*)	
Lepidoptera	A Hand-maid moth (*Datana ranaeceps*)	
Lepidoptera	Pointed sallow (*Epiglaea apiata*)	
Lepidoptera	Persius duskywing (*Erynnis persius persius*)	
Lepidoptera	Olympia marble (*Euchloe olympia*)	
Lepidoptera	Zebra swallowtail (*Eurytides marcellus*)	
Lepidoptera	Rare spring moth (*Heliomata infulata*)	
Lepidoptera	Barrens buckmoth *(Hemileuca maia*)	
Lepidoptera	A moth (*Hydraecia stramentosa*)	
Lepidoptera	Esther moth (*Hypagyrtis esther*)	
Lepidoptera	Northern brocade moth (*Neoligia semicana*)	
Lepidoptera	Flypoison borer moth (*Papaipema* sp. 1)	
Lepidoptera	An oak moth (*Phoberia ingenua*)	
Lepidoptera	Pink sallow (*Psectraglaea carnosa*)	
Lepidoptera	Appalachian grizzled skipper (*Pyrgus wyandot*)	
Lepidoptera	Northern hairstreak (*Satyrium favonius ontario*)	
Lepidoptera	The maroonwing (*Sideridis maryx*)	
Lepidoptera	Regal fritillary (*Speyeria idalia*)	
Lepidoptera	Apple sphinx (*Sphinx gordius*)	
Lepidoptera	Broad sallow moth (*Xylotype capax*)	
Mammals	Big brown bat - Breeding (*Eptesicus fuscus*)	Human structures, trees, and other hollow spaces.
Mammals	Eastern small-footed bat - Breeding (*Myotis leibii*)	Summer - deciduous/mixed forested areas containing rock outcrops and talus..
Mammals	Little brown bat - Breeding (*Myotis lucifugus*)	Various habitats, from forested to urban/human structures.

Mammals	Northern long-eared bat (*Myotis septentrionalis*)	Summer - deciduous/mixed forested areas containing mature trees with exfoliating bark/snags, also human structures. Winter – caves and mines.
Mammals	Appalachian cottontail (*Sylvilagus obscurus*)	High elevation flat ridgetops dominated by mountain laurel with interspersed grassy openings; small, recently planted pine plantations with significant grass and forb cover; young clearcuts; also low elevation beaver meadows w/ thickets.
Mayflies	*Ephemerella invaria*	
Odonates	Seepage dancer (*Argia bipunctulata*)	
Odonates	Arrowhead spiketail (*Cordulegaster obliqua*)	
Odonates	Blue corporal (*Ladona deplanata*)	
Odonates	Golden-winged skimmer (*Libellula auripennis*)	
Other Beetles	Six-banded longhorn beetle (*Dryobius sexnotatus*)	
Reptile	Eastern worm snake (*Carphophis amoenus amoenus*)	
Reptile	Spotted turtle *(Clemmys guttata*)	Soft-bottomed aquatic habitats, including small streams, marshes, swamps, and vernal pools w/ upland forests or open habitats.
Reptile	Eastern hognose snake (*Heterodon platirhinos*)	Sandy clearings in forests and grasslands. Often associated with sandy floodplains along waterways.
Reptile	Broadhead skink (*Plestiodon laticeps*)	Deciduous forests with an abundance of dead standing timber, large stumps, and hollow logs.
Reptile	Eastern box turtle (*Terrapene carolina carolina*)	Deciduous forests, old fields, ecotonal areas, and marshy areas.
Reptile	Eastern ribbon snake (*Thamnophis sauritus*)	Riparian edges of emergent marshes, bogs, streams, rivers, ponds and lakes with with dense sedges, grasses, rushes, and emergent shrubs, and lots of frogs.
Snails	Broad-banded forestsnail (*Allogona profunda*)	
Snails	Flamed tigersnail (*Anguispira alternata*)	
Snails	Banded globe (*Anguispira kochi*)	
Snails	*Euchemotrema leai*	
Snails	Proud globelet (*Patera pennsylvanica*)	
Snails	White-lip dagger (*Pupoides albilabris*)	
Snails	Dished three-tooth (*Triodopsis vulgata*)	
Snails	Delicate vertigo (*Vertigo bollesiana*)	
Snails	Crested vertigo (*Vertigo cristata*)	
Snails	Blade vertigo (*Vertigo milium*)	
Snails	Five-tooth vertigo (*Vertigo ventricosa*)	
Tiger Beetles	one-spotted tiger beetle (*Cicindela unipunctata*)	

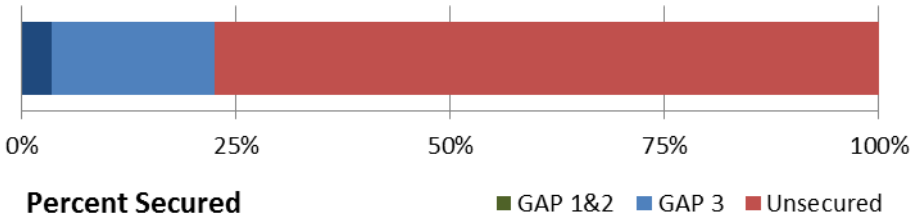
The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Summer tanager - Breeding (*Piranga rubra*)	Dry, upland forests, particularly oak woodlands with an open understory; often near minor openings.
Birds	Golden-winged warbler - Breeding (*Vermivora chrysoptera*)	Mosaic of herbaceous patches and shrubby thickets located along a forest edge, often at higher elevations; increasingly found in higher elevation bogs and forested wetlands.
Lepidoptera	A cutworm moth (*Apamea burgessi*)	
Lepidoptera	Dusted skipper (*Atrytonopsis hianna*)	
Lepidoptera	Brown elfin (*Callophrys augustinus*)	
Lepidoptera	Rare sand quaker (*Caradrina meralis*)	
Lepidoptera	Silvery checkerspot (*Chlosyne nycteis*)	
Lepidoptera	Pure lichen moth (*Crambidia pura*)	
Lepidoptera	Red dart moth (*Diarsia rubifera*)	
Lepidoptera	A noctuid moth (*Dichagyris grotei*)	
Lepidoptera	Broad-lined erastria moth (*Erastria coloraria*)	
Lepidoptera	Barrens itame (*Speranzainextricata*)	
Lepidoptera	Promiscuous angle (*Semiothisa promiscuata*)	
Lepidoptera	Shiny gray carpet moth (*Stamnodes gibbicostata*)	
Lepidoptera	Pine barrens zale (*Zale lunifera*)	
Lepidoptera	Pine barrens zanclognatha (*Zanclognatha martha*)	
Mammals	Indiana or social myotis - Breeding (*Myotis sodalis*)	Riparian, bottomland or upland forests, old fields and pastures. Many roosts include shagbark and shell bark hickories. Proximate to hibernation area for males and typically forests with lots of shagbark hickories for maternity sites in flood-prone areas with moist soils, but also documented on top of ridges in PA and WV.
Mammals	Allegheny woodrat (*Neotoma magister*)	Extensive expanses of sandstone and/or limestone rock outcrops in unfragmented oak- hickory forest communities.
Mammals	Water shrew (*Sorex palustris albibarbis*)	High-quality primary and secondary order streams with moderate flow, deeply undercut banks and other streamside structure (rock shelters, rock jumbles, and brush piles), and high to low gradients. Sites may or may not have dense ground cover. Streams flow through hardwood dominated forests at lower elevations, and primarily mixed forests at higher elevations (1500+ ft.).
Odonates	Blue-ringed dancer (*Argia sedula*)	
Odonates	Tiger spiketail (*Cordulegaster erronea*)	
Reptile	Rough green snake (*Opheodrys aestivus*)	Riparian thickets and lake shores where trees or woody shrubs (1-3 meters in height) dominate the vegetation.
Reptile	Eastern box turtle (*Terrapene carolina carolina*)	Deciduous forests, old fields, ecotonal areas, and marshy areas.

Reptile	Mountain earth snake (*Virginia valeria pulchra*)
Snails	Spike-lip crater (*Appalachina sayana*)
Snails	Bark snaggletooth (*Gastrocopta corticaria*)
Snails	Maryland glyph (*Glyphyalinia raderi*)
Snails	Cherrystone drop (*Hendersonia occulta*)

Condition metrics

Approximately 19.1% of the Northeastern Interior Dry-Mesic Oak Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 8.3% of the total distribution of the habitat in the Northeast:

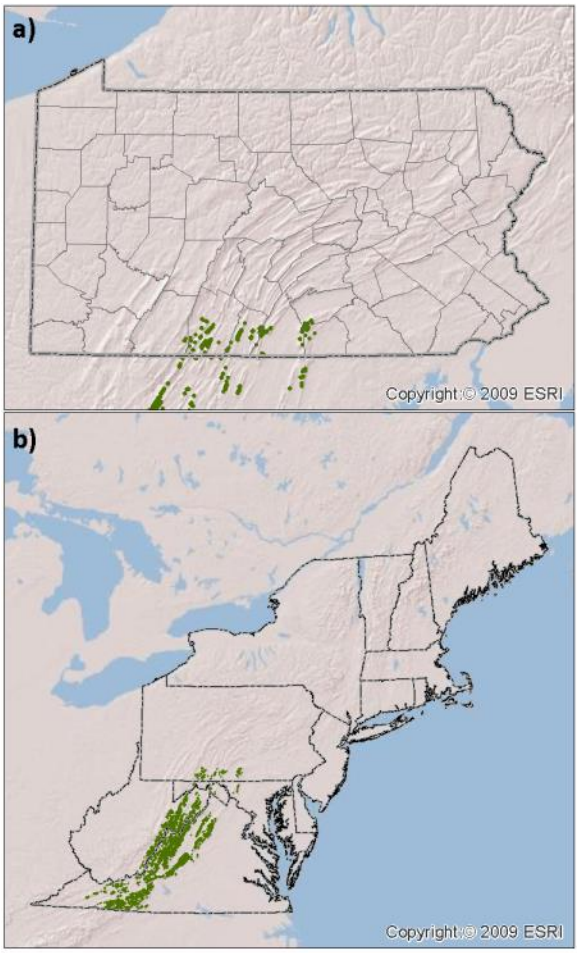


The mean Landscape Context Index (LCI) for this habitat is 109.3 (0-336.9). The mean score for the northeastern states was 55.0, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 30.6 years (s.d. 16.6), suggesting that patches of this habitat are relatively young.

Southern Appalachian Montane Pine Forest and Woodland

Macrogroup: Central Oak-Pine
Scale: Matrix forest
Area: Pennsylvania: 1,079 acres;
Northeast: 33,532 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A conifer forest of slopes and ridges at high elevations in the Southern Appalachians. Table mountain pine is typical and often dominant, occurring with pitch pine (*Pinus rigida*) or Virginia pine (*P. virginiana*). Chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), and scrub oak (*Quercus ilicifolia*) are usually present and are sometimes abundant in examples that have not burned recently. A dense heath shrub layer is typical; herbs are usually sparse but may be more abundant and shrubs less dense when fires occurred more frequently. Presumably, periodic fire also maintained a more open woodland canopy structure in these communities. In some areas pines may be able to maintain dominance due to edaphic conditions, such as very shallow soil or extreme exposure, but most sites appear eventually to succeed to oak in the absence of fire.

This system occurs on the most extreme of convex landforms—sharp ridges and adjacent upper slopes. At the northern end of its range in the central Appalachians, it is found from elevations of about 1750 to 4000 feet. Underlying rocks are acidic and soils are infertile, shallow and droughty. A thick duff layer and volatile heath shrubs create a strongly fire-prone habitat. Disturbance from southern pine beetle outbreaks can be system-changing.

<u>Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk</u>

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

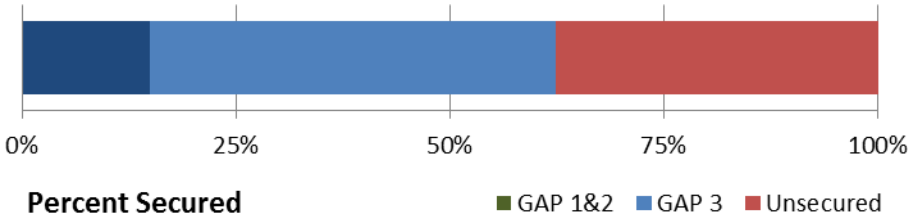
- Pitch pine - mixed hardwood woodland
- Dry oak - heath woodland
- Pitch pine - mixed oak forest
- Dry white pine (hemlock) - oak forest

Species assemblages

Four unique occurrences or observations of four SGCN were associated with the Southern Appalachian Montane Pine Forest and Woodland habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 69.8% of the Southern Appalachian Montane Pine Forest and Woodland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 2% of the total distribution of the habitat in the Northeast:

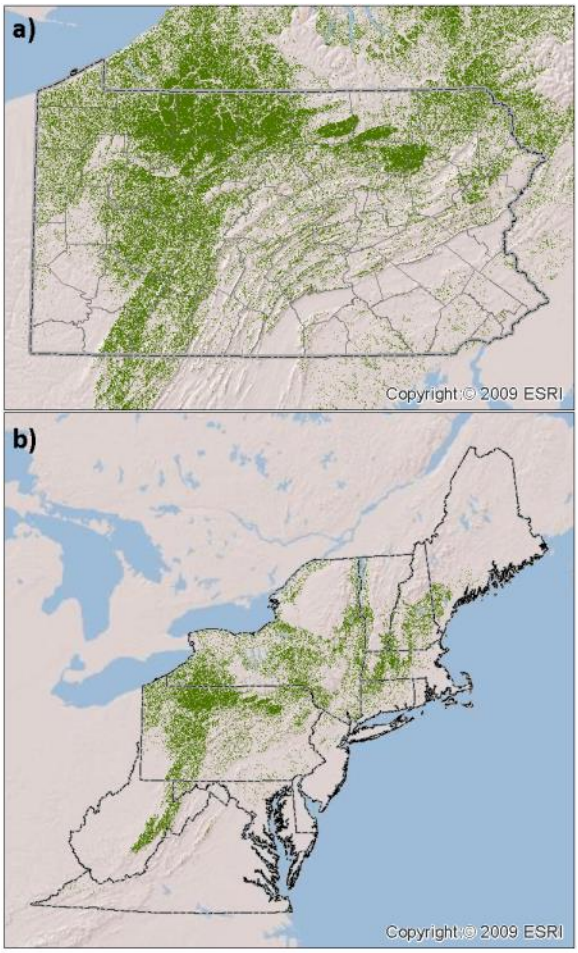


The mean Landscape Context Index (LCI) for this habitat is 33.9 (range 17.5-56.8), indicating that this habitat is minorly impacted by roads, agriculture, and development. The mean score for the northeastern states was 14.0, which suggests this habitat may be in slightly poorer condition in Pennsylvania.

The mean stand age for this habitat was 59.9 years (s.d. 4.8), suggesting that patches of this habitat are relatively old.

Appalachian (Hemlock)-Northern Hardwood Forest

Macrogroup: Northern Hardwood & Conifer
Scale: Matrix forest
Area: Pennsylvania: 8,222,612 acres;
Northeast: 20,995,362 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A hardwood forest of sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia)*, and yellow birch (*Betula alleghaniensis)*, sometimes mixed with, and sometimes dominated by, eastern hemlock (*Tsuga canadensis*), Northern red oak (*Quercus rubra*), and white oak (*Q. alba*) occur commonly, but do not dominate. Black cherry (*Prunus serotina*), black birch (*Betula lenta*), white pine (*Pinus strobus*), and tuliptree (*Liriodendron tulipifera*) are typical on nutrient rich or historically disturbed sites. This forest system is broadly defined, and is the only one to occur in at least parts of all 13 northeast states. It is the dominant forest system in Pennsylvania.

This habitat type is an ecological generalist in much of its range, occupying low to mid-elevations on a variety of landforms and bedrock types. Drier, typic, and moist/cool variants occur along a gradient from higher, more exposed sites to lower, more protected ones. To the south, the hemlock wooly adelgid and a warming climate may push this system to more closely resemble Southern Appalachian Oak Forests. This habitat can range from dry to typical to moist/cool sites with minor differences in plant species composition among them. In our analysis, SGCN species did not discriminate between these differences in moisture, but some species may be more associated with one particular type.

<u>Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk</u>

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Hemlock (White Pine) - Northern Hardwood Forest
- Hemlock - Tuliptree - Birch Forest
- Black Cherry - Northern Hardwood Forest
- Golden Saxifrage - Pennsylvania Bitter-cress Spring Run
- Northern Hardwood Forest
- Tuliptree - Beech - Maple Forest
- Hemlock (White Pine) Forest
- Sugar Maple - Basswood Forest
- Red maple (terrestrial) Forest

SGCN Associated with this Habitat

25,433 unique occurrences or observations of 306 SGCN were associated with the Appalachian (Hemlock)-Northern Hardwood Forest habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Jefferson salamander (*Ambystoma jeffersonianum*)	Vernal pools in mixed deciduous forests - primarily upland sites.
Amphibian	Green salamander (*Aneides aeneus*)	Moist crevices in sandstone outcrops and ledges.
Amphibian	Northern ravine salamander (*Plethodon electromorphus*)	Forested uplands.
Amphibian	Eastern mud salamander (*Pseudotriton montanus montanus*)	Bottomland swamp systems.
Birds	Northern goshawk - Breeding (*Accipiter gentilis*)	Large tracks of old growth / mature mixed (hardwood/hemlock) forests with dense canopy for nesting, open understory, near water.
Birds	Sharp-shinned hawk - Breeding *(Accipiter striatus*)	Large, contiguous coniferous or mixed conifer/deciduous forests, away from suburban areas or areas of human consistent human activity. Dense forest stands of either conifers or younger forest used for nesting. Nesting birds use forest openings, dirt roads or right of ways for foraging.
Birds	Sharp-shinned hawk - Migration (*Accipiter striatus*)	Large, contiguous coniferous or mixed conifer/deciduous forests, away from suburban areas or areas of human consistent human activity. Dense forest stands of either conifers or younger forest used for nesting. Nesting birds use forest openings, dirt roads or right of ways for foraging.
Birds	Northern saw-whet owl - Migration (*Aegolius acadicus*)	Any forested habitat, including edges and ruderal forests, presumably.
Birds	Long-eared owl - Breeding (*Asio otus*)	Conifer woods, often plantations, intermingled with field and meadows. Few breeding sites and widespread apparent potential makes characterization difficult.
Birds	Ruffed grouse - Breeding (*Bonasa umbellus*)	Mosaic of age classes within a forested landscape, with early succession forest as 12-15% of total. Peak use by drummers occurs at years 6-18 of regrowth. Low moist bottomlands with herbaceous cover, as well as coarse woody debris, important as brood habitat.
Birds	Broad-winged hawk - Breeding (*Buteo platypterus*)	Continuous deciduous or mixed deciduous forests with openings and water source nearby.
Birds	Canada warbler - Breeding (*Cardellina canadensis*)	Hemlock-dominated ravines and wet sites in northern hardwood and mixed forest with a dense understory of shrubs such as rhododendron or hobblebush; higher elevations (greater than 457 m).
Birds	Swainson's thrush - Breeding (*Catharus ustulatus*)	High elevation conifer-dominated forests, typically in extensive unfragmented forest near water.
Birds	Brown creeper - Breeding (*Certhia americana*)	Requires dead trees with loose bark for nesting in late-successional forest.
Birds	Bald eagle - Breeding (*Haliaeetus leucocephalus*)	Shallow flat-water with abundant fish, roost trees and large trees within a mile of water for nesting.
Birds	Wood thrush - Breeding (*Hylocichla mustelina*)	Second-growth deciduous forest and forest-edge habitats; often with available fruit.

Birds	Black-and-white warbler - Breeding (*Mniotilta varia*)	Reported by some as an area-sensitive forest breeder, although apparently accepts early-successional forest; most abundant in forest with dense understory, including scrubby barrens.
Birds	Louisiana Waterthrush - Breeding (*Parkesia motacilla*)	Mature, forested watersheds w/ med-high gradient headwater (1st-3rd order) streams, with well-developed banks (ravines) and/or plentiful overturned trees with exposed root masses. High-quality stream indicator.
Birds	Northern Waterthrush - Breeding (*Parkesia noveboracensis*)	Forested swamps, scrub-shrub wetlands, and beaver swamps.
Birds	Scarlet Tanager - Breeding (*Piranga olivacea*)	A wide variety of mature deciduous and mixed-deciduous forest types.
Birds	Black-throated Blue warbler - Breeding (*Setophaga caerulescens*)	Unfragmented mixed, coniferous forest with structural diversity, elevation > 800m.
Birds	Blackburnian warbler - Breeding (*Setophaga fusca*)	Higher elevation, unfragmented forest with conifers.
Birds	Black-throated green warbler - Breeding (*Setophaga virens*)	Large tracks of coniferous, deciduous, and mixed forests > 300 m elevation.
Birds	Pine siskin - Breeding (*Spinus pinus*)	Northern boreal forest, preferring open stands of spruce and pine interspersed with birch and maple hardwood.
Birds	Winter wren - Breeding (*Troglodytes hiemalis*)	High elevation, coniferous/mixed forests, w/a substantial hemlock component. Nests often near water, particularly streams in hemlock ravines but sometimes near bogs or swamps; require substantial downed woody debris, standing dead trees, or large-diameter
Lepidoptera	Crested apamea (*Apamea cristata*)	
Lepidoptera	New Jersey tea inchworm (*Apodrepanulatrix liberaria*)	
Lepidoptera	Dusted skipper (*Atrytonopsis hianna*)	
Lepidoptera	Silver-bordered fritillary (*Boloria selene myrina*)	
Lepidoptera	Northern metalmark (*Calephelis borealis*)	
Lepidoptera	Arctic skipper (*Carterocephalus palaemon mandan*)	
Lepidoptera	Miranda underwing (*Catocala miranda*)	
Lepidoptera	Shadow underwing (*Catocala umbrosa*)	
Lepidoptera	Appalachian azure (*Celastrina neglectamajor*)	
Lepidoptera	Harris' checkerspot (*Chlosyne harrisii*)	
Lepidoptera	Grote's sallow (*Copivaleria grotei*)	
Lepidoptera	A noctuid moth (*Dichagyris acclivis*)	
Lepidoptera	A midget moth (*Elaphria georgei*)	
Lepidoptera	Columbine duskywing (*Erynnis lucilius*)	

Lepidoptera	Mottled duskywing (*Erynnis martialis*)	
Lepidoptera	Silvery blue (*Glaucopsyche lygdamus nittanyensis*)	
Lepidoptera	Graceful clearwing (*Hemaris gracilis*)	
Lepidoptera	Leonard's skipper (*Hesperia leonardus*)	
Lepidoptera	Indian skipper (*Hesperia sassacus*)	
Lepidoptera	Straw wave moth (*Idaea eremiata*)	
Lepidoptera	Black-waved flannel moth (*Lagoa crispata*)	
Lepidoptera	Goldenrod brindle (*Lithomoia germana*)	
Lepidoptera	An owlet moth (*Macaria promiscuata*)	
Lepidoptera	Splendid palpitan (*Palpita magniferalis*)	
Lepidoptera	Indigo stem borer (*Papaipema baptisiae*)	
Lepidoptera	Brick-red borer moth (*Papaipema marginidens*)	
Lepidoptera	*Masked parahypenodes (Parahypenodes quadralis)*	
Lepidoptera	West Virginia white (*Pieris virginiensis*)	
Lepidoptera	Acadian hairstreak (*Satyrium acadica*)	
Lepidoptera	Promiscuous angle (*Semiothisa promiscuata*)	
Lepidoptera	Gold-spotted Ghost moth (*Sthenopis auratus*)	
Lepidoptera	Joyful holomelina moth (*Virbia laeta*)	
Lepidoptera	Black-eyed zale *(Zale curema*)	
Lepidoptera	Oblique zale moth (*Zale obliqua*)	
Lepidoptera	Gray-banded zale (*Zale squamularis*)	
Lepidoptera	Pine Barrens zanclognatha (*Zanclognatha martha*)	
Mammals	Northern flying squirrel (*Glaucomys sabrinus*)	Mature, mixed-deciduous-hemlock/spruce/fir stands with closed canopies, open ground cover with a rhododendron component, and thick leaf litter.
Mammals	Silver-haired bat - Breeding (*Lasionycteris noctivagans*)	Maternity roost (data deficient in Pennslyvania)- deciduous forest with adjacent agricultural fields. Resident male habitat - coniferous and mixed forests adjacent to wetlands and open water bodies, or high deciduous upland forests. Migration - various habitats.
Mammals	Rock vole (*Microtus chrotorrhinus*)	High elevation, northern hardwood forests characterized by rocks and talus, streams, mosses, and heavy forb cover (Kirkland and Jannett 1982, Orrock et al. 1999, Orrock and Pagels 2003, Hart in PGC-PFBC 2005).
Mammals	Eastern fox squirrel (*Sciurus niger vulpinus*)	Open, park-like woods with sparse ground cover.

Mammals	Long-tailed shrew (*Sorex dispar*)	Cool, moist forests with rocky talus deposits. Often associated with mesic hardwood and mixed hardwood-conifer, and conifer forests with rhododendron component. Almost always associated with rocky, talus substrates.
Mammals	Maryland shrew (*Sorex cinereus fontinalis*)	Found in multiple habitats, but prefers those that are moist including sedge-grass meadows, woodlands, and hedgerows in early successional areas (Merritt 1987). This species is seldom captured on ridge tops or elevations above 300 m (Genoways and Brenner 1985).
Mammals	Northern water shrew (*Sorex palustris albibarbis*)	High-quality primary and secondary order streams with moderate flow, deeply undercut banks and other streamside structure (rock shelters, rock jumbles, and brush piles), and high to low gradients. Sites may or may not have dense ground cover. Streams flow through hardwood dominated forests at lower elevations, and primarily mixed forests at higher elevations (1500+ ft.).
Mammals	West Virginia water shrew (*Sorex palustris punctulatus*)	Clear mountain streams at elevations > 1,500 to 2,000 ft. with high quality, moderate flow and bordered by deeply undercut stream banks, exposed tree root balls, rock, brush piles, and greater than 75% ground cover.
Odonates	Variable darner (*Aeshna interrupta*)	
Odonates	Cyrano darner (*Nasiaeschna pentacantha*)	
Reptile	Northern coal skink (*Plestiodon anthracinus anthracinus*)	Open habitat (less than 50 percent canopy cover by trees) where rocks and logs provide abundant cover.
Reptile	Queen snake (*Regina septemvittata*)	Descriptions of the habitat of this species are fairly variable and include small, shallow streams, rivers, lakes, and marshes
Snails	Spike-lip crater (*Appalachina sayana*)	
Snails	Domed disc (*Discus patulus*)	
Snails	Toothed globe (*Megapallifera mutabilis*)	
Tiger Beetles	Big sand tiger beetle (*Cicindela formosa*)	

The following SGCN had their Secondary Habitat Association with this habitat:

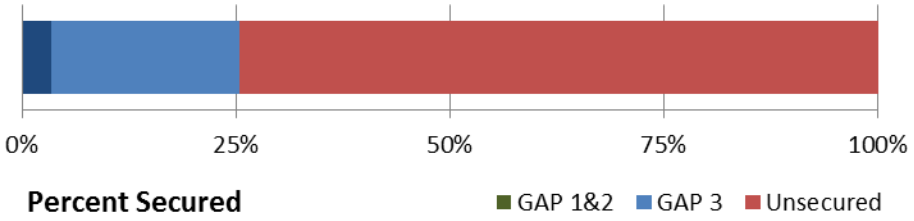
Taxa Group	SGCN	Specific Habitat Requirements
Birds	Olive-sided flycatcher - Breeding (*Contopus cooperi*)	A characteristic member of the North American boreal conifer forest bird community, it is most strongly associated with the northern conifer forests that extend into Pennsylvania and down the Appalachian Mountains at higher elevations. Nests in both mature forests and forest edge or burned over areas. Often found in bogs, semi-open forest, and the edges of wetlands, ponds, and forest. Territories include conifers such as spruces, tamaracks, hemlocks, and firs, but also deciduous trees such as maples, aspens, and mountain ash.
Birds	Hooded warbler - Migration (*Setophaga citrina*)	Most frequent during migration in edges and early-successional deciduous forest (Rodewald).
Birds	Blackpoll warbler - Breeding (*Setophaga striata*)	Boreal conifer swamps that are headwater wetlands above 2000 feet elev. In NY, it occurs more often in high elevation conifer forests. Pennsylvania Blackpolls are associated with red spruce with some eastern hemlock, eastern larch, eastern white pine, and
Lepidoptera	Yankee dart (*Abagrotis brunneipennis*)	
Lepidoptera	Common roadside skipper	

	(*Amblyscirtes vialis*)	
Lepidoptera	Spiny oakworm moth (*Anisota stigma*)	
Lepidoptera	Crested apamea (*Apamea cristata*)	
Lepidoptera	A noctuid moth (*Aplectoides condita*)	
Lepidoptera	New Jersey tea inchworm (*Apodrepanulatrix liberaria*)	
Lepidoptera	Dot-lined white moth (*Artace cribraria*)	
Lepidoptera	Silver-bordered fritillary (*Boloria selene myrina*)	
Lepidoptera	Henry's elfin (*Callophrys henrici*)	
Lepidoptera	a sallow moth (*Chaetaglaea cerata*)	
Lepidoptera	Columbine duskywing (*Erynnis lucilius*)	
Lepidoptera	Blueberry gray (*Glena cognataria*)	
Lepidoptera	Cobweb skipper (*Hesperia metea*)	
Lepidoptera	Esther moth (*Hypagyrtis esther*)	
Lepidoptera	A wave moth (*Idaea violacearia*)	
Lepidoptera	Twilight moth (*Lycia rachelae*)	
Lepidoptera	Turtlehead borer (*Papaipema nepheleptena*)	
Lepidoptera	Flypoison borer moth (*Papaipema* sp. 1)	
Lepidoptera	Coral hairstreak (*Satyrium titus*)	
Lepidoptera	Apple sphinx (*Sphinx gordius*)	
Lepidoptera	Tolype moth (*Tolype notialis*)	
Lepidoptera	*Oblique zale moth (Zale obliqua*)	
Lepidoptera	Gray-banded zale (*Zale squamularis*)	
Lepidoptera	A zale moth (*Zale submediana*)	
Mammals	Northern flying squirrel (*Glaucomys sabrinus*)	Mature, mixed-deciduous-hemlock/spruce/fir stands with closed canopies, open ground cover with a rhododendron component, and thick leaf litter.
Mammals	Little brown bat - Breeding (*Myotis lucifugus*)	Various habitats, from forested to urban/human structures.
Mammals	Northern long-eared Myotis (*Myotis septentrionalis*)	Summer - deciduous/mixed forested areas containing mature trees with exfoliating bark/snags, also human structures. Winter – caves and mines.
Odonates	Variable darner (*Aeshna interrupta*)	
Odonates	Zebra clubtail	

	(*Stylurus scudderi*)	
Reptile	Eastern ribbon snake (*Thamnophis sauritus*)	Riparian edges of emergent marshes, bogs, streams, rivers, ponds and lakes with dense sedges, grasses, rushes, and emergent shrubs, and lots of frogs.
Snails	Delicate vertigo (*Vertigo bollesiana*)	
Snails	Pygmy vertigo (*Vertigo pygmaea*)	

Condition metrics

Approximately 20.1% of the Appalachian (Hemlock)-Northern Hardwood Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 9.9% of the total distribution of the habitat in the Northeast:



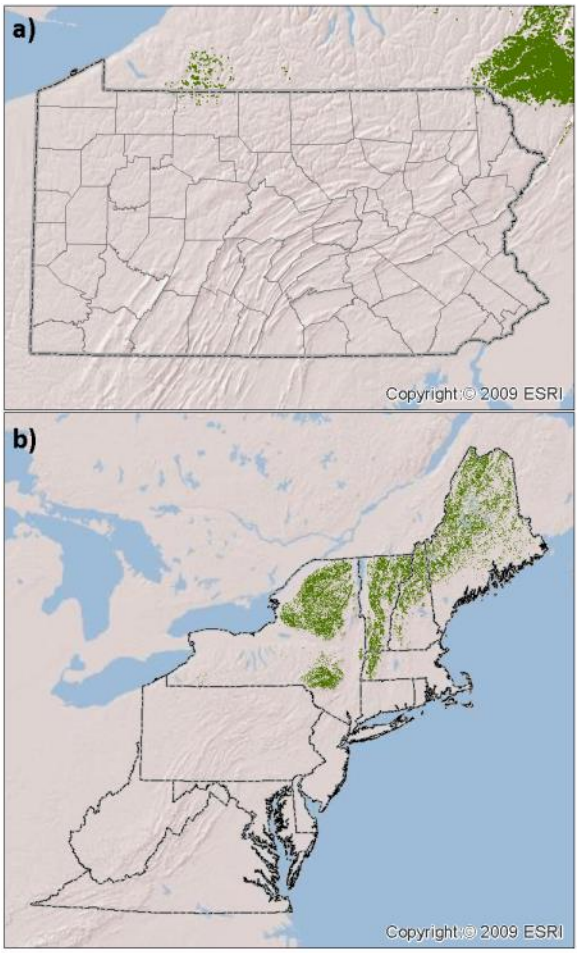
The mean Landscape Context Index (LCI) for this habitat is 87.2 (range 0-311.3). The mean score for the northeastern states was 48.3, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 35.7 years (s.d. 15.5), suggesting that patches of this habitat are relatively young.

Laurentian-Acadian Northern Hardwood Forest

Macrogroup: Northern Hardwood & Conifer
Scale: Matrix forest
Area: Pennsylvania: 6,236 acres;
Northeast: 12,740,118 acres

A hardwood forest dominated by sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), and yellow birch (*Betula alleghaniensis*); white ash (*Fraxinus americana*) is common on some sites, and hemlock (*Tsuga canadensis*) and red spruce (*Picea rubens*) are frequent but minor canopy associates. Paper birch (*Betula papyrifera*), red maple (*Acer rubrum*), aspen (*Populus* spp.), and white pine (*Pinus strobus*) are common in successional stands. This is the "matrix" forest in the northern part of our region, within which upland and wetland systems that occur at smaller scale are embedded. Rich expressions of this habitat type, with herb, shrub, and canopy layers of high diversity, occur over areas of calcium-rich bedrock and in cool, moist sites; forests on acidic till or in areas of granitic (or similar) bedrock are relatively poor floristically. Variability in climate, substrate, and exposure, can lead to stands proportionally higher in conifers or red oak (*Quercus rubra*).



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A broadly defined ecological generalist, this system is found on slopes, hills, and flats, on a wide variety of bedrocks and tills. It occurs at low to moderate elevations that vary with latitude, but generally from 800 to 2200 feet. Blowdowns of small and relatively large scale, or snow and ice loading, are the most frequent forms of natural disturbance; these forests do not easily ignite easily and burn. Old growth examples are rare in the Northeast.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

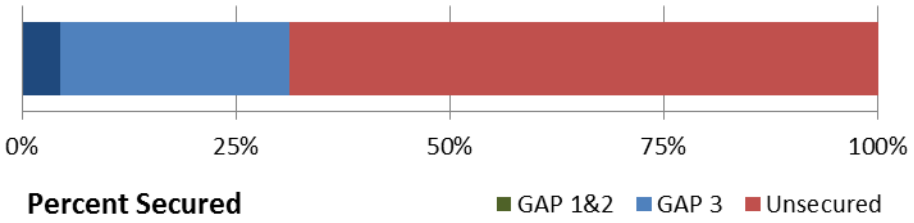
- Northern Hardwood Forest
- Hemlock (white pine) -northern hardwood forest

SGCN Associated with this Habitat

11 unique occurrences or observations of eight SGCN were associated with the Laurentian-Acadian Northern Hardwood Forest habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 37.8% of the Laurentian-Acadian Northern Hardwood Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:

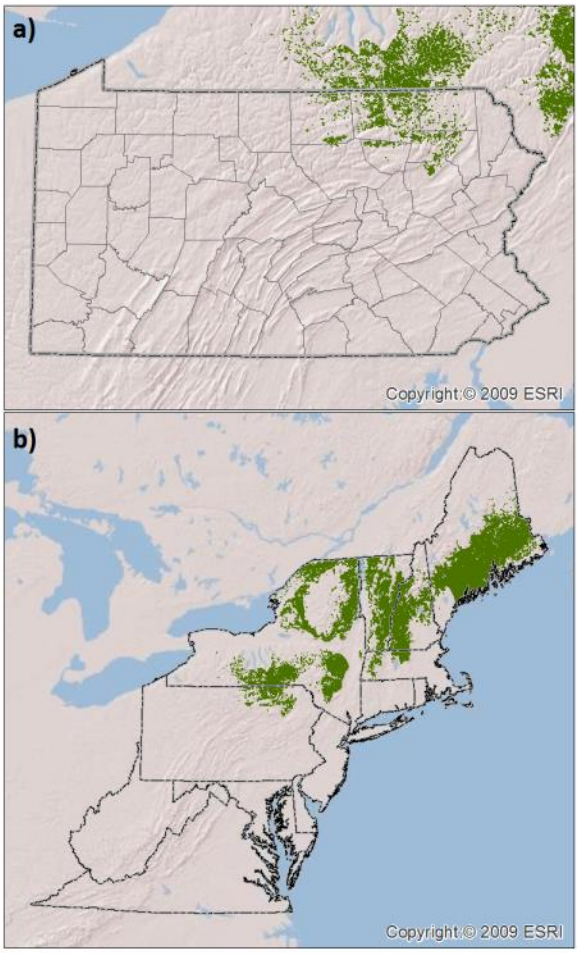


The mean Landscape Context Index (LCI) for this habitat is 23.3 (2.1-62.5) indicating that this habitat is minorly impacted by development and agriculture. The mean score for the northeastern states was 10.0, which suggests this habitat may be in slightly poorer condition in Pennsylvania.

The mean stand age for this habitat was 61.0 years (s.d. 10.8), suggesting that patches of this habitat are relatively old.

Laurentian-Acadian Pine-Hemlock-Hardwood Forest

Macrogroup: Northern Hardwood & Conifer
Scale: Matrix Forest
Area: Pennsylvania: 102,354 acres;
Northeast: 6,105,581 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A coniferous or mixed forest widespread in the glaciated northeast, it ranges from the northeastern U.S. to adjacent Canada, and westward to the Great Lakes and upper Midwest. White pine (*Pinus strobus*), hemlock (*Tsuga canadensis*), and red oak (*Quercus rubra*) are typical canopy dominants. Red maple (*Acer rubrum*) is common, and other hardwoods like sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), and birch (*Betula* spp.) also occur. Red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) are uncommon associates, and oaks besides red oak are essentially absent from these forests. This forest system may be considered transitional between northern hardwood forests at higher elevations and to the north, and the warmer Appalachian hemlock hardwoods and oak-pine forests at lower elevations and to the south.

These dry to mesic forests usually occur on low-nutrient loamy-to-sandy soils on a wide range of landforms at lower elevations, mostly below about 2000'. As with most other forest types in the region, single tree blowdowns and gap replacement are the most common disturbance/regeneration events. Fire is infrequent.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

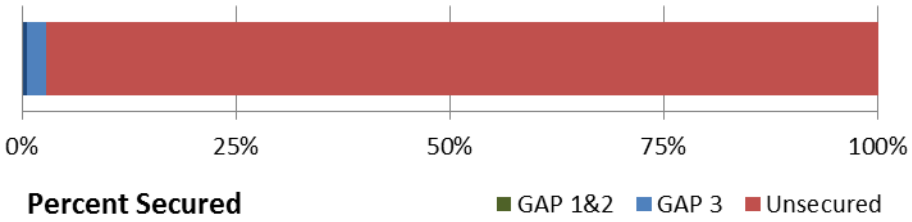
- Hemlock (White Pine) - Northern Hardwood Forest
- Hemlock (white pine) Forest

SGCN Associated with this Habitat

180 unique occurrences or observations of 41 SGCN were associated with the Laurentian-Acadian Pine-Hemlock-Hardwood Forest habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 15% of the Laurentian-Acadian Pine-Hemlock-Hardwood Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:



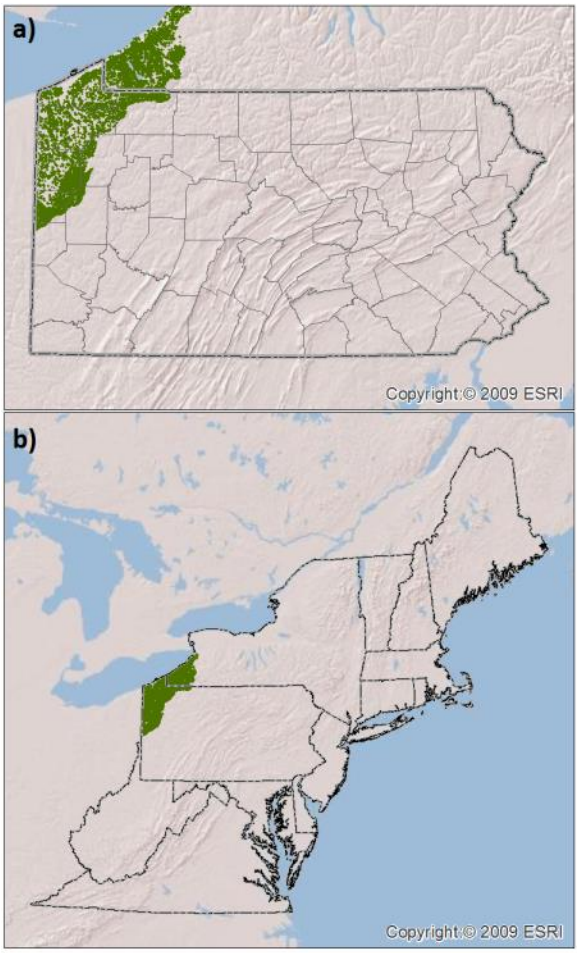
The mean Landscape Context Index (LCI) for this habitat is 93.5 (6.4-196.2), indicating the habitat is fairly impacted by roads, development, and agriculture. The mean score for the northeastern states was 30.1, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 31.7 years (s.d. 9.3), suggesting that patches of this habitat are relatively young.

North-Central Interior Beech-Maple Forest

Macrogroup: Northern Hardwood & Conifer
Scale: Matrix forest
Area: Pennsylvania: 41,812 acres;
Northeast: 72,645 acres

A hardwood forest in which American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) make up most of the canopy. Associates can include red oak (*Quercus rubra*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), yellow buckeye (*Aesculus flava*), hornbeam (*Carpinus caroliniana*), and hop-hornbeam (*Ostrya virginiana*). This forest is characterized by a dense tree canopy that forms a thick layer of humus and leaf litter leading to a rich herbaceous layer, typically including many spring ephemerals. Saplings of canopy trees are often the most abundant component of the shrub layer; other common shrubs include various viburnums (*Viburnum* spp.), witch hazel (*Hamamelis virginiana*), and spicebush (*Lindera benzoin*). Found primarily along the southern Great Lakes, it is peripheral to our region, occurring only in a small area near Lake Erie. Conversion to agriculture has significantly decreased the range of this system, and very few large stands remain intact.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This forest is typically found in rich loam soils that formed in glacial till, on flat to rolling uplands, though it favors lower slope positions. The primary natural disturbance and replacement processes influencing this system are wind driven gap dynamics. Examples in which ecological processes are intact may be difficult to find, as it occurs mostly as small patches in an agricultural landscape.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

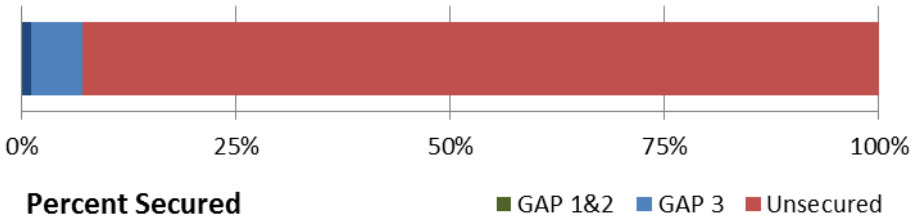
- Northern Hardwood Forest

SGCN Associated with this Habitat

59 unique occurrences or observations of 27 SGCN were associated with the North-Central Interior Beech-Maple Forest habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 6.9% of the North-Central Interior Beech-Maple Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 4.1% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 85.8 (7.6-251.2), indicating that many patches of this habitat are in relatively good landscape context. However, the broad range of indicates that some of the patches are heavily impacted by roads, agriculture, and development. The mean score for the northeastern states was 68.8 which suggests this habitat may be in slightly poorer condition in Pennsylvania.

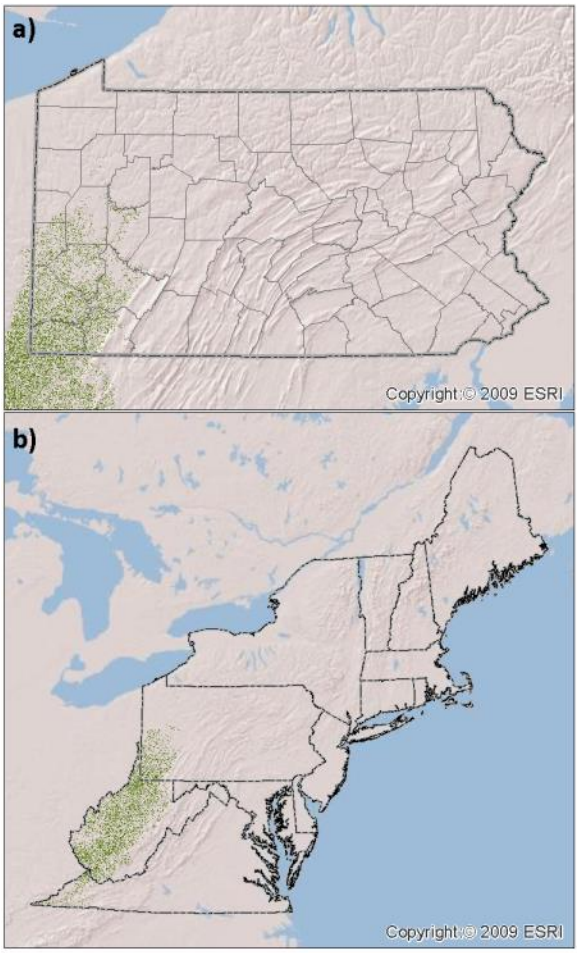
The mean stand age for this habitat was 34.7 years (s.d. 11.0), suggesting that patches of this habitat are relatively young.

South-Central Interior Mesophytic Forest

Macrogroup: Northern Hardwood & Conifer
Scale: Matrix forest
Area: Pennsylvania: 533,048 acres;
Northeast: 3,543,609 acres

A high-diversity, predominately hardwood forest that occurs on deep and enriched lowland soils or in somewhat protected landscape positions such as coves or lower slopes. Dominant species include sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), tuliptree (*Liriodendron tulipifera*), basswood (*Tilia Americana*), red oak (*Quercus rubra*), cucumber tree (*Magnolia acuminata*), and black walnut (*Juglans nigra*). Eastern hemlock (*Tsuga canadensis*) may be a component of some stands. Trees may grow very large in undisturbed areas. The herb layer is rich, often with abundant spring ephemerals. The core distribution of this system lies in the unglaciated Cumberland and Allegheny plateaus -- it occurs in our region only in the western and southern part.

This habitat is widespread in western West Virginia that most often occurs as large patches on enriched soils in depositional settings (coves and other concave landforms). It reaches the northern limits of its range in southwestern Pennsylvania. This habitat corresponds to what Lucy Braun described as "Mixed Mesophytic Forest."



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

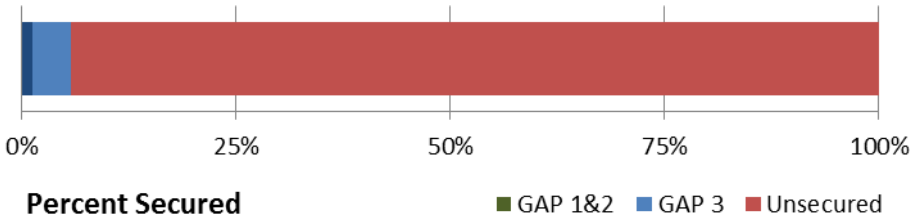
- Hemlock - Tuliptree - Birch Forest
- Mixed Mesophytic Forest
- Sugar Maple - Basswood Forest
- Red oak - mixed hardwood forest
- Tuliptree- beech-maple forest

SGCN Associated with this Habitat

2,398 unique occurrences or observations of 110 SGCN were associated with the South-Central Interior Mesophytic Forest habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 4.4% of the South-Central Interior Mesophytic Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.9% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 112.2 (12.3-336.9), indicating that many patches of this habitat are in relatively good landscape context. However, the broad range of indicates that some of the patches are heavily impacted by roads, agriculture, and development. The mean score for the northeastern states was 41.1, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 26.3 years (s.d. 10.2), suggesting that patches of this habitat are relatively young.

Southern Atlantic Coastal Plain Mesic Hardwood Forest

Macrogroup: Northern Hardwood & Conifer
Scale: Matrix forest
Area: Pennsylvania: 139 acres;
Northeast: 1,932,352 acres

Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This describes the hardwood forest of the coastal plain with a significant component of mesophytic (moist but non-wetland) species, such as American beech (*Fagus grandifolia*) or southern sugar maple (*Acer saccharum*). Upland and bottomland oaks at the mid-range of moisture tolerance are usually also present, particularly white oak, but sometimes also southern red oak (*Quercus rubra*), or Shumard's oak (*Q. shurmardii*). Loblolly pine is sometimes present, but it is unclear if it is a natural component or has entered only as a result of past cutting. Understories are usually well developed. Shrub and herb layers may be sparse or moderately dense. Ranging south from New Jersey to Georgia, these mostly large patch coastal plain forests occupy a variety of moist sites that are naturally sheltered from frequent fire.

This habitat is found on lower slopes, along streams and rivers, on mesic flats between drier pine-dominated uplands and floodplains, and on local raised areas within bottomland terraces or wet flats. Soils are variable in texture and pH, excluding only the coarsest sands. Fire is not an important disturbance in this system.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

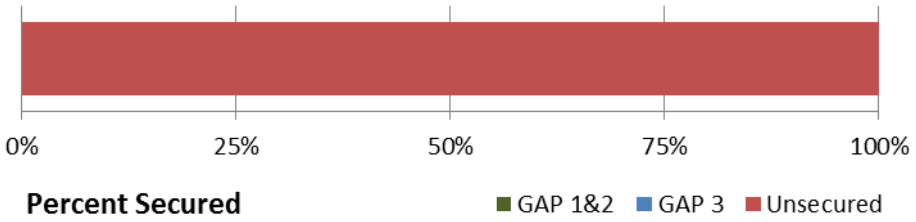
There is currently no direct crosswalk to a community described in the Pennsylvania Community Classification (Zimmerman et al. 2012). This habitat may not be present in Pennsylvania.

SGCN Associated with this Habitat

No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 12.1% of the Southern Atlantic Coastal Plain Mesic Hardwood Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 234.0 (232.8-235.3) indicating that this habitat is highly impacted by roads and development. The mean score for the northeastern states was 75.5, which suggests this habitat may be in much poorer condition in Pennsylvania.

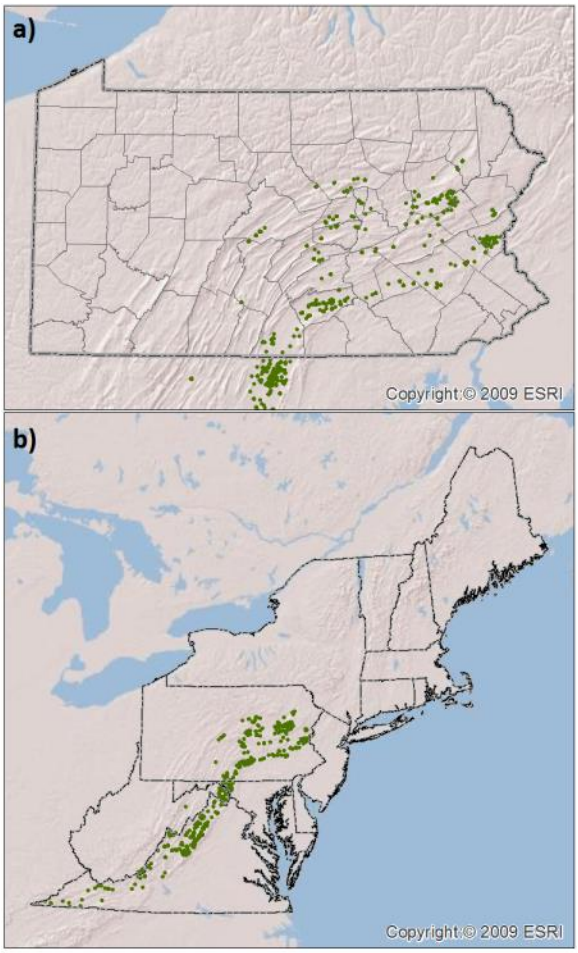
The mean stand age for this habitat was 22.5 years (s.d. 0.1), suggesting that patches of this habitat are relatively young.

Central Interior Highlands and Appalachian Sinkhole and Depression Pond

Macrogroup: Central Hardwood Swamp
Scale: Wetland
Area: Pennsylvania: 653 acres;
Northeast: 1,458 acres

A hardwood forest of upland and wetland species occurring in depressions or poorly drained lowlands throughout the northern glaciated Midwest and Lower New England. Pin oak (*Quercus palustris*) dominates in many areas; other common (sometimes dominant) trees include swamp white oak (*Quercus bicolor*), bur oak (*Q. nigra*), black gum (*Nyssa sylvatica*), sweet gum (*Liquidambar styraciflua*), and red maple (*Acer rubrum*). Areas with denser tree cover have less shrub and herbaceous cover then the dense understory associated with more open canopies. Buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticilata*), and alder (*Alnus* spp.) are typical shrubs; various sedges (*Carex* spp.) and cinnamon fern (*Osmunda cinnamomea*) are common in the herb layer. Composition changes with fluctuating moisture levels.

Soils are very poorly drained, and surface water may be present for extended periods of time, occasionally becoming dry. Soils may be deep (>1 m; 3.3 ft), consisting of peat or muck, with parent material of peat, muck or alluvium.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

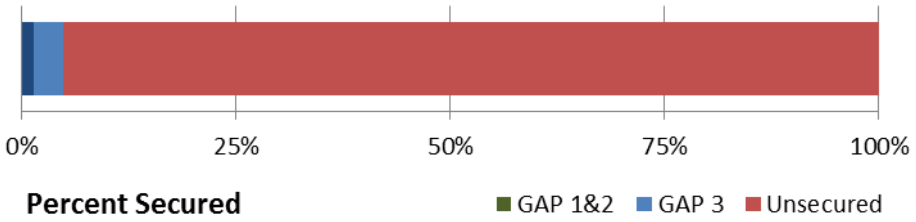
The "Spatterdock - Water-lily Emergent Wetland" as described in the Pennsylvania Community Classification (Zimmerman et al. 2012) is typically associated within this habitat:

SGCN Associated with this Habitat

Four unique occurrences or observations of four SGCN were associated with the Central Interior Highlands and Appalachian Sinkhole and Depression Pond habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 7.9% of the Central Interior Highlands and Appalachian Sinkhole and Depression Pond habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 2.2% of the total distribution of the habitat in the Northeast:



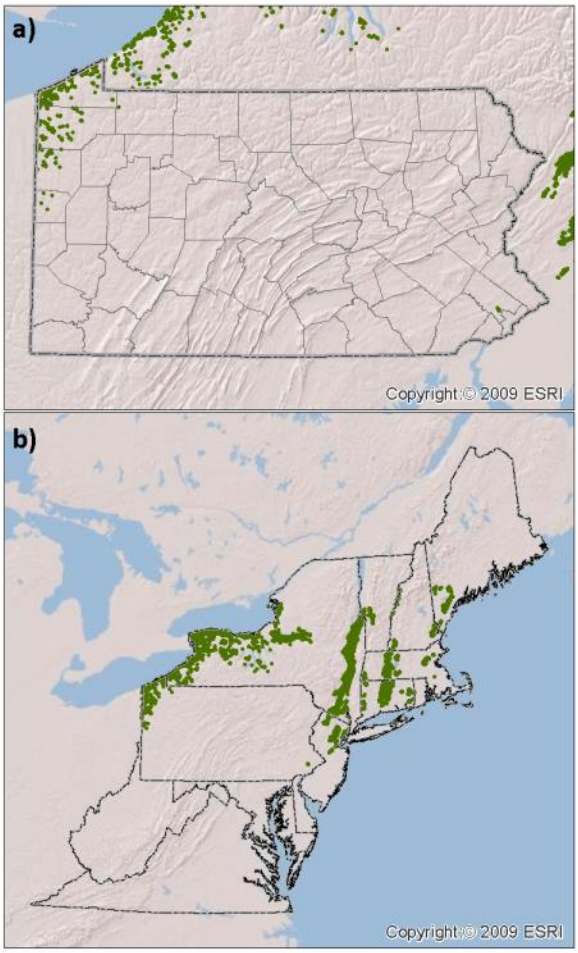
The mean Landscape Context Index (LCI) for this habitat is 151.3 (16.4-345.1), indicating that the habitat has been impacted by roads, agriculture, and development. The mean score for the northeastern states was 139.5, which suggests this habitat may be in approximately the same condition in Pennsylvania.

The mean stand age for this habitat was 23.4 years (s.d. 20.3), suggesting that forests surrounding this habitat are relatively young.

North-Central Interior Wet Flatwoods

Macrogroup: Central Hardwood Swamp
Scale: Wetland
Area: Pennsylvania: 1,049 acres;
Northeast: 81,802 acres

A small pond and wetland habitat with variable vegetation found in basins of sinkholes or other isolated depressions on uplands from the Ozarks east to the northern Piedmont. Water depth may vary greatly on a seasonal basis and may be a meter deep or more in the winter. Some examples become dry in the summer. Structure varies from open water to herb-dominated to shrub-dominated, where buttonbush (*Cephalanthus occidentalis*) is a typical component. Tree-dominated examples typically contain oaks (*Quercus* spp.), sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccharinum*), and/or black gum (*Nyssa sylvatica*). Many of these ponds have their geologic origin as a more-or-less complete karst collapse feature.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

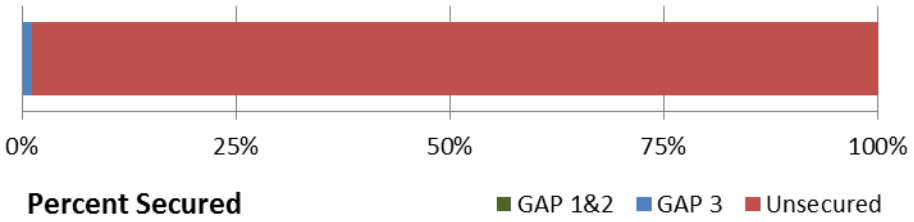
- Oak - Mixed Hardwood Palustrine Forest
- Elm – Ash – Maple Lakeplain Forest

SGCN Associated with this Habitat

No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 7.5% of the North-Central Interior Wet Flatwoods habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 120.9 (37.9-340.6), indicating that the habitat has been impacted by roads, agriculture, and development. The mean score for the northeastern states was 122.4, which suggests this habitat may be in approximately the same condition in Pennsylvania.

The mean stand age for this habitat was 20.8 years (s.d. 10.0), suggesting that patches of this habitat are relatively young.

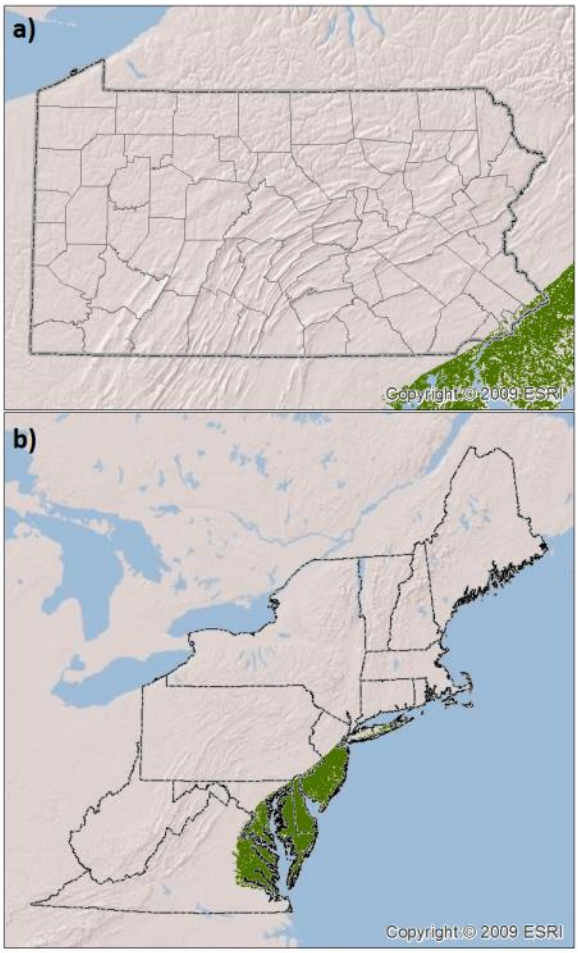
North Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest

Macrogroup: Coastal Plain Swamp
Scale: Wetland
Area: Pennsylvania: 5,123 acres;
Northeast: 974,772 acres

This is a basin hardwood swamp of seasonally flooded coastal plain habitats from Long Island south to Virginia. Characteristic tree species include red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), willow oak (*Quercus phellos*), and green ash (*Fraxinus pennsylvanica*). Although it supports some seepage indicators, it is also affected by overland flow.

These swamps of poorly drained, relatively shallow depressions are often groundwater-influenced, but are also often configured in large patches along streams and rivers, especially in headwater settings. They occur on mineral soils overlain by a variable organic but non-peaty layer.

This habitat can occur in isolated conditions, or associated with the floodplain of smaller rivers.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Oak - Mixed Hardwood Palustrine Forest
- Sweetgum - Willow Oak Coastal Plain Palustrine Forest
- Red Maple – Magnolia Palustrine Forest
- Red Maple – Black Ash Palustrine Forest

SGCN Associated with this Habitat

98 unique occurrences or observations of 36 SGCN were associated with the North Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Southern leopard frog (*Lithobates sphenocephalus utricularius*)	Marshes, ponds, wet meadows, and the edges of slow-moving rivers and streams. Also brackish waters near coastal areas.

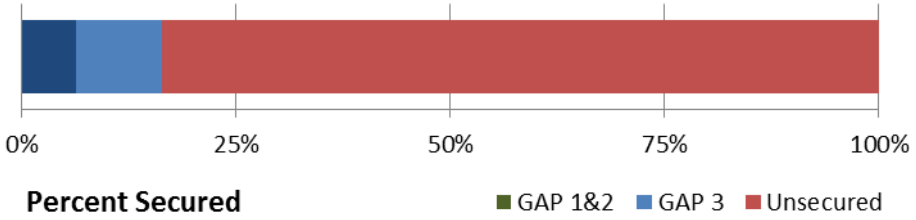
Reptile	Eastern mud turtle (*Kinosternon subrubrum subrubrum*)	Atlantic Coastal Plain wetlands with intact uplands.
Reptile	Eastern redbelly turtle (*Pseudemys rubriventris*)	Relatively deep waterbodies such as moderate gradient rivers, reservoirs, ponds, and marshes.

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Fowler's toad (*Anaxyrus fowleri*)	River bottoms, lake edges, sandy places, urban gardens with alluvium deposits of dry gravelly and sandy substrate.

Condition metrics

Approximately 18.9% of the North Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.1% of the total distribution of the habitat in the Northeast:



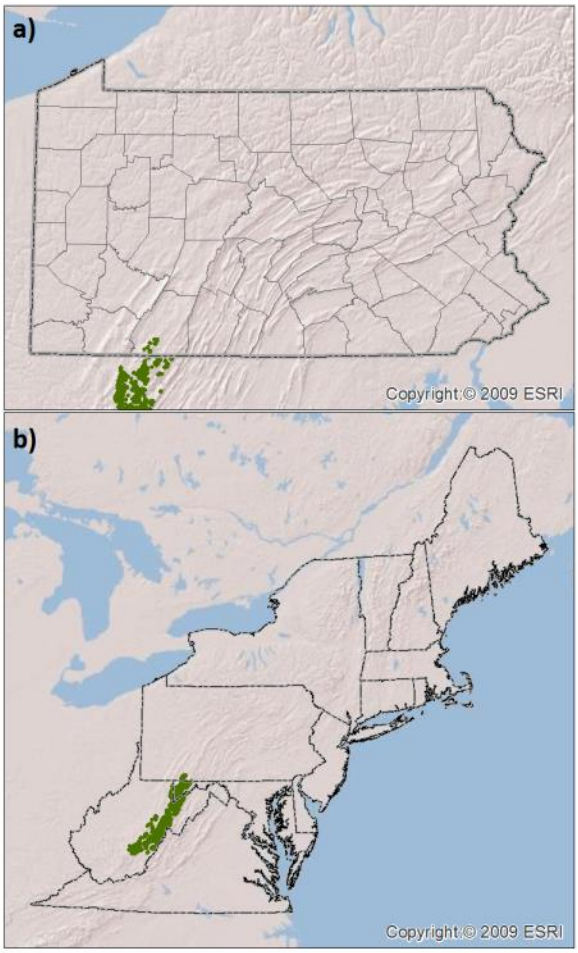
The mean Landscape Context Index (LCI) for this habitat is 261.3 (48.0-362.2) indicating that the habitat has been highly impacted by roads, agriculture, and development. The mean score for the northeastern states was 92.4, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 14.4 years (s.d. 12.3), suggesting that patches of this habitat are relatively young.

High Allegheny Headwater Wetland

Macrogroup: Northern Swamp
Scale: Wetland
Area: Pennsylvania: 112 acres;
Northeast: 27,695 acres

A wetland complex of forested swamps, shrub swamps, wet meadows and open marshes occurring at high elevations (2400 to 5000 feet) along the high plateau of the Allegheny Mountains. They are mostly in West Virginia, but also found in higher elevation portions of Pennsylvania, and range in size from a few hectares to about 6000 hectares. Forested swamps are dominated by red spruce (*Picea rubens*), with red maple (*Acer rubrum*), hemlock (*Tsuga canadensis*), and yellow birch (*Betula alleghaniensis*). Where calcareous bedrock influences seepage water, balsam fir (*Abies balsamea*), and black ash (*Fraxinus nigra*) are typical. Common shrubs are nannyberry (*Viburnum lentago*), great rhododendron (*Rhododendron maximum*), alder (*Alnus* sp.), blueberry (*Vaccinnium* spp.), bushy St. Johnswort (*Hypericum densiflorum*), winterberry (*Ilex verticillata*), and black chokeberry (*Aronia melanocarpa*). Peat mosses (*Sphagnum* spp.) and haircap mosses (*Polytrichum* spp.) form a well-developed bryophyte layer. Bogs may occur in undisturbed portions of larger wetlands.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

These wetlands form where drainage is impounded in high, flat-lying basins by natural dams of resistant sandstone. They are maintained by a mix of seepage, low-energy flooding, beaver activity, and plentiful rainfall. The poorly drained soils, typically peat-based and acidic to circumneutral, are drained by low-gradient, meandering, headwater streams. Cold air frost pockets are common.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

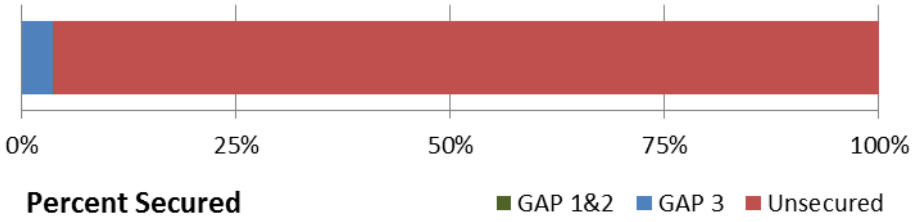
- Bulrush Mash;
- Cotton-grass Poor Fen;
- Golden Saxifrage - Pennsylvania Bitter-cress Spring Run;
- Mixed Form - Graminoid Wet Meadow;
- Mixed Forb Marsh;
- Red Spruce - Mixed Hardwood Palustrine Forest;
- Red Spruce Palustrine Forest;
- Tussock Sedge Marsh;
- Wool-grass - Mannagrass - Mixed Shrub Marsh

SGCN Associated with this Habitat

No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 52% of the High Allegheny Headwater Wetland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 44.4 (23.5-90.9) indicating that the habitat is moderately affected by roads, agriculture, and development. The mean score for the northeastern states was 41.0, which suggests this habitat may be in approximately the same condition in Pennsylvania.

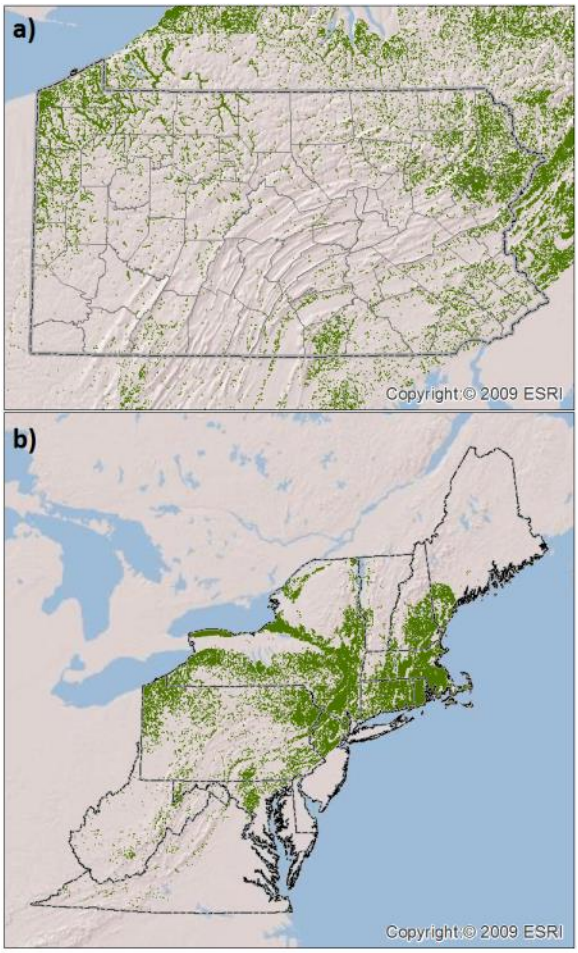
The mean stand age for this habitat was 46.1 years (s.d. 8.4), suggesting that forests surrounding this habitat are relatively old.

North-Central Appalachian Acidic Swamp

Macrogroup: Northern Swamp
Scale: Wetland
Area: Pennsylvania: 213,320 acres;
Northeast: 1,505,822 acres

A conifer or mixed conifer-hardwood swamp of poorly drained acidic substrates throughout central New England and the Central Appalachians, encompassing a broad range of basin, seepage, and stream-associated wetland communities. Hemlock (*Tsuga canadensis*) is usually present and may be dominant. It is often mixed with deciduous wetland trees such as red maple (*Acer rubrum*) or black gum (*Nyssa sylvatica*). Spruce (*Picea* sp.) is rarely present. Basin swamps tend to be more nutrient-poor than seepage swamps; in some settings, the two occur adjacent to each other with the basin swamp vegetation surrounded by seepage swamp vegetation on its upland periphery.

This habitat occurs at low to mid elevations in poorly drained depressions that may be in proximity to a stream. The acidic substrate is mineral soil, often with a component of organic muck; if peat is present, it usually forms a thin layer over the mineral soil rather than a true peat substrate.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Red Maple - Black-gum Palustrine Forest
- Red Maple - Sedge Palustrine Woodland
- Hemlock - Mixed Hardwood Palustrine Forest
- Red Spruce Palustrine Forest
- Hemlock Palustrine Forest
- Red Maple - Mixed Shrub Palustrine Woodland
- Red Spruce - Mixed Hardwood Palustrine Woodland
- Cat-tail Marsh
- Common Reed Marsh
- Hemlock – Mixed Hardwood Palustrine Forest
- Hemlock – Mixed Hardwood Palustrine Woodland
- Hemlock Palustrine Forest
- Highbush Blueberry – Meadow-sweet Wetland
- Mixed Forb – Graminoid Wet Meadow
- Mixed Forb Marsh
- Pitch Pine – Leatherleaf Palustrine Woodland
- Red Maple – Black Ash Palustrine Forest

- Red Maple – Black-gum Palustrine Forest
- Red Maple – Highbush Blueberry Palustrine Woodland
- Red Maple – Magnolia Palustrine Forest
- Red Maple – Mixed shrub Palustrine Woodland
- Red Maple – Sedge Palustrine Woodland
- Red Spruce – Mixed Hardwood Palustrine Forest
- Red Spruce – Mixed Hardwood Palustrine Woodland
- Red Spruce Palustrine Forest
- Water-willow (*Decodon verticillatus*) Shrub Wetland

SGCN Associated with this Habitat

1,040 unique occurrences or observations of 162 SGCN were associated with the North-Central Appalachian Acidic Swamp habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Blue-spotted salamander (*Ambystoma laterale*)	Forested floodplain wetlands and red maple swamps.
Amphibian	Northern leopard frog (*Lithobates pipiens*)	Temporary pools and wet meadows for breeding, with adjacent grass/old field foraging areas.
Birds	Olive-sided flycatcher - Breeding (*Contopus cooperi*)	A characteristic member of the North American boreal conifer forest bird community, it is most strongly associated with the northern conifer forests that extend into Pennsylvania and down the Appalachian Mountains at higher elevations. Nests in both mature forests and forest edge or burned over areas. Often found in bogs, semi-open forest, and the edges of wetlands, ponds, and forest. Territories include conifers such as spruces, tamaracks, hemlocks, and firs, but also deciduous trees such as maples, aspens, and mountain ash.
Birds	Yellow-bellied flycatcher - Breeding (*Empidonax flaviventris*)	Cool, shady conifer-dominated forested wetlands and conifer forests. Nest sites are associated with conifer cover (spruce, hemlock), sphagnum moss cover, numerous shrubs and saplings, and a rich layer of ground herbs, species typical of boreal forests (goldthread, starflower, bunchberry, creeping snowberry). Ferns can be numerous. There can be canopy gaps and territories can have less than 50% canopy cover and many deciduous trees.
Birds	Wilson's snipe - Breeding (*Gallinago delicata*)	Wet meadows and poorly drained pastures where moderate grazing maintains the vegetation in a cropped condition.
Birds	Prothonotary warbler - Breeding (*Protonotaria citrea*)	Wooded swamps or other flooded forest types > 100 hectares; swampy riparian forest > 30 meters wide.
Birds	White-throated sparrow - Breeding (*Zonotrichia albicollis*)	Shrubby wetlands and shrub habitats associated with the glaciated northeast
Fish	Black bullhead (*Ameiurus melas*)	Inhabits backwaters of rivers, ponds, and stream pools often in association with vegetation, mud, and slow currents. Tolerant of turbidity.
Fish	Brindled madtom (*Noturus miurus*)	Low gradient sections of streams, rivers, lakes. Especially areas of little or no current w/substrates of sand. silt, mud, and organic debris
Lepidoptera	Black dash (*Euphyes conspicua*)	
Lepidoptera	A noctuid moth (*Lemmeria digitalis*)	
Lepidoptera	Bronze copper (*Lycaena hyllus*)	
Lepidoptera	Turtlehead borer	

	(*Papaipema nepheleptena*)	
Lepidoptera	Mayapple borer (*Papaipema rutila)*	
Lepidoptera	Northern crescent (*Phyciodes cocyta*)	
Lepidoptera	Pine barrens zale (*Zale lunifera*)	
Lepidoptera	A zale moth (*Zale submediana*)	
Odonates	Lance-tipped darner (*Aeshna constricta*)	
Odonates	Blue-ringed dancer (*Argia sedula*)	
Odonates	Taiga bluet (*Coenagrion resolutum*)	
Odonates	Boreal bluet (*Enallagma boreale*)	
Odonates	Tule bluet (*Enallagma carunculatum*)	
Odonates	spiny baskettail (*Epitheca spinigera*)	
Odonates	Midland clubtail (*Gomphus fraternus*)	
Odonates	Elfin skimmer (*Nannothemis bella*)	
Odonates	Williamson's emerald (*Somatochlora williamsoni*)	
Odonates	Zebra clubtail (*Stylurus scudderi*)	
Odonates	Gray petaltail (*Tachopteryx thoreyi*)	
Reptile	Eastern massasauga (*Sistrurus catenatus catenatus*)	Wetlands with surrounding old field and prairie habitats that contain sunny basking sites.
Snails	Blue glass snail (*Nesovitrea binneyana*)	
Snails	Ohio pebblesnail (*Somatogyrus integra*)	
Spiders	A ghost spider (*Arachosia cubana*)	

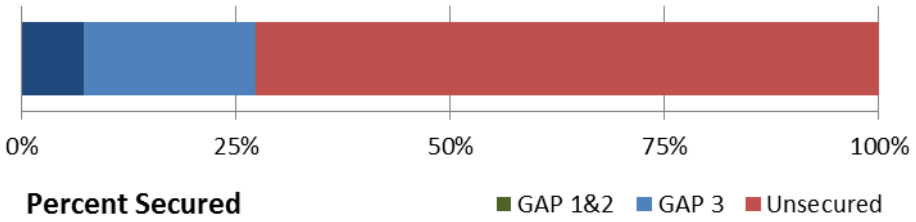
The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Canada warbler - Breeding (*Cardellina canadensis*)	Hemlock-dominated ravines and wet sites in northern hardwood and mixed forest with a dense understory of shrubs such as rhododendron or hobblebush; higher elevations (greater than 457 m).
Birds	Bald eagle - Breeding (*Haliaeetus leucocephalus*)	Protected perch and roost site trees near open water for foraging.
Birds	Nashville warbler - Breeding (*Oreothlypis ruficapilla*)	Shrub oak barrens and scrub shrub wetlands, higher elevations (greater than 457 meters).

Birds	Sora - Breeding (*Porzana carolina*)	Large shallow-intermediate depth emergent wetlands with a mosaic of open water, dense emergent vegetation, and mudflats.
Birds	Common tern - Breeding (*Sterna hirundo*)	Sandy beaches (Presque Isle State Park is only historic nesting location) and rocky maritime sites
Fish	Eastern mudminnow (*Umbra pygmaea*)	Sluggish sections of small creeks to medium-sized streams and lentic habitats, including lakes, ponds, bog, marshes, swamps, and ditches; waters may be clear to somewhat turbid
Lepidoptera	Baltimore (*Euphydryas phaeton*)	
Lepidoptera	Sundew cutworm moth (*Hemipachnobia monochromatea*)	
Lepidoptera	Eyed brown (*Lethe eurydice*)	
Lepidoptera	Bog copper (*Lycaena epixanthe*)	
Lepidoptera	Atlantis fritillary (*Speyeria atlantis*)	
Odonates	Comet darner (*Anax longipes*)	
Odonates	Banded pennant (*Celithemis fasciata*)	
Odonates	American emerald (*Cordulia shurtleffii*)	
Odonates	Petite mmerald (*Dorocordulia lepida*)	
Odonates	Harlequin darner (*Gomphaeschna furcillata*)	
Odonates	Beaverpond clubtail (*Gomphus borealis*)	
Odonates	Emerald spreadwing (*Lestes dryas*)	
Odonates	Amber-winged Spreadwing (*Lestes eurinus*)	
Odonates	Belted whiteface (*Leucorrhinia proxima*)	
Odonates	Brush-tipped emerald (*Somatochlora walshii*)	
Snails	Vernal physa (*Physa vernalis*)	

Condition metrics

Approximately 19.1% of the North-Central Appalachian Acidic Swamp habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 3.9% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 110.4 (0.6-354.9) indicating that the habitat is moderately impacted by roads, agriculture and development. The mean score for the northeastern states was 74.2, which suggests this habitat may be in slightly poorer condition in Pennsylvania.

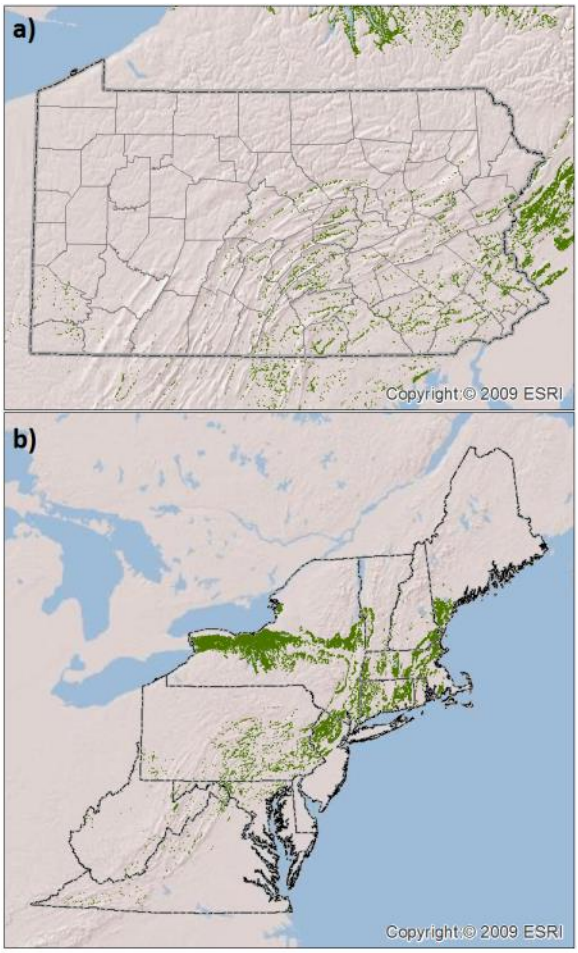
The mean stand age for this habitat was 29.6 years (s.d. 16.8), suggesting that patches of this habitat are relatively young.

North-Central Interior and Appalachian Rich Swamp

Macrogroup: Northern Swamp
Scale: Wetland
Area: Pennsylvania: 28,125 acres;
Northeast: 830,818 acres

A hardwood or occasionally mixed swamp of alkaline wetlands associated with limestone or other calcareous substrate in the southern portion of the region. Red maple (*Acer rubrum*) and black ash (*Fraxinus nigra*) are the dominant deciduous trees in most examples. Conifers may include larch (*Larix laricina*), but typically not northern white cedar (*Thuja occidentalis*), which is characteristic of more northern wetlands. The canopy can be variable, as there may be shrubby or herbaceous openings within the swamp. A diverse ground cover is made up of some combination of herbs indicative of nutrient-rich conditions, ferns, and bryophytes characteristic of fens.

This forested wetland habitat occurs at low to mid elevations. They are found in poorly drained depressions or at the margins of stream valley bottoms, where higher pH and nutrient levels are associated with a rich flora. The substrate is primarily mineral soil, but there may be some peat development. Basin settings may still be hydrologically connected to nearby streams.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Three sub-types of this have been identified in the classification:

- Isolated,
- Lake/pond: any size,
- Smaller river floodplain/riparian

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Elm - Ash - Maple Lakeplain Forest
- Red Maple - Black Ash Palustrine Forest
- Circumneutral Mixed Shrub Wetland
- Water-willow (*Decodon verticillatus*) Shrub Wetland
- Mixed Forb Marsh

SGCN Associated with this Habitat

252 unique occurrences or observations of 78 SGCN were associated with the North-Central Interior and Appalachian Rich Swamp habitat. The following SGCN had their Primary Habitat Association with this habitat:

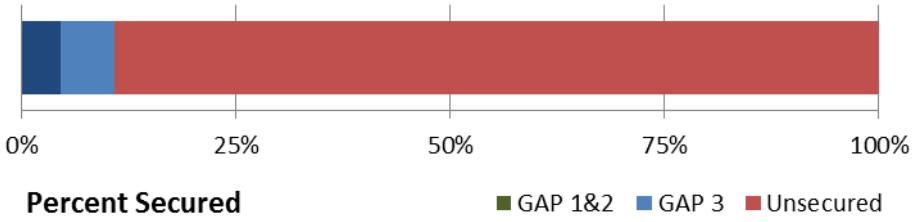
Taxa Group	SGCN	Specific Habitat Requirements
Snails	*Ventridens virginicus*	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Lepidoptera	Persius duskywing (*Erynnis persius persius*)	
Reptile	Spotted turtle (*Clemmys guttata*)	Soft-bottomed aquatic habitats, including small streams, marshes, swamps, and vernal pools w/ upland forests or open habitats.

Condition metrics

Approximately 12% of the North-Central Interior and Appalachian Rich Swamp habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.4% of the total distribution of the habitat in the Northeast:

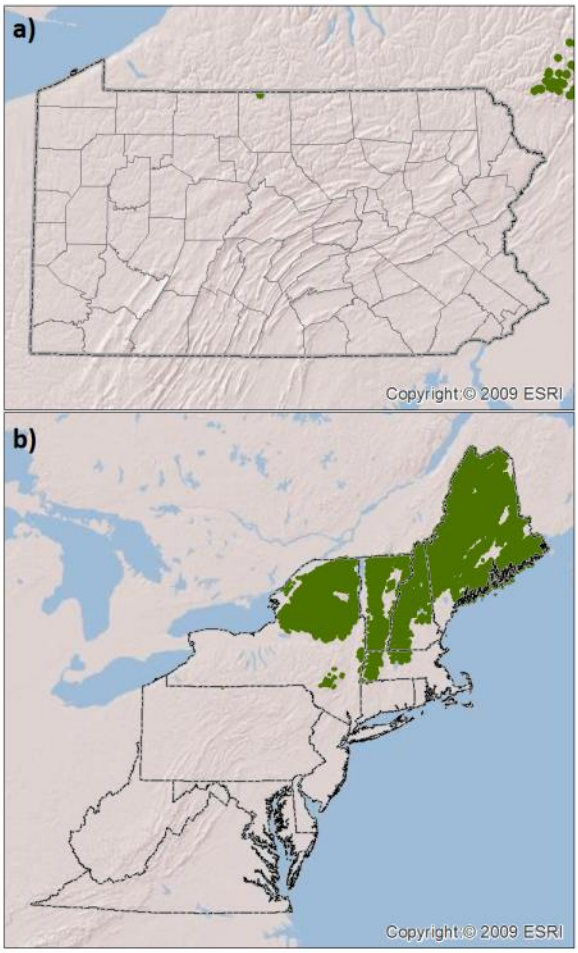


The mean Landscape Context Index (LCI) for this habitat is 140.8 (5.4-350.4), indicating that the habitat is moderately impacted by roads, agriculture, and development. The mean score for the northeastern states was 91.5, which suggests this habitat may be in relatively poorer condition in Pennsylvania.

The mean stand age for this habitat was 22.9 years (s.d. 16.9), suggesting that patches of this habitat are relatively young.

Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp

Macrogroup: Northern Swamp
Scale: Wetland
Area: Pennsylvania: 2 acres;
Northeast: 1,311,922 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

A conifer or mixed forested swamp of permanently saturated basins with seasonal standing water. Characteristic of the glaciated Northeast, this habitat may develop in peat moss or mineral soil. In peat, trees form a partial to full cover and stunted to well-developed black spruce (*Picea mariana*) and larch (*Larix laricina*) are dominant. Heath shrubs and sedges are common in the understory, although the dwarf-shrub layer is less well developed than in open acidic peatlands. In mineral soil red maple (*Acer rubrum*), red spruce (*P. rubens*), and balsam fir (*Abies balsamea*) are the most typical trees; ash (*Fraxinus* spp.) may be common in some locations. The herbaceous and shrub layers tend to be fairly species-poor; cinnamon fern (*Osmunda cinnamomea*), interrupted fern (*O. claytoniana*), sensitive fern (*Onoclea sensibilis*), and wetland sedges (*Carex* spp.) are typical.

Occurs in permanently saturated basins and depressions that may have standing water seasonally. Peat moss or mineral soil is the primary substrate, but many examples are associated with streams, and the more minerotrophic conditions (groundwater contact) yield nutrient levels somewhat higher than in a true bog.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

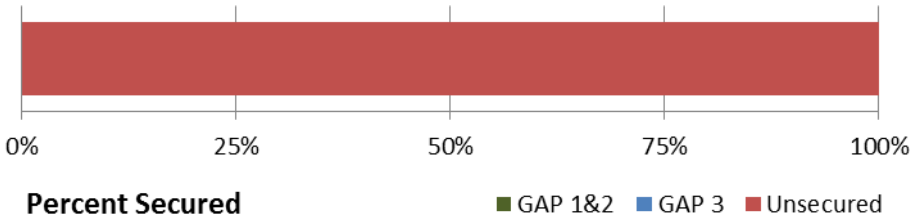
- Red Maple - Sedge Palustrine Woodland
- Same as other acid swamps (Isolated)

SGCN Associated with this Habitat

No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 38% of the Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0% of the total distribution of the habitat in the Northeast:



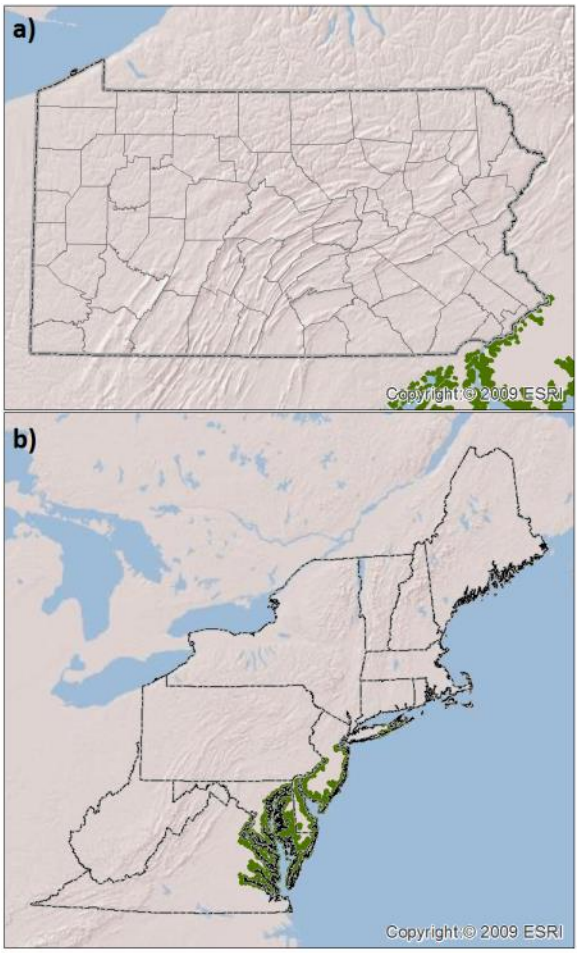
The mean Landscape Context Index (LCI) for this habitat is 116.3 (one patch), indicating that it is moderately impacted by roads, agriculture and development. The mean score for the northeastern states was 11.2, which suggests this habitat may be in much poorer condition in Pennsylvania.

The mean stand age for this habitat was 43.0 years, suggesting that surrounding forests are relatively young.

North Atlantic Coastal Plain Tidal Swamp

Macrogroup: Tidal Swamp
Scale: Wetland
Area: Pennsylvania: 1,278 acres;
Northeast: 196,233 acres

A tidally flooded hardwood forest and shrubland in lower river floodplains and estuaries of the North Atlantic Coastal Plain. Deciduous hardwood species predominate, especially green ash (*Fraxinus pennsylvanica*), black gum (*Nyssa sylvatica*), along with red maple (*Acer rubrum*), American elm (*Ulmus americana*), and black willow (*Salix nigra*). Alder (*Alnus* spp.) and silky dogwood (*Cornus amomum*) are common shrubs. Lianas and vines are common: poison ivy (*Toxiodendron radicans*), greenbrier (*Smilax rotundifolia*), and Virginia creeper (*Parthenocissus quinquefolia*). Species richness in the herbaceous layer is exceptionally high due to microtopographic features. Regularly flooded hollows primarily support flood-tolerant swamp species such as orange jewelweed (*Impatiens capensis*), arrow arum (*Peltandra virginica*), and various smartweeds (*Persicaria* spp.). Water hemlock (*Cicuta maculata*) and smallspike false nettle (*Boehmeria cylindrica*) are typical of elevated hummocks.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Occurs as small patches in the uppermost portions of tidal rivers that have sufficiently fresh water and short enough flooding to support trees. Stands form distinct pockets and fringes on poorly-drained, slightly acidic tidal muck with high silt and clay content. In Pennsylvania, this habitat is restricted to the extreme southeast corner of the state, within the tidally influenced portion of the Delaware Basin.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Red Maple – Magnolia Palustrine Forest
- Freshwater Tidal Mixed High Marsh
- Riverbank Freshwater Tidal Marsh

SGCN Associated with this Habitat

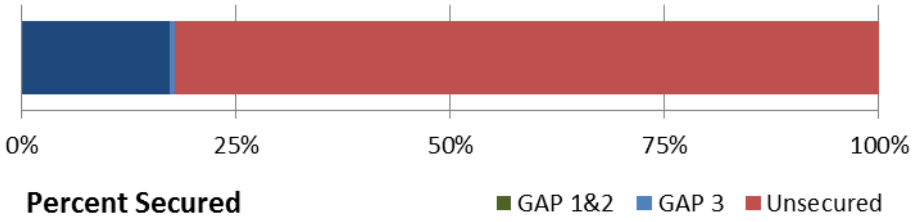
26 unique occurrences or observations of 16 SGCN were associated with the North Atlantic Coastal Plain Tidal Swamp habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Fowler's toad (*Anaxyrus fowleri*)	River bottoms, lake edges, sandy places, urban gardens with alluvium deposits of dry gravelly and sandy substrate.

No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

Approximately 30% of the North Atlantic Coastal Plain Tidal Swamp habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.1% of the total distribution of the habitat in the Northeast:



The mean Landscape Context Index (LCI) for this habitat is 193.6 (48.0-292.5) indicating that this habitat is highly impacted by roads and development. The mean score for the northeastern states was 60.1, which suggests this habitat may be in much poorer condition in Pennsylvania.

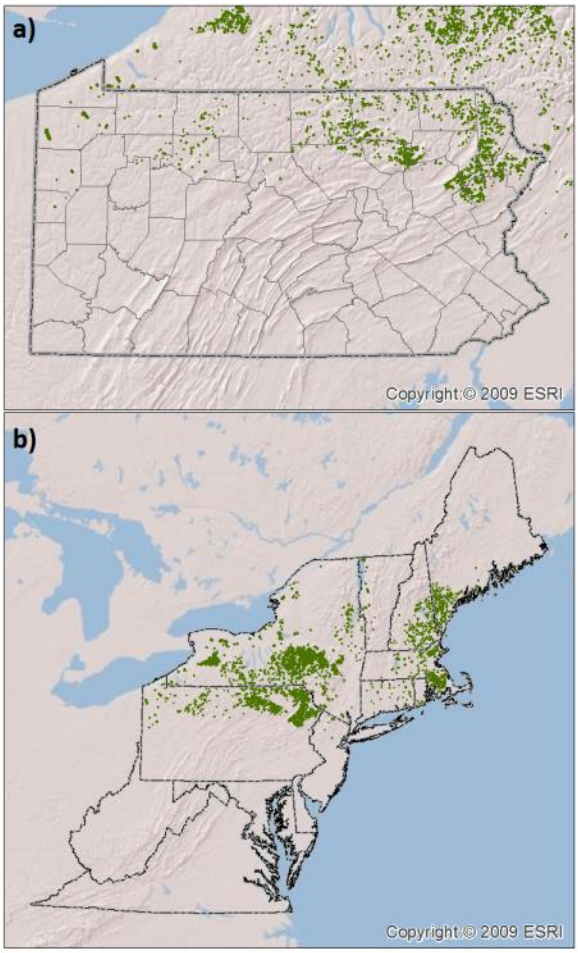
The mean stand age for this habitat was 11.6 years (s.d. 5.6), suggesting that patches of this habitat are relatively young.

North-Central Interior and Appalachian Acidic Peatland

Macrogroup: Northern Peatland
Scale: Wetland
Area: Pennsylvania: 30,168 acres;
Northeast: 83,789 acres

A dwarf-shrub peatland of small basins south of the coldest regions of the Northeast, down to near the glacial boundary, where stagnated ice left coarse deposits and glacial depressions. Vegetation is dominated by heath shrubs and dwarf-shrubs (e.g., leatherleaf), with patches of sedges and forbs. Some peatlands may have a sparse tree layer (black spruce (*Picea mariana*), larch (*Larix laricina*), pitch pine (*Pinus rigida*). Although these are often called bogs, in most cases they should technically be called fens. Because the glacial "kettleholes" and small basins they form in are generally closed (i.e., without inlets or outlets of surface water), the vegetation remains in contact with the groundwater, as with fens.

The nutrient-poor substrate and the reduced throughflow of water create conditions fostering the development of peat and peatland vegetation. In deeper basins, the vascular vegetation grows on a peat mat over water, with no mineral soil development.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

- Leatherleaf - Bog-rosemary Bog
- Leatherleaf - Cranberry Bog
- Leatherleaf - Sedge Wetland
- Black Spruce - Tamarack Palustrine Woodland
- Black Spruce - Tamarack Peatland Forest
- Sphagnum - Beak-rush Peatland
- Highbush Blueberry - Meadow-sweet Wetland
- Highbush Blueberry - Sphagnum Wetland
- Pitch Pine - Leatherleaf Palustrine Woodland
- Cotton-grass Poor Fen

SGCN Associated with this Habitat

264 unique occurrences or observations of 90 SGCN were associated with the North-Central Interior and Appalachian Acidic Peatland habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Nashville warbler - Breeding (*Oreothlypis ruficapilla*)	Shrub oak barrens and scrub shrub wetlands, higher elevations (greater than 457 meters).
Birds	Blackpoll warbler - Breeding (*Setophaga striata*)	Boreal conifer swamps that are headwater wetlands above 2000 feet elev. Pennsylvania Blackpolls are associated with red spruce, eastern hemlock, eastern larch, eastern white pine, and northern hardwoods, as well as dense shrub cover (blueberry, mountain holly, swamp azelea). They generally occupy dense conifer stands, but some territories have sparse conifer cover. Some blackpoll warblers have been found in upland conifer stands as they are found elsewhere in their breeding range. Blackpoll warbler occupation of spruce, fir, pine, or hemlock summits is possible and perhaps overlooked.
Lepidoptera	Ruddy metarranthis (*Metarranthis* sp. near *duaria*)	
Lepidoptera	Dusky Azure (*Celastrina nigra*)	
Lepidoptera	Baltimore (*Euphydryas phaeton*)	
Lepidoptera	Two-spotted skipper (*Euphyes bimacula*)	
Lepidoptera	Dion skipper (*Euphyes dion*)	
Lepidoptera	Bog copper (*Lycaena epixanthe*)	
Odonates	Beaverpond clubtail (*Gomphus borealis*)	
Odonates	White corporal (*Ladona exusta*)	
Odonates	Belted whiteface (*Leucorrhinia proxima*)	
Odonates	Forcipate emerald (*Somatochlora forcipata*)	
Odonates	Incurvate emerald (*Somatochlora incurvata*)	
Odonates	Brush-tipped emerald (*Somatochlora walshii*)	
Odonates	Cherry-faced meadowhawk (*Sympetrum internum*)	

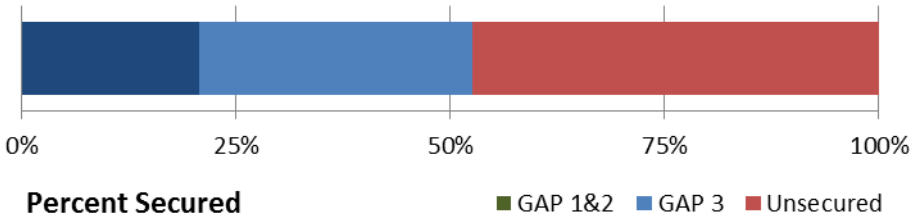
The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Northern leopard frog (*Lithobates pipiens*)	Temporary pools and wet meadows for breeding, with adjacent grass/old field foraging areas.
Birds	Yellow-bellied flycatcher - Breeding (*Empidonax flaviventris*)	Cool, shady conifer-dominated forested wetlands and conifer forests. Nest sites are associated with conifer cover (spruce, hemlock), sphagnum moss cover, numerous shrubs and saplings, and a rich layer of ground herbs, species typical of boreal forests (goldthread, starflower, bunchberry, creeping snowberry). Ferns can be numerous. There can be canopy gaps and territories can have less than 50% canopy cover and many deciduous trees.

Fish	Brindled madtom (*Noturus miurus*)	Low gradient sections of streams, rivers, lakes. Especially areas of little or no current w/substrates of sand. silt, mud, and organic debris.
Lepidoptera	Broad-winged skipper (*Poanes viator viator*)	
Lepidoptera	A noctuid moth (*Sympistis dentata*)	
Odonates	Mottled darner (*Aeshna clepsydra*)	
Odonates	Turquoise bluet (*Enallagma divagans*)	
Odonates	Crimson-ringed whiteface (*Leucorrhinia glacialis*)	
Odonates	Spatterdock darner (*Rhionaeschna mutata*)	

Condition metrics

Approximately 38.1% of the North-Central Interior and Appalachian Acidic Peatland habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 18.9% of the total distribution of the habitat in the Northeast:

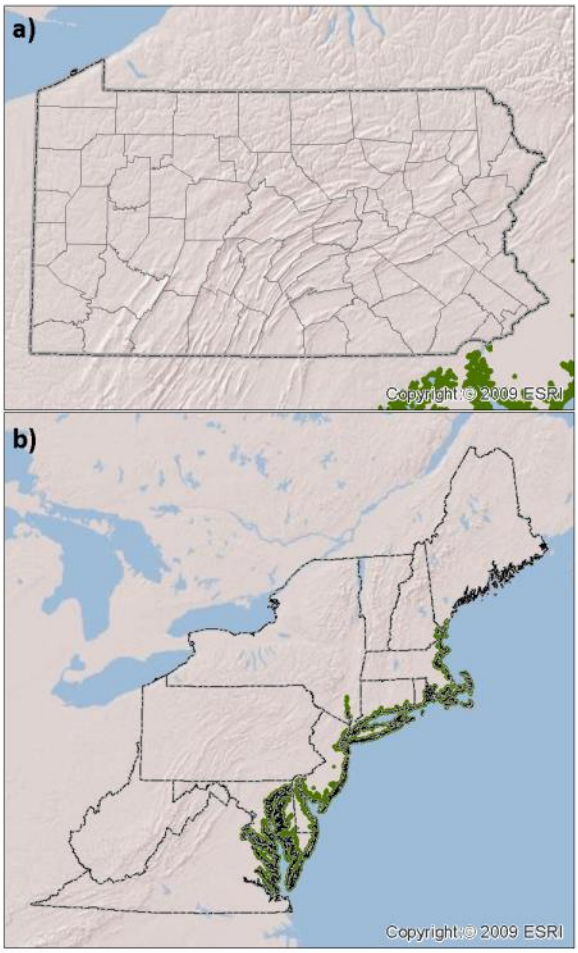


The mean Landscape Context Index (LCI) for this habitat is 65.3 (2.6-166.6) indicating that the habitat is moderately impacted by roads, agriculture, and development. The mean score for the northeastern states was 47.3, which suggests this habitat may be in slightly poorer condition in Pennsylvania.

The mean stand age for this habitat was 40.9 years (s.d. 13.8), suggesting that forests surrounding this habitat are relatively young.

North Atlantic Coastal Plain Tidal Salt Marsh

Macrogroup: Tidal Marsh
Scale: Wetland
Area: Pennsylvania: 1,636 acres;
Northeast: 920,107 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This describes the complex of tidally influenced marshes from the coastal shore on up the tidal rivers of the Northern Atlantic Coastal Plain. This habitat includes salt marsh, brackish marsh, and freshwater tidal marsh. A salt marsh profile features a low regularly flooded marsh dominated by salt marsh cordgrass; a higher irregularly flooded marsh dominated by saltmeadow cordgrass and saltgrass; low hypersaline pannes characterized by saltwort; and a salt scrub ecotone characterized by marsh elder (*Iva frutescens*), groundsel-tree (*Baccharis halimifolia*), and switchgrass (*Panicum* spp.). Brackish areas support salt marsh cordgrass (*Spartina alterniflora*), giant cordgrass (*Spartina cynosuroides*), narrowleaf cattail (*Typha angustifolia*), and bulrush (*Schoenoplectus* spp.). Freshwater tidal areas include wild rice (*Zizania aquatica*) marshes, and forbs such as water hemp (*Amaranthus rudis*), and rosemallow (*Hibiscus moscheutos*).

The salt-freshwater gradient tracks the degree to which intertidal flats are removed from the open ocean. Brackish marshes can occur along upper edges of salt marshes and along tidal rivers. Freshwater tidal marshes occur on the upper reaches of large rivers influenced by tidal flooding beyond the reach of the salt wedge. Marshes of lower salinity levels are best developed in Chesapeake and Delaware Bays. In Pennsylvania, this habitat is restricted to the extreme southeast corner of the state, within the Delaware Basin.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

The following Pennsylvania Community Types (Zimmerman et al. 2012) are typically associated within this habitat:

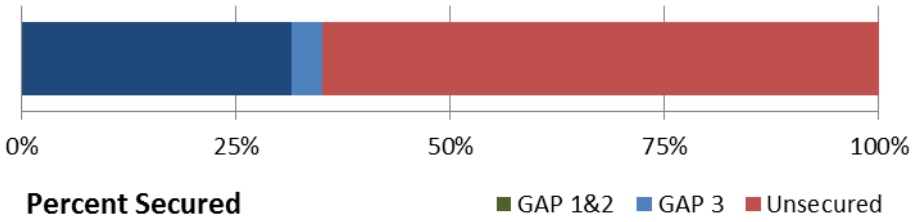
- Freshwater Tidal Mixed High Marsh
- Riverbank Freshwater Tidal Marsh

SGCN Associated with this Habitat

47 unique occurrences or observations of 23 SGCN were associated with the North Atlantic Coastal Plain Tidal Salt Marsh habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 45.2% of the North Atlantic Coastal Plain Tidal Salt Marsh habitat has been secured against conversion to other uses in the Northeast. Comparatively speaking, Pennsylvania has secured 0.1% of the total distribution of the habitat in the Northeast:

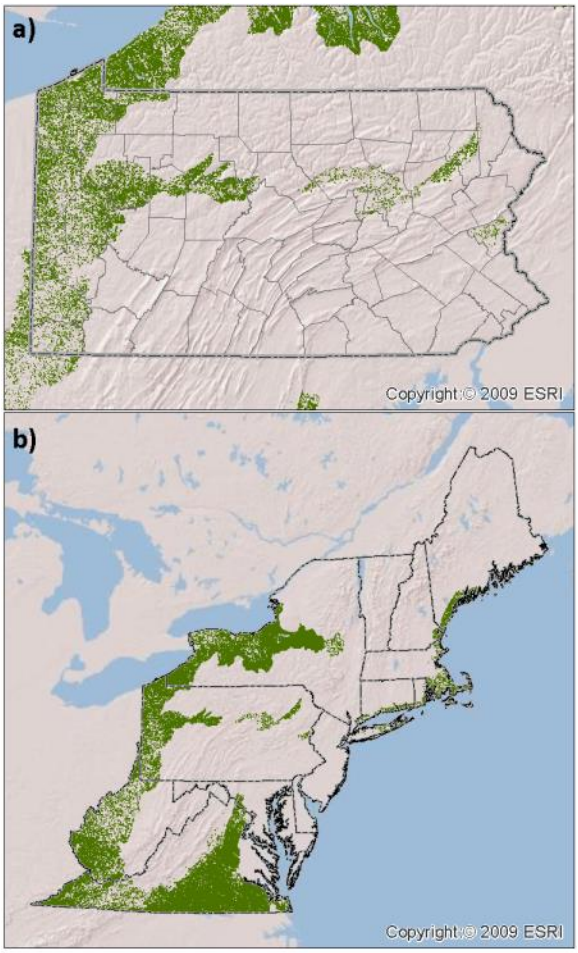


The mean Landscape Context Index (LCI) for this habitat is 238.2 (128.5-374.4), indicating that the habitat is highly impacted by roads, agriculture and development. The mean score for the northeastern states was 45.1, which suggests this habitat may be in much poorer condition in Pennsylvania.

The mean stand age for this habitat was 12.0 years (s.d. 10.5), suggesting that forests surrounding this habitat are relatively young.

Shrubland & grassland (NLCD 52/71)

Macrogroup: Non Natural Types
Scale: Other (matrix)
Area: Pennsylvania: 159,711 acres;
Northeast: 1,733,276 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat is based on the two NLCD cover types:

- Shrub/Scrub (52) – areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
- Grassland/Herbaceous (71) – areas dominated by graminoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.

The Pennsylvania portion of this habitat largely consists of recovering stripmines, fallow fields, and other disturbed areas.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

As this is a type that is the result of human modification, it is not classified in the Pennsylvania Community Classification (Zimmerman et al. 2012). However, remnant patches of other natural systems may remain within the developed matrix.

SGCN Associated with this Habitat

590 unique occurrences or observations of 86 SGCN were associated with the Shrubland & grassland (NLCD 52/71) habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	American woodcock - Breeding (*Scolopax minor*)	Mix of habitats, including small, scattered openings and dense stands of shrubs and young trees on moist soils.
Birds	Prairie warbler - Breeding (*Setophaga discolor*)	Brushy second growth, dry scrub, low pine-juniper, mangroves, pine barrens, burned-over areas, and sproutlands.
Lepidoptera	Blueberry gray (*Glena cognataria*)	
Lepidoptera	Twilight moth (*Lycia rachelae*)	
Lepidoptera	*Sutyna privata*	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Upland sandpiper - Breeding (*Bartramia longicauda*)	Large tracts of contiguous grassland with mosaics of tall (15-35centimeters) stands of grass for nesting and short stands (greater than <15 centimeters), often in weed rich pasture for foraging.
Lepidoptera	Broad sallow moth (*Xylotype capax*)	
Snails	Crested vertigo (*Vertigo cristata*)	

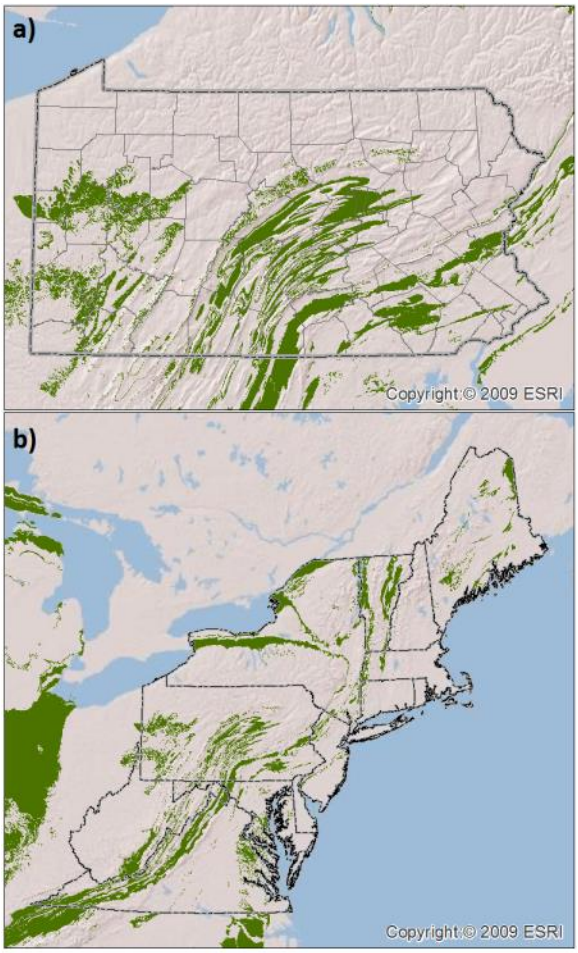
Condition metrics

As this is a modified type, no condition metrics have been calculated.

Subterranean Habitats

Macrogroup: Subterranean
Scale: Patch
Area: Pennsylvania: unknown acres;
Northeast: unknown acres

Over 1100 caves have been documented in Pennsylvania, primarily in the Appalachian Mountains, Allegheny Mountains, and the Great Valley Physiographic Sections.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

In addition to natural caves, extensive mining in Pennsylvania has resulted in numerous man-made subterranean excavations that also sometimes function as caves for animal species (Mohr 1942; Johnson et. al. 2006). The distribution of mines in Pennsylvania is associated with the northeastern and southwestern portions of the state. Use of mines is likely an artifact of historic use of rock habitats, but it does indicate that these man-made sights can contribute significantly to the conservation of SGCN.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

Subterranean systems are not covered in the Pennsylvania Community Classification (Zimmerman et al. 2012). However, Thorne (1995) recognized four different cave communities in Pennsylvania:

- Terrestrial solution caves – The largest and most common type of cave in Pennsylvania, occurring in limestone bedrock.
- Aquatic solution caves – Similar to terrestrial solution caves, these flooded systems are habitat for many species of invertebrates such as flatworms, isopods, and amphipods, some of which are found nowhere else in the world.
- Tectonic caves – These are essentially wide, subsurface cracks due to the movement of bedrock (typically sandstone). They are usually dry and also used by bats and woodrats.
- Talus caves – Formed from masses of boulders piled in a way that creates openings between and beneath rocks. These are typically used by reptiles and small mammals.

SGCN Associated with this Habitat

385 unique occurrences or observations of 14 SGCN were associated with the Subterranean habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Mammals	Big brown bat - Wintering	Human structures, caves, mines, tunnels, and other structures.

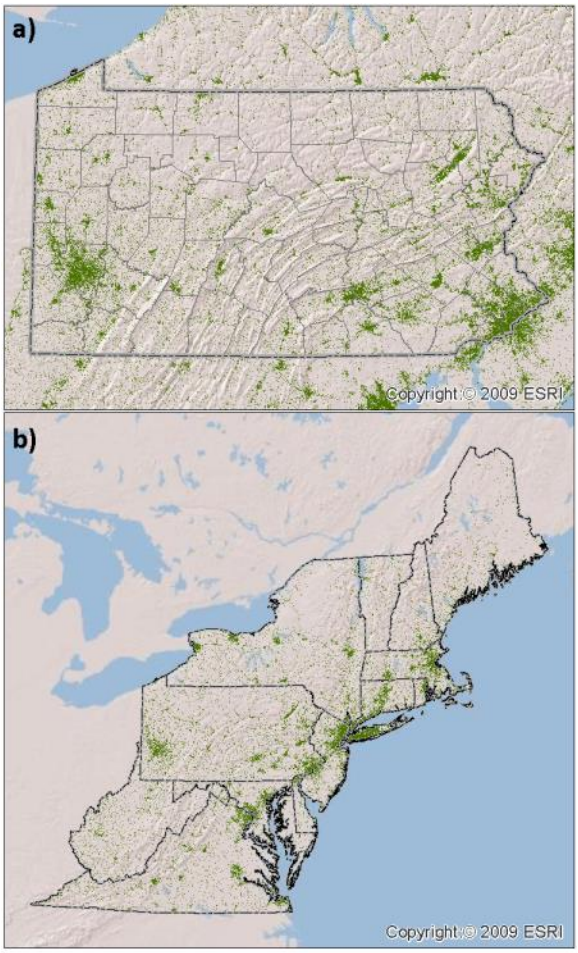
	(*Eptesicus fuscus*)	
Mammals	Tri-colored bat - Wintering (*Perlinella drymo*)	Slightly warmer locales from 46-53˚F.
Mammals	Indiana bat - Wintering (*Myotis sodalis*)	Caves and mines where temps range from 42-51˚F.
Cave Invertebrates	Refton cave planarian (*Sphalloplana pricei*)	
Mammals	Little brown bat - Wintering (*Myotis lucifugus*)	Primarily caves and mines but also minimal use in rock fissures and human structures such as ditches and tunnels where more stable temps in 40-50˚F range are found.
Mammals	Big brown bat - Wintering (*Eptesicus fuscus*)	Human structures, trees, and other hollow spaces.
Cave Invertebrates	*Caecidotea franzi*	
Cave Invertebrates	*Caecidotea kenki*	
Cave Invertebrates	*Caecidotea pricei*	
Cave Invertebrates	*Crangonyx dearolfi*	
Cave Invertebrates	*Stygobromus allegheniensis*	
Cave Invertebrates	*Stygobromus biggersi*	
Cave Invertebrates	*Stygobromus franzi*	
Cave Invertebrates	*Stygobromus gracilipes*	
Cave Invertebrates	*Stygobromus pizzinii*	
Cave Invertebrates	*Stygobromus stellmacki*	
Cave Invertebrates	*Stygobromus tenuis potomacus*	
Ground Beetles	Pennsylvania cave beetle (*Pseudanophthalmus sp. nov.*)	
Spiders	Appalachian cave spider (*Porrhomma cavernicola*)	
Spiders	Beatty's sheetweb cave spider (*Oreonetides beattyi*)	
Spiders	Subterranean sheetweb spider (*Phanetta subterranean*)	
Spiders	Weyer's sheetweb cave spider (*Bathyphantes weyeri*)	
Springtails	Heller cave springtail (*Typhlogastrura helleri*)	
Amphipods	*Gammarus cohabitus*	

Condition metrics

As this habitat was not included in the Northeast Habitat classification, no condition metrics have been calculated. We recommend that a condition of subterranean habitat study be conducted.

Developed (NLCD 21-24 & 31)

Macrogroup: Non Natural Types
Scale: Other (matrix)
Area: Pennsylvania: 3,406,702 acres;
Northeast: 15,663,735 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

These this habitat consists of residential, commercial, and industrial areas. Areas classified as this type of in the Terrestrial Habitat Map were selected from the 2006 NLCD as pixels where percent cover by buildings, roads, and other impervious surfaces is greater than vegetative cover:

- Developed, Open Space (NLCD 21) – areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
- Developed, Low Intensity (NLCD 22) – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
- Developed, Medium Intensity (NLCD 23) – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
- Developed High Intensity (NLCD 24) – highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
- Barren Land [Rock/Sand/Clay] (NLCD 31) – areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

As this is a developed type, this is not classified in the Pennsylvania Community Classification (Zimmerman et al. 2012). However, remnant patches of other natural systems may remain within the developed matrix.

SGCN Associated with this Habitat

34,894 unique occurrences or observations of 253 SGCN were associated with the Developed habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Northern goshawk - Wintering (*Accipiter gentilis*)	Any forested habitat, including edges and ruderal forests, presumably.
Birds	Chimney swift - Breeding (*Chaetura pelagica*)	Dark vertical hollow shafts, chimneys, hollow logs, silos and old barns.
Birds	Common nighthawk - Breeding (*Chordeiles minor*)	Rock outcrops; gravel rooftops in cities and towns; barrens; former strip mines.
Birds	Gray catbird - Breeding (*Dumetella carolinensis*)	Dense, shrubby vegetation, including thickets, hedgerows, woodland edges, and regenerating clearcuts.
Birds	Peregrine falcon - Breeding (*Falco peregrinus*)	Nesting requires tall structures to provide nest security and open areas for foraging. Large cliffs across the state, most often associated with rivers, were formerly (pre-DDT) the predominant habitat for nesting; now used to a more limited extent. At present, most nests are on tall man-made structures: large and medium-sized bridges, tall buildings, and rather tall structures (e.g. smokestacks, water towers). Open areas distant from nest site are used for hunting during the non-nesting season; these include agricultural areas and areas hosting large concentrations of avian prey (e.g. wintering waterfowl).
Birds	Red-headed woodpecker - Breeding (*Melanerpes erythrocephalus*)	Woodlots at least 2 hectares in size with snags near open pasture. Savannah-like forests, parks, swamps.
Birds	Yellow-crowned night-heron - Breeding (*Nyctanassa violacea*)	Riparian forest. Nests located 30 – 80 feet up on a horizontal branch in tall shade trees, such as American sycamore, with open understory along riparian margins.
Lepidoptera	A cutworm moth (*Apamea burgessi*)	
Lepidoptera	Hoary elfin (*Callophrys polios*)	
Lepidoptera	Buffalo moth (*Parapamea buffaloensis*)	
Lepidoptera	Southern cloudywing (*Thorybes bathyllus*)	
Mammals	Least shrew (*Cryptotis parva*)	The least shrew is an inhabitant of open areas. In Pennsylvania, early successional communities are preferred and include native grasslands, old fields, abandoned pastureland, and weedy meadows (Merritt 1987). Inhabited sites are usually associated with a water source of some form (Hart 2010).
Snails	*Amnicola decisus*	
Snails	Moss bladder snail (*Aplexa hypnorum*)	
Snails	Moss chrysalis snail (*Pupilla muscorum*)	
Snails	Ovate vertigo (*Vertigo ovata*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Short-eared owl - Wintering (*Asio flammeus*)	Unmowed grassy fields of greater than 200 acres in extent with minimal incursion of shrubs and trees; grassy marsh lands with minimal tree incursion.
Birds	Brown creeper - Breeding (*Certhia americana*)	Requires dead trees with loose bark for nesting in late-successional forest.
Birds	Bald eagle - Wintering (*Haliaeetus leucocephalus*)	Protected perch and roost site trees near open water for foraging.
Lepidoptera	Graceful clearwing (*Hemaris gracilis*)	
Lepidoptera	Long dash (*Polites mystic*)	

Condition metrics

As this is a modified type, no condition metrics have been calculated.

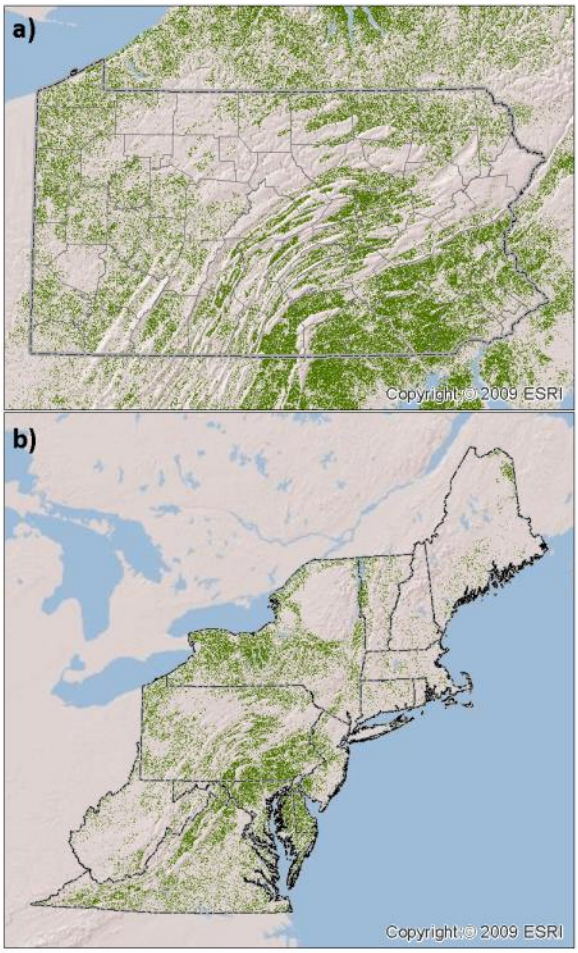
Agriculture (NLCD 81-82)

Macrogroup: Non Natural Types
Scale: Other (matrix)
Area: Pennsylvania: 7,175,635 acres;
Northeast: 27,837,800 acres

These are lands currently being used for crop production or pasture. Additionally, abandoned agricultural fields, bare ground, and grass-dominated lands (e.g. hay fields, pastures, lawns, and golf courses) can be present in the habitat system. Two types of agriculture have been identified in the NLCD:

- Pasture/Hay – areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
- Cultivated Crops – areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.

There may be overlap between this habitat type and the Shrubland & grassland (NLCD 52/71) system above due to classification and temporal errors.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Agricultural landscapes can make a meaningful contribution to conservation by providing natural habitat that can in some instances, meets the needs of certain wildlife species. Natural areas can be protected from conversion to domestic crops. Other areas may be actively restored to native habitat. On many farms, opportunities exist to accommodate the needs of local species with only minor changes to farming practices.

Pennsylvania Terrestrial and Palustrine Community Classification Crosswalk

As this is an agricultural type, this is not classified in the Pennsylvania Community Classification (Zimmerman et al. 2012). However, remnant patches of other natural systems may remain within the agricultural matrix in the form of wetlands, hedgerows, and small woodlots.

SGCN Associated with this Habitat

23436 unique occurrences or observations of 220 SGCN were associated with the Agriculture habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Eastern spadefoot (*Scaphiopus holbrookii*)	Temporary, ephemeral pools in depression areas in agricultural or wooded settings, upland habitat friable loamy to sandy soils.
Birds	Henslow's sparrow - Breeding (*Ammodramus henslowii*)	Indicator for large-scale grasslands; grassland obligate species
Birds	Grasshopper sparrow - Breeding (*Ammodramus savannarum*)	Indicator for large-scale grasslands; grassland obligate species
Birds	Short-eared owl - Breeding (*Asio flammeus*)	Unmowed grassy fields of greater than 200 acres in extent with minimal incursion of shrubs and trees; grassy marsh lands with minimal tree incursion.
Birds	Short-eared owl - Wintering (*Asio flammeus*)	Unmowed grassy fields of greater than 200 acres in extent with minimal incursion of shrubs and trees; grassy marsh lands with minimal tree incursion.
Birds	Long-eared owl - Wintering *(Asio otus*)	Both during breeding and winter, we generally think of long-eared owls using planted conifers near agricultural or grassland habitats.
Birds	Upland sandpiper - Breeding (*Bartramia longicauda*)	Large tracts of contiguous grassland with mosaics of tall (15-35 cm) stands of grass for nesting and short stands (< 15 cm), often in weed rich pasture, for foraging.
Birds	Northern harrier - Breeding (*Circus cyaneus*)	Large open grasslands (reclaimed strip mines); marshy meadows, wet lightly grazed pastures, open bogs, freshwater and brackish marshes, and riparian woodland
Birds	Sedge wren - Breeding (*Cistothorus platensis*)	Densely-vegetated wet meadows, hayfields, retired croplands, and upland pond and lake margins, and in coastal, brackish marshes with limited standing water
Birds	Tundra swan - Migration (*Cygnus columbianus*)	Combination of open water areas (lakes and slow-moving portions of large rivers) for secure roosting with substantial amounts of large agricultural fields (especially harvested corn, harvested soybeans, and winter wheat) for feeding within 5-10 miles of roost sites.
Birds	Bobolink - Breeding (*Dolichonyx oryzivorus*)	Moist meadows and fields of hay, clover, alfalfa and other herbaceous vegetation.
Birds	American kestrel - Breeding (*Falco sparverius*)	Uses variety of grassland habitats with short herbaceous vegetation and sparse woody vegetation preferred; use meadows, agricultural fields, pastures, large lawn areas. Requires nest tree with cavity or nest box on tree, barn, or pole. Prime habitat includes 25 or more hectares of contiguous grassland. Areas used consistently include >65% open habitat in 1 hectare around nest site and distances from woodland >350 meters (Smallwood and Bird 2002).
Birds	Bald eagle - Wintering (*Haliaeetus leucocephalus*)	Protected perch and roost site trees near open water for foraging.
Birds	Migrant loggerhead shrike - Breeding (*Lanius ludovicianus*)	Open country with short grasses and forbs of low stature interspersed with bare ground and shrubs or small trees.
Birds	Savannah sparrow - Breeding (*Passerculus sandwichensis*)	Arable fields, pastures, and reclaimed surface mines (Wilson in Wilson et al. 2012).
Birds	Vesper sparrow - Breeding (*Pooecetes gramineus*)	Agricultural lands and reclaimed surface mines (Santner 1992) to shrubs and woodland edges, with bare ground for foraging (Wilson in Wilson et al. 2012).
Birds	Purple martin - Breeding (*Progne subis*)	Having nearby water sources is not necessary in a Purple Martins habitat, however it can be helpful as a food source. Martin housing should be placed in the most open spot available (at least 40', but preferably

		60’ from trees or buildings) and within 100’ of human housing or activity. Proximity to humans and a wide-open location and flight area will help protect the martins from predators.
Birds	Dickcissel - Breeding (*Spiza Americana*)	Old fields, grasslands with medium to high vegetation and moderate litter
Birds	Field sparrow - Breeding (*Spizella pusilla*)	Mixture of grasses and shrubs.
Birds	Eastern meadowlark - Breeding (*Sturnella magna*)	Prairies, pastures, hayfields, and fallow lands.
Birds	Barn owl - Breeding (*Tyto alba*)	Low altitude grasslands (meadows, hayfields and abandoned arable fields) w/ natural and/or artificial cavities (barns, silos)
Birds	Blue-winged warbler - Breeding (*Vermivora cyanoptera*)	Early-mid successional forests and thickets w/openings; areas marked by patches of herbs, shrubs, and trees and often located near a forest edge.
Lepidoptera	Marvel moth (*Chytonix sensilis*)	
Lepidoptera	Dark stoneroot borer (*Papaipema duplicata*)	
Lepidoptera	Coneflower borer (*Papaipema nelita)*	
Lepidoptera	Long dash (*Polites mystic*)	
Snails	Eastern glass-snail (*Vitrina angelicae*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Northern goshawk - Wintering (*Accipiter gentilis*)	Any forested habitat, including edges and ruderal forests, presumably.
Birds	Chimney swift - Breeding (*Chaetura pelagica*)	Dark vertical hollow shafts, chimneys, hollow logs, silos and old barns.
Birds	Willow flycatcher - Breeding (*Empidonax traillii*)	Low-elevation shrub swamp, wet meadow, and brushy habitats along streams and the edges of ponds and marshes; sometimes dry upland sites
Birds	Red-headed woodpecker - Breeding (*Melanerpes erythrocephalus*)	Woodlots at least 2 hectares in size with snags near open pasture. Savannah-like forests, parks, swamps.
Birds	American woodcock - Breeding (*Scolopax minor*)	Mix of habitats, including small, scattered openings and dense stands of shrubs and young trees on moist soils.
Mammals	Least shrew (*Cryptotis parva*)	The least shrew is an inhabitant of open areas. In Pennsylvania, early successional communities are preferred and include native grasslands, old fields, abandoned pastureland, and weedy meadows (Merritt 1987). Inhabited sites are usually associated with a water source of some form (Hart 2010).

Condition metrics

As this is a modified type, no condition metrics have been calculated.

Lotic Aquatic Habitat Descriptions

For each flowing water aquatic habitat, the following information is presented.

The macrogroup the habitat is within as well as the stream length, in miles, of each habitat in Pennsylvania as well as the Northeast.

This description is modeled after that which contained in the Northeastern Habitat Guides (Anderson et. al. 2013b). Modifications have been made to the descriptions to reflect the habitat as it exists within Pennsylvania. A list of the Pennsylvania Aquatic communities as described by Walsh et al. (2007), which is a biological classification system to identify stream types in Pennsylvania based on freshwater mussels, macroinvertebrates and fish.

Tables of Primary and Secondary SGCN Habitat Associations for each habitat are presented. SGCN associations with each particular habitat were determined using the methods outlined in Chapter 2. Primary habitat represents a statistical majority of documented observations occur, Secondary Habitat was described as where the next highest statistical habitat association. Note that SGCN may occur in other habitats than what are listed here.

Condition metrics were calculated for the state based on the Condition of Northeast Habitats (Anderson et. al. 2013a). "Condition" here refers to one aspect of condition--landscape context, which was assessed as through remotely assessed metrics. Other important factors influencing stream condition cannot reliable measured or accessed at this spatial scale. To allow for comparisons on condition between Pennsylvania and the Northeast, here possible, we computed condition metrics for both.

We present information of the Securement of the 100m Riparian Buffer for each lotic habitat type.

Additionally, Landcover statistics across five broad categories are presented for each habitat type for both Pennsylvania and the Northeast as a whole.

Impervious surfaces are hard substrates like paved roads, parking lots, and roves. To examine impervious surfaces in the region, we summarized the amount of impervious cover for the total upstream watershed of each stream reach using the 2006 National Landcover Impervious Surface Dataset (Fry et al. 2011). The following four classes of upstream impervious are calculated for each habitat.

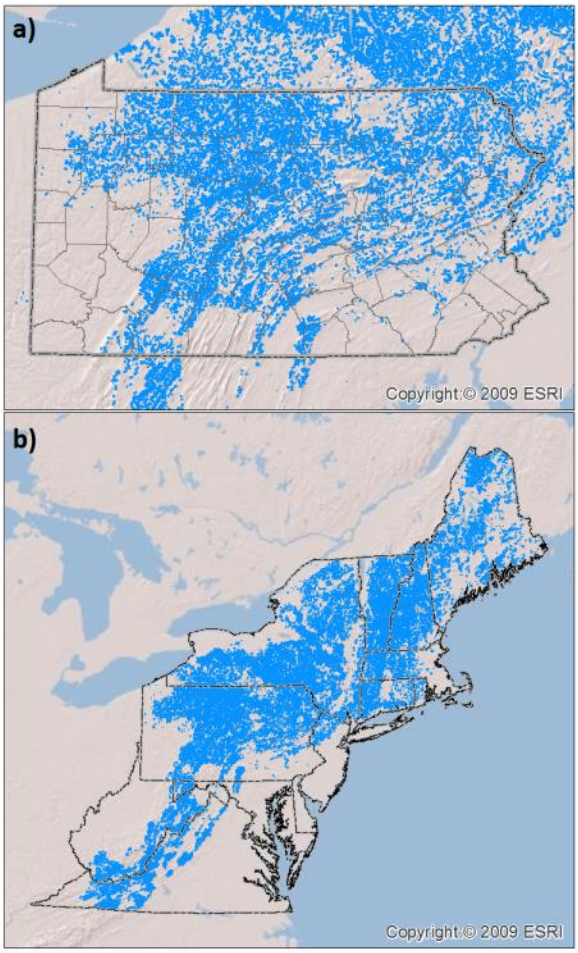
- Class 1: Undisturbed: ≥ 0 < 0.5 % impervious
- Class 2: Low impacts: ≥ 0.5 < 2 % impervious
- Class 3: Moderately impacted: ≥ 2 < 10 % impervious
- Class 4: Highly impacted: ≥ 10 % impervious

The Landscape Context Index (LCI) is a metric quantifies the relative amount of development, agriculture, quarries, roads, or other fragmenting features within an area directly surrounding each 30m cell of land. The metric values range from 0 to 400. A LCI below 20 indicates that the occurrence is surrounded primarily by natural cover, whereas higher LCIs indicate increasing amounts of roads, development, and agriculture within the local neighborhood.

In addition to the condition metrics presented above, metrics describing Dam Type and Density, Risk of Flow Alteration from Dam Water Storage, Network Size, and Road-Stream Crossings are available in the Northeast Terrestrial and Aquatic Geospatial Condition Analysis report (Anderson et al. 2013a).

High Gradient, Cold, Headwaters and Creeks

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 8,847 miles;
Northeast: 36, 183 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes cold, fast-moving headwaters and creeks of steeper slopes at moderate to high elevations. These small streams of northern regions or high elevations occur on steep slope in watersheds less than 39 square miles (101 square kilometers) in size. The cold fast moving water has high water clarity and is well oxygenated. Instream habitats are dominated by riffles and cascade and step-pool systems. Channels are usually narrowly confined, high-gradient, and surrounded by upland forests. Bed materials often consist of bedrock, boulders, cobbles, and coarse gravel. The predominant source of energy to the stream is terrestrial leaf litter or organic matter. Permanent cold water temperatures in these streams means coldwater fish species, such as brook trout, likely represent over half of the fish community. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Coldwater Community
- Ohio-Great Lakes Basins Fish Coldwater Community

SGCN Associated with this Habitat

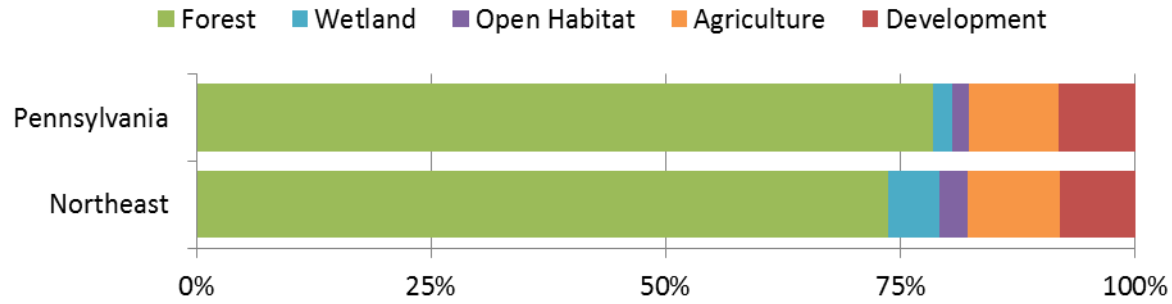
47 unique occurrences or observations of 27 SGCN were associated with the High Gradient, Cold, Headwaters and Creeks habitat. No SGCN had their Primary Habitat Association with this habitat.

The following SGCN had their Secondary Habitat Association with this habitat:

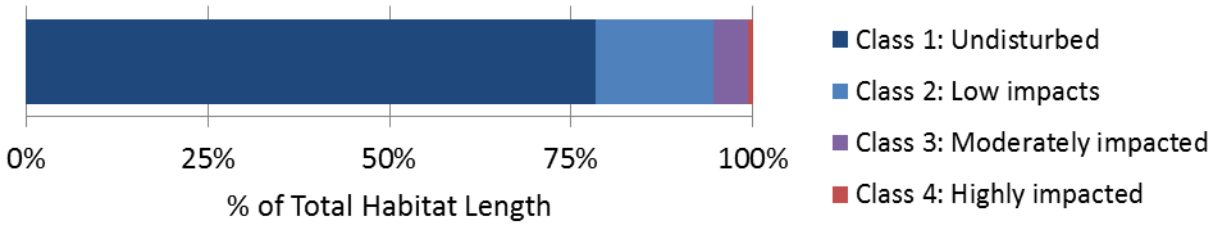
Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Mudpuppy (*Necturus maculosus*)	Lotic and lentic habitats.
Odonates	Riffle snaketail (*Ophiogomphus carolus*)	
Odonates	Ski-tailed emerald (*Somatochlora elongata*)	
Snails	*Lymnaea catascopium*	

Condition metrics

Approximately 29.5% of the 100m riparian buffer for the High Gradient, Cold, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 70.5% unsecured. Compared to the entire Northeast region, Pennsylvania has about 4% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



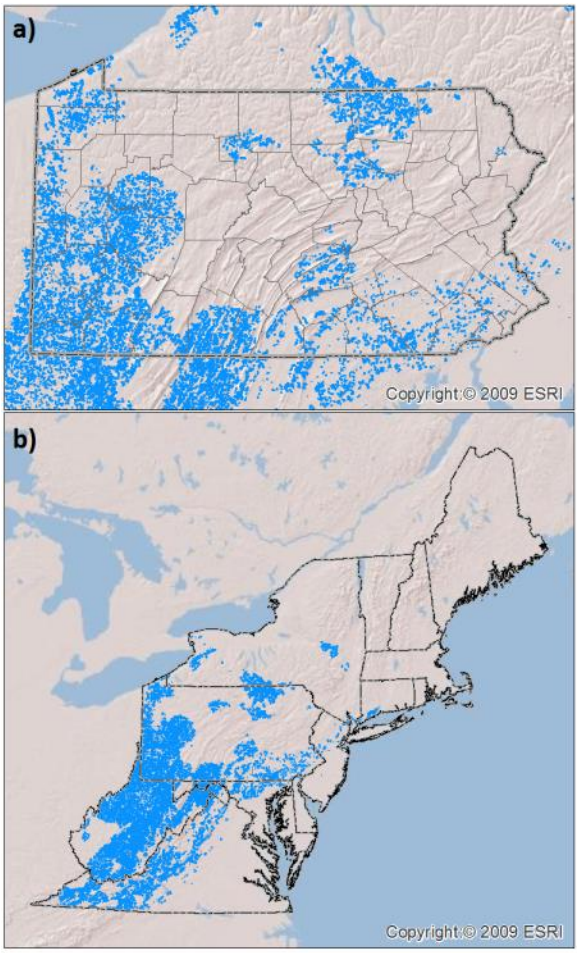
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the High Gradient, Cold, Headwaters and Creeks habitat is 41.9 (range 0-342.4) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

High Gradient, Cool, Headwaters and Creeks

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 3,875 miles;
Northeast: 12,390 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Cool, fast-moving headwaters and creeks of steeper slopes at low to moderate elevations. These small streams of the Mid-Atlantic occur on steep slopes at low to moderate elevations in watersheds less than 39 square miles (101 square kilometers) in size. The cool fast moving water has high water clarity and is well oxygenated. High-gradient instream habitats are dominated by riffles and cascade and step-pool systems. Channels are usually narrowly confined, high-gradient, and surrounded by upland forests. Bed materials often consist of bedrock, boulders, cobbles, and coarse gravel. The predominant source of energy to the stream is terrestrial leaf litter or organic matter. Cool water temperatures in these streams means the fish community will contain a higher proportion of cool and warm water species relative to coldwater species. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

<u>Pennsylvania Aquatic Community Classification Crosswalk</u>

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Coolwater Community 1
- Ohio-Great Lakes Basins Fish Coolwater Stream Community

SGCN Associated with this Habitat

22 unique occurrences or observations of 15 SGCN were associated with the High Gradient, Cool, Headwaters and Creeks habitat. The following SGCN had their Primary Habitat Association with this habitat:

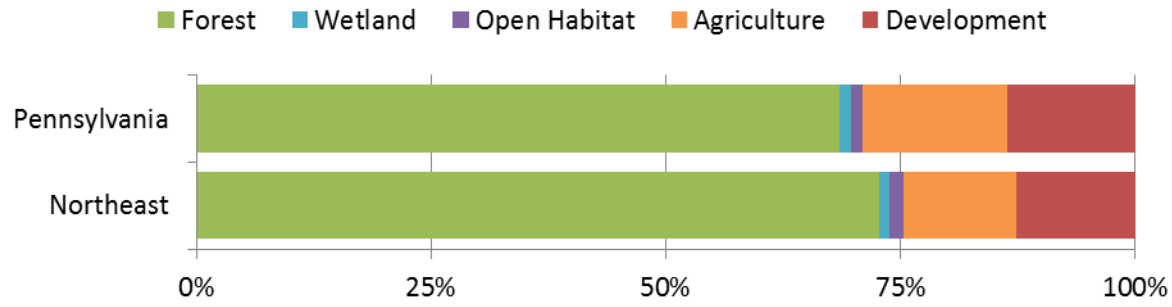
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Northern redbelly dace (*Chrosomus eos*)	Sluggish current in small springs and streams, headwater wetlands, beaver ponds.
Odonates	Taper-tailed darner (*Gomphaeschna antilope*)	

The following SGCN had their Secondary Habitat Association with this habitat:

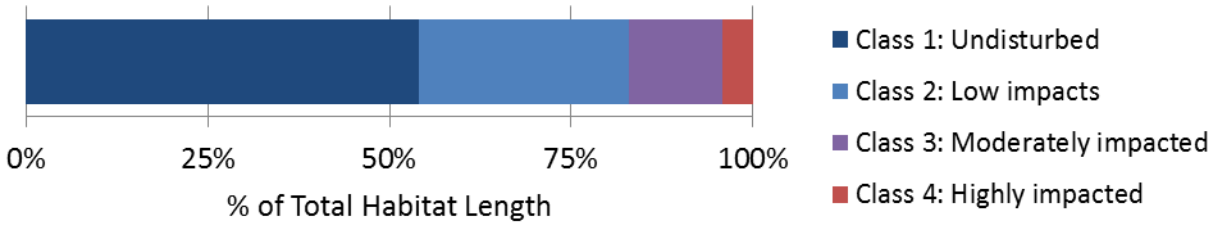
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Brook stickleback (*Culaea inconstans*)	Inhabits clear, cool waters of lakes, ponds, sluggish stream and river sections, spring runs, wetlands, and bogs. Prefers heavily vegetated areas with sand, muck, organic debris, and gravel substrates, but sometimes occurs near structure like stumps/root

Condition metrics

Approximately 11.6% of the 100m riparian buffer for the High Gradient, Cool, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 88.4% unsecured. Compared to the entire Northeast region, Pennsylvania has about 1% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

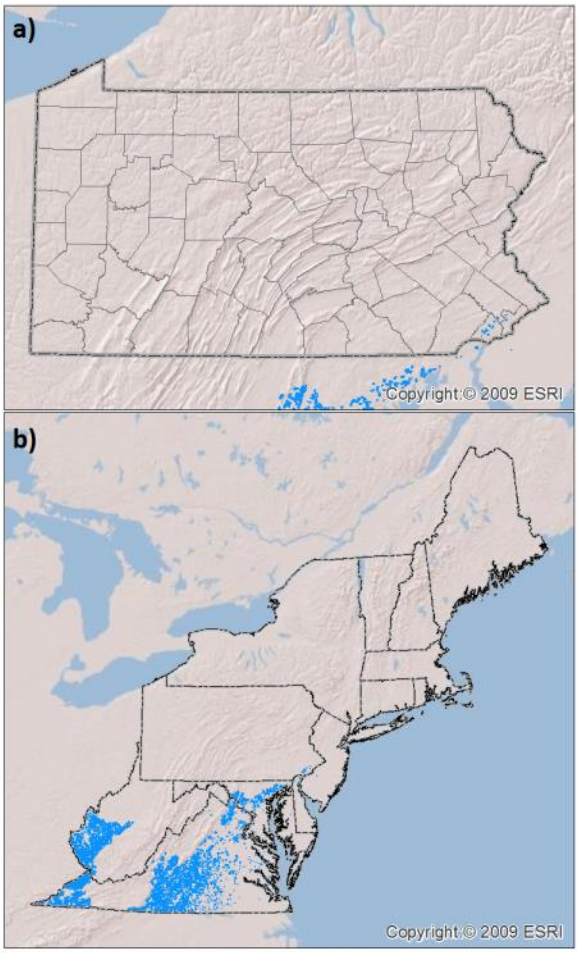


The mean Landscape Context Index (LCI) for the High Gradient, Cool, Headwaters and Creeks habitat is 80.4 (range 0-329.5) out of the maximum value of 400. This is higher than the average for the northeast,

indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

High Gradient, Warm, Headwaters and Creeks

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 3 miles;
Northeast: 2,681 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes warm, fast-moving, headwaters and creeks of steeper slopes at low-elevation. These small streams of the Mid-Atlantic region occur on steep slopes at low to moderate elevations in watersheds less than 39 square miles (101 square kilometers) in size. The warm fast-moving water has high water clarity and is well oxygenated. High-gradient instream habitats are dominated by riffles and cascade and step-pool systems. Channels are usually narrowly confined, high gradient, and surrounded by upland forests. Bed materials often consist of bedrock, boulders, cobbles, and coarse gravel. The predominant source of energy to the stream is terrestrial leaf litter or organic matter. Warm water temperatures in these streams means the fish community will contain a higher proportion of warmwater species relative to coolwater species. These systems are unlikely to support any resident coldwater species. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

<u>Pennsylvania Aquatic Community Classification Crosswalk</u>

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

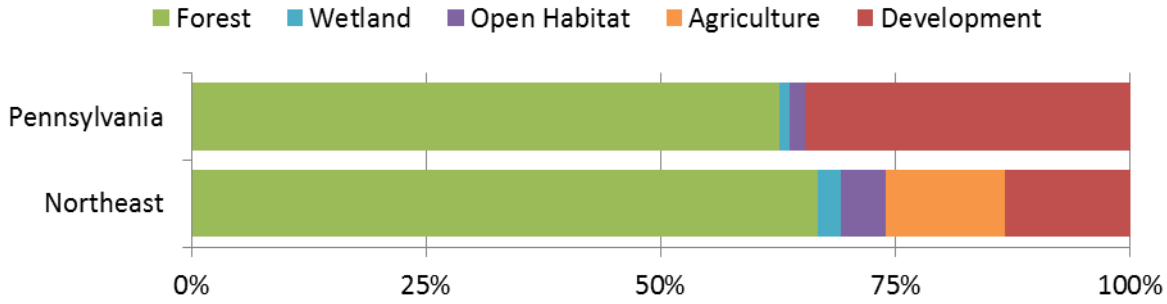
- None identified

SGCN Associated with this Habitat

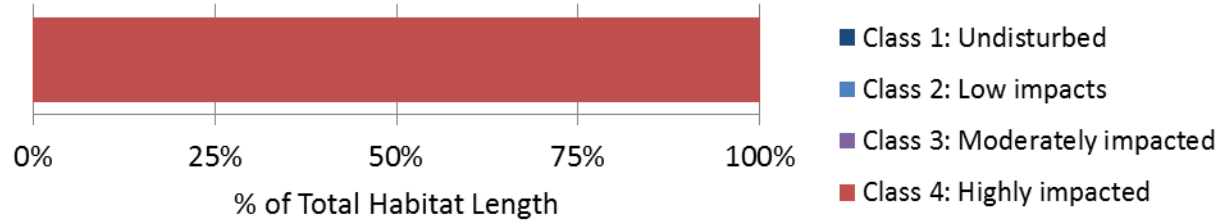
No occurrences or observations of SGNC overlapped with the High Gradient, Warm, Headwaters and Creeks habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 0.2% of the 100m riparian buffer for the High Gradient, Warm, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 99.8% unsecured. Compared to the entire Northeast region, Pennsylvania has about 1% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



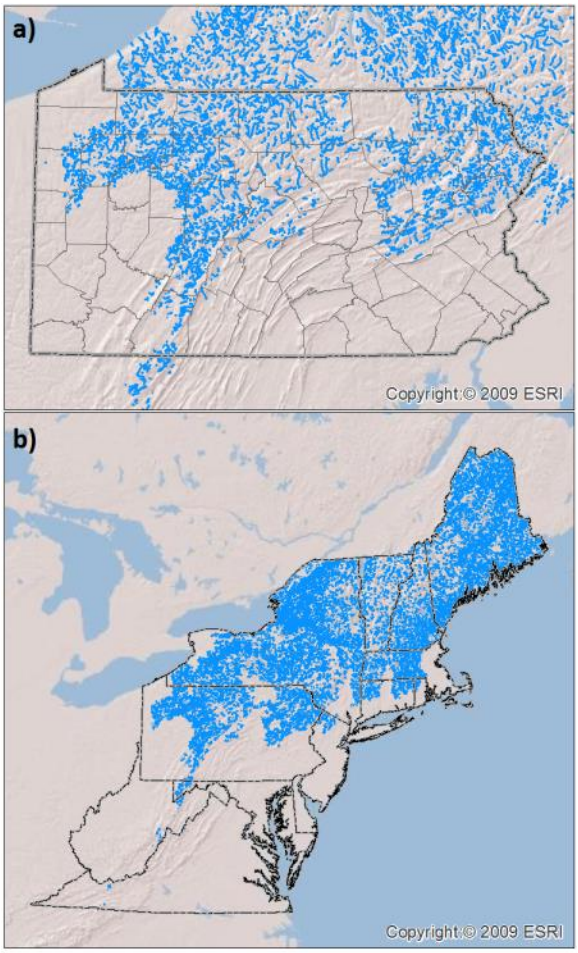
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the High Gradient, Warm, Headwaters and Creeks habitat is 219.8 (range 204.5-243.2) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Moderate Gradient, Cold, Headwaters and Creeks

Macrogroup: *Headwaters and Creeks*
Length: Pennsylvania: 5,493 miles;
Northeast: 32,073 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes cold, moderately fast-moving, headwaters and creeks of hills and gentle slopes. These small streams of northern regions or high elevations, occur on hills and slopes at moderate to high elevations in watersheds less than 39 square miles (101 square kilometers) in size. They have cold moderately fast-moving waters water with good oxygenation. Instream habitats are dominated by riffle-pool development with low sinuosity, moderately entrenchment, and moderately narrow valleys. They have substrates dominated by cobble, gravel, and sand with occasional small patches of boulders. The predominant source of energy to the stream is terrestrial leaf litter or organic matter. Permanent cold water temperatures in these streams means coldwater fish species, such as brook trout, likely represent over half of the fish community. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification (Walsh et. al. 2007) Types are typically contained within this habitat:

- Atlantic Basin Fish Coldwater Community
- Ohio-Great Lakes Basins Fish Coldwater Community

SGCN Associated with this Habitat

88 unique occurrences or observations of 29 SGCN were associated with the Moderate Gradient, Cold, Headwaters and Creeks habitat. The following SGCN had their Primary Habitat Association with this habitat:

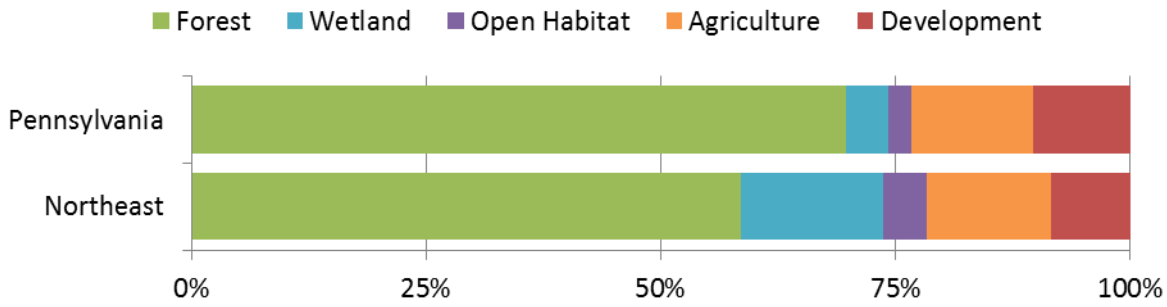
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Burbot (*Lota lota*)	clear cold creeks of moderate gradient that are well oxygenated
Odonates	Superb jewelwing (*Calopteryx amata*)	
Odonates	Sable clubtail (*Gomphus rogersi*)	
Odonates	Ski-tailed emerald (*Somatochlora elongata*)	

The following SGCN had their Secondary Habitat Association with this habitat:

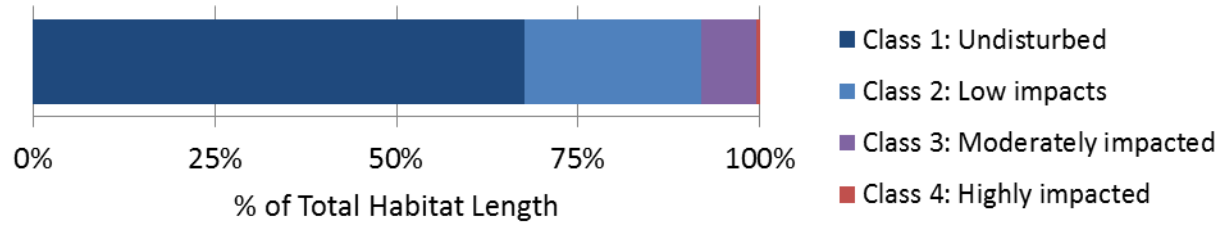
Taxa Group	SGCN	Specific Habitat Requirements
Odonates	Maine snaketail (*Ophiogomphus mainensis*)	

Condition metrics

Approximately 21.1% of the 100m riparian buffer for the Moderate Gradient, Cold, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 78.9% unsecured. Compared to the entire Northeast region, Pennsylvania has about 3% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



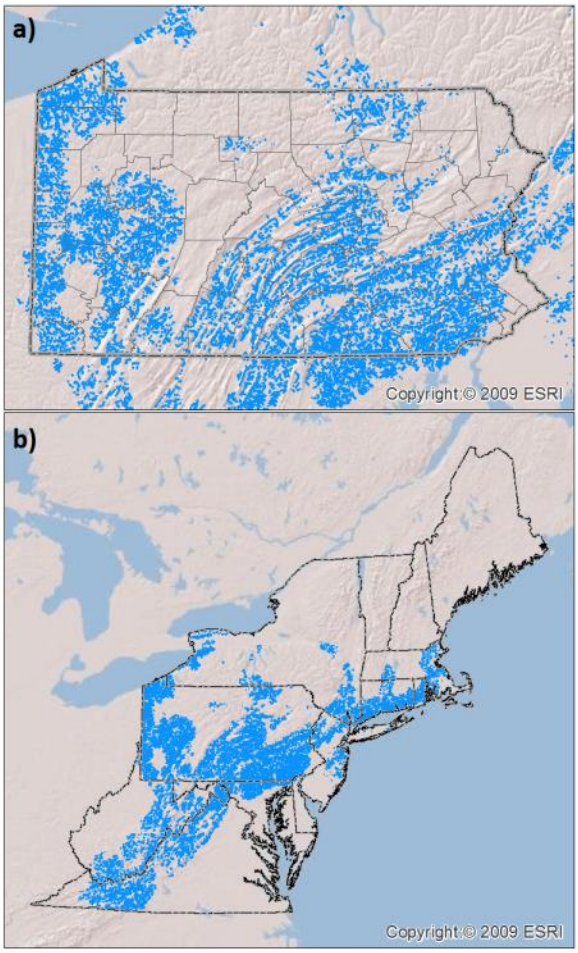
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Moderate Gradient, Cold, Headwaters and Creeks habitat is 53.5 (range 0-311) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Moderate Gradient, Cool, Headwaters and Creeks

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 10,080 miles;
Northeast: 21,323 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Cool, moderately fast-moving, headwaters and creeks of low elevation hills and gentle slopes. These small streams of the Southern New England and the Mid-Atlantic occur on hills and slopes at low to moderate elevations in watersheds less than 39 square miles (101 square kilometers) in size. They have cool moderately fast-moving waters water with good oxygenation. Instream habitats are dominated by riffle-pool development with low sinuosity, moderately entrenchment, and moderately narrow valleys. They have substrates dominated by cobble, gravel, and sand with occasional small patches of boulders. The predominant source of energy to the stream is terrestrial leaf litter or organic matter. Cool water temperatures in these streams means the fish community will contain a higher proportion of cool and warm water species relative to coldwater species. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

<u>Pennsylvania Aquatic Community Classification Crosswalk</u>

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Coolwater Community
- Ohio-Great Lakes Basins Fish Coolwater Stream Community

SGCN Associated with this Habitat

75 unique occurrences or observations of 32 SGCN were associated with the Moderate Gradient, Cool, Headwaters and Creeks habitat. The following SGCN had their Primary Habitat Association with this habitat:

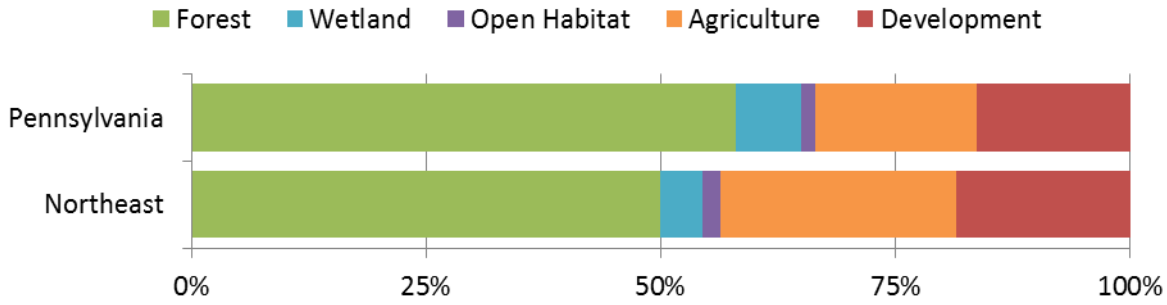
Taxa Group	SGCN	Specific Habitat Requirements
Crayfish	Spinycheek crayfish (*Orconectes limosus*)	
Fish	Southern redbelly dace (*Chrosomus erythrogaster*)	Clear, cool, small to medium-sized streams w/quiet pools and slow runs; spring runs. Occasionally in lakes & swamps in PA.
Fish	Northern brook Lamprey (*Ichthyomyzon fossor*)	Small-medium sized streams, usually in moderately warm waters. Substrates include sand, gravel, mud, and silt
Fish	Least brook lamprey (*Lampetra aepyptera*)	Creeks with rocky, gravelly, and/or sandy riffles, along with significant deposits of mud, muck, sand, and detritus associated with sluggish pools, edges, backwaters, and/or eddies.
Fish	Allegheny pearl dace (*Manduca jasminearum*)	
Fish	Hornyhead chub (*Nocomis biguttatus*)	Clear, small to medium-sized streams with clean gravel, rubble, and sandy substrates.
Fish	Chesapeake logperch (*Percina bimaculata*)	Small to large streams, rivers, and reservoirs with areas of sand or gravel for spawning
Fish	Brook trout (*Salvelinus fontinalis*)	Clear mountain streams at elevations > 1,500 to 2,000 ft. with high quality, moderate flow and bordered by deeply undercut stream banks, exposed tree root balls, rock, brush piles, and greater than 75% ground cover.
Odonates	Skillet clubtail (*Gomphus ventricosus*)	
Snails	Sprite elimia (*Pleurocera proxima*)	

The following SGCN had their Secondary Habitat Association with this habitat:

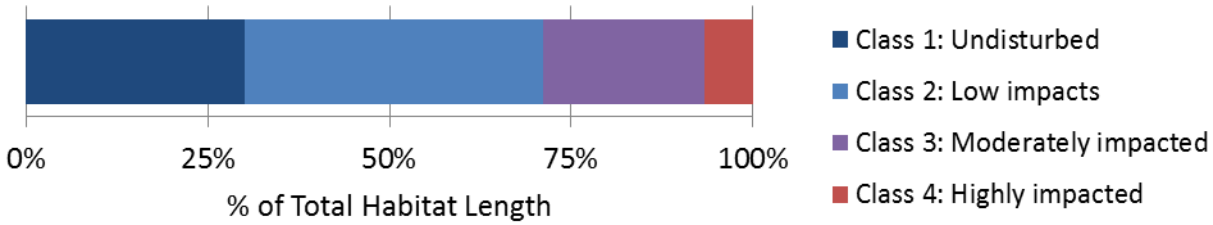
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Burbot (*Lota lota*)	clear cold creeks of moderate gradient that are well oxygenated
Fish	Hornyhead chub (*Nocomis biguttatus*)	Clear, small to medium-sized streams with clean gravel, rubble, and sandy substrates.
Mussels	Round hickorynut (*Obovaria subrotunda*)	Large Rivers.
Mussels	Rainbow mussel (*Villosa iris*)	
Odonates	Superb jewelwing (*Calopteryx amata*)	
Odonates	Riverine clubtail (*Stylurus amnicola*)	

Condition metrics

Approximately 5.8% of the 100m riparian buffer for the Moderate Gradient, Cool, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 94.2% unsecured. Compared to the entire Northeast region, Pennsylvania has about 19% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



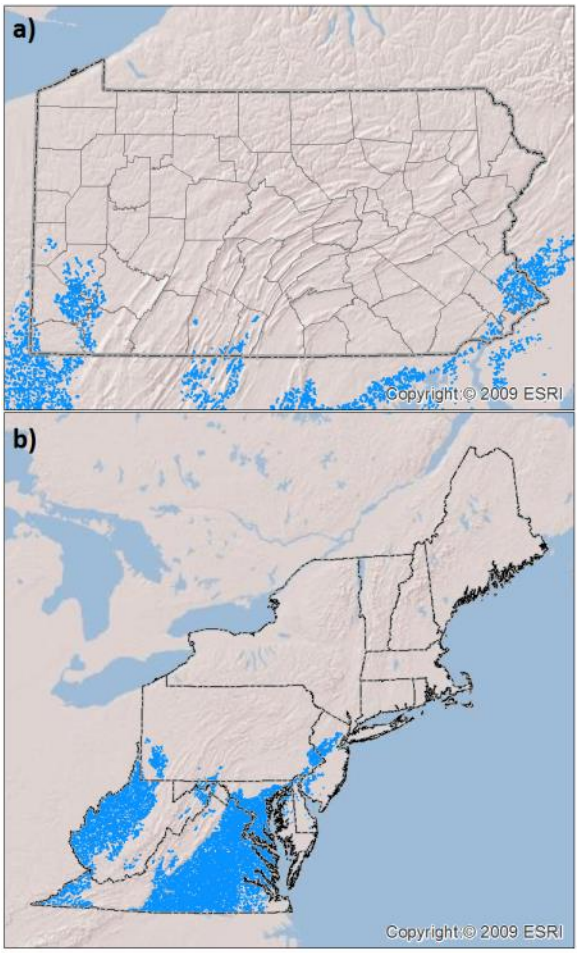
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Moderate Gradient, Cool, Headwaters and Creeks habitat is 111.7 (range 0-346.2) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Moderate Gradient, Warm, Headwaters and Creeks

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 784 miles;
Northeast: 16,894 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes warm, moderately fast-moving, headwaters and creeks of low elevation hills and gentle slopes. These small streams of the Mid-Atlantic region occur on hills and slopes at low to moderate elevations in watersheds less than 39 square miles (101 square kilometers) in size. They have warm, moderately fast moving water with good oxygenation. Instream habitats are dominated by riffle-pool development with low sinuosity, moderately entrenchment, and moderately narrow valleys. They have substrates dominated by cobble, gravel, and sand with occasional small patches of boulder. The predominant source of energy to the stream is terrestrial leaf litter or organic matter. Warm water temperatures in these streams means the fish community will contain a higher proportion of warmwater species relative to coolwater species. These systems are unlikely to support any resident coldwater species. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

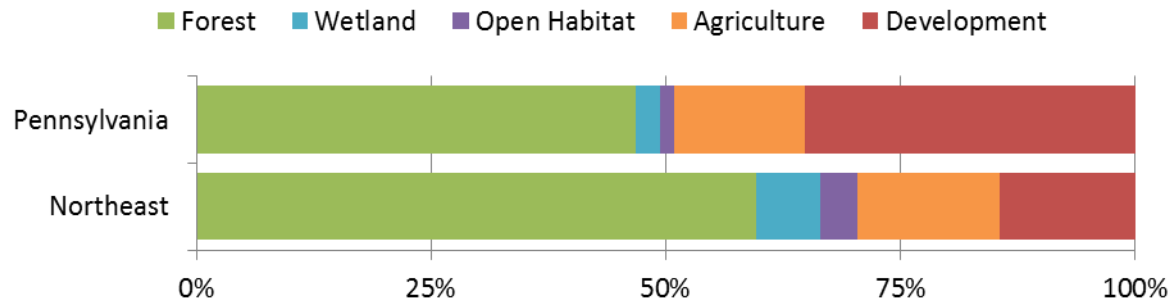
- Atlantic Basin Fish Warmwater Community 1
- Ohio-Great Lakes Basins Fish Warmwater Stream Community

SGCN Associated with this Habitat

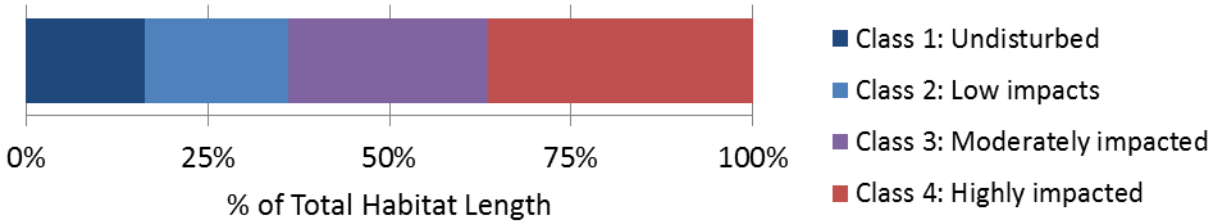
Two unique occurrences or observations of two SGCN were associated with the Moderate Gradient, Warm, Headwaters and Creeks habitat. No SGCN had their Primary Habitat or Secondary Habitat Association with this habitat.

Condition metrics

Approximately 5.4% of the 100m riparian buffer for the Moderate Gradient, Warm, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 94.6% unsecured. Compared to the entire Northeast region, Pennsylvania has about 1% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:

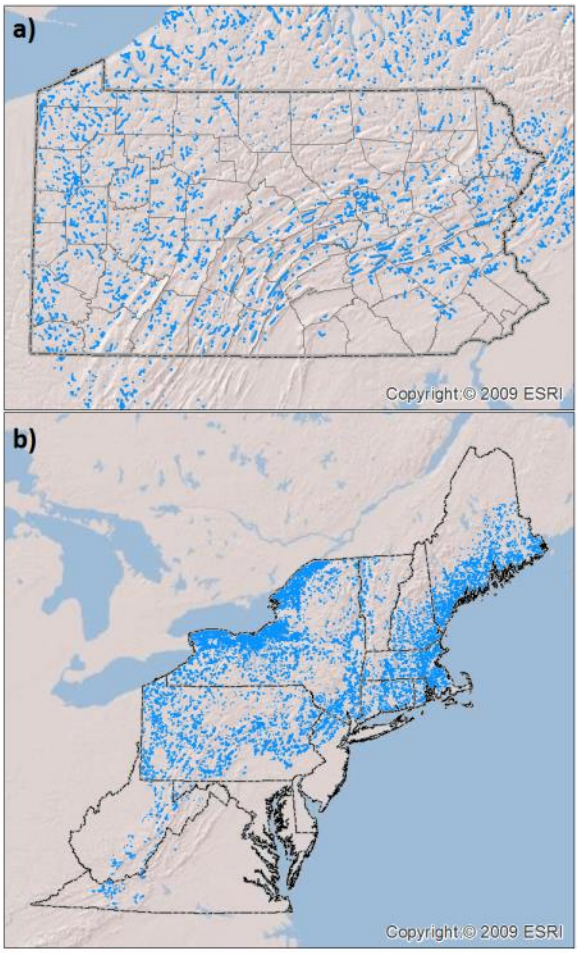


The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Moderate Gradient, Warm, Headwaters and Creeks habitat is 144 (range 11.7-350.1) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Low Gradient, Cool, Headwaters and Creeks



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 3,163 miles;
Northeast: 16,579 miles

Cool, slow-moving, headwaters and creeks of low-moderate elevation flat, marshy settings. These small streams of moderate to low elevations occur on flats or very gentle slopes in watersheds less than 39 square miles (101 square kilometers) in size. The cool slow-moving waters may have high turbidity and be somewhat poorly oxygenated. Instream habitats are dominated by glide-pool and ripple-dune systems with runs interspersed by pools and a few short or no distinct riffles. Bed materials are predominantly sands, silt, and only isolated amounts of gravel. These low-gradient streams may have high sinuosity but are usually only slightly entrenched with adjacent floodplain and riparian wetland ecosystems. Cool water temperatures in these streams means the fish community contains a higher proportion of cool and warm water species relative to coldwater species. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers) and have an average bankfull width of 32 feet (10 meters).

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Coolwater Community 1
- Ohio-Great Lakes Basins Fish Coolwater Stream Community

SGCN Associated with this Habitat

93 unique occurrences or observations of 46 SGCN were associated with the Low Gradient, Cool, Headwaters and Creeks habitat. The following SGCN had their Primary Habitat Association with this habitat:

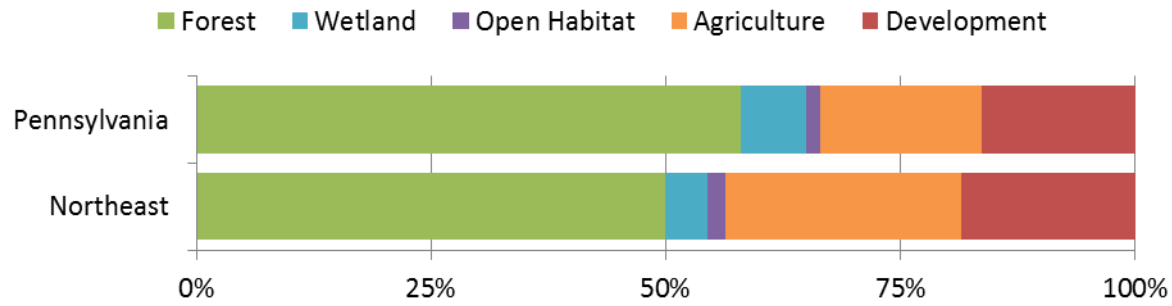
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Brook stickleback (*Culaea inconstans*)	Inhabits clear, cool waters of lakes, ponds, sluggish stream and river sections, spring runs, wetlands, and bogs. Prefers heavily vegetated areas with sand, muck, organic debris, and gravel substrates, but sometimes occurs near structure like stumps/root.
Fish	Redfin shiner (*Lythrurus umbratilis*)	Warm-water creeks and small rivers with a mud and sand bottom in quiet water
Fish	Bridle shiner (*Notropis bifrenatus*)	Swamps and sluggish sections of clear, warmwater creeks and rivers with abundant coarse woody debris and aquatic vegetation
Fish	River shiner (*Notropis blennius*)	Large rivers and river lakes, where it prefers channels, eddies, sloughs, and sandbars; affinity for sand and gravel substrates, but occurs over a variety of substrates
Fish	Ironcolor shiner (*Notropis chalybaeus*)	Swamps and sluggish sections of clear, warmwater creeks with abundant coarse woody debris and aquatic vegetation.
Fish	Central mudminnow (*Umbra limi*)	Prefers lakes, ponds, swamps, marshes, and sluggish or ponded sections of streams with substrates of mud, muck, and organic debris. It is most frequent in areas with dense vegetation.
Mussels	Cylindrical papershell (*Anodontoides ferussacianus*)	
Mussels	White heelsplitter (*Lasmigona complanata*)	
Mussels	Eastern pearlshell (*Margariscus margarita*)	Pools and sluggish current in cool and cold spring runs and creeks; occasionally ponds.
Odonates	Smoky rubyspot (*Hetaerina titia*)	

The following SGCN had their Secondary Habitat Association with this habitat:

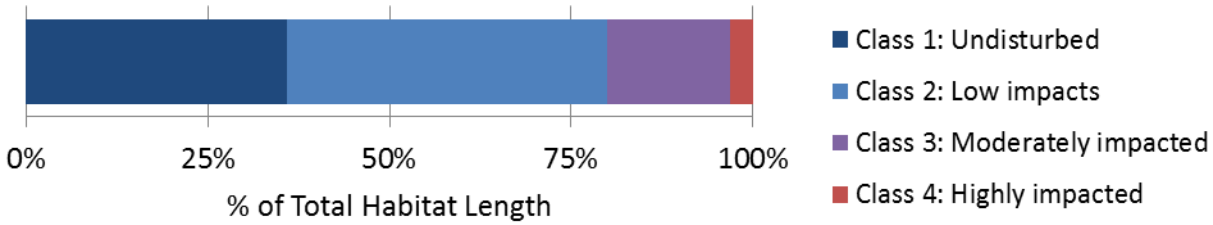
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Least brook lamprey (*Lampetra aepyptera*)	Creeks with rocky, gravelly, and/or sandy riffles, along with significant deposits of mud, muck, sand, and detritus associated with sluggish pools, edges, backwaters, and/or eddies.
Mussels	Green floater (*Lasmigona subviridis*)	
Odonates	River jewelwing (*Calopteryx aequabilis*)	
Odonates	Spine-crowned clubtail (*Gomphus abbreviatus*)	
Odonates	Sable clubtail (*Gomphus rogersi*)	
Odonates	Uhler's sundragon (*Helocordulia uhleri*)	

Condition metrics

Approximately 11.9% of the 100m riparian buffer for the Low Gradient, Cool, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 88.1% unsecured. Compared to the entire Northeast region, Pennsylvania has about 2% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



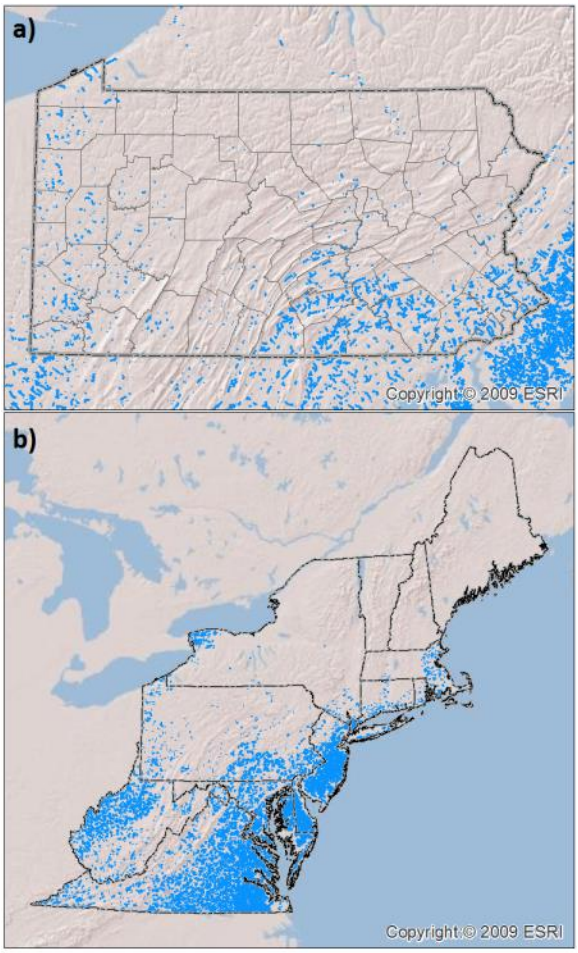
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Low Gradient, Cool, Headwaters and Creeks habitat is 87.7 (range 0-324.6) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Low Gradient, Warm, Headwaters and Creeks

Macrogroup: Headwaters and Creeks
Length: Pennsylvania: 1,637 miles;
Northeast: 17,704 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes warm, slow-moving, headwaters and creeks of low-elevation flat, marshy settings. These small streams of the Mid-Atlantic region occur at moderate to low elevations on flats or very gentle slopes in watersheds less than 39 square miles (101 square kilometers) in size. The warm slow-moving waters may have high turbidity and be somewhat poorly oxygenated. Instream habitats are dominated by glide-pool and ripple-dune systems with runs interspersed by pools and a few short or no distinct riffles. Bed materials are predominantly sands, silt, and only isolated amounts of gravel. Some examples flow through wetlands and these segments may be dominated by silt, muck, peat, marl deposits, organic matter, and woody or leafy debris. These low-gradient streams may have high sinuosity, but are usually only slightly entrenched with adjacent floodplain and riparian wetland ecosystems. Warm water temperatures in these streams means the fish community will contain a higher proportion of warmwater species relative to coolwater species, and are unlikely to support any resident coldwater species. Additional variation in the stream biological community is associated with acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota. The habitat can be further subdivided into headwaters that drain watersheds less than four square miles (10 square kilometers), and creeks that include larger streams with watersheds up to 39 square miles (101 square kilometers).

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Warmwater Community 1
- Ohio-Great Lakes Basins Fish Warmwater Stream Community

SGCN Associated with this Habitat

51 unique occurrences or observations of 36 SGCN were associated with the Low Gradient, Warm, Headwaters and Creeks habitat. The following SGCN had their Primary Habitat Association with this habitat:

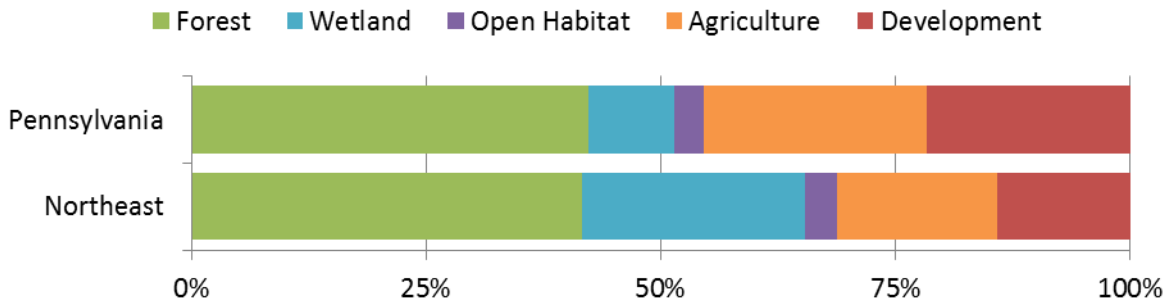
Taxa Group	SGCN	Specific Habitat Requirements
Caddisflies	Vannote's cheumatopsyche caddisfly (*Cheumatopsyche vannotei*)	
Mussels	Pistolgrip mussel (*Quadrula verrucosa*)	Medium Rivers.
Odonates	Splendid clubtail (*Gomphus lineatifrons*)	
Odonates	Appalachian snaketail (*Ophiogomphus incurvatus incurvatus*)	

The following SGCN had their Secondary Habitat Association with this habitat:

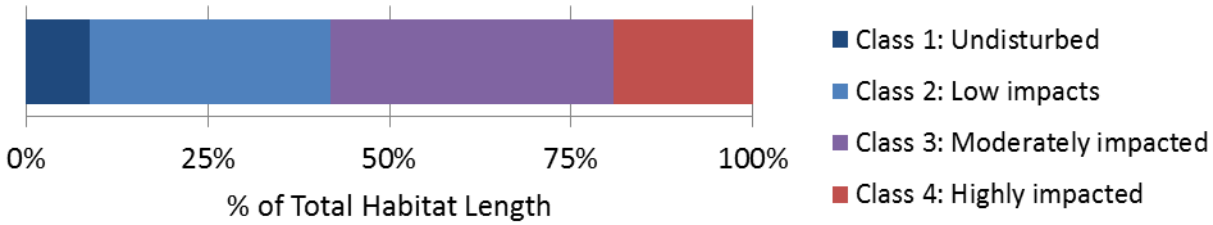
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Southern redbelly dace (*Chrosomus erythrogaster*)	Clear, cool, small to medium-sized streams w/quiet pools and slow runs; spring runs. Occasionally in lakes & swamps in PA.
Mussels	Clubshell (*Pleurobema clava*)	Medium Rivers

Condition metrics

Approximately 8.6% of the 100m riparian buffer for the Low Gradient, Warm, Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 91.4% unsecured. Compared to the entire Northeast region, Pennsylvania has about 1% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

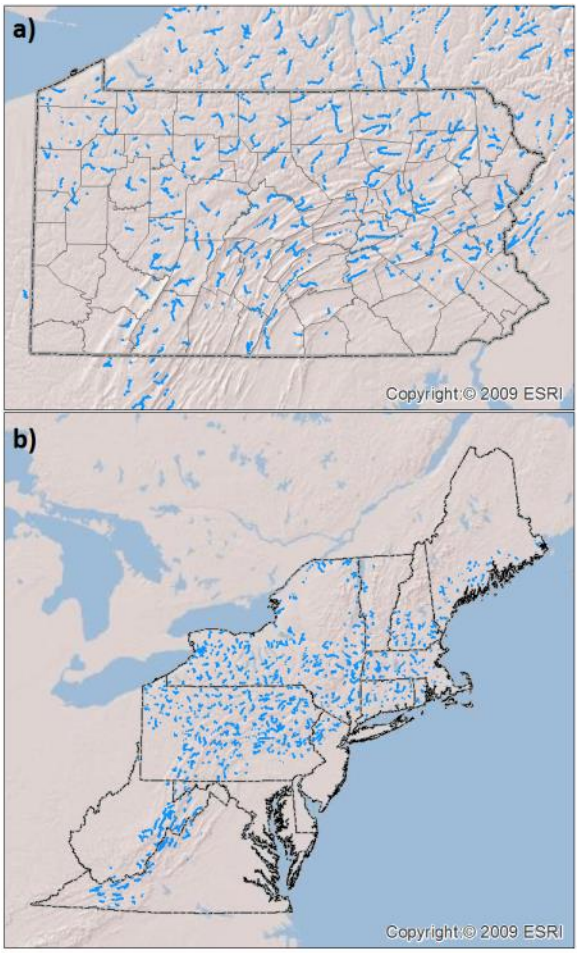


The mean Landscape Context Index (LCI) for the Low Gradient, Warm, Headwaters and Creeks habitat is 135.1 (range 0.5-360.5) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Moderate Gradient, Cool, Small River

Macrogroup: Small River
Length: Pennsylvania: 2,115 miles;
Northeast: 6,343 miles

Cool, moderately fast-moving, small rivers at moderate to low elevations in the north and at higher elevations in the south. These small rivers drain watersheds up to 200 square miles (518 square kilometers) and have an average bankfull width of 62 feet. The moderately fast-moving waters are dominated by a well-defined pattern of alternating pools, riffles, and runs. Their substrate is composed of sand, gravel, and cobble, and they often have high water clarity and are well oxygenated. These moderate gradient rivers exhibit moderate to low sinuosity with moderately narrow valleys and adjacent riverside upland communities. Cool water temperatures in these rivers means the fish community will support few permanent coldwater species and will contain a higher proportion of cool and warm water species relative to coldwater species. Additional variation in the biological community is expected in and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Coolwater Community 2
- Ohio-Great Lakes Basins Fish Coolwater Stream Community

SGCN Associated with this Habitat

127 unique occurrences or observations of 45 SGCN were associated with the Moderate Gradient, Cool, Small River habitat. The following SGCN had their Primary Habitat Association with this habitat:

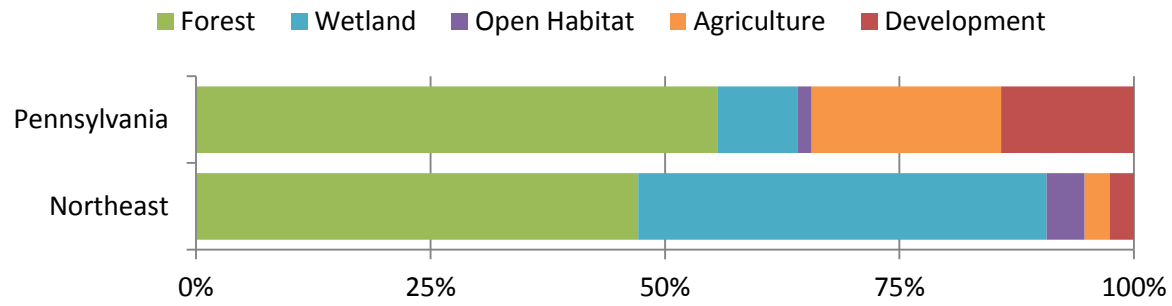
Taxa Group	SGCN	Specific Habitat Requirements
Caddisflies	Helma's cheumatopsyche caddisfly (*Cheumatopsyche helma*)	
Fish	Ohio lamprey (*Ichthyomyzon bdellium*)	
Fish	Mountain brook lamprey (*Ichthyomyzon greeleyi*)	Clear, small-medium sized creeks, but occasionally found in larger waters.
Mussels	Creek heelsplitter (*Lasmigona compressa*)	
Odonates	Uhler's sundragon (*Helocordulia uhleri*)	
Odonates	Riffle snaketail (*Ophiogomphus carolus*)	
Odonates	Maine snaketail (*Ophiogomphus mainensis*)	
Reptile	Wood turtle (*Glyptemys insculpta*)	Large streams and associated riparian and forested habitats (edge habitats) with thick cover, sunlight, and food availability. Nesting habitat is open-canopy riparian thickets, well-drained soils with sparse vegetation.

The following SGCN had their Secondary Habitat Association with this habitat:

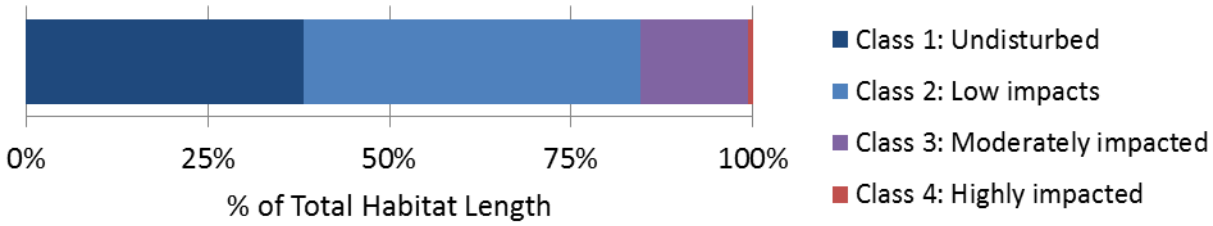
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Burbot (*Lota lota*)	Clear cold creeks of moderate gradient that are well oxygenated and deep cold lakes.
Fish	Hornyhead chub (*Nocomis biguttatus*)	Clear, small to medium-sized streams with clean gravel, rubble, and sandy substrates.
Mussels	Round Hickorynut (*Obovaria subrotunda*)	Large Rivers
Mussels	Rainbow mussel (*Villosa iris*)	
Odonates	Superb jewelwing (*Calopteryx amata*)	
Odonates	Riverine clubtail (*Stylurus amnicola*)	

Condition metrics

Approximately 13.6% of the 100m riparian buffer for the Moderate Gradient, Cool, Small River habitat has been secured against conversion to other uses, leaving about 86.4% unsecured. Compared to the entire Northeast region, Pennsylvania has about 5% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

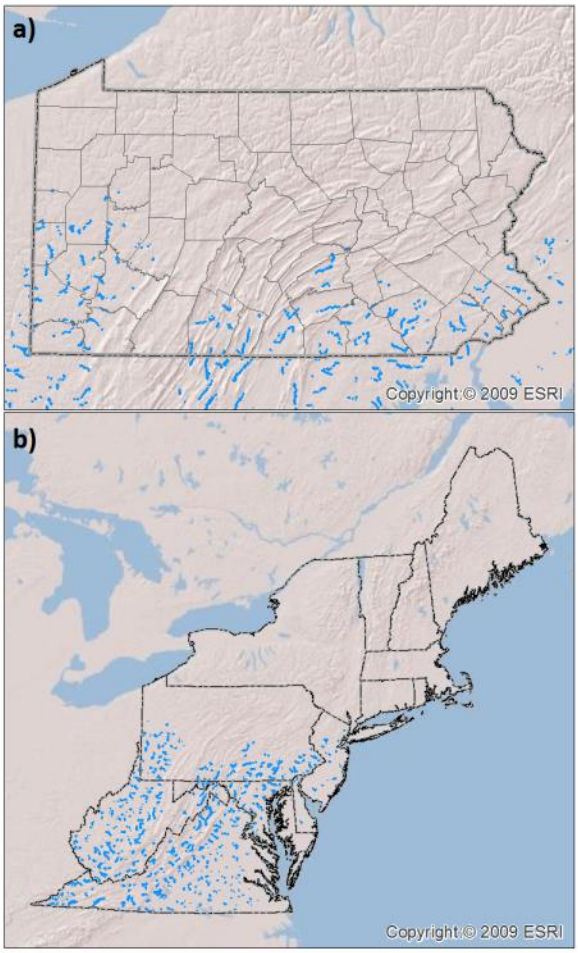


The mean Landscape Context Index (LCI) for the Moderate Gradient, Cool, Small River habitat is 73.8 (range 0-367) out of the maximum value of 400. This is lower than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively better condition than similar habitat in the region.

Moderate Gradient, Warm, Small River

Macrogroup: Small River
Length: Pennsylvania: 773 miles;
Northeast: 3,664 miles

This habitat describes warm, moderately fast-moving, small rivers of the southern Mid-Atlantic region. These small rivers of the south drain watersheds up to 200 square miles (518 square kilometers) and have an average bankfull width of 69 feet. The moderately fast-moving waters are dominated by a well-defined pattern of alternating pools, riffles, and runs. Their substrate is composed of sand, gravel, and cobble, and they often have high water clarity and are well oxygenated. These moderate gradient rivers exhibit moderate to low sinuosity with moderately narrow valleys and adjacent riverside upland communities. Warm water temperatures in these rivers means the fish community will contain a higher proportion of warmwater species relative to coolwater species. These systems are unlikely to support any resident coldwater species. Additional variation in the biological community is expected in acidic, calcareous, and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification (Walsh et. al. 2007) Types are typically contained within this habitat:

- Atlantic Basin Fish Warmwater Community 1
- Atlantic Basin Fish Warmwater Community 2
- Ohio-Great Lakes Basins Fish Warmwater Stream Community
- Ohio-Great Lakes Basins Mussels Fluted Shell Mussel Community
- Susquehanna – Potomac River Basins Mussels Eastern Elliptio Community

SGCN Associated with this Habitat

28 unique occurrences or observations of 18 SGCN were associated with the Moderate Gradient, Warm, Small River habitat. The following SGCN had their Primary Habitat Association with this habitat:

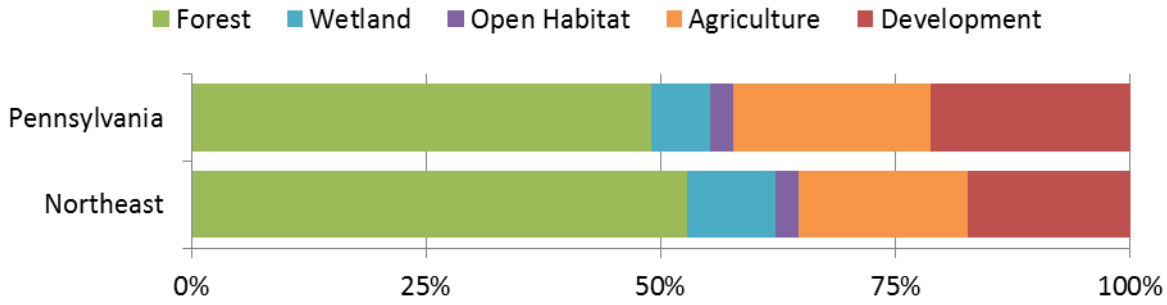
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Threespine stickleback (*Gasterosteus aculeatus*)	Shallow, vegetated areas of tidal pools, creeks, marshes, estuaries, shore waters, and freshwater lakes.

The following SGCN had their Secondary Habitat Association with this habitat:

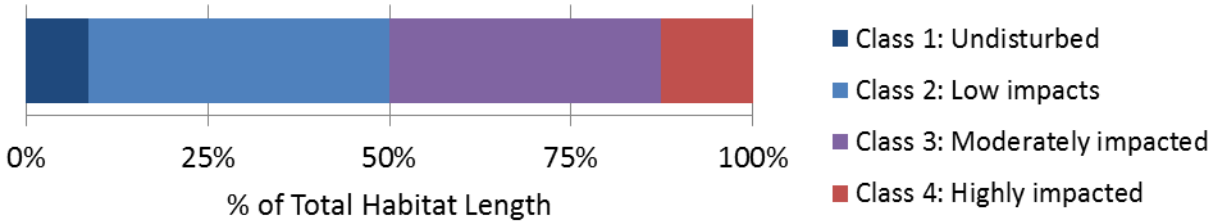
Taxa Group	SGCN	Specific Habitat Requirements
Mussels	Salamander mussel (*Simpsonaias ambigua*)	Large Rivers, with shelter rock.

Condition metrics

Approximately 7.1% of the 100m riparian buffer for the Moderate Gradient, Warm, Small River habitat has been secured against conversion to other uses, leaving about 92.9% unsecured. Compared to the entire Northeast region, Pennsylvania has about 2% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

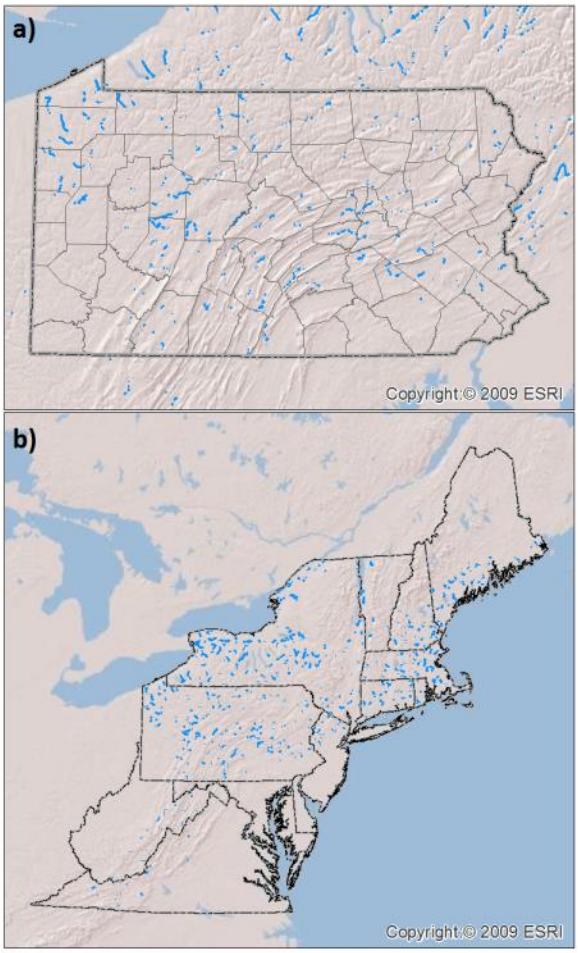


The mean Landscape Context Index (LCI) for the Moderate Gradient, Warm, Small River habitat is 124.6 (range 7.5-325.7) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Low Gradient, Cool, Small River

Macrogroup: Small River
Length: Pennsylvania: 594 miles;
Northeast: 2,416 miles

Cool, slow-moving, small rivers of flat, marshy settings at low to moderate elevations. These small rivers drain small watersheds of up to 200 square miles (518 square kilometers) in size and have an average bankfull width of 65 feet. The slow-moving waters are dominated by runs with interspersed pool sections and a few short or no distinct riffles. Their substrate is usually dominated by silt, sand, and fine gravel, and they may exhibit high turbidity and be somewhat poorly oxygenated. These low-gradient rivers are often described as unconfined and have moderate to high sinuosity with broader valleys. They are typically surrounded by floodplain forest, wetlands, or eroded sand or clay banks or fine sediment bars. Cool water temperatures in these rivers means the fish community will contain a higher proportion of cool and warm water species relative to coldwater species. There will be fewer habitats with cool enough temperatures to support coldwater species year round. Additional variation in the biological community is expected in and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

<u>Pennsylvania Aquatic Community Classification Crosswalk</u>

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Coolwater Community 1
- Ohio-Great Lakes Basins Fish Coolwater Stream Community

SGCN Associated with this Habitat

60 unique occurrences or observations of 34 SGCN were associated with the Low Gradient, Cool, Small River habitat. The following SGCN had their Primary Habitat Association with this habitat:

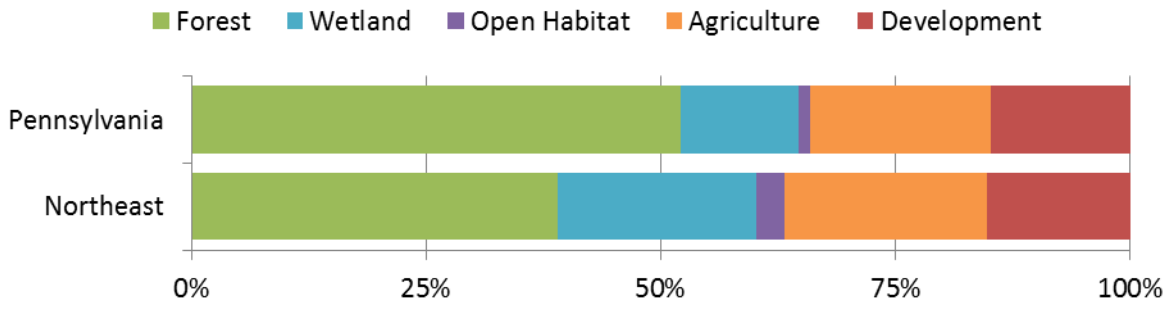
Taxa Group	SGCN	Specific Habitat Requirements
Odonates	River jewelwing (*Calopteryx aequabilis*)	

The following SGCN had their Secondary Habitat Association with this habitat:

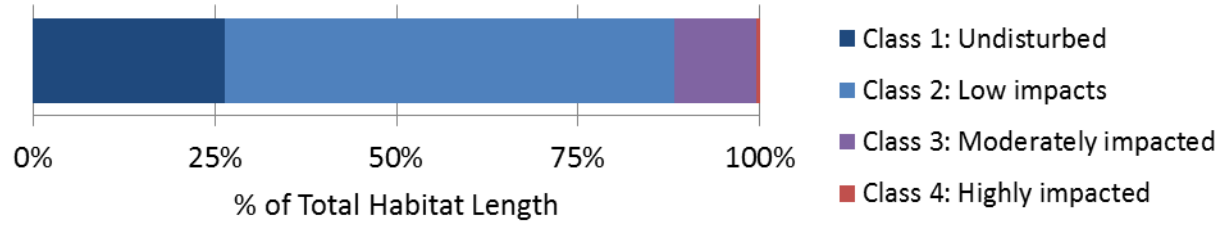
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Bowfin (*Amia calva*)	Inhabits swamps, marshes, ditches, ponds, and lakes, and sluggish sections of rivers and creeks, where it prefers areas with submerged vegetation, undercut banks, and coarse woody debris.
Mussels	Snuffbox (*Epioblasma triquetra*)	Medium Rivers
Mussels	Round pigtoe (*Pleurobema sintoxia*)	
Mussels	Rayed bean mussel (*Villosa fabalis*)	Medium Rivers.

Condition metrics

Approximately 12.2% of the 100m riparian buffer for the Low Gradient, Cool, Small River habitat has been secured against conversion to other uses, leaving about 87.8% unsecured. Compared to the entire Northeast region, Pennsylvania has about 1% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

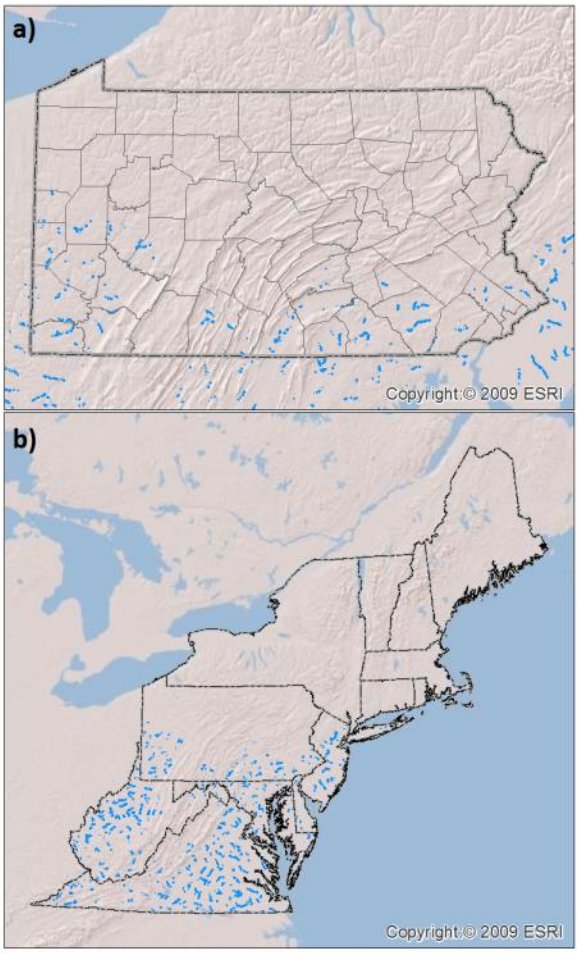


The mean Landscape Context Index (LCI) for the Low Gradient, Cool, Small River habitat is 83.2 (range 0-346.5) out of the maximum value of 400. This is lower than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively better condition than similar habitat in the region.

Low Gradient, Warm, Small River

Macrogroup: Small River
Length: Pennsylvania: 343 miles;
Northeast: 2,488 miles

This habitat describes warm, slow-moving, small rivers of flat, marshy settings at low elevations and throughout the southern Mid-Atlantic. These small rivers of southern regions drain watersheds up to 200 square miles (518 square kilometers) and have an average bankfull width of 62 feet. The slow-moving waters are dominated by runs with interspersed pool sections and a few short or no distinct riffles. Their substrate is usually dominated by silt, sand, and fine gravel, and they may exhibit high turbidity and be somewhat poorly oxygenated. These low-gradient rivers are often described as unconfined and have moderate to high sinuosity with broader valleys. They are typically surrounded by floodplain forest, wetlands, or eroded sand or clay banks or fine sediment bars. Warm water temperatures in these rivers means the fish community will contain a higher proportion of warmwater species relative to coolwater species. These systems are unlikely to support any resident coldwater species. Additional variation in the biological community is expected in and neutral geologic settings where the pH of the water will limit the distribution of certain macroinvertebrates, plants, and other aquatic biota.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Warmwater Community 1
- Ohio-Great Lakes Basins Fish Warmwater Stream Community

SGCN Associated with this Habitat

16 unique occurrences or observations of 11 SGCN were associated with the Low Gradient, Warm, Small River habitat. The following SGCN had their Primary Habitat Association with this habitat:

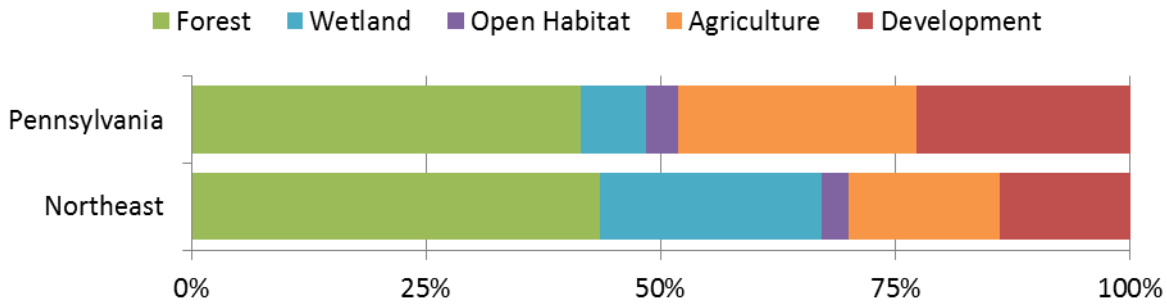
Taxa Group	SGCN	Specific Habitat Requirements
Mussels	Wabash pigtoe (*Fusconaia flava*)	

The following SGCN had their Secondary Habitat Association with this habitat:

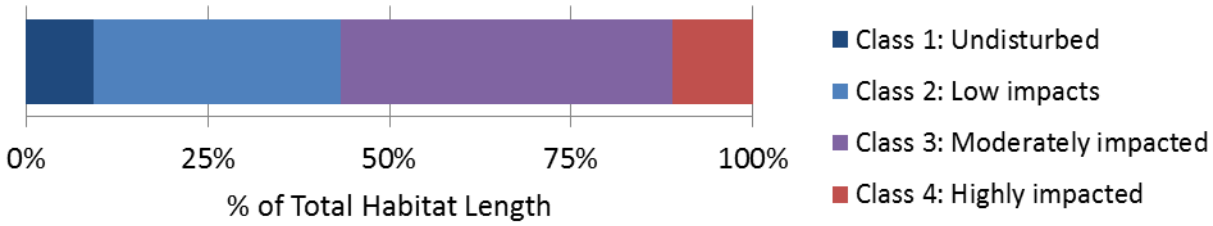
Taxa Group	SGCN	Specific Habitat Requirements
Mussels	Eastern lampmussel (*Lampsilis radiata*)	
Mussels	Pistolgrip mussel (*Quadrula verrucosa*)	Medium Rivers.

Condition metrics

Approximately 6.5% of the 100m riparian buffer for the Low Gradient, Warm, Small River habitat has been secured against conversion to other uses, leaving about 93.5% unsecured. Compared to the entire Northeast region, Pennsylvania has about 1% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



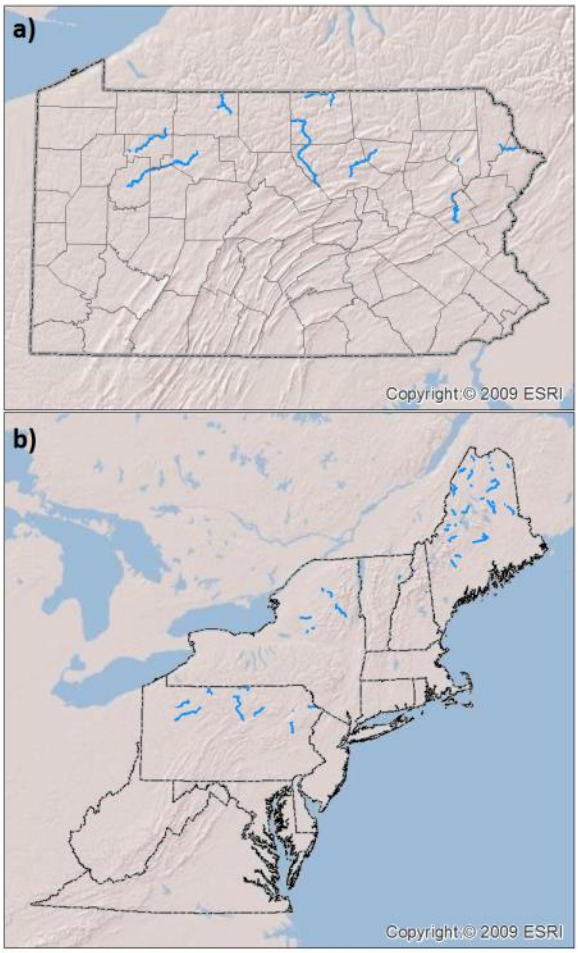
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Low Gradient, Warm, Small River habitat is 137.7 (range 26.9-317.8) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Cool, Medium River

Macrogroup: Medium River
Length: Pennsylvania: 353 miles;
Northeast: 2,661 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Cool, medium-sized rivers of the moderate elevation northern region. These medium sized rivers drain watersheds up to 1000 square miles (2590 square kilometers) in size and have an average bankfull width of 115 feet (35 meters). Slower moving, lower gradient sections of these rivers are expected to be more unconfined with higher sinuosity, broader floodplain valleys, more riparian wetlands, and lower width/depth ratios than the more moderate gradient portions. Cool water temperatures in these rivers means the fish community will support few permanent coldwater species and will contain a higher proportion of cool and warm water species relative to coldwater species. Examples of this type in Pennsylvania include the Genesee, Pine Creek, and the Clarion River.

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Warmwater Community 1
- Ohio-Great Lakes Basins Fish Warmwater Stream Community

SGCN Associated with this Habitat

54 unique occurrences or observations of 23 SGCN were associated with the Cool, Medium River habitat. The following SGCN had their Primary Habitat Association with this habitat:

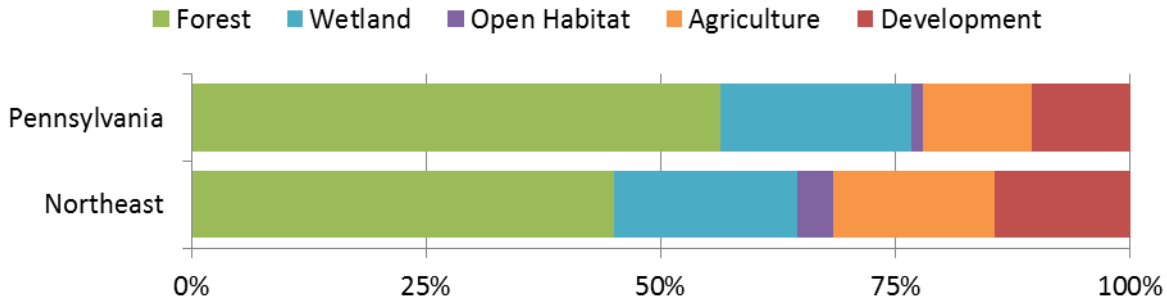
Taxa Group	SGCN	Specific Habitat Requirements
Amphibian	Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*)	Good quality, cool to cold, moderate to large streams and rivers with abundant rock cover (shale) and abundant crayfish populations.
Fish	Longnose sucker (*Catostomus catostomus*)	Casselman River drainage, small-medium cool, clear streams. (deeper pools w/ boulder-rubble substrate or a significant coarse, woody debris).
Odonates	Mustached clubtail (*Gomphus adelphus*)	
Odonates	Green-faced clubtail (*Gomphus viridifrons*)	

The following SGCN had their Secondary Habitat Association with this habitat:

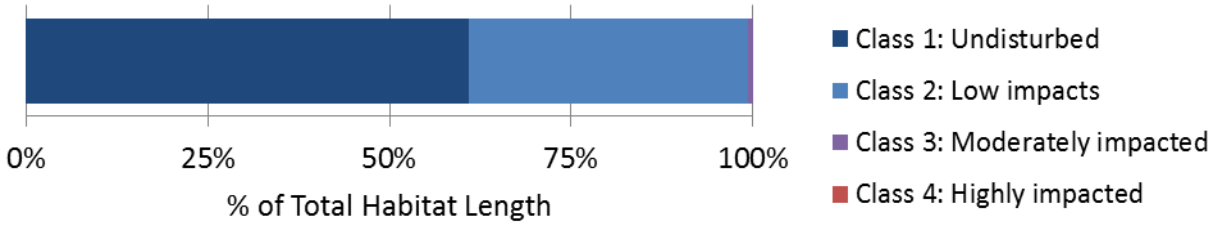
Taxa Group	SGCN	Specific Habitat Requirements
Snails	Sprite elimia (*Pleurocera proxima*)	

Condition metrics

Approximately 29.2% of the 100m riparian buffer for the Cool, Medium River habitat has been secured against conversion to other uses, leaving about 70.8% unsecured. Compared to the entire Northeast region, Pennsylvania has about 15% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

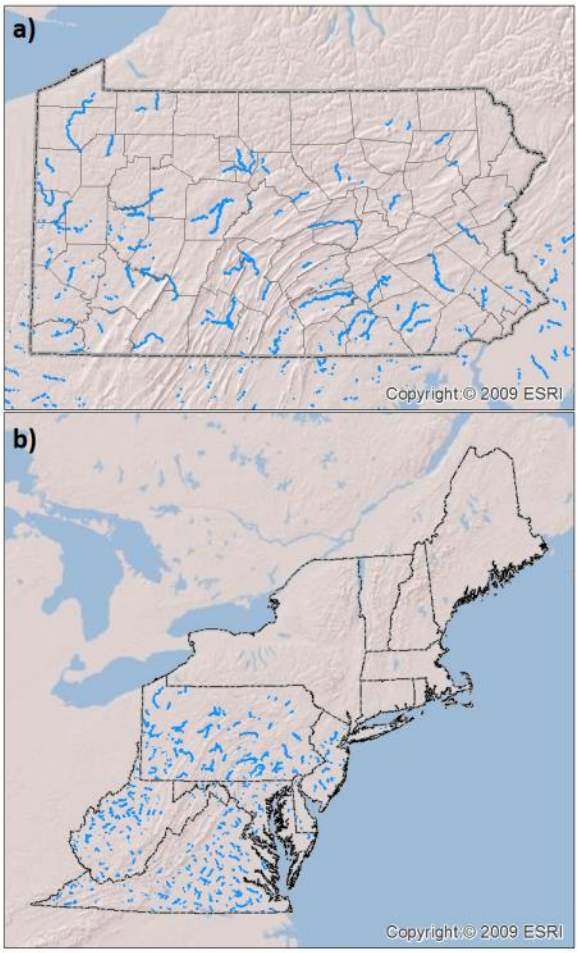


The mean Landscape Context Index (LCI) for the Cool, Medium River habitat is 41.8 (range 0-364.5) out of the maximum value of 400. This is lower than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively better condition than similar habitat in the region.

Warm, Medium River

Macrogroup: Medium River
Length: Pennsylvania: 1,245 miles;
Northeast: 4,953 miles

This habitat describes warm, medium-sized rivers of the low elevation north and of the Mid-Atlantic. These medium sized rivers drain watersheds up to 1000 square miles (2590 square kilometers) in size and have an average bankfull width of 115 feet (35 meters). Slower moving, lower gradient sections of these rivers are expected to be more unconfined with higher sinuosity, broader floodplain valleys, more riparian wetlands, and lower width/depth ratios than the more moderate gradient portions. Warm water temperatures in these rivers means the fish community will contain a higher proportion of warmwater species relative to coolwater species. These systems are unlikely to support any resident coldwater species. Examples of this type in the region include French Creek and Conodoguinet Creek.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Pennsylvania Aquatic Community Classification Crosswalk

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish Warmwater Community 2
- Ohio-Great Lakes Basins Fish Warmwater Stream Community

SGCN Associated with this Habitat

184 unique occurrences or observations of 51 SGCN were associated with the Warm, Medium River habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Mussels	Brook floater (*Alasmidonta varicosa*)	
Fish	Bowfin (*Amia calva*)	Inhabits swamps, marshes, ditches, ponds, and lakes, and sluggish sections of rivers and creeks, where it prefers areas with submerged vegetation, undercut banks, and coarse woody debris.
Tiger Beetles	Appalachian tiger beetle (*Cicindela ancocisconensis*)	
Mussels	Snuffbox (Epioblasma triquetra)	Medium Rivers
Fish	Streamline chub (*Erimystax dissimilis*)	Swift sections of large streams and rivers, where it prefers clean sand, gravel, and rubble substrate.

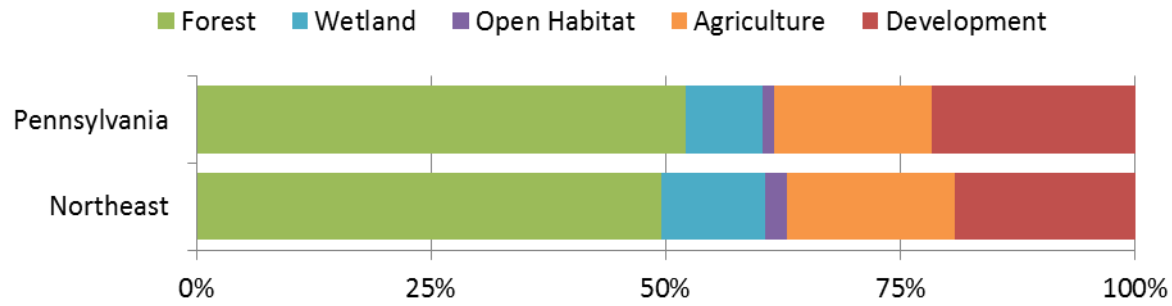
Fish	Spotted darter (*Etheostoma maculatum*)	Large streams and rivers -faster, deeper portions of riffles possessing gravel and rubble substrates.
Mussels	Long-solid (*Fusconaia subrotunda*)	
Amphibian	Mudpuppy (*Necturus maculosus*)	Lotic and lentic habitats.
Fish	Mountain madtom (*Noturus eleutherus*)	Mod-swift rivers, large streams w/ clear water +substrates of sand, gravel, cobble, and rubble. Usually taken in riffles or rapids.
Fish	Northern madtom (*Noturus stigmosus*)	Clear riffles w/mod-swift current, and substrate of gravel, cobble, and rubble in French Creek.
Mussels	Round hickorynut (*Obovaria subrotunda*)	Large Rivers.

The following SGCN had their Secondary Habitat Association with this habitat:

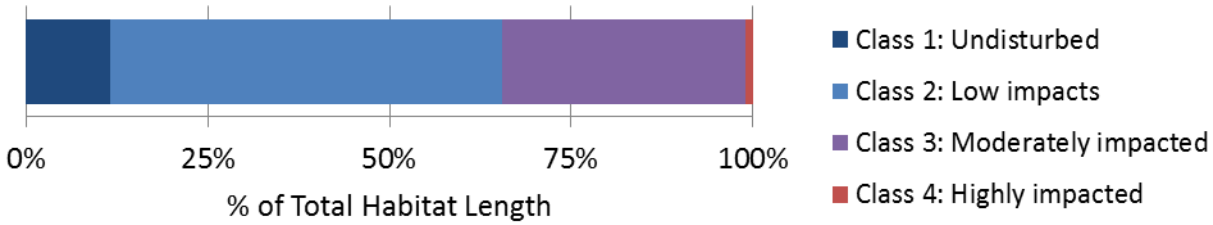
Taxa Group	SGCN	Specific Habitat Requirements
Mussels	Elktoe (*Alasmidonta marginata*)	
Mussels	Triangle floater (*Alasmidonta undulata*)	
Mussels	Purple wartyback (*Cyclonaias tuberculata*)	
Mussels	Northern riffleshell (*Epioblasma torulosa rangiana*)	Medium Rivers.
Odonates	Rapids clubtail (*Gomphus quadricolor*)	
Fish	Mountain brook Lamprey (*Ichthyomyzon greeleyi*)	Clear, small-medium sized creeks, but occasionally found in larger waters.
Mussels	Yellow lampmussel (*Lampsilis cariosa*)	
Mussels	Pocketbook (*Lampsilis ovata*)	
Mussels	Creek heelsplitter (*Lasmigona compressa*)	
Fish	Longhead darter (*Percina macrocephala*)	Warm rivers and large streams, and occupies a wide array of habitats.
Mussels	Rabbitsfoot (*Quadrula cylindrica cylindrica*)	Medium Rivers.

Condition metrics

Approximately 7.4% of the 100m riparian buffer for the Warm, Medium River habitat has been secured against conversion to other uses, leaving about 92.6% unsecured. Compared to the entire Northeast region, Pennsylvania has about 2% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



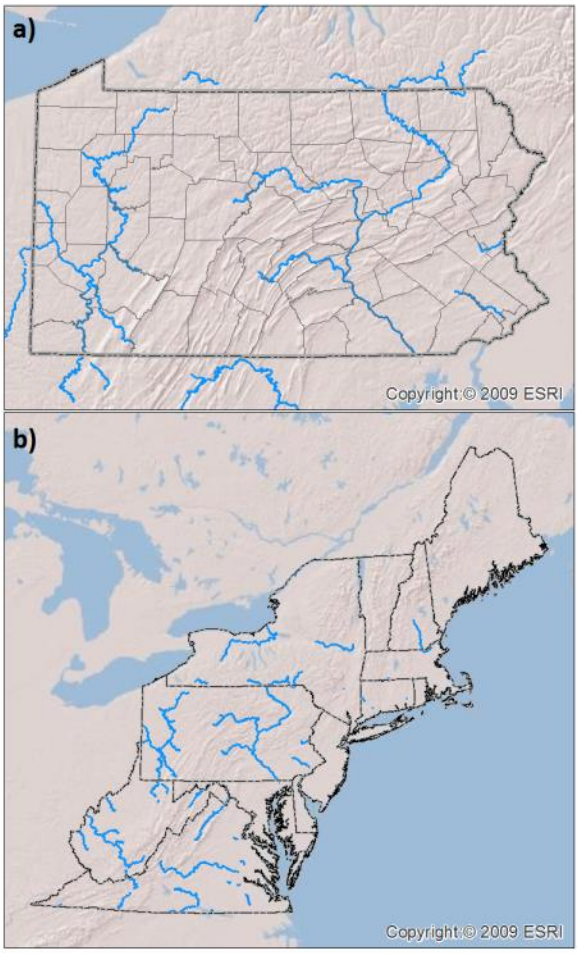
The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Warm, Medium River habitat is 106.3 (range 0.2-343.5) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Warm, Large River

Macrogroup: Large River
Length: Pennsylvania: 1,210 miles;
Northeast: 3,853 miles



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

This habitat describes large, deep, warmwater rivers of the Mid-Atlantic and low elevations in the north. These very large and deep rivers drain watersheds >1000 square miles (2590 square kilometers) and have an average bankfull width of 250 feet (76 meters). Slower moving, lower gradient sections of these rivers are expected to be more unconfined with higher sinuosity, broader floodplain valleys, more riparian wetlands, and lower width/depth ratios than the more moderate gradient portions. Species diversity is high in these large rivers and species assemblages characteristic of runs, pools, and the pelagic zone dominate the community. Profundal areas without effective light penetration are also found and support populations of bacteria, fungi, and other decomposers that break down organic matter reaching the bottom. In coastal connected river sections, anadromous species are often found. Warm water temperatures in these streams means the fish community will contain a higher proportion of warmwater species relative to coolwater species. These systems are unlikely to support any resident coldwater species. Examples of this type in the region include the Delaware, Susquehanna, West Branch Susquehanna, Allegheny, Juniata, Ohio, and Monongahela.

<u>Pennsylvania Aquatic Community Classification Crosswalk</u>

The following Pennsylvania Aquatic Community Classification Types (Walsh et. al. 2007) are typically contained within this habitat:

- Atlantic Basin Fish River and Impoundment Community
- Ohio-Great Lakes Basins Fish Large River Community

SGCN Associated with this Habitat

424 unique occurrences or observations of 78 SGCN were associated with the Warm, Large River habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Horned Grebe - Wintering (*Podiceps auritus*)	More common in coastal salt water; in Pennsylvania, medium to large-sized fresh water bodies, including rivers, inland lakes and large ponds.
Birds	Red Knot - Migration (*Calidris canutus rufa*)	Great Lakes beaches and inland riverine and lacustrine mud flats (often reservoirs). Most sightings in Pennsylvania are from Gull Point, Erie Co., and Conejohela Flats, Lancaster Co. (McWilliams and Brauning 2000).
Fish	Gravel chub (*Erimystax x-punctatus*)	Clear to somewhat turbid sections of large streams and rivers, preferring riffles and runs with moderate to swift current over sand, gravel or rocky substrate.
Fish	Tippecanoe darter (*Etheostoma tippecanoe*)	Riffles of large creeks and rivers w/ clean gravel or sand/gravel substrates.
Fish	Longear sunfish (*Lepomis megalotis*)	Warmwater lakes, ponds, streams, and rivers under a variety of circumstances
Fish	Ghost shiner (*Notropis buchanani*)	Low-gradient sections of large streams and rivers, usually in quiet water with sluggish current.
Fish	Longhead darter (*Percina macrocephala*)	Warm rivers and large streams, and occupies a wide array of habitats
Mussels	Dwarf wedgemussel (*Alasmidonta heterodon*)	Medium Rivers.
Mussels	Elktoe (*Alasmidonta marginata*)	
Mussels	Triangle floater (*Alasmidonta undulata*)	
Mussels	Three-ridge (*Amblema plicata*)	
Mussels	Alewife floater (*Anodonta implicata*)	
Mussels	Flat floater (*Anodonta suborbiculata*)	
Mussels	Purple wartyback (*Cyclonaias tuberculata*)	
Mussels	Fanshell (*Cyprogenia stegaria*)	
Mussels	Butterfly (*Ellipsaria lineolata*)	
Mussels	Elephant ear (*Elliptio crassidens*)	
Mussels	Northern rifffleshell (*Epioblasma torulosa rangiana*)	Medium Rivers.
Mussels	Pink Mucket (*Lampsilis abrupta*)	
Mussels	Yellow lampmussel (*Lampsilis cariosa*)	
Mussels	Pocketbook (*Lampsilis ovata*)	
Mussels	Eastern lampmussel (*Lampsilis radiata*)	
Mussels	Green floater (*Lasmigona subviridis*)	
Mussels	Fragile papershell (*Leptodea fragilis*)	

Mussels	Threehorn wartyback (*Obliquaria reflexa*)	
Mussels	Hickorynut (*Obovaria olivaria*)	
Mussels	Orange-foot pimpleback (*Plethobasus cooperianus*)	
Mussels	Clubshell (*Pleurobema clava*)	Medium Rivers.
Mussels	Sheepnose mussel (*Plethobasus cyphyus*)	Large Rivers.
Mussels	Rough pigtoe (*Pleurobema plenum*)	
Mussels	Pyramid pigtoe (*Pleurobema rubrum*)	
Mussels	Round pigtoe (*Pleurobema sintoxia*)	
Mussels	Rabbitsfoot (*Quadrula cylindrica cylindrica*)	Medium Rivers.
Mussels	Monkeyface (*Quadrula metanevra*)	
Mussels	Mapleleaf (*Quadrula quadrula*)	
Mussels	Salamander mussel (*Simpsonaias ambigua*)	Large Rivers, with shelter rock.
Mussels	Lilliput (*Toxolasma parvum*)	
Mussels	Rayed bean mussel (Villosa fabalis)	
Mussels	Rainbow mussel (*Villosa iris*)	
Odonates	Spine-crowned clubtail (*Gomphus abbreviatus*)	
Odonates	Rapids clubtail (*Gomphus quadricolor*)	
Odonates	Allegheny river cruiser (*Macromia alleghaniensis*)	
Odonates	Extra-striped snaketail (*Ophiogomphus anomalus*)	
Odonates	Pygmy dragonfly (*Ophiogomphus howei*)	
Odonates	Riverine clubtail (*Stylurus amnicola*)	
Odonates	Elusive clubtail (*Stylurus notatus*)	
Odonates	Russet-tipped clubtail (*Stylurus plagiatus*)	
Snails	Globe siltsnail (*Birgella subglobosa*)	

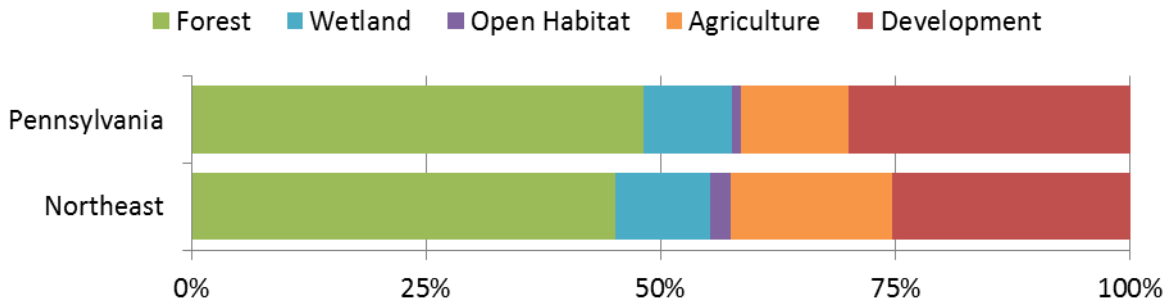
The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Crayfish	Spinycheek crayfish (*Orconectes limosus*)	
Fish	Streamline chub (*Erimystax dissimilis*)	Swift sections of large streams and rivers, where it prefers clean sand, gravel, and rubble substrate

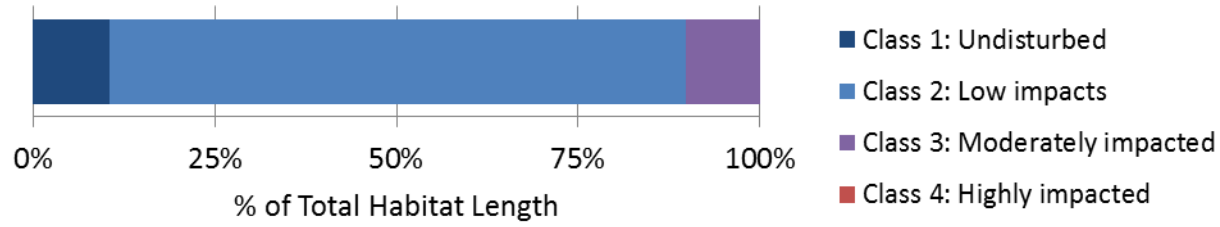
Fish	Spotted darter (*Etheostoma maculatum*)	Large streams and rivers -faster, deeper portions of riffles possessing gravel and rubble substrates
Fish	Ohio lamprey (*Ichthyomyzon bdellium*)	Occurs in large streams to large rivers during parasitic phase, but enters smaller streams to spawn. Adults are generally taken in riffles and runs over gravel, cobble, and rubble. Ammocetes generally prefer sluggish sections of small-medium sized streams
Fish	Mountain madtom (*Noturus eleutherus*)	Mod-swift rivers, large streams w/ clear water +substrates of sand, gravel, cobble, and rubble. Usually taken in riffles or rapids.
Fish	Northern madtom (*Noturus stigmosus*)	Clear riffles w/mod-swift current, and substrate of gravel, cobble, and rubble in French Creek.
Mussels	Brook floater (*Alasmidonta varicosa*)	
Mussels	Long-solid (*Fusconaia subrotunda*)	

Condition metrics

Approximately 11.5% of the 100m riparian buffer for the Warm, Large River habitat has been secured against conversion to other uses, leaving about 88.5% unsecured. Compared to the entire Northeast region, Pennsylvania has nearly the same amount of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes are presented below:

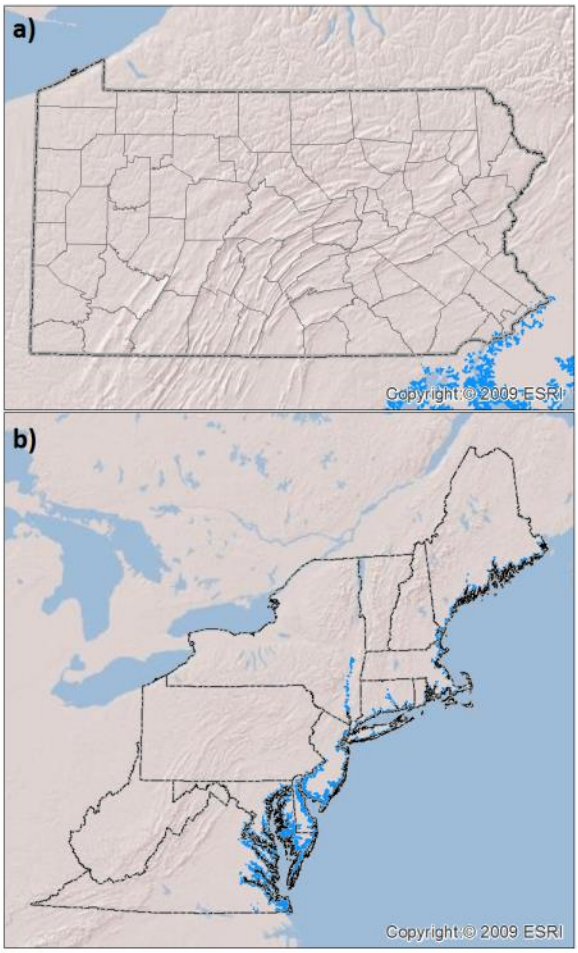


The mean Landscape Context Index (LCI) for the Warm, Large River habitat is 97.4 (range 0.9-333.7) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Tidal Headwaters and Creeks

Macrogroup: Tidal Headwaters and Creeks
Length: Pennsylvania: 24 miles;
Northeast: 7,835 miles

Slow-moving, shallow, tidally influenced creeks and headwater streams. These tidal creeks and streams connect directly to the ocean or to large tidal rivers estuaries and have watersheds under 39 square miles (101 square kilometers). The water flow and level in these streams fluctuates with the tides creating subtidal habitat which is permanently flooded and an intertidal habitat exposed at low tide. Salinity typically ranges between 30 and 0.5 ppt and grades into a freshwater system in the upper portions of many of these reaches. Most tidal streams have moderately firm, sandy channel bottoms and vertical banks that are regularly eroded and slump into the creek bottom. Many have a very sinuous pattern as they wind through large salt marshes along the coast. Others have smaller associated brackish or salt marshes along their length and/or intertidal sand and mud flats in their lower portions. These streams and their associated estuaries support a rich diversity of plant and animals and serve as the primary nursery area for many marine fishes. The ecological importance of small tidal streams has historically been undervalued, but recent research is showing their collective influence on estuarine ecosystem function may equal or exceed that of larger tidal rivers.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

In Pennsylvania, this habitat is restricted to the extreme southeast corner of the state, within the Delaware Basin.

Pennsylvania Aquatic Community Classification Crosswalk

A type representing this habitat was not included in the Pennsylvania Aquatic Community Classification (Walsh et. al. 2007).

SGCN Associated with this Habitat

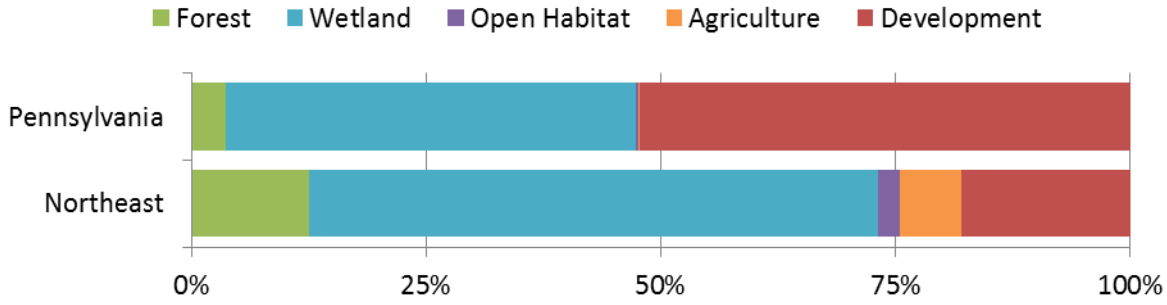
Two unique occurrences or observations of two SGCN were associated with the Tidal Headwaters and Creeks habitat.

No SGCN had their Primary Habitat Association with this habitat. The following SGCN had their Secondary Habitat Association with this habitat:

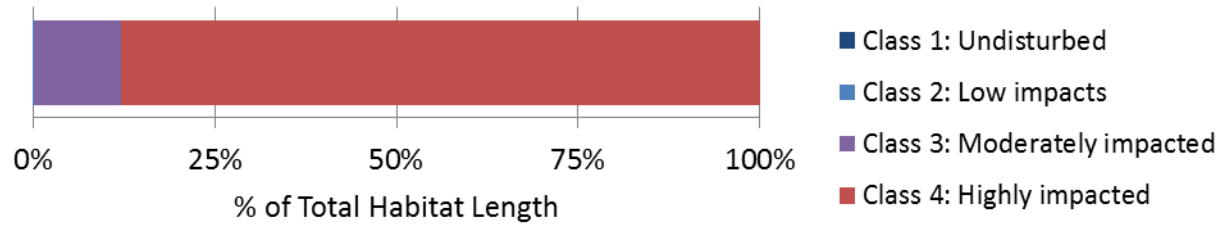
Taxa Group	SGCN	Specific Habitat Requirements
Fish	Banded sunfish (*Enneacanthus obesus*)	Delaware estuary; sluggish, calm streams, rivers, lakes, ponds with dense stands of rooted and suspended aquatic vegetation over substrates of silt, sand, mud, and detritus.

Condition metrics

Approximately 35.5% of the 100m riparian buffer for the Tidal Headwaters and Creeks habitat has been secured against conversion to other uses, leaving about 64.5% unsecured. Compared to the entire Northeast region, Pennsylvania has about 21% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:

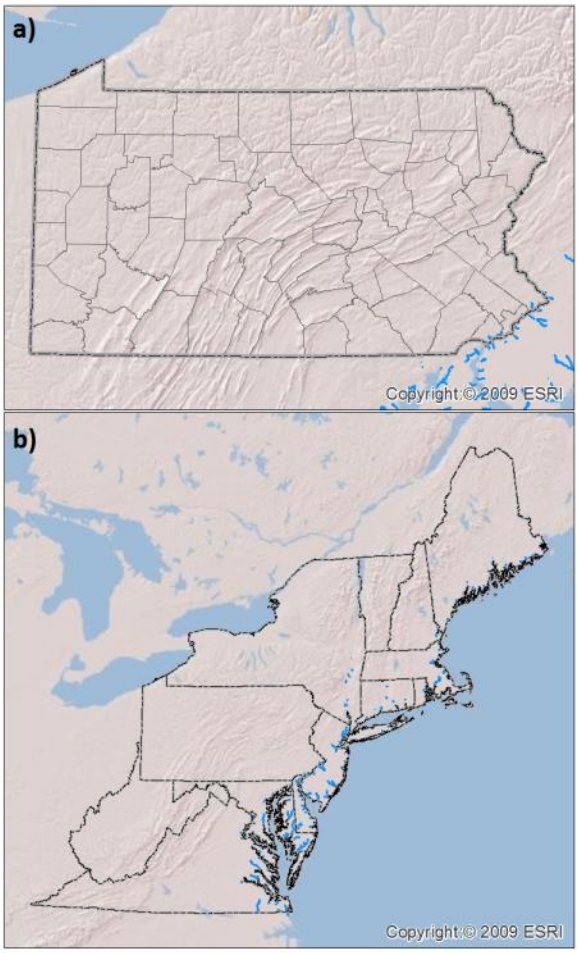


The mean Landscape Context Index (LCI) for the Tidal Headwaters and Creeks habitat is 225.3 (range 106.8-387.8) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Tidal Small and Medium River

Tidal Small and Medium River
Length: Pennsylvania: 23 miles;
Northeast: 1,885 miles

Slow moving, small to medium, tidally influenced rivers. These small to medium sized rivers connect directly to the ocean or to large estuaries and their water flow and level fluctuates with the tides. They drain watersheds up to 1,000 square miles in size and have an average bankfull width of 89 feet. In the river there is a vertical salinity gradient, with a surface layer of fresh water (salinity less than 0.5 ppt) floating over a deeper layer of brackish water (salinity between 0.5 and 18.0ppt). Salinities at any one place in the river may fluctuate as the tides flow in and out because the "salt wedge" of brackish water alternately rises and falls with the tides. Plant and faunal communities found in and along the river are determined by both depth and salinity. Commonly associated communities include brackish and salt marshes, swamps, and mudflats. These rivers and their associated estuaries support a rich diversity of plant and animals and serve as the primary nursery area for many marine, estuarine, and anadromous fishes.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

In Pennsylvania, this habitat is restricted to the extreme southeast corner of the state, within the Delaware Basin.

Pennsylvania Aquatic Community Classification Crosswalk

A type representing this habitat was not included in the Pennsylvania Aquatic Community Classification (Walsh et. al. 2007).

SGCN Associated with this Habitat

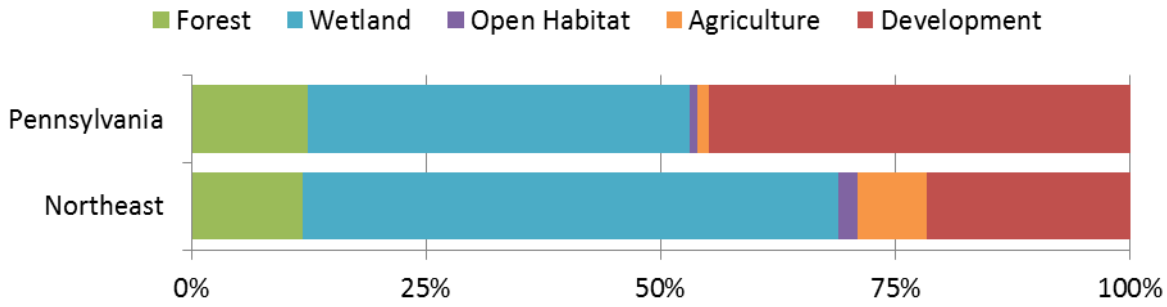
Two unique occurrences or observations of two SGCN were associated with the Tidal Small and Medium River habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Snails	*Littoridinops tenuipes*	

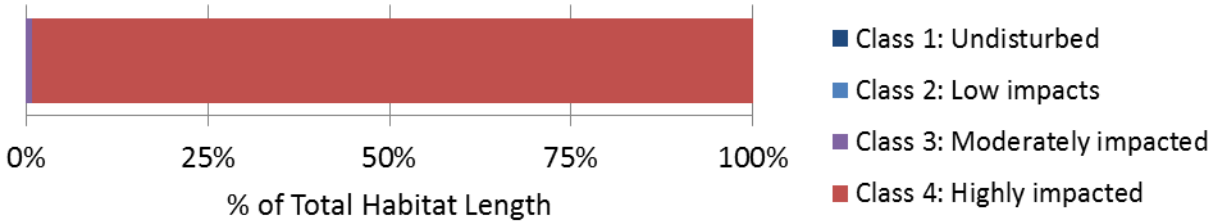
No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

Approximately 36.8% of the 100m riparian buffer for the Tidal Small and Medium River habitat has been secured against conversion to other uses, leaving about 63.2% unsecured. Compared to the entire Northeast region, Pennsylvania has about 15% more of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes is presented below:



The mean Landscape Context Index (LCI) for the Tidal Small and Medium River habitat is 205.5 (range 121.2-305.8) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Tidal Large River

Macrogroup: Tidal Large River
Length: Pennsylvania: 46 miles;
Northeast: 1,026 miles

Slow moving, large, deep, tidally influenced rivers. These very large rivers connect directly to the ocean or to large estuaries and their water flow and level fluctuates with the tides. They have large upstream watersheds >1000 square miles (2590 square kilometers) and average bankfull widths of over 300 feet. In the river there is a vertical salinity gradient, with a surface layer of fresh water (salinity less than 0.5 ppt) floating over a deeper layer of brackish water (salinity between 0.5 and 18.0ppt). Salinities at any one place in the river may fluctuate as the tides flow in and out because the "salt wedge" of brackish water alternately rises and falls with the tides. Plant and animal communities found in and along the river are determined by both depth and salinity. Commonly associated communities include brackish and salt marshes, swamps, and mudflats. Most of these rivers have extensive salt marshes and/or intertidal sand and mud flats at their mouths. These rivers and their associated estuaries support a rich diversity of plant and animals and serve as the primary nursery area for many marine, estuarine, and anadromous fishes.

Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

In Pennsylvania, this habitat is restricted to the extreme southeast corner of the state, within the Delaware Basin.

Pennsylvania Aquatic Community Classification Crosswalk

A type representing this habitat was not included in the Pennsylvania Aquatic Community Classification (Walsh et. al. 2007).

SGCN Associated with this Habitat

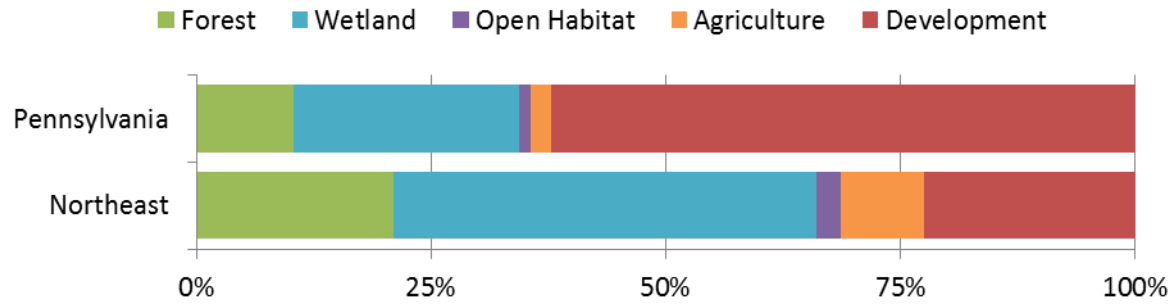
12 unique occurrences or observations of 9 SGCN were associated with the Tidal Large River habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Fish	Shortnose sturgeon (*Acipenser brevirostrum*)	Large coastal rivers and estuaries.
Fish	Atlantic sturgeon (*Acipenser oxyrhynchus*)	Rivers, estuaries, and coastal oceanic habitats depending upon season; spawn in flowing water over hard substrates and pools at the base of waterfalls.
Fish	Banded sunfish (*Enneacanthus obesus*)	Delaware estuary; sluggish, calm streams, rivers, lakes, ponds with dense stands of rooted and suspended aquatic vegetation over substrates of silt, sand, mud, and detritus.
Fish	Blueback herring (*Alosa aestivalis*)	Anadromous coastal marine species: spawns in tidal and non-tidal mainstem river sections, backwater sloughs, and flooded swamps of tributary streams
Mussels	Tidewater mucket (*Leptodea ochracea*)	
Snails	*Lymnaea catascopium*	

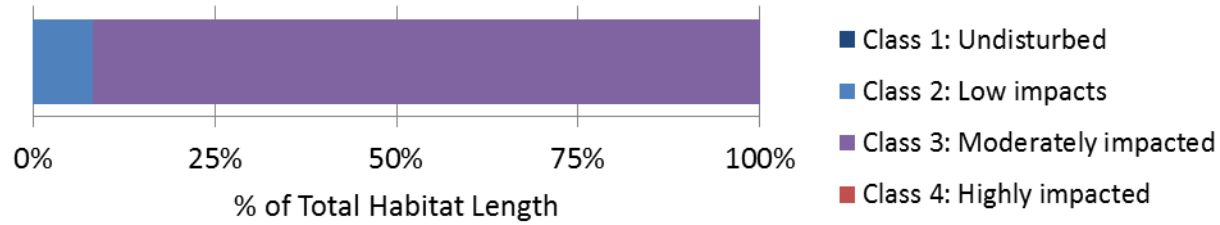
No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

Approximately 12.9% of the 100m riparian buffer for the Tidal Large River habitat has been secured against conversion to other uses, leaving about 87.1% unsecured. Compared to the entire Northeast region, Pennsylvania has about 2% less of this habitat secured from conversion. The percentages of five landcover groups for Pennsylvania compared to the Northeast that intersect the 100m riparian buffer are presented below:



The cumulative amount of upstream impervious surface across four disturbance classes are presented below:



The mean Landscape Context Index (LCI) for the Tidal Large River habitat is 197.3 (range 12.7-355.8) out of the maximum value of 400. This is higher than the average for the northeast, indicating that the Pennsylvania portion of the habitat is in relatively poorer condition than similar habitat in the region.

Lentic Aquatic Habitat Descriptions

For each standing water aquatic habitat, the following information is presented:

This description is modeled after that which contained in the Northeastern Habitat Guides (Anderson et. al. 2013b) based on the content of the Northeast Lake and Pond Classification (Olivero Sheldon 2014). Modifications have been made to the descriptions to reflect the habitat as it exists within Pennsylvania.

Pennsylvania does not currently have a lake and pond classification, so there is no crosswalk to locally defined communities.

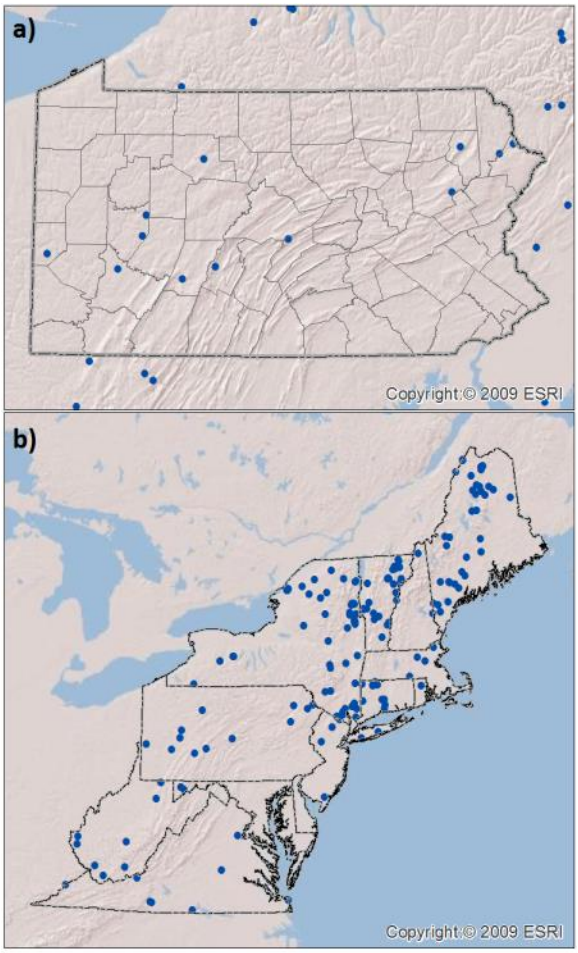
Tables of Primary and Secondary SGCN Habitat Associations for each habitat are presented. SGCN associations with each particular habitat were determined using the methods outlined in Chapter 2. Primary habitat represents a statistical majority of documented observations occur, Secondary Habitat was described as where the next highest statistical habitat association. Note that SGCN may occur in other habitats than what are listed here.

No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Note: Although the Northeast Lakes Classification lists "Oligotrophic, High Alkalinity Lake" as occurring in Pennsylvania, the two modeled sites for it represent slackwaters behind dams on the lower Susquehanna River. We have chosen to ignore this habitat in the PAWAP, as it most likely does not represented true lakes.

Oligotrophic, Medium Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 8,731 acres;
Northeast: 105,267 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

These lakes are typically nutrient poor, with low biological productivity and high clarity. Alkalinity is a measure of how well buffered a waterbody is from acidification. Medium alkalinity lakes typically represent lakes that have a neutral pH and support a wide range of species. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and a lake have deeper areas where light does not penetrate.

There were 12 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Oligotrophic, Medium Alkalinity Lakes was 789.2 acres, ranging from 61.5 to 5541.6 acres. The average area for Oligotrophic, Medium Alkalinity Ponds was 49.3 acres, ranging from 49.3 to 49.3 acres.

SGCN Associated with this Habitat

58 unique occurrences or observations of 18 SGCN were associated with the Oligotrophic, Medium Alkalinity Lake/Pond habitat. No SGCN had their Primary Habitat Association with this habitat. No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

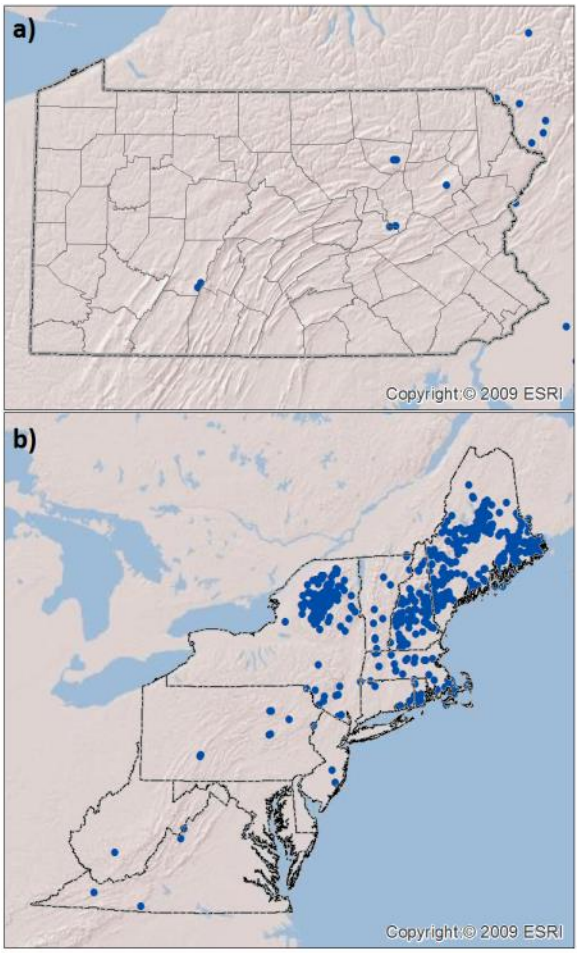
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Oligotrophic, Low Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 1,175 acres;
Northeast: 388,632acres

These lakes are typically nutrient poor, with low biological productivity and high clarity. Alkalinity is a measure of how well buffered a waterbody is from acidification. Low alkalinity lakes are typically associated with sandstone dominated watersheds with contain fewer acid neutralizing ions and thus have a lower pH. Many fish species cannot tolerate these low pH conditions. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 7 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Oligotrophic, Low Alkalinity Lakes was 200.8 acres, ranging from 59.4 to 374.4 acres. The average area for Oligotrophic, Low Alkalinity Ponds was 143.1 acres, ranging from 8.8 to 533.7 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

SGCN Associated with this Habitat

11 unique occurrences or observations of 8 SGCN were associated with the Oligotrophic, Low Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Lepidoptera	Atlantis fritillary (*Speyeria atlantis*)	

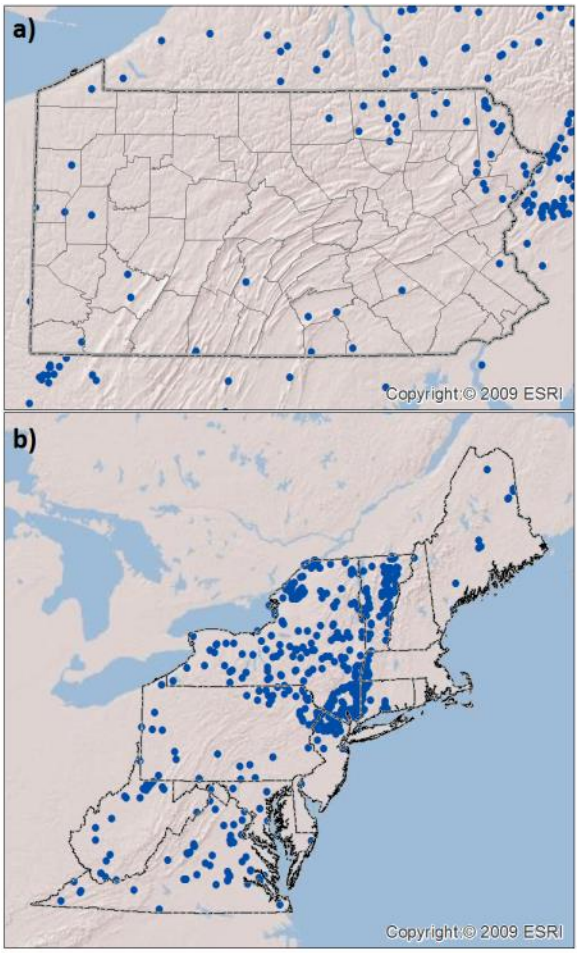
No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Mesotrophic, High Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 14,159 acres;
Northeast: 409,245 acres



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Mesotrophic lakes tend to have moderate levels of nutrients and biological productivity. Alkalinity is a measure of how well buffered a waterbody is from acidification. High alkalinity lakes are typically found in watersheds with limestone or other calcareous bedrock. Some high alkalinity lakes may have higher pH and thus support a unique set of plants and aquatic invertebrates. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 50 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Mesotrophic, High Alkalinity Lakes was 949.4 acres, ranging from 7.5 to 8271.4 acres. The average area for Mesotrophic, High Alkalinity Ponds was 24.1 acres, ranging from 2.9 to 149.5 acres.

SGCN Associated with this Habitat

76 unique occurrences or observations of 27 SGCN were associated with the Mesotrophic, High Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Fish	Blackchin shiner (*Notropis heterodon*)	Shallow sections of glacial lakes w/stands of dense aquatic vegetation.
Fish	Iowa darter (*Etheostoma exile*)	Less than 1.5-meter deep areas of natural lakes with substrates of sand, muck, and organic debris, and w/dense aquatic vegetation.
Lepidoptera	A noctuid moth (*Dichagyris grotei*)	
Odonates	Appalachian jewelwing (*Calopteryx angustipennis*)	
Snails	Great pondsnail (*Lymnaea stagnalis*)	

No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

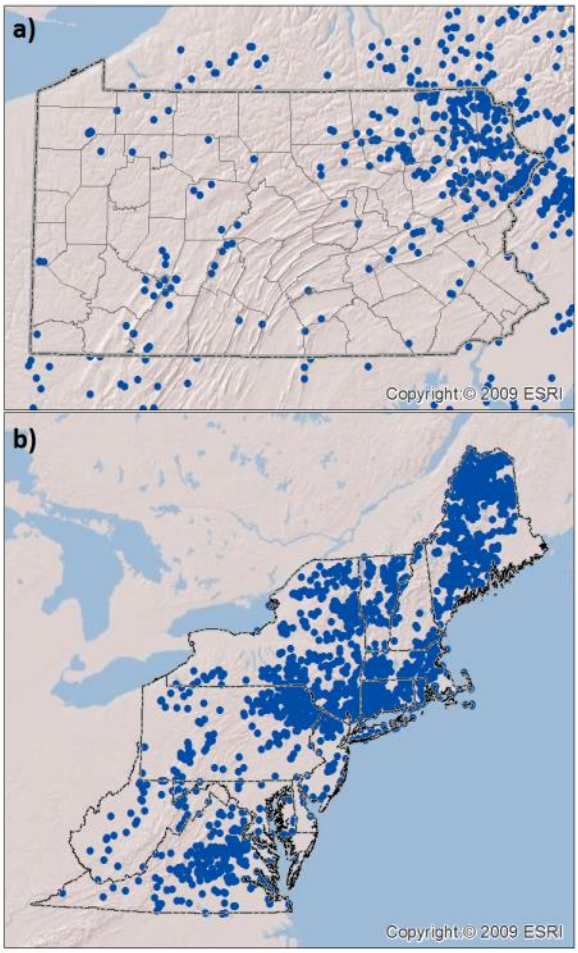
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Mesotrophic, Medium Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 24,152 acres;
Northeast: 389,619 acres

Mesotrophic lakes tend to have moderate levels of nutrients and biological productivity. Alkalinity is a measure of how well buffered a waterbody is from acidification. Medium alkalinity lakes typically represent lakes that have a neutral pH and support a wide range of species. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 355 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Mesotrophic, Medium Alkalinity Lakes was 133 acres, ranging from 7.8 to 2704.7 acres. The average area for Mesotrophic, Medium Alkalinity Ponds was 24.7 acres, ranging from 2 to 260.3 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

SGCN Associated with this Habitat

291 unique occurrences or observations of 50 SGCN were associated with the Mesotrophic, Medium Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Green-winged teal – Breeding (*Anas crecca*)	Wetlands, particularly dense emergent marshes and shrubby swamps; lakes and ponds with emergent aquatic vegetation. Shallow wetlands are preferred, and teal are often associated with wetlands of high quality.
Odonates	Banded pennant (*Celithemis fasciata*)	
Odonates	Emerald spreadwing (*Lestes dryas*)	
Odonates	Lilypad clubtail (*Arigomphus furcifer*)	
Odonates	New England bluet (*Enallagma laterale*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Osprey – Breeding (*Pandion haliaetus*)	Shallow water areas with good fish populations and artificial or natural nesting structures nearby.
Birds	Horned grebe - Wintering (*Podiceps auritus*)	More common in coastal salt water; in Pennsylvania, medium to large-sized fresh water bodies, including rivers, inland lakes and large ponds.

Condition metrics

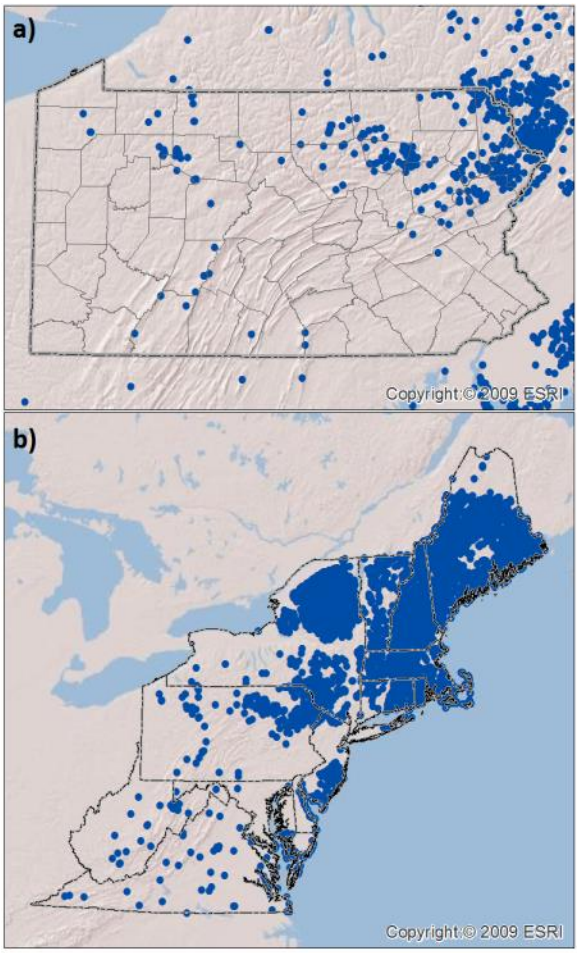
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Mesotrophic, Low Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 10,833 acres;
Northeast: 831,408 acres

Mesotrophic lakes tend to have moderate levels of nutrients and biological productivity. Low alkalinity lakes are typically associated with sandstone dominated watersheds with contain fewer acid neutralizing ions and thus have a lower pH. Many fish species cannot tolerate these low pH conditions. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 320 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Mesotrophic, Low Alkalinity Lakes was 70.8 acres, ranging from 7.2 to 464.2 acres. The average area for Mesotrophic, Low Alkalinity Ponds was 26.5 acres, ranging from 2.2 to 515.7 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

SGCN Associated with this Habitat

129 unique occurrences or observations of 38 SGCN were associated with the Mesotrophic, Low Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Fish	Eastern mudminnow (*Umbra pygmaea*)	Sluggish sections of small creeks to medium-sized streams and lentic habitats, including lakes, ponds, bog, marshes, swamps, and ditches; waters may be clear to somewhat turbid.
Birds	Pied-billed grebe - Breeding (*Podilymbus podiceps*)	Emergent wetlands with abundant vegetation (70% cover, 69-133cm in height) and shallow water (24-56cm depth).
Odonates	Amber-winged spreadwing (*Lestes eurinus*)	
Odonates	Band-winged meadowhawk (*Sympetrum semicinctum*)	
Odonates	Comet darner (*Anax longipes*)	
Odonates	Crimson-ringed whiteface (*Leucorrhinia glacialis*)	
Odonates	Harlequin darner (*Gomphaeschna furcillata*)	

Odonates	Mottled darner (*Aeshna clepsydra*)
Odonates	Petite emerald (*Dorocordulia lepida*)

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Odonates	Lilypad forktail (*Ischnura kellicotti*)	
Odonates	Lilypad clubtail (*Arigomphus furcifer*)	

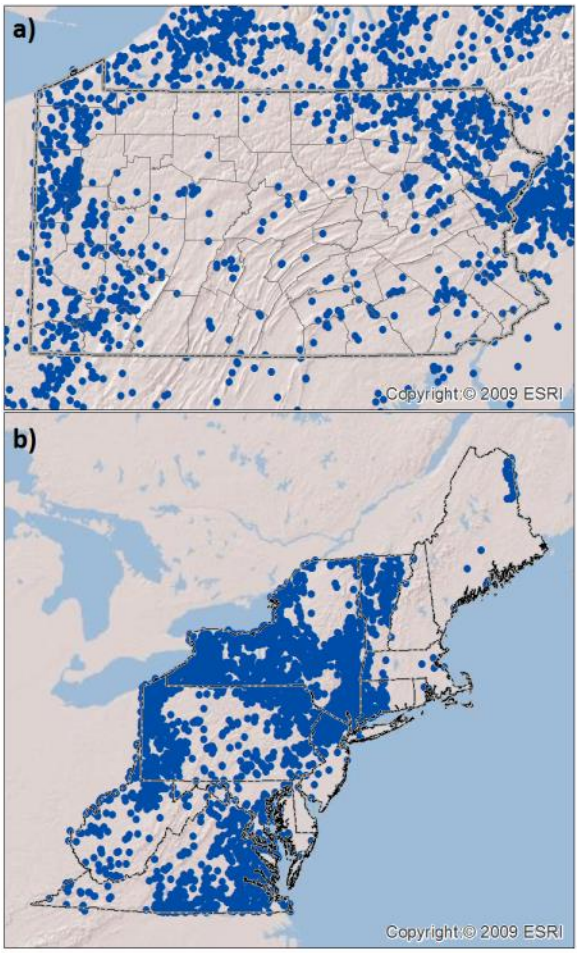
Condition metrics

No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Eutrophic, High Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 25,171 acres;
Northeast: 106,709 acres

Eutrophic lakes are well-nourished, highly biologically productive systems that support a balanced and diverse array of species, with low clarity due to high algal and chlorophyll concentrations. Alkalinity is a measure of how well buffered a waterbody is from acidification. High alkalinity lakes are typically found in watersheds with limestone or other calcareous bedrock. Some high alkalinity lakes may have higher pH and thus support a unique set of plants and aquatic invertebrates. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

There were 1056 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Eutrophic, High Alkalinity Lakes was 64.1 acres, ranging from 2.2 to 6306.1 acres. The average area for Eutrophic, High Alkalinity Ponds was 11.4 acres, ranging from 2 to 1734.5 acres.

SGCN Associated with this Habitat

370 unique occurrences or observations of 50 SGCN were associated with the Eutrophic, High Alkilinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Least bittern - Breeding (*Ixobrychus exilis*)	Palustrine emergent wetlands, dominated by tall emergent vegetation such as cattails interspersed with shrubs and open water.
Birds	Common gallinule - Breeding (*Gallinula galeata*)	Large shallow-intermediate depth wetlands with a 1:1 ratio of open water and emergent vegetation and vegetated fringes.

No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

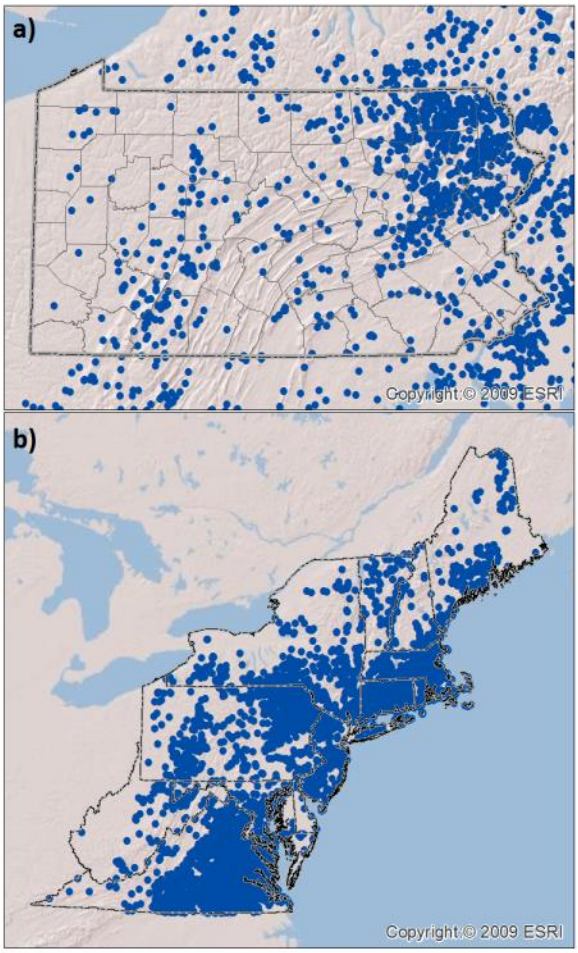
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Eutrophic, Medium Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 42,145 acres;
Northeast: 249,620 acres

Eutrophic lakes are well nourished, highly biologically productive that support a balanced and diverse array of species, with low clarity due to high algal and chlorophyll concentrations. Alkalinity is a measure of how well buffered a waterbody is from acidification. Medium alkalinity lakes typically represent lakes that have a neutral pH and support a wide range of species. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 951 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Eutrophic, Medium Alkalinity Lakes was 94.3 acres, ranging from 2 to 11647.8 acres. The average area for Eutrophic, Medium Alkalinity Ponds was 11.8 acres, ranging from 2 to 396.6 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

<u>SGCN Associated with this Habitat</u>

660 unique occurrences or observations of 71 SGCN were associated with the Eutrophic, Medium Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	American black duck - Breeding (*Anas rubripes*)	Palustrine shallow wetlands in forested regions, scrub/shrub, forested wetlands, emergent marshes, and beaver flowages.
Birds	American black duck – Migration (*Anas rubripes*)	Palustrine and lacustrine wetlands.
Birds	Tadpole madtom (*Noturus gyrinus*)	Backwaters and sluggish current in flowing waters, ponds, lakes, and oxbows with soft, organic substrates and an abundant cover, provided by dense aquatic vegetation or coarse woody debris.
Birds	Osprey - Breeding (*Pandion haliaetus*)	Shallow water areas with good fish populations and artificial or natural nesting structures nearby.
Birds	Spotted sandpiper - Breeding (*Actitis macularius*)	Nests are always associated with water (river, lake, wetland, gravel pit, farm pond, etc.), typically within 100 m of water's edge, but up to 300 m. Shoreline is used for foraging, semi-open nesting habitat with patches of dense vegetation assists brood protection (Reed et al. 2013).
Odonates	American emerald (*Cordulia shurtleffi*)	
Odonates	Brown spiketail	

	(Cordulegaster bilineata)
Odonates	Lilypad forktail (*Ischnura kellicotti*)
Odonates	Spatterdock darner (*Rhionaeschna mutata*)
Odonates	Turquoise bluet (*Enallagma divagans*)

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Lesser scaup - Winter (*Aythya affinis*)	Large, deep waterbodies providing diverse submerged aquatic vegetation and abundant aquatic invertebrate prey. Lake Erie is believed to be the only portion of Pennsylvania providing adequate habitat to support a significant proportion of the species' population.
Odonates	Mocha emerald (*Somatochlora linearis*)	
Odonates	New England bluet (*Enallagma laterale*)	

Condition metrics

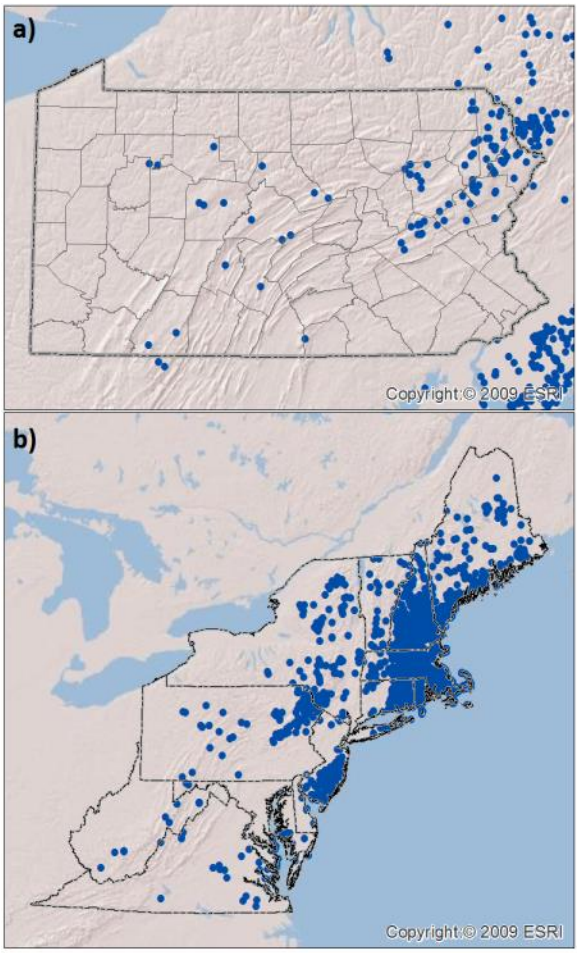
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Eutrophic, Low Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 3,953acres;
Northeast: 75,491acres

Eutrophic lakes are well nourished; highly biologically productive that support a balanced and diverse array of species, with low clarity due to high algal and chlorophyll concentrations. Low alkalinity lakes are typically associated with sandstone dominated watersheds with contain fewer acid neutralizing ions and thus have a lower pH. Many fish species cannot tolerate these low pH conditions. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 91 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Eutrophic, Low Alkalinity Lakes was 98.4 acres, ranging from 2.1 to 1109.4 acres. The average area for Eutrophic, Low Alkalinity Ponds was 12.2 acres, ranging from 2.3 to 71.9 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

<u>SGCN Associated with this Habitat</u>

23 unique occurrences or observations of 12 SGCN were associated with the Eutrophic, Low Alkalinity Lake/Pond habitat. No SGCN had their Primary Habitat Association with this habitat. No SGCN had their Secondary Habitat Association with this habitat.

<u>Condition metrics</u>

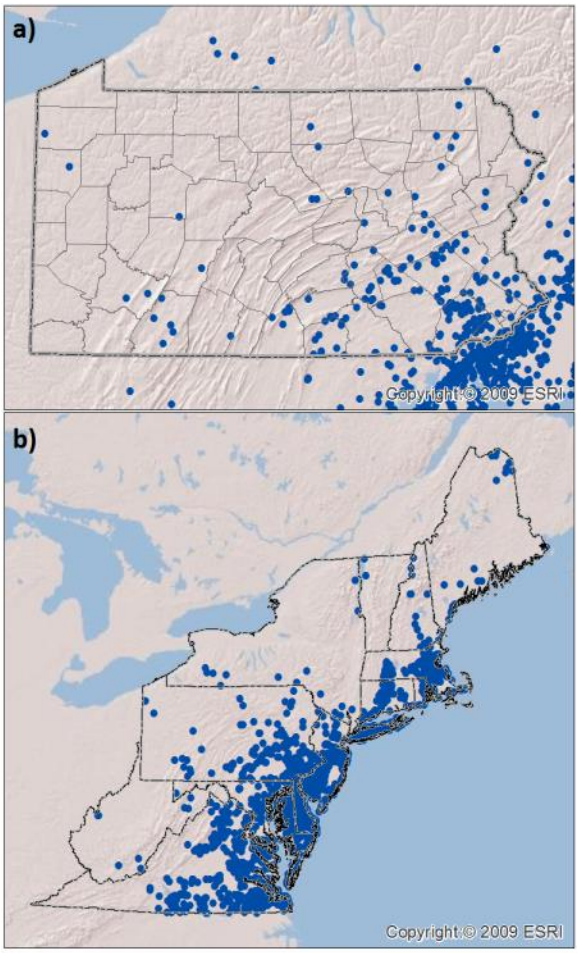
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Hypereutrophic, High Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 27,581 acres;
Northeast: 55,472 acres

Hypereutrophic lakes tend to have an excess of nutrients that give rise to algal blooms, vegetative overgrowth, and low biodiversity. Alkalinity is a measure of how well buffered a waterbody is from acidification. High alkalinity lakes are typically found in watersheds with limestone or other calcareous bedrock. Some high alkalinity lakes may have higher pH and thus support a unique set of plants and aquatic invertebrates. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 772 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Hypereutrophic, High Alkalinity Lakes was 369.4 acres, ranging from 2.1 to 13885.1 acres. The average area for Hypereutrophic, High Alkalinity Ponds was 6.1 acres, ranging from 2 to 134.7 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

SGCN Associated with this Habitat

365 unique occurrences or observations of 33 SGCN were associated with the Hypereutrophic, High Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Great egret – Breeding (*Ardea alba*)	Wade Island - nests built at or near the top of river birch, silver maple, green ash, American sycamore, black willow.
Mussels	Ohio pigtoe (*Pleurobema cordatum*)	

The following SGCN had their Secondary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Spotted sandpiper - Breeding (*Actitis macularius*)	Nests are always associated with water (river, lake, wetland, gravel pit, farm pond, etc.), typically within 100 m of water's edge, but up to 300 m. Shoreline is used for foraging, semi-open nesting habitat with patches of dense vegetation assists brood protection (Reed et al. 2013).
Birds	Blue-winged teal - Breeding (*Anas discors*)	Wetlands, particularly emergent marshes, vernal wetlands, lakes and ponds with emergent aquatic vegetation. Shallow wetlands are preferred, and teal are often associated with wetlands of high quality. Agricultural habitats, especially grasslands, are used for nesting.

Birds	Black-crowned night-heron - Breeding (*Nycticorax nycticorax*)	Shallow aquatic/terrestrial margins of fresh, brackish and salty aquatic environments -in both remote wetlands and city parks.
Birds	Red knot - Migration (*Calidris canutus rufa*)	Great Lakes beaches and inland riverine and lacustrine mud flats (often reservoirs). Most sightings in Pennsylvania are from Gull Point, Erie Co., and Conejohela Flats, Lancaster Co. (McWilliams and Brauning 2000).

Condition metrics

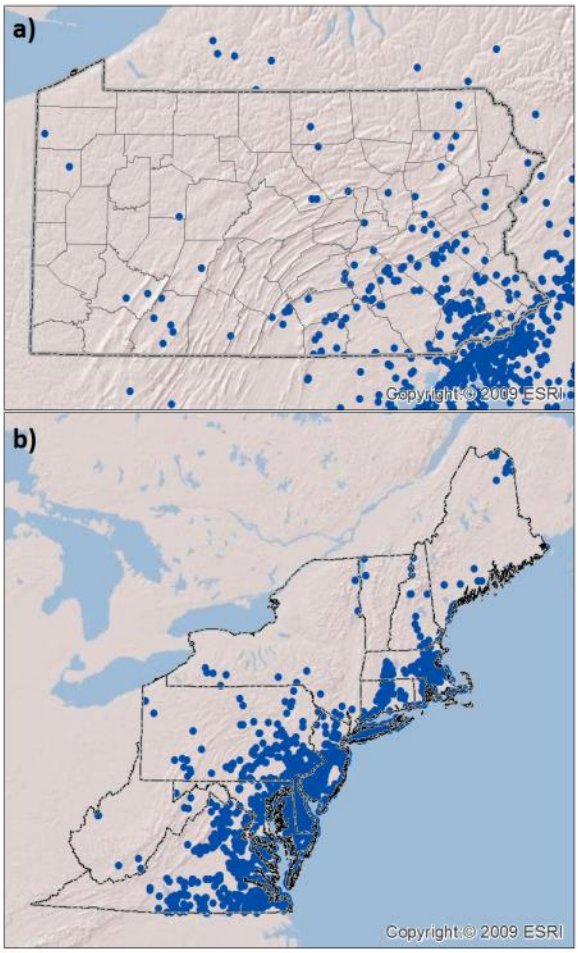
No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Hypereutrophic, Medium Alkalinity Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 4,666 acres;
Northeast: 36,461acres

Hypereutrophic lakes tend to have an excess of nutrients that give rise to algal blooms, vegetative overgrowth, and low biodiversity. Alkalinity is a measure of how well buffered a waterbody is from acidification. Medium alkalinity lakes typically represent lakes that have a neutral pH and support a wide range of species. While not explicitly noted in this classification, lakes and ponds are split by depth in which light reaches the bottom of a pond and lakes have deeper areas where light does not penetrate.

There were 241 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Hypereutrophic, Medium Alkalinity Lakes was 85.8 acres, ranging from 2.7 to 624.9 acres. The average area for Hypereutrophic, Medium Alkalinity Ponds was 11.3 acres, ranging from 2 to 822.4 acres.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

SGCN Associated with this Habitat

315 unique occurrences or observations of 33 SGCN were associated with the Hypereutrophic, Medium Alkalinity Lake/Pond habitat. The following SGCN had their Primary Habitat Association with this habitat:

Taxa Group	SGCN	Specific Habitat Requirements
Birds	Blue-winged teal – Breeding (*Anas discors*)	Wetlands, particularly emergent marshes, vernal wetlands, lakes and ponds with emergent aquatic vegetation. Shallow wetlands are preferred, and teal are often associated with wetlands of high quality. Agricultural habitats, especially grasslands, are used for nesting.
Odonates	Mocha emerald (*Somatochlora linearis*)	

No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.

Unclassifiable Lake

Macrogroup: Lakes and Ponds
Area: Pennsylvania: 1,373 acres;
Northeast: 16,542acres

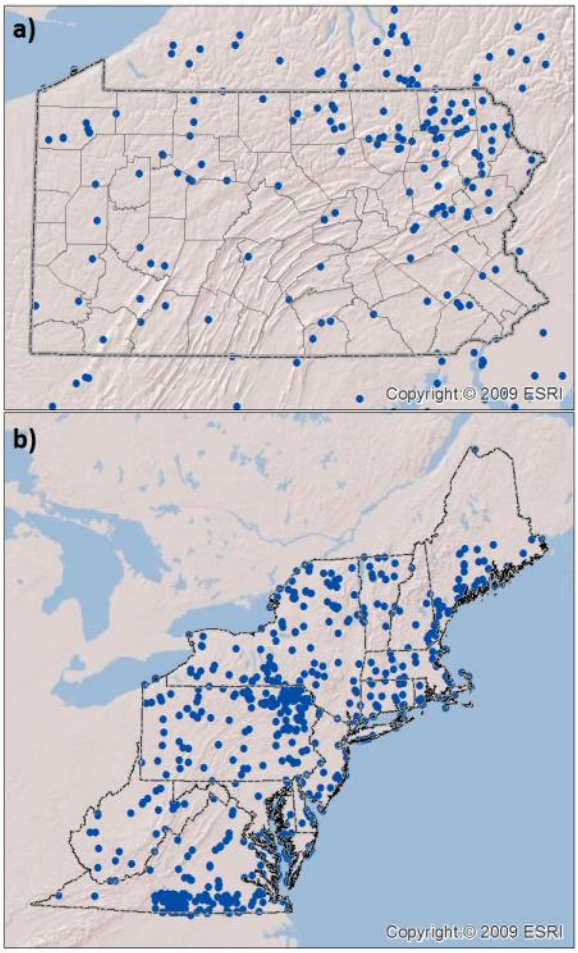
There were 132 Lakes and Ponds of this habitat type mapped within Pennsylvania. The average area for Unclassifiable Lakes was 46.1 acres, ranging from 2.7 to 223.4 acres. The average area for Unclassifiable Ponds was 4.8 acres, ranging from 2 to 29.2 acres.

SGCN Associated with this Habitat

14 unique occurrences or observations of 11 SGCN were associated with the Unclassifiable Lake/Pond habitat. No SGCN had their Primary Habitat Association with this habitat. No SGCN had their Secondary Habitat Association with this habitat.

Condition metrics

No comprehensive lake and pond condition metrics have been calculated for the Northeast, however additional attributes including lacustrine buffer landcover, dams, impervious surface are available as part of the Northeast Lake and Pond Classification which may be useful for determining condition.



Habitat occurrences are increased in size when needed for clarity. This map is a modeled distribution based on current data and is not a substitute for field based inventory. Contact PNHP for additional information.

Appendix 2.2

PENNSYLVANIA
WILDLIFE ACTION PLAN
2015–2025

Crosswalk from the 2005 Pennsylvania Wildlife Action Plan to the Northeast Terrestrial and Aquatic Habitat Classification

The following table shows the linkage between the habitats mapped in the 2005 Pennsylvania Wildlife Action Plan (Plan) compared to what is presented in the 2015 update. This analysis is based on the crosswalk between habitat systems used by northeastern states in previous Wildlife Action Plans provided by (Gawler 2008) and updated to the analysis conducted by The Nature Conservancy (Anderson et al. 2013b) that appears in the 2015 Plan.

Table 1. Crosswalk from the 2005 Pennsylvania Wildlife Action plan to the Northeast Terrestrial and Aquatic Habitat Classifications.

	Formation	Macrogroup	NETHM HABITAT SYSTEM (ESLF)	2005 SWAP Habitat Unit	NLCD Representation
Terrestrial Habitats	Agricultural	Agricultural	Agricultural (81-82)	Grassland Habitats – Farmland	Cultivated Crops (82)
					Pasture/Hay (81)
	Northeastern Upland Forest	Central Oak-Pine	Allegheny-Cumberland Dry Oak Forest and Woodland	Deciduous/Mixed Forest (upland)	Deciduous Forest (41)
			Central Appalachian Dry Oak Pine Forest	Deciduous/Mixed Forest (upland)	Mixed Forest (43)
			Central Appalachian Pine-Oak Rocky Woodland	Coniferous Forest (upland)	Mixed Forest (43)
				Deciduous/Mixed Forest (upland)	Mixed Forest (43)
				Thicket/Shrub Habitats - Naturally occurring barrens	Mixed Forest (43)
			Northeastern Interior Dry-Mesic Oak Forest	Deciduous/Mixed Forest (upland)	Deciduous Forest (41)
			Northern Atlantic Coastal Plain Hardwood Forest	Deciduous/Mixed Forest (upland)	Deciduous Forest (41)
			Southern Appalachian Montane Pine Forest and Woodland	Coniferous Forest (upland)	Evergreen Forest (42)
				Thicket/Shrub Habitats - Naturally occurring barrens	Evergreen Forest (42)
		Northern Hardwood & Conifer	Appalachian (Hemlock)- Northern Hardwood Forest	Coniferous Forest (upland)	Mixed Forest (43)
				Deciduous/Mixed Forest (upland)	Mixed Forest (43)
			Laurentian-Acadian Northern Hardwoods Forest	Deciduous/Mixed Forest (upland)	Deciduous Forest (41)
			Laurentian-Acadian Northern Pine-(Oak) Forest	Coniferous Forest (upland)	Evergreen Forest (42)
			Laurentian-Acadian Pine Hemlock-Hardwood Forest	Coniferous Forest (upland)	Mixed Forest (43)
				Deciduous/Mixed Forest (upland)	Mixed Forest (43)
			North-Central Interior Beech Maple Forest	Deciduous/Mixed Forest (upland)	Deciduous Forest (41)
			South-Central Interior Mesophytic Forest	Deciduous/Mixed Forest (upland)	Deciduous Forest (41)
	Cliff & Rock	Cliff and Talus	Calcareous Cliff and Talus	Rock Habitats	Barren Land (31)
			Acidic Cliff and Talus		
			Circumneutral Cliff and Talus		
	Coastal Scrub-Herb	Coastal Grassland & Shrubland	Great Lakes Dune and Swale	Grassland Habitats - Naturally occurring barrens	Grassland/Herbaceous (72)
				Sandy Beach Habitats	Grassland/Herbaceous (72)
	Freshwater Marsh	Emergent Marsh	Laurentian-Acadian Freshwater Marsh	Wetlands - Emergent Freshwater	Emergent Herbaceous Wetland (95)
		Wet Meadow / Shrub Marsh	Laurentian-Acadian Wet Meadow-Shrub Swamp	Wetlands - Scrub/Shrub Swamps	Emergent Herbaceous Wetland (95)
	Grassland & Shrubland	Glade, Barren, and Savanna	Eastern Serpentine Woodland	Grassland Habitats - Naturally occurring barrens	Mixed Forest (43)
			Central Appalachian Alkaline Glade and Woodland	Deciduous/Mixed Forest (upland)	Grassland/Herbaceous (72)
				Grassland Habitats - Naturally occurring	Grassland/Herbaceous (72)

				barrens	
			Appalachian Shale Barrens	Deciduous/Mixed Forest (upland)	Mixed Forest (43)
				Rock Habitats	Mixed Forest (43)
		Ruderal Shrubland & Grassland	Ruderal Upland - Old Field (8301)	Thicket/Shrub Habitats - Temporal Shrubland/Thickets	Scrub/Shrub (52) OR Grassland/Herbaceous (72)
	Peatland	Northern Peatland	North-Central Interior and Appalachian Acidic Peatland	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
				Wetlands - Scrub/Shrub Swamps	Woody Wetlands (90)
	Northeastern Wetland Forest	Northern Swamp	North-Central Appalachian Acidic Swamp	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
			North-Central Interior and Appalachian Rich Swamp	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
			Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
		Central Hardwood Swamp	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
			North-Central Interior Wet Flatwoods	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
		Large River Floodplain	Central Appalachian River Floodplain	Riparian Thickets/Forests	Woody Wetlands (90)
			North-Central Interior Large Floodplain	Riparian Thickets/Forests	Woody Wetlands (90)
		Tidal Swamp	North Atlantic Coastal Plain Tidal Swamp		
		Coastal Plain Swamp	Northern Atlantic Coastal Plain Basin Swamp and Wet Hardwood Forest	Wetlands - Forested Wetlands and Bogs	Woody Wetlands (90)
	Salt Marsh	Tidal Marsh	North Atlantic Coastal Plain Tidal Salt Marsh		
	Developed	Urban/Suburban Built	Developed (21-24)	Anthropogenic Habitats (Urban/Suburban)	Developed, Open Space (21) Developed, Low Intensity (22) Developed, Medium Intensity (23) Developed, High Intensity (24)
		Extractive	Quarries/Pits/Stripmines (32)	Grassland Habitats - Reclaimed Surface Mines	Barren Land (31)
Aquatic Habitats	Lotic	Headwaters and Creeks	High Gradient, Cold, Headwaters and Creeks	Streams and Rivers were represented in the 2005 SWAP by aquatic flowlines from a DEP dataset. No specific habitats were spatially mapped but the SWAP did present the concept of stream size and placement in the drainage hierarchy as a way to understand the aquatic system.	
			High Gradient, Cool, Headwaters and Creeks High Gradient, Warm, Headwaters and Creeks		
			Moderate Gradient, Cold, Headwaters and Creeks		
			Moderate Gradient, Cool, Headwaters and Creeks		
			Moderate Gradient, Warm, Headwaters and Creeks		
			Low Gradient, Cool, Headwaters and Creeks		
			Low Gradient, Warm, Headwaters and Creeks		
		Small Rivers	Moderate Gradient, Cool, Small River		
			Moderate Gradient, Warm, Small River		
			Low Gradient, Cool, Small River		
			Low Gradient, Warm, Small River		

	Medium Rivers	Cool, Medium River	
		Warm, Medium River	
	Large Rivers	Warm, Large River	
	Tidal Headwaters and Creeks	Tidal Headwaters and Creeks	
	Tidal Small-Medium Rivers	Tidal Small-Medium Rivers	
	Tidal Large Rivers	Tidal Large Rivers	
Lentic	Lakes & Ponds	Oligotrophic, Medium Alkalinity Lake	Lakes and Ponds were covered under the Wetlands section in the 2005 SWAP
		Oligotrophic, Low Alkalinity Lake	
		Mesotrophic, High Alkalinity Lake	
		Mesotrophic, Medium Alkalinity Lake	
		Mesotrophic, Low Alkalinity Lake	
		Eutrophic, High Alkalinity Lake	
		Eutrophic, Medium Alkalinity Lake	
		Eutrophic, Low Alkalinity Lake	
		Hypereutrophic, High Alkalinity Lake	
		Hypereutrophic, Medium Alkalinity Lake	
		Unclassifiable Lake	