

Bitternut Hickory Floodplain Forest



System: Palustrine

Subsystem: Forest

PA Ecological Group(s): River Floodplain

Global Rank: G2G4

State Rank: S3

General Description

This forest occurs on mid to high floodplain terraces of mid- to large-sized rivers. It is currently documented from the Delaware, Allegheny, and Cheat rivers and probably occurs on other rivers within the region. Flood frequency is unknown, but it is likely flooded less often than Sycamore – Mixed Hardwood Floodplain Forest and Silver Maple Floodplain Forest found on lower floodplain terraces. Soils on these stabilized terraces are derived from alluvial deposits and consist of fine sandy loams and loamy fine sand.

The canopy is usually somewhat open, although occasionally closed, dominated by bitternut hickory (*Carya cordiformis*). Co-dominant or associate canopy species include northern red oak (*Quercus rubra*), butternut (*Juglans cinerea*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), white ash (*Fraxinus americana*), and silver maple (*Acer saccharinum*). The relatively sparse subcanopy is similar to the canopy layer and may also include hornbeam (*Carpinus caroliniana*), red maple (*Acer rubrum*) and sugar maple (*Acer saccharum*).

The shrub layer is usually sparse and includes occasional saplings of canopy and subcanopy species, as well as opportunistic native and exotic shrubs such as multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese barberry (*Berberis thunbergii*), black raspberry (*Rubus occidentalis*), and prickly dewberry (*Rubus flagellaris*). The herbaceous layer is weedy, with invasive exotic species common or dominant, including Japanese stiltgrass (*Microstegium vimineum*), garlic-

mustard (*Alliaria petiolata*), and gill-over-the-ground (*Glechoma hederacea*). Common native species include white-snakeroot (*Ageratina altissima* var. *altissima*), Virginia waterleaf (*Hydrophyllum virginianum*), and sedges (*Carex* spp).

Rank Justification

National or subnational conservation status not yet assessed.

Identification

- Found in mid to high floodplain terraces of mid- to large-sized rivers
- Somewhat open canopy dominated or co-dominated by bitternut hickory
- Soils are derived from alluvial deposits and consist of fine sandy loams and loamy fine sand

Characteristic Species

Trees

- [Bitternut hickory \(*Carya cordiformis*\)](#)
- [American beech \(*Fagus grandifolia*\)](#)
- [Sycamore \(*Platanus occidentalis*\)](#)
- [Silver maple \(*Acer saccharinum*\)](#)
- [Sugar maple \(*Acer saccharum*\)](#)
- [Wild black cherry \(*Prunus serotina*\)](#)
- [White ash \(*Fraxinus americana*\)](#)
- [Green ash, red ash \(*Fraxinus pennsylvanica*\)](#)
- [Hornbeam \(*Carpinus caroliniana*\)](#)

Shrubs

- [Black raspberry \(*Rubus occidentalis*\)](#)
- [Prickly dewberry \(*Rubus flagellaris*\)](#)

Herbs

- [White-snakeroot \(*Ageratina altissima* var. *altissima*\)](#)
- [Virginia waterleaf \(*Hydrophyllum virginianum*\)](#)

- [Sedges \(*Carex* spp.\)](#)

Vines

- [Poison-ivy \(*Toxicodendron radicans*\)](#)

Exotic Species

- [Multiflora rose \(*Rosa multiflora*\)](#)
- [Morrow's honeysuckle \(*Lonicera morrowii*\)](#)
- [Japanese barberry \(*Berberis thunbergii*\)](#)
- [Japanese stiltgrass \(*Microstegium vimineum*\)](#)
- [Garlic-mustard \(*Alliaria petiolata*\)](#)
- [Gill-over-the-ground \(*Glechoma hederacea*\)](#)

International Vegetation Classification Associations:

[Bitternut Hickory - Black Cherry / White Snakeroot Forest](#) (CEGL006445)

NatureServe Ecological Systems:

[Central Appalachian River Floodplain](#) (CES202.608)

Origin of Concept

Perles, S. J., G. S. Podniesinski, E. Eastman, L. A. Sneddon, and S. C. Gawler. 2007. Classification and Mapping of Vegetation and Fire Fuel Models at Delaware Water Gap National Recreation Area. Technical Report NPS/NER/NRTR—2007/076. National Park Service. Philadelphia, PA.

Pennsylvania Community Code

SX : Miscellaneous Palustrine/Floodplain Forest

Similar Ecological Communities

Bitternut Hickory Floodplain Forest and Silver Maple Floodplain Forest can have similar species and position on the floodplain. Bitternut Hickory Floodplain Forest is distinguished by the dominance of bitternut hickory (*Carya cordiformis*) while Silver Maple Floodplain Forest is dominated by silver maple (*Acer saccharinum*). Bitternut Hickory Floodplain Forest and Sugar Maple – Mixed Hardwood Floodplain Forest can have similar species and position on the floodplain. Bitternut Hickory Floodplain Forest is distinguished by the dominance of bitternut hickory (*Carya cordiformis*) while Sugar Maple – Mixed Hardwood Floodplain Forest is dominated by sugar maple (*Acer saccharum*).

Fike Crosswalk

None. This type is new to the Pennsylvania Plant Community Classification developed from NPS Community Classification and mapping studies along the Delaware River and floodplain classification studies in the Ohio River Basin.

Conservation Value

The community is an important part of the river floodplain ecosystem, which provides significant ecosystem services such as sediment control, filtering runoff, and cooling overland flow of water, in addition to wildlife habitat. Great blue herons (*Adrea herodias*) nest in colonies on river floodplains near their riverine foraging areas. Standing dead trees (snags) provide cavities for bats, wood ducks (*Aix sponsa*), and other cavity nesting species. Large contiguous floodplain forests provide important habitat for wildlife species requiring large blocks of interior forest, such as neotropical migrants. The dominant species in this community, bitternut hickory (*Carya cordiformis*), produces mast seed which serves an important role as a food source in mammal population dynamics.

Due to the widespread conversion to agriculture and development, large patches of floodplain forest are uncommon in Pennsylvania and have high conservation significance. Within the river floodplain system, Bitternut Hickory Floodplain Forests are rare and are limited to small patches often occurring within a greater more diverse complex of communities.

Threats

Alteration to the frequency and duration of flood events and development of the river floodplains are the two greatest threats to this community statewide and can lead to habitat destruction and/or shifts in community function and dynamics. Non-native invasive plants may be equally devastating as native floodplain plants are displaced. Development of adjacent land can lead to an accumulation of agricultural run-off, sedimentation, and pollution.

Management

Direct impacts to the floodplain ecosystems (e.g., road construction, development, filling of wetlands) can greatly alter their composition, structure, and function region-wide. Further impacts that alter riparian function of the remaining areas should therefore be avoided. When development is unavoidable, low impact alternatives (e.g., elevated footpaths, boardwalks, bridges, pervious paving) that maintain floodplain processes should be utilized to minimize impacts to natural areas and the plant and animal species within them. Maintenance of natural buffers surrounding high quality floodplain wetlands is recommended in order to minimize nutrient runoff, pollution, and sedimentation.

Care should also be taken to control and prevent the spread of invasive species into high quality sites.

As floodplains are dependent on periodic disturbance, natural flooding frequency and duration should be maintained and construction of new dams, levees or other in-stream modifications should be avoided. Activities resulting in destabilization of the banks or alteration of the disturbance patterns of the site should be avoided. Numerous land use planning recommendations have been proposed to reduce the negative impacts of changing land use on riparian systems. These include protecting riparian

buffer habitat, retaining natural areas in developed landscapes, compensating for lost habitat, excluding livestock grazing from riparian areas, providing corridors between riparian and upland habitats, avoiding constructing roads and utility lines through riparian habitat areas, and restoring degraded riparian habitat. In general, unaltered and intact river systems are more resilient to environmental stress than human-impacted or engineered river systems.

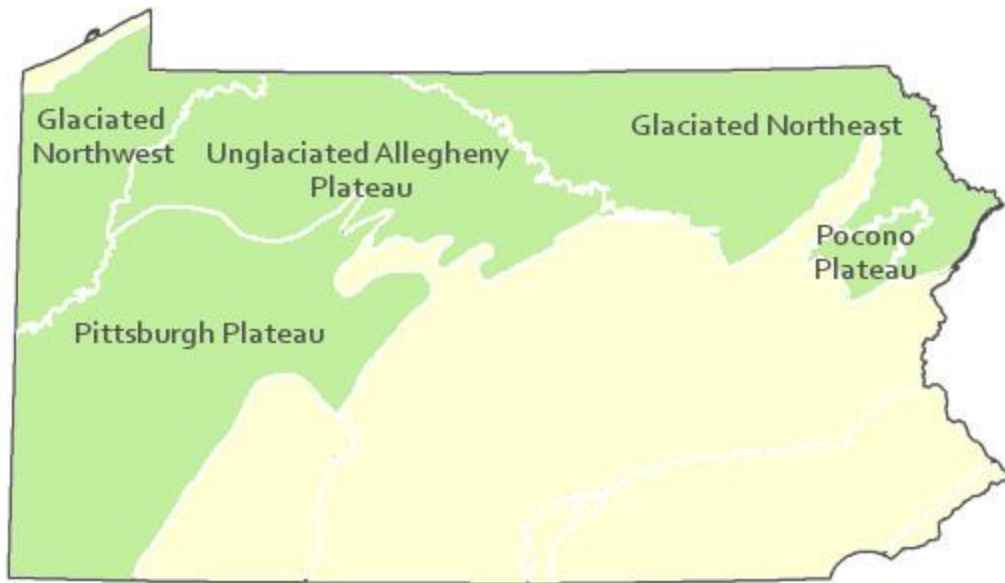
Research Needs

The Bitternut Hickory Floodplain Forest has been documented for the Delaware, Allegheny, and Cheat rivers. However, due to the limited occurrences of this type in the Allegheny, it is unclear how widespread this type is within the basin and how and if it differs from the floodplain forests described for the Delaware and Cheat. Bitternut hickory is often a part of mesic floodplain forests in the Ohio River Basin, and it is unclear if it is a distinct type in the Allegheny, or just part of a broader Silver Maple Floodplain Forest type. More work should be done to document and describe the species composition, environmental settings, and distribution of hickory dominated forests within the upper Ohio River Basin. Additionally, there is need to monitor high quality examples of this community type in the Delaware and to determine the impact of invasive species within this type.

Trends

Bitternut Hickory Floodplain Forests were undoubtedly more common historically and have declined due to dam impoundments, human development, and conversion of rich floodplain sites to agriculture; modification of the adjacent upland has further impacted the quality of this type. Conversion of rich floodplain areas to agriculture probably contributed the most to loss of this type across its range. In addition, as this type is dependent upon nutrient input and disturbance from flowing water, alteration of the natural flooding regime (duration and frequency) also contributed to changes in the composition of this type, as species not able to tolerate periodic inundation were able to gain a foothold. The relative trend for this community is most likely declining slightly due to development; however, new alterations to river hydrology could result in significant changes to this type. High quality examples are most likely declining with invasion of exotic plant species, lack of recruitment due to deer browsing, and lack of periodic flooding events.

Range Map



Pennsylvania Range

This type is found in the High Appalachian Plateau Ecoregion, primarily within the Upper Delaware and Upper Allegheny river basins.

Global Distribution

This type is currently documented from New Jersey, New York, Pennsylvania, and West Virginia.