**Atlantic Coastal Pine Barrens**

**Ecoregion Description**

The Atlantic Coastal Pine Barrens is a disjunct ecoregion covering approximately 6,200 square miles of the coastal plain of New Jersey, Long Island in New York, and Cape Cod, Martha's Vineyard, and Nantucket in Massachusetts, as well as nearby islands. Hydrology, soils, fire regimes, and vegetation combine to distinguish this ecoregion from neighboring ecoregions. The region has a wide variety of ecological systems, including cedar swamps, meadows, stunted pitch pine and oak forests, sphagnum bogs, heathlands, coastal salt ponds, dune systems, and the Nation's only maritime grasslands on Martha's Vineyard and Long Island.

Rainfall averages about 48 inches per year, but the soil is sandy, extremely porous, and drains very quickly. Soils and water in the ecoregion are generally very acidic, which limits naturally occurring flora, fauna, and suitable agricultural crops. Acid-tolerant shrubs, such as those of the heath family (blueberries, laurels, staggerbush), are common. Agricultural activity in many areas is limited to acid-loving crops, such as blueberries and cranberries, although parts of the ecoregion with richer soils support fruits, vegetables, and other crops. Aquatic fauna must also be acid-tolerant, resulting in relatively few species of freshwater fish and amphibians.

Historically, fire is the major disturbance factor influencing vegetation composition in the ecoregion. In its natural state, the landscape is swept by frequent fires, giving the advantage to species able to cope, such as pitch pine, scrub oak, heath shrubs, and bracken fern.

**Historical Land Use and Land Cover**

Early land use and land cover change was based largely on natural resource extraction, especially on the use of vast timber resources. Rot-resistant white cedar was in high demand for shingling, ship building, and other uses. Pitch pine provided a source of strong, dense, high-quality wood for flooring, furniture, construction, and fuel, and the pine's resin was widely used for naval stores. The enormous demand for wood, coupled with uncontrollable forest fires, drastically changed the landscape of the region from its prehistoric form (Berger and Sinton, 1985, 117).

Early in the 19th century, a booming iron industry began. The New Jersey Pine Barrens were rich with "bog iron," natural deposits of iron-rich material. Clam and oyster shells from the shoreline were harvested to provide lime required for smelting, and the vast forestlands provided the fuel. However, the production of bog iron ended by the 1860s, because higher grade iron and coal deposits discovered in Pennsylvania and elsewhere were much more efficient to exploit.
Glass industries also took advantage of the natural resources of the Pine Barrens. The quality of the sands, the abundance of trees for fuel, and the proximity of large urban markets made much of the area ideal for the production of glass products. Twenty glass industries were established by 1800 in the New Jersey Pine Barrens alone, but all had closed by 1870.

Beginning in the 1850s, railroads brought newcomers into the area. The railroads encouraged truck farming, fruit farming, and tourism by linking the region with nearby urban centers. Berry agriculture soon replaced rural industry in parts of the ecoregion. The acid-loving cranberry became a primary crop, given its ability to grow in the poor, acidic soils found throughout much of the ecoregion. A commercially profitable domestic blueberry crop was developed by 1916, yet another acid-loving crop extremely well suited to the region. Other areas of the ecoregion with richer soils, such as Long Island and the part of New Jersey closer to the Delaware River, became agricultural hinterlands to New York City and Philadelphia. Long Island became known for the large quantity of potatoes grown there.

Developed land uses started to expand during the late 19th and early 20th centuries. Resort communities became established on many of the barrier islands along the New Jersey shore, including Atlantic City. The commercial activities associated with seasonal resorts quickly became the backbone of the economy along the New Jersey Shore, Cape Cod, Martha’s Vineyard, and eastern Long Island.

Urban development became a substantial land use change in parts of the ecoregion during the 20th century, especially in the post-World War II automobile-dominated suburbs of the nearby large cities. The western and central sections of Long Island became extensive suburbs of New York City, with Nassau and Suffolk Counties each having more than a million residents by 1970. The greater New York City/northern New Jersey metropolitan area was also encroaching from the north into central New Jersey. The Philadelphia metropolitan area grew into the ecoregion from the west as the New Jersey suburbs expanded. Development in the coastal areas continued as more seasonal and second homes were built along the Jersey shore, Cape Cod, Martha’s Vineyard, and the Hamptons of eastern Long Island.

**Contemporary Land Use and Land Cover Change**

The USGS Land Cover Trends project analyzed land use and land cover change in the Atlantic Coastal Pine Barrens ecoregion using a sampling framework and historical satellite imagery. The overall rates of land cover conversion were generally steady, hovering around 1.5 percent total change per time interval. Of the total landscape, 5.3 percent changed land use/cover types once during the 1973 to 2000 study period, while 0.4 percent changed more than once.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Miles</th>
<th>Transition Type</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973 to 1980</td>
<td>34</td>
<td>Forest to Urban</td>
<td>1.5%</td>
</tr>
<tr>
<td>1980 to 1986</td>
<td>29</td>
<td>Agriculture to Urban</td>
<td>1.7%</td>
</tr>
<tr>
<td>1986 to 1992</td>
<td>8</td>
<td>Mechanically Disturbed to Urban</td>
<td>1.4%</td>
</tr>
<tr>
<td>1992 to 2000</td>
<td>51</td>
<td>Agriculture to Urban</td>
<td>1.5%</td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>Forest to Urban</td>
<td>1.4%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Forest to Mining</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Although overall change rates are relatively low, significant land cover trends are apparent. The table above shows the three most common land cover transitions by time interval, listed in descending order. Note that “Mechanically Disturbed” represents lands that have been altered by human activity, such as the cutting of forestlands for timber. The general trends show gradually increasing developed (urban) land cover, with parallel reductions in the amount of forest and agricultural land. Other forms of land cover conversion were generally minor. Although the total percentage of area changed may seem relatively low, the vast majority of that change was the transformation of other land cover types to urban/developed uses. More than 325 square miles of land was developed from 1973 to 2000, resulting in the loss of 190 square miles of agricultural land, 115 square miles of forest, and 20 square miles of other land cover types.

![Cranberry bog](image1.png)

A cranberry bog in rural New Jersey, ready for harvesting. Cranberries and blueberries, two acid-loving crops, thrive in the Atlantic Coastal Pine Barrens.

![Multidate satellite imagery](image2.png)

Multidate satellite imagery, showing some of the typical changes found in the ecoregion. The image on the left is Landsat multispectral scanner data from 1973, and the image on the right is Landsat enhanced thematic mapper plus data from 1999. Changes in this time span include (1) a new reservoir, (2) new residential developments, mostly at the expense of agricultural land, (3) a new golf course, supporting the high recreational demands in the ecoregion, and (4) ball fields and a park complex.
the heavily developed urban corridor running from Washington, D.C., in the south, through Baltimore, Philadelphia, and New York City, to Boston in the north.

Population Growth: Both overall population and population densities have substantially increased since 1970.

Drivers of Contemporary Land Use Change
Between 1970 and 2000, population in the ecoregion increased 15 percent, from 9.6 to 11.0 million. Locally, population increases have been more dramatic, with Cape Cod experiencing a doubling in population over the same time period (from roughly 100,000 to more than 220,000). Accommodating this growth was the primary driver of landscape change.

Connections with Neighboring Ecoregions
The Atlantic Coastal Pine Barrens has undergone considerably less change, as a percentage of total area, than many of the Eastern United States ecoregions. Overall change was about 1.5 percent for each of the four time intervals, but some eastern ecoregions experienced change as high as 11 percent for a single interval. This can be explained by the relative lack of timber harvesting in the Pine Barrens compared to ecoregions such as the Southeastern Plains and the Middle Atlantic Coastal Plain. Where a thriving timber industry is present, the area represented by clearcuts is generally much higher than that undergoing conversion to developed uses.

Ecoregion Comparison: The Atlantic Coastal Pine Barrens (in red) exhibits less total change per interval than most other Eastern United States ecoregions.

The Atlantic Coastal Pine Barrens lacks a large-scale timber industry, but it is one of the most dynamic eastern ecoregions in terms of increasing urban development. Nearly 4.5 percent of the ecoregion area was converted to developed uses from 1973 to 2000. A similar increase in developed land cover is found in the adjacent Northern Piedmont ecoregion. Combined, these two ecoregions cover much of the Northeastern United States “megalopolis.”

Nonetheless, urban pressures continue to exert a powerful force. The region’s population continues to grow, and many residents desire a less crowded lifestyle than previous generations. Much of the growth occurs at or near major highway intersections and in high-amenity coastal zones. Recently, retirement communities have become a substantial land use development trend. Increased populations, especially those of retired persons with large amounts of free time, have also resulted in an increased demand for recreational facilities, such as golf courses and public beaches.

Increased urbanization in the ecoregion has also resulted in aggressive fire suppression, changing the composition of many of the ecoregion’s plant communities. With prolonged fire...
suppression, vegetational succession leads to the replacement of pine barrens by oak forest. In addition, fire fuel build-up leads to very intense fires that kill all vegetation, including the naturally fire-resistant pitch pines. The impacts of increased land management can thus change land cover composition in areas remote from actual development.

**Future Trends**

Given the continued pressures of expansion from neighboring urban centers, the demand for recreational opportunities in the ecoregion, and the growth of retirement communities, it is expected that urban development will continue to be the primary land use conversion for the foreseeable future. Although the development of forestland outstripped the development of agricultural land during the early part of this study, the development of agricultural land became the increasingly dominant form of urbanization through each time interval. With increased environmental awareness and the desire to protect natural habitats, it is expected that development pressures will result in the continued loss of agricultural land, with somewhat less but still significant pressure on the Pine Barrens.

**Land Cover Trends and The National Map**

Land cover and land use change information provided by the Land Cover Trends project makes up an important component of The National Map. The National Map is a consistent framework for geographic knowledge needed by the Nation. It provides public access to high-quality geospatial data and information from multiple partners to help inform decision-making by resource managers and the public. The National Map enhances America's ability to access, integrate, and apply geospatial data at global, national, and local scales. Web site: www.nationalmap.usgs.gov

**References**


