Chapter 3 Affected Environment

3.1 Introduction

The NiSource facilities and associated NCL include almost 9.8 million acres of land in the eastern United States, comprising portions of 14 states, ranging from Louisiana in the south to New York in the north, with the majority of the NCL area located in the Ohio, West Virginia, and Pennsylvania. The NCL area acreage by state is summarized in **Table 3.1-1**.

Table 3.1-1: Acreage by State

State	Acres	State	Acres
Delaware	2,049	New York	185,422
Indiana	88,599	North Carolina	936
Kentucky	499,418	Ohio	3,219,472
Louisiana	485,622	Pennsylvania	1,694,423
Maryland	371,784	Tennessee	122,393
Mississippi	140,909	Virginia	446,248
New Jersey	43,335	West Virginia	2,475,988

The NCL includes almost every type of environment and land use found in the eastern United States. From the swamps of the Mississippi delta, to the fields of the central plains, to the parklands of the central Appalachians, and into the heavily urbanized northeastern states, an immense variety of land forms and processes comprise the NCL area. Although site descriptions of every distinct variation would not be feasible for the scope of this document, general patterns are identified and described.

This section describes existing and historical conditions of the proposed NCL area. See the subsections below:

3.2 Physical Resources

This provides background information on physical resources such as geology, soils, water, and climate for the 14-state area that comprise the NCL. Section topics summarize surface water, ground water, geology, topography, hazardous materials, and soils within the NCL and in surrounding regions.

3.2.1 Surface Water

Surface water includes all forms of natural water found above the ground surface; such as lakes, ponds, rivers, streams, and springs. Semi-permanent manmade water features can also be included, such as reservoirs, retention ponds, ponds, canals, and regularly flooded ditches. Due to the multi-state extent of NiSource facilities, surface waters will be described as part of a system rather than as individual features. The NCL area will be described in terms of Hydrologic Units.

The United States is divided into a series of Hydrologic Units, often described as drainage areas or watersheds. Hydrologic units describe how a piece of land is drained in an ascending series of greater geographic generalization. The tiered system is made up of cataloging units, which describe part or all of a surface drainage basin, a combination of drainage basins, or a distinct large hydrologic feature. Multiple cataloging units are combined to form accounting units, which are further combined to make the more general hydrologic subregions. These subregions are then combined to form hydrologic regions. Each hydrologic unit is identified by a unique Hydrologic Unit Code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system (Seaber et al 1987).

The first tier of classification, hydrologic region, divides the United States into 21 major geographic areas. A hydrologic region geographically describes either the drainage area of a major river, such as the Missouri River of the Missouri Region, or the combined drainage areas of a series of linked rivers, such as the majority of rivers draining into the western Gulf of Mexico that form the Texas-Gulf Region. Eighteen of these regions form the conterminous United States (Seaber et al 1987). The NCL area falls within seven of these regions. The key regions include the Ohio (64-percent of the NCL area), Mid-Atlantic (21-percent of the NCL area), Great Lakes (7-percent of the NCL area), and Lower Mississippi (6-percent of the NCL area). See **Figure 3.2-1** for location of these regions. A list of regions crossed and the percent of the area they comprise can be found in **Table 3.2-1**.

The second tier of classification, hydrologic subregion, divides the 21 regions into 221 subregions. A subregion geographically describes the area drained by a river system, a reach of a river and its tributaries in that reach, a closed basin, or a group of streams

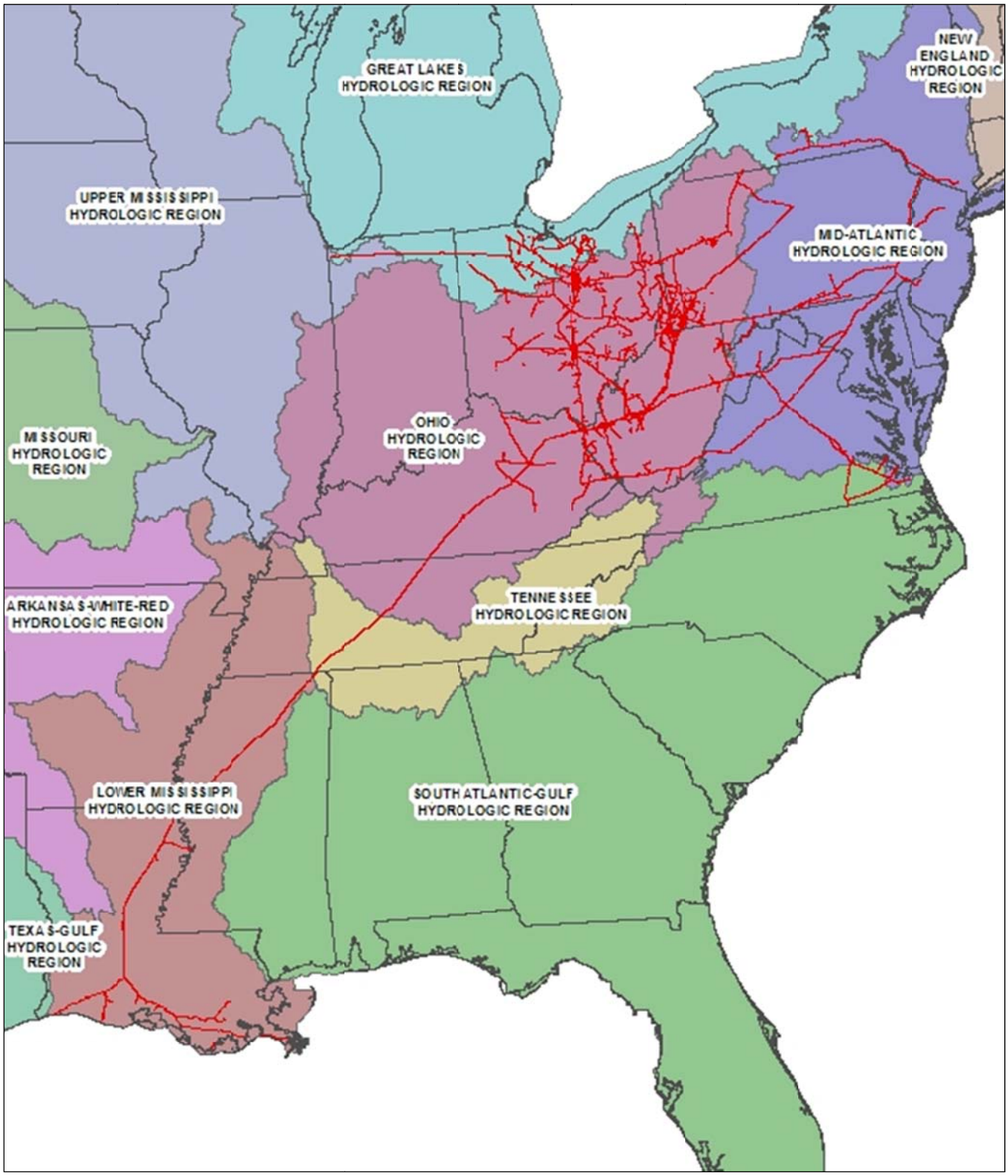
forming a coastal drainage area (Seaber et al 1987). The NCL area crosses 36 subregions within the seven regions (see **Table 3.2-1**).

Table 3.2-1: Regional and Subregional Watersheds within the NCL

Subregion HUC Code	Regional Watershed Name	Subregional Watershed Name	Acres by Subregional Watershed	Percent of NCL by Region
0202	Mid-Atlantic Region	Upper Hudson	13,450	20.45
0203		Lower Hudson-Long Island	38,527	
0204		Delaware	178,824	
0205		Susquehanna	736,436	
0206		Upper Chesapeake	38,519	
0207		Potomac	767,698	
0208		Lower Chesapeake	227,039	
0301	South Atlantic-Gulf Region	Chowan-Roanoke	99,904	1.02
0404	Great Lakes Region	Southwestern Lake Michigan	13,027	6.66
0405		Southeastern Lake Michigan	26,439	
0410		Western Lake Erie	441,240	
0411		Southern Lake Erie	148,546	
0413		Southwestern Lake Ontario	4,684	
0414		Southeastern Lake Ontario	17,667	
0501	Ohio Region	Allegheny	190,954	64.43
0502		Monongahela	784,125	
0503		Upper Ohio	1,795,906	
0504		Muskingum	1,314,812	
0505		Kanawha	761,206	
0506		Scioto	466,442	
0507		Big Sandy-Guyandotte	322,317	
0508		Great Miami	32,698	
0509		Middle Ohio	286,484	
0510		Kentucky-Licking	229,642	
0511		Green	69,150	
0513		Cumberland	50,043	
0604	Tennessee Region	Lower Tennessee	69,442	0.71
0712	Upper Mississippi Region	Upper Illinois	34,518	0.35
0801	Lower Mississippi Region	Lower Mississippi-Hatchie	20,350	6.37
0803		Lower Mississippi - Yazoo	123,369	
0804		Lower Red - Ouachita	40,896	
0805		Boeuf-Tensas	77,964	
0806		Lower Mississippi - Big Black	1,802	
0808		Louisiana Coastal	233,324	
0809		Lower Mississippi	125,757	

Source: U.S. Geological Survey (USGS) 1994

Figure 3.2-1: Hydrological Units



Source: USGS 1994

Hydrology and Watershed Information

The NCL area includes portions of seven hydrologic regions, with 36 associated hydrologic subregions. This section contains a description of the hydrologic units and the properties, distribution, and the biological, recreational, and economic importance of the main water bodies within these units.

- **The Mid-Atlantic Region** is comprised of almost 72-million acres and contains a number of sensitive hydrologic features. The Delaware River estuary contains the largest world-wide population of horseshoe crabs and provides important habitat for migratory birds and spawning fish. It is also significant to regional economic, recreational, and cultural activities. The Barnegat, Peconic, Delaware Inland, and Maryland Coastal Bays, along with the New York/New Jersey Harbor are designated as Estuaries of National Significance and are significant to regional economies. Lake Champlain is a key regional recreational center. Additionally, the Catskill Watershed in the upper Delaware River Basin provides the fresh water supply for New York City (SCC 2007).

  The Mid-Atlantic Region comprises 21-percent of the NCL area. The region includes all of the areas that discharge into the Atlantic Ocean between New York and Virginia; the Long Island Sound south of the New York - Connecticut border; and the Riviere Richelieu. It covers all of Delaware, New Jersey, and District of Columbia along with portions of Connecticut, Maryland, Massachusetts, New York, Pennsylvania, Vermont, Virginia, and West Virginia (USGS 2007a).

  Portions of seven subregions of the Mid-Atlantic Region are within the NCL area. The Upper Hudson subregion covers the Hudson River Basin to the Popolopen Brook Basin just upstream from the Bear Mountain Ridge. The Lower Hudson-Long Island subregion covers the coastal drainage and associated waters from the Byram River Basin to the Manasquan River Basin. The Delaware subregion covers the coastal drainage and associated hydrology from the Manasquam River Basin to the Delaware River Basin. The Susquehanna subregion covers the Susquehanna River Basin. The Upper Chesapeake subregion covers the Chesapeake Bay and its tributaries north of the Maryland-Virginia boundary. The

Potomac subregion covers the Potomac River Basin. The Lower Chesapeake subregion covers the Chesapeake Bay and its tributaries south of the Maryland-Virginia boundary (USGS 2007a).

- **The South Atlantic-Gulf Region** covers over 177-million acres with the largest abundance of surface waters in the contiguous U.S. as well as the longest coast of any regional watershed (SCC 2007).

  The South Atlantic-Gulf Region comprises 1-percent of the NCL area. The region encompasses all of the areas that discharge into the Atlantic Ocean between Virginia and Florida; the Gulf of Mexico between Florida and Louisiana; and all of the associated waters. It covers all of Florida and South Carolina along with portions of Alabama, Georgia, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia (USGS 2007a).

  One South Atlantic-Gulf Region subregion falls within the NCL area. The Chowan-Roanoke subregion covers the coastal drainage and associated hydrology from the Back Bay drainage to the Oregon Inlet (USGS 2007a).

- **The Great Lakes Region** covers over 111-million acres. The region contains almost 6-quadrillion gallons of fresh surface water, approximately 95-percent of the U.S. supply or 20-percent of the world supply. The region consists of 4,500-miles of shoreline on the U.S. side, 300,000-acres of wetlands, 35,000 islands, 20-percent of U.S. forests, and 20-percent of U.S. manufacturing (SCC 2007).

  The Great Lakes Region covers seven percent of the NCL area. The region comprises all of the areas that discharge into the Great Lakes, along with the lake surfaces, and the St. Lawrence River to the Riviere Richelieu drainage boundary. It covers portions of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin (USGS 2007a).

  Portions of six Great Lakes Region subregions are within the NCL area. The Southwestern Lake Michigan subregion covers the Lake Michigan drainage between the St. Joseph River Basin and the Milwaukee River Basin. The Southeastern Lake Michigan subregion covers the Lake Michigan drainage between the St. Joseph River Basin and the Grand River Basin. The Western

Lake Erie subregion covers the Lake Erie drainage between the Huron River Basin and the Vermilion River Basin. The Southern Lake Erie subregion covers the Lake Erie drainage between the Vermilion River Basin and the Ashtabula River Basin. The Southwestern Lake Ontario subregion covers the Lake Ontario drainage between the Niagara River Basin and the Genesee River Basin. The Southeastern Lake Ontario subregion covers the Lake Ontario drainage between Genesee River Basin and the Stony Creek Basin (USGS 2007a).

- **The Ohio Region** covers over 104 million acres. The region is primarily drained by tributaries, with less than five percent of the region draining directly into the Ohio River. The Allegheny and Monongahela merge at the border of the Mid-Atlantic Region to form the headwaters of the Ohio River, which flows 981 miles south and drains into the Mississippi River. The Ohio River provides drinking water for more than three million people, and approximately ten percent of the U.S. lives within the region. The river provides important habitat for numerous species along with providing recreation, power generation, and cargo transportation (SCC 2007).

  The Ohio Region covers the majority (64 percent) of the NCL area. The region comprises the drainage area of the Ohio River Basin, excluding the area of the Tennessee River Basin. It covers portions of Illinois, Indiana, Kentucky, Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia (USGS 2007a).

  Portions of twelve Ohio Region subregions are within the NCL area. The Allegheny, Monongahela, Muskingum, Kanawha, Scioto, Great Miami, Green, and Cumberland subregions cover the river basins of the same name. The Upper Ohio subregion covers the Ohio River basin between the confluence of the Allegheny and Monongahela basins and the confluence of the Kanawha River basin, excluding the Muskingum River basin. The Big Sandy-Guyandotte subregion covers the Big Sandy and Guyandotte River basins. The Middle Ohio subregion covers the Ohio River basin between Kanawha and Kentucky River basins, excluding the Big Sandy, Great Miami, Guyandotte, Kentucky, Licking and Scioto River basins. The Kentucky-Licking subregion covers the Licking and Kentucky River basins (USGS 2007a).

- **The Tennessee Region** is one of the smallest in the country, covering slightly more than 26 million acres. The northern boundary of the region marks the southern boundary of historic glaciations from the last ice age. The aquatic species of the north meet those of the south in this region, forming one of the most diverse freshwater aquatic habitats on the planet (SCC 2007).

  The Tennessee Region comprises one percent of the NCL area. The region comprises all of the drainage area of the Tennessee River Basin. It covers portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia (USGS 2007a).

  One Tennessee Region subregion falls within the NCL area. The Lower Tennessee subregion covers the Tennessee River Basin below the Pickwick Dam (USGS 2007a).

- **The Upper Mississippi Region** covers over 121 million acres. The region begins in the forested lakes region of northern Minnesota and Wisconsin, stretching south to the St. Louis, Missouri area. It flows through a dense mosaic of residential, industrial, and rich agricultural lands. Demands on the river include use as habitat, recreation, water supply, and shipping (SCC 2007).

  The Upper Mississippi Region comprises 0.4 percent of the NCL area. The region comprises all of the drainage area of the Mississippi River Basin above the confluence with the Ohio River, excluding the area of the Missouri River Basin. It covers portions of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, South Dakota, and Wisconsin (USGS 2007a).

  One Upper Mississippi Region subregion falls within the NCL area. The Upper Illinois subregion covers the Illinois River Basin above the confluence of the Fox River Basin (USGS 2007a).

- **The Lower Mississippi Region** covers over 67 million acres. Major hydrologic features in the region, in addition to the Mississippi River, include the Lower Atchafalaya River, Wax Lake outlet, Atchafalaya Bay, Atchafalaya River and Bayou Chene, Boeuf, and Black navigation channels. The river is important for

regional agriculture, commercial fishing, shipping, and is part of a primary avian migration path (SCC 2007).

The Lower Mississippi Region covers six percent of the NCL area. The region comprises the drainage area of the Mississippi River below the confluence with the Ohio River, excluding the Arkansas, Red, and White River Basins above the high-backwater line. The region also includes the coastal streams that discharge into the Gulf of Mexico between the Pearl River Basin and Sabine River drainage boundaries. It covers portions of Arkansas, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee (USGS 2007a).

Portions of seven Lower Mississippi Region subregions are within the NCL area. The Lower Mississippi-Hatchie subregion covers the Mississippi River basin between the confluence of the Ohio River through the Horn Lake Creek basin, excluding the drainage west of the West-Bank Levee. The Lower Mississippi-Yazoo subregion covers the Mississippi River basin between the Arkansas River basin and the Yazoo River basin, excluding the drainage west of the West-Bank Levee. The Lower Red-Ouachita subregion covers Red River basin below the Bayou Rigolette basin, excluding the Boeuf and Tensas River basins. The Boeuf-Tensas subregion covers the Boeuf and Tensas River basins. The Lower Mississippi-Big Black subregion covers the Mississippi River basin between the Yazoo River basin and the Lower Old River drainage boundary, excluding the drainage west of the West-Bank Levee. The Louisiana Coastal subregion covers the Louisiana coastal drainage, including associated islands and waters, south of the Red River basin and west of the East-Bank Levee of the Atchafalaya basin floodway to the Sabine River and Lake drainage boundary. The Lower Mississippi subregion covers the Mississippi River basin below the Bonnet Carre Floodway and Coastal drainage, from the Pearl River basin boundary and the Mississippi-Louisiana border to the East-Bank Levee of the Atchafalaya, excluding the drainage from the north into Lake Pontchartrain, east to the Tchefuncta River drainage boundary, and excluding the Lower Grand River basin (USGS 2007a).

Water Quality

Water quality is a critical component of all site descriptions and planning processes. This section generally describes water quality and potential water quality issues within each of the hydrologic regions described in **Section 3.2.1**.

- **The Mid-Atlantic Region's** water quality as recently as 20 years ago was seriously imperiled due to discharge of untreated sewage and wastes into regional waters. Since that time, water quality has improved due to required industrial waste treatment and upgrades in sewage treatment facilities. However, pollution is still a large problem in the region, especially from agriculture, urban runoff, and abandoned mine drainage. Key issues in the region include the following (SCC 2007):

    - **Water Quality and Toxic Contaminants**: The Delaware Estuary, a critical biological, recreational, commercial, and cultural area, has continuing problems with water clarity and contaminants associated with urbanization and industrialization. The region has one of the highest levels of chemical contaminants in fish and shellfish populations in the country. Although clean-up efforts are underway, much progress is still needed.

    - **Development and Urbanization**: Many of the regional bays and harbors are experiencing continued growth with associated increases in water pollution as a result of runoff and sewage. Although many of these bays are among the least degraded within the region, they are increasingly threatened by urbanization. Nutrient enrichment from agricultural runoff is a problem, resulting in low dissolved oxygen levels that negatively impact aquatic organisms.

    - **Protection of the Lake Champlain Basin**: Lake Champlain was designated as a resource of national significance in 1990. This designation led to the planning and implementation of pollution prevention, pollution control, and restoration measures to this important part of the regional hydrology.

  - **Wetlands Protection**: Wetlands protection is an important issue in the region, and many wetlands areas are recognized as being internationally important. Wetland loss and fragmentation are ongoing concerns in the region.

- **The South Atlantic-Gulf Region** contains the greatest quantity of surface water and shoreline of any region in the contiguous U.S. Given the quantity and variety of hydrology in the region, water quality is of concern of the region. Key issues in the region include (SCC 2007):

  - **Industry and Shipping**: The region boasts the highest abundance of major industrial permittees and the largest quantity of water-borne trade in the U.S., highlighting the potential for large quantities of industrial and transportation related pollution.

  - **Population Growth**: Regional population growth in recent years has focused in the potentially sensitive coastal regions.

  - **Urbanization and Water Projects**: Urban expansion and related construction projects are leading causes of regional water quality impairment in the form of nutrient over-enrichment, sedimentation, and pathogen loading. Increases in impervious surfaces, along with channelization of streams, large dams, and introduced exotic vegetation are producing major changes to the natural hydrology.

  - **Changing Weather Patterns**: Southern portions of the region have suffered from a five-year drought in recent years. In contrast, the northern coast has seen unprecedented flooding due to hurricanes. Changes in weather patterns, if continued over long periods, will lead to an alteration of regional water resources.

- **The Great Lakes Region** boasts one of the largest concentrations of open fresh water worldwide, but the region also hosts a large portion of the U.S. population and industry, leading to potential conflicts regarding water quality. The following key issues have been identified for the region (SCC 2007):

- **Toxic Chemical Contamination**: All of the Great Lakes have multiple fish consumption advisories due to toxic chemical contamination. Contaminated sediments and air deposition from regional and global sources introduce pollutants to the lakes. In addition, many regional beaches are periodically closed due to pollution from storm events and overflows/leaks from the region's outdated sewage systems.

- **Invasive Species**: Upwards of 160 non-native invasive species have been introduced to the Great Lakes ecosystem, disrupting regional food-webs. These species can have severe economic impacts as well as impacts to recreational and commercial aquatic opportunities in the region.

- **Habitat Loss**: Urbanization and urban sprawl continue to threaten regional ecosystems.

- **The Ohio Region** serves a large population that uses the Ohio River as a potable water source. Additionally, large quantities of regional agriculture, power generation, and barge transportation depend upon the Ohio River. Concerns related to nonpoint source pollution from urban runoff, agricultural activities, and abandoned mines are growing in the region. Identified key issues include (SCC 2007):

  - **Dioxin**: The upper two-thirds of the Ohio River have been studied extensively for dioxin contamination, with concentrations exceeding standards in the Pittsburgh, Pennsylvania; Marietta, Ohio; and Kanawha River junction areas.

  - **Combined Sewer Overflows**: In older cities in the region with combined storm and sanitary sewers, large storm events have been shown to overload the system, leading to overflows of both storm water and untreated human and industrial waste, which results in direct discharges to regional hydrology.

- **Acid Mine Drainage**: Abandoned coal mines in the Three Rivers Area / Monongahela River Watershed are a leading cause of regional water degradation due to high acid and metal drainage from the historic mines.

- **Growth and Urbanization**: Expansion of regional development has led to increased sedimentation, turbidity, nutrient levels, and urban runoff. Thermal pollution in regional industrial discharges has also been identified as a potential problem for aquatic communities and water quality.

- **The Tennessee Region** has one of the highest freshwater aquatic diversities in the world, making water quality an extremely important regional issue. Key regional issues include the following (SCC 2007):

  - **Hydroelectric Dams**: The TVA manages multiple dams in the region, providing one of the most profound impacts to regional watersheds and communities, with heavy development around the resulting reservoirs. However, the TVA balances this by operating one of the largest federal watershed assistance and management programs in the country.

  - **Mining**: Both historic and present-day mining has led to water quality impacts related to sediment and polluted runoff and debris loading in lowland stream areas.

  - **Urban and Suburban Sprawl:** Due to population growth, urbanization is increasing at an alarming rate in the region, resulting in increases to impervious surfaces, run-off, and sewage loads.

  - **Water Quality Impairment**: Studies have identified nutrient enrichment, sedimentation, and pathogens as the leading causes of water quality impairment in the region.

- **Upper Mississippi Region** water quality is relatively pristine in the northern headwater areas but quickly becomes polluted by the time it reaches the southern limit of the region in St. Louis, Missouri. The following key issues have been identified for the region (SCC 2007):

- **Polluted Runoff**: Pollution due to runoff comes from municipal, industrial, and agricultural sources. Chemicals, sediments, and fertilizer introductions degrade regional water quality. . Excessive nutrient inputs from this region contribute to hypoxia in the Gulf of Mexico.

- **Industrial and Municipal Pollution**: Point source pollution from regional municipalities and industry is also a growing problem.

- **Wetlands Loss**: Loss of regional wetlands, which naturally filter runoff waters before they are introduced into the river system, is also leading to a general lowering of regional water quality

- **Lock and Dam System**: In addition to impacting regional wildlife communities, impoundments result in permanent flooding of historic wetlands and further contribute to the loss of wetlands in the area.

- **Organic Waste**: Impoundments not only flood historic wetlands, but they also trap sediments and municipal/industrial pollutants, which build up over time in these stagnant pools leading to both high pollutant loads and oxygen deficiencies.

- **Floodplain**: The Upper Mississippi has largely been channelized and levied to allow for agriculture in historic floodplains. Without these floodplains, natural sediment loads in the river are not given the opportunity to settle out in backwaters, leading to higher sediment loads in the main channel.

- **The Lower Mississippi Region** is an area of significant concern regarding surface and ground water quality according to the Environmental Protection Agency (EPA). Key issues for the region include the following (SCC 2007):

  - **Nonpoint Pollution**: Abundant rainfall, finely textured alluvial soils, and intensive cultivation in the region have contributed to serious nonpoint pollution problems. The region loses an estimated 12-45 tons of soil per acre annually in the region, leading to increased turbidity, siltation, pesticide run-off, toxicity to wildlife, oxygen depletion, and eutrophication

in regional waters. High pathogen levels are evident in coastal shellfish populations, resulting in multiple closures of shellfish grounds.

- **Deforestation**: Historically the region was heavily forested, but forest clearing for agriculture has reduced soil stabilization in the region, allowing for increased siltation.

- **Flood Control**: The Lower Mississippi River has largely been channelized and levied to allow for agriculture in historic floodplains. Without these floodplains, natural sediment loads in the river are not given the opportunity to settle out in backwaters, leading to higher sediment loads in the main channel and an expansion of the hypoxic zone in the Gulf of Mexico.

- **Coastal Land Loss**: The region has the highest rate of coastal land loss in the nation, upwards of 40 square miles a year. This land loss leads to further sedimentation of the Gulf of Mexico and the loss of coastal wetlands.

3.2.2 Ground Water

Groundwater is a significant source of drinking water in many areas crossed by the NCL, along with providing a source for agricultural and residential irrigation, and industrial uses. While depth to the groundwater is variable across the NCL, it is often found near to the ground surface, or with man-made or natural pathways of access (e.g. water wells, seep crevices), presenting a potential for Project activities to encounter and possibly impact groundwater resources.

Major aquifers crossed by portions of the NCL include (NAUS 2003):

- Pennsylvanian
- Mississippian
- Valley and Ridge
- Silurian-Devonian
- Coastal Lowlands
- Valley and Ridge Carbonate-Rock
- Piedmont and Blue Ridge Crystalline-Rock

- Northern Atlantic Coastal Plain
- Mississippi River Valley Alluvial
- Early Mesozoic Basin
- Piedmont and Blue Ridge Carbonate-Rock
- Ordovician
- Southeastern Coastal Plain
- Mississippi Embayment
- New York and New England Carbonate-Rock

The aquifers underlying the NCL are generally found in geological units composed of sandstone, sandstone and carbonate-rock, unconsolidated sand and gravel, semiconsolidated sand, carbonate-rock, and igneous and metamorphic rock. Additional information on the aquifers that are found within the NCL, along with sole-source aquifers, water supply wells and springs, and wellhead protection areas are presented below.

Aquifer Systems

Sandstone aquifers underlie over 4.1-million acres of the NCL, with portions of the Pennsylvanian and Early Mesozoic aquifers represented, found in the states of Kentucky, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, and West Virginia. Sandstone aquifers are commonly interbedded with siltstone or shale, laid down during sedimentary cycles. They are level or gently dip, and generally contain water under confined conditions. Groundwater movement is generally along bedding planes, though joints and fractures allow for some vertical movement between beds. These aquifers are highly productive in many areas, providing large volumes of mineral heavy water. The Pennsylvanian aquifer is generally poorly permeable, with yield primarily from shallow fracture systems and interbedded, cleated coals. The Early Mesozoic basin occupied titled grabens or half-grabens, are often interbedded with fine-grained sediments and intruded traprock, and generally only yield small quantities of water (Miller 1999).

Sandstone and carbonate-rock aquifers underlie over 3.1-million acres of the NCL, with portions of the Mississippian, Valley and Ridge, and Valley and Ridge Carbonate-Rock aquifer systems represented, found in the states of Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. These aquifers are formed of sandstone interbedded with carbonate rocks, with primary water yield from the

carbonate rocks, and lesser yields from the sandstones. Water within the aquifer is found in both confined and unconfined states, with water yield largely dependent on localized bed make-up (Miller 1999).

Unconsolidated sand and gravel aquifers underlie over 995,000-acres of the NCL with portions of the Mississippi River Valley Alluvial aquifer system represented, found in the states of Louisiana and Mississippi. The unconsolidated sand and gravel aquifers of this region are of the blanket sand and gravel type. It was formed by alluvial deposits of the Mississippi River floodplain of medium to coarse sand and gravel. Water in this aquifer is found under unconfined, or water-table type conditions (Miller 1999).

Semiconsolidated sand aquifers underlie over 652,000-acres of the NCL, with portions of the Coastal Lowlands, Northern Atlantic Coastal Plain, Southeastern Coastal Plain, and Mississippi Embayment aquifer systems represented, found in the states of Louisiana, Mississippi, New Jersey, North Carolina, Tennessee, and Virginia. The aquifer is formed of sediments, primarily consisting of semiconsolidated sand, silt, and clay, interbedded with some carbonate rocks. They are primarily coastal in nature, found along the Atlantic and Gulf of Mexico coasts, with a wedge form that thickens seaward, formed by a series of transgressions and regressions of the sea, and vary widely by area. Aquifer recharge is from upland precipitation, with the water generally becoming increasingly confined as it approaches the coast (Miller 1999).

Carbonate-Rock aquifers underlie over 616,000-acres of the NCL, with portions of the Silurian-Devonian, Piedmont and Blue Ridge Carbonate-Rock, Ordovician, and New York and New England Carbonate-Rock aquifer systems represented, found in the states of Indiana, Kentucky, Maryland, New Jersey, New York, Ohio, Pennsylvania, and Tennessee. These aquifers are generally formed of limestone, though some are formed of dolomite and marble, with the rock formed during the Precambrian to Miocene age. Karst topography is common within this aquifer (Miller 1999).

Finally, Igneous and Metamorphic Rock aquifers underlie over 276,000 acres of the NCL, with portions of the Piedmont and Blue Ridge Crystalline-Rock aquifer system represented, found in the states of Delaware, Maryland, New Jersey, Pennsylvania, and Virginia. This aquifer is formed of crystalline rocks with insignificant porosity, thus it is

only permeable through secondary openings such as fractures, thus water yields tend to be small (Miller 1999).

Sole-Source Aquifers

The EPA defines a sole (or principal) source aquifer (SSA) as an aquifer that supplies at least 50-percent of the drinking water for the overlying area. The guidelines further stipulate that such areas can not have an alternate source of drinking water that could physically, legally, or economically supply the population that is dependent upon the aquifer (EPA 2010b). The NCL covers portions of 15 EPA designated sole-source aquifers in nine states (EPA 2009). See **Table 3.2-2** for a list of sole-source aquifers crossed, the state and county in which they were crossed, the approximate acreage of the crossing, and FR references that can be used if further information on the sole-source aquifer is required.

Table 3.2-2: Sole-Source Aquifers Crossed by the Proposed Project

State	County	SSA Name	FR ID	Acres
DE	New Castle	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	73,020
LA	Acadia	Chicot Aquifer System SSA	53 FR 20893 (1988)	1,333,756
	Avoyelles	Chicot Aquifer System SSA	53 FR 20893 (1988)	105,418
	Calcasieu	Chicot Aquifer System SSA	53 FR 20893 (1988)	20,791
	Cameron	Chicot Aquifer System SSA	53 FR 20893 (1988)	2,404,857
	Evangeline	Chicot Aquifer System SSA	53 FR 20893 (1988)	653,348
	Iberia	Chicot Aquifer System SSA	53 FR 20893 (1988)	677,884
	Jefferson Davis	Chicot Aquifer System SSA	53 FR 20893 (1988)	658,564
	Lafayette	Chicot Aquifer System SSA	53 FR 20893 (1988)	443,606
	Rapides	Chicot Aquifer System SSA	53 FR 20893 (1988)	418,616
	St. Landry	Chicot Aquifer System SSA	53 FR 20893 (1988)	147,073
	St. Mary	Chicot Aquifer System SSA	53 FR 20893 (1988)	1,027,724
	Vermilion	Chicot Aquifer System SSA	53 FR 20893 (1988)	994,664
MD	Montgomery	Piedmont (Maryland Piedmont) Aquifer SSA	45 FR 57165 (1980)	193,210
	Montgomery	Poolesville Area Aquifer Extension of the Maryland Piedmont Aquifer SSA	63 FR 6176 (1998)	205,659
MS	Warren	Southern Hills Regional Aquifer System SSA	53 FR 25538 (1988)	24,958
NJ	Gloucester	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	58,377
	Gloucester	New Jersey Coastal Plain Aquifer System SSA	53 FR 23791 (1988)	437,252
	Hunterdon	New Jersey Fifteen Basin Aquifers SSA	53 FR 23685 (1988)	488,914
	Morris	Buried Valley Aquifers, Central Basin SSA	45 FR 30537 (1980)	196,485
	Morris	New Jersey Fifteen Basin Aquifers SSA	53 FR 23685 (1988)	423,849
	Morris	Upper Rockaway River Basin SSA	49 FR 2946 (1984)	93,214
	Salem	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	10,333

State	County	SSA Name	FR ID	Acres
NJ (cont.)	Salem	New Jersey Coastal Plain Aquifer System SSA	53 FR 23791 (1988)	9,538
	Warren	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	40,728
	Warren	New Jersey Fifteen Basin Aquifers SSA	53 FR 23685 (1988)	66,650
NY	Broome	Clinton Street-Ballpark Valley Aquifer SSA	50 FR 2025 (1985)	773,394
	Chemung	Clinton Street-Ballpark Valley Aquifer SSA	50 FR 2025 (1985)	111
	Delaware	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	324,342
	Orange	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	55,913
	Orange	Highlands Aquifer System Passaic SSA	52 FR 37213 (1987)	54,597
	Orange	New Jersey Fifteen Basin Aquifers SSA	53 FR 23685 (1988)	272,979
	Orange	Ramapo River Basin Aquifer Systems SSA	57 FR 39201 (1992)	166,292
	Rockland	Ramapo River Basin Aquifer Systems SSA	57 FR 39201 (1992)	205,155
	Sullivan	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	301,605
	Tioga	Clinton Street-Ballpark Valley Aquifer SSA	50 FR 2025 (1985)	641,729
OH	Butler	Greater Miami Buried Aquifer & OKI Extension (Southern Portion) SSA	57 FR 2567 and 15876 (1988)	11,860
	Champaign	Greater Miami Buried Aquifer & OKI Extension (Southern Portion) SSA	57 FR 2567 and 15876 (1988)	182,721
	Clark	Greater Miami Buried Aquifer & OKI Extension (Southern Portion) SSA	57 FR 2567 and 15876 (1988)	196,419
	Greene	Greater Miami Buried Aquifer & OKI Extension (Southern Portion) SSA	57 FR 2567 and 15876 (1988)	61,971
	Guernsey	Pleasant City Aquifer, Ohio SSA	52 FR 32342 (1987)	28,132
PA	Delaware	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	21,240
	Monroe	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	121,838
	Northampton	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	85,784
	Northampton	New Jersey Fifteen Basin Aquifers SSA	53 FR 23685 (1988)	492
	Pike	Delaware River Streamflow Zone/New Jersey Coastal Plains Aquifer SSA	53 FR 23791 (1988)	149,083
	York	Seven Valleys Aquifer, York County SSA	50 FR 9126 (1985)	268,138
VA	Loudoun	Poolesville Area Aquifer Extension of the Maryland Piedmont Aquifer SSA	63 FR 6176 (1998)	287

Source: EPA 2009

Water Supply Wells and Springs

Due to the wide spatial extent of the NCL, the presence of both public and private water supply wells and/or springs is likely within, or directly adjacent to the NCL. The availability of water supply information over large areas is limited, due to the potentially sensitive nature of the information, thus a complete analysis and listing of water supply

wells/springs found within the NCL is not possible here. As such, the environmental consequences examined in Chapter 4 are somewhat general. We have, therefore, prescribed criteria for further NEPA tiering to examine site specific conditions when they are known.

Wellhead Protection Areas

Wellhead Protection Areas (WHPA) are those areas, both surface and subsurface, that surround a public water supply well and recharge the aquifer that contributes water to the well. They are established to prevent or control the potential for contaminants to move toward and reach a water well, and as such, are regulated to protect the water supply of a well. Due to the wide spatial extent of the NCL, the presence of WHPAs is likely within, or directly adjacent to the NCL. The availability of water supply information over large areas is limited, due to the potentially sensitive nature of the information, thus a complete analysis and listing of water supply wells/springs within the NCL is not possible here. As such, the environmental consequences examined in Chapter 4 are somewhat general. We have, therefore, prescribed criteria for further NEPA tiering to examine site specific conditions when they are known.

3.2.3 Geology

Geologic resources consist of surface and subsurface materials and their inherent properties, including topography, seismic characteristics, and soil stability. Geology of the NCL area varies greatly from the Mississippi delta region in the south through the coastal plains, central plains, Appalachians and Adirondacks, and back into the coastal plains. A short description of the three primary geologic areas of the NCL, the coastal plain, Appalachian orogenic belt, and Appalachians proper, are included below and adapted from *Earth: Portrait of a Planet* (Marshak 2001).

The coastal plain area extends from the southern tip of Texas across the Gulf of Mexico coastal region into the Mississippi embayment and northeast through the Mid-Atlantic states. A classic passive continental margin, the plain consists of a deep clastic wedge of sediment eroded from the platform and mountain belts. The region first formed during the Jurassic and Cretaceous periods through the opening of the Atlantic Ocean and Gulf of Mexico.

The Appalachian orogenic belt extends from Mississippi and Alabama north into the New England region. The Ouachita Mountains of Arkansas and the Marathon uplift of Texas are also part of this area. The belt formed in the Alleghenian orogeny, which took place when Pangea assembled in the late Paleozoic period. Although the region was characterized by high peaks and mountainous areas, it has experienced heavy weathering since the opening of the Atlantic Ocean in the Jurassic and Cretaceous periods.

The Appalachian Mountain Range proper is composed of deformed sedimentary rocks cut through by numerous thrust faults. Similar to the western cordillera, the Appalachians went through several orogenies during the Paleozoic period, making interpretation of the region's geologic history difficult.

The Middle Paleozoic (Silurian, Devonian, and Mississippian) sedimentary rocks are the most abundant geologic member occurring within the NCL area (see **Table 3.2-3**). These sedimentary rocks include the following rock types:

- Silurian dolomites, limestones, and shales;
- Devonian shales and limestones; and
- Mississippian shales, sandstones, and limestones.

The Upper Paleozoic (Pennsylvanian, Permian) sedimentary rocks are the second most abundant geologic member occurring within the NCL area. These sedimentary rocks include the following rock types:

- Pennsylvanian sandstones, shales, and carbonates; and
- Permian shales and limestones.

Table 3.2-3: Geology of the NCL Area

Geology	Acreage of NCL	Percent of NCL	States Crossed	Acreage by State
Middle Paleozoic (Silurian, Devonian, and Mississippian) sedimentary rocks	4,067,129	41.65	Indiana	88,599
			Kentucky	169,218
			Maryland	225,055
			New York	158,459

Geology	Acreage of NCL	Percent of NCL	States Crossed	Acreage by State
			Ohio	2,393,303
			Pennsylvania	658,777
			Tennessee	54,393
			Virginia	50,836
			West Virginia	268,489
Upper Paleozoic (Pennsylvanian and Permian) sedimentary rocks	4,008,407	41.05	Kentucky	207,879
			Maryland	75,730
			Ohio	807,748
			Pennsylvania	709,483
			Tennessee	67
			West Virginia	2,207,499
Quaternary deposits	595,062	6.09	Louisiana	441,660
			Mississippi	53,116
			Virginia	100,286
Lower Paleozoic (Cambrian and Ordovician) sedimentary rocks	499,001	5.11	Kentucky	122,321
			Maryland	20,187
			New Jersey	8,035
			New York	16,778
			Ohio	17,110
			Pennsylvania	186,327
			Tennessee	56,068
			Virginia	72,175
Late Proterozoic and lower Paleozoic sedimentary rocks	104,331	1.07	Delaware	1,209
			Maryland	46,441
			New Jersey	1,122
			Pennsylvania	37,640
			Virginia	17,917
Lower Mesozoic (Triassic and Jurassic) sedimentary rocks	101,923	1.04	Maryland	3,655
			New Jersey	2,249
			New York	894
			Pennsylvania	59,753
			Virginia	35,372
Paleogene sedimentary rocks	88,886	0.91	Louisiana	34,892
			Mississippi	53,993
Middle Proterozoic gneiss	77,034	0.79	New Jersey	21,883
			New York	9,291
			Pennsylvania	17,490
			Virginia	28,370
Neogene sedimentary rocks	59,520	0.61	North Carolina	936
			Virginia	58,585
Cretaceous sedimentary rocks	55,711	0.57	Mississippi	33,800
			New Jersey	10,046
			Tennessee	11,865
Late Proterozoic sedimentary rocks	49,310	0.50	Virginia	49,310
Lower Mesozoic mafic rocks	24,301	0.25	Pennsylvania	16,362
			Virginia	7,939

Geology	Acreage of NCL	Percent of NCL	States Crossed	Acreage by State
Upper Paleozoic granitic rocks	18,386	0.19	Virginia	18,386
Late Proterozoic volcanic rocks	15,185	0.16	Pennsylvania	8,241
			Virginia	6,944
Late Proterozoic and lower Paleozoic mafic rocks	368	0.00	Maryland	368
Water body	273	0.00	Louisiana	273
Source: USGS 2005				

Topography

The NCL area stretches from the coastal lowlands of the Gulf of Mexico in the south through the central plains and into the Appalachian Mountains and rocky coastal plains of the northeastern states, encompassing the majority of land forms found east of the Mississippi River. The southern section of the area is predominantly just below sea level and comprised of flat coastal plains and the Mississippi alluvial valley. The central sections, forming the majority of the NCL area, range in elevation from 300-1,300-feet above sea level (asl) and are predominantly composed of irregular glaciated plains and rolling hills. In the Appalachians, rugged plateaus and foothills rise from 1,500-feet asl to rounded mountains of 5,000-feet asl. The coastal plains in the northeastern portion of the area range from 0-1,000-feet asl (Griffith 2007).

Geologic Hazards

The presence of geologic hazards such as volcanoes, earthquakes, active faults, and landslides can potentially threaten the integrity of the NCL area. Any spills or leaks caused by these geologic hazards could affect the surrounding environment. Fortunately, the eastern portion of the United States is relatively geologically stable compared to the western U.S. The eastern U.S. does not have any active volcanoes, and the faults that are active are relatively quiet in comparison to the west. In the following sections, an overview of some of the potential geologic hazards that could occur will be discussed with respect to the NCL area.

Earthquakes

An earthquake is the result of a sudden release of energy in the earth's crust, which creates seismic waves. Earthquakes are mainly caused by ruptures of geological faults but can also be caused by events such as volcanic activity, landslides, mine blasts, and nuclear experiments.

The Mercalli scale is commonly used in the U.S. by seismologists seeking information from personal reports on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end.

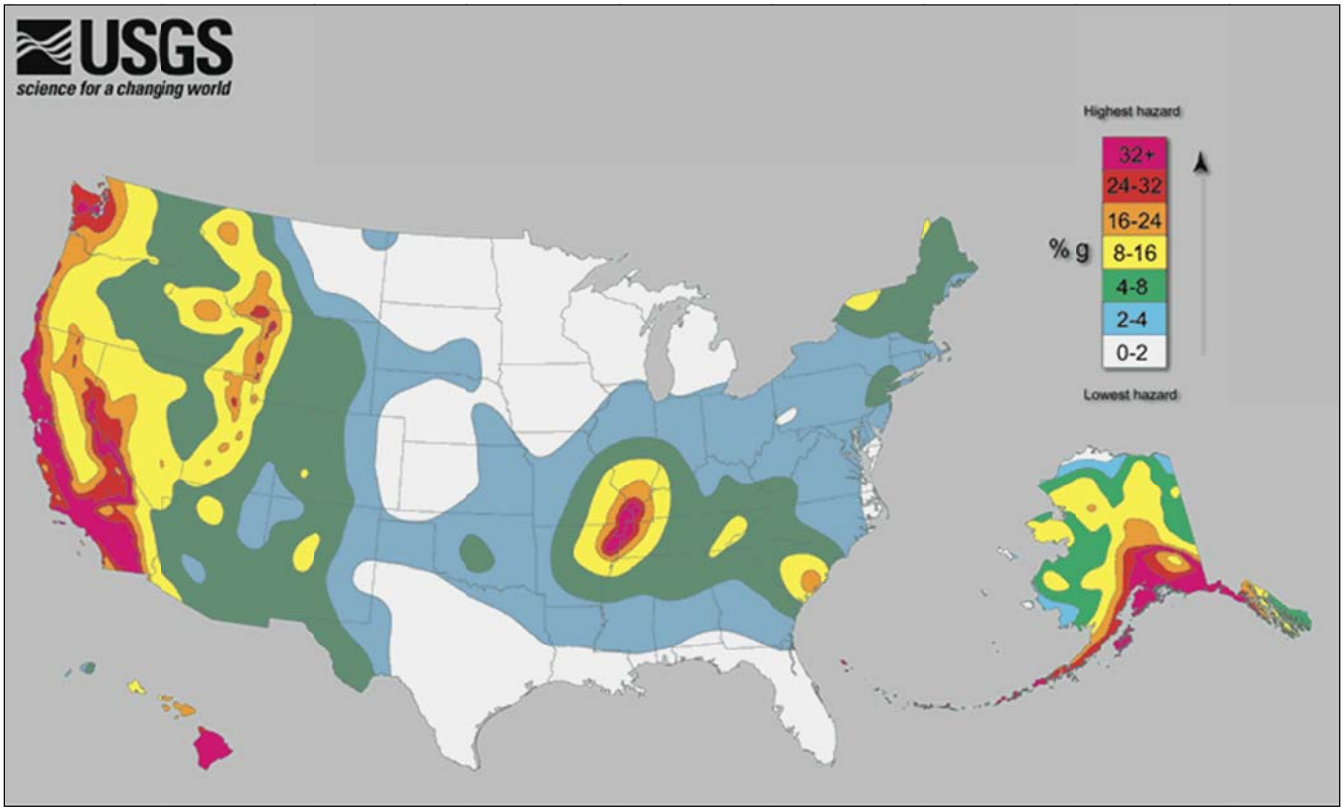
The Peak Ground Acceleration (PGA), which is measured by instruments, shows how hard the earth shakes in a given geographic area and generally correlates well with the Mercalli scale. The hazard value ratings for ground acceleration are on a scale from 0 to 124+ as shown in **Table 3.2-4** and in **Figure 3.2-2**. The Modified Mercalli (MM) scale and correlated ground acceleration values are described in detail in **Table 3.2-4** below.

Table 3.2-4: Modified Mercalli Scale of Earthquake Intensity with Acceleration Percent Gravity

MM Intensity	Accel. %g	Description of Intensity Level
I	<0.17	Not felt except by a very few under especially favorable circumstances.
II	0.17-1.4	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	0.17-1.4	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV	1.4-3.9	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	3.9-9.2	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	9.2-18	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	18-34	Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
VIII	34-65	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	65-124	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	124	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	>124	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.

MM Intensity	Accel. %g	Description of Intensity Level
XII	-	Damage total. Lines of sight and level distorted. Objects thrown into the air.
Source: Qamar and Ludwin 2008		

Figure 3.2-2: Peak Ground Acceleration Values for the US



Source: USGS 2007b

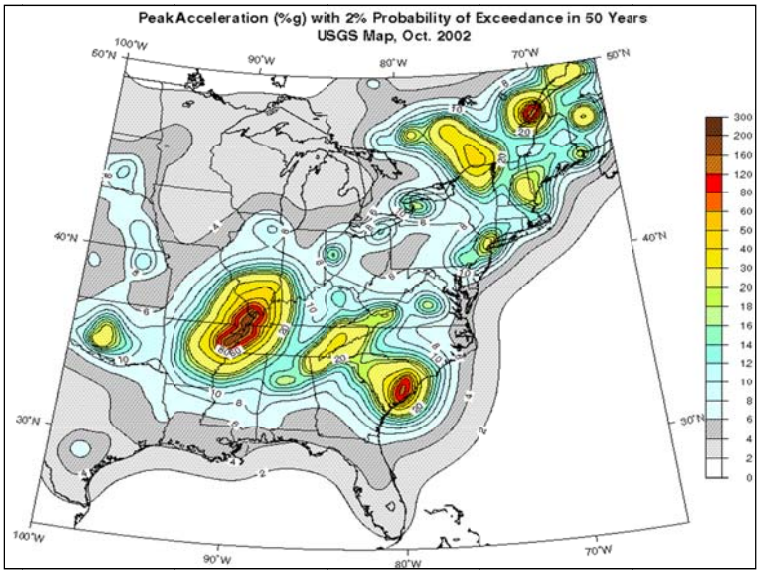
Ground shaking is perceptible to humans if the acceleration exceeds 1/10th of 1%g. Structural damage in buildings not designed to be resistant usually occurs at 10%g. Accelerations caused by earthquakes have been recorded exceeding 100%g. Factors other than acceleration must also be considered in evaluating the causes of damage such as the oscillation frequency and the total duration of shaking. For example, tall buildings are most affected by low frequency ground motions while typical family residences are most affected by high frequency motions.

During an earthquake, the ground acceleration varies with time and the force on any building is proportional to ground acceleration. The acceleration values shown in **Figure 3.2-2** are the peak or maximum values expected during the earthquake. "G" is a common value of acceleration equal to 9.8-meters/second/second (the acceleration due

to gravity at the surface of the earth). 30%g is the acceleration one would experience in a car that takes nine-seconds to brake from 60 miles per hour to a complete stop.

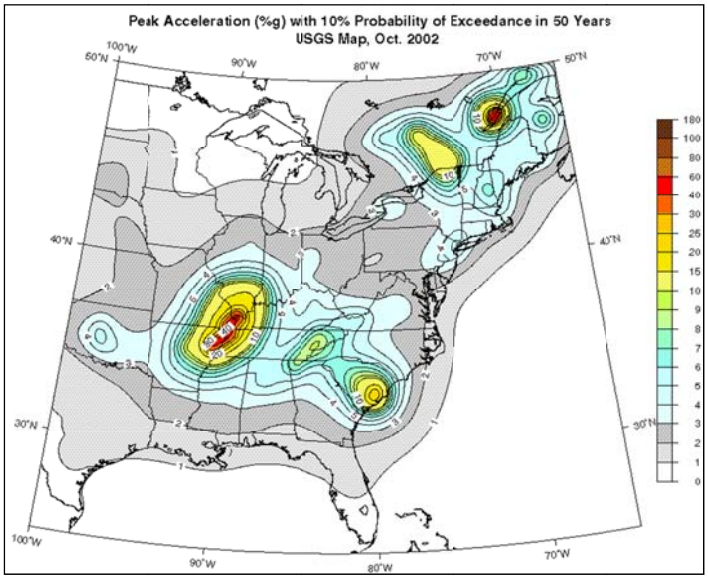
As shown in **Figure 3.2-3**, a "2-percent probability of exceedance in 50-years" refers to the fact that earthquakes are somewhat random in occurrence. One cannot predict exactly whether an earthquake of a given size will or will not occur in the next 50-years. The map takes the random nature of earthquakes into account. It was constructed so that there is a two percent chance that the ground acceleration values shown will be exceeded in a 50-year time period. **Figure 3.2-4** shows a ten-percent chance that values shown will be exceeded in a 50-year time period (USGS 2007b).

Figure 3.2-3: Peak Acceleration with a 2% Probability of Exceedance in 50 Years



Source: USGS 2007b

Figure 3.2-4: Peak Acceleration with a 10% Probability of Exceedance in 50 Years



Source: USGS 2007b

The NCL area has only one recorded earthquake; a 1776 earthquake occurred near the Muskingum River in Ohio with an intensity of 6 on the MM scale (NAUS 2005e). The state acceleration values within the NCL area are shown below in **Table 3.2-5**, with the highest values showing a 6%g in the states of New Jersey and West Virginia. A reading of 6%g is a fairly low ground acceleration hazard reading.

Table 3.2-5: Modified Acceleration Values within the NCL Area

State	Acceleration Value	Acres of NCL	Percent of NCL by State
Delaware	4	2,049	100.00
Indiana	1	1,093	1.23
	2	87,506	98.77
Kentucky	3	211,475	42.34
	4	270,345	54.13
	5	17,598	3.52
Louisiana	1	390,907	80.71
	2	93,418	19.29
Maryland	2	350,639	94.31
	3	21,145	5.69
Mississippi	2	8,742	6.20
	3	51,033	36.22
	4	46,675	33.12
	5	34,459	24.45
New Jersey	4	18,368	42.39
	5	23,383	53.96
	6	1,584	3.65

State	Acceleration Value	Acres of NCL	Percent of NCL by State
New York	2	103,996	56.09
	3	42,228	22.77
	4	19,352	10.44
	5	19,846	10.70
North Carolina	2	936	100.00
Ohio	2	2,954,202	91.76
	3	265,270	8.24
Pennsylvania	2	1,522,879	89.88
	3	50,319	2.97
	4	121,226	7.15
Tennessee	3	1,296	1.06
	4	68,115	55.65
	5	52,982	43.29
Virginia	1	7,802	1.75
	2	207,618	46.54
	3	186,547	41.81
	4	43,944	9.85
	5	227	0.05
West Virginia	2	1,494,397	60.36
	3	829,779	33.51
	4	76,660	3.10
	5	74,912	3.03
	6	240	0.01
Source: NAUS 2002			

Faults

A fault is a planar rock fracture that shows evidence of relative movement. Large faults within the Earth's crust are the result of shear motion, and active fault zones are the cause of most earthquakes. Earthquakes are caused by energy release during rapid slippage along faults. The largest examples are at the tectonic plate boundaries, but many faults occur far from active plate boundaries. Given that faults do not usually consist of a single clean fracture, the term fault zone is used when referring to the zone of complex deformation that is associated with the fault plane.

Quaternary active faults are those that have slipped in Quaternary time (the last 1.8-million years). Geologists think that these faults are the most likely source of future great earthquakes. The NCL area has five states with active Quaternary faults present. These States include Kentucky, Louisiana, Mississippi, Virginia, and West Virginia; with Louisiana containing the largest amount of Quaternary fault acres within the NCL at 485,622-acres (see **Table 3.2-6**).

Table 3.2-6: Quaternary Active Faults within the NCL Area

State	Fault Name	Fault Age	Rate of Motion (mm/yr)	Acres of NCL
Kentucky	Kentucky River fault system (Class B)	<1,600,000 years	> 0.2	5,338
Louisiana	Gulf Coast normal faults, LA and AR (Class B)	<1,600,000 years	> 0.2	455,240
	Monroe uplift (Class B)	<15,000 years	> 0.2	29,580
	Gulf Coast normal faults, MS (Class B)	<1,600,000 years	> 0.2	802
Mississippi	Monroe uplift (Class B)	<15,000 years	> 0.2	6,659
	Gulf Coast normal faults, MS (Class B)	<1,600,000 years	> 0.2	5,250
Virginia	Pembroke faults (Class B)	<1,600,000 years	unknown	227
West Virginia	Pembroke faults (Class B)	<1,600,000 years	unknown	14,201
Source: NAUS 2005c				

Karst Feature

Karst topography is a landscape shaped by the dissolution of a layer or layers of soluble bedrock; usually carbonate rock such as limestone or dolomite. Due to subterranean drainage, there may be very limited surface water rivers and lakes may be absent. Many karst regions display distinctive surface features, with dolines or sinkholes being the most common. However, distinctive karst surface features may be completely absent where the soluble rock is mantled, such as by glacial debris, or confined by a superimposed non-soluble rock stratum. Some karst regions include thousands of explored caves; though evidence of caves that are big enough for human exploration is not a required characteristic of a karst.

The karst topography itself also poses some difficulties for human inhabitants. Sinkholes can develop gradually as surface openings enlarge, but quite often progressive erosion is unseen and the roof of an underground cavern suddenly collapses. Such events have swallowed homes, cattle, cars, and farm machinery.

The NCL area contains 1,179,322-acres of karst topography, with Pennsylvania containing the majority at 663,943-acres, followed by Ohio with 451,877-acres (see **Table 3.2-7**). Over a third of the NCL area in the states of Maryland, Pennsylvania, and Tennessee is underlain by karst topography.

Table 3.2-7: Karst Topography within the NCL Area

State	Description	Acres of NCL	Percent of NCL by State
Indiana	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	8,963	10.12
Kentucky	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in gently dipping to flat-lying beds of carbonate rock	60,027	12.02
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	35,553	7.12
	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	8,190	1.64
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	7,301	1.46
Louisiana	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	10,841	2.23
Maryland	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in moderately to steeply dipping beds of carbonate rock	101,425	27.28
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	29,658	7.98
Maryland (cont.)	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in metamorphosed limestone, dolostone, and marble	3,821	1.03
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in moderately to steeply dipping beds of carbonate rock	154	0.04
Mississippi	Fissures, tubes, and caves generally absent; where present in small isolated areas, less than 50 ft long; less than 50 ft vertical extent; in gently dipping to flat-lying beds of carbonate rock	13,334	9.46
New Jersey	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in moderately to steeply dipping beds of carbonate rock	9,837	22.70
New York	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in moderately to steeply dipping beds of carbonate rock	13,661	7.37
Ohio	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	419,204	13.02
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	32,673	1.01
Pennsylvania	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in moderately to steeply dipping beds of carbonate rock	280,895	16.58
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	258,830	15.28
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in moderately to steeply dipping beds of carbonate rock	67,502	3.98
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in metamorphosed limestone, dolostone, and marble	47,063	2.78

Table 3.2-7: Karst Topography within the NCL Area

State	Description	Acres of NCL	Percent of NCL by State
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	6,050	0.36
	Fissures, tubes, and caves generally absent; where present in small isolated areas, less than 50 ft long; less than 50 ft vertical extent; in moderately to steeply dipping beds of carbonate rock	2,873	0.17
	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in gently dipping to flat-lying beds of carbonate rock	731	0.04
Tennessee	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in gently dipping to flat-lying beds of carbonate rock	78,554	64.18
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	6,649	5.43
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	5,688	4.65
Virginia	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in moderately to steeply dipping beds of carbonate rock	55,735	12.49
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in metamorphosed limestone, dolostone, and marble	11,743	2.63
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in moderately to steeply dipping beds of carbonate rock	8,088	1.81
West Virginia	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	126,880	5.12
West Virginia (cont.)	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in gently dipping to flat-lying beds of carbonate rock	57,641	2.33
	Fissures, tubes, and caves over 1,000 ft long; 50 ft to over 250 ft vertical extent; in moderately to steeply dipping beds of carbonate rock	27,900	1.13
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft to 200 ft thick	9,841	0.40
	Fissures, tubes and caves generally less than 1,000 ft long; 50 ft or less vertical extent; in moderately to steeply dipping beds of carbonate rock	2,017	0.08

Source: NAUS 2005a

Landslide Potential

A landslide is a geological phenomenon that includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are caused when the stability of a slope changes from a stable to an unstable condition. Although the action of gravity on an over-steepened slope is the primary reason for a landslide, several factors contribute to the original slope stability.

Natural Causes:

- Groundwater pressure.
- Loss or absence of vertical vegetative structure, soil nutrients, and soil structure.
- Erosion of the toe of a slope by rivers or ocean waves.
- Weakening of a slope through saturation by snowmelt, glaciers melting, or heavy rains.
- Earthquakes adding loads to barely-stable slopes.
- Earthquake-caused liquefaction.
- Volcanic eruptions.

Human Causes:

- Vibrations from machinery or traffic.
- Blasting.
- Earthwork that alters the shape of a slope or imposes new loads on an existing slope
- In shallow soils, the removal of deep-rooted vegetation that binds colluvium to bedrock.
- Construction, agricultural, or forestry activities that change the amount of water that infiltrates into the soil.

The NCL area does have landslide susceptibility and incidence within its footprint as shown in **Table 3.2-8**. Susceptibility and incidence rates are categorized as low, moderate, or high.

Table 3.2-8: Landslide Susceptibility and Incidence within the NCL Area

State	Susceptibility	Acres of NCL	Percent of NCL by State
Delaware	Moderate susceptibility to landsliding and low incidence.	1,217	59.42
	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	831	40.58
Indiana	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	85,197	96.16
	Moderate susceptibility to landsliding and low incidence.	3,401	3.84
Kentucky	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	204,462	40.94
	High landslide incidence (more than 15 percent of the area is involved in landsliding).	183,787	36.80
	Moderate susceptibility to landsliding and low incidence.	46,120	9.23
	High susceptibility to landsliding and moderate incidence.	41,014	8.21
	Moderate landslide incidence (1.5 - 15 percent of the area is involved in landsliding).	24,034	4.81
Louisiana	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	300,782	62.10
	Moderate susceptibility to landsliding and low incidence.	160,804	33.20
	High susceptibility to landsliding and low incidence.	17,637	3.64
	High landslide incidence (more than 15 percent of the area is involved in landsliding).	5,104	1.05
Maryland	High susceptibility to landsliding and moderate incidence.	288,768	77.67
	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	83,016	22.33
Mississippi	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	127,922	90.78
	High susceptibility to landsliding and moderate incidence.	7,920	5.62
	High susceptibility to landsliding and low incidence.	5,067	3.60
New Jersey	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	37,787	87.20
	Moderate susceptibility to landsliding and low incidence.	5,548	12.80
New York	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	130,219	70.23
	Moderate landslide incidence (1.5 - 15 percent of the area is involved in landsliding).	36,422	19.64
	Moderate susceptibility to landsliding and low incidence.	11,837	6.38
	High susceptibility to landsliding and moderate incidence.	6,008	3.24
	High landslide incidence (more than 15 percent of the area is involved in landsliding).	936	0.50
North Carolina	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	936	100.00

Table 3.2-8: Landslide Susceptibility and Incidence within the NCL Area

State	Susceptibility	Acres of NCL	Percent of NCL by State
Ohio	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	2,407,546	74.78
	High susceptibility to landsliding and low incidence.	409,887	12.73
	High susceptibility to landsliding and moderate incidence.	185,594	5.76
	High landslide incidence (more than 15 percent of the area is involved in landsliding).	126,554	3.93
	Moderate susceptibility to landsliding and low incidence.	65,490	2.03
	Moderate landslide incidence (1.5 - 15 percent of the area is involved in landsliding).	24,356	0.76
	No data exist for these areas.	46	0.00
Pennsylvania	High susceptibility to landsliding and moderate incidence.	723,535	42.70
	High landslide incidence (more than 15 percent of the area is involved in landsliding).	431,855	25.49
	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	377,487	22.28
	High susceptibility to landsliding and low incidence.	65,924	3.89
	Moderate landslide incidence (1.5 - 15 percent of the area is involved in landsliding).	57,451	3.39
	Moderate susceptibility to landsliding and low incidence.	38,171	2.25
Tennessee	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	116,135	94.89
	Moderate landslide incidence (1.5 - 15 percent of the area is involved in landsliding).	6,258	5.11
Virginia	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	253,790	56.89
	High susceptibility to landsliding and moderate incidence.	104,633	23.45
	Moderate susceptibility to landsliding and low incidence.	53,996	12.10
	High landslide incidence (more than 15 percent of the area is involved in landsliding).	26,630	5.97
	Moderate landslide incidence (1.5 - 15 percent of the area is involved in landsliding).	7,091	1.59
West Virginia	High landslide incidence (more than 15 percent of the area is involved in landsliding).	2,111,066	85.26
West Virginia (cont.)	High susceptibility to landsliding and moderate incidence.	191,047	7.72
	Low landslide incidence (less than 1.5 percent of the area is involved in landsliding).	165,475	6.68
	High susceptibility to landsliding and low incidence.	7,527	0.30
	Moderate susceptibility to landsliding and low incidence.	873	0.04
Source: NAUS 2001b			

3.2.4 Soils

The soils in the NCL area are very diverse due to the variety of climates, parent material, vegetation, landforms, and age of surface materials.

Soils are classified into 12 different soil orders based on a classification system developed by the Natural Resources Conservation Service (NRCS) for soil taxonomy. Throughout the 14 states, six of the 12 soil orders are encountered within the NCL area. These soil orders are Ultisols, Alfisols, Inceptisols, Entisols, Mollisols, and Histosols.

Inceptisols are the most abundant soil order within the area, underlying 51-percent of the NCL Area, as shown in **Table 3.2-9**. They show minimal horizon development and are widely distributed, occurring within a wide range of environments. They are predominantly found on steep slopes, young geomorphic surfaces, and on resistant parent materials. A large percentage of Inceptisols are found in mountainous areas with typical uses being forestry, recreation, and watersheds (University of Idaho 2007).

Alfisols are the second most abundant soil order within the area, underlying 32-percent of the NCL area. They are generally well developed soils containing a subsurface horizon in which clays have accumulated. They are predominantly found in temperate humid and sub-humid regions and are productive soils typically used for agricultural and silvicultural activities (University of Idaho 2007).

Table 3.2-9: Soils of the NCL Area

Soil Order	Soil Description	States Crossed	Acreage by State	Acreage of NCL Area	Percent of NCL Area
Alfisols	A layer of clay minerals and other constituents leached from a surface layer into the subsoil. Is usually formed under forest or savanna vegetation.	Indiana	67,015	3,087,139	31.62
		Kentucky	165,719		
		Louisiana	194,022		
		Maryland	491		
		Mississippi	32,172		
		New Jersey	8		
		New York	1,766		
		Ohio	2,361,204		
		Pennsylvania	174,712		
		Tennessee	38,332		
		Virginia	43,244		
		West Virginia	8,454		
Entisols	Young soils with little or no development of diagnostic soil horizons. Found in young alluvium, sands, and soils on steep slopes and in basins of arid and semiarid environments.	Indiana	1,835	1,835	0.02
Histosols	Soils that are composed mainly of organic materials. They contain at least 20-30 percent organic matter by weight and are more than 40 cm thick. These soils are often referred to as peats and mucks and have physical properties that restrict their use for engineering purposes.	Louisiana	111,261	119,140	1.22
		Virginia	7,879		
Inceptisols	Soil occurs in a wide variety of climates and generally exhibits only moderate degrees of soil weathering and development.	Kentucky	220,341	5,016,926	51.39
		Louisiana	62,535		
		Maryland	300,786		
		Mississippi	36,310		
		New Jersey	6,845		
		New York	183,656		
		Ohio	848,240		
		Pennsylvania	1,010,595		
		Virginia	52,739		
		West Virginia	2,294,880		
Mollisols	Have a very dark brown to black surface horizon, mostly formed under grass or savanna vegetation. Soils can be developed on basalt and loess parent material.	Indiana	19,750	94,929	0.97
		Louisiana	75,180		

Soil Order	Soil Description	States Crossed	Acreage by State	Acreage of NCL Area	Percent of NCL Area
Ultisols	Show intensive leaching of clay minerals and other constituents, resulting in a clay-enriched subsoil dominated by quartz, kaolinite, and iron oxides.	Delaware	1,860	1,443,110	14.78
		Kentucky	113,358		
		Louisiana	29,441		
		Maryland	70,507		
		Mississippi	72,427		
		New Jersey	36,482		
		North Carolina	936		
		Ohio	10,022		
		Pennsylvania	509,117		
		Tennessee	84,061		
		Virginia	342,245		
		West Virginia	172,654		
Source: NRCS 2006, University of Idaho 2007					

3.2.5 Climate

Climate can vary substantially across the NCL area and is influenced by variations in elevation, topographic features, latitude, and proximity to the ocean. The National Climatic Data Center (NCDC) identifies four climatic regions that occur within the area: the Southern Region, the Southeast Region, the Midwest Region, and the Northeast Region.

The Southern Region includes Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas. The region shows significant variations in climate with the semi-tropical Gulf Coastal region, the windswept plains of Texas and Oklahoma, and the hot, humid region of the Mississippi Delta. Summers are typically hot and humid and primarily sunny with precipitation coming in the form of fast, heavy showers. Winters are typically mild with cool nights and minor showers in the Gulf area and generally drier to the north with limited snow in the far northern regions (SRCC 2008).

The Southeast Region includes Alabama, Georgia, Florida, North Carolina, South Carolina, and Virginia. The region shows significant variations in climate due to latitude, including the semi-tropical Gulf Coastal region and the mid-latitude sub-tropical climate of Virginia. Hurricanes and heavy rains are common in the area, although much of the region is currently suffering from a multi-year drought. Summers are typically hot and humid and primarily sunny with precipitation coming in the form of fast, heavy showers.

Winters are typically mild with cool nights and cloudy skies with rain showers from Nor'easters common and some snow in the far northern portions (SERCC 2008).

The Midwest Region includes Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. Regional climate is relatively uniform in comparison to other regions, with similar weather patterns across the area and variations based on latitude and proximity to the Great Lakes. Summers are typically warm and humid with regular showers. Winters are typically fairly cold and dry, with the majority of the precipitation coming in the form of snow throughout the region and lake effect snows in the Great Lakes areas (MRCC 2008).

The Northeast Region includes Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia. Regional climate is generally severe mid-latitude, humid continental. Summers are typically warm and humid and primarily sunny with precipitation coming in the form of fast, heavy showers. Winters are typically fairly cold with long, light snow storms and frequent Nor'easter rain/snow storms (NRCC 2008).

Ecoregion descriptions, as developed by the Commission for Environmental Cooperation (CEC), can be used for a finer level of discussion of climate trends across the NCL area. Ecoregions are areas within which the type, quality and quantity of environmental resources (such as vegetation, wildlife, soils, geology, climate, hydrology, land use, and land form) are generally similar. A further description of the ecoregion concept, along with detailed descriptions of the ecoregions crossed by the NCL area can be found in **Section 3.3.1**. See **Table 3.2-10** for descriptions of regional climates, included to show the range of climate types in the NCL.

Table 3.2-10: Climates of the NCL Area

Level III Ecoregions	Crossed States	Acres of NCL	General Description	Summers	Winters	Mean Temp. (°F)	Frost Free Period (days)	Annual Mean Precip.	Annual Precip. Range
Western Allegheny Plateau	KY,OH, PA,WV	3,106,096	SMLHC	Warm to Hot	Cold	46-55	130-200	42"	34-45"
Erie Drift Plain	OH,PA	1,261,659	SMLHC	Warm	Cold	45-50	140-200	40"	34-50"
Ridge and Valley	MD,PA, VA,WV	1,225,969	SMLHC	Hot, Humid	Cold	46-61	125-235	45"	35-53"
Central Appalachians	KY,PA, WV	1,175,161	SMLHC	Warm	Snowy, Cold	37-46	120-160	43"	33-50"
Eastern Corn Belt	IN,OH	756,426	SMLHC	Hot	Cold	48-55	160-200	39"	34-45"

Level III Ecoregions	Crossed States	Acres of NCL	General Description	Summers	Winters	Mean Temp. (°F)	Frost Free Period (days)	Annual Mean Precip.	Annual Precip. Range
Plains									
Northern Piedmont	MD,NJ, VA	351,249	Transitional	Hot	Mild to Cold	52	160-230	43"	37-49"
Interior Plateau	KY,TN	336,750	MMLHS	Hot	Mild	54-61	160-220	50"	40-58"
Mississippi Alluvial Plain	LA,MS	298,883	MMLHS	Hot, Humid	Mild	57-70	200-355	55"	45-69"
Huron/Erie Lake Plain	OH	192,847	SMLHC	Hot	Severe	46-52	150-200	32"	28-36"
Southeastern Plains	MS,NC, TN,WV	184,265	MMLHS	Hot, Humid	Mild	55-66	200-300	53"	45-60"
North Central Appalachians	NY,PA	174,081	SMLHC	Warm	Snowy, Cold	37-46	120-160	43"	33-50"
Western Gulf Coastal Plain	LA	173,466	MMLHS	Hot	Mild	68-77	270-365	42"	23-64"
Northern Allegheny Plateau	NY	89,359	SMLHC	Warm	Severe	45	120-170	38"	35-47"
Middle Atlantic Coastal Plain	DE,NJ, VA	79,708	MMLHS	Hot, Humid	Mild	57-63	190-300	48"	40-56"
Northeastern Highlands	NJ,NY, PA	64,945	SMLHC	Warm	Snowy, Cold	34-46	100-180	47"	33-79"
South Central Plains	LA	58,897	MMLHS	Hot	Mild	63-68	220-290	50"	41-67"
Southern Michigan/Northern Indiana Drift Plains	IN	56,741	SMLHC	Warm to Hot	Severe	45-50	140-200	34"	30-39"
Piedmont	VA	55,522	MMLHS	Hot, Humid	Mild, Dry	55-63	170-250	48"	43-65"
Eastern Great Lakes Lowlands	NY	54,122	SMLHC	Warm	Snowy, Cold	41-48	120-170	38"	28-47"
Blue Ridge	PA,VA	32,755	SMLHC	Hot	Cold to Mild	45-57	130-210	56"	43-98"
Central Corn Belt Plains	IN	22,994	SMLHC	Hot	Severe	46-54	160-190	37"	34-41"
Mississippi Valley Loess Plains	MS	9,919	MMLHS	Hot	Mild	57-68	200-290	56"	45-65"
Atlantic Coastal Pine Barrens	NJ	3,983	SMLHC	Hot	Cold	52	190-225	45"	---

SMLHC – Severe Mid-Latitude Humid Continental
MMLHS – Mild Mid-Latitude Humid Subtropical
Source: Griffith 2007

3.2.5.1 Global Climate Change

Climate change is the subject of extensive study and increasing concern. According to the EPA (USEPA 2011), our climate is changing due to the emission of greenhouse gases, which prevent heat from escaping to space. As the concentrations of these gases have increased, global mean temperatures have increased 1.2 to 1.4^{o}F in the last 100 years, with most of the warming occurring in recent decades. Due to this warming, aspects of the world's climate that are changing include rainfall patterns, snow and ice cover, and sea level. Climate models predict warming of the Earth's surface from 3.2 to 7.2^{o}F above 1990 levels by the end of this century. Human activities are the cause of this acceleration in global mean temperature. While scientists are certain of this cause, they remain uncertain of the rate at which this change will occur.

Climate change has the potential to affect the human environment in a number of ways. With respect to this EIS, the potential for effects on the environment include species life history, range shifts, vegetation changes, flooding frequency, fire, and other changes that influence the site-specific planning processes. Through the evaluations that will occur during future NEPA tiering, aspects of the human environment will be examined relative to the baseline and changes that may have occurred over time.

A complete analysis of site-specific climatic characteristics of the NCL is not possible at the scale of this EIS. As such, the environmental consequences examined in Chapter 4 are somewhat general. In addition, the baseline is expected to change over the 50-year timeframe of this project. We have, therefore, prescribed criteria for further NEPA tiering to examine site specific conditions when they are known.

3.2.6 Air Quality

This section discusses an overview of national air quality standards with a focus on the NCL area. Air quality can be influenced by meteorological and climatic factors such as

wind direction. The eastern United States has prevailing wind directions from west to east.

Air Quality Standards

The ambient air quality in an area can be characterized in terms of compliance with the primary and secondary National Ambient Air Quality Standards (NAAQS). The Clean Air Act (CAA), as amended, requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. NAAQS are provided for seven criteria pollutants:

- Carbon monoxide (CO);
- Lead (Pb);
- Nitrogen dioxide (NO_2);
- Ozone (O_3);
- Particulate matter with an aerodynamic size less than or equal to 10 microns (PM_{10});
- Particulate matter with an aerodynamic size less than or equal to 2.5 microns ($PM_{2.5}$); and
- Sulfur dioxide (SO_2).

Criteria pollutants are relatively common throughout the U.S. They are believed to be detrimental to public health and the environment and are known to cause property damage. NAAQS for criteria pollutants are shown in **Table 3.2-11** (EPA 2010a).

Table 3.2-11: National Ambient Air Quality Standards

Pollutant	Primary Standards	Averaging Times	Secondary Standards
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None
	35 ppm (40 mg/m^3)	1-hour[1]	
Lead	0.15 μg/m^3 [2]	Rolling 3-month Ave.	Same as Primary
	1.5 μg/m^3	Quarterly Average	
Nitrogen Dioxide	53 ppb [3]	Annual (Arith. Ave.)	Same as Primary
	100 ppb	1-hour [4]	None
Particulate Matter (PM_{10})	150 μg/m^3	24-hour [5]	Same as Primary
Particulate Matter ($PM_{2.5}$)	15.0 μg/m^3	Annual [6] (Arith. Ave.)	Same as Primary

Pollutant	Primary Standards	Averaging Times	Secondary Standards
	35 μg/m^3	24-hour [7]	
Ozone	0.075 ppm (2008 std)	8-hour [8]	Same as Primary
	0.08 ppm (1997 std)	8-hour [9]	Same as Primary
	0.12 ppm	1-hour [10]	
Sulfur Oxides	0.03 ppm	Annual (Arith. Ave.)	0.5 ppm - 3-hour [1]
	0.14 ppm	24-hour [1]	
	75 ppb [11]	1-hour	None

[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008.
[3] The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[5] Not to be exceeded more than once per year on average over 3 years.
[6] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m3.
[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m3 (effective December 17, 2006).
[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008).
[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008)..
[10] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.
[11] Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
Source: EPA 2010a

Nonattainment and Maintenance Areas

The CAA and Amendments of 1990 define a "nonattainment area" as any locality that persistently exceeds or fails to meet (or contributes to ambient air quality in a nearby area that fails to meet) the NAAQS. Designating an area as nonattainment is a formal rulemaking process, and EPA normally takes this action only after air quality standards have been exceeded for several consecutive years. Nonattainment areas are given a classification based on the severity of the violation and the type of air quality standard they exceed.

EPA designations of nonattainment areas are based on violations of NAAQS for CO, Pb, O_3, PM_{10}, $PM_{2.5}$, and SO_2. Currently, no nonattainment listings exist for NO_2. See **Table 3.2-12** for more information on nonattainment and maintenance areas within the NCL area.

Table 3.2-12: Nonattainment and Maintenance Areas within the NCL Area

State	Area Name	Pollutant	Status	Acres of NCL	Percent of NCL by State
Delaware	Philadelphia-Wilmington, PA-NY-DE	$PM_{2.5}$	Nonattainment	1,176	57.39
	Philadelphia-Wilmington-Atlantic City, PA-NY-MD-DE	O_3	Nonattainment	2,049	100.00
Indiana	Chicago-Gary-Lake County, IL-IN	O_3	Nonattainment	17,827	20.12
Indiana (cont.)		$PM_{2.5}$	Nonattainment	17,827	20.12
	Lake County, IN	SO_x	Maintenance	4,608	5.20
	LaPorte, IN	O_3	Nonattainment	13,478	15.21
	South Bend-Elkhart, IN	O_3	Nonattainment	22,024	24.86
Kentucky	Boyd County (part), KY	SO_x	Nonattainment	15,751	3.15
	Cincinnati-Hamilton, OH-KY-IN	O_3	Nonattainment	678	0.14
	Cincinnati-Hamilton, OH-KY-IN	$PM_{2.5}$	Nonattainment	678	0.14
	Huntington-Ashland, WV-KY	O_3	Nonattainment	23,181	4.64
	Huntington-Ashland, WV-KY-OH	$PM_{2.5}$	Nonattainment	26,318	5.27
Maryland	Baltimore, MD	O_3	Nonattainment	40,486	10.89
		$PM_{2.5}$	Nonattainment	40,486	10.89
	Martinsburg, WV-Hagerstown, MD	$PM_{2.5}$	Nonattainment	4,785	1.29
	Philadelphia-Wilmington-Atlantic City, PA-NY-MD-DE	O_3	Nonattainment	2,474	0.67
	Washington County (Hagerstown), MD	O_3	EAC	4,785	1.29
	Washington, DC-MD-VA	CO	Maintenance	4,608	1.24
		O_3	Nonattainment	27,562	7.41
	Washington, DC-MD-VA	$PM_{2.5}$	Nonattainment	27,562	7.41
New Jersey	New York-N. New Jersey-Long Island, NY-NJ-CT	$PM_{2.5}$	Nonattainment	17,644	40.71
		O_3	Nonattainment	32,167	74.23
	Philadelphia-Wilmington, PA-NY-DE	$PM_{2.5}$	Nonattainment	10,806	24.94
	Philadelphia-Wilmington-Atlantic City, PA-NY-MD-DE	O_3	Nonattainment	11,168	25.77
New York	New York-N. New Jersey-Long Island, NY-NJ-CT	$PM_{2.5}$	Nonattainment	34,951	18.85
		O_3	Nonattainment	7,179	3.87
	Poughkeepsie, NY	O_3	Nonattainment	27,772	14.98
Ohio	Addison Township (Gallia County), OH	SO_x	Maintenance	4,313	0.13
	Canton-Massillon, OH	O_3	Nonattainment	30,515	0.95
		$PM_{2.5}$	Nonattainment	30,515	0.95
	Cincinnati-Hamilton, OH-KY-IN	O_3	Nonattainment	8,599	0.27
		$PM_{2.5}$	Nonattainment	5,450	0.17
	Cleveland, OH	CO	Maintenance	6,640	0.21
	Cleveland-Akron-Lorain, OH	O_3	Nonattainment	138,466	4.30
		$PM_{2.5}$	Nonattainment	128,565	3.99
	Columbus, OH	O_3	Nonattainment	787,014	24.45
		$PM_{2.5}$	Nonattainment	424,770	13.19
	Cuyahoga County, OH	PM_{10}	Maintenance	6,640	0.21

Table 3.2-12: Nonattainment and Maintenance Areas within the NCL Area

State	Area Name	Pollutant	Status	Acres of NCL	Percent of NCL by State
	Dayton-Springfield, OH	O_3	Nonattainment	52,827	1.64
		$PM_{2.5}$	Nonattainment	52,827	1.64
	Franklin Township (Coshocton County), OH	SO_x	Maintenance	4,759	0.15
Ohio (cont.)	Huntington-Ashland, WV-KY-OH	$PM_{2.5}$	Nonattainment	48,200	1.50
	Jefferson County, OH	PM_{10}	Maintenance	1,257	0.04
	Lima, OH	O_3	Nonattainment	17,162	0.53
	Lorain County, OH	SO_x	Maintenance	450	0.01
	Lucas County, OH	SO_x	Maintenance	1,760	0.05
	Parkersburg-Marietta, WV-OH	O_3	Nonattainment	58,717	1.82
		$PM_{2.5}$	Nonattainment	58,717	1.82
	Steubenville & Mingo Junction, OH	SO_x	Maintenance	15,405	0.48
	Steubenville-Weirton, OH-WV	O_3	Nonattainment	32,013	0.99
		$PM_{2.5}$	Nonattainment	32,013	0.99
	Toledo, OH	O_3	Nonattainment	51,776	1.61
	Waterford Township (Washington County), OH	SO_x	Maintenance	3,823	0.12
	Wheeling, WV-OH	O_3	Nonattainment	49,135	1.53
		$PM_{2.5}$	Nonattainment	49,135	1.53
	Youngstown-Warren-Sharon, OH-PA	O_3	Nonattainment	125,306	3.89
Pennsylvania	Allentown-Bethlehem-Easton, PA	O_3	Nonattainment	24,421	1.44
	Altoona, PA	O_3	Nonattainment	30	0.00
	Armstrong County, PA	SO_x	Nonattainment	14,302	0.84
	Clearfield and Indiana Counties, PA	O_3	Nonattainment	57,440	3.39
	Franklin County, PA	O_3	Nonattainment	39,083	2.31
	Greene County, PA	O_3	Nonattainment	138,682	8.18
	Harrisburg-Lebanon-Carlisle, PA	O_3	Nonattainment	2,967	0.18
		$PM_{2.5}$	Nonattainment	2,967	0.18
	Johnstown, PA	O_3	Nonattainment	280	0.02
		$PM_{2.5}$	Nonattainment	3,650	0.22
	Lancaster, PA	O_3	Nonattainment	34,898	2.06
		$PM_{2.5}$	Nonattainment	34,898	2.06
	Philadelphia-Wilmington, PA-NY-DE	$PM_{2.5}$	Nonattainment	64,546	3.81
	Philadelphia-Wilmington-Atlantic City, PA-NY-MD-DE	O_3	Nonattainment	64,551	3.81
	Pittsburgh-Beaver Valley, PA	O_3	Nonattainment	353,975	20.89
		$PM_{2.5}$	Nonattainment	289,046	17.06
	Scranton-Wilkes Barre, PA	O_3	Nonattainment	8,412	0.50
	State College, PA	O_3	Nonattainment	8,884	0.52
	York, PA	O_3	Nonattainment	83,371	4.92

Table 3.2-12: Nonattainment and Maintenance Areas within the NCL Area

State	Area Name	Pollutant	Status	Acres of NCL	Percent of NCL by State
		$PM_{2.5}$	Nonattainment	35,445	2.09
Tennessee	Nashville, TN	O_3	EAC	41,315	33.76
Virginia	Frederick County, VA	O_3	EAC	141	0.03
Virginia (cont.)	Norfolk-Virginia Beach-Newport News, VA	O_3	Nonattainment	46,923	10.51
	Richmond-Petersburg, VA	O_3	Nonattainment	57,720	12.93
	Roanoke, VA	O_3	EAC	9,163	2.05
	Washington, DC-MD-VA	O_3	Nonattainment	44,556	9.98
		$PM_{2.5}$	Nonattainment	44,556	9.98
West Virginia	Charleston, WV	O_3	Nonattainment	609,421	24.61
		$PM_{2.5}$	Nonattainment	609,421	24.61
	Follansbee, WV	PM_{10}	Maintenance	917	0.04
	Huntington-Ashland, WV-KY	O_3	Nonattainment	101,310	4.09
	Huntington-Ashland, WV-KY-OH	$PM_{2.5}$	Nonattainment	101,310	4.09
	New Manchester-Grant Magisterial District (Hancock County), WV	SO_x	Maintenance	10,906	0.44
	Parkersburg-Marietta, WV-OH	O_3	Nonattainment	5,532	0.22
		$PM_{2.5}$	Nonattainment	5,532	0.22
	Steubenville-Weirton, OH-WV	O_3	Nonattainment	41,017	1.66
		$PM_{2.5}$	Nonattainment	41,017	1.66
	Weirton, WV	PM_{10}	Nonattainment	4,623	0.19
		SO_x	Maintenance	6,742	0.27
	Wheeling, WV-OH	O_3	Nonattainment	219,336	8.86
	Wheeling, WV-OH	$PM_{2.5}$	Nonattainment	219,336	8.86

EAC – Early Action Component
Source: RITABTS 2006a-g

Maintenance areas are those geographic areas that have had a history of nonattainment but are now consistently meeting the NAAQS. Maintenance areas have been re-designated by the EPA from "nonattainment" to "attainment with a maintenance plan".

Ohio has the highest amount of nonattainment and maintenance classification areas within the NCL at 2,226,770 acres, followed closely by West Virginia and Pennsylvania at 1,976,419 acres and 1,261,848 acres, respectively.

If a project came with a current or future nonattainment or maintenance area, the federal agency responsible would need to perform a general Conformity Applicability Determination to evaluate whether the project conforms with the respective state implementation plan.

3.3 Biological Resources

Covering almost 9.8 million acres, the NCL area includes portions of 14 states, stretching from coastal Louisiana to upstate New York. The area crosses portions of all types of habitat found in the continental United States east of the Mississippi river; from the Mississippi delta swamps, to the southeastern and central plains, the Great Lakes region, the Appalachians, and the northeastern coast. These habitats provide a diverse flora and fauna. This section describes the variety of vegetation, land cover, wetlands, wildlife, and sensitive species encountered in the area.

3.3.1 Vegetation and Land Cover Descriptions by Ecoregion

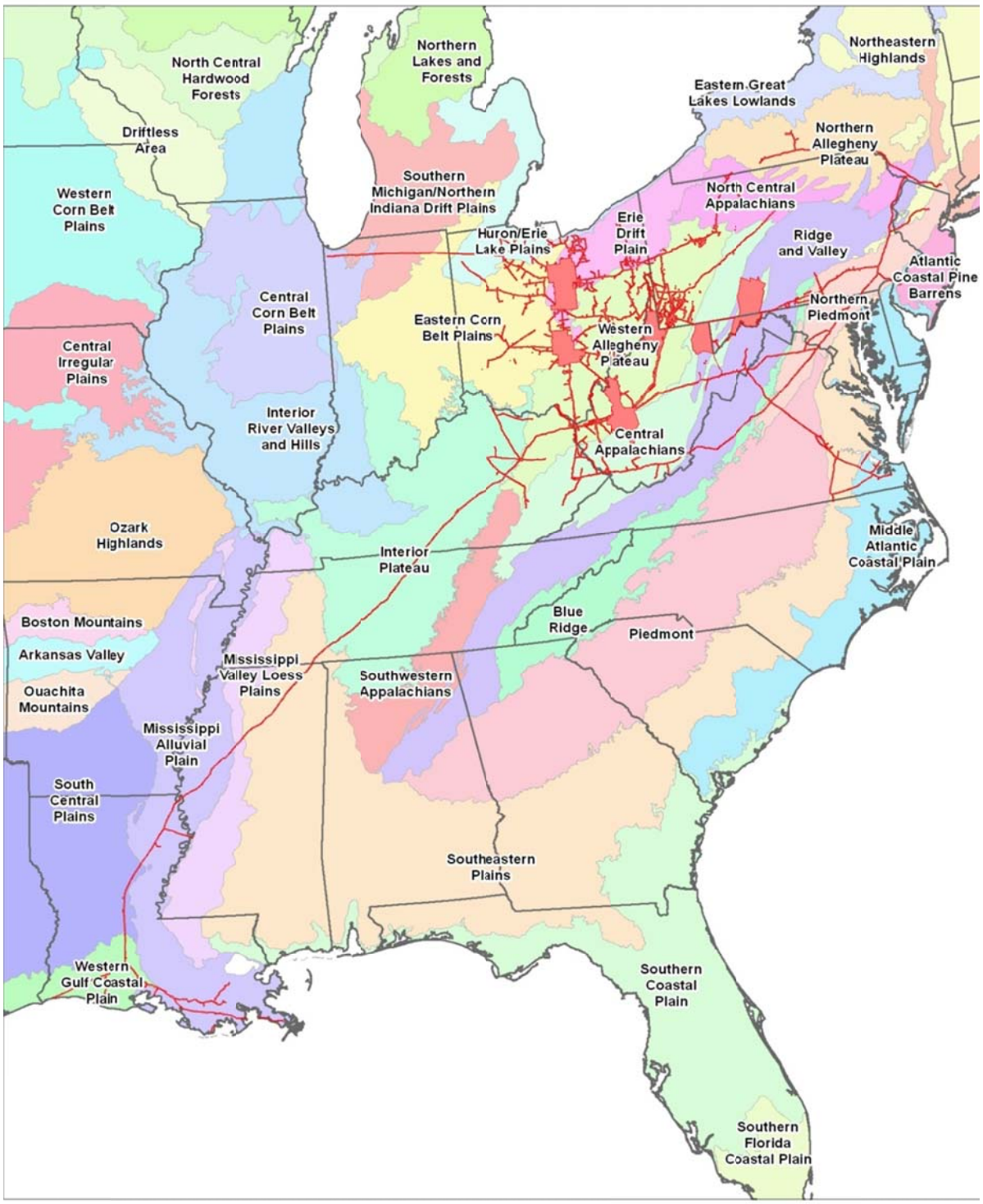
The NCL area encompasses a wide variety of vegetation types including coastal plains, oak-hickory-pine forest, Appalachian plateaus, and elm-ash swamps and sand dunes. In addition to these natural habitats, the NCL area includes various anthropogenic cover types including portions in the corn and wheat belts, pasture lands, managed forests, mines, and developed areas ranging from the smallest rural community to some of the largest urban complexes in the country.

Each land cover class encountered within the area is unique, with variations in species diversity and structure based on such factors as climate, elevation, soil type, and human influence. The CEC developed a generalized representation termed “ecoregions” to describe the vegetation and land cover characteristics over large areas. These are designed to provide a spatial framework for environmental planning and resource management decision making over large areas. Ecoregions are areas within which the type, quality, and quantity of environmental resources (such as vegetation, wildlife, soils, geology, climate, hydrology, land use, and land form) are generally similar. Based on ecoregions originally developed by Omernik (Omernik 1987), the ecoregions developed by the CEC are a collection of four nested levels. Level I ecoregions are the coarsest, with 15 classes covering the North American continent. Level II ecoregions further subdivide the continent into 52 classes. Level III ecoregions divide the continental U.S. into 84 regions, 23 of which cover portions of the NCL area. Finally, Level IV ecoregions subdivide the Level III regions, providing the finest description of site resources. The following map depicts the NCL within the Level IV ecoregions (EPA 2010).

The 23 Level III Ecoregions incorporated in the NCL area (see **Figure 3.3-1**) include:

- Atlantic Coastal Pine Barrens
- Blue Ridge
- Central Appalachians
- Central Corn Belt Plains
- Eastern Corn Belt Plains
- Eastern Great Lakes Lowlands
- Erie Drift Plain
- Huron/Erie Lake Plains
- Interior Plateau
- Middle Atlantic Coastal Plain
- Mississippi Alluvial Plain
- Mississippi Valley Loess Plains
- North Central Appalachians
- Northeastern Highlands
- Northern Allegheny Plateau
- Northern Piedmont
- Piedmont
- Ridge and Valley
- South Central Plains
- Southeastern Plains
- Southern Michigan/Northern Indiana Drift Plains
- Western Allegheny Plateau
- Western Gulf Coastal Plain

Figure 3.3-1: Ecoregions Overview



Source: CEC/EPA 2010

Descriptions for each of these ecoregions are provided in the following subsections. These descriptions are adapted from the original Level III descriptions developed by the EPA (EPA 2002) and the revised descriptions developed by Griffith for the CEC (Griffith 2007) based on further studies. In addition to descriptions of the ecoregions from the EPA and CEC, additional information on the regions based on the National Land Cover Database (NLCD) and various other state and federal data sources are included in each section to further described the NCL portion of the ecoregion. Ecoregions are listed in the order that they are encountered by the NCL area as it traverses northeast from Louisiana.

Western Gulf Coastal Plain

The Western Gulf Coastal Plain ecoregion includes the southwestern region of Louisiana and coastal Texas (see **Figure 3.3-2)**. The ecoregion is distinct from surrounding regions by being flatter and less forested, along with more wide spread conversion to agriculture, than in inland regions to the north (EPA 2002). The NCL area stretches over 682-miles of this ecoregion, with an overall footprint of 173,469-acres covering portions of the NCL area in Louisiana.

Figure 3.3-2: Western Gulf Coastal Plain Ecoregion

Source: CEC 2006

Regional terrain is a combination of flat coastal plains, barrier islands, dunes, beaches, bays, estuaries, and tidal marshes. Soils are primarily composed of Pleistocene marine sands, silts, and clays. Hydrologically, the land consists of low gradient intermittent and perennial streams and coastal lakes. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

Vegetation of the ecoregion varies based upon latitude and land form. Native vegetation in northern portions of the region is tallgrass prairies typified by little and big bluestem, yellow indiangrass, and brown-seed paspalum mixed with hundreds of other herbaceous species. Central portions of the region have similar vegetation along with tall dropseed, silver bluestem, common curly-mesquite, and plains bristlegrass. Coastal marshes consist of cordgrass, saltgrass, needlerush, and saltmarsh bulrush; and barrier islands are comprised of seacoast bluestem, gulfdune paspalum, and sea oats (Griffith 2007).

The NLCD classes for the Western Gulf Coastal Plain portion of the NCL area indicate that the area is primarily covered by Cultivated Crops, Emergent Herbaceous Wetlands, and Pasture/Hay (see **Table 3.3-1**).

Table 3.3-1: NLCD within the Western Gulf Coastal Plain Ecoregion

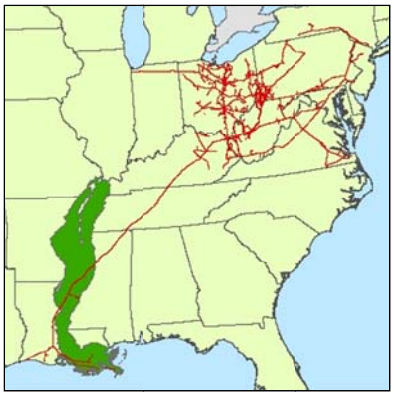
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	17,025	9.81	Mixed Forest	12	0.01
Developed, Open Space	412	0.24	Scrub/Shrub	383	0.22
Developed, Low Intensity	8,067	4.65	Grassland/Herbaceous	1,846	1.06
Developed, Medium Intensity	720	0.42	Pasture/Hay	19,331	11.14
Developed, High Intensity	373	0.21	Cultivated Crops	84,880	48.93
Barren Land	76	0.04	Woody Wetlands	10,763	6.20 t
Deciduous Forest	32	0.02	Emergent Herbaceous Wetland	29,521	17.02
Evergreen Forest	26	0.01			
Source: USGS 2003					

The coastal prairie and marsh natural communities that once covered 2.5-million acres of this area have been reduced to just 600 acres (LADWF 2005). Much of the area has been converted to cropland, with typical crops including rice, soybeans, sugarcane, cotton, corn, grain sorghum, wheat, hay, and pastureland. In the southern portion of the ecoregion, vegetables, melons, citrus, and rangeland for livestock grazing is also common. Onshore oil and gas production is also a significant land use in the region, with such high production fields as Grand Lake and Pecan Lake located in proximity to the NCL area, along with refinement and transportation facilities for offshore fields (LADNR 2010). Also, urbanization and industrialization have become common in this area in recent years, with 16 of Louisiana's large cities growing in this region (Griffith 2007).

Mississippi Alluvial Plain

The Mississippi Alluvial Plain ecoregion stretches from the confluence of the Ohio and Mississippi Rivers in Illinois to the south through Kentucky, Missouri, Tennessee, Arkansas, Mississippi, and Louisiana and terminates in the Gulf of Mexico (see **Figure 3.3-3**). The ecoregion is distinct from surrounding regions due to the poorly drained, fine textured soils typical in this region as compared to surrounding upland ecoregions (EPA 2002). The NCL area extends over 860-miles of the region, with an overall footprint of 298,734-acres covering portions of the NCL area in Louisiana and Mississippi.

Figure 3.3-3: Mississippi Alluvial Plain Ecoregion



Source: CEC 2006

Regional terrain is dominated by the Mississippi Valley, a broad, flat alluvial plain with associated terraces, swales, and levees. Soils are primarily composed of Pleistocene to Holocene sandy to clayey alluvium and are typically finer in texture and more poorly drained than in surrounding regions. Hydrologically, the Mississippi River watershed drains approximately 13-percent of the land area of North America. Historically, the region contained one of the largest wetland complexes in North America, with many marshes, oxbow lakes, and ponds along with the river and its side channels, though much of it has been modified through channelization, navigation, and flood control measures. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

Pre-colonization, bottomland hardwood forests almost completely dominated the Mississippi Alluvial Plain ecoregion. Regular flooding of the region, both from headwater and backwater flood events, maintained these natural communities with hydroperiod

determining localized tree species varieties (MSDWFP 2005). The river swamp forests are the wettest communities and are dominated by bald cypress and water-tupelo. The hardwood swamp forests are typified by water hickory, red maple, green ash, and river birch. Finally, the higher, seasonally flooded areas are composed of sweetgum, sycamore, laurel oak, Nuttall's oak, and willow oak (Griffith 2007).

The NLCD classes for the Mississippi Alluvial Plain portion of the NCL area indicate that the area is now primarily covered by Cultivated Crops, Woody Wetlands, Emergent Herbaceous Wetlands, and Open Water (see **Table 3.3-2**).

Table 3.3-2: NLCD within the Mississippi Alluvial Plain Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	30,009	10.05	Mixed Forest	2,076	0.70
Developed, Open Space	6,882	2.30	Scrub/Shrub	992	0.33
Developed, Low Intensity	8,394	2.81	Grassland/Herbaceous	483	0.16
Developed, Medium Intensity	895	0.30	Pasture/Hay	8,115	2.72
Developed, High Intensity	622	0.21	Cultivated Crops	121,888	40.81
Barren Land	871	0.29	Woody Wetlands	61,380	20.55
Deciduous Forest	1,474	0.49	Emergent Herbaceous Wetland	54,482	18.24
Evergreen Forest	112	0.04			
Source: USGS 2003					

Since settlement, the area has been almost completely converted to cropland through plowing, herbicide application, and flood control engineering. Primary crops in the area are soybeans, cotton, corn, rice, wheat, and sugarcane. Commercial production of catfish and crawfish in regional ponds is also common. Multiple large municipalities occur in the region along the Mississippi River (Griffith 2007).

South Central Plains

The South Central Plains ecoregion covers a large portion of western Louisiana, eastern Texas, and lesser portions of Arkansas and Oklahoma (see **Figure 3.3-4**). Unlike other ecoregions in the area, about one-sixth of the South Central Plains ecoregion is covered by cropland, whereas two-thirds of the ecoregion is covered by forests (EPA 2002). The NCL area stretches over 256-miles of the region, with an overall footprint of 58,897-acres covering portions of the NCL area in Louisiana.

Figure 3.3-4: South Central Plains Ecoregion

Source: CEC 2006

Regional terrain is more rolling than surrounding regions, dominated by rolling plains broken by fluvial terraces, bottomlands, sandy low hills, and low cuestas. Soils are primarily poorly-consolidated Tertiary coastal plain deposits in the form of acidic sandy loams, silt loams, sands, and sandy loams. Hydrologically, the region has a high density of perennial streams but largely lacks natural lakes; however, a number of large reservoirs have been constructed in the area. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

Native upland vegetation in the ecoregion is dominated by shortleaf pine/hardwood forests in the north and longleaf pine and savannas in the south. Southern upland forests are typified by southern red oak, post oak, white oak, hickory and loblolly pine, along with patches of American beech and magnolia. Southern floodplain forests are dominated by water oak, willow oak, swamp chestnut oak, sweetgum, blackgum, red maple, bald cypress, and water-tupelo (Griffith 2007).

The NLCD classes for the South Central Plains portion of the NCL area indicate that the area is now primarily covered by Evergreen Forest, Woody Wetlands, Cultivated Crops, and Scrub/Shrub (see **Table 3.3-3**).

Table 3.3-3: NLCD within the South Central Plains Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	389	0.70	Mixed Forest	1,967	3.55
Developed, Open Space	1,562	2.82	Scrub/Shrub	8,202	14.79
Developed, Low Intensity	858	1.55	Grassland/Herbaceous	282	0.51
Developed, Medium Intensity	78	0.14	Pasture/Hay	2,267	4.09

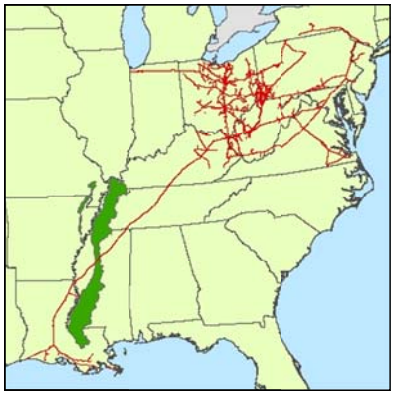
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Developed, High Intensity	15	0.03	Cultivated Crops	8,334	15.03
Barren Land	56	0.10	Woody Wetlands	13,181	23.76
Deciduous Forest	862	1.55	Emergent Herbaceous Wetland	480	0.86
Evergreen Forest	16,931	30.53			
Source: USGS 2003					

Shortleaf pine-oak-hickory forests once dominated much of this region, but the majority of the shortleaf pine was logged upon settlement and, aside from remnant patches, has been largely replaced by loblolly pine plantations (LADWF 2005). Commercial pine plantations are extensive in this region, and timber production, along with livestock grazing and oil/gas production, form the majority of commercial land use in this region. Areas cleared for cultivation make up 15-20-percent of the region and are primarily planted with cotton, corn, soybeans, rice, and pasture (Griffith 2007).

Mississippi Valley Loess Plains

The Mississippi Valley Loess Plains ecoregion stretches from the Ohio River in western Kentucky to the south through Missouri, Tennessee, Arkansas, Mississippi, and Louisiana, largely east of the Mississippi River, although a small portion of the ecoregion occurs west of the Mississippi River outside of the NCL area (see **Figure 3.3-5**). The ecoregion is distinct from surrounding regions by being generally flatter, with lower gradient streams and thicker loess soils than in surrounding regions (EPA 2002). The NCL area stretches over 44 miles of this ecoregion, with an overall footprint of 9,919 acres covering portions of the NCL area in Mississippi.

Figure 3.3-5: Mississippi Valley Loess Plains Ecoregion



Source: CEC 2006

Regional terrain is formed of irregular plains of rolling hills, dissected hills, ridges, and bluffs near the Mississippi River. Soils in the form of thick deposits of Quaternary loess are one of the region's distinguishing characteristics, with underlying tertiary deposits of sand, silt, and clay. Hydrologically, the area has a network of low-moderate gradient perennial and intermittent streams, and it contains almost no lakes. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

Oak-hickory-pine forests form the natural vegetation throughout the eastern uplands. Representative species include a variety of oaks, hickories, and a combination of loblolly and shortleaf pines (Griffith 2007).

The NLCD classes for the Mississippi Valley Loess Plains portion of the NCL area show the area is primarily covered by Pasture/Hay, Cultivated Crops, Deciduous Forest, and Woody Wetlands (see **Table 3.3-4**).

Table 3.3-4: NLCD within the Mississippi Valley Loess Plains Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	86	0.87	Mixed Forest	143	1.44
Developed, Open Space	610	6.15	Scrub/Shrub	777	7.83
Developed, Low Intensity	89	0.90	Grassland/Herbaceous	1	0.01
Developed, Medium Intensity	6	0.06	Pasture/Hay	2,866	28.90
Developed, High Intensity	2	0.02	Cultivated Crops	2,023	20.40
Barren Land	0	0.00	Woody Wetlands	1,039	10.48
Deciduous Forest	1,814	18.29	Emergent Herbaceous Wetland	83	0.84
Evergreen Forest	381	3.84			
Source: USGS 2003					

The oak-hickory-pine forests that historically dominated the region have been fragmented by pine plantations, pasture, and cropland. Typical crops include soybeans, cotton, corn, wheat, and hay. Some oil and gas production also occurs in the region. Multiple large municipalities are also common in the region near the Mississippi River valley (Griffith 2007).

Southeastern Plains

The Southeastern Plains ecoregion stretches from just north of the Gulf of Mexico to Maryland and covers portions of Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Tennessee, and Louisiana and forms one of the largest

ecoregions in the eastern U.S. (see **Figure 3.3-6**). The ecoregion is distinct from surrounding regions by being younger geologically than regions to the north and west, and more rugged than in regions to the south and east (EPA 2002). The NCL area stretches over 627 miles of this ecoregion, with an overall footprint of 184,265 acres encompassing portions of the NCL area in Mississippi, Tennessee, Virginia, and North Carolina.

Figure 3.3-6: Southeastern Plains Ecoregion

Source: CEC 2006

Regional terrain is formed of dissected, rolling to smooth plains. Regional soils are a combination of Cretaceous and Tertiary-age sands, silts, and clays. Hydrologically, the area is dissected by a moderate to dense network of perennial streams and rivers but largely lacks natural lakes, although a number of large reservoirs have been constructed in the area. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

The predominant natural vegetation type of the ecoregion is longleaf pine with patches of oak-hickory-pine forest. Southern portions of the ecoregion have stands of American beech, sweetgum, southern magnolia, laurel, and live oak along with various pines. Floodplain areas are comprised of bottomland oaks, red maple, green ash, sweetgum, and American elm with patches of bald cypress, pond cypress, and water-tupelo (Griffith 2007).

The NLCD classes for the Southeastern Plains portion of the NCL area show the area is primarily covered by Deciduous Forest, Evergreen Forest, Cultivated Crops, and Pasture/Hay (see **Table 3.3-5**).

Table 3.3-5: NLCD within the Southeastern Plains Ecoregion

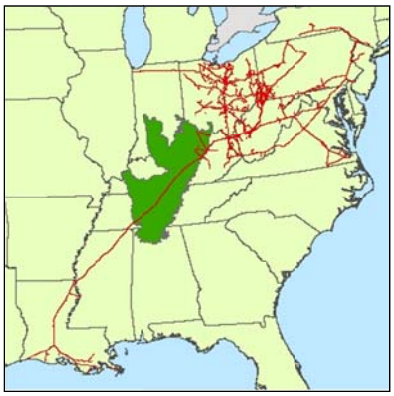
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	1,225	0.69	Mixed Forest	7,258	4.11
Developed, Open Space	9,504	5.38	Scrub/Shrub	11,582	6.56
Developed, Low Intensity	4,324	2.45	Grassland/Herbaceous	371	0.21
Developed, Medium Intensity	1,253	0.71	Pasture/Hay	23,580	13.35
Developed, High Intensity	640	0.36	Cultivated Crops	28,834	16.32
Barren Land	1,566	0.89	Woody Wetlands	13,676	7.74
Deciduous Forest	41,585	23.54	Emergent Herbaceous Wetland	1,442	0.82
Evergreen Forest	29,803	16.87			
Source: USGS 2003					

This ecoregion, once a large swath of mixed forest, is now a mosaic of crops, pasture, woodland, and remnant mixed forests. Large pine plantations and successional pine and hardwood woodlots are common in the region. Areas converted to cropland are typically planted with corn, cotton, soybeans, peanuts, onions, sweet potatoes, melons, and tobacco. Poultry and hog farms are also common. In addition, numerous large cities occur in this region (Griffith 2007). In the southern portion of the region, coniferous stands increasing as native deciduous forests are converted to pine plantations (MSDWFP 2005). In the northern portion of the region, deciduous stands are increasing due to frequent fires and preferential cutting of pine. Additionally, the northern section has seen a rapid expansion of urbanization and residential development within commuting distance of the Beltway (Woods et al 1999).

Interior Plateau

The Interior Plateau is a diverse ecoregion covering large portions of Tennessee and Kentucky, with additional areas in Indiana, Ohio, and Alabama (see **Figure 3.3-7**). Regional soils and geology are distinctly different from the sediments and alluvium typical in regions to the west, and elevations are considerably lower than in regions to the east (EPA 2002). The NCL area extends over 1,260 miles, with an overall footprint of 336,750 acres covering portions of the NCL area in Tennessee, Kentucky, and Ohio.

Figure 3.3-7: Interior Plateau Ecoregion



Source: CEC 2006

Regional terrain is primarily composed of rolling and irregular plains combined with a variety of karst plains, dissected plateaus and tablelands, open hills, broad ridges, steep slopes, and ravines. The region is primarily underlain with Mississippian and Ordovician-age limestone, chert, sandstone, siltstone, and shale overlain by Ultisols and Alfisols. Hydrologically, the Kentucky, Green, Cumberland, Duck, Elk, and Tennessee River systems are found within the region along with a variety of perennial and intermittent streams, springs, and reservoirs. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

The dominant natural plant community is oak-hickory forest with patches of bluestem prairie, cedar glades, and mixed mesophytic forest. Typical species include white oak, northern red oak, black oak, hickories, yellow poplar, red maple, and eastern red-cedar (Griffith 2007).

The NLCD classes for the Interior Plateau portion of the NCL area indicate that the area is primarily covered by Pasture/Hay and Deciduous Forest (see **Table 3.3-6**).

Table 3.3-6: NLCD within the Interior Plateau Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	4,268	1.28	Mixed Forest	5,109	1.53
Developed, Open Space	19,283	5.78	Scrub/Shrub	2,507	0.75
Developed, Low Intensity	6,551	1.96	Grassland/Herbaceous	7,305	2.19
Developed, Medium Intensity	2,352	0.71	Pasture/Hay	142,317	42.68
Developed, High Intensity	839	0.25	Cultivated Crops	11,339	3.40
Barren Land	214	0.06	Woody Wetlands	247	0.07
Deciduous Forest	121,331	36.39	Emergent Herbaceous Wetland	38	0.01
Evergreen Forest	9,734	2.92			
Source: USGS 2003					

The Interior Plateau ecoregion has become a mosaic of forest, woodlots, pasture, and cropland. Primary agricultural products of the region are hay, cattle, cotton, corn, small grains, soybeans, and tobacco. Expanding urbanization is common, with the majority of the large cities of Tennessee and Kentucky occurring in this ecoregion (Griffith 2007).

Central Corn Belt Plains

The Central Corn Belt Plains ecoregion covers the majority of Illinois and extends into Indiana and Wisconsin (see **Figure 3.3-8**). The ecoregion is distinct from the more heavily forested ecoregions to the east and the mostly treeless plains ecoregions to the west (EPA 2002). The NCL area stretches over 35 miles, with an overall footprint of 22,994 acres encompassing portions of the NCL area in Indiana.

Figure 3.3-8: Central Corn Belt Plains Ecoregion

Source: CEC 2006

Topography within the ecoregion has been heavily modified through historic glaciations (EPA 2002). Regional terrain is primarily composed of flat to rolling plains with patches of sand dunes and lake plains. Soils of the eastern portion of the regions are largely

dark, fertile and deep, derived from drift material, overlaying Paleozoic shale, siltstone and limestone. Hydrologically, the area naturally is covered by a low density of intermittent and perennial streams, though many areas have been tiled, ditched, and tied into the existing drainage systems to support agriculture. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Although the majority of the natural vegetation communities of the region have been replaced by agriculture, remnant patches still exist. Mesic prairie communities are dominated by big bluestem, Indiangrass, prairie dropseed, and switchgrass. Dry upland prairies are typified by little bluestem and sideoats grama. Woodlands primarily contain white oak, black oak, and shagbark hickory, along with some sugar maple and American elm on more mesic sites (Griffith 2007).

The NLCD classes for the Central Corn Belt Plains portion of the NCL area show the area is primarily covered by Cultivated Crops, Deciduous Forest, and Low Intensity Development (see **Table 3.3-7**).

Table 3.3-7: NLCD within the Central Corn Belt Plains Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	164	0.71	Mixed Forest	1	0.00
Developed, Open Space	1,638	7.12	Scrub/Shrub	137	0.60
Developed, Low Intensity	2,874	12.50	Grassland/Herbaceous	1,468	6.38
Developed, Medium Intensity	815	3.54	Pasture/Hay	877	3.81
Developed, High Intensity	181	0.79	Cultivated Crops	10,407	45.26
Barren Land	0	0.00	Woody Wetlands	458	1.99
Deciduous Forest	3,861	16.79	Emergent Herbaceous Wetland	28	0.12
Evergreen Forest	85	0.37			
Source: USGS 2003					

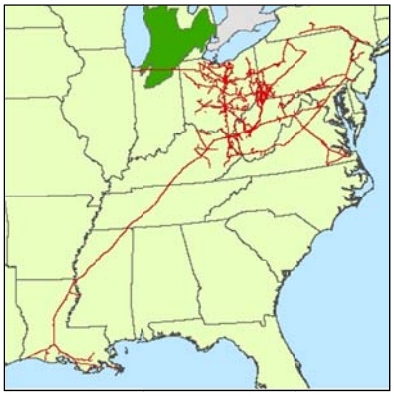
The ecoregion saw a gradual replacement of natural vegetation by managed agriculture starting in the nineteenth century. Farms now dominate the region, primarily producing corn, soybeans, cattle, sheep, poultry, and hogs. Development is also common as the Chicago metropolitan area and most other major cities in Illinois are found within this ecoregion (Griffith 2007).

Southern Michigan/Northern Indiana Drift Plains

The Southern Michigan/Northern Indiana Drift Plains ecoregion covers much of the area between Lake Michigan and Lakes Huron/Erie including the majority of southern

Michigan and portions of northern Indiana and Ohio (see **Figure 3.3-9**). The ecoregion is distinct from surrounding regions due to better drainage and more lakes than the regions to the east, less agriculture than the regions to the south, and more nutrient rich soils than the regions to the north (EPA 2002). The NCL stretch over 89 miles of this ecoregion with an overall footprint of 56,741 acres encompassing portions of the NCL area in Indiana.

Figure 3.3-9: Southern Michigan/Northern Indiana Drift Plains Ecoregion



Source: CEC 2006

Regional terrain, formed by historic glaciations, is primarily composed of a broad till plain formed by a complex of drift deposits, paleobeach ridges, relict dunes, morainal hills, kames, drumlins, melt water channels, and kettles. Soils are a mix of Alfisols, Histosols, and Mollisols over deeply buried bedrock composed of sandstone and shale. Hydrologically, the region has numerous perennial streams, small- and medium-sized lakes, and an abundance of groundwater. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Natural vegetation communities of the area include oak-hickory forests, northern swamp forests, and beech forests. Common species for the region include white oak, northern red oak, black oak, bitternut hickory, shagbark hickory, sugar maple, and American beech (Griffith 2007).

The NLCD classes for the Southern Michigan/Northern Indiana Drift Plains portion of the NCL area indicate the area is primarily covered by Cultivated Crops and Deciduous Forest (see **Table 3.3-8**).

Table 3.3-8: NLCD within the Southern Michigan/Northern Indiana Plains Ecoregion

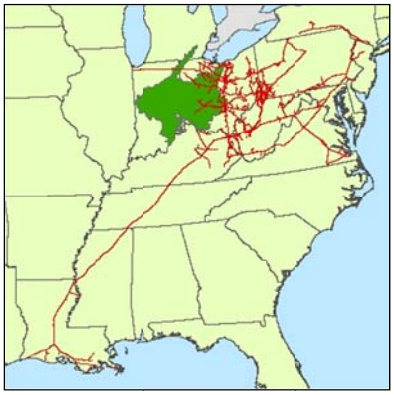
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	223	0.42	Mixed Forest	0	0.00
Developed, Open Space	2,541	4.82	Scrub/Shrub	61	0.12
Developed, Low Intensity	561	1.06	Grassland/Herbaceous	421	0.80
Developed, Medium Intensity	63	0.12	Pasture/Hay	3,343	6.34
Developed, High Intensity	41	0.08	Cultivated Crops	39,079	74.16
Barren Land	1	0.00	Woody Wetlands	578	1.10
Deciduous Forest	5,470	10.38	Emergent Herbaceous Wetland	259	0.49
Evergreen Forest	57	0.11			
Source: USGS 2003					

This ecoregion, once primarily forested, is now largely a mix of agricultural, pasture, urban, suburban and rural lands with patches of woodland and native forests. Primary agricultural products include corn and other feed grains, hay for dairy cattle and other livestock, along with winter wheat, dry beans, and some fruits and vegetables (Griffith 2007). Recreational and residential development near lake fronts, along with gravel quarries are also common in the region (EPA 1998).

Eastern Corn Belt Plains

The Eastern Corn Belt Plains ecoregion covers large portions of Indiana and Ohio and a small portion of Michigan (see **Figure 3.3-10**). The ecoregion is distinct from surrounding ecoregions due to more trees and lighter soils than regions to the west, loamier and better drained soils than regions to the north, and richer soils than those to the east (EPA 2002). The NCL area extends over 1,123 miles of the region, with an overall footprint of 756,426 acres covering portions of the NCL area in Ohio and Indiana.

Figure 3.3-10: Eastern Corn Belt Plains Ecoregion



Source: CEC 2006

Regional terrain, formed by historic glaciations, is primarily a rolling till plain with local end moraines. Soils are a mix of Wisconsinan age glacial deposits, till, outwash and thin loess overlying Paleozoic carbonates, shale, and sandstone. Hydrologically, the region has numerous perennial and intermittent streams, wetlands, lakes, and reservoirs along with an abundance of groundwater. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Natural vegetation communities for the ecoregion include beech forests and elm-ash swamps in wetter areas (Griffith 2007). Common species in these communities include American beech, American elm, white ash, black ash, red maple, and silver maple (Sampson 1930). Pin oak swamps and white oak woodlands are also common (EPA 1998).

The NLCD classes for the Eastern Corn Belt Plains portion of the NCL area show the area is primarily covered by Cultivated Crops and Deciduous Forest (see **Table 3.3-9**).

Table 3.3-9: NLCD within the Eastern Corn Belt Plains Ecoregion

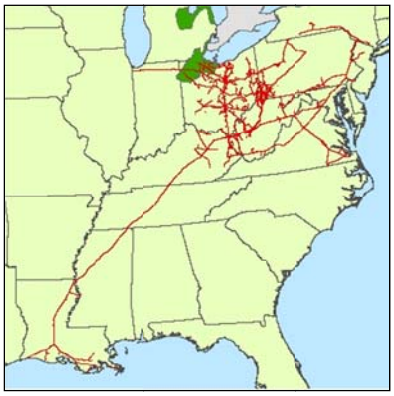
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	5,135	0.68	Mixed Forest	1,370	0.18
Developed, Open Space	59,923	7.92	Scrub/Shrub	1,161	0.15
Developed, Low Intensity	28,572	3.78	Grassland/Herbaceous	5,182	0.68
Developed, Medium Intensity	8,152	1.08	Pasture/Hay	67,366	8.91
Developed, High Intensity	3,316	0.44	Cultivated Crops	483,680	63.94
Barren Land	661	0.09	Woody Wetlands	2,373	0.31
Deciduous Forest	87,788	11.61	Emergent Herbaceous Wetland	583	0.08
Evergreen Forest	1,164	0.15			
Source: USGS 2003					

This ecoregion has principally been converted to agricultural uses, with primary products including corn, soybeans, wheat, dairy, and livestock. Additional land uses include urban, suburban, industrial, and rural residential. Many of the largest cities in Ohio and Indiana occur in the Eastern Corn Belt Plains, including Columbus, Dayton, Indianapolis, and Fort Wayne (Griffith 2007).

Huron/Erie Lake Plain

The Huron/Erie Lake Plain ecoregion covers the coastal areas of Lakes Huron and Erie in Michigan and Ohio, with an interior extension across northern Ohio into Indiana (see **Figure 3.3-11**). The ecoregion is distinct from the surrounding Eastern Corn Belt Plains, which is loamier and better drained (EPA 2002). The NCL area extends over 339 miles of the region, with an overall footprint of 192,840 acres encompassing the NCL area in Ohio.

Figure 3.3-11: Huron/Erie Lake Plain Ecoregion



Source: CEC 2006

Regional terrain is a broad, nearly flat plain with relic areas of sand dunes, beach ridges, and end moraines. Soils are a combination of fine lacustrine sediments and coarser moraine material overlaying a bedrock layer mostly formed of Silurian, Devonian and Mississippian limestone, dolomite, and shale. Hydrologically, the region has numerous perennial streams. This region was composed of extensive swamps and marshes but most have been drained for agriculture. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Natural vegetation for the ecoregion is dominated by elm-ash swamps and beech forests along with patches of mixed oak forests. Oak savannas occur in well-drained sandy

areas. Common species include red maple, white ash, American basswood, aspen, white oak, northern red oak, black oak, bitternut hickory, and shagbark hickory. The majority of the natural vegetation has been cleared for agriculture and only exists in remnant patches (Griffith 2007).

The NLCD classes for the Huron/Erie Lake Plain portion of the NCL area indicate the area is primarily covered by Cultivated Crops (see **Table 3.3-10**).

Table 3.3-10: NLCD within the Huron/Erie Lake Plain Ecoregion

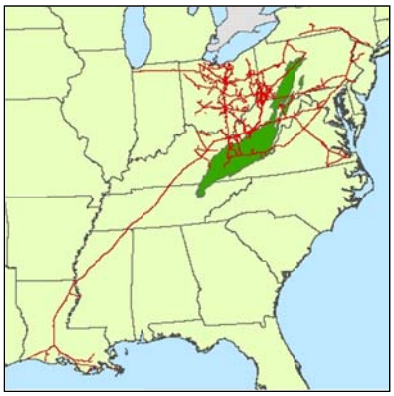
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	1,562	0.81	Mixed Forest	1	0.00
Developed, Open Space	15,540	8.06	Scrub/Shrub	0	0.00
Developed, Low Intensity	8,224	4.26	Grassland/Herbaceous	2,222	1.15
Developed, Medium Intensity	2,189	1.13	Pasture/Hay	2,205	1.14
Developed, High Intensity	1,194	0.62	Cultivated Crops	145,846	75.63
Barren Land	803	0.42	Woody Wetlands	612	0.32
Deciduous Forest	9,422	4.89	Emergent Herbaceous Wetland	2,999	1.56
Evergreen Forest	20	0.01			
Source: USGS 2003					

Through extensive drainage projects, much of this region has been converted from marshy forests to highly productive agricultural lands. Principal agricultural products include corn, soybeans, winter wheat, hay, livestock, and vegetables. Urban and industrial areas are also common in this ecoregion, including the Detroit metropolitan area and the city of Toledo (Griffith 2007).

Central Appalachians

The Central Appalachians ecoregion, encompassing a large portion of the Appalachian Mountains, stretches from Tennessee through portions of Kentucky, Virginia, West Virginia, Maryland, and into central Pennsylvania (see **Figure 3.3-12**). The ecoregion is distinct from regions to the west based on higher elevation, cooler temperatures, steeper slopes, and higher levels of ruggedness and forestation (Griffith 2007). It is distinct from regions to the north due to less severe climate and lower forest densities and is separated from regions to the east by a sandstone escarpment (Woods et al 1999). The NCL area extends over 1,051 miles of the region, with an overall footprint of 1,175,161 acres covering portions of the NCL area in West Virginia, Kentucky, Pennsylvania, Maryland, and Virginia.

Figure 3.3-12: Central Appalachians Ecoregion



Source: CEC 2006

Regional terrain is primarily a highly dissected, rugged plateau along with areas of high hills, low mountains, steep narrow ridges, narrow winding valleys, and deep coves with large variations in site elevation. Soils are primarily Inceptisols and Ultisols overlaying Pennsylvanian-age sandstone, shale, conglomerate, and coal. Hydrologically, the region has a high density of perennial streams, along with some waterfalls and reservoirs but few natural lakes. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Natural vegetation for the ecoregion is primarily mixed mesophytic forest, historically dominated by American chestnut. Several tree species co-occur including chestnut oak, red maple, white oak, black oak, American beech, yellow poplar, sugar maple, ash, American basswood, buckeye, and eastern hemlock. Additionally, there are some areas of Appalachian oak forest and northern hardwood forests with maple, American beech, birch, and eastern hemlock. Areas of red spruce and eastern hemlock occur at the highest elevations in the north-central portion of the region (Griffith 2007).

The NLCD classes for the Central Appalachians portion of the NCL area indicate the area is primarily covered by Deciduous Forest (see **Table 3.3-11**).

Table 3.3-11: NLCD within the Central Appalachians Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	6,770	0.58	Mixed Forest	11,818	1.01
Developed, Open Space	63,124	5.38	Scrub/Shrub	290	0.02
Developed, Low Intensity	15,852	1.35	Grassland/Herbaceous	29,726	2.53
Developed, Medium Intensity	6,843	0.58	Pasture/Hay	73,682	6.28
Developed, High Intensity	1,014	0.09	Cultivated Crops	18,014	1.53

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Barren Land	10,223	0.87	Woody Wetlands	641	0.05
Deciduous Forest	912,996	77.79	Emergent Herbaceous Wetland	494	0.04
Evergreen Forest	22,197	1.89			
Source: USGS 2003					

Most of the forests of the region were logged by the 1900s; however, remnant patches of virgin forest still remain in park areas (WVDNR 2005). This ecoregion's rugged topography make most areas incompatible with agriculture, and most areas have remained or have returned to forest. As a result commercial forestry is common. Additionally, both surface and underground bituminous coal mines are common in the region (Griffith 2007). In lower areas with less rugged terrain, small dairy, livestock and pasture lands are interspersed with woodlands. Gas wells and Christmas tree plantations are also common (Woods et al 1999).

Western Allegheny Plateau

The Western Allegheny Plateau ecoregion covers portions of Kentucky, Ohio, West Virginia, and Pennsylvania (see **Figure 3.3-13**). The ecoregion is distinct from surrounding regions by being more rugged than the agricultural till plains to the north and west but less rugged and less forested than the regions to the east and south (EPA 2002). The NCL area stretches over 4,425 miles of this ecoregion, with an overall footprint of 3,106,096 acres covering portions of the NCL area in West Virginia, Ohio, Pennsylvania, and Kentucky.

Figure 3.3-13: Western Allegheny Plateau Ecoregion

Source: CEC 2006

Regional terrain is an unglaciated, dissected plateau with areas of rugged hills. Soils are a combination of Alfisols, Ultisols, and Inceptisols underlain by horizontally bedded, often carboniferous, sedimentary rock. Hydrologically, the region has a high density of perennial streams and a number of man-made reservoirs, and natural lakes are largely absent. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Natural vegetation is predominantly mixed mesophytic forest with areas of Appalachian oak forest. Common species include chestnut oak, red maple, white oak, black oak, American beech, yellow poplar, sugar maple, ash, American basswood, buckeye, and eastern hemlock (Griffith 2007).

The NLCD classes for the Western Allegheny Plateau portion of the NCL area indicate the area is primarily covered by Deciduous Forest and Pasture/Hay (see **Table 3.3-12**).

Table 3.3-12: NLCD within the Western Allegheny Plateau Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	36,672	1.19	Mixed Forest	7,647	0.25
Developed, Open Space	224,897	7.27	Scrub/Shrub	4,250	0.14
Developed, Low Intensity	70,438	2.28	Grassland/Herbaceous	43,872	1.42
Developed, Medium Intensity	27,943	0.90	Pasture/Hay	375,647	12.14
Developed, High Intensity	9,710	0.31	Cultivated Crops	123,343	3.99
Barren Land	4,310	0.14	Woody Wetlands	1,511	0.05
Deciduous Forest	2,120,789	68.53	Emergent Herbaceous Wetland	301	0.01
Evergreen Forest	43,326	1.40			
Source: USGS 2003					

The region is still largely forested with some logging and public national forest lands. Some areas have been converted to livestock and dairy farming. Regional areas of cropland primarily produce hay, corn, small grains, and tobacco. Surface and underground coal mining is common in the area (Griffith 2007). Additionally, urban and industrial activity is common in the major river valleys with many medium and large settlements found in the ecoregion, including the Pittsburgh metropolitan area (Woods et al 1999). Oil and gas wells are also common in the region (EPA 1998).

Erie Drift Plain

The Erie Drift Plain ecoregion covers the land southeast of Lake Erie including portions of Ohio, Pennsylvania, and New York (see **Figure 3.3-14**). The region is distinct from

surrounding regions by being more rugged and less fertile than regions to the west and is composed of a glaciated terrain unlike regions to the south and east (EPA 2002). The NCL area extends over 1,589 miles of this ecoregion, with an overall footprint of 1,261,659 acres covering portions of the NCL area in Ohio and Pennsylvania.

Figure 3.3-14: Erie Drift Plain Ecoregion

Source: CEC 2006

Regional terrain is predominantly a gently to strongly rolling dissected plateau with low rounded hills, scattered end moraines, kettles, and marshy lowlands as a result of heavy glaciation. Soils are a combination of glacial outwash and till overlying Paleozoic sandstone and shale. Hydrologically, the region has a network of perennial and intermittent streams with numerous wetlands, sphagnum bogs, and lakes. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Native vegetation is composed of beech-maple forests, mixed oak forests, and mixed mesophytic forests. Common species include northern red oak, white oak, shagbark hickory, sugar maple, yellow birch, American beech, and eastern hemlock (Griffith 2007). Elm-ash swamp forests and sphagnum peat bogs are also common in the lowlands (EPA 1998). Common species in the elm-ash swamps include American elm, white ash, and black ash (Sampson 1930). Common species in the sphagnum peat bogs include sphagnum peat moss, sedges, sundew, tamarack, and eastern hemlock (Woods et al 1999).

The NLCD classes for the Erie Drift Plain portion of the NCL area indicate that the area is primarily covered by Cultivated Crops, Deciduous Forest, and Pasture/Hay (see **Table 3.3-13**).

Table 3.3-13: NLCD within the Erie Drift Plain Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	9,743	0.77	Mixed Forest	153	0.01
Developed, Open Space	95,152	7.54	Scrub/Shrub	2,704	0.21
Developed, Low Intensity	34,097	2.70	Grassland/Herbaceous	11,771	0.93
Developed, Medium Intensity	9,291	0.74	Pasture/Hay	217,239	17.22
Developed, High Intensity	3,777	0.30	Cultivated Crops	461,824	36.60
Barren Land	116	0.01	Woody Wetlands	16,538	1.31
Deciduous Forest	390,172	30.93	Emergent Herbaceous Wetland	277	0.02
Evergreen Forest	8,803	0.70			
Source: USGS 2003					

Much of the ecoregion has been converted to agriculture, primarily in the form of dairy operations. Local croplands are primarily used for feed grains and forage crops. Timber operations are also common in the area, providing saw logs for construction, firewood, and specialty wood products. Urban development and industrial activities are also found locally (Griffith 2007). Vegetable and fruit farms, natural gas wells, recreational development on public lands, and gravel mining are also common land uses in the region (EPA 1998).

Ridge and Valley

The Ridge and Valley ecoregion covers a long, narrow stretch of land from Alabama in the south through portions of Georgia, Tennessee, Virginia, West Virginia, Maryland, Pennsylvania, New Jersey, and New York (see **Figure 3.3-15**). It is distinct from surrounding ecoregions by being relatively lower, less rugged, and less forested (EPA 2002). The NCL area stretches over 872 miles of the ecoregion, with an overall footprint of 1,225,969 acres covering portions of the NCL area in Pennsylvania, Maryland, West Virginia, Virginia, New York, and New Jersey.

Figure 3.3-15: Ridge and Valley Ecoregion

Source: CEC 2006

Regional terrain is northeast-southwest trending having relatively low-lying rolling valleys with ridges and low irregular hills. Soils are a combination of Ultisols and Inceptisols overlying a variety of limestone, dolomite, shale, siltstone, sandstone, chert, mudstone, and marble. Hydrologically, the regional drainage is in a trellised pattern with smaller streams on the slopes draining into meandering streams in the valley, combined with natural springs and some large reservoirs to make a diverse aquatic system. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Natural vegetation for the region is dominated by Appalachian oak forest communities in the north and oak-hickory-pine forest communities in the south (Griffith 2007). Appalachian oak forest areas are dominated by white oak and northern red oak. Oak-hickory-pine forests are dominated by hickory, longleaf pine, shortleaf pine, loblolly pine, white oak, and post oak. White pine, American beech, and other hardwoods are also common in the area (Woods et al 1999).

The NLCD classes for the Ridge and Valley portion of the NCL area indicate that the area is primarily covered by Deciduous Forest and Pasture/Hay (see **Table 3.3-14**).

Table 3.3-14: NLCD within the Ridge and Valley Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	7,739	0.63	Mixed Forest	24,083	1.96
Developed, Open Space	69,310	5.65	Scrub/Shrub	225	0.02
Developed, Low Intensity	21,529	1.76	Grassland/Herbaceous	63	0.01
Developed, Medium Intensity	5,385	0.44	Pasture/Hay	192,547	15.71
Developed, High Intensity	1,756	0.14	Cultivated Crops	80,787	6.59
Barren Land	1,189	0.10	Woody Wetlands	1,955	0.16

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Deciduous Forest	784,862	64.02	Emergent Herbaceous Wetland	500	0.04
Evergreen Forest	34,041	2.78			
Source: USGS 2003					

The region is currently a mix of forested ridges with agricultural development in the valleys (Woods et al 1999). Land uses in the region consist of pine plantations, pasture, and cropland with areas of rural residential, urban, and industrial. Regional agricultural products include hay, pasture and grain for beef and dairy cattle, corn, soybeans, tobacco, and cotton. Numerous large and medium cities are found throughout the region (Griffith 2007). Anthracite coal mining and poultry operations are also regionally significant (Woods et al 1999).

Blue Ridge

The Blue Ridge ecoregion covers a long, narrow stretch of land from Georgia in the south through portions of South Carolina, North Carolina, Tennessee, Virginia, Maryland, and Pennsylvania (see **Figure 3.3-16**). It is distinct from surrounding ecoregions by being generally more rugged and forested than surrounding regions (EPA 2002). The NCL area extends over 64 miles of this ecoregion, with an overall footprint of 32,755 acres covering portions of the NCL area in Virginia and Pennsylvania.

Figure 3.3-16: Blue Ridge Ecoregion

Source: CEC 2006

Regional terrain is generally rugged, varying from narrow ridges to hilly plateaus with areas of massive mountains and high peaks, including Mount Mitchell, the highest point in the U.S. east of the Mississippi River. Soils are a combination of Inceptisols and Ultisols overlying primarily metamorphic bedrock in the form of gneiss, schist, and quartzite along with areas of igneous and sedimentary rock. Hydrologically, the region

has a high density of cool, clear perennial streams along with a few large reservoirs, and natural lakes are largely absent. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

This ecoregion's temperate broadleaf forests are some of the most floristically diverse forests in the world. Vegetation communities found in the region are a combination of Appalachian oak forests along with a variety of oak, hemlock, cove hardwoods, and pine communities. American chestnut, a species of high ecologic and economic importance, once dominated forests in the region but was largely wiped out by Chestnut blight by the 1930's. The chestnut was principally replaced by yellow poplar, chestnut oak, white oak, black locust, red maple, and various species of pine. Higher elevation forests are dominated by northern hardwoods such as American beech, yellow birch, yellow buckeye, and maples. The highest elevations are covered by Southeastern spruce-fir forests, with Fraser fir, red spruce, yellow birch, and rhododendrons (Griffith 2007).

The NLCD classes for the Blue Ridge portion of the NCL area indicate that the area is primarily covered by Deciduous Forest (see **Table 3.3-15**).

Table 3.3-15: NLCD within the Blue Ridge Ecoregion

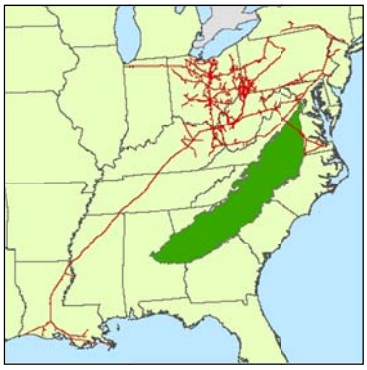
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	17	0.05	Mixed Forest	1,139	3.48
Developed, Open Space	1,763	5.38	Scrub/Shrub	0	0.00
Developed, Low Intensity	177	0.54	Grassland/Herbaceous	0	0.00
Developed, Medium Intensity	18	0.05	Pasture/Hay	1,826	5.58
Developed, High Intensity	2	0.01	Cultivated Crops	273	0.83
Barren Land	10	0.03	Woody Wetlands	46	0.14
Deciduous Forest	26,002	79.38	Emergent Herbaceous Wetland	5	0.02
Evergreen Forest	1,478	4.51			
Source: USGS 2003					

Much of the region remains forested, so land uses are primarily forest-related such as timber and Christmas tree farms. Agricultural uses such as pasture and hay production and apple orchards are also common. The region contains a number of large public lands including national forests and parks where recreation, tourism, and hunting play a major factor in land use design. Development is not as common as in surrounding regions, but a number of large settlements occur in the region (Griffith 2007).

Piedmont

The Piedmont ecoregion forms the transitional area between the Appalachians and the eastern coastal plains, stretching from Alabama in the south through portions of Georgia, South Carolina, North Carolina, and Virginia (see **Figure 3.3-17**). The region is considered by physiographers to be the non-mountainous portion of the old Appalachians Highland. The region is distinct from surrounding ecoregions by being lower in elevation and less rugged than the Appalachian regions to the northwest and higher and more rugged with finer-textured soils than the coastal plains regions to the southeast (EPA 2002). The NCL area stretches over 187 miles of this ecoregion, with an overall footprint of 55,522 acres covering portions of the NCL area in Virginia.

Figure 3.3-17: Piedmont Ecoregion



Source: CEC 2006

Regional terrain is an erosional terrain of moderately dissected irregular plains between areas of hills. Soils are primarily Ultisols with a mosaic of Precambrian and Paleozoic metamorphic and igneous rocks covered by a thick mantle of saprolite. Hydrologically, the region has a moderate to high density of perennial streams along with numerous large reservoirs, though the area largely lacks lakes. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

Natural vegetation in the region is dominated by the oak-hickory-pine forest community. Typical species include white oak, southern red oak, post oak, and hickory, with areas of shortleaf pine and loblolly pine (Griffith 2007). Chestnut oak and Virginia pine are also common in the region (Woods et al 1999).

The NLCD classes for the Piedmont portion of the NCL area indicate that the area is primarily covered by Deciduous Forest, Pasture/Hay, Developed Open Space, and Evergreen Forest (see **Table 3.3-16**).

Table 3.3-16: NLCD within the Piedmont Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	420	0.83	Mixed Forest	765	1.51
Developed, Open Space	7,192	14.18	Scrub/Shrub	210	0.41
Developed, Low Intensity	2,504	4.94	Grassland/Herbaceous	296	0.58
Developed, Medium Intensity	823	1.62	Pasture/Hay	8,858	17.46
Developed, High Intensity	187	0.37	Cultivated Crops	2,144	4.23
Barren Land	411	0.81	Woody Wetlands	1,112	2.19
Deciduous Forest	19,566	38.57	Emergent Herbaceous Wetland	64	0.13
Evergreen Forest	6,182	12.19			
Source: USGS 2003					

The region became an important farming area in the 19th century, but due to problems with soil erosion, declining soil fertility, costs associated with boll weevil management, and competition with other regions, farmland returned to forest during each economic downturn beginning with the Civil War (Napton 2007). Recently, urban and suburban development has spread widely into the region. Historic and remnant agricultural products included cotton, corn, tobacco, and wheat. Large portions of the region are now covered in commercially planted pine or have reverted to successional pine and hardwood forests intermixed with areas of pasture and development. Large developed areas in the region include the Atlanta metropolitan area, portions of the outer Beltway in northern Virginia, and the majority of North Carolina's large cities (Griffith 2007).

Middle Atlantic Coastal Plain

The Middle Atlantic Coastal Plain ecoregion covers a large portion of the southeastern Atlantic coast, stretching from South Carolina through portions of North Carolina, Virginia, Maryland, Delaware, New Jersey, and Pennsylvania (see **Figure 3.3-18**). The ecoregion is distinct from surrounding regions with finer soils and different vegetation than regions to the south and lower, flatter, and more poorly drained than regions to the west (EPA 2002). The NCL area extends over 201 miles of this ecoregion, with an overall footprint of 79,609 acres covering portions of the NCL area in Virginia New Jersey, Delaware, and Pennsylvania.

Figure 3.3-18: Middle Atlantic Coastal Plain Ecoregion

Source: CEC 2006

Regional terrain is a combination of flat plains, low terraces, dunes, barrier islands, and beaches. Soils are generally poorly drained and coarse to finer in texture, formed of a combination of Ultisols, Entisols and Histosols, and generally underlain by unconsolidated sediments. Hydrologically, the region has a mix of streams, rivers, swamps, marshes, estuaries, and a few large lakes with a number of bays and pocosins in some areas. Regional climate is described as mild mid-latitude humid subtropical (Griffith 2007).

Native vegetation in the region includes longleaf pine with areas of oak-hickory-pine forest in the northern areas. Much of the region is covered by loblolly pine and shortleaf pine with patches of oak, gum, and cypress in major riparian areas. The southern barrier islands are primarily covered by maritime forests of live oak, laurel oak, and loblolly pine. Coastal marshes are primarily covered by cordgrass, saltgrass, and rushes. Dunes are covered by beach grass and sea oats (Griffith 2007).

The NLCD classes for the Middle Atlantic Coastal Plain portion of the NCL area indicate that the area is primarily covered by Cultivated Crops, Deciduous Forest, Evergreen Forest, Woody Wetlands, and Pasture/Hay (see **Table 3.3-17**).

Table 3.3-17: NLCD within the Middle Atlantic Coastal Plain Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	2,292	2.88	Mixed Forest	1,817	2.28
Developed, Open Space	2,459	3.09	Scrub/Shrub	0	0.00
Developed, Low Intensity	2,500	3.14	Grassland/Herbaceous	0	0.00
Developed, Medium Intensity	1,387	1.74	Pasture/Hay	8,262	10.38
Developed, High Intensity	814	1.02	Cultivated Crops	17,801	22.36

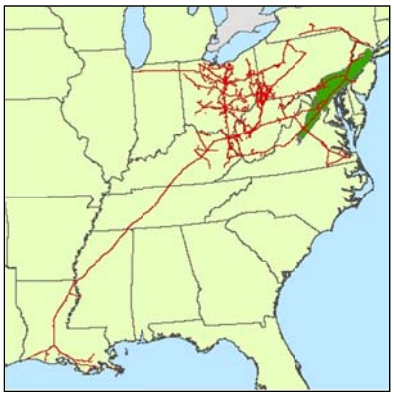
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Barren Land	1,172	1.47	Woody Wetlands	10,063	12.64
Deciduous Forest	17,552	22.05	Emergent Herbaceous Wetland	2,557	3.21
Evergreen Forest	10,932	13.73			
Source: USGS 2003					

The region is a mix of pine plantations used for pulp and lumber, agriculture in the north and central areas, and extensive urban and suburban development. Agricultural products for the region include wheat, corn, soybeans, potatoes, cotton, blueberries, peanuts, chicken, turkey, and hogs. Large portions of the coastal areas are developed for recreation and tourism. All major port towns in Virginia and North Carolina and their associated industry and infrastructure are located within this region (Griffith 2007).

Northern Piedmont

The Northern Piedmont ecoregion, much like the Piedmont ecoregion to the south, forms the transitional area between the Appalachians and the eastern coastal plains, stretching from Virginia in the south through portions of Maryland, Delaware, Pennsylvania, and New Jersey (see **Figure 3.3-19**). The ecoregion is distinct from surrounding regions by being lower and less rugged than regions to the north and west but hillier than regions to the east, and is covered by a different forest system historically and more cropland currently than regions to the south (EPA 2002). The NCL area extends over 758 miles of the ecoregion, with an overall footprint of 351,249 acres covering portions of the NCL area in Pennsylvania, Virginia, Maryland, New Jersey, and Delaware.

Figure 3.3-19: Northern Piedmont Ecoregion



Source: CEC 2006

Regional terrain is a transition between the mountains to the west and coastal plains to the east and is composed of low rounded hills, irregular plains, open valleys, and areas of intrusive dikes and sills forming sharp low ridges. Soils are a combination of Alfisols, Inceptisols, and Ultisols underlain by a mix of metamorphic, igneous, and sedimentary rocks. Hydrologically, the region hosts numerous perennial streams and springs. Regional climate is described as transitional between mild mid-latitude humid subtropical and severe mid-latitude (Griffith 2007).

Much of the natural vegetation of the ecoregion is composed of Appalachian oak forest, although most forests have been cleared. Representative species include chestnut oak, white oak, northern red oak, hickory, ash, American elm, and yellow poplar. Eastern red-cedar is also common on abandoned farmland (Griffith 2007). Other species common in some areas are Virginia pine, pitch pine, and black oak (Woods et al 1999).

The NLCD classes for the Northern Piedmont portion of the NCL area indicate that the area is primarily covered by Pasture/Hay, Deciduous Forest, and Cultivated Crops (see **Table 3.3-18**).

Table 3.3-18: NLCD within the Northern Piedmont Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	3,006	0.86	Mixed Forest	3,418	0.97
Developed, Open Space	21,706	6.18	Scrub/Shrub	13	0.00
Developed, Low Intensity	16,451	4.68	Grassland/Herbaceous	0	0.00
Developed, Medium Intensity	6,227	1.77	Pasture/Hay	133,985	38.15
Developed, High Intensity	1,912	0.54	Cultivated Crops	55,687	15.85
Barren Land	3,022	0.86	Woody Wetlands	5,116	1.46

Deciduous Forest	89,999	25.62	Emergent Herbaceous Wetland	1,548	0.44
Evergreen Forest	9,158	2.61			
Source: USGS 2003					

Much of the region has been converted to agriculture, urban, suburban, and industrial land uses. Regional agricultural products include feed and forage crops and soybeans. Other land uses common to the region include nurseries, plant farms, Christmas trees plantations, woodlots, and horse and hobby farms. Large settlements are common in the region including the suburban areas of Philadelphia, Baltimore, and most of the Beltway (Griffith 2007).

Atlantic Coastal Pine Barrens

The Atlantic Coastal Pine Barrens ecoregion covers roughly half of the state of New Jersey along with portions of the coastal areas and outer islands of New York, Rhode Island, and Massachusetts (see **Figure 3.3-20**). The ecoregion is distinct from surrounding regions by having a cooler climate, coarser soils, and different vegetation from regions to the south, a milder climate, and different vegetation from regions to the north, and differing terrain from western regions (EPA 2002). The NCL area extends over six-miles of this ecoregion, with an overall footprint of 3,983-acres covering portions of the NCL area in New Jersey.

Figure 3.3-20: Atlantic Coastal Pine Barrens Ecoregion

Source: CEC 2006

Regional terrain is a combination of sandy beaches, dunes, bays, barrier islands, and marshes. Soils are a combination of Entisols and Ultisols in the form of terminal moraines, outwash plains, and coastal deposits with deep deposits of gravel, sand, silt and clay, generally formed from Quaternary and Tertiary sediment with some

Cretaceous geology. Hydrologically, the region hosts numerous perennial streams, lakes, swamps, bogs, and salt and freshwater marshes. Regional climate is described as severe mid-latitude humid continental moderated by maritime influences (Griffith 2007).

The region is composed of the Pine Barrens region of New Jersey along with the beaches, dunes, bays, and marshes of portions of the area coastline. The region is predominantly covered by pine-oak forests, dominated by pitch pine, scarlet oak, black oak, and some areas of shortleaf pine and chestnut oak. Native vegetation in inland areas include mixed oak forests of white oak, black oak, American beech, pignut hickory, mockernut hickory, black walnut, yellow poplar, and red maple, although much of it has been cleared. Areas of Atlantic white cedar swamps also occur. Coastal and dune areas are dominated by dune woodlands, low shrub thickets, and areas of dune grass (Griffith 2007).

The NLCD classes for the Atlantic Coastal Pine Barrens portion of the NCL area indicate that the area is primarily covered by Cultivated Crops, Deciduous Forest, and Pasture/Hay (see **Table 3.3-19**).

Table 3.3-19: NLCD within the Atlantic Coastal Pine Barrens Ecoregion

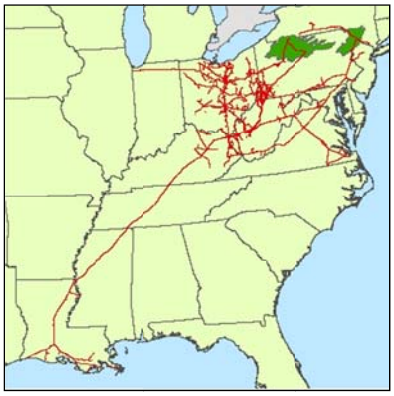
Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	14	0.35	Mixed Forest	0	0.00
Developed, Open Space	241	6.04	Scrub/Shrub	0	0.00
Developed, Low Intensity	287	7.21	Grassland/Herbaceous	0	0.00
Developed, Medium Intensity	99	2.48	Pasture/Hay	440	11.04
Developed, High Intensity	37	0.93	Cultivated Crops	1,893	47.52
Barren Land	146	3.67	Woody Wetlands	120	3.01
Deciduous Forest	607	15.25	Emergent Herbaceous Wetland	97	2.43
Evergreen Forest	3	0.07			
Source: USGS 2003					

The region is a mosaic of land uses including forestry, agriculture, urban and suburban development, and transportation infrastructure. Products from the area include timber, cranberries, blueberries, corn, wheat, soybeans, vegetables, dairy, and poultry. Tourism and recreational development are also common in the area. Outside of the Pine Barrens, much of the region is heavily developed, including the areas of Long Island and Cape Cod (Griffith 2007).

North Central Appalachians

The North Central Appalachians ecoregion covers a large portion of northern Pennsylvania along with portions of New York and New Jersey (see **Figure 3.3-21**). The ecoregion is distinct from surrounding regions by having heavier forest cover and a general lack of historic glacier activity (EPA 2002). The NCL area stretches over 300 miles of this ecoregion, with an overall footprint of 174,081 acres covering portions of the NCL area in Pennsylvania and New York.

Figure 3.3-21: North Central Appalachians Ecoregion



Source: CEC 2006

Regional terrain is described as a combination of plateau surfaces, high hills, and low mountains that were mostly unaffected by glaciations. Soils are generally low nutrient Inceptisols overlying horizontally bedded sandstone, shale, siltstone, conglomerate, and coal. Hydrologically, the region has numerous perennial streams and lakes. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

The region is covered primarily with a combination of northern hardwood forests and Appalachian oak forests along with numerous areas of bog and marsh. By 1870, most of the regional old growth forests were cut or burned and were replaced by mixed hardwood regrowth (Woods et al 1999). Areas of northern hardwood forest are dominated by sugar maple, American beech, and yellow birch. Areas of Appalachian oak forest are dominated by white oak, northern red oak, and hickory. Patches of eastern hemlock, pitch pine, and white pine are also present (Griffith 2007). The glacial till barrens are a mosaic of shrubland dominated by scrub oak, sheep laurel, rhodora, and patches of pitch pine forest (Woods et al 1999).

The NLCD classes for the North Central Appalachians portion of the NCL area indicate that the area is primarily covered by Deciduous Forest and Mixed Forest (see **Table 3.3-20**).

Table 3.3-20: NLCD within the North Central Appalachians Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	985	0.57	Mixed Forest	29,786	17.12
Developed, Open Space	7,562	4.35	Scrub/Shrub	5,278	3.03
Developed, Low Intensity	1,103	0.63	Grassland/Herbaceous	1,240	0.71
Developed, Medium Intensity	269	0.15	Pasture/Hay	7,355	4.23
Developed, High Intensity	66	0.04	Cultivated Crops	1,668	0.96
Barren Land	242	0.14	Woody Wetlands	2,300	1.32
Deciduous Forest	106,559	61.25	Emergent Herbaceous Wetland	232	0.13
Evergreen Forest	9,322	5.36			
Source: USGS 2003					

Land use in the region is predominantly forestry and recreation along with coal mines, oil and gas wells, dairy farming, public lands, and suburban development (Griffith 2007). The Pocono High Plateau area of the ecoregion is heavily utilized for recreation and tourism. Vacation and suburban developments are increasingly common in the region, especially around the area's larger lakes (Woods et al 1999).

Northern Allegheny Plateau

The Northern Allegheny Plateau ecoregion covers portions of northern Pennsylvania and southern New York (see **Figure 3.3-22**). The region forms a transition between the plains of the Great Lakes and the Appalachian. The ecoregion is distinct from surrounding regions by being more rugged and less cultivated and developed than regions to the north and west, and less mountainous, forested, and populated than regions to the south and east (EPA 2002). The NCL area extends over 148 miles of the ecoregion, with an overall footprint of 89,359 acres covering portions of the NCL area in New York.

Figure 3.3-22: Northern Allegheny Plateau Ecoregion

Source: CEC 2006

Regional terrain is described as glaciated upland plateau with rolling hills, open valleys and low mountains. Soils are primarily Inceptisols overlying Devonian-age shales, siltstones and sandstones. Hydrologically, the region has a number of perennial streams and small glacial lakes. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Native vegetation communities of the area include Appalachian oak and northern hardwood forests. Typical species include white oak, black oak, hickory, white pine, sugar maple, American beech, and yellow birch (Griffith 2007). Other common species include northern red oak, eastern hemlock, white ash, and black cherry. Bogs and marshes are also common in the region (Brooks 2007).

The NLCD classes for the Northern Allegheny Plateau portion of the NCL area indicate that the area is primarily covered by Deciduous Forest, Pasture/Hay, and Mixed Forest (see **Table 3.3-21**).

Table 3.3-21: NLCD within the Northern Allegheny Plateau Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	406	0.45	Mixed Forest	14,146	15.83
Developed, Open Space	3,483	3.90	Scrub/Shrub	2,149	2.40
Developed, Low Intensity	866	0.97	Grassland/Herbaceous	395	0.44
Developed, Medium Intensity	250	0.28	Pasture/Hay	16,717	18.71
Developed, High Intensity	66	0.07	Cultivated Crops	6,525	7.30
Barren Land	75	0.08	Woody Wetlands	1,040	1.16
Deciduous Forest	37,994	42.52	Emergent Herbaceous Wetland	335	0.37
Evergreen Forest	4,911	5.50			

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Source: USGS 2003					

The landscape of this ecoregion is a mosaic of farmland, pasture, forest, and woodlands. Principal crops of the region are hay and grain for dairy cattle operations (Griffith 2007). The dairy industry and supporting crops are prevalent in the region as soils, topography, and climate are unsuitable for traditional agriculture. Farming is declining regionally, with many old farmlands reverting to woodlands. Vacation cabins are also becoming common in the region (Woods et al 1999).

Northeastern Highlands

The Northeastern Highlands ecoregion covers the mountainous portions of New England along with the Adirondacks and Catskills, covering portions of New York, New Jersey, Pennsylvania, Connecticut, Massachusetts, Vermont, New Hampshire, and Maine (see **Figure 3.3-23**). The ecoregion is distinct from surrounding regions by being more rugged and less populated than surrounding regions, and less farmed than regions to the west (EPA 2002). The NCL area stretches over 113 miles of this ecoregion, with an overall footprint of 64,945 acres covering portions of the NCL area in New Jersey, New York, and Pennsylvania.

Figure 3.3-23: Northeastern Highlands Ecoregion

Source: CEC 2006

Regional terrain is a combination of glaciated hills, mountains, narrow valleys and some hilly plains. Soils are generally nutrient-poor Spodosols and Inceptisols overlaying a variety of metamorphic and igneous rocks along with some sedimentary material. Hydrologically, the area has numerous perennial streams, some large rivers and many large and small glacial lakes, many of them sensitive to deposition from industry in other

regions. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Native vegetation in the region is transitional between the boreal regions to the north and the broadleaf deciduous forests to the south, with dominant regional communities including mixed hardwood and spruce-fir forests. Mixed hardwood forests are dominated by sugar maple, American beech, yellow birch, eastern hemlock, and white pine. Spruce-fir forests are dominated by balsam fir, red spruce, and birches. Common species in swampy areas include black spruce, red maple, black ash, and tamarack (Griffith 2007). Appalachian oak forest is also found in the southern portions of the region, dominated by white oak and northern red oak (Woods et al 1999).

The NLCD classes for the Northeastern Highlands portion of the NCL area indicate that the area is primarily covered by Deciduous Forest and Cultivated Crops (see **Table 3.3-22**).

Table 3.3-22: NLCD within the Northeastern Highlands Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	332	0.51	Mixed Forest	3,242	4.99
Developed, Open Space	4,632	7.13	Scrub/Shrub	454	0.70
Developed, Low Intensity	1,244	1.92	Grassland/Herbaceous	458	0.71
Developed, Medium Intensity	372	0.57	Pasture/Hay	4,417	6.80
Developed, High Intensity	100	0.15	Cultivated Crops	8,226	12.67
Barren Land	346	0.53	Woody Wetlands	3,343	5.15
Deciduous Forest	36,876	56.78	Emergent Herbaceous Wetland	114	0.18
Evergreen Forest	788	1.21			
Source: USGS 2003					

The region has a pastoral character due to the scenic nature of the regions forested mountains and relatively sparse population. Primary land uses include recreation, tourism, and forestry. Although the region was once heavily farmed, farm abandonment became common in the region starting in the 19th century and much of the land has reverted to forest cover. Some farming remains in the alluvial valleys, glacial lake basins, and areas of limestone-derived soils with primary products including dairy products, forage crops, apples, and potatoes. Primary uses of regional forest land include recreational homes, tourism, and commercial timber harvest (Griffith 2007).

Eastern Great Lakes Lowlands

The Eastern Great Lakes Lowlands ecoregion covers much of the lowlands of New York and Vermont and the Great Lakes coasts of Pennsylvania and Ohio (see **Figure 3.3-24**). The ecoregion is distinct from regions to the south and east by being less rugged and more populated and agricultural in nature (EPA 2002). The NCL area extends over 100 miles in this ecoregion, with an overall footprint of 54,122 acres covering portions of the area in New York and Ohio.

Figure 3.3-24: Eastern Great Lakes Lowlands Ecoregion

Source: CEC 2006

Regional terrain is a glaciated, rolling to level plain. Soils are a combination of Alfisols, Inceptisols, and Spodosols overlying a variety of deep glacial and marine deposits of Paleozoic sedimentary rocks with bedrock outcrops. Hydrologically, the area has a mix of perennial streams, larger rivers, lakes, and wetlands. Regional climate is described as severe mid-latitude humid continental (Griffith 2007).

Native vegetation in the region is a mix of coniferous and deciduous forests. Remnant forests are primarily composed of sugar maple, yellow birch, eastern hemlock, American basswood, and white pine, along with American beech in the warmer areas. Dry areas are typified by northern red oak, red pine, white pine, and eastern white cedar. Wetter areas are composed of red maple, black ash, white spruce, tamarack, and eastern white cedar (Griffith 2007).

The NLCD classes for the Eastern Great Lakes Lowlands portion of the NCL area indicate that the area is primarily covered by Cultivated Crops, Deciduous Forest, and Pasture/Hay (see **Table 3.3-23**).

Table 3.3-23: NLCD within the Eastern Great Lakes Lowlands Ecoregion

Land Cover Type	Acres	Percent	Land Cover Type	Acres	Percent
Open Water	363	0.67	Mixed Forest	1,989	3.68
Developed, Open Space	5,221	9.65	Scrub/Shrub	1,744	3.22
Developed, Low Intensity	4,381	8.09	Grassland/Herbaceous	178	0.33
Developed, Medium Intensity	1,272	2.35	Pasture/Hay	7,857	14.52
Developed, High Intensity	363	0.67	Cultivated Crops	15,861	29.31
Barren Land	16	0.03	Woody Wetlands	1,483	2.74
Deciduous Forest	12,398	22.91	Emergent Herbaceous Wetland	477	0.88
Evergreen Forest	519	0.96			
Source: USGS 2003					

The region has largely been converted to agriculture and urban and suburban development along with a dense transportation infrastructure. All major cities in upstate New York, along with numerous large Canadian cities, are found within this region. The majority of agricultural activities in the area are associated with dairy operations. Other agricultural areas include orchards, vineyards, and vegetable farming. Typical crops include small grains, corn, soybeans, and hay (Griffith 2007) along with apples, grapes, tart cherries, pears, plums, wheat, oats, barley, cabbage, and potatoes (Taylor 2007).

3.3.2 Wetlands

Wetlands are transitional areas between terrestrial and aquatic systems where water covers the land, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Water saturation (hydrology) largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils (EPA 2006).

On a national level, jurisdictional wetlands include those wetlands subject to regulatory authority under Section 404 of the CWA as well as Executive Order (EO) 11990 (Protection of Wetlands). Wetland are defined by the USACE and EPA as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support a prevalence of wetland vegetation typically adapted for life in saturated soils conditions (USACE 1995). Many

states also have state-level regulations that further protect wetland areas, including isolated wetlands not subject to federal regulations.

The wetlands are classified according to Cowardin et al. 1979. Cowardin's wetland classification system is hierarchical and divided into five different Systems and 10 Subsystems based on specific shared characteristics. These Subsystems are further separated into more detailed classes; however, wetlands in the NCL area will be described at the System and Subsystem level by ecoregion due to the extent of the NCL area. Wetland systems are divided into the following subsystems:

- Marine - Subtidal and Intertidal
- Estuarine - Subtidal and Intertidal
- Riverine - Tidal, Lower Perennial, Upper Perennial, Intermittent, and Unknown Perennial
- Lacustrine - Limnetic and Littoral
- Palustrine - none

Coastlines including the subtidal and intertidal zones are Marine Systems, whereas wetlands in which the ocean is periodically inundated by freshwater runoff from land (e.g., where rivers flow into the ocean) are Estuarine Systems. Wetlands along the edges of rivers and streams are Riverine Systems, and wetlands along the edges of lakes are Lacustrine Systems. Palustrine wetlands include the majority of vegetated freshwater wetlands except those along lakes and rivers. Palustrine wetlands are generally small in size and shallow and may be isolated or connected by surface or groundwater to rivers and lakes (Cowardin et al. 1979).

Water regime, and consequently, vegetation and soils vary for each of the systems. Marine Systems are dominated by tides. Estuarine Systems are influenced by the interaction of tides, precipitation, and freshwater runoff. Riverine Systems reflect the controlling role of flooding from high flows, whereas the water supply for Lacustrine Systems depends on the lake level and the water supply to the lake in the form of precipitation and groundwater. Palustrine Systems usually are influenced primarily by

precipitation. As noted previously, groundwater may play an influential role in any of these systems, depending on the local geological situation (EPA 2006).

In order to generally characterize wetland resources within the NCL area, the USFWS's National Wetlands Inventory (NWI) dataset were analyzed where information was available. This overarching analysis is depicted in **Table 3.3-24** below. NWI surveys are primarily intended for broad scope analyses. Project specific wetland surveys and jurisdictional determinations would be required on a case-by-case basis for future projects; therefore further large-scale analyses (e.g., soil mapping) were not conducted at this time.

As part of the analysis, acres for each wetland system were totaled for the NCL area by ecoregion. Of the almost 9.8 million acres encompassed by the NCL area, approximately 6.5 million acres, or 66 percent, is mapped by NWI, with the remaining 34 percent unmapped at the time of analysis. Of the 6.5 million acres of NWI mapped area, approximately 300,000 acres, or about 5 percent of the NWI mapped portion of the NCL area is considered a wetland by NWI. For example, within the Eastern Corn Belt Plains, approximately 87 percent of the area is not mapped by NWI, with the remaining 13 percent of the NCL area, the mapped portion, composed primarily (98 percent) of upland, with palustrine, lacustrine, and riverine wetlands making up the remainder of the area (2 percent).

Table 3.3-24: Wetlands by Ecoregion within the NCL Area

Ecoregion III Name	Wetland System	Acres	Percent of NCL
Atlantic Coastal Pine Barrens	Palustrine	302	7.58% wetlands
Blue Ridge	Palustrine	104	0.32% wetlands
	Lacustrine	0.1	
Central Appalachians	Palustrine	4,131	0.86% wetlands
	Lacustrine	1,138	
	Riverine	4,820	
Central Corn Belt Plains	Palustrine	1,798	8.03% wetlands
	Lacustrine	30	
	Riverine	18	
Eastern Corn Belt Plains	Palustrine	1,193	1.59% wetlands
	Lacustrine	188	
	Riverine	141	
	No Digital Data Available	660,860	87.37% unmapped

Ecoregion III Name	Wetland System	Acres	Percent of NCL
Eastern Great Lakes Lowlands	Palustrine	397	2.74% wetlands
	Lacustrine	74	
	Riverine	22	
	No Digital Data Available	36,126	66.75% unmapped
Erie Drift Plain	Palustrine	695	4.17% wetlands
	Riverine	175	
	No Digital Data Available	1,240,805	98.35% unmapped
Huron/Erie Lake Plains	Palustrine	410	3.34% wetlands
	Lacustrine	123	
	Riverine	181	
	No Digital Data Available	171,486	89.93% unmapped
Interior Plateau	Palustrine	3,165	2.51% wetlands
	Lacustrine	4,175	
	Riverine	411	
	No Digital Data Available	28,177	8.37% unmapped
Middle Atlantic Coastal Plain	Estuarine	3,237	24.75% wetlands
	Palustrine	15,192	
	Lacustrine	982	
	Riverine	319	
Mississippi Alluvial Plain	Estuarine	37,886	72.89% wetlands
	Palustrine	67,598	
	Lacustrine	3,762	
	Riverine	4,469	
	No Digital Data Available	142,871	47.83% unmapped
Mississippi Valley Loess Plains	No Digital Data Available	9,917	100% unmapped
North Central Appalachians	Palustrine	3,593	2.72% wetlands
	Lacustrine	247	
	Riverine	427	
	No Digital Data Available	16,894	9.70% unmapped
Northeastern Highlands	Palustrine	3,640	6.32% wetlands
	Lacustrine	207	
	Riverine	257	
Northern Allegheny Plateau	Palustrine	1,284	1.96% wetlands
	Lacustrine	80	
	Riverine	348	
	No Digital Data Available	1,774	1.99% unmapped
Northern Piedmont	Palustrine	8,079	3.19% wetlands
	Lacustrine	1,858	
	Riverine	1,281	

Ecoregion III Name	Wetland System	Acres	Percent of NCL
Piedmont	Palustrine	2,723	5.78% wetlands
	Lacustrine	289	
	Riverine	199	
Ridge and Valley	Palustrine	5,398	0.92% wetlands
	Lacustrine	1,316	
	Riverine	4,622	
South Central Plains	No Digital Data Available	58,897	100% unmapped
Southeastern Plains	Palustrine	15,582	11.46% wetlands
	Lacustrine	368	
	Riverine	538	
	No Digital Data Available	40,446	21.95% unmapped
Southern Michigan/Northern Indiana Drift Plains	Palustrine	2,764	5.12% wetlands
	Lacustrine	140	
Western Allegheny Plateau	Palustrine	6,291	1.66% wetlands
	Lacustrine	3,771	
	Riverine	26,584	
	No Digital Data Available	893,219	28.76% unmapped
Western Gulf Coastal Plain	Estuarine	24,087	32.60% wetlands
	Palustrine	20,773	
	Lacustrine	6,400	
	Riverine	1,277	
	No Digital Data Available	12,327	7.11% unmapped

Source: USFWS 2007c

The most abundant wetland system within the NCL area is Palustrine, accounting for 165,112 acres or two percent of the area (**Table 3.3-25**). The total acreage accounted for by wetlands within the NCL area is 301,559 acres. This number does not take into account portions of the NCL area where wetlands have not been digitally mapped. In addition, as discussed above, NWI surveys are interpretations of large scale aerial photography and do not include field verification; accordingly, this data is primarily intended for broad scope analyses. Project specific wetland surveys and jurisdictional determinations would be required on a case-by-case basis for future projects.

Table 3.3-25: Overview of NWI-Mapped Wetlands Included within the NCL Area

Wetland Classification	Total Acres of NCL	Percent of NCL
Palustrine	165,112	1.69
Estuarine	65,210	0.67
Riverine	46,089	0.47
Lacustrine	25,148	0.26

Wetland Classification	Total Acres of NCL	Percent of NCL
Source: USFWS 2007c		

Within the NCL, wetlands represent approximately 3 percent of the land cover. Compliance with wetlands standards and any associated state-specific regulations regarding any specific NiSource operations, maintenance, or new construction projects will occur on a project-by-project basis for those projects requiring additional Federal approvals. A complete analysis of wetland impacts is not possible at the scale of this EIS. As such, the environmental consequences examined in Chapter 4 are somewhat general. The environmental details presented in this Chapter will provide a basis for future analysis of site-specific conditions and associated NEPA analysis. NEPA tiering assures that Federal agencies participating on this EIS will take a hard look when project details are known.

3.3.3 Fish and Wildlife

A general overview of common fish and wildlife species from major taxonomic groups for the entire area is provided below. As these are common species, the list below excludes species listed under the ESA, which are discussed in a later section. Additionally, representative non-listed fish and wildlife species for each ecoregion within the NCL area are included (**Table 3.3-26**). Examples of species identified within individual state wildlife action plans as being "Species of Greatest Conservation Need" are presented in this section.

Mammals

- ***Furbearers/Small Game*** - beaver, mink, muskrat, raccoon, Virginia opossum, striped skunk, eastern cottontail, woodchuck, long-tailed weasel
- ***Squirrels*** - gray squirrel, eastern fox squirrel, red squirrel, thirteen-lined ground squirrel, eastern chipmunk, southern flying squirrel
- ***Big Game*** - white-tailed deer, elk
- ***Small Mammals*** - eastern mole, meadow vole, white-footed mouse, masked shrew, short-tailed shrew

- ***Bats*** - hoary bat, little brown bat, big brown bat, Eastern pipistrelle, red bat, southeastern myotis, silver-haired bat, eastern small-footed bat, Rafinesque's big-eared Bat

- ***Canids*** - coyote, gray fox, red fox

- ***Felids*** - lynx, bobcat

- ***Large Carnivores*** – American black bear

Birds

- Hundreds of bird species spend at least some portion of the year within the 14 states included in the NCL area. Species occurring within the NCL area include:

- ***Waterfowl*** - mallard, canvasback, Canada goose, hooded merganser, bufflehead, snow goose, American coot, American black duck, common goldeneye, northern pintail, wood duck

- ***Shorebirds*** - killdeer, American woodcock, Wilson's snipe, upland sandpiper, semipalmated plover, American black-bellied plover

- ***Raptors*** - red-tailed hawk, red-shouldered hawk, broad-winged hawk, bald eagle, Cooper's hawk, peregrine falcon, osprey, northern harrier, American kestrel

- ***Owls*** - eastern screech-owl, barred owl, barn owl, short-eared owl, great horned owl, ferruginous pygmy owl

- ***Land Birds*** - tufted titmouse, northern cardinal, Carolina wren, blue jay, mourning dove, red-headed woodpecker, hairy woodpecker, northern flicker, white-breasted nuthatch, downy woodpecker, common nighthawk, whip-poor-will, black-and-white warbler, Blackburnian warbler, Canada warbler, Kentucky warbler, mourning warbler, cerulean warbler, prothonotary warbler, red-eyed vireo, wood thrush, field sparrow, grasshopper sparrow, Bachman's sparrow, Baltimore oriole, eastern wood-pewee, eastern kingbird, eastern meadowlark,

summer tanager, scarlet tanager, Louisiana waterthrush, sedge wren, bobolink, dickcissel, brown thrasher

- ***Upland Game Birds*** - wild turkey, ruffed grouse, northern bobwhite, ring-necked pheasant

- ***Water Birds*** - great blue heron, black-crowned night heron, little blue heron, American bittern, Virginia rail, sora

Herpetofauna

- ***Snakes*** - cottonmouth, cornsnake, common gartersnake, copperhead, eastern diamondback rattlesnake, coralsnake, northern watersnake, northern pinesnake

- American alligator

- ***Turtles*** - alligator snapping turtle, eastern box turtle, red-eared slider, spotted turtle

- ***Salamanders/Newts*** - mudpuppy, red-spotted newt, blue-spotted salamander, tiger salamander, dusky salamander, redback salamander

- ***Frogs/Toads*** - bullfrog, eastern American toad, northern leopard frog, wood frog, Woodhouse's toad, spring peeper, pickerel frog

Fish

- bluegill, pumpkinseed, redear sunfish, black crappie, white crappie, white perch, yellow perch, rainbow trout, brown trout, brook trout, muskellunge, channel catfish, pickerel, walleye, yellow bass, white bass, largemouth bass, smallmouth bass, striped bass, herring, northern pike, buffalo fish, American shad

- **Table 3.3-26: Representative Fauna by Ecoregion in the NCL Area**

Level III Ecoregions	States	Representative Fish and Wildlife Species
Atlantic Coastal Pine Barrens	NJ	black skimmer, least tern, loggerhead

Level III Ecoregions	States	Representative Fish and Wildlife Species
Blue Ridge	PA,VA	American black bear, bobcat, red squirrel, northern flying squirrel, rock vole, wild turkey, common raven, ruffed grouse, saw-whet owl, blackburnian warbler, brook trout, red-spotted newt, longtail salamander
Central Appalachians	KY,PA,WV	American black bear, gray fox, bobcat, red squirrel, eastern fox squirrel, big brown bat, wild turkey, ruffed grouse, scarlet tanager, hermit thrush, eastern box turtle, smallmouth bass
Central Corn Belt Plains	IN	coyote, bobcat, meadow vole, upland sandpiper, Illinois mud turtle, Illinois chorus frog
Eastern Corn Belt Plains	IN,OH	coyote, gray fox, Rafinesque's big-eared bat, white-footed mouse, eastern mole, indigo bunting, eastern bluebird, Canada warbler, American redstart, American tree sparrow, bluebreast darter, redside dace
Eastern Great Lakes Lowlands	NY	American black bear, moose, coyote, snowshoe hare, red squirrel, gray squirrel, osprey, eastern screech-owl, ruffed grouse, pileated woodpecker, wood thrush, Canada warbler, canvasback, wood duck
Erie Drift Plain	OH,PA	woodchuck, beaver, striped skunk, eastern chipmunk, eastern fox squirrel, bald eagle, osprey, red-tailed hawk, northern flicker, canvasback, wood duck, Canada warbler, eastern screech-owl, snapping turtle, dusky salamander
Huron/Erie Lake Plains	OH	downy woodpecker, green heron, wood duck, snapping turtle, northern watersnake, flathead catfish, greater redhorse
Interior Plateau	KY,TN	American black bear, bobcat, gray fox, pine vole, northern cardinal, northern mockingbird, summer tanager, brown thrasher, snapping turtle, blackspot shiner, northern cavefish.
Middle Atlantic Coastal Plain	DE,NJ,VA	American black bear, bobcat, gray fox, gray squirrel, wild turkey, northern bobwhite, mourning dove, double-crested cormorant, prothonotary warbler, eastern box turtle
Mississippi Alluvial Plain	LA,MS	bobcat, gray fox, swamp rabbit, wild turkey, wood thrush, yellow-throated vireo, American alligator, alligator gar.
Mississippi Valley Loess Plains	MS	gray squirrel, wood thrush, Carolina wren, northern bobwhite, mourning dove, wild turkey, bayou darter
North Central Appalachians	NY,PA	American black bear, bobcat, coyote, beaver, gray fox, gray squirrel, mink, river otter, snowshoe hare, red-shouldered hawk, saw-whet owl, northern goshawk, wild turkey, ruffed grouse, gray treefrog
Northeastern Highlands	NJ,NY,PA	moose, American black bear, bobcat, lynx, snowshoe hare, porcupine, fisher, beaver, northern flying squirrel, osprey, red-tailed hawk, wild turkey, ruffed grouse, black-backed woodpecker, gray jay, common loon, redback salamander.
Northern Allegheny Plateau	NY	American black bear, gray fox, beaver, striped skunk, gray squirrel, wild turkey, ruffed grouse, American woodcock, wood duck, Cooper’s hawk, cerulean warbler, redback salamander, wood turtle
Northern Piedmont	MD,NJ,VA	gray fox, red squirrel, mink, muskrat, ruffed grouse, eastern meadowlark, field sparrow, great blue heron
Piedmont	VA	American black bear, bobcat, gray fox, gray squirrel, eastern chipmunk, pine vole, wild turkey, Carolina wren, wood thrush, prairie warbler, field sparrow, eastern box turtle, common gartersnake, copperhead

Level III Ecoregions	States	Representative Fish and Wildlife Species
Ridge and Valley	MD,PA,VA,WV	American black bear, bobcat, gray fox, muskrat, mink, eastern fox squirrel, bald eagle, wild turkey, northern bobwhite, red-eyed vireo, eastern box turtle, sculpins, minnows, darters
South Central Plains	LA	coyote, beaver, muskrat, mink, river otter, swamp rabbit, armadillo, mourning dove, white ibis, Mississippi kite, American alligator, Louisiana pinesnake
Southeastern Plains	MS,NC,TN,WV	American black bear, bobcat, gray fox, gray squirrel, swamp rabbit, eastern chipmunk, pine vole, wild turkey, Carolina wren, wood thrush, hooded warbler, summer tanager, American alligator, eastern box turtle, common gartersnake, copperhead, eastern diamondback rattlesnake
Southern Michigan/Northern Indiana Drift Plains	IN	coyote, gray fox, beaver, river otter, mink, Canada warbler, upland sandpiper, northern pike, walleye, salmon, rainbow trout
Western Allegheny Plateau	KY,OH,PA,WV	gray fox, woodchuck, gray squirrel, wild turkey, ruffed grouse, barred owl, pileated woodpecker, ovenbird, Kentucky warbler, northern watersnake, dusky salamander
Western Gulf Coastal Plain	LA	ocelot, coyote, eastern ringtail, armadillo, swamp rabbit, American alligator, ferruginous pygmy-owl, green jay, Altimira oriole, Attwater's prairie chicken, whooping crane
Source: EPA 2002, Griffith 2007; updated Ecoregion Names, EPA 2010		

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State Wildlife Action Plans

Fish and wildlife agencies in all 50 states have developed Wildlife Action Plans that examine the health and status of each state's wildlife and habitats, identify potential threats, and outline the actions that are needed to conserve wildlife and their habitats over the long term. Wildlife Action Plans (WAP) for each of the 14 states within the NCL area are summarized below.

Delaware Division of Fish & Wildlife - The Delaware State WAP identifies over 1,000 wildlife species across the state with more than 450 identified as Species of Greatest Conservation Need (SGCN) including 18 mammals, 146 birds, 23 fish, and 33 amphibians and reptiles. Some of these species include horseshoe crab, Atlantic sturgeon, Cooper's hawk, northern harrier, and coyote (DEDFW 2006). For a complete list see: http://www.dnrec.state.de.us/nhp/information/DEWAPTOC.shtml

Indiana Department of Natural Resources - The Indiana Wildlife Diversity Section is responsible for the conservation and management of over 750 species of non-game and endangered wildlife across Indiana, representing more than 90-percent of the state's mammals, birds, fish, mussels, reptiles, and amphibians. According to the Indiana Comprehensive Wildlife Strategy, over 270 species are listed as SGCN, including 22

mammals, 40 birds, 28 reptiles and amphibians, and 25 fish. Some of these species include badger, bobcat, barn owl, common nighthawk, hoary bat, northern leopard frog, river otter, and sandhill crane (INDNR 2006). For a complete list see: http://www.in.gov/dnr/fishwild/endangered/CWS_MANUSCRIPT.pdf

Kentucky Department of Fish & Wildlife Resources - A total of 251 SGCN were identified in Kentucky's WAP, representing species from seven taxonomic groups including bivalves, fishes, lampreys, amphibians, reptiles, birds, and mammals. Some of these species include the black bear, eastern spotted skunk, lake sturgeon, American woodcock, white pelican, barn owl, osprey, wood thrush, alligator snapping turtle, eastern mud turtle, barking treefrog, and wood frog (KYDFWR 2005). For a complete list of species see: http://fw.ky.gov/kfwis/stwg/

Louisiana Department of Wildlife & Fisheries - The Louisiana WAP identified 240 SGCN, including 18 mammals, 69 birds, 45 reptiles and amphibians, and 28 freshwater fish. Some of these species include the eastern spotted skunk, American bittern, American woodcock, wood stork, short-eared owl, long-tailed weasel, wood thrush, southern crawfish frog, southern red salamander, and alligator snapping turtle (LADWF 2005). For a complete list of species see: http://www.wlf.state.la.us/experience/wildlifeactionplan/wildlifeplandetails/

Maryland Department of Natural Resources - The Maryland Wildlife Diversity Conservation Plan identified over 500 SGCN, including 34 mammals, over 40 amphibians and reptiles, and over 140 birds. Some of these species include the porcupine, bobcat, eastern spotted skunk, common loon, canvasback, eastern meadowlark, scarlet tanager, brook trout, wood turtle, and red salamander (MDDNR 2005). For a complete list of species go to: http://www.dnr.state.md.us/wildlife/divplan_propneed.asp

Mississippi Department of Wildlife, Fisheries & Parks - The Mississippi Comprehensive Wildlife Conservation Strategy (CWCS) identified nearly 300 SGCN, including 17 mammals, 53 amphibians and reptiles, 74 fish, and 70 birds. Some of these species include the American black bear, eastern spotted skunk, little blue heron,

white ibis, wood stork, bearded red crayfish, and crawfish frog (MSDWFP 2005). For a complete list of species go to: http://www.mdwfp.com/Level2/cwcs/Final.asp

New Jersey Department of Environmental Protection - The New Jersey WAP identified nearly 290 SGCN, including 17 mammals, 149 birds, 20 fish, and 28 amphibians and reptiles. Some of these species include the Allegheny woodrat, bobcat, American bittern, least tern, upland sandpiper, cornsnake, blue-spotted salamander, and the northern pinesnake (NJDEP 2008). For a complete list of species go to: http://www.state.nj.us/dep/fgw/ensp/wap/pdf/wap_apx1.pdf.

New York Department of Environmental Conservation - The New York CWCS identified 535 SGCN, including 22 mammals, 118 birds, 40 freshwater fish, and 44 amphibians and reptiles. Some of these species include American marten, Allegheny woodrat, American black duck, little blue heron, long-eared owl, northern harrier, red-headed woodpecker, eastern box turtle, wood turtle, blue-spotted salamander, and the hellbender (NYDEC 2005). A complete list of species identified can be found at: http://www.dec.ny.gov/animals/9406.html.

North Carolina Wildlife Resources Commission - The North Carolina CWCS identified 365 SGCN, including 38 mammals, 92 birds, 83 fish, and 84 amphibians and reptiles. Some of these species include Cooper's hawk, short-eared owl, whip-poor-will, northern flicker, long-tailed weasel, eastern mole, eastern fox squirrel, spotted salamander, marbled salamander, American alligator, cornsnake, shortnose sturgeon, and Atlantic sturgeon (NCWRC 2005). For a complete list of species see: http://www.ncwildlife.org/pg07_wildlifespeciescon/WAP_complete.pdf

Ohio Department of Natural Resources - The Ohio CWCS identified 240 SGCN, including 25 mammals, 89 birds, 40 freshwater fish, and 32 amphibians and reptiles. Some of these species include American black bear, bobcat, badger, sandhill crane, American bittern, snowshoe hare, trumpeter swan, eastern plains gartersnake, blue-spotted salamander, and Ohio lamprey (OHDNR 2005). For a complete list of species go to: http://www.fws.gov/midwest/FederalAid/state_plans.html

Pennsylvania Game Commission - The Pennsylvania WAP identified 572 SGCN, including 14 mammals, 44 birds, 69 fish, and 37 amphibians and reptiles. Some of

these species include upland sandpiper, northern bobwhite, short-eared owl, Allegheny woodrat, eastern spotted skunk, northern flying squirrel, hellbender, spotted turtle, mountain chorus frog, green salamander, eastern sand darter, and Atlantic sturgeon (PAGC 2005). For information on the entire list of species go to: http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=496&q=162067

Tennessee Wildlife Resources Agency - The Tennessee CWCS identified 664 SGCN, including 29 mammals, 81 birds, 85 fish, and 41 amphibians and reptiles. Some of these species include southern cavefish, green salamander, southern cricket frog, upland sandpiper, whip-poor-will, winter wren, snowshoe hare, Allegheny woodrat, red squirrel, and northern pinesnake (TNWRA 2005a). For a complete list go to: http://www.state.tn.us/twra/cwcs/tncwcs2005app.pdf

Virginia Department of Game & Inland Fisheries - The Virginia WAP identified 925 SGCN, including 24 mammals, 96 birds, 97 fish, and 60 amphibians and reptiles. Some of these species include the Carolina northern flying squirrel, snowshoe hare, fisher, peregrine falcon, American black duck, least tern, wood turtle, barking treefrog, green salamander, shortnose sturgeon, and paddlefish (VADGIF 2005). For a complete list see: http://bewildvirginia.org/species/

West Virginia Division of Natural Resources - The West Virginia Wildlife Conservation Action Plan identified 524 SGCN, including 26 mammals, 74 birds, 73 fish, and 39 amphibians and reptiles. Some of these species include northern goshawk, northern bobwhite, marsh wren, yellow-bellied sapsucker, Cooper's hawk, Rafinesque's big-eared bat, eastern harvest mouse, least shrew, spotted turtle, cornsnake, West Virginia spring salamander, and northern leopard frog (WVDNR 2005). For a complete list see: http://www.wvdnr.gov/Wildlife/PDFFiles/wvwcap.pdf

Migratory Birds

Migratory birds are those species that migrate to north of the Tropic of Cancer (the United States and Canada) during the summer months to breed, but spend winter months south of that latitude in such areas as Mexico, Central America, South America, or the Caribbean. About 200 species of migratory birds have been identified in the

western hemisphere, primarily including song birds, though many shorebirds, raptors, and waterfowl are included (SNZP 2009).

Migratory birds are protected by the MBTA of 1918 (16 USC 703-711), the Convention for the Protection of Migratory Birds with Great Britain on behalf of Canada of 1916, the Convention for the Protection of Migratory Birds and Game Mammals-Mexico of 1936, the Convention for the Protection of Birds and Their Environment-Japan of 1972, the Convention for the Conservation of Migratory Birds and Their Environment-Union of Soviet Socialist Republics of 1978.

Species of migratory birds that are protected under the MBTA include all species listed within 50 CFR 10.13. These include songbirds, raptors, ducks, waterbirds, and others. For a complete list of the birds protected, refer to http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtintro.html. As described in Chapter 1, the MBTA generally prohibits the taking (both intentional and unintentional) of migratory birds, the destruction or disturbance of migratory bird nests, or the disturbance of any eggs or young of migratory birds without prior authorization from the USFWS. In addition to protection under MBTA, certain birds have been listed under the ESA and receive additional regulatory protections. ESA-listed birds that may occur within the NCL are the Interior Least Tern, Piping Plover, and Red-cockaded Woodpecker. These three bird species are covered more fully in Section 3.3.4.

Executive Order 13186 (66 CFR 3853) also serves to protect migratory birds from adverse impacts of federal actions. The EO, enacted in 2001, is intended to ensure that, among other things, prior to all federal actions, an evaluation of potential direct or indirect impacts to migratory birds is conducted, with an emphasis on species of concern, priority habitat, and key risk factors. One requirement of the EO is that agencies are required to establish memoranda of understanding with the Service detailing each agency's responsibilities to migratory birds. The MOUs that have been developed to date focus on avoiding or minimizing impacts to migratory birds and strengthening conservation through enhanced communication and collaboration between the Service and the cooperating Federal agency. Of relevance to NiSource activities, the NPS, USFS, USACE (Department of Defense) and FERC have finalized

MOUs with the Service. Copies of the completed MOUs are available on the Service's web site at: http://www.fws.gov/migratorybirds/PartnershipsAndIniatives.html.

Four generalized migration corridors, or flyways, have been identified in the United States, roughly defined by large scale physiographic features. Two of these flyways, the Atlantic Flyway and Mississippi Flyway cross through the proposed project area. The Atlantic Flyway, encompassing the east coast to the Allegheny Mountains, is the route followed by most migrants from Eastern Canada and the New England states, with most species wintering in Florida, the Caribbean, and Eastern Mexico and South America. The Mississippi Flyway, encompassing the Mississippi River valley and surrounding flatlands into Central Canada, is the route followed by many Central Canada migrants along with a portion of the Alaskan migrants, with most species wintering in Mexico, Central, and South America. For more information on the flyways of the United States, see www.flyways.us.

Under the Fish and Wildlife Conservation Act of 1980 ("Nongame Act", 16 USC 2901-2912), the USFWS is required to "*identify species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing*" under the ESA. The goal of the act is to prevent the addition of further migratory species to the ESA list through the implementation of proactive management and conservation actions. To this end, Partners in Flight (PIF), a cooperative partnership among federal, state and local government agencies, along with philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals and organizations was founded in 1990 to emphasize the conservation of birds not covered by existing conservation initiatives. For more information on PIF, see www.partnersinflight.org.

Similarly, the U.S. North American Bird Conservation Initiative (NABCI), formed in 1999 as a coalition of government agencies, private organizations, and bird initiatives, aims to advance integrated bird conservation through enhanced cooperation among North American groups. To that goal, NABCI, along with PIF and multiple other contributing groups divided the continent into Bird Conservation Regions (BCRs), or ecologically distinct regions of the continent with similar bird communities, habitats, and resource management issues to aid in the development and implementation of regional

Conservation Plans (CPs). The NCL encompasses portions of eleven BCRs, covering a wide range of habitat types and bird communities. For more information on NABCI or the BCRs, see www.nabci-us.org. Crossed BCRs include:

- Appalachian Mountains
- Central Hardwoods
- Eastern Tallgrass Prairie
- Gulf Coastal Prairie
- Lower Great Lakes/St. Lawrence Plain
- Mississippi Alluvial Valley
- New England/Mid-Atlantic Coast
- Piedmont
- Prairie Hardwood Transition
- Southeastern Coastal Plain
- West Gulf Coastal Plain/Ouachitas

For each BCR, one or more CPs were developed by various groups for the management and monitoring of landbirds, shorebirds, waterbirds, and waterfowl. Within each CP, a list of species suggested for population monitoring and potential management is included. High priority members of these lists were compiled to form a list of high priority species by BCR. As BCRs cover large areas, including many areas outside of the NCL, these high priority species lists were further refined by cross comparing them with Species of Interest lists developed by State Division of Wildlife and Natural Heritage Programs. Through this analysis, 114 species of migratory birds potentially occurring within NCL were identified (Appendix D) for future site-specific evaluation. These 114 species have been identified by PIF to be declining within habitats that occur in the NCL.

Bald and Golden Eagles

Eagles are the largest members of the raptor family, with two representatives, the bald eagle (*Haliaeetus leucocephalus*) and the golden eagle (*Aquila chrysaetos*) found in the lower 48 states. The bald eagle was removed from the federal list of threatened and

endangered species on August 9th, 2007. After nearly disappearing from the lower 48 states, the bald eagle is now flourishing across the nation and no longer requires the protection of the ESA. The golden eagle, while relatively common in portions of the west, is largely diminished in the eastern United States. The golden eagle is not officially listed as threatened or endangered under the ESA, but it is has been identified as a Species of Concern by the USFWS. Golden eagles are not known to nest in the eastern United States in any areas within the NCL.

Although bald and golden eagles are no longer afforded protection under the ESA, they are still protected under the following acts:

- *Bald and Golden Eagle Protection Act* – Passed in 1940, this law provides protection for eagles *by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. "Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.*

- *Migratory Bird Treaty Act* – This act is a Federal law that codifies the U.S. commitment to four international conventions with Canada, Japan, Mexico, and Russia. The conventions provide protection for birds that migrate across international borders, including eagles, and regulate any potential "take" of those species. The Act specifically prohibits the *taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit.*

- *Lacey Act* – Even though the bald eagle was delisted, it is still covered under the Lacey Act, which protects the species by making it a Federal offense to take, possess, transport, sell, import, or export their nests, eggs, and parts that are taken in violation of any State, Tribal, or Federal law.

Both species of eagle are large raptors with a 6- to 8-foot wing-span, have generalist diets consisting primarily of small mammals, fish, and carrion, and are variably migratory based on breeding location and year-round habitat suitability. Both species are most

prone to disturbance during the nesting period, making those areas the principal area of concern for protection. Nests are located in mature or old-growth trees, snags, cliffs, or rock promontories. Bald eagle nests are most commonly associated with coastlines, rivers, or large lakes and streams while golden eagle nests are most commonly associated with cliffs in hilly or mountainous areas. As stated previously, golden eagles are not known to nest within the NCL. Eagle nesting occurs anywhere between October in Florida to May in the Northeast, with full incubation and fledging lasting between four and five months.

For more information, refer to the following:

- http://www.fws.gov/midwest/eagle/index.html
- http://www.fws.gov/arcata/es/birds/baldEagle/b_eagle.html
- http://ecos.fws.gov/speciesProfile

T&E and Candidate Species

Under the ESA, an "endangered" species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is defined as one that is likely to become endangered in the foreseeable future. Candidate species are those species being considered by the Service for listing as a T&E species but are not yet the subject of a proposed rule.

Originally, 104 species were considered for inclusion in the HCP. **Table 3.3-27** provides a complete list of these 104 species.

Table 3.3-27: List of Species Considered for Inclusion in HCP

Group	#	Common Name	Scientific Name	Federal Status
Mammals	1	Gray bat	*Myotis grisescens*	Endangered
	2	Indiana bat	*Myotis sodalis*	Endangered
	3	Louisiana black bear	*Ursus americanus luteolus*	Threatened
	4	Virginia big-eared bat	*Plecotus townsendii*	Endangered
	5	West Virginia northern flying squirrel	*Glaucomys sabrinus fuscus*	Endangered
	6	New England cottontail	*Sylvilagus transitionalis*	Candidate
	7	Delmarva fox squirrel	*Sciurus niger cinereus*	Endangered
	8	West Indian manatee	*Trichechus manatus*	Endangered
Birds	9	Bald eagle	*Haliaeetus leucophalus*	Delisted

Table 3.3-27: List of Species Considered for Inclusion in HCP

Group	#	Common Name	Scientific Name	Federal Status
	10	Brown pelican	*Pelecabus occidentalis Linnaeus*	Delisted
	11	Interior least tern	*Sterna antillarum*	Endangered
	12	Piping plover	*Charadrius melodus*	Threatened (Endangered in Great Lakes)
	13	Red-cockaded woodpecker	*Picoides borealis*	Endangered
	14	Roseate tern	*Sterna dougallii*	Endangered/Threatened
Reptiles	15	Bog turtle	*Glyptemys muhlenbergii*	Threatened
Reptiles (cont.)	16	Copperbelly watersnake	*Nerodia erythrogaster*	Threatened
	17	Eastern massasauga	*Sistrurus catenatus catenatus*	Candidate
	18	Louisiana pinesnake	*Pituophis ruthveni*	Candidate
	19	Lake Erie water snake	*Nerodia sipedon insularum*	Threatened
	20	Leatherback sea turtle	*Dermochelys coriacea*	Endangered
	21	Loggerhead sea turtle	*Caretta caretta*	Threatened
	22	Atlantic Ridley sea turtle	*Lepidochelys kempii*	Endangered
	23	Green sea turtle	*Chelonia mydas*	Threatened
	24	Hawk's bill sea turtle	*Eretmochelys imbricata*	Endangered
	25	Timber rattlesnake	*Crotalus horridus*	None (state-listed)
Amphibians	26	Cheat mountain salamander	*Plethodon nettingi*	Threatened
	27	Shenandoah salamander	*Plethodon Shenandoah*	Threatened
Fish	28	Maryland darter	*Etheostoma sellare*	Endangered
	29	Pallid sturgeon	*Scapnirhynchus albus*	Endangered
	30	Roanoke logperch	*Percina rex*	Endangered
	31	Spotfin chub	*Erimonax monachus*	Threatened
	32	Blackside dace	*Phoxinus cumberlandensis*	Threatened
	33	Cumberland darter	*Etheostoma susanae*	Candidate
	34	Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened
	35	Scioto madtom	*Noturus trautmani*	Endangered
	36	Slackwater darter	*Etheostoma boschungi*	Threatened
	37	Diamond darter	*Crystallaria cincotta*	Candidate
	38	Pygmy madtom	*Noturus stanauli*	Endangered (XN)
Crustaceans/ Gastropods	39	Madison cave isopod	*Antrolana lira*	Threatened
	40	Nashville crayfish	*Orconectes shoupi*	Endangered
	41	Flat-spired three-toothed snail	*Triodopsis platysayoides*	Threatened
Mollusks	42	Birdwing pearlymussel	*Lemiox rimosus*	Endangered
	43	Clubshell	*Pleurobema clava*	Endangered
	44	Cracking pearlymussel	*Hemistena lata*	Endangered
	45	Cumberland bean pearlymussel	*Villosa trabalis*	Endangered (XN)
	46	Cumberland monkeyface pearlymussel	*Quadrula rafinesque*	Endangered
	47	Dromedary pearlymussel	*Dromus dromas*	Endangered (XN)
	48	Dwarf wedgemussel	*Alasmidonta heterodon*	Endangered
	49	Fanshell	*Cyprogenia stegaria*	Endangered

Table 3.3-27: List of Species Considered for Inclusion in HCP

Group	#	Common Name	Scientific Name	Federal Status
	50	Fat pocketbook	*Potamilus capax*	Endangered
	51	Fluted kidneyshell pearlymussel	*Ptychobranchus subtentum*	Candidate
	52	James spinymussel	*Pleurobema collina*	Endangered
	53	Louisiana pearlshell	*Margaritifera hembeli*	Endangered
	54	Northern riffleshell	*Epioblasma torulosa rangiana*	Endangered
	55	Orangefoot pimpleback pearlymussel	*Plethobasus cooperianus*	Endangered
	56	Oyster mussel	*Epioblasma capsaeformis*	Endangered
	57	Pale liliput pearlymussel	*Toxolasma cylindrellus*	Threatened
Mollusks (cont.)	58	Pink mucket pearlymussel	*Lampsilis orbiculata*	Endangered
	59	Purple cat's paw pearlymussel	*Epioblasma obliquata*	Endangered
	60	Rabbitsfoot	*Quadrula cylindrica cylindrica*	Candidate
	61	Rayed bean	*Villosa fabalis*	Proposed
	62	Ring pink mussel	*Obovaria retusa*	Endangered
	63	Rough pigtoe	*Pleurobema plenum*	Endangered
	64	Sheepnose	*Plethobasus cyphyus*	Proposed
	65	Slabside pearlymussel	*Lexingtonia dolabelloides*	Candidate
	66	Spectaclecase	*Cumberlandia monodonta*	Proposed
	67	Tan riffleshell	*Epioblasma florentina walkeri*	Endangered
	68	White cat's paw pearlymussel	*Epioblasma obliquata perobliqua*	Endangered
	69	White wartyback pearlymussel	*Plethobasus cicatriocosus*	Endangered
Insects	70	American burying beetle	*Nicophorus americanus*	Endangered
	71	Karner blue butterfly	*Lycaeides melissa samuelis*	Endangered
	72	Mitchell's satyr butterfly	*Neonympha mitchellii mitchellii*	Endangered
	73	Puritan tiger beetle	*Cicindela puritana*	Threatened
Plants	74	American chaffseed	*Schwalbea Americana L.*	Endangered
	75	Braun’s rock cress	*Arabis perstellata*	Endangered
	76	Eastern prairie fringed orchid	*Platanthera leucophaea*	Threatened
	77	Globe bladderpod (previously Short's bladderpod)	*Lesquerella globosa*	Candidate
	78	Harperella	*Ptilimnium nodosum*	Endangered
	79	Lakeside daisy	*Tetraneuris herbacea*	Endangered
	80	Leafy prairie clover	*Dalea foliosa*	Endangered
	81	Leedy's roseroot	*Rhodiola integrifolia Leedyi*	Threatened
	82	Mead's milkweed	*Asclepias meadii*	Threatened
	83	Michaux's sumac	*Rhus michauxii*	Threatened
	84	Northeastern bulrush	*Scirpus ancistrochaetus*	Endangered
	85	Northern monkshood	*Aconitum noveboracense*	Threatened
	86	Peter’s mountain mallow	*Iliamna corei*	Endangered
	87	Pitcher’s thistle	*Cirsium pitcheri*	Threatened
	88	Pondberry	*Lindera melissifolia*	Threatened
	89	Price's potato bean	*Apios priceana*	Endangered
	90	Running buffalo clover	*Trifolium stoloniferum*	Endangered

Table 3.3-27: List of Species Considered for Inclusion in HCP

Group	#	Common Name	Scientific Name	Federal Status
	91	Sandplain gerardia	*Agalinis acuta*	Endangered
	92	Sensitive joint-vetch	*Aeschynomene sensitive*	Threatened
	93	Shale barren rockcress	*Arabis serotina*	Endangered
	94	Short's goldenrod	*Solidago shortii*	Endangered
	95	Small whorled pogonia	*Isotria medeoloides*	Threatened
	96	Smooth coneflower	*Echinacea laevigata*	Endangered
	97	Spring Creek bladderpod	*Lesquerella perforate*	Endangered
	98	Swamp pink	*Helonias bullata L.*	Threatened
Plants (cont.)	99	Tennessee purple coneflower	*Echinacea tennesseenis*	Endangered
	100	Tennessee yellow-eyed grass	*Xyris tennesseensis kral*	Endangered
	101	Virginia sneezeweed	*Helenium virginicum*	Threatened
	102	Virginia spiraea	*Spiraea virginiana*	Threatened
	103	White fringeless orchid	*Platanthera integrilabia*	Candidate
	104	White-haired goldenrod	*Solidago albopilosa*	Threatened

NiSource chose to seek take coverage for only 10 of these species and analyze 33 others. These 43 species, their habitats, general locations and anticipated impacts are summarized in **Table 3.3-28**, below (Also see **Appendix E** for more comprehensive descriptions of the 19 species for which impacts or take are anticipated). Although not the Service's preference to exclude species from the HCP, it is the applicant's prerogative. Nevertheless, the Service is still obligated to analyze the potential impacts to any other species as a result of NiSource proposed activities. As such, this DEIS and the Service's Biological opinion will do so. **Table 3.3-29** provides the Service's summary of these 61 non-HCP species and their status. This includes 16 species that the Service has determined will not be impacted because they do not presently occur within the NCL. In addition, it identifies 45 species for which further analysis will be necessary (See **Appendix F** for additional species-specific information).

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mammals	Gray bat[4] *Myotis grisescens*	Endangered	**May affect**[6] in Adair, Allen, Carter, Clark, Estill, Fayette, Garrard, Greenup, Lee, Letcher, Lincoln, Madison, Menifee, Metcalfe, Monroe, Montgomery, Morgan, Powell, and Rowan counties, KY; and Davidson, Hardin, Lewis, Macon, Maury, McNairy, Sumner, Trousdale, Wayne, Williamson, and Wilson counties, TN.	Suitable winter hibernacula are typically deep and vertical, with a large volume below the lowest entrance that acts as a cold air trap. A much wider variety of cave types are used during spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provides restricted rooms with dome ceilings that are capable of trapping the combined body heat of thousands of clustered individuals. Gray bats forage primarily over water along river and reservoir edges. Forestlands located around caves, between caves and foraging habitats are important for gray bats. Gray bats utilize surrounding forest outside of cave entrances for shelter for young that have just begun to fly and for bats of any age to fly from the cave to feeding areas in the protection of the forest canopy.	Human disturbance during hibernation and destruction of roosting habitat; reduction in insect prey (specifically mayflies, caddis flies and stoneflies) over streams possibly degraded through excessive pollution and siltation from forest clearing, channelization, siltation, herbicides, pesticides, etc.; deforestation of areas near cave entrances and between caves and rivers/reservoirs where gray bats feed; pesticide poisoning; herbicide spraying

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mammals	Indiana bat[5] *Myotis sodalis*	Endangered	**May affect**[6] throughout the entire NCL footprint in Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia; and in Allegany, Garret, and Washington counties, MD; Hunterdon, Morris, and Warren counties, NJ; Orange and Rockland counties, NY; and Albemarle, Alleghany, Augusta, Botetourt, Clarke, Frederick, Giles, Greene, Lexington, Lexington City, Madison, Page, Rockbridge, Rockingham, Shenandoah, Warren, Waynesboro City, and Waynesboro counties, VA[1]	Indiana bats are restricted to suitable underground roost sites that attain appropriate temperatures and relative humidity to hibernate. The majority of these sites are caves located in karst areas of the east-central United States; however, Indiana bats also hibernate in other cave-like locations. Bats choose roosts with a low risk of freezing. Ideal sites are 50° or below when bats arrive in October and November. Maternity colonies are typically located under the sloughing bark of live, dead, and partially dead trees in upland and lowland forest. A typical primary roost is located under the exfoliating bark of dead ash, elm, hickory, maple, oak, or poplar, although any tree that retains large, thick slabs of peeling bark probably is suitable. Colony trees are usually large-diameter, standing dead trees with direct exposure to sunlight. Observations of Indiana bat indicate that they typically forage in closed to semi-open forested habitats and forest edges. The Indiana bat consistently follows tree-lined paths rather than crossing large open areas. As a result, suitable forest patches may not be available to Indiana bats unless the patches are connected by a wooded corridor. A much wider variety of cave types are used during spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provides restricted rooms with dome ceilings that are capable of trapping the combined body heat of thousands of clustered individuals	Destruction/degradation of hibernation habitat; disturbances that arouse the bat from hibernation using fat reserves necessary to survive the winter (noise greater than 0.5 miles away); loss/degradation of summer habitat, migration habitat, and swarming habitat; dredging and channelization of riverine habitat; Impacts to migratory habitat and surface areas surrounding hibernacula; environmental contaminants

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mammals	Louisiana black bear[4] *Ursus americanus luteolus*	Threatened	**May affect**[6] in East Carroll, Franklin, Iberia, Madison, Richland, and St. Mary parishes, LA; and Humphreys, Issaquena, Sharkey, Warren, and Washington counties, MS. **No effect**[7] in Avoyelles and St. Landry Parish, LA	Species occupy bottomland hardwood forests or forests within southeastern United States floodplains which can consist of a number of woody species occupying positions of dominance and co-dominance. Other habitat types may be utilized, including marsh; upland forested areas; forested spoil areas along bayous, brackish marsh, and freshwater marsh; salt domes; and agricultural fields.	Habitat modification and destruction; habitat fragmentation (primarily roads and highways); human induced mortality (vehicle collisions, disturbance causing den abandonment)
	Virginia big-eared bat[4] *Plecotus townsendii*	Endangered	**May affect**[6] in Bath, Carter, Estill, Jackson, Lee, Madison, Menifee, Montgomery, Morgan, Owsley, Powell, and Rowan counties, KY; Augusta, Bland, Giles, Rockingham, and Shenandoah counties, VA; and Fayette, Grant, Hardy, McDowell, Pendleton, Preston, Randolph, and Tucker counties, WV.	Habitat typically consists of caves or cliffs in limestone karst areas within mature hardwood forests dominated by oak, hickory, beech, maple, or hemlock trees. Hibernation caves are cool 36.5^{o}F to 49.1^{o}F and well ventilated. They typically roost near cave entrances or in areas of significant air movement.	Very intolerant of disturbance in summer and winter; habitat destruction; pesticides effecting important food sources; human alteration through filling and rock removal; loss of foraging habitat through forest clearing
	Delmarva fox squirrel[4] *Sciurus niger cinereus*	Endangered	**No Effect**[7]	n/a	n/a
	West Indian manatee[4] *Trichechus manatus*	Endangered	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Birds	Interior least tern[4] *Sterna antillarum*	Endangered	**May affect**[6] in East Carroll Parish, LA; and Issaquena, County, MS. **No effect**[7] in Grant and Madison parishes, LA; and Warren and Washington counties, MS.	Interior least terns depend on sand or gravel bars containing sparse vegetation, within an unobstructed river channel, or salt flats along lake shores for nesting. They often also nest on artificial habitats such as sand or gravel pits and dredge islands. Least terns often choose nest locations at higher elevations to prevent flooding that can occur during high flows.	Habitat alteration and destruction (loss of sandbar habitat); hydrologic alteration (e.g. dams and reservoirs, channelization, irrigation); river narrowing resulting in decreased sand bar habitat; human disturbance
Reptiles	Bog turtle[5] *Glyptemys muhlenbergii*	Threatened	**May affect**[6] in New Castle County, DE; Baltimore, Cecil, and Harford counties, MD; Gloucester, Hunterdon, Morris, Salem, and Warren counties, NJ; Orange and Rockland counties, NY; and Adams, Bucks, Chester, Cumberland, Delaware, Lancaster, Lehigh, Monroe, Montgomery, Northampton, and York counties, PA.	The bog turtle is a semi-aquatic species, and usually occurs in small, discrete populations occupying suitable wetland habitat dispersed along a watershed. Bog turtles prefer wetland habitats that include shallow, spring-fed fens, sphagnum bogs, swamps, marshy meadows, and pastures that have soft, muddy bottoms; clear, cool, slow-flowing water, often forming a network of rivulets; and open canopies.	Continued loss, alteration, and fragmentation of its highly specialized wetland habitat; habitat fragmentation/alteration causing exposure to crushing on roads; alterations to local hydrological systems from development; increasing levels of human use, including habitat fragmentation, nutrient enrichment, and contaminant inputs from septic, road, and fertilizer run-off; establishment of alien/invasive plants from disturbance of surface soils and degraded water quality
	Copperbelly watersnake[4] *Nerodia erythrogaster*	Threatened	**No Effect**[7]	n/a	n/a
	Louisiana pinesnake[4] *Pituophis ruthveni*	Candidate	**No Effect**[7]	n/a	n/a
	Lake Erie water snake[4] *Nerodia sipedon insularum*	Threatened	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Amphibians	Cheat Mountain salamander[4] *Plethodon nettingi*	Threatened	**May affect**[6] in Grant, Pendleton, Pocahontas, Randolph, and Tucker counties, WV.	Habitat is located above an altitude of 3,412 feet, preferably in red spruce or mixed-deciduous forests with moist soil and relatively cool temperatures. This species is found under rocks and logs during the day, or in rock crevices below the ground. At night, especially during rainy weather, the species forages on the forest floor in the damp cool climate.	Removal of canopy cover from below disturbances; logging; habitat loss and alteration; dispersal barriers (clear cuts, pipelines, new roads, anything that removes the litter layer or opens the canopy cover, also affects mating which appears to occur where habitats overlap)
	Shenandoah salamander[4] *Plethodon Shenandoah*	Threatened	**No Effect**[7]	n/a	n/a
Fish	Maryland darter[4] *Etheostoma sellare*	Endangered	**No Effect**[7]	n/a	n/a
	Blackside dace[4] *Phoxinus cumberlandensis*	Threatened	**No Effect**[7]	n/a	n/a
	Cumberland darter[4] *Etheostoma susanae*	Candidate	**No Effect**[7]	n/a	n/a
	Gulf sturgeon[4] *Acipenser oxyrinchus desotoi*	Threatened	**No Effect**[7]	n/a	n/a
	Scioto madtom[4] *Noturus trautmani*	Endangered	**No Effect**[7]	n/a	n/a
	Slackwater darter[4] *Etheostoma boschungi*	Threatened	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Crustaceans	Madison cave isopod[5] *Antrolana lira*	Threatened	**May affect**[6] in Augusta, Clarke, Page, Rockbridge, Rockingham, Shenandoah, and Warren counties, and the City of Waynesboro, VA.	Madison Cave isopods are predominantly adapted to unlighted subsurface lakes and deep, water-filled fissures in western Virginia. Habitat consists of deep karst aquifers and underground lakes where water temperatures range from 11 to 14 degrees. The species is typically found in waters supersaturated with calcium carbonates.	Habitat degradation (ground water contamination/pollution); sensitive to disturbance
	Nashville crayfish[5] *Orconectes shoupi*	Endangered	**May affect**[6] in Davidson and Williamson counties, TN.	The Nashville crayfish has been found in a wide range of environments including gravel and cobble runs, pools with up to 3.94 inches of settled sediment, and under slabrocks and other cover. The species has also been found in small pools where the flow was intermittent. Gravel-cobble substrate provides good cover for juveniles. The substrate of Mill Creek, the primary water body in which the species is found, is mainly bedrock covered in some areas with gravel and scattered limestone slabs. The pools, backwater areas, and stream margins of Mill Creek are covered with silt and sand. Adult Nashville crayfish tend to be solitary, seeking cover under large rocks, logs, debris, or rubble; the largest individuals generally select the largest cover available.	Siltation; stream alterations; general water quality deterioration associated land disturbance; road and bridge construction, stream channel modifications, impoundments, single catastrophic event, e.g. toxic chemical spill or other contamination
Mollusks	Birdwing pearlymussel[4] *Lemiox rimosus*	Endangered	**May affect**[6] in Maury County, TN.	Habitat is typically shallow, fast-flowing water with stable, clean substrate. However, the species has been reported at water depths of up to seven feet. Preferred habitat also includes small to medium free-flowing steams of moderate gradient over stable, relatively silt-free rubble, gravel, and sand substrates.	Siltation and pollution

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mollusks	Clubshell mussel[5] *Pleurobema clava*	Endangered	**May affect**[6] in Franklin, Madison, and Pickaway counties, OH; Armstrong and Clarion counties, PA; and Braxton, Clay, and Doddridge counties, WV. **No effect**[7] in Dekalb and Marshall counties, IN; Allen, Bath, Bracken, Mason, Pendleton, and Robertson counties, KY; Coshocton, Defiance, Delaware, Fairfield, Greene, Hancock, Trumbull, Tuscarawas, and Union counties, OH; Cattaraugus County, NY; Hardin County, TN; and Kanawha and Lewis counties, WV.	Habitat consists primarily of small to medium-sized rivers with coarse sand and fine gravel substrates in shallow riffles or runs with moderate current, often just downstream of a riffle. Species is commonly found at depths of less than 1 meter, and often buries itself completely beneath the substrate. The clubshell requires clean substrate and flowing water, and cannot tolerate mud or slackwater conditions.	Dams; impoundments; channelization; dredging; pollution (fertilizers causing plant growth and reduced dissolved oxygen); sedimentation; fish kills that eliminate host fish; introduction of non-native species
	Cracking pearlymussel[4] *Hemistena lata*	Endangered	**May affect**[6] in Hardin, Maury, and Wayne counties, TN.	Habitat consists of moderately sized streams and occurs primarily in gravel-riffle areas where it is habitually buried deep within the substrate. Habitats may also have sand, gravel, and cobble, with higher water velocities. If this species is found in slower flows, a substrate of sand and mud is preferred.	Sedimentation; land use practices causing a decrease in water quality and population loss; pollution; oil and gas exploration and production; gravel dredging; channel maintenance
	Cumberland bean pearlymussel[4] *Villosa trabalis*	Endangered (XN)	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mollusks	Cumberland monkeyface pearlymussel[4] *Quadrula rafinesque*	Endangered	**May affect**[6] in Maury County, TN	Habitat consists of shallow (i.e., generally two feet or less in depth) shoal and riffle areas in free-flowing streams of high to moderate gradient. Substrate preferences include firm rubble, gravel, and sand and the species most often remains buried with only siphons visible. The species has never been found in small streams.	Habitat degradation (sedimentation, pollution) and habitat loss (dam construction, channelization)
	Dromedary pearlymussel[4] *Dromus dromas*	Endangered (XN)	**No Effect**[7]	n/a	n/a
	Fanshell mussel[5] *Cyprogenia stegaria*	Endangered	**May affect**[6] in Bracken, Nicholas, Pendleton, and Robertson counties, KY; Coshocton, Meigs, Morgan, Muskingum, and Washington counties, OH; Hardin County, TN; and Jackson and Kanawha counties, WV. **No effect**[7] in Allen, Barren, Boyd, Carter, Greenup, Lawrence, Lewis, Mason, Monroe, and Powell counties, KY; and Wood County, WV	Habitat consists of the shoals and riffles of medium to large rivers. It has been reported primarily from relatively deep water in sandy or gravelly substrate with moderate to strong current.	Dams; impoundments; channelization; dredging; pollution (fertilizers causing plant growth and reduced dissolved oxygen); sedimentation; fish kills that eliminate host fish; introduction of non-native species
	James spinymussel[5] *Pleurobema collina*	Endangered	**May affect**[6] in Albemarle, Alleghany, Botetourt, Goochland, Greene, Orange, Powhatan, and Rockbridge counties, VA. **No effect**[7] in Giles County, VA; and Monroe County, WV	Habitat consists primarily of streams of slow to moderate currents and a substrate of sand and cobble with or without boulders, pebbles, or silt. Stream width for this species varies from 10 to 75 feet with a water depth of 0.5 to 3 feet. It is limited to areas of unpolluted water.	Dams; impoundments; channelization; dredging; pollution (fertilizers causing plant growth and reduced dissolved oxygen); sedimentation; fish kills that eliminate host fish; introduction of non-native species

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mollusks	Louisiana pearlshell[4] *Margaritifera hembeli*	Endangered	**No Effect**[7]	n/a	n/a
	Northern riffleshell mussel[5] *Epioblasma torulosa rangiana*	Endangered	**May affect**[6] in Pickaway, County, OH; Armstrong and Clarion counties, PA; and Kanawha County, WV. **No effect**[7] in De Kalb County, IN; Bath, Pendleton, and Rowan counties, KY; Franklin, Madison, and Union counties, OH; and Braxton and Clay counties, WV.	Habitat occurs in a wide variety of streams, large and small, preferring runs with a bottom composed of firmly packed sand and fine to coarse gravel. These fresh water mussels also require swiftly moving, well-oxygenated water.	Dams; impoundments; channelization; dredging; pollution (fertilizers causing plant growth and reduced dissolved oxygen); sedimentation; fish kills that eliminate host fish; introduction of non-native species
	Oyster mussel[4] *Epioblasma capsaeformis*	Endangered	**May affect**[6] in Maury County, TN. **No effect**[7] in Monroe County, KY	Habitat occurs in streams ranging from medium-sized creeks to large rivers. Prefers a gravel/boulder and coarse sand substrate, and moderate to swift currents. The species appears to prefer shallow shoals and riffles in association with beds of water willow. The oyster mussel also has been observed in areas of swift currents in gravel pockets between bedrock ledges.	Dams; impoundments; channelization; dredging; pollution (fertilizers causing plant growth and reduced dissolved oxygen); sedimentation; fish kills that eliminate host fish; introduction of non-native species
	Pale liliput pearlymussel[4] *Toxolasma cylindrellus*	Threatened	**No Effect**[7]	n/a	n/a
	Purple cat's paw pearlymussel[4] *Epioblasma obliquata*	Endangered	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Mollusks	Sheepnose mussel[5] *Plethobasus cyphyus*	Proposed	**May affect**[6] in Bath, Boyd, Bracken, Clark, Fayette, Greenup, Lewis, Madison, Mason, Nicholas, Pendleton, and Rowan counties, KY; Sunflower County, MS; Adams, Brown, Clermont, Gallia, Lawrence, Meigs, Scioto, and Washington counties, OH; and Cabell, Jackson, Mason, Wayne, and Wood counties, WV. **No effect**[7] in Garrard County, KY; Humphreys County, MS; and Athens, Coshocton, and Morgan counties, OH.	Primarily shallow shoal habitats with moderate to swift currents over coarse sand and gravel. May also have mud, cobble, and boulders. Specimens in larger rivers may occur in deep runs. In field trials it was demonstrated that mussels in streams occur chiefly in flow refuges, or relatively stable areas that displayed little movement of particles during flood events	Dams; impoundments; channelization; dredging; pollution (fertilizers causing plant growth and reduced dissolved oxygen); sedimentation; fish kills that eliminate host fish; introduction of non-native species
	Tan riffleshell[4] *Epioblasma florentina walkeri*	Endangered	**No Effect**[7]	n/a	n/a
	White cat's paw pearlymussel[4] *Epioblasma obliquata perobliqua*	Endangered	**No Effect**[7]	n/a	n/a
	White wartyback pearlymussel[4] *Plethobasus cicatriocosus*	Endangered	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
Insects	American burying beetle[5] *Nicophorus americanus*	Endangered	**May affect**[6] in Athens, Morgan, and Perry counties, OH. **No effect**[7] in Lafayette County, MS; and Gloucester County, NJ; and Hocking and Vinton counties, OH.	Little is known about the natural habitat of the American burying beetle. Natural habitat may be mature forests, although the species exhibits tolerance to an array of vegetation. American burying beetles are recorded from grassland, old field shrub land, and hardwood forests. Soil properties however, are important. The beetle must be able to bury a carcass within which eggs are laid to sustain development of the larvae. It must also be able to dig big escape tunnels nearby. To do so, the soil must not be extremely dry, saturated, or of loose sandy consistency	Habitat loss, alteration and degradation due to development (increase in edge habitat, fragmentation), barriers (natural gas pipelines), pesticides
	Karner blue butterfly[4] *Lycaeides melissa samuelis*	Endangered	**No Effect**[7]	n/a	n/a
	Mitchell's satyr butterfly[4] *Neonympha mitchellii mitchellii*	Endangered	**No Effect**[7]	n/a	n/a
	Puritan tiger beetle[4] *Cicindela puritana*	Threatened	**No Effect**[7]	n/a	n/a
Plants	Braun's rock cress[4] *Arabis perstellata*	Endangered	**No Effect**[7]	n/a	n/a
	Mead's milkweed[4] *Asclepias meadii*	Threatened	**No Effect**[7]	n/a	n/a
	Pitcher's thistle[4] *Cirsium pitcheri*	Threatened	**No Effect**[7]	n/a	n/a
	Sandplain gerardia[4] *Agalinis acuta*	Endangered	**No Effect**[7]	n/a	n/a

Table 3.3-28: HCP Species To Be Analyzed

Group	Common/Scientific Name	Federal Status	Determination within Project Area	Habitat Type[2]	Potential Threats[3]
[1]See Appendix E for county-specific listing [2]See Appendix E for species references related to habitat type [3]See Appendix E for species references related to potential threats [4]No Take requested for this species [5]Take requested for this species [6]May Affect – the conclusion reached by a Federal action agency when a proposed action may pose any effects on listed species or critical habitat [7]No Effect – the conclusion reached by a Federal action agency when a proposed action will not affect a listed species or critical habitat					

Table 3.3-29: Non-HCP Species Outside of NCL Area or Delisted

Group	#	Common Name	Scientific Name	Federal Status
Mammals	1	New England cottontail	*Sylvilagus transitionalis*	Candidate
	2	Bald eagle	*Haliaeetus leucophalus*	Delisted
Birds	3	Brown pelican	*Pelecabus occidentalis Linnaeus*	Delisted
	4	Roseate tern	*Sterna dougallii*	Endangered/Threatened
	5	Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Reptiles	6	Loggerhead sea turtle	*Caretta caretta*	Threatened
	7	Atlantic Ridley sea turtle	*Lepidochelys kempii*	Endangered
	8	Green sea turtle	*Chelonia mydas*	Threatened
	9	Hawk's bill sea turtle	*Eretmochelys imbricata*	Endangered
	10	Timber rattlesnake	*Crotalus horridus*	None (state-listed)
	11	Copperbelly watersnake	*Nerobia erthrogaster*	Threatened
	12	Louisiana pinesnake	*Pituophis ruthveni*	Candidate
	13	Flat-spired three-toothed snail	*Triodopsis platysayoides*	Threatened
Crustaceans	14	Tennessee yellow-eyed grass	*Xyris tennesseensis kral*	Endangered
Plants	15	White fringeless orchid	*Platanthera integrilabia*	Candidate
	16	Sandplain gerardia	*Agalinis acuta*	Endangered

NEPA requires that all T&E species with the potential to be impacted within the NCL area be examined regardless of status in the HCP. As such, the remaining Non-HCP Species are discussed briefly in **Table 3.3-30** below, including an overview of general locations, habitat types, and potential threats. See **Appendix F** for further species-specific information.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Mammals	West Virginia Northern flying squirrel *Glaucomys sabrinus fuscus*	Endangered	**Known populations** in Grant, Pocahontas, Pendleton, Randolph, Tucker, and Webster counties, WV	Small, nocturnal, gliding mammal endemic to the Allegheny Highlands of WV and VA. Species is confined to montane boreal forests of the central Appalachians. Primarily uses spruce, mixed spruce-northern hardwood, and open habitats. Species nests mainly in tree cavities.	Habitat modification through clearing of suitable habitat during nesting season, habitat loss and degradation
Mussels	Dwarf wedgemussel *Alasmidonta heterodon*	Endangered	**Known populations** in Delaware, Orange, Sullivan, and Warren counties, NY; Pike County, PA; and Culpepper, Dinwiddie, Fauquier, Greensville, Hanover, Louisa, Prince William, and Sussex counties, VA. Potential for rediscovery of the species within portions of its **historic range** in Morris County, NJ; and Chesterfield County, VA.	Freshwater mussel that is most commonly found in shallow to deep water with a quick current and a stream bed of cobble, fine gravel, or firm silt/sand. Submerged aquatic vegetation and overhanging tree limbs near stream banks are also potential habitats.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
	Fat pocketbook *Potamilus capax*	Endangered	**Known populations** in East Carroll Parish, LA; and Issaquena, Sharkey, and Washington counties, MS.	Freshwater mussel that has a preference for a substrate with a stable mix of sand, mud and fine gravel. Flowing water is required for the species to thrive. Recent studies have also found the species inhabiting agricultural ditches, sloughs, bayous and streams of the St. Francis watershed.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Fluted Kidney shell pearlymussel *Ptychobranchus subtentum*	Candidate	**Known populations** in Jackson County, KY.	Fresh water mussel that generally inhabits small to medium rivers in swift current or riffle areas, with some populations recently documented in the shoal areas of larger rivers. Individuals are usually embedded in sand, gravel, or cobble substrates.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
Mussels	Orangefoot pimpleback pearlymussel *Plethobasus cooperianus*	Endangered	**Known populations** in Bracken, Lewis, and Pendleton counties, KY; and Hardin and Maury counties, TN.	Fresh water mussel that is primarily found in medium to large rivers with sand, gravel and cobble substrates. Generally the species inhabits deep water riffles and shoals with steady currents, though it is also found in some shallower shoals and riffles.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
	Pink mucket pearlymussel *Lampsilis abrupta*	Endangered	**Known populations** in Bath, Pendleton, and Rowan counties, KY; Gallia, Lawrence, Meigs, Morgan, and Washington counties, OH; Hardin and Trousdale counties, TN; and Clay, Jackson, Kanawha and Mason counties, WV.	Fresh water mussel that is found in medium to large rivers with substrates ranging from silt to boulders, rubble, gravel, and sand. The species is primarily found in large rivers with moderate to fast flowing water at depths from 1.5 to 26 feet.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Rabbitsfoot *Quadrula cylindrica*	Candidate	**Known populations** in DeKalb County, IN; Adair, Allen, Barren, Campbell, Floyd, Greenup, Jackson, Lewis, Monroe, Owsley, and Pendleton counties, KY; Sunflower County, MS; Adams, Ashland, Coshocton, Defiance, Delaware, Fairfield, Franklin, Knox, Madison, Muskingum, Pickaway, Putnam, and Union counties, OH; Allegheny, Armstrong, Beaver, Fayette, Greene, Lawrence, Washington, and Westmoreland counties, PA; and Hardin and Maury Counties, TN.	Fresh water mussel that generally inhabits small to medium rivers with moderate to swift currents. In smaller streams it generally inhabits bars or gravel and cobble close to fast currents, while in medium to large rivers it usually resides in sand and gravel.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
Mussels	Rayed bean *Villosa fabalis*	Proposed Endangered	**Known populations** in Dekalb and Marshall counties, IN; Brown, Champaign, Clermont, Coshocton, Defiance, Delaware, Franklin, Hancock, Hardin, Lucas, Madison, Marion, Morrow, Pickaway, Scioto, Union, Warren, and Wyandot counties, OH; and Armstrong, Clarian and Mercer counties, PA.	Fresh water mussel that is generally found in smaller, headwater creeks, though it has also been reported in larger rivers. Inhabited areas generally include shoal or riffle areas, and in shallow, wave-washed portions of glacial lakes, including extant populations in Lake Erie. It is usually found in substrates of gravel and sand, though it is also often found buried among the roots of vegetation such as water willow and water milfoil.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
	Ring pink mussel *Obovaria retusa*	Endangered XN	**Known populations** in Bracken, Greenup, Lewis, and Pendleton counties, KY.	Fresh water mussel that is primarily a large river species that generally inhabits gravelly and sandy substrates in relatively shallow water, usually up to two feet deep.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Rough pigtoe *Pleurobema plenum*	Endangered	**Known populations** in Bracken, Lewis, and Pendleton counties, KY; and Hardin and Trousdale counties, TN.	Fresh water mussel that is primarily found in medium to large rivers in shoals with moderate current. They inhabit sand, gravel, and cobble substrates and typically require flowing, well-oxygenated water to thrive, though it is also occasionally found on flats and muddy sand.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
Mussels	Slabside pearlymussel *Lexingtonia dolabelloides*	Candidate	**Known populations** in Maury County, TN.	Fresh water mussel that is generally found in large creeks to moderately sized rivers, inhabiting sand, fine gravel, and cobble substrates in relatively shallow riffles and shoals with moderate current. This species requires flowing, well-oxygenated water to thrive, and is usually found at depths of less than three feet.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.
	Spectaclecase *Cumberlandia monodonta*	Proposed Endangered	**Known populations** in Hardin County, TN.	Fresh water mussel that is primarily found in larger streams and appears to be more of a habitat specialist than most mussel species. The species inhabits substrates from mud and sand to gravel, cobble, and boulders, generally in shallow riffles and shoals with variable current. Most commonly is found in firm mud between large rocks in quiet water directly adjacent to swifter currents.	Short-term impoundments, increased siltation, pollution run-off into the water body, exotic invasive species introduction, and further population fragmentation and genetic bottlenecking through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Plants	American chaffseed *Schwalbea americana*	Endangered	Potential for rediscovery of the species within portions of its **historic range** in Greensville and Sussex counties, VA.	Perennial herb in the Figwort family located in pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric sandy soils, and other open grass-sedge systems.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
Plants	Eastern prairie fringed orchid *Plateurothera leucophaea*	Threatened	**Known populations** in Elkhart, Lake, LaPorte, Noble and St. Joseph counties, IN; Clark, Holmes, Lucas, Ottawa, Sandusky, and Wayne counties, OH; and Augusta County, VA.	Perennial herb in the Orchid family that requires full sun for optimum growth, and is primarily found in tall grass calcareous silt loams or sub-irrigated sand prairies, though it can also be found in open portions of fens, sedge meadows, marshes, and bogs.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
	Globe (Shortt's) bladderpod *Lesquerella globosa*	Candidate	**Known populations** in Bourbon, Fayette, and Madison counties, KY; and Davidson and Trousdale counties, TN. Potential for rediscovery of the species within portions of its **historic range** in Clark, Garrard, and Powell counties, KY; and Maury County, TN.	Perennial herb in the Mustard family that is primarily found on steep, rocky wooded slopes and talus areas, along with cliff tops, bases, and ledges. It is often found in close proximity to rivers or streams, and generally on south to west facing slopes, often in association with outcrops of calcareous rock.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Harperella *Ptilimnium nodosum*	Endangered	**Known populations** in Allegany and Washington counties, MD.	Annual herb in the Carrot family. The riverine form of the species grows on rocky and sandy shoals, or occasionally on muddy banks, of seasonally flooded and quickly moving streams; generally in microsites that are sheltered from rapidly moving water the pond form is found on the edges of shallow pineland ponds, low savanna meadows, and along a granite outcrop in one site.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
Plants	Lakeside daisy *Hymenoxys herbacea*	Threatened	**Known populations** in Erie and Ottawa counties, OH.	Perennial herb in the Sunflower family that grows on outcrops of dolomite or limestone bedrock, dry gravelly prairies on terraces or hills associated with major river systems, rocky shores, sand fields, and alvars. U.S. populations persist on dry, thin-soiled, degraded prairies with limestone or dolomite bedrock at or near the surface.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
	Leafy-prairie clover *Dalea foliosa*	Endangered	**Known populations** in Davidson, Maury, Williamson, and Wilson counties, TN. Potential for rediscovery of the species within portions of its **historic range** in Sumner County, TN.	Perennial herb in the Pea family that grows in thin-soiled mesic and wet-mesic dolomite prairies, limestone cedar glades, and limestone barrens.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Leedy's roseroot *Rhodiola integrifolium leedyi*	Threatened	**Known populations** in Schuyler and Yates counties, NY.	Perennial herb in the Stonecrop family that is found on north or east-facing talus slopes or cliff ledges. It is always found associated with areas where ground water or cool air constantly seep through the strata or between rocks, which effectively maintains a cool, wet microclimate throughout the summer.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, and the use of herbicides/pesticides.
	Michaux's sumac *Rhus michauxii*	Endangered	**Known populations** in Dinwiddie County, VA.	Perennial herb in the Sumac family found primarily in sandy or rocky open woods, underlain by sand or sandy loam acidic soils with low cation exchange capacities.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, the use of herbicides/pesticides, and further genetic bottlenecking through take.
Plants	Northeastern bulrush *Scirpus ancistrochaetus*	Endangered	**Known populations** in Washington County, MD; Adams, Bedford, Cambria, Centre, Clinton, Cumberland, Franklin, Fulton, Lehigh, Monroe, and Northampton counties, PA; Alleghany, Augusta, and Rockingham counties, VA; and Hardy County, WV.	Perennial herb in the Sedge family found in open, tall herb-dominated wetlands throughout its range. It is primarily found at the water's edge or within very shallow water, though it may also be located in areas with up to three feet of water, or in upland areas. Habitats include natural ponds, shallow sinkholes, and wet depressions, though it has not been found in artificial habitats such as ditches, borrow pits, or dredged ponds.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Northern monkshood *Aconitum noveboracense*	Threatened	**Known populations** in Delaware and Sullivan counties, NY; and Hocking County, OH.	Perennial herb in the Buttercup family. Midwestern populations are found on shaded or partially shaded cliffs and talus slopes. New York populations are found at high-elevation headwaters and in crevices along streams. All inhabited areas have a generally cold soil environment, with either active and continuous cold air drainage, or cold ground water flow seeping out of nearby bedrock, creating a cool, damp microclimate.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, and the use of herbicides/pesticides.
Plants	Peter's Mtn. mallow *Iliamna corei*	Endangered	**Known populations** in Giles County, VA.	Perennial herb in the Mallow family only found in one location; shallow soil-filled pockets and crevices of the Clinch sandstone outcrops on the northwest-facing slope of Peters Mountain. They are found in proximity to the ridge line of a mixed deciduous-evergreen forest.	Introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Pondberry *Lindera melissifolia*	Endangered	**Known populations** in Sharkey and Sunflower counties, MS.	Perennial herb in the Laurel family capable of occupying a variety of habitats as long as its hydrological requirements are met. Across its range, the species has been found on seasonally flooded wetlands, on the bottoms and edges of shallow seasonal ponds of old dune fields, along the edges of ponds and depressions in pine forests, around the edges of sinkholes in coastal areas with karst topography, and along the edges of sphagnum bogs.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
Plants	Price's potato bean *Apios priceana*	Endangered	**Known populations** in Maury, Wayne, and Williamson counties, TN. Potential for rediscovery of the species within portions of its **historic range** in Davidson County, TN.	Perennial herb in the Pea family that thrives in open, wooded areas, and is usually found in forest gaps or along forest edges. The species shows a preference for mesic areas, often being located in open, low areas near streams, or along stream and river banks. It is also sometimes found at the base of small limestone bluffs. Most extant populations are found in cleared areas, such as powerline or road right-of-ways.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, the use of herbicides/pesticides, and further fragmentation and genetic bottlenecking through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Running buffalo clover *Trifolium stoloniferum*	Endangered	**Known populations** in Bourbon, Campbell, Clark, Fayette, Madison, and Montgomery counties, KY; Brown, Clermont, and Lawrence counties, OH; and Pendleton, Pocahontas, Preston, Randolph, Tucker, and Webster counties; WV. Potential for rediscovery of the species within portions of its **historic range** in Jackson County, KY; and Monongalia County, WV.	Perennial herb in the Pea family that is primarily found in areas underlain by limestone or other calcareous bedrocks. Habitat associations include mesic woodlands, savannahs, floodplains, stream banks, sandbars, grazed woodlots, mowed paths, old logging roads, off-road trails, mowed wildlife openings within mature forest, and steep ravines.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
	Sensitive joint-vetch *Aeschynomene virginica*	Threatened	**Known populations** in Chesterfield, Henrico, and James City counties, VA. Potential for rediscovery of the species within portions of its **historic range** in Gloucester and Salem counties, NJ; Delaware County, PA; and Prince George and Surry Counties, VA.	Annual herb in the Pea family primarily found in sparsely vegetated areas within 6-7 feet of the low water mark on raised banks; generally on peaty, sandy, or gravelly substrates.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
Plants	Shale barren rockcress *Arabis serotina*	Endangered	**Known populations** in Alleghany, Augusta, Page, and Rockbridge counties, VA; and Greenbrier, Hardy, and Pendleton counties, WV.	Biennial herb in the Mustard family found in sparsely-vegetated xeric shale deposits on south or west facing slopes. Populations are found on both shale openings and shale woodlands adjacent to the openings.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
	Short's goldenrod *Solidago shortii*	Endangered	**Known populations** in Nicholas and Robertson counties, KY	Perennial herb in the Aster family primarily found in cedar glades and glade-like habitats (e.g. right-of-ways, roadside ledges, meadows/pastures) where droughty soils prevent habitat succession to trees/shrubs. The species is also found on roadsides, and on dry, rocky, overgrazed pastures.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, the use of herbicides/pesticides, and further fragmentation and genetic bottlenecking through take.
	Small-whorled pogonia *Isotria medeoloides*	Threatened	**Known populations** in New Castle County, DE; Hocking and Scioto counties, OH; Centre and Chester counties, PA; and Fairfax, James City, Madison, and Prince William counties, VA. Potential for rediscovery of the species within portions of its **historic range** in Montgomery County, MD; Hunterdon County, NJ; Rockland County, NY; Greene, Monroe, and Montgomery counties, PA; and Greenbrier County, WV.	Perennial herb in the Orchid family found primarily in mixed-deciduous or mixed-deciduous/coniferous forests, often in second- or third-growth stages, occurring in both fairly young woodlands and in maturing stands. Common characteristics for the majority of inhabited locations include sparse to moderate ground cover, a relatively open understory canopy, and proximity to logging roads, streams, or other long persisting breaks in the forest canopy.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Plants	Smooth coneflower *Echinacea laevigata*	Endangered	**Known populations** in Allegheny and Botetourt counties, VA. Potential for rediscovery of the species within portions of its **historic range** in Lancaster County, PA.	Perennial herb in the Aster family found in open woods, cedar barrens, along roadsides, within clear cuts, along dry limestone bluffs, and within power line right-of-ways. Soils are generally rich in magnesium or calcium, usually associated with amphibolite, dolomite, limestone, gabbro, diabase, or marble. Optimal habitat for the species is characterized by abundant sunlight and little competition with other species in the herbaceous layer.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, the use of herbicides/pesticides, and further fragmentation and genetic bottlenecking through take.
	Spring creek bladderpod *Lesquerella perforata*	Endangered	**Known populations** in Wilson County, TN.	Annual herb in the Mustard family found within the floodplain fields of three streams. It is primarily located on newly disturbed sites and appears to require some degree of annual disturbance to complete its life cycle. Historically this disturbance came from periodic flooding and its associated scouring, though cultivation appears capable of approximating this disturbance currently.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Plants	Swamp pink *Helonias bullata*	Threatened	**Known populations** in New Castle County, DE; Cecil County, MD; Gloucester, Morris, and Salem counties, NJ; and Augusta and Henrico counties, VA.	Perennial herb in the Lily family found in forested wetlands that are groundwater influenced and perennially water-saturated. These wetlands occur at sites where the water table is at or very near the surface and maintains a relatively stable height throughout the spring and summer. Some primary habitats include Atlantic white cedar swamps, headwater seepage wetlands, red maple swamps, and occasionally black spruce-tamarack bogs.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, the use of herbicides/pesticides, and further fragmentation and genetic bottlenecking through take.
	Tennessee purple coneflower *Echinacea tennesseensis*	Endangered	**Known populations** in Davidson and Wilson counties, TN.	Perennial herb in the Aster family found in open limestone cedar glades, a habit type found in barren, open areas in forests that contain insufficient soil and resources to support woody vegetation. Glades generally have exposed or thinly soil-covered limestone bedrock and harsh environments, with dry, hot conditions and full sun exposure typical.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Plants	Virginia sneezeweed *Helenium virginicum*	Threatened	**Known populations** in Augusta and Rockingham counties, VA.	Small perennial forb in the Aster family generally found in locations with a substrate consisting of poorly drained, acidic, silty soils underlain by gray clays and dolomitic bedrock. Basin habitat is generally flooded from January to July. The species appears to be dependent on fluctuating water levels giving it a competitive advantage over other species such as shrubs and trees	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
	Virginia spirea *Spiraea virginiana*	Threatened	**Known populations** in Lewis County, KY; Sioto County, OH; and Greenbrier, Mercer, Raleigh, Summers, and Upshur counties, WV. Potential for rediscovery of the species within portions of its **historic range** in Fayette County, PA.	Perennial shrub in the Rose family that inhabits the banks of high gradient sections of second and third order streams, along with meander scrolls and point bars, natural levees, and other braided features of lower stream reaches, often near the mouth of the stream. The species is found in early successional areas with a regime of frequent disturbance. A lack of competition appears to be key to the species.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, the use of herbicides/pesticides, and further fragmentation and genetic bottlenecking through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Plants	White-haired goldenrod *Solidago albopilosa*	Threatened	**Known populations** in Menifee and Powell counties, KY.	Perennial herb in the Aster family found in rock-shelters on the upper slopes of the Red River Gorge. It is usually found in partial shade behind the drip line of rock-shelters, but is not found in the furthest depths of the larger rock shelters, nor in full sun, showing an apparent preference for partial shade. It is also occasionally found on rock ledges or in the sandy soil along trails.	Habitat loss or degradation, partial defoliation, local population or individual extirpation, introduction and/or spread of exotic species, and the use of herbicides/pesticides.
Birds	Piping plover *Charadrius melodus*	Endangered	**Known populations** in Cameron, Lafourche, Plaquemines, St. Mary, Terrebonne, and Vermilion parishes, LA.	Migratory shorebird that utilizes sandy upper beaches, especially in association with scattered grassy tufts, and sparsely vegetated shores and islands for breeding. Wintering populations are found most commonly on ocean beaches or on sand or algal flats in protected bays, with the highest abundance found on expansive sandflats, sandy mudflats, and sandy beaches, generally in habitats with high heterogeneity.	Temporary or permanent loss or degradation of habitat, potential attraction of predators, increased disturbance stress on individuals, and the potential for contaminant impacts from accidental spills or the use of herbicides for O&M activities.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Birds	Red-cockaded woodpecker *Picoidees borealis*	Endangered	**Known populations** in Calcasieu, Evangeline, Grant, La Salle, and Rapides parishes, LA; and Lafayette County, MS. Potential for rediscovery of the species within portions of its **historic range** in Powell County, KY; Catahoula Parish, LA; Northampton County, NC; Hardin and McNairy counties, TN; and Southampton and Sussex counties, VA.	Small, non-migratory woodpecker found in open pine woodlands and savannahs, with large old-growth pines for nesting and roosting habitat. Cavity trees must be in open stands with a limited quantity of hardwood mid- or over-story. Foraging habitats consist of mature pines with an open canopy, low densities of small pines and hardwoods, and abundant native bunchgrass and forbs as groundcover.	Temporary or permanent loss or degradation of habitat, and further species fragmentation and genetic bottlenecking.
Fish	Diamond Darter *Crystallaria cincotta*	Candidate	**Known populations** in Kanawha and Clay counties, WV.	Benthic invertivore that inhabits moderate to large warm-water streams with clean sand and gravel substrates and moderate current.	Short-term impoundments, increased siltation, pollution run-off into the water body, and further population fragmentation and genetic bottlenecking through take.
	Pallid sturgeon *Scaphirhynchus albus*	Endangered	**Known populations** in East Carroll, Madison, Rapides, and St. Mary parishes, LA; and Issaquena, Sharkey, Warren, and Washington counties, MS.	Large freshwater benthic-dwelling fish in the Sturgeon family found in large, turbid, free-flowing rivers with swift currents. They are generally over sand or gravel substrate in water around 15 feet deep, usually in areas with an irregular bottom contour, which are common at the downstream end of sunken sand bars and in open channels with dunes.	Short-term impoundments, pollution run-off and small spills into the water body, and potential entrainment of juveniles or fry during water intake for hydrostatic test water.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Fish	Roanoke logperch *Percina rex*	Endangered	**Known populations** in Brunswick, Dinwiddie, Greensville, Mecklenburg, Southampton, and Sussex counties, VA.	Small freshwater fish in the Perch family that occupies clean, clear, moderate to large sized warm-water streams and rivers with moderate gradients and relatively unsilted substrata. They most commonly inhabit riffle-run-pool areas and substrates made of mostly gravel and rubble. Males are generally found in shallow riffles, females in deep runs with gravel and small cobble bottoms, and young in slow runs and pools with clean sand bottoms. All classes are assumed to winter under boulders in deep pools.	Short-term impoundments, increased siltation, pollution run-off and small spills into the water body, potential entrainment of individuals during water intake for hydrostatic test water, and further population fragmentation and genetic bottlenecking through take.
	Spotfin chub *Erimonax monachus*	Threatened XN	**Known populations** in Lewis County, TN.	Small freshwater fish in the Minnow family primarily found in moderate to large streams and rivers, generally of widths ranging from 55 to 230 feet with water depths from 1 to 3.2 feet. They generally inhabit riffles and pools with moderate to swift current and clear water at cool to warm temperatures. Preferred substrates range from gravel to bedrock, though the species is rarely found in conjunction with sand and silt substrates.	Short-term impoundments, increased siltation, pollution run-off and small spills into the water body, and potential entrainment of juveniles or fry during water intake for hydrostatic test water, and further population fragmentation through take.

Table 3.3-30: Non-HCP Species To Be Analyzed in the EIS

Category	Name	Status	Locations within Project Area	Habitat Type[1]	Potential Threats[2]
Fish	Pygmy madtom *Noturus stanauli*	Endangered XN	**Known populations** in Maury County, TN.	Small freshwater fish in the Catfish family that inhabits moderate to large rivers with clear water, and is generally located on shallow pea-size gravel or fine sand shoals, with a current ranging from moderate to strong. The species is also found in the flowing portions of pools during the reproductive season, and eggs are generally laid under slab rocks, in empty mussel shells, or in other similar situations	Short-term impoundments, increased siltation, pollution run-off and small spills into the water body, potential entrainment of individuals during water intake for hydrostatic test water, and further population fragmentation and genetic bottlenecking through take.
Reptiles	Eastern massasauga *Sistrurus catenatus catenatus*	Candidate	**Known populations** in Elkhart, LaPorte, Marshall, Noble, Porter, and St. Joseph counties, IN; Ashtabula, Champaign, Clark, Clinton, Columbiana, Crawford, Defiance, Erie, Fairfield, Fayette, Greene, Hardin, Huron, Licking, Logan, Lorain, Lucas, Marion, Medina, Montgomery, Ottawa, Paulding, Sandusky, Seneca, Stark, Trumbull, Warren, Wayne, and Wyandot counties OH; and Butler and Mercer counties, PA.	Medium-sized rattlesnake found in both wetland and upland habitats, which typically shifts between the two seasonally, with the shift varying across the species range, along with between sexes and life stages. Occupied sites generally contain a mix of open sunlit areas and shaded areas for thermoregulation; have a water table near the surface for hibernation, and variable elevations between the adjoining wetland and upland areas.	Temporary or permanent loss or degradation of habitat, individual disturbance or mortality, chemical contaminants, facilitated predation and collection, water level manipulation and sedimentation, and further species fragmentation and genetic bottlenecking.

[1]See Appendix F for more information about species' habitat types
[2]See Appendix F for more information about potential threats to species

State-Listed Species

State-listed species that are not federally listed or candidate species are not covered by the proposed HCP. State-listed species will be considered separately via individual state-by-state laws that address those species and within the context of future NEPA tiering. Information on state listed species is available on state web sites, as described in Section 3.3.3, Wildlife Action Plans.

3.4 Social Resources

To characterize the human environment potentially affected by the proposed action and alternatives, the Social Resources section examines a range of socio-economic resource areas, including land ownership and use, socio-economics, demographics, income, employment, environmental justice, housing, public services, transportation and utilities, cultural resources, recreation, visual resources, and noise. Data are presented on a state-by-state basis, and, when available, additional site-specific data are also presented at the NCL area level.

3.4.1 Land Ownership and Use

In the following section, several land use measures are discussed. The discussion begins with the percentage of each state included within the NCL area, and types of ownership, including federal, state, and local conservation lands. This is followed by regional and state-by-state descriptions of land use types based on best available data sources.

State-by-State Overview

Approximately 75-percent of the entire NCL area falls within three states: Ohio (33-percent), West Virginia (25-percent), and Pennsylvania (17-percent). On the contrary, lands in Delaware, Indiana, New Jersey, and North Carolina combined make up less than 2-percent of the NCL area (See **Table 3.4-1**).

Table 3.4-1: NCL Area by State

State	Acres in NCL	Percent of NCL By State
Delaware	2,049	0.02
Indiana	88,599	0.91
Kentucky	499,418	5.11
Louisiana	485,622	4.97
Maryland	371,784	3.80
Mississippi	140,909	1.44
New Jersey	43,335	0.44

State	Acres in NCL	Percent of NCL By State
New York	185,422	1.90
North Carolina	936	0.01
Ohio	**3,219,472**	**32.93**
Pennsylvania	**1,694,423**	**17.33**
Tennessee	122,393	1.25
Virginia	446,248	4.56
West Virginia	**2,475,988**	**25.33**
Total	9,776,598	

As shown in **Table 3.4-2**, data from aggregate land ownership for the 14 states show that the majority (91-percent) of land is under private ownership and approximately 8-percent is under either state or federal ownership. Within the NCL area (See **Table 3.4-3**), approximately 94-percent of the land is under private ownership, and 6-percent is under state or federal ownership. Less than 1-percent of both land areas is identified as being owned by local governments and NGOs.

Table 3.4-2: Aggregate Land Ownership Type by State

Owner	Acres	Percent
Federal	12,212,811	3.86
Local	1,085,814	0.34
NGO	448,588	0.14
Private	287,245,357	90.81
State	14,158,842	4.48
Other/Unknown	1,152,870	0.36
Total	316,304,282	
Source: State Based Ownership Data**, NAUS 2006a, NPS 2007a, USFS 2006a		

** Note: Tables and data in Section 3.4 compiled from the following (noted as State Based Ownership Data below): CMI 2000, Cornell 2000, Ducks Unlimited 2006, ESRI 1998, INDNR Unpublished, KYDFWR 2001, KYIA 2007, MDDNR/UMDES 2002a-c, MSDWFP Unknown, MSU 2003, NCCGIA 2002, NCDA 2006, NCDENR 2006, NCSU 2001, TNWRA 1997, USGS 2000, WVU 2000

Table 3.4-3: Aggregate Land Ownership Type for NCL Area

Owner	Acres	Percent
Federal	243,856	2.49
Local	29,129	0.30
NGO	1,594	0.02
Private	9,144,863	93.54
State	349,773	3.58
Other/Unknown	7,383	0.08
Total	9,776,598	
Source: State Based Ownership Data, NAUS 2006a, NPS 2007a, USFS 2006a		

Land Ownership

An analysis of land ownership, particularly public lands, is important because many of the species impacted by the issuance of the ITP may rely on habitat conserved by federal, state, and local government lands. Below is a state-by-state discussion of land ownership, with a focus on conservation lands and lands available for recreation.

Private Lands

Values for the proportion of private land encompassed by the NCL area for each state range from 80-percent in Maryland to 100-percent in North Carolina. The number of acres of private land included within the NCL area is greatest in Ohio, followed by Pennsylvania and West Virginia (**Table 3.4-4**). North Carolina and Delaware have the least amount of private land included within the NCL area.

Table 3.4-4: State-by-State Land Ownership Type for the NCL Area

State	Federal Acres	State Acres	Local Acres	Private Acres	NGO Acres	Water Acres	Total Acres in NCL
Delaware	-	-	72	1,065	-	-	1,137
Indiana	-	751	423	87,344	81	-	88,599
Kentucky	5,421	6,526	474	486,997	-	-	499,418
Louisiana	2,891	9,919	-	473,112		-	485,922
Maryland	476	66,814	6,376	298,138	414	-	372,218
Mississippi	3,438	1,037	-	137,679	-	-	142,154
New Jersey	-	1,356	437	41,235	176	-	43,204
New York	-	11,280	-	173,538	-	482	185,301
North Carolina	-	-	-	929	-	-	929
Ohio	126,595	38,524	18,389	3,035,622	342	-	3,219,472
Pennsylvania	17,113	163,081	2,192	1,494,606	122	-	1,677,115
Tennessee	713	4,960	-	117,192	-	-	122,865
Virginia	51,833	2,379	669	398,957	-	-	453,837
West Virginia	35,378	43,146	96	2,398,448	459	724	2,478,251
Total	**243,858**	**349,773**	**29,128**	**9,144,862**	**1,594**	**1,206**	**9,770,422**
Source: State Based Ownership Data, NAUS 2006a, NPS 2007a, USFS 2006a							

Federal Lands

In total, the NCL area crosses approximately 243,856-acres of federal land under federal control. The greatest acreage of federal land within the NCL area is located in Ohio, followed by West Virginia, Virginia, and Pennsylvania. As shown in **Table 3.4-5**, West Virginia has the greatest number of individual properties under federal ownership. Several states, including

Delaware, Indiana, New Jersey, New York, and North Carolina have no federal lands within the NCL area.

Federal land management agencies that control lands within the NCL area include the NPS, USFS, USFWS, USACE, the Department of Defense (DOD), the General Services Administration (GSA), and the Metropolitan Washington Airport. The majority of lands are managed by the USFS, followed by the NPS and USFWS. The majority of federal lands in the area are available for some level of recreational use. Some of the larger tracts (over 1,000-acres) of federal land included within the NCL area are summarized below in **Table 3.4-5**.

Table 3.4-5: Federal Lands with Over 1000 Acres in NCL Area

Agency	Area	States	Acres
USFS	Wayne NF	OH, WV	121,475
USFS	Monongahela NF	WV	67,655
USFS	Daniel Boone NF	KY	39,972
USFS	George Washington & Jefferson NFs	VA-WV	41,435
USFS	Allegheny NF	PA	23,512
NPS	Chesapeake and Ohio Canal National Historic Park (NHP)	MD	7,269
NPS	Shenandoah National Park (NP)	VA	4,402
NPS	Green Springs National Historic Landmark (NHL)	VA	3,505
USFS	Holly Springs NF	MS	3,104
NPS	Upper Delaware Scenic & Recreational River (SRR)	NY, PA	2,871
USACE	J. Percy Priest Lake	TN	2,699
NPS	Delaware Water Gap National Recreation Area (NRA)	NJ-PA	2,344
USFWS	Cameron Prairie National Wildlife Refuge (NWR)	LA	2,225
USACE	Old Hickory Lake	TN	2,080
USFWS	Grand Cote NWR	LA	1,936
USFWS	Great Dismal Swamp NWR	NC-VA	1,607
USFWS	Canaan Valley NWR	WV	1,371
NPS	Manassas National Battlefield Park (NBP)	VA	1,307
Source: NAUS 2006a, NPS 2007a, USFS 2006a			

State Lands

There are approximately 349,773-acres of state-owned lands within the NCL area. Nearly 47-percent of these state lands are located in Pennsylvania. Another 42-percent is located in Maryland, West Virginia, and Ohio, collectively. Ohio and Pennsylvania have the greatest number of individual state owned properties within the NCL area. Several states have no state lands within the NCL area, including North Carolina and Delaware.

State lands typically include State Parks (SP), Wildlife Management Areas (WMAs), and State Forests (SF). All are considered conservation lands and available for some level of recreational

use. Some of the larger areas of state owned lands included in the NCL area (over 1,000-acres) include the following in **Table 3.4-6**.

Table 3.4-6: Named State Lands with Over 1000-Acres in NCL Area

Area	States	Acres
Green River Lake WMA	KY	3,835
Rockefeller WMA	LA	6,912
Boeuf WMA	LA	2,311
Green Ridge SF	MD	43,880
Savage River SF	MD	1,467
Patuxent SP	MD	1,165
Rocky Gap SP	MD	3,131
Dans Mountain WMA	MD	8,864
Warrior Mountain WMA	MD	4,169
Malmaison WMA	MS	1,037
Palisades - Harriman	NY	4,347
Palisades – Sterling Forest	NY	1,133
Mongaup Valley	NY	2,555
Buckeye SP	OH	1,802
Crane Hollow NP	OH	1,088
Killbuck Marsh Wildlife Area	OH	1,231
Kokosing Lake	OH	1,210
Mohican SP	OH	1,062
Mohican-Memorial SF	OH	4,569
Hocking Hill SP	OH	2,487
Hocking Hill SF	OH	9,405
Tar Hollow SF	OH	1,085
Tri Valley Wildlife Area	OH	1,746
Warriors Path SP	PA	1,490,124
Sproul SF	PA	29,697
Shawnee SP	PA	14,522
Burns Run Wild Area	PA	13,913
Sinnemahoning SP	PA	7,117
Kettle Creek SP	PA	5,279
Ryerson Station SP	PA	4,648
Yellow Creek SP	PA	4,482
Marsh Creek SP	PA	3,227
Hyner Run SP	PA	3,164
Moshannon SF	PA	2,601
Blue Knob SP	PA	2,304
Mont Alto SP	PA	2,214
Clear Creek SF	PA	1,267
Gallitzin SF	PA	1,177
Mcconnells Mill SP	PA	1,044
Eagle Creek WMA	TN	3,738
Canaan Valley SP	WV	1,509
Coopers Rock SF	WV	5,669

Area	States	Acres
Kanawha SF	WV	9,388
Pipestem SP	WV	1,017
Twin Falls SP	WV	1,498
Frozencamp WMA	WV	1,826
Hillcrest WMA	WV	1,486
Lewis Wetzel WMA	WV	9,328
Wallback WMA	WV	3,548
Woodrum Lake WMA	WV	1,869
Source: State Based Ownership Data		

Local Lands

Existing state data sets do not provide a comprehensive or consistent measure of locally owned acreage within the NCL area. Of the data that are available, Ohio and Maryland have the largest acreage of known lands owned by local governments within the area. Lands that are identified as owned by local governments are typically local parks and nature preserves. Most of the known locally owned properties are small in size, 100-acres or less, and are considered conservation lands available for some level of recreational use.

NGO Lands

Six states have lands owned by NGOs within the NCL area. NGO properties in the NCL area are primarily owned and managed by TNC, along with state, regional and local conservation and land management groups.

A summary of the number of publicly owned properties by state within the NCL area can be found in **Table 3.4-7**.

Table 3.4-7: Number of Individual Publicly Owned Properties within the NCL Area

State	Federal Properties	State Properties	Local Properties
Delaware	-	-	4
Indiana	-	5	3
Kentucky	2	8	16
Louisiana	4	8	-
Maryland	2	17	47
Mississippi	2	1	-
New Jersey	-	10	1
New York	-	17	-
North Carolina	-	-	-
Ohio	5	89	185
Pennsylvania	6	58	16
Tennessee	5	5	-

State	Federal Properties	State Properties	Local Properties
Virginia	12	6	Incomplete Data
West Virginia	19	37	1
Source: State Based Ownership Data, NAUS 2006a, NPS 2007a, USFS 2006a			

Land Cover/Land Use Type

Existing land use is also an important consideration when determining whether a species may be present within a given area. NLCD data were examined to determine existing land cover classes within the NCL area. A summary of land-use types within the NCL area as a whole is provided below in **Table 3.4-8**.

The most prevalent land cover classes in the NCL area include Deciduous Forest, Cultivated Crops, Pasture/Hay, and Developed, Open Space. The remainder of the area is covered by 11 other types, none exceeding three-percent of the total area.

Table 3.4-8: Land Use Cover Classes within the NCL Area (NLCD 2001)

Land Cover Class	Acres of NCL	Percent of NCL	Class Description
Deciduous Forest	4,799,870	49.34	Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
Cultivated Crops	1,722,685	17.71	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 percent of total vegetation. This class also includes all land being actively tilled.
Pasture/Hay	1,321,169	13.58	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 percent of total vegetation.
Developed, Open Space	625,981	6.43	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent 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	244,524	2.51	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 percent-49 percent of total cover. These areas most commonly include single-family housing units.

Land Cover Class	Acres of NCL	Percent of NCL	Class Description
Evergreen Forest	215,417	2.21	Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
Woody Wetlands	151,182	1.55	Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Open Water	134,753	1.39	All areas of open water, generally with less than 25 percent cover of vegetation or soil.
Mixed Forest	124,263	1.28	Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.
Grassland/Herbaceous	107,445	1.10	Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Emergent Herbaceous Wetlands	102,396	1.05	Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Developed, Medium Intensity	79,184	0.81	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 percent-79 percent of the total cover. These areas most commonly include single-family housing units.
Shrub/Scrub	44,315	0.46	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.
Developed, High Intensity	28,907	0.30	Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial facilities. Impervious surfaces account for 80 percent to100 percent of the total cover.
Barren Land (Rock/Sand/Clay)	25,783	0.27	Barren 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 percent of total cover
Source: USGS 2003			

Land Conversion

Land conversion to urban and suburban development has increased throughout the U.S. in the last few decades. **Table 3.4-9** provides an overview of increase in development on a state-by-state basis for a 15-year period between 1982 and 1997. For the U.S. as a whole, the USDA Natural Resources Inventory (NRI) estimates that just less than 5-percent of available non-federal land was developed in 1982. This figure rose to almost 6.6-percent in 1997.

All 14 states have higher percentages of land developed, as well as higher rates of change over this 15-year timeframe. New Jersey, Maryland, and Delaware had the highest percentages of developed non-federal land in both 1982 and 1997. Mississippi, on the other hand, had the lowest percent of non-federal lands developed in 1997, followed by Louisiana and West Virginia. North Carolina saw the highest increase in developed land from 1982 to 1997, followed by Tennessee and Kentucky. The only states with an increase in developed lands below the national average for this time period were New York, Indiana, and Ohio.

Table 3.4-9: Percentage of Developed Non-Federal Land 1982-1997

State	Non Federal Land - 1982			Non Federal Land – 1997			Percent Change in Developed Acres (1982-1997)
	Total*	Developed*	Percent Developed	Total*	Developed*	Percent Developed	Increase
US	1,495,931.7	73,245.8	4.90	1,492,011.4	98,251.7	6.59	34.1
Delaware	1,214.3	167.0	13.75	1,213.8	225.5	18.58	35.0
Indiana	22,338.1	1,834.8	8.21	22,329.1	2,260.4	10.12	23.2
Kentucky	24,183.0	1,145.3	4.74	24,064.9	1,737.5	7.22	51.7
Louisiana	26,525.0	1,233.9	4.65	26,287.8	1,623.8	6.18	31.6
Maryland	6,057.2	913.0	15.07	6,044.0	1,235.7	20.45	35.3
Mississippi	28,172.2	1,120.2	3.98	27,902.6	1,474.0	5.28	31.6
New Jersey	4,565.5	1,265.5	27.72	4,543.8	1,778.2	39.13	40.5
New York	29,885.6	2,635.8	8.82	29,885.9	3,183.6	10.65	20.8
North Carolina	28,804.3	2,416.7	8.39	28,448.7	3,856.4	13.56	59.6
Ohio	25,709.5	2,782.8	10.82	25,681.0	3,611.3	14.06	29.8
Pennsylvania	27,808.3	2,818.8	10.14	27,799.6	3,983.2	14.33	41.3
Tennessee	25,002.7	1,504.7	6.02	24,967.2	2,370.6	9.49	57.5
Virginia	22,562.1	1,841.3	8.16	22,511.8	2,625.8	11.66	42.6
West Virginia	14,237.2	583.9	4.10	14,125.4	873.6	6.18	49.6
* Values in Thousands of Acres - Source: NRCS 2000							

Land Use Restrictions, Easements and Zoning

Land use restrictions, easements, and zoning regulations cover a range of legal mechanisms through which public (e.g. federal, state, county, municipal, and regional governments or agencies) and private (e.g. NGOs, utilities, businesses, individuals) groups can guide, limit, or prevent development on properties. Due to the spatial scale of the NCL area and the wide range of lands and regions crossed, a variety of land use and development restrictions is anticipated to be encountered. Existing ROWs and facilities have been established within the bounds of local ordinances along the NCL corridor. In the case of covered activities that involve

additional construction, restrictions will be applied in concert with any applicable public ordinances or laws. The impacts of any restrictions will be factored into future NEPA tiering to the extent that the project is bounded by those restrictions.

One example of land use restrictions within the NCL area is the Louisiana Coastal Zone Management (CZM) area, crossed by the NCL within Cameron, Iberia, Lafourche, Plaquemines, St. Charles, St. Mary, Terrebonne, and Vermillion parishes. The program, a cooperative venture between the USACE and the Louisiana Coastal Resources Program, a branch of the Louisiana Department of Natural Resources, seeks to protect the natural resources of the coastal wetland zone while encouraging multiple resource uses and adequate economic development. A Coastal Use Permit (CUP) would be required for any dredge and fill work, shoreline maintenance, or other wetland impacting activities within the listed parishes. For more information, see: http://dnr.louisiana.gov/crm/coastmgt/coastmgt.asp.

As specific projects are undertaken, depending upon the nature of the activity, local approvals and/or state level permits or review may be required. As such, potential impacts from land use restrictions, easements, and/or zoning would be considered on a project-by-project basis, and may be subject to future NEPA analysis. Examples may include coordination with local or regional zoning boards, consultation with NGOs or public agencies with interests in the area, or the completion of land use permits prior to construction activities.

3.4.2 Socioeconomics

In the following section, several socioeconomic measures are discussed. The discussion begins with a regional perspective by examining the population within U.S. Census Bureau (USCB) Regions and Divisions in the NCL area. This is followed by state-by-state descriptions of current, estimated, and projected population, employment, unemployment, personal income, poverty, and local/state employment. Additionally, environmental justice, housing, and public services are discussed.

Demographics, Income, and Employment

Regional Overview

Census Regions and five Census Divisions are located within the NCL area. See **Table 3.4-10** for a list of all Regions, Divisions, and States within the NCL area.

Table 3.4-10: USCB Regions, Divisions and States in the NCL Area

Region 1: Northeast	Region 2: Midwest	Region 3: South
Middle Atlantic Division: ♦ New Jersey ♦ New York ♦ Pennsylvania	*East North Central Division:* ♦ Indiana ♦ Ohio	*South Atlantic Division:* ♦ Delaware, ♦ Maryland, ♦ North Carolina, ♦ Virginia, ♦ West Virginia
		East South Central Division: ♦ Kentucky, ♦ Mississippi, ♦ Tennessee
		West South Central Division: ♦ Louisiana

As depicted in **Table 3.4-11,** overall population growth in the U.S. is expected to be just over seven-percent between 2000 and 2007. The Northeast and Midwest Census Regions each have lower estimated population growth rates than the national average at two-percent and three-percent, respectively. Only the Southern Region has an expected growth rate that is higher than the national average.

Table 3.4-11: Estimated Population and Growth in the NCL Area

Geographic Area	Census 2000	July 1, 2007 Population Estimate	Estimated Growth (percent)
UNITED STATES	281,421,906	301,621,157	7.2
Northeast Region	53,594,378	54,680,626	2.0
Middle Atlantic Division	39,671,861	40,416,441	1.9
Midwest Region	64,392,776	66,388,795	3.1
East North Central Division	45,155,037	46,338,216	2.6
South Region	100,236,820	110,454,786	10.2
South Atlantic Division	51,769,160	57,860,260	11.8
East South Central Division	17,022,810	17,944,829	5.4
West South Central Division	31,444,850	34,649,697	10.2
Source: USCB 2007a			

According to the USCB, the NCL area includes six of the 25 largest Metropolitan Areas in the country including; (1) New York-Northern New Jersey-Long Island, NY; (4) Washington-Baltimore, DC-MD-VA-WV; (6) Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD; (16) Cleveland-Akron, OH; (22) Pittsburgh, PA; and (24) Cincinnati-Hamilton, OH-KY-IN. These six Metropolitan Areas alone comprised over 42-million residents according to the 2000 Census (USCB 2001).

State Populations

Average population and population density per square mile varies among the states in the NCL area, although density in each state is higher than the national average. **Table 3.4-12** summarizes the total 2000 population, land area, and persons per square mile for each of the 14 states in the NCL area.

The states within the NCL area comprise approximately 35-percent of the U.S. population. The three most populous states are New York, Pennsylvania, and Ohio, comprising approximately 44-percent of the NCL area's population. Delaware and West Virginia are the least populous states in the area, comprising less than one-percent of the NCL area's population.

Of the states in the NCL area, only Mississippi and West Virginia have densities lower than the national average. Delaware, Maryland, New York and New Jersey have the highest densities, at least five times higher than that national average.

Table 3.4-12: 2000 Population, Land Area, and Density by State in the NCL Area

Geographic Area	Population	Land Area	Persons per Sq. Mile of Land Area
U.S.	**281,421,906**	**3,537,438**	**79.6**
Delaware	783,600	1,954	401
Indiana	6,080,485	35,867	170
Kentucky	4,041,769	39,728	102
Louisiana	4,468,976	43,562	103
Maryland	5,296,486	9,774	542
Mississippi	2,844,658	46,907	61
New Jersey	8,414,350	7,417	1,134
New York	18,976,457	47,214	402
North Carolina	8,049,313	48,711	165
Ohio	11,353,140	40,948	277
Pennsylvania	12,281,054	44,817	274
Tennessee	5,689,283	41,217	138
Virginia	7,078,515	39,594	179
West Virginia	1,808,344	24,077	75
Source: USCB 2000a			

Population growth between 2000 and July 2007 varied tremendously among the fourteen states in the NCL area (See **Table 3.4-13**). Nine states were expected to grow at a slower rate than the national average, and one was expected to decline. Louisiana's population was expected to decline nearly four-percent over this seven year timeframe; due largely to the impacts of the 2005 hurricane season. West Virginia, New York, Ohio, and Pennsylvania had expected growth rates of less than two-percent. Only Delaware, North Carolina, Tennessee, and Virginia had higher estimated growth rates than the national average.

Table 3.4-13: 2000 Population, 2007 Population Estimate and Estimated Growth

Geographic Area	Census 2000	July 2007 Population Estimate	Estimated Growth (percent)
U.S.	**281,421,906**	**301,621,157**	**7.2**
Delaware	783,600	864,764	10.4
Indiana	6,080,485	6,345,289	4.4
Kentucky	4,041,769	4,241,474	4.9
Louisiana	4,468,976	4,293,204	-3.9
Maryland	5,296,486	5,618,344	6.1
Mississippi	2,844,658	2,918,785	2.6
New Jersey	8,414,350	8,685,920	3.2
New York	18,976,457	19,297,729	1.7
North Carolina	8,049,313	9,061,032	12.6
Ohio	11,353,140	11,466,917	1.0
Pennsylvania	12,281,054	12,432,792	1.2
Tennessee	5,689,283	6,156,719	8.2
Virginia	7,078,515	7,712,091	9.0
West Virginia	1,808,344	1,812,035	0.2
Source: USCB 2007a			

The USCB also generates long-term population projections (See **Table 3.4-14**). These projections are based on assumptions that current state trends in fertility, mortality, domestic migration, and international migration will continue. Eight states are expected to grow at much slower rates than the national average, whereas Maryland, North Carolina, and Virginia are expected to grow at faster rates than the national average. Only West Virginia expected to see a population decline over the next 30 years.

Table 3.4-14: 2000 Population and Long Term Projections

Geographic Area	Census April 1, 2000	Projections July 1, 2010	Projections July 1, 2020	Projections July 1, 2030	Percent change 2000 to 2030
U.S.	**281,421,906**	**308,935,581**	**335,804,546**	**363,584,435**	**29.2**
Delaware	783,600	884,342	963,209	1,012,658	29.2
Indiana	6,080,485	6,392,139	6,627,008	6,810,108	12.0
Kentucky	4,041,769	4,265,117	4,424,431	4,554,998	12.7
Louisiana	4,468,976	4,612,679	4,719,160	4,802,633	7.5
Maryland	5,296,486	5,904,970	6,497,626	7,022,251	32.6
Mississippi	2,844,658	2,971,412	3,044,812	3,092,410	8.7
New Jersey	8,414,350	9,018,231	9,461,635	9,802,440	16.5
New York	18,976,457	19,443,672	19,576,920	19,477,429	2.6
North Carolina	8,049,313	9,345,823	10,709,289	12,227,739	51.9
Ohio	11,353,140	11,576,181	11,644,058	11,550,528	1.7
Pennsylvania	12,281,054	12,584,487	12,787,354	12,768,184	4.0
Tennessee	5,689,283	6,230,852	6,780,670	7,380,634	29.7
Virginia	7,078,515	8,010,245	8,917,395	9,825,019	38.8
West Virginia	1,808,344	1,829,141	1,801,112	1,719,959	-4.9
Source: USCB 2005					

Employment and Unemployment

Within the NCL area, the states with the largest labor force in both 2000 and 2007 are New York, Pennsylvania, and Ohio, which corresponds with the population rankings of these states. Louisiana and West Virginia experienced a loss in total labor force during this timeframe, corresponding to their declining or stable populations.

Unemployment rates for most of the fourteen states are similar to the national average in both 2000 and 2007 (See **Table 3.4-15**). The highest unemployment rates are seen in Mississippi, followed by Ohio and Kentucky. The lowest unemployment rates in the NCL area are in Virginia, followed by Delaware and Louisiana.

Table 3.4-15: Employment and Unemployment Statistics for the NCL Area

Geographic Area	Nov. 2000 Civilian Labor Force*	2000 Average Unemployment Rate (percent)	Nov. 2007 Civilian Labor Force*	Nov. 2007 Unemployment Rate (percent)	Change in Labor Force 2000 to 2007 (percent)
U.S.	**-**	**4.00**	**-**	**4.70**	**-**
Delaware	415.2	3.30	445.4	3.40	7.30
Indiana	3093.3	2.90	3,230.50	4.70	4.40
Kentucky	1989.7	4.20	2,057.20	5.00	3.40
Louisiana	2043.2	5.00	2,008.60	3.50	-1.70
Maryland	2857.1	3.60	3,021.80	3.70	5.80
Mississippi	1324.9	5.70	1,342.60	6.30	1.30
New Jersey	4234	3.70	4,522.10	4.20	6.80
New York	8991.5	4.50	9,524.10	4.60	5.90
North Carolina	3983.9	3.70	4,537.20	4.70	13.90
Ohio	5891.6	4.00	6,007.60	5.60	2.00
Pennsylvania	6002	4.20	6,336.10	4.20	5.60
Tennessee	2844.1	4.00	3,059.60	4.90	7.60
Virginia	3662.9	2.30	4,088.70	3.20	11.60
West Virginia	818.7	5.50	818	4.60	-0.10

* Values in Thousands
Source: USBLS 2001 and 2008

Income

Personal income statistics show that New York had the highest personal income of the 14 state area in both 1990 and 2006, followed by Pennsylvania, New Jersey, and Ohio (See **Table 3.4-16**). Average annual growth of personal income varied slightly among the states. The fastest personal income growth rate was seen in North Carolina, Tennessee, and Virginia. The slowest growth rate was seen in Ohio, Pennsylvania, West Virginia, and New York.

Table 3.4-16: Total Personal Income in Current Dollars by State

Geographic Area	1990 Personal Income	2006 Personal Income	Average Annual Growth Rate 1990-2006 (percent)
U.S.	$4,861,936,000	$10,966,808,000	5.2
Delaware	$14,343,329	$33,271,963	5.4
Indiana	$97,213,489	$203,457,453	4.7
Kentucky	$57,025,587	$125,000,728	5.0
Louisiana	$64,052,221	$134,504,614	4.7
Maryland	$109,685,959	$245,821,150	5.2
Mississippi	$33,754,245	$78,317,451	5.4
New Jersey	$190,753,441	$404,192,118	4.8
New York	$423,896,642	$848,744,137	4.4
North Carolina	$114,926,195	$286,404,526	5.9
Ohio	$203,630,112	$381,260,142	4.0
Pennsylvania	$234,334,315	$456,429,169	4.3
Tennessee	$81,700,422	$195,085,114	5.6
Virginia	$127,129,323	$302,381,894	5.6
West Virginia	$25,980,212	$51,038,834	4.3

In Thousands of Dollars. All state dollar estimates are in current dollars (not adjusted for inflation).
Source: USBEA 2007

In examining per capita income, Department of Commerce data show that personal income varies widely across the region (See **Table 3.4-17**). New Jersey has the highest per capita income, followed by New York, Maryland, Virginia, and Delaware. Several states had levels well below the national average of $36,629. Mississippi had the lowest per capita income levels in the 14 state region, followed by West Virginia and Kentucky. On a national level, New Jersey ranked 3rd in the country while West Virginia and Mississippi rank 49th and 50th, respectively, in national per capita income levels.

Table 3.4-17: Per Capita Income by State

Geographic Area	2000 Per Capita Income	2006 Per Capita Income	Average Annual Percent Change
U.S.	$29,843	$36,629	3.47
Delaware	$30,867	$38,984	3.79
Indiana	$27,130	$32,226	2.91
Kentucky	$24,411	$29,719	3.33
Louisiana	$23,079	$31,369	5.25
Maryland	$34,256	$43,774	4.17
Mississippi	$21,005	$26,908	4.21
New Jersey	$38,362	$46,328	3.19
New York	$34,895	$43,962	3.92
North Carolina	$27,067	$32,338	3.01
Ohio	$28,205	$33,217	2.76
Pennsylvania	$29,693	$36,689	3.59
Tennessee	$26,096	$32,305	3.62
Virginia	$31,085	$39,564	4.10

Geographic Area	2000 Per Capita Income	2006 Per Capita Income	Average Annual Percent Change
West Virginia	$21,898	$28,067	4.22
All state dollar estimates are in current dollars (not adjusted for inflation). Source: USBEA 2007			

Of the 14 states included in the NCL area, seven have poverty levels higher than the national average (See **Table 3.4-18**). Based on the most recent data available, Mississippi has the highest percent of its population below the poverty level, followed by Louisiana, West Virginia, Kentucky, Tennessee, and New York. States with the lowest poverty level include Maryland, New Jersey, and Virginia. All states except Maryland, West Virginia, and Louisiana showed an increase in the number of individuals below the poverty level between 2000 and 2005.

Table 3.4-18: Individuals Below Poverty Level by State

Geographic Area	2000 (percent)	2005 (percent)
U.S.	**12.2**	**13.3**
Delaware	9.3	10.4
Indiana	10.1	12.2
Kentucky	16.4	16.8
Louisiana	20.0	19.8
Maryland	9.3	8.2
Mississippi	18.2	21.3
New Jersey	7.9	8.7
New York	13.1	13.8
North Carolina	13.1	15.1
Ohio	11.1	13.0
Pennsylvania	10.5	11.9
Tennessee	13.5	15.5
Virginia	9.2	10.0
West Virginia	18.6	18.0
Source: USCB 2008		

Government Employment

Local and state government employment generally showed a consistent increase within all 14 states (see **Table 3.4-19**). North Carolina had the largest increase in state and local government employment between 1995 and 2005 at two-percent, two-thirds higher than the national average. Delaware, Kentucky, New Jersey, Tennessee, and Virginia also had an increase in individuals employed by state or local government higher than the national average. West Virginia had the smallest increase in the number of individuals employed by state or local government among the 14 states.

Table 3.4-19: Total Local and State Government Employment

Geographic Area	1995 Government Employment	2005 Government Employment	Average Annual Growth Rate 1995-2005 (percent)
U.S.	14,090,531	15,923,650	1.2
Delaware	41,279	47,114	1.3
Indiana	305,747	332,761	0.9
Kentucky	206,035	238,421	1.5
Louisiana	263,576	283,287	0.7
Maryland	252,816	278,497	1.0
Mississippi	172,368	188,707	0.9
New Jersey	437,174	501,643	1.4
New York	1,113,591	1,184,190	0.6
North Carolina	395,200	483,464	2.0
Ohio	567,185	620,466	0.9
Pennsylvania	521,411	576,511	1.0
Tennessee	272,878	321,954	1.7
Virginia	362,702	417,788	1.4
West Virginia	94,247	98,422	0.4
Source: USCB 2007b			

Environmental Justice

EO 12898 requires federal agencies to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations. Below is a set of tables that provides statewide information on minority and low income populations, as well as information specific to the population residing within the NCL area.

Of the 14 states included in the NCL area, West Virginia has the lowest overall minority population; whereas New York, Maryland, and Louisiana have the highest (see **Tables 3.4-20** through **3.4-22**). Within the NCL area specifically, a higher proportion of individuals are considered minority in North Carolina and Delaware relative to their respective statewide populations, whereas the NCL area in New York has a lower minority population relative to the rest of the state.

New Jersey and Maryland have the lowest low income populations statewide, whereas Mississippi, Louisiana, West Virginia, and Kentucky have the highest. The proportion of the population considered low income within the NCL area is similar relative to statewide numbers for the majority of the 14 states. However, North Carolina, Kentucky, and Mississippi have a higher proportion of their populations within the NCL area considered low income relative to their respective statewide populations, and New Jersey, Delaware, Tennessee, and Virginia

have a lower proportion of their populations within the NCL area considered low income relative to statewide numbers.

Table 3.4-20: Minority and Low Income Population within the NCL Area (DE-MD)

Demographic	Delaware	Indiana	Kentucky	Louisiana	Maryland
Total Population	15,526	198,448	573,573	439,323	418,353
White, Non-Hispanic	10,875	178,556	545,079	337,558	335,857
Hispanic or Latino	344	7,590	5,015	5,947	9,717
Black or African American	3,380	7,869	15,706	79,925	44,953
American Indian or Alaskan Native	30	398	925	7,327	663
Asian	589	1,584	2,179	3,685	20,636
Native Hawaiian or Other Pacific Islander	7	36	73	66	85
Some Other Race	29	126	301	397	589
Two or More Races	272	2,289	4,295	4,418	5,853
Total Minority	4,651	19,892	28,494	101,765	82,496
Total Poverty	1,351	20,490	142,680	111,661	38,959
Percent Minority	30.0	10.0	5.0	23.2	19.7
Percent Poverty	8.7	10.3	24.9	25.4	9.3
State Percent Minority	27.5	14.2	10.7	37.5	37.9
State Percent Poverty	11.3	10.7	21.4	24.6	10.4
Source: USCB 2000a,b, NAUS 2005b, 2006b and 2006c Poverty numbers based on 2001 Small Area Income and Poverty Estimates program data					

Table 3.4-21: Minority and Low Income Population within the NCL Area (MS-OH)

Demographic	Mississippi	New Jersey	New York	North Carolina	Ohio
Total Population	156,802	168,340	284,849	6,296	2,894,520
White, Non-Hispanic	107,884	147,452	263,597	1,480	2,703,796
Hispanic or Latino	2,393	5,110	7,270	28	36,727
Black or African American	45,066	5,671	6,131	4,731	95,690
American Indian or Alaskan Native	240	140	503	20	5,636
Asian	339	7,919	3,869	6	18,642
Native Hawaiian or Other Pacific Islander	21	42	61	1	494
Some Other Race	45	173	283	1	2,267
Two or More Races	814	1,833	3,135	29	31,268
Total Minority	48,918	20,888	21,252	4,816	190,724

Demographic	Mississippi	New Jersey	New York	North Carolina	Ohio
Total Poverty	44,052	10,639	41,991	1,530	382,671
Percent Minority	31.2	12.4	7.5	76.5	6.6
Percent Poverty	28.1	6.3	14.7	24.3	13.2
State Percent Minority	39.3	34.0	38.0	29.8	16.0
State Percent Poverty	26.2	9.2	14.2	16.9	12.8
Source: USCB 2000a,b, NAUS 2005b, 2006b and 2006c Poverty numbers based on 2001 Small Area Income and Poverty Estimates program data					

Table 3.4-22: Minority and Low Income Population within the NCL Area (PA-WV)

Demographic	Pennsylvania	Tennessee	Virginia	West Virginia
Total Population	1,718,007	230,964	1,062,943	1,006,320
White, Non-Hispanic	1,638,283	199,027	784,418	962,178
Hispanic or Latino	20,697	4,465	34,826	5,043
Black or African American	32,548	20,972	189,616	24,364
American Indian or Alaskan Native	1,830	533	2,636	1,802
Asian	11,144	3,252	32,664	4,265
Native Hawaiian or Other Pacific Islander	250	70	375	170
Some Other Race	1,122	181	1,570	529
Two or More Races	12,133	2,464	16,838	7,969
Total Minority	79,724	31,937	278,525	44,142
Total Poverty	204,721	37,815	71,021	224,350
Percent Minority	4.6	13.8	26.2	4.4
Percent Poverty	11.9	16.4	6.7	22.3
State Percent Minority	15.9	20.8	29.8	5.4
State Percent Poverty	12.6	18.5	13.6	21.8
Source: USCB 2000a,b, NAUS 2005b, 2006b and 2006c Poverty numbers based on 2001 Small Area Income and Poverty Estimates program data				

Housing

The issuance of the ITP does not specifically authorize projects that will significantly impact short or long term populations in a specific area, and there is no expectation that the issuance of the ITP would impact local or regional housing availability. However, site specific projects may need approvals or permits from local land use and/or state agencies. As such, potential impacts on local housing availability would be considered on a project-by-project basis, and may be

subject to conditions of approval that are outside the scope of this EIS. Given the nature of the covered activities anticipated under this ITP, any increases in employment within a local labor market are expected to be very minimal and would not result in significant changes in either population or housing. Accordingly, no specific mitigation measures are anticipated to offset impacts to population or housing.

Public Services

Public services typically include those services supported by government taxes, most notably public schools, police protection, and fire protection. Within the NCL area, hundreds of school districts, as well as city or rural (township) fire departments, and city, county, and state police departments potentially occur. The issuance of the ITP does not specifically authorize projects that would directly affect the capacity of existing schools in a particular area, or specifically tax the capacity of existing fire or police services, locally.

As specific projects are undertaken, depending upon the nature of the activity, local approvals and/or state level permits or review may be required. As such, potential impacts on public services would be considered on a project-by-project basis, and may be subject to conditions of approval that are outside the scope of this EIS. Examples may include preparing (prior to construction) an Emergency Response Plan addressing construction and operation safety issues and response procedures to emergencies and providing public notification of proposed construction activities, including timing of construction, to all local service providers within the immediate vicinity.

3.4.3 Transportation and Utilities

Transportation includes vehicular, rail and air travel networks including roads, highways, railroads, and airports. Traffic circulation refers to the movement of vehicles throughout a road or highway network. Utilities include water/sewer lines, electric transmission lines, and telecommunication lines.

The issuance of the ITP does not specifically authorize projects that would directly affect the capacity of the existing transportation infrastructure or utility systems within the 14 state NCL area. That said, site specific projects may need approval and/or encroachment permits from local governments, and some may also require additional state or federal level permits or review. Therefore, any potential site specific impacts on transportation or utilities would be considered on a project-by-project basis, and the approval of individual projects may be subject

to specific mitigation measures. Conditions of approval for transportation may include notification requirements and traffic control measures during construction. Mitigation related to utilities could potentially include efforts to avoid temporary construction-related disruptions in service, including advance coordination with service providers and scheduling work during low-demand periods. Other examples include communication with utility providers prior to construction to coordinate the relocation of utilities within an alternative right-of-way, if needed. Construction would be scheduled to minimize or avoid potential service interruptions. Below is a general description of the types of transportation and utilities located within the NCL area.

Railroads

There are approximately 1,677-miles of railroad and 53 unique railroad lines crossed within all states in the NCL area except North Carolina. The majority of lines have less than five-miles within the NCL area. CSX Transportation Incorporated and Norfolk Southern Railway Company are the two primary lines within the NCL area; making up just over 73-percent of the total. **Table 3.4-23** below show the ten railroad companies with the most miles of line within the NCL area.

Table 3.4-23: Major Railroads within the NCL Area

Primary Owner	States	Miles Crossed
CSX Transportation, Incorporated	DE/IN/KY/MD/NJ/OH/PA/TN/VA/WV	722.17
Norfolk Southern Railway Company	IN/KY/MD/MS/NJ/NY/OH/PA/VA	517.30
Wheeling and Lake Erie Railway Company	OH/PA/WV	54.11
Indiana and Ohio Railway Company	OH	47.52
Ashland Railway, Incorporated	OH	46.80
Buffalo and Pittsburgh Railroad, Incorporated	NY/PA	37.76
Union Pacific Railroad Company	LA	32.27
Columbus and Ohio River Railroad Company	OH	30.07
Canadian National Railway	IN/OH/MS	19.41
Kansas City Southern Railway Company	LA/MS	16.25
Source: NAUS 2005d		

Roads

There are innumerous federal, state, county, and local roadways crossed by the NCL area. Site specific projects that cross roadways will be required to comply with applicable local, state, or federal requirements, depending upon the nature of the activities undertaken. The bulleted list below provides a general overview, by state, of the federal and state roadways crossed in the NCL area (NAUS 1999).

- In **Delaware**, the NCL area crosses Interstate 495 and 95, two other numbered US Routes, and one other numbered State Route.

- In **Indiana**, the NCL area crosses Interstate 65 and Interstate 69, as well as six other numbered US Routes, and nine numbered State Routes.

- In **Kentucky**, the NCL area crosses Interstate 64 and Interstate 75, two named Parkways, 11 other numbered US Routes and 31 numbered State Routes.

- In **Louisiana**, the NCL area crosses Interstates 10, 20 and 49, as well as seven other numbered US Routes, and 26 numbered State Routes.

- In **Maryland**, the NCL area crosses Interstates 68, 70, 83, 270, and 795, seven other numbered US Routes, and 22 numbered State Routes.

- In **Mississippi**, the NCL area crosses Interstate 55, seven numbered US Routes, and 13 numbered State Routes.

- In **New Jersey**, the NCL area crosses Interstates 78, 295, and 287, the New Jersey Turnpike, four numbered US Routes, and five numbered State Routes.

- In **New York**, the NCL area crosses Interstates 81, 84, 97, the Pine Island Turnpike, Palisades Interstate Parkway, five numbered US Routes, and 24 numbered State Routes.

- The NCL area crosses no major federal or state roads in **North Carolina**.

- In **Ohio**, the NCL area crosses Interstates 70, 71, 75, 76, 77, 80, 90, 270, 470, 475, 480, 20 other numbered US Routes, and more than 75 numbered State Routes.

- In **Pennsylvania**, the NCL area crosses Interstates 70, 76, 78, 79, 80, 81, 83, 84, 95, 17 numbered US Routes, and more than 80 numbered State Routes.

- In **Tennessee**, the NCL area crosses Interstates 24, 40, and 65, the Natchez Trace Parkway, seven numbered US Routes, and 20 numbered State Routes.

- In **Virginia**, the NCL area crosses Interstates 64, 66, 81, 95, 295, and 464, as well as 28 numbered US Routes, and 20 numbered State Routes.

- In **West Virginia**, the NCL area crosses Interstate 64, 68, 70, 77, and 79, as well as 15 numbered US Routes, and 34 numbered State Routes.

Airports

There are five airports located within the NCL area and 15 others that are within a three-mile radius of the NCL area, including two major international airports (Washington Dulles International and Pittsburgh International) (NAUS 2001a). The five airports located directly within the NCL area include:

- Bedford County Airport, Bedford County, PA
- Lancaster Airport, Lancaster County, PA
- Lima Allen County Airport, Allen County, OH
- Tri-State/Milton J. Ferguson Field, Wayne County, WV
- Yeager Airport, Kanawha County, WV

The fifteen other airports within a three-mile radius of the NCL area include:

- Abbeville Chris Crusta Memorial Airport, Vermillion Parish, LA
- Altoona-Blair County Airport, Blair County, PA
- Binghamton Regional/Edwin A. Link Field, Broome County, NY
- Bradford Regional Airport, McKean County, PA
- Carl R. Keller Field, Ottawa County, OH
- Du Bois-Jefferson County Airport, Jefferson County, PA
- Elmira/Corning Regional Airport, Chemung County, NY
- Geauga County Airport, Geauga County, OH
- Greater Cumberland Regional Airport, Mineral County, WV
- Griffing Sandusky Airport, Erie County, OH

- Hagerstown Regional-Richard A. Henson Field, Washington County, MD
- Morristown Municipal Airport, Morris County, NJ
- Pittsburgh International Airport, Allegheny County, PA
- Port Columbus International Airport, Franklin County, OH
- Salem Airpark, Inc., Mahoning County, OH
- Washington Dulles International Airport, Loudoun County, VA

Utilities

Information on locations of utility corridors and natural gas pipelines has been protected since the events of September 11, 2001. FERC licensing and permitting processes require that companies provide pipeline corridor locations associated with their applications on the company web sites. For the NiSource Covered Lands which is the subject of this EIS, the pipeline information is available at: www.ngts.com. Consolidated information on the location of utility corridors in the NCL is no longer available; however, 1993 data (ESRI 1993) show that the majority of transmission lines within the NCL area are located in Ohio, followed by West Virginia, and Pennsylvania (see **Table 3.4-24**).

Table 3.4-24: Miles of Transmission Line within the NCL Area

State	Miles
Indiana	31.95
Kentucky	167.82
Louisiana	99.12
Maryland	100.05
Mississippi	24.47
New Jersey	19.54
New York	86.44
North Carolina	1.05
Ohio	917.46
Pennsylvania	366.95
Tennessee	70.67
Virginia	137.73
West Virginia	774.95
Source: ESRI 1993	

3.4.4 Cultural Resources

The National Historic Preservation Act (NHPA) is a comprehensive law that creates a framework for managing cultural resources in the United States. The law expands the National Register of Historic Places (NRHP); establishes State Historic Preservation Officers (SHPOs),

Tribal Historic Preservation Officers (THPOs), and the Advisory Council on Historic Preservation (ACHP); and provides a number of mandates for federal agencies. Section 106 of the NHPA directs all federal agencies to consider the effects of their actions and authorizations on historic properties, and afford the ACHP an opportunity to comment on the undertaking. Historic properties are prehistoric and historic districts, sites, buildings, structures, objects, and sites of traditional and cultural importance to a Native American tribe, which are included in, or eligible for, the NRHP. The process for complying with Section 106 of the NHPA is outlined in the ACHP implementing regulations at 36 CFR 800.

In addition, other laws, regulations, policies, and EOs pertaining to cultural resources apply to projects undertaken on federal land or which require federal permitting or funding. These include EO 11593, "Protection and Enhancement of the Cultural Environment" (1971); Archaeological and Historic Preservation Act (1974) (AHPA); Archaeological Resources Protection Act of 1979 (ARPA); American Indian Religious Freedom Act of 1978 (AIRFA); Native American Graves Protection and Repatriation Act of 1990 (NAGPRA); EO 13007, "Indian Sacred Sites" (1996); EO 13287, "Preserve America" (2003); and the Federal Land Policy and Management Act of 1976 (FLPMA).

Compliance with Section 106 will occur within the NCL as projects are reviewed for site-specific resource issues. Areas that have been maintained within the pipeline ROW have been reviewed for archeological resource issues over the life of the pipeline operation. As new activities such as expansion projects occur, the areas will be reviewed for compliance with the NHPA. NiSource annual project planning includes consultation with State Historic Preservation Officers for clearance or completion of any required compliance documentation (e.g., Phase I surveys). In the event that a site-specific project requires further planning relative to impacts on historic or cultural resources, NiSource serves as the non-Federal representative to complete those plans. For the Federal agency, and for agencies cooperating on this EIS, future NEPA documentation will include evaluation of any historic or cultural preservation concerns as a result of NiSource planning and providing the information.

From a practical standpoint, the extent to which NiSource is able to document previous NHPA clearance for maintenance activities, such review will be completed. Where new ground disturbance is anticipated, such as looping of the existing pipeline, NiSource must assure that their Federally permitted activities are in full compliance with NHPA and other applicable Federal and state law governing historic and cultural resource preservation. Specific NEPA

analysis of historic and cultural resources within the NCL is not completed within this EIS due to the scale of the project and lack of specific information regarding the on-the-ground impacts anticipated over time.

The NCL "affected environment" is, generally, disturbed land where historic and cultural concerns have been addressed in the past 50+ years of pipeline construction and operation. NiSource has, in practice, exercised caution when it has encountered any areas that appear to contain any artifacts, bones, etc. The procedures for addressing these types of resources have evolved over the last decades and all known historic and cultural sites that have been protected through the NiSource planning process. In the event that an area appears to have historic resource concerns that were previously unknown, the activity ceased until an archeologist could be consulted. At this time, the Gala compressor station (Virginia) is one of the sites that included planning in a manner to preserve this type of resource. In this case, NiSource operates the compressor station under terms of an agreement with the Virginia SHPO.

Table 3.4-25 below provides examples of federal and state-specific historic review/compliance statutes that may apply depending upon the nature of the project.

Table 3.4-25: Federal and State Historic Review/Compliance Requirements

State	Federal/State Historic Review Requirements
Delaware	NHPA - Section 106; Delaware Code, Title 7, Chapter 54
Indiana	NHPA - Section 106
Kentucky	NHPA - Section 106
Louisiana	NHPA - Section 106
Maryland	NHPA - Section 106; Article 83B Section 5-617 and 5-618 of the Maryland Code
Mississippi	NHPA - Section 106; Antiquities Act of Mississippi
New Jersey	NHPA - Section 106; New Jersey Register of Historic Places Act
New York	NHPA - Section 106; Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law of 1980; State Environmental Quality Review Act (SEQRA) of 1978
North Carolina	NHPA - Section 106; General Statute 121-12
Ohio	NHPA - Section 106
Pennsylvania	NHPA - Section 106; Title 37 - Pennsylvania History Code
Tennessee	NHPA - Section 106
Virginia	NHPA - Section 106; Virginia Environmental Impacts Report Act (10.1-1188)
West Virginia	NHPA - Section 106; §29-1-8. Historic preservation section
Source: See web-pages listed below	

The following websites can be referenced for many of the state-specific Cultural Resources rules and regulations:

- Delaware Division of Historical and Cultural Affairs: http://history.delaware.gov/preservation/protection/sec106.shtml
- Indiana Division of Historic Preservation and Archaeology: http://www.state.in.us/dnr/historic/106statereview.html
- Kentucky Heritage Council: http://www.state.ky.us/agencies/khc/section106.htm
- Louisiana Division of Historic Preservation: http://www.crt.state.la.us/hp/sect106.htm
- Maryland Historic Trust: http://www.marylandhistoricaltrust.net/projrev.html
- Mississippi Department of Archives and History: http://www.mdah.state.ms.us/hpres/fedstatereview.php
- New Jersey Historic Preservation Office: http://www.state.nj.us/dep/hpo/2protection/protect.htm#106
- New York Historic Preservation Field Services Bureau: http://www.nysparks.com/shpo/environ/forms/PRCoverForm.pdf
- North Carolina State Historic Preservation Office: http://www.hpo.dcr.state.nc.us/er.htm
- Ohio Historic Preservation Office: http://www.ohiohistory.org/resource/histpres/services/106rev.html
- Pennsylvania Historical and Museum Commission: http://www.portal.state.pa.us/portal/server.pt?open=512&mode=2&objID=1426
- Tennessee Historical Commission: http://www.tennessee.gov/environment/hist/federal/sect106.shtml
- Virginia Department of Historic Resources: http://www.dhr.virginia.gov/homepage_general/forms.htm

- West Virginia Department of Culture and History: http://www.wvculture.org/shpo/review.html

3.4.5 Recreation

This section describes the amount and type of land in public ownership (federal, state, local) by state within the NCL area. Data on visitation rates for specific federal lands are provided when available. This section then examines recreational uses on federal lands owned by the USFS, NPS, USFWS, and USACE.

Recreation Lands

As shown in **Table 3.4-26**, nearly all land within the NCL area is under private ownership, with the remaining land under local, state, or federal ownership. Lands that are under local, state, or federal ownership are considered public lands for the purpose of this analysis and as such are open to some level of recreational use.

Table 3.4-26: Aggregate Land Ownership Type for the NCL Area

Owner	Acres	Percent
Federal	243,856	2.50
Local	29,129	0.30
NGO	1,594	0.02
Private	9,144,863	93.60
State	349,773	3.58
Water	1,206	0.01

Source: State Based Ownership Data, NAUS 2006a, NPS 2007a, USFS 2006a

The majority of publicly accessible lands are concentrated in Ohio, West Virginia, Virginia, and Pennsylvania (**Table 3.4-27**). In total, the NCL area includes 243,856 acres of land under federal control. Several states, including Delaware, Indiana, New Jersey, New York, and North Carolina have no federal lands within the NCL area.

The NCL area encompasses nearly 350,000 acres state-owned lands. Nearly 47 percent of state lands are located in Pennsylvania, while 42 percent is located in Maryland, West Virginia, and Ohio, collectively. Several states have no state lands within the NCL area, including North Carolina and Delaware. State lands typically include state parks, wildlife management areas and state forests.

Lands that are identified as owned by local governments are typically local parks and nature preserves. Individual parcels are generally 100 acres or less. The majority of properties owned by local governments are located in Ohio and Maryland.

Table 3.4-27: Public Land Ownership in the NCL Area

State	Total Acres in NCL Area	Federal Acres	State Acres	Local Acres
Delaware	1,137	-	-	72
Indiana	88,599	-	751	423
Kentucky	499,418	5,421	6,526	474
Louisiana	485,922	2,891	9,919	-
Maryland	372,218	476	66,814	6,376
Mississippi	142,154	3,438	1,037	-
New Jersey	43,204	-	1,356	437
New York	185,301	-	11,280	-
North Carolina	929	-	-	-
Ohio	3,219,472	126,595	38,524	18,389
Pennsylvania	1,677,115	17,113	163,081	2,192
Tennessee	122,865	713	4,960	-
Virginia	453,837	51,833	2,379	669
West Virginia	2,478,251	35,378	43,146	96
Source: State Based Ownership Data, NAUS 2006a, NPS 2007a, USFS 2006a				

USFS Lands

USFS data from 2005 show that the six National Forests within the NCL area had estimated site visitation rates ranging from a low of approximately 458,000 in Wayne NF in Ohio, to a high of 4.17 million in the George Washington - Jefferson NF (see **Table 3.4-28**).

Table 3.4-28: Estimated 2005 Site Visits to National Forests in the NCL Area

USFS Area	States	Acres	Estimated Site Visits 2005
Wayne NF	OH	71,874	458,000
Monongahela NF	WV	57,046	1,146,000
Daniel Boone NF	KY	39,178	3,396,000
George Washington – Jefferson NF	VA-WV	35,138	4,168,000
Allegheny NF	PA	23,498	1,616,000
National Forests of Mississippi	MS	3,114	3,166,000
Source: USFS 2006c			

Localized participation rates for a series of activities around USFS lands impacted by the NCL area were estimated using data from a recent (2000-2004) National Survey on Recreation and the Environment conducted by the USFS Southern Research Station. Below are estimated

participation rates in selected activities for the local population aged 16 and older who live within a 75 mile radius of the six USFS lands (see **Table 3.4-29**).

Overall, participation rates for each activity are fairly similar among all six forests. Walking for pleasure is the most popular activity. Viewing/photographing natural scenery, driving for pleasure, picnicking, and viewing/photographing other wildlife are among the top five activities for all USFS lands, and hunting is the least popular activity.

Table 3.4-29: Participation Rates in Outdoor Activities Around USFS Lands

Outdoor Recreation Activities	Wayne NF (percent)	Monongahela NF (percent)	Daniel Boone NF (percent)	George Washington-Jefferson NF* (percent)	Allegheny NF (percent)	Holly Springs – MS NF (percent)
Visiting a wilderness or primitive area	35.0	36.6	38.2	36.5	34..2	27.5
Day hiking	34.8	35.4	36.9	38.2	35.4	20.2
Viewing/photographing natural scenery	64.4	65.3	61.8	63.3	66.7	50.9
Viewing/photographing other wildlife	51.9	53.6	50.8	50.4	52.8	39.3
Freshwater fishing	33.4	32.3	38.0	30.9	28.6	38.6
Hunting	14.4	17.3	15.5	13.5	14.6	18.2
Boating	37.6	37.7	38.1	38.3	39.9	33.7
Swimming in a lake/stream, etc.	42.5	44.8	41.3	43.4	49.2	34.2
Picnicking	62.3	63.1	61.4	62.2	65.5	50.5
Walking for pleasure	86.7	87.3	83.3	86.5	87.2	83.8
Driving for pleasure	62.2	63.1	68.8	65.3	60.8	62.5
*Average of Both NF area statistics - Source: USFS 2006b						

NPS Lands

The NPS Social Science Program provides visitation estimates for each of the properties under its management, including summaries by state. In examining the 14 state NCL area, the highest visitation rates to NPS lands were found in Virginia, followed by North Carolina, and New York. Delaware has no NPS lands (see **Table 3.4-30**).

Table 3.4-30: Total Visits to NPS Lands by State

State	NPS Recreation Visits 2006
Delaware	--
Indiana	2,190,492
Kentucky	1,924,683
Louisiana	333,508
Maryland	3,249,642
Mississippi	6,016,266

State	NPS Recreation Visits 2006
New Jersey	5,708,286
New York	15,154,997
North Carolina	20,091,486
Ohio	2,704,686
Pennsylvania	8,842,235
Tennessee	7,758,199
Virginia	22,944,011
West Virginia	1,737,487
Total	110,579,323
Source: NPS 2007c	

Table 3.4-31 shows the area and number of visitors to 13 unique NPS lands within the NCL area between 1996 and 2006. Visitation rates over the last decade show that the most visited NPS land in the NCL area has been the Natchez Trace Parkway and National Scenic Trail (NST).

Table 3.4-31: Visits to NPS Lands within the NCL Area

National Park Service Lands	State(s)	Acres	Visitation 1996	Visitation 2000	Visitation 2006
Bluestone National Scenic River (NSR)	WV	550	64,651	51,738	46,093
Cedar Creek and Belle Grove Historical Park	VA	893	n/a	n/a	n/a
Chesapeake and Ohio Canal NHP	MD-WV	7,269	904,509	3,115,654	3,039,178
Delaware Water Gap NRA	PA-NJ	2,344	4,657,735	4,900,745	5,254,216
Friendship Hill National Historic Site (NHS)	PA	545	19,228	29,913	25,636
Gettysburg National Military Park (NMP)	PA	646	1,632,720	1,542,184	1,666,365
Green Springs NHL District	VA	3,505	n/a	n/a	n/a
Indiana Dunes National Lakeshore (NL)	IN	91	1,526,166	1,820,228	1,938,132
Manassas NBP	VA	1,307	725,086	692,006	674,851
Natchez Trace Parkway and NST	MS-TN	268	6,088,610	5,737,183	5,713,583
Petersburg National Battlefield	VA	781	171,312	171,009	152,889
Shenandoah NP	VA	4,402	1,571,019	1,419,579	1,076,150
Upper Delaware SRR	NY-PA	2,871	494,267	276,178	276,178
Total			17,855,303	19,756,417	19,863,271
Source: NPS 1997, 2001 and 2007c					

The 444 mile Natchez Trace Parkway commemorates an ancient trail that connected southern portions of the Mississippi River, through Alabama, to salt licks in central Tennessee (NPS 2007b). The Old Natchez Trace NST commemorates a 500-mile footpath that ran through Choctaw and Chickasaw lands connecting Natchez, Mississippi to Nashville, Tennessee (NPS 2006). The second most popular NPS lands include the Delaware Water Gap NRA and the Chesapeake and Ohio Canal NHP. The Delaware Water Gap NRA is a 40 mile water trail that

passes through forested mountains and the "Water Gap" of the Middle Delaware River (NPS 2008b). The Chesapeake and Ohio Canal NHP preserves the U.S. transportation and canal-era history along the Potomac River (NPS 2008a). Gettysburg NMP, Indiana Dunes NL, and Shenandoah NP are also popular areas, with over a million visits annually.

***USFWS Lands**:*

There are six NWRs within the NCL area. Some of the larger refuges include the following:

Grand Cote NWR provides valuable waterfowl habitat in the Mississippi/Red River floodplain as part of the North American Waterfowl Management Plan. The 6,000-acre refuge, located in central/north central Louisiana, hosts approximately 10,000 visitors annually (USFWS 2008c).

Cameron Prairie NWR in southwest Louisiana was established to preserve and protect wintering waterfowl and their habitat. It contains 9,621 acres of fresh marsh, coastal prairie, and old rice fields (currently moist soil units). The refuge is located at the convergence of two major flyways. Approximately 30,000 people visit the refuge annually (USFWS 2008a).

The Canaan Valley NWR was established in 1994 to preserve the unique wetlands and uplands of a high elevation region in West Virginia. Canaan Valley contains the largest freshwater wetland area in West Virginia and the central and southern Appalachians (USFWS 2008b).

The Great Dismal Swamp NWR, located in southeastern Virginia and northeastern North Carolina, includes 111,000 acres of forested wetlands and Lake Drummond (USFWS 2008d).

***USACE Lands**:*

The USACE manages several sites within the NCL area. Some of the larger properties include Old Hickory Lake and Cheatham Lake in Tennessee, and Mohawk Reservoir and Charles Mill Lake in Ohio. Both Old Hickory Lake and Cheatham Lake are located near Nashville and are popular destinations for fishing, hunting, camping, picnicking, boating, canoeing, and hiking for millions of visitors annually (USACE 2008a). The Mohawk Dam/Reservoir was built along with 13 other dams authorized by the Flood Control Act of 1938 to control flooding within the Muskingum River watershed. The area is available for boating and fishing. Charles Mill Lake is located on the Black Fork of the Mohican River and is a popular area for boating and fishing (USACE 2008b).

Recreation Participation

Table 3.4-32 below shows statewide participation rates in wildlife-associated recreation, including fishing, hunting, and wildlife watching. In total, approximately 37 percent of the U.S. angling population 16 years and older fished within the NCL area. Most anglers occurred in North Carolina, Ohio, and New York and the fewest occurred in Delaware and West Virginia. Approximately 39 percent of hunters in the U.S. 16 years or older hunted within the NCL area with the most hunters in Pennsylvania and the fewest in Delaware and New Jersey. The most popular recreational activity is wildlife watching. Approximately 31 percent of the total U.S. population participated in some form of wildlife watching. Within the NCL area, the greatest number of participants occurs in Pennsylvania, Ohio, and New York.

Table 3.4-32: Participation in Wildlife-Associated Recreation – 2006

State	Total Anglers, Residents and Nonresidents	Total Hunters, Residents and Nonresidents	Wildlife Watching, Total Participants
US Total	29,952	12,510	71,132
Delaware	159	42	212
Indiana	768	272	1,825
Kentucky	721	291	1,341
Louisiana	702	270	712
Maryland	645	161	1,334
Mississippi	546	304	618
New Jersey	654	89	1,537
New York	1,153	566	3,548
North Carolina	1,263	304	2,267
Ohio	1,256	500	3,379
Pennsylvania	994	1,044	3,638
Tennessee	871	329	1,966
Virginia	858	413	2,126
West Virginia	376	269	585
* Numbers in Thousands of Participants - Source: USFWS 2006a			

3.4.6 Visual Resources

Visual resources include natural or human made features that make up the aesthetic quality of a particular area. These features may be landforms, water resources, vegetation, or manufactured in form, and make up the overall visual impression in a certain area. Specific lands or resources that would constitute potentially sensitive visual resources within the NCL area include lands owned by the NPS (**see Table 3.4-31**) or USFS (**see Table 3.4-28**), as well as Wild and Scenic Rivers (WSR), and National Scenic Byways (NSB), All-American Roads

(AAR), and state-designated scenic byways. Other federal lands of note within the NCL area include the Appalachian Trail and the Laurel Forks Wilderness Area within the Monongahela NF in West Virginia. The Appalachian Trail is managed cooperatively by the NPS, the Appalachian Trail Conservancy, a number of local clubs, the USFS, and other public land managing agencies. The Appalachian Trail is crossed by the NCL area eight times; twice in Shenandoah NP, once in the in Delaware Water Gap NRA, and five times on other, non-federal lands. The Laurel Forks Wilderness Area has separate and more stringent requirements under the Wilderness Act of 1964 (Public Law 88-577).

The issuance of the ITP does not specifically authorize projects that would directly affect the quality of visual resources within the NCL area. However, as specific projects are undertaken local, state, or federal level permits or review may be required depending upon the nature of the activity. As such, potential impacts on visual resources would be considered on a project-by-project basis, and may be subject to conditions of site-specific approval. Below is a general description of the types of visually sensitive lands and resources within the NCL area.

National Park Service Lands

Table 3.4-31 shows that 13 unique NPS lands are crossed in nine different states by the NCL area. Resources include about 91 acres of the Indiana Dunes National Lakeshore in Indiana, 4,402 acres of the Shenandoah NP in Virginia, and over 7,200 acres of the Chesapeake and Ohio Canal NHP.

U.S. Forest Service Lands

USFS data shows that the six National Forest areas are directly crossed by the NCL area (see **Table 3.4-28**). The Wayne NF in Ohio is the largest area crossed by the NCL at nearly 72,000 acres, followed by the Monongahela NF in West Virginia.

Scenic Byways

Scenic Byways include roadways nationally designated by the USDOT Federal Highway Administration (NSBs or AARs) based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. The NSB Program was established under the Intermodal Surface Transportation Efficiency Act of 1991, and has been reauthorized under the Transportation Equity Act for the 21st Century, as well as the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005. Many states also have passed state legislation authorizing the designation of state-level byways that are of statewide

significance due their archaeological, cultural, historic, natural, recreational, and scenic qualities.

There are 10 states in the NCL area that have federally designated byways and/or state designated byways. **Table 3.4-33** provides a breakdown of these byways on a state-by-state basis.

Table 3.4-33: Scenic Byways within the NCL Area

State	Name	Designation	Miles
Kentucky	Boone Creek Scenic Byway	State	0.1
	Cordell Hull Highway	State	1.1
	Country Music Highway	NSB, State	22.7
	Cumberland Cultural Heritage Highway	State	11.4
Louisiana	Bayou Teche Scenic Byway	State	26.4
	Bienville Trace Scenic Byway	State	17.0
	Colonial Trails Scenic Byway	State	4.8
	Creole Nature Trail	NSB, State	6.3
	Jean Lafitte Scenic Byway	State	12.6
	River Road Scenic Byway	State	2.7
	Wetlands Cultural Trail	State	23.4
	Zydeco Cajun Prairie Scenic Byway	State	12.8
Maryland	Falls Road	State	1.4
	Historic National Road - Maryland	NSB, State	44.5
	Horses and Hounds Scenic Byway	State	2.0
	Mason and Dixon Byway	State	2.4
	Mountain Maryland Byway	State	36.8

State	Name	Designation	Miles
Mississippi	Great River Road - Mississippi	Other	1.1
	Lower Mississippi Great River Road	NSB	0.1
	Mississippi Delta Great River Road	State	1.0
New York	Upper Delaware Scenic Byway (Route 97)	State	5.5
Ohio	Amish Country Byway	NSB, State	10.5
	Covered Bridge Scenic Byway	USFS	6.8
	Drovers' Trail Scenic Byway	State	13.7
	Gateway to Amish Country	State	24.1
	Historic National Road - Ohio	NSB, State	27.2
	Jefferson Township Scenic Byway	State	5.4
	Lake Erie Coastal Ohio Trail	NSB, State	0.9
	Maumee Valley Scenic Byway	State	3.9
	Morgan County Scenic Byway	State	1.6
	Ohio & Erie Canalway	NSB, State	2.3
	Ohio Lincoln Highway Historic Byway	State	93.3
	Ohio River Scenic Byway	NSB	99.3
	Tappan-Moravian Trail Scenic Byway	State	7.1
	Wally Road Scenic Byway	State	5.8
	Welsh Scenic Byway	State	5.0
Pennsylvania	Brandywine Valley Scenic Byway	State	7.4
	Bucktail Trail	State	2.9
	High Plateau Scenic Byway	State	16.1
	Historic National Road - Pennsylvania	NSB, State	16.4
	Kinzua Bridge Byway	State	0.8
	Laurel Highlands Scenic Byway	State	0.5
Tennessee	Natchez Trace Parkway	NSB, USFS, NPS	3.1
Virginia	Old Georgetown Pike	State	1.5
	Skyline Drive	NSB, NPS	3.3
West Virginia	Cheat River Byway	State	14.1
	Coal Heritage Trail	NSB, State	6.5
	Farm Heritage Road	State	9.9
	Historic National Road - West Virginia	NSB	4.9
	Little Kanawha Parkway	State	2.2
	Midland Trail	NSB, State	28.6
	Northwestern Turnpike	State	28.0
	Ohio Lincoln Highway Historic Byway	State	0.5
	Old Route 7 Byway	State	27.3
	Rich Mountain Backway	State	2.2
	Staunton-Parkersburg Turnpike	NSB, State	9.5
Source: NSB Program unpublished data a,b			

Wild and Scenic Rivers

The Wild and Scenic Rivers Act was passed on October 2, 1968 to protect rivers with outstanding scenic, natural, historic, cultural, and recreational characteristics, and to protect

their free-flowing condition. This Act prohibits federal funding for dams or water projects that would adversely affect river values, requires a management plan to be developed for rivers in the system to address overall management and resource protection, development, and recreation. Management oversight of these rivers is varied and can include federal, state, and local partners depending upon the specific river segment designated.

As of 2006, the WSR system contained 165 rivers nationally (including Puerto Rico) covering approximately 11,000 miles (USFWS 2007a). There are eight segments of rivers designated as Wild and Scenic totaling just over 25 miles within the NCL area. **Table 3.4-34** provides a listing of the specific WSR segments and mileages within the NCL area.

Table 3.4-34: Wild and Scenic Rivers within the NCL Area

Name	States	Miles
Big and Little Darby Creek WSR	OH	5.11
Bluestone NSR	WV	.05
Clarion WSR	PA	2.67
Little Beaver Creek WSR	OH	2.19
Little Miami WSR	OH	1.35
Upper Delaware SRR	NY/PA	1.09
Musconetocong WSR	NJ	11.65
Lower Delaware WSR	NJ/PA	1.48
Source: USFWS 2006b, 2007b,d, USGS 2001		

3.4.7 Noise

Noise refers to a sound or sounds that are loud, unpleasant, unexpected, or undesired. Human responses to noise can vary depending on the time of day, sensitivity of the receptor (homes, schools, hospitals, etc.), the distance between the source of noise and the receptor, and the type of noise.

Sound is measured in decibels (dB), and is based on a logarithmic scale. This means that a 10dB increase corresponds to a 100 percent increase in perceived sound or noise. An A-weighted decibel scale (dBA) is commonly utilized to measure environmental noise or potential noise pollution, as it more effectively measures sounds that are perceptible to the human ear.

Sound levels are often reported in terms of day-night average sounds level (Ldn). The Ldn is the average noise level over a 24-hour period with the noise between the hours of 10PM and 7AM artificially increased by 10dB to compensate for the increase in sensitivity to noise events and the lower level of background noise during these night-time hours. An Ldn of 55dB is

recognized by many federal agencies, including the EPA, as an outdoor limit for protecting public health and welfare in residential areas. An Ldn of 65dB is the noise level at which residential land use becomes questionable for structures with average or below average acoustic insulation. An Ldn exceeding 75dB is considered by many federal agencies to be unacceptable for residential areas (EPA 1974).

Overall, the issuance of the ITP does not specifically authorize projects that would directly affect potential noise receptive areas within a particular area of the NCL. However, as specific projects are undertaken, depending upon the nature of the activity, local noise ordinances, state noise regulations, or federal level permits or review may be required. As such, potential impacts on noise receptive areas would be considered on a project-by-project basis, and may be subject to additional conditions of approval during future NEPA actions, tiered or otherwise.

Under the NGA, FERC regulations (18 CFR 380.12) require that a noise resource report be developed involving compressor facilities at new or existing stations and for all new liquid natural gas facilities. The purpose of this report is to identify effects of the project and mitigations for those effects (FERC 1987). FERC requires that new stations or new facilities at existing stations must not exceed an Ldn of 55dBA at any pre-existing noise-sensitive area (such as schools, hospitals, or residences). Specifically, according to 18 CFR § 380.12, environmental reports for NGA applications must:

- *Quantitatively describe existing noise levels at noise-sensitive areas, such as schools, hospitals, or residences and include any areas covered by relevant state or local noise ordinances.*
    - *Report existing noise levels as the Leq (day), Leq (night), and Ldn and include the basis for the data or estimates.*
    - *For existing compressor stations, include the results of a sound level survey at the site property line and nearby noise-sensitive areas while the compressors are operated at full load.*
    - *For proposed new compressor station sites, measure or estimate the existing ambient sound environment based on current land uses and activities.*
    - *Include a plot plan that identifies the locations and duration of noise measurements, the time of day, weather conditions, wind speed and direction, engine load, and other noise sources present during each measurement.*
- *Provide a quantitative estimate of the impact of the project on noise levels at noise-sensitive areas, such as schools, hospitals, or residences.*
- *Include step-by-step supporting calculations or identify the computer program used to model the noise levels, the input and raw output data and all assumptions made when running the model, far-field sound level data for maximum facility operation, and the source of the data.*
- *Include sound pressure levels for unmuffled engine inlets and exhausts, engine casings, and cooling equipment; dynamic insertion loss for all mufflers; sound transmission loss*

for all compressor building components, including walls, roof, doors, windows and ventilation openings; sound attenuation from the station to nearby noise-sensitive areas; the manufacturer's name, the model number, the performance rating; and a description of each noise source and noise control component to be employed at the proposed compressor station. For proposed compressors the initial filing must include at least the proposed horsepower, type of compression, and energy source for the compressor.

- *Far-field sound level data measured from similar units in service elsewhere, when available, may be substituted for manufacturer's far-field sound level data.*
- *If specific noise control equipment has not been chosen, include a schedule for submitting the data prior to certification.*
- *The estimate must demonstrate that the project will comply with applicable noise regulations and show how the facility will meet the following requirements:*
    - *The noise attributable to any new compressor station, compression added to an existing station, or any modification, upgrade or update of an existing station, must not exceed a day- night sound level (Ldn) of 55 dBA at any pre-existing noise-sensitive area (such as schools, hospitals, or residences).*
    - *New compressor stations or modifications of existing stations shall not result in a perceptible increase in vibration at any noise-sensitive area.*
- *Describe measures and manufacturer's specifications for equipment proposed to mitigate impact to noise quality, including installation of filters, mufflers, or insulation of piping and buildings, and orientation of equipment away from noise-sensitive areas.*